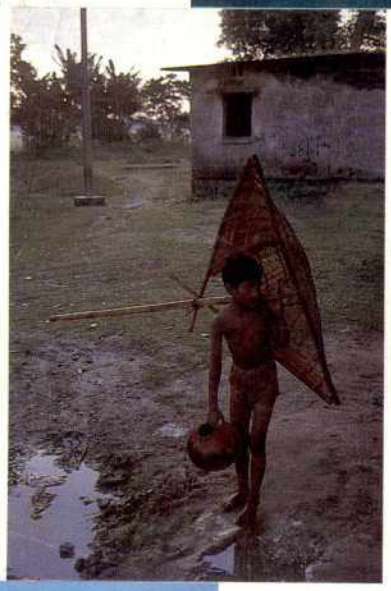
FAP 1

Fisheries Studies
and
Pilot Project

FINAL REPORT

(Draft)

JUNE 1994



Supporting Volume
No. 12

VILLAGE STUDY

CHALAN BEEL POLDER B

Prepared for the Government of Bangladesh

FAP 17

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** Draft **

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SUMMARY OF FINDINGS

1. Impacts of FCD/I on fisheries resources

The Chalan Beel Polder 'B' scheme has had effects on fisheries both inside and outside the protected area. Inside, floodwaters from the Atrai River and rainfall now drain more slowly due to drainage congestion. Water areas in Haribhanga *beel* hold water for **relatively** longer over a larger area. This encourages **more** fishing inside the embankment than outside. The excavation of *kua* (fish-pits) in the *beel* has developed more quickly in Haribhanga *beel*, due to the more controlled environment and the longer holding of water.

By contrast with the situation inside the embankment, siltation in Chalan *beel*, combined with intensive withdrawal of surface water resources during the dry season for *boro* irrigation, has led to most of the previously permanent waterbodies in the *beel* area becoming seasonal. The area drains very rapidly during the flood recession and there are relatively few overwintering habitats remaining for fish. This siltation, and its' negative effects on fisheries are partly the result of flood control schemes in the Atrai Basin, including Chalan Beel Polder 'B'.

2. Impacts of FCD/I on livelihoods in general

Incomes are higher in all landholding categories in Durgapur, inside the Chalan Beel Polder 'B' embankment. For the landless in the community, this is mostly due to improved communications along the embankment which now connects the village with the union headquarters at Biaghat and makes communications with the district town of Gurudespur much easier. Most of the improved income among the landless in Durgapur comes from non-agricultural labour and work in small trading. The village currently **exports** agricultural labour.

3. Fisheries in livelihood strategies

Fishing for income is not widespread in non-fishing communities, mainly because of the strong social stigma associated with fishing. When people do take up fishing, it tends to become an important element in their livelihood strategies. Relatively few households get "occasional" income from fishing. Fishing purely for consumption purposes, particularly in the Atrai River and nearby *khal*, is widespread but the contribution it makes to overall household livelihoods is limited.

Small landowners are more likely to be involved in seasonal fishing for income. The development of *kua* (fish-pits) in lowland areas as a in lowland areas a complement to HYV *boro* cultivation is particularly beneficial to this category. *Kua* are better managed inside the Polder 'B' embankment where landowners are directly involved in managing their *kua*. There are fewer of these fish-pits outside the poldered area where management is more difficult and many are leased out to fishermen who are less able to invest in *kua* improvement.

4. Seasonality of fishing activity

In agricultural communities, fishing activity is limited to the flood season and drawdown. The drawdown period is most important, particularly for landowners who harvest the fish from water draining off their land.

During the dry season, fishing is only important for *kua* owners.

5. Impact of FCD/I on fishing communities

Siltation in Chalan *beel*, which has been encouraged by FCD/I, is having a serious impact on fishing communities. The deeper and more productive *beel* and *gari*(river channels in *beel* area) are silting up, depriving fishermen of their most important fishing grounds. As a result, more fishing effort is being concentrated on secondary rivers such as the Atrai.

6. Conflicts between agriculture and fisheries

The expansion of cultivation in *beel* areas, and the distribution of previously *khas* land to farmers has led to more and more interaction between farmers and fishermen, particularly during the flood recession and dry season. Farmers are increasingly claiming rights over floodplain fisheries on their land and excluding fishermen. This is particularly serious for Muslim traditional fishermen in the area who are highly dependent on the open-access floodplain fishery.

During the dry season, there is competition for water resources and surface water withdrawal for irrigation of *boro* crops is contributing to the reduction of perennial water area. This has negative impacts on the sustainability of fisheries from one year to another. Patterns of regulation of water resources, whether through water regulators inside the Polder 'B' scheme or by the damming of rivers and *khal* in the unprotected area of Chalan *beel*, are dictated by the needs of agriculture which are often in conflict with the needs of fisheries, particularly during the dry season and at the time of early floods.

7. Access regulation

On leased areas, traditional fishermen in the area generally have nominal control of leases through their fisheries *samity* although they are normally dependent on influential locals, often non-fishermen, for financing to pay for leases.

Although they hold exclusive rights to fisheries on most of these leased waterbodies, traditional fishermen, whether Hindu or Muslim, are not able to effectively limit fishing activity by non-fishermen using gears such as *current jal* and traps. Because of their low social status, the fishing community is not in a position to oppose abuse of access regulations by the majority farming community. As more and more farmers take up seasonal fishing, they are normally able to find easy access to most waterbodies in the *beel* and on the rivers at the expense of the traditional fishing community.

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 floodplains areas. There is concern that the massive 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 in flooded areas has caused particular concern and raised doubts 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 is therefore analysing 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 covering 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, an area in Chalan Beel was identified where previously similar agro-ecological units were present both inside and outside a poldered area. The Chalan Beel Polder 'B', located on the west bank of the Atrai River, is a flood control and drainage

scheme protecting an area that was previously part of the huge Chalan Beel wetland, which before the introduction of widespread flood control measures was reportedly one of the biggest wetlands in Asia. Immediately across the Atrai River from this scheme is practically the last remaining unempoldered section of Chalan Beel. The area therefore offers a good opportunity for comparisons of the impacts which changes in fisheries have had on the livelihoods of local people.

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 7 reports of Village Studies published by FAP 17, as Supporting Volumes of the project Final Report. The findings of these studies are summarised in the Main Volume of the Final Report.

VILLAGE STUDY
Chalan Beel Polder 'B'

1 DESCRIPTION OF AREA

1.1 Location

The Chalan Beel Polder 'B' scheme is located in the central portion of the North-West Region of Bangladesh, spreading across parts of Natore and Bogra Districts. The Chalan Beel area is located to the east of the scheme and extends into Sirajganj and Pabna Districts. The location of the scheme is shown in Figure 1.

The polder is one of four flood control and drainage schemes originally proposed in 1970 to protect a large proportion of Chalan *beel* from flooding and increase agricultural production in the area. Chalan *beel* is an area of lowland and *beel* located on either side of the Atrai River and its various distributories such as the Sib and the Barnai. Some parts of this vast wetland area were already being drained and protected by flood control works during the colonial period. The four more modern schemes, Chalan Beel Polders 'A','B','C' and 'D', have been implemented in various stages since the 1970s, with work still continuing on some sections.

Polder 'B' is bounded by rivers on three sides : the Barnai River in the north, the Nandikuja in the south and the Atrai on the east. This section of the Atrai is also described as the Gur River, while the section immediately downstream towards Chatmohar is also known as the Gumani. The western boundary of the project is marked by the Pabna-Bogra railway embankment. The scheme currently provides full flood control and drainage to an area of 32,093 hectares. This area is surrounded by a full-flood embankment with two water regulators which allow in- and outflow into the Atrai River.

Durgapur and Haribhanga *Beel*

The south-eastern corner of the scheme, lying just north of the confluence of the Nandakuja and Atrai River is generally lower than most of the rest of the scheme area. Several *beel* are located in this area of which Haribhanga is one of the largest.

Figure 1
Location of Durgapur and Krishnanagar in Bangladesh

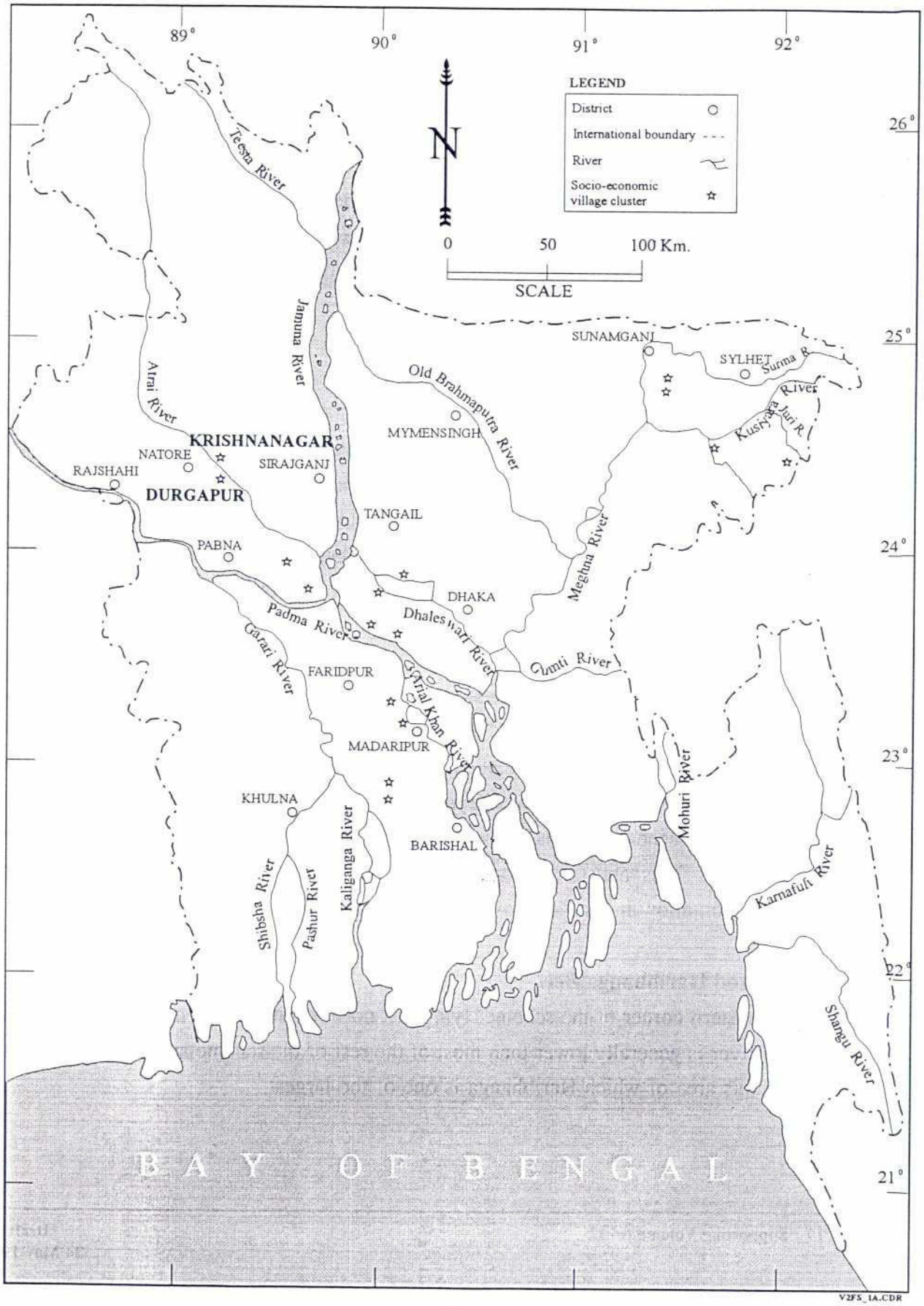


Figure 2 shows the location of the main villages and the nearby fishing communities selected for study inside the Chalan Beel Polder 'B' and in the unprotected area of Chalan *beel*.

Durgapur, the community identified as the main village inside the scheme is located along its eastern edge, astride the Polder 'B' embankment which seperates Haribhanga *beel* from the Atrai. The village is in Gurudaspur *thana* under Natore District. Most of the homestead areas of the village are actually located on the outer side of the embankment. The oldest *para* of the village is located nearer to the *beel* inside the scheme. The administrative *mauza* of Durgapur also includes some *para* on the far south-western side of Haribhanga *beel*, but these effectively constitute a separate village. The deepest part of Haribhanga *beel* is about one and a half kilometres from Durgapur. Most of the land owned by people in the village is located inside Polder 'B', although several villagers also have land on the other side of the river in Chalan *beel*. There is a *khal*, controlled by the Haribhanga sluice gate, running off the Atrai into Haribhanga *beel* on the southern edge of the village.

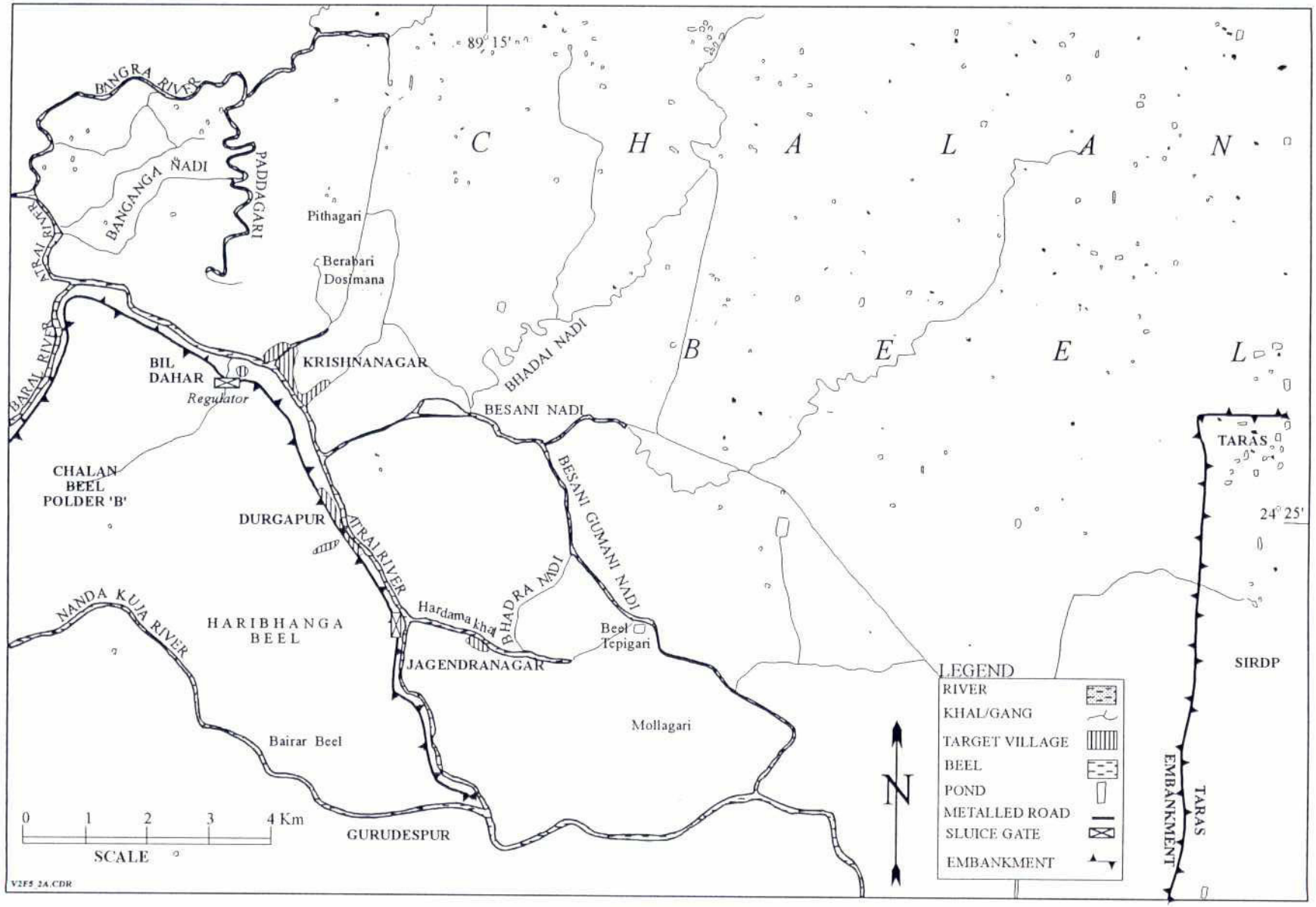
Satellite fishing communities were identified whose members fished near the main villages, or in areas also exploited by people from those villages. The satellite fishing community for Durgapur, located in the village of Jagendranagar, is actually located outside the polder on the east bank of the Atrai. This fishing community is just a small part of a larger, mainly agricultural community. All the fishermen in this group are Muslim but have been involved in fishing as their principal occupation for several generations at least. They fish both in Haribhanga *beel*, inside the scheme, as well as in the Atrai River, *khal* and in Chalan *beel*. The community is located on the south bank of Hardama *khal*, one of several man-made channels connecting the Atrai with Chalan *beel*.

Krishnanagar and Chalan *beel*

For comparison, a community on the other side of the Atrai, overlooking Chalan *beel* was selected. Krishnanagar is located in Singra *thana*, Natore District about three kilometres up the Atrai from Durgapur. The community sits astride a *khal* which connects the Atrai with Chalan *beel* and stretches from the banks of the Atrai back away from the river to the point where the broad expanse of Chalan *beel* commences.

Just upstream from Krishnanagar, on the opposite side of the Atrai, is a large fishing community called Bildahar. This community is tightly packed into a small area next to the *bazar* at Aekanno Bigha. Like the fishermen in Jagendranagar, the inhabitants are not new

Figure 2
Location of study villages



entrants into fisheries but a well-established community of traditional Muslim fishermen. Originally there was also a sizeable group of Hindu *rajbangshi* fishermen in this community, but the few remaining Hindu households have shifted from fishing into other occupations.

1.2 Community profile

Table 1 reviews 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. These categories are explained below.

The relatively low levels of landlessness in Krishnanagar are due to the numbers of households who received (or occupied) land in Chalan *beel* during land registration there in the early 1970s. One entire *para* in Krishnanagar is made up of households who migrated into the village in the 1940s to take advantage of uncultivated land in the *beel*.

There are several large Hindu landowners in the village, most of whom no longer live in the area but continue to control and farm large areas of land in the *beel*.

1.3 Agroecology

The two main villages occupy areas on the same agro-ecological unit (AEUs). These agro-ecological units have been defined by the Bangladesh Land Resource Survey (FAO, 1988) which are themselves based on soil reconnaissance surveys conducted in the 1960s. They are therefore 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 the areas of different flooding phase to establish the agricultural potential of different areas. Areas of particular distributions of soil type and land height are defined as agro-ecological units.

In Figure 3, the agro-ecological units immediately surrounding Durgapur and Krishnanagar are shown. On the map, AEUs are shaded according to their predominant flood depth while details of the particular AEU where target villages are located are given in the table below the map.

Table 1
Durgapur & Jagendranagar
Community Profile

NW3-1 Durgapur — 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	7	48.9	8.6	8.9	1.6	100.0	0.0	40	1230	3	0	1273
Medium	32	47.2	5.9	6.0	1.4	100.0	0.0	16	414	3	0	433
Small	68	40.4	2.9	4.9	1.4	100.0	0.0	11	112	1	2	126
Landless	117	36.6	1.1	4.0	1.2	100.0	0.0	4	6	0	0	10

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.

NW3-2 Jagendranagar — 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
F1	3	48.3	1.3	4.0	1.0	100.0	0.0	9	0	0	0	9
F2	32	41.9	0.9	4.8	1.7	100.0	0.0	5	29	0	0	34
F3	6	39.7	0.2	4.2	1.3	100.0	0.0	3	3	0	0	6

Source: FAP17 Village Census

* Fishing categories are defined as follows:
F1 = Fishing as only source of income
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
Krishnanagar & Bildahar
Community Profile

NW4-1 Krishnanagar **Main village** **Outside**

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	11	52.8	3.8	7.7	1.9	36.4	63.6	36	1527	6	0	1569
Medium	55	48.0	4.5	6.3	1.5	65.5	32.7	25	410	1	0	436
Small	135	45.3	3.0	5.8	1.5	79.3	20.7	14	118	0	0	132
Landless	168	37.9	1.4	5.0	1.4	89.9	10.1	5	4	0	0	9

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.

NW4-2 Bildahar **Satellite fishing community** **Outside**

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	83	40.3	1.0	4.7	1.2	100.0	0.0	3	5	0	0	8
F2	101	39.9	1.0	4.3	1.2	100.0	0.0	2	11	0	0	13
F3	29	40.5	0.9	4.7	1.1	100.0	0.0	2	10	0	0	12

Source: FAP17 Village Census

* Fishing categories are defined as follows:
F1 = Fishing as only source of income
F2 = Fishing as primary source of income but with other subsidiary source of income as well
F3 = Fishing as secondary source of household income.

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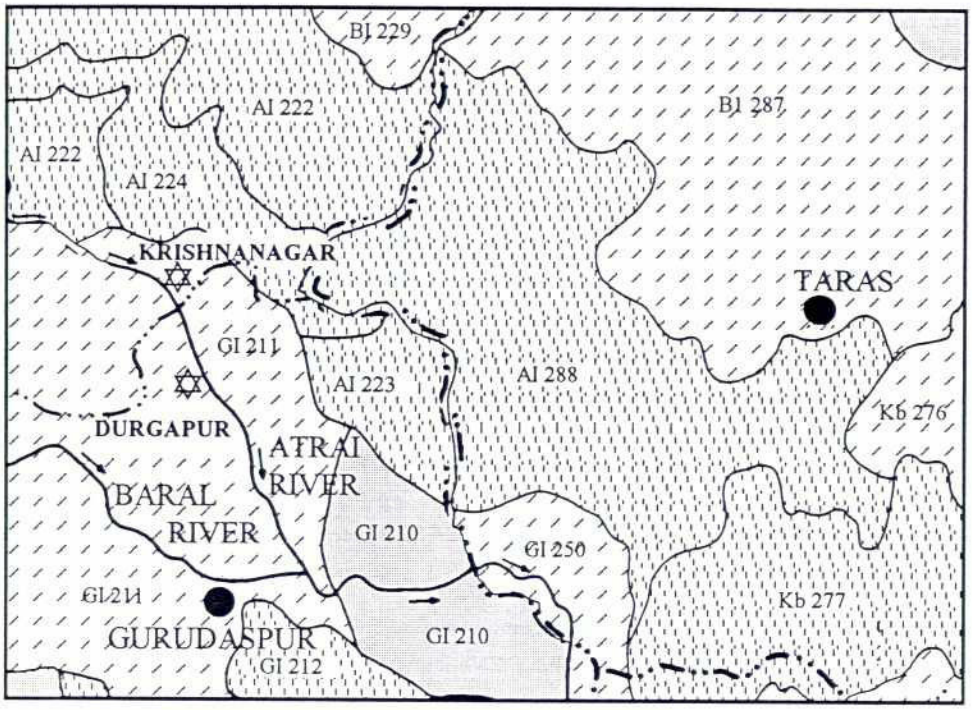
Figure 3
Durgapur & Krishnanagar
Flood phases & agroecological units



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 211	20	25	55	0	0	IVWw (65%)	One poor wetland crop. Hazard of deep flooding.	IIDw (15%)	Moderate wetland crops & one moderate to poor dry-land rabi crop per year.

1.4 Floods

The Atrai River, which dominates local flooding patterns, is the principal drainage channel for a catchment which extends over the Indian border to the west into the hills of West Bengal. Chalan Beel Polder 'B' is located precisely at the point where, prior to flood control interventions, the waters from the Atrai system and distributaries of the River Ganges mingle. The Barnai River on the northern boundary of the polder is connected with the Sib and Fakirni Rivers to the west, which are distributaries of the Atrai. Most of the flow of this river, prior to flood control, was reported to be from local rainfall except during peak floods when it received water from the Atrai system. The Nandakuja River, which runs along the south side of the project, is a distributary of the Baral and receives most of its flow from the point where the Baral leaves the Ganges at Charghat. The confluence of the Nandakuja and the Atrai Rivers at Chanchkair is effectively the meeting point of the Atrai and Ganges systems.

Both these systems empty into the Baral and then the Hurasnagar Rivers through which they drain into the Jamuna just below Bera. This drainage pattern gives rise to one of the most important sources of flooding in the area, which is the backing up of water from this single outlet to the Jamuna. Generally the flood peaks for both the Atrai and the Baral occur relatively late, during *bhadra* (August/September) and even early *ashwin* (mid-September), later than the peak on the Jamuna. However, fairly marginal variations in the timing of these peaks can easily lead to the build up of drainage congestion as far upstream as Chanchkair. When the peaks in the various systems converge, the resulting flooding can be disastrous.

This drainage congestion was a feature of the natural system even before the introduction of any major flood control works in the area. In fact, it seems that this Chalan *beel* was only formed when the shifting of the course of the River Brahmaputra, in 1794, into the Jamuna, led to this chronic backing up of flood flows along the Atrai and the Baral, inundating the surrounding lowlands on a regular basis.

In the past, the vast extent of *beel* and low floodplain on the Atrai left bank, which extends practically all the way to the Jamuna, seems to have acted as a sink for much of this flood water, spreading and diffusing the flooding effect over a wider area. Since the construction of extensive flood control embankments on both sides of the Atrai and along the lower reaches of the Baral River, this diffusion of floodwater has been radically restricted,

increasing drainage congestion. The last remaining unprotected area of Chalan *beel*, stretching from behind Krishnanagar and Jagendranagar villages eastwards to the Taras embankment, has been particularly badly hit as flood waters are funneled into a more and more limited area. The Taras embankment to the east marks the western boundary of the SIRDP (Sirajganj Integrated Rural Development Project) and has, in the past, had a particularly severe impact on flooding patterns in this area. This embankment has been regularly cut by local people living on the outside whenever there has been substantial flooding. The cuts made in the embankment during the disastrous floods of 1988 have never been fully repaired and the impact of the embankment is therefore less marked at present.

Flooding in the unprotected areas is reported to be more sudden and violent, as well as deeper. A higher concentration of sediment deposits in a more restricted area has already reduced in number and depth the many small *beel* and perennial waterbodies which used to dot the floodplain around the Besani-Gumani River. As a result, flood recession is now quicker and flood duration reduced.

The area inside Polder 'B' is now completely protected from the devastating effects of these floods. The embankment seals the area from intrusion by flood waters from the Atrai. Even before the construction of the embankment, local people had apparently blocked off some of the *khal* leading into the *beel* in order to protect crops from flooding, particularly early in the season.

Prior to the embankment, Haribhanga *beel* received floodwaters almost entirely from the Atrai River on the east although some water also entered the *beel* from the Nandakuja. Now rainfall flooding accounts for a considerable proportion of the floodwaters inside the scheme.

1.5 Waterbodies and access

Durgapur and Jagendranagar

Tables 3 and 4 show the access arrangements, leaseholders and institutions responsible for waterbodies for the area around Durgapur and Krishnanagar.

Formal fisheries leasing arrangements around Durgapur and Krishnanagar are dominated by a single "group-fishery" *jalmahal* known as the Sadadigar. This includes a wide range of

Table 3

Chalan Beel Polder 'B'

Leasing arrangements for different waterbodies & waterbody types

Waterbodies covered (location)	Official leaseholders/ actual controller	Leasing system	Institution responsible	Period
Haribhanga *beel*	**Official** - no leasing **Actual** - landowners exert control after *magh* (January/February)	none	privately owned	Not applicable
Dolar *beel* (11 *bigha* in Kalifapara)	**Official** - mosque committee **Actual** - same	assigned by Union Parishad to the local mosque committee	Union Parishad	1 year
Dolar *beel*	**Official** - no leasing **Actual** - landowners exert some control after *kartik* (October/November)	none	Privately owned	Not applicable
Floodplain	**Official** - no leasing **Actual** - landowners exert some control, especially around *kua* after *kartik* (October/November)	none	Privately owned	Not applicable
Haribhanga *khal* -	**Official** - Hindu fisherman from Gurudespur **Actual** - same	leasing system (auctioned)	Land Revenue Department / ADC Natore District	1 year

Source: FAP17 Village Appraisals

Table 4
Chalan *beel*
Leasing arrangements for different waterbodies & waterbody types

Waterbodies covered (location)	Official leaseholders/ actual controller	Leasing system	Institution responsible	Period
Sadadigar Group Fishery -	**Official** - fisheries *samity* **Actual** - same - distribu-tion of sub-leases determined by few strong members	leasing system (auctioned)-sub-leases / fixed-fee to fishermen groups/individuals	Land Revenue Department / ADC Natore District	1 year
Atrai River (part of Satadikar)	**Official** - fisheries *samity* **Actual** - same - sub-lease primarily to Bildahar fishermen - some sights to Jagendranagar & Bilsa	leasing system (auctioned)-sub-leases / fixed-fee to fishermen groups/individuals	Land Revenue Department / sub-leases through fisheries *samity*	1 year
Hardama *khal*	**Official** - fisheries *samity* **Actual** - same - sub-lease normally to Jagendranagar fishermen - this year to Bilsa fishermen, sub-leased again to Jagendranagar fishermen	leasing system (auctioned)-sub-leases / fixed-fee to fishermen groups/individuals	Land Revenue Department / sub-leases through fisheries *samity*	1 year
Previously perennial *gari*, *beel* & river i.e.Doani, *beel* Tepigari, Paddagari, Banganga *nadi*	**Official** - fisheries *samity* **Actual** - same - sub-lease normally to different fishing groups/ communities	leasing system (auctioned)-sub-leases / fixed-fee to fishermen groups/individuals	Land Revenue Department / sub-leases through fisheries *samity*	1 year
Floodplains & seasonal *beel* i.e. Mollagari	**Official** - open **Actual** - landowners exert some control from *kartik* (October/November) on	none	privately owned	not applicable

Source: FAP17 Village Appraisals

different, though interconnected, waterbodies over a considerable area, all of which are grouped together for the purpose of leasing through the Land Revenue Office. The *jalmahal* was established in 1952 after the Land Settlement Act and covers areas in no less than four different districts : Pabna, Natore, Sirajganj and Bogra and stretches from Gurudespur in the south almost to Singra in the north.

For administrative purposes, the *jalmahal* has been divided into two sections and leased out to several *samity* which group together local fishing communities. The southern part is leased to the Biaghat *matshasibi samabaya samity* which is made up of 6 fishing communities around Durgapur and including Jagendranagar, although fishermen from Biaghat and Bilsa are reported to play the leading role. The area covered by this southern section of the Sadadigar and the communities which fish there are shown in Figure 4

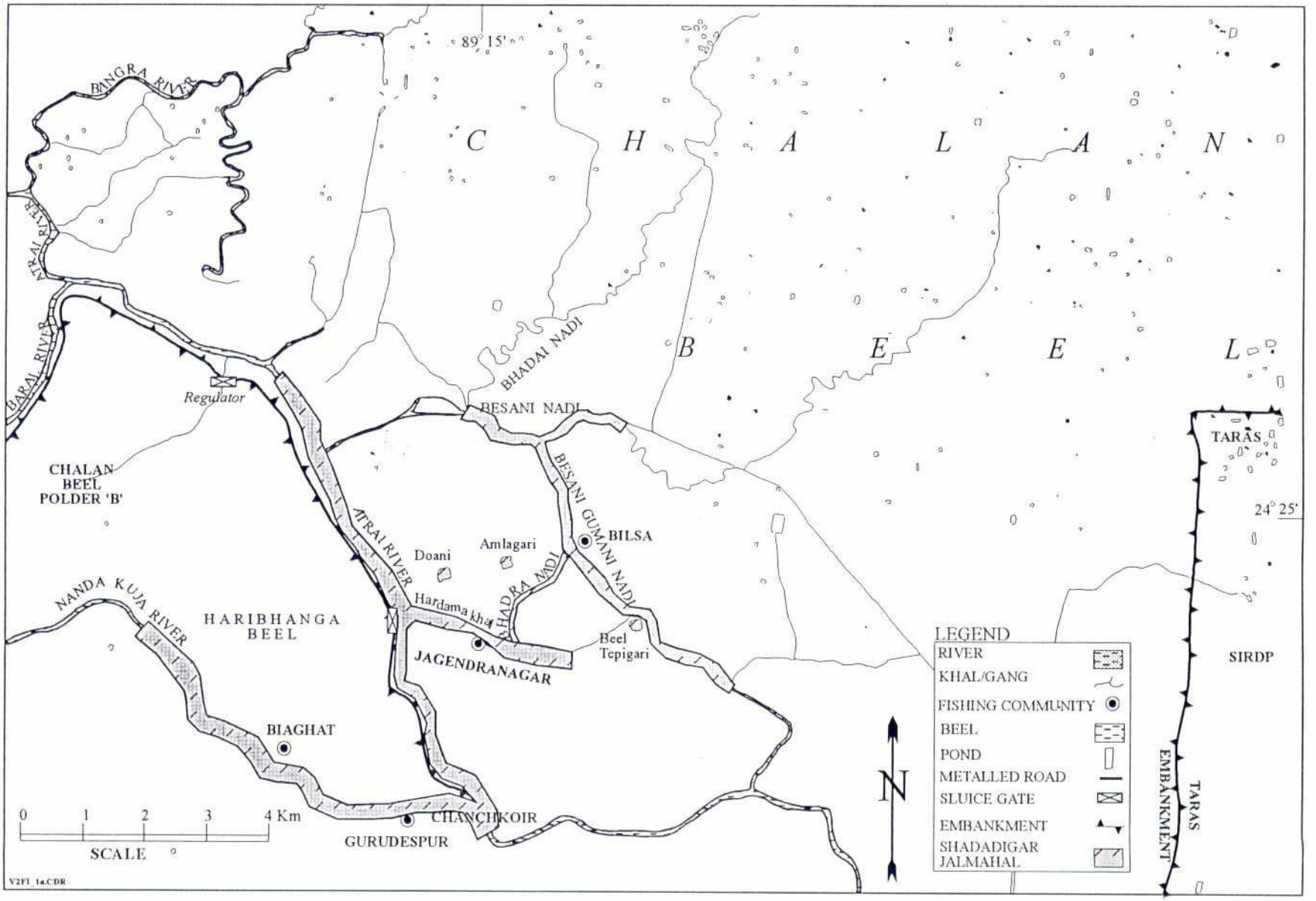
The northern section is leased by another goup of fishing communities, including Bildahar and covers the Atrai River and most of the *beel* in Chalan *beel* which are fished by Bildahar fishermen.

For Jagendranagar fishermen, Hardama *khal*, the Doani and *beel* Tepigari are their principal fishing grounds which fall within the Sadadigar. They normally obtain rights to this *khal* directly from the *samity*. They are also generally able to negotiate access to the Atrai River which is sub-leased by fishermen from Chanchkoir. During the year 1993-94, access rights to Hardama *khal* were acquired from the Biaghat *samity* by an influential fisherman from Bilsa and those Jagendranagar fishermen wishing to fish on the *khal* have been forced to sub-lease sites from this individual.

The principal waterbodies in Chalan *beel* which come under the Sadadigar, such as the Bhesani-Gumani River are controlled by the generally stronger and more influential fishing community in Bilsa, although Jagendranagar fishermen can gain access by paying a fixed fee.

Further north, the waterbodies exploited by Bildahar fishermen all come under the northern section of the Sadadigar. The leases to these are generally controlled by Bildahar fishermen in conjunction with other fishing communities. The Padda *gari*, for example, is controlled by Bildahar and Datia fishermen together with all the other *gari*, small *beel* and depressions north of the Atrai.

Figure 4
Waterbodies covered by
Southern section of Shadadigar Jalmahal



A particular feature of this part of Chalan *beel* are the waterbodies known locally as *gari*. These are mostly sections of *khal*, usually natural but sometimes man-made, which run through the lowland areas of Chalan *beel*. They only have any current during the period of rising and falling flood. During the dry season they are the only areas which retain water and, in terms of fisheries, they function much like perennial *beel*, concentrating fisheries resources and focussing fishing effort. These *gari* are important for fishermen from both Jagendranagar and Bildahar.

The right to fish on areas of privately owned land in Chalan *beel* when they are inundated is theoretically open to all. However, in practice, during the drawdown, landowners are increasingly restricting access to fisheries on their land.

In Chalan Beel Polder 'B', Haribhanga *beel*, and most of the smaller *beel* dotted around its' perifery, are not subject to any form of formal leasing. There was some *khas* land in the lower portions of some of these *beel* up until the Independence of Bangladesh, but this was almost all distributed as the *beel* area came under cultivation following the construction of the embankment. During the period of the floods this entire area is open for fishing. However, once the drawdown begins, landowners are increasingly restricting fishing on their land, particularly where they have excavated *kua*.

One remaining 11-*bigha* section of *khas* land in Dolar *beel*, nominally under the control of the Biaghat Union *parishad*, is devolved by them to the local mosque committee. The fishing rights to this area are auctioned annually by the mosque committee and the proceeds used to support the mosque. For the year 1993/94, the fishing rights were acquired by a local farmer from Durgapur for Tk.5,000. The section of *beel* is generally fished out by villagers under the supervision of the leasee during the drawdown in *kartik*. Note that this land is **not** permanent waterbody but *khas* land leased out, for agricultural purposes, to farmers. It is actually located in the relatively **higher** part of Dolar *beel*, which drains out more quickly. Only the rights to **fishing** on this section are given to the mosque committee and through them to an individual.

The *khal* leading from Haribhanga *beel* to the sluice gate on the Atrai River, generally called the Haribhanga *khal*, is *khas* land which is leased by the ADC Revenue, Natore. The Gurudespur *Matshajibi Samabaya Samity* currently holds the lease for this *khal*.

2. FISHERIES IN DURGAPUR AND KRISHNANAGAR

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 fishing involvement

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

Table 5
Durgapur & Krishnanagar
Ranking of sources of household income
by landholding category

NW3-1 Durgapur **Main Village** **Inside**

Land Cat.	No.	First Rank Occupation *					Second Rank Occupation **				
		Farm	Fish	Lab	Trade	Other	Farm	Fish	Lab	Trade	Other
Large	7	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	28.6
Medium	32	93.8	0.0	0.0	0.0	6.3	6.3	0.0	3.1	12.5	12.5
Small	68	82.4	2.9	5.9	2.9	5.9	14.7	2.9	26.5	2.9	8.8
Landless	117	12.0	1.7	70.1	1.7	14.5	28.2	11.1	7.7	2.6	6.0

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

NW4-1 Krishnanagar **Main village** **Outside**

Land Cat.	No.	First Rank Occupation *					Second Rank Occupation **				
		Farm	Fish	Lab	Trade	Other	Farm	Fish	Lab	Trade	Other
Large	11	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.3	18.2
Medium	55	92.7	0.0	0.0	1.8	5.5	7.3	1.8	0.0	14.5	14.5
Small	135	65.2	2.2	10.4	9.6	12.6	29.6	4.4	18.5	3.7	7.4
Landless	168	7.7	0.0	61.9	9.5	20.2	16.1	8.3	7.7	1.2	3.0

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

In both Durgapur and Krishnanagar, considerable proportions of households have some minor income from fisheries which did not show up in this initial data set. It also became apparent during the course of work in the village that other households probably earned some income from fishing but were reluctant to report it due to the low prestige associated with fishing as an income-generating activity.

Table 6 uses fishing activity by sample households recorded during the monitoring of households activities to establish a more realistic picture of fishing gear use 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.

Durgapur

The higher levels of fishing activity among small landholders than among the landless is notable and supports accounts from local fishermen that landowners are increasingly involved in exploiting the fisheries on their own lands rather than allowing open exploitation by others. Both *current jal* (monofilament gillnet) and *kadum* (traps) are static gear which landowners set in areas on or around their own plots of agricultural land in the *beel* and floodplain. The increasing importance of *kua* (fish-pits) for the same socio-economic group in the village is also apparent. The "dewatering" activity recorded for almost 6% of small landholders takes place in these *kua* on the floodplain or in *maital* (ditches) near to homesteads.

Fishing activity by landless households is more limited, proportionally. Landless labourers seem to be more inclined to seek other sources of income, often outside the village, rather than fishing. Limitations on access by landowners may play a role in this.

Krishnanagar

Apart from the **apparent** lack of *current jal* use, the pattern in Krishnanagar is quite similar. A higher proportional level of fishing activity is reported among small landholders. Various forms of line fisheries (*sip)* and traps are predominant. *Current jal* is certainly used more extensively than is indicated by these figures.

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Table 6
Durgapur & Krishnanagar
Gear ownership and average annual income from gear types and landholding category

NW3-1 Durgapur **Main village** **Inside**

Gear Type	Bengali Name	Medium Farmers			Small Farmers			Landless		
		No.	%	Tk.	No.	%	Tk.	No.	%	Tk.
Gill nets	Current jal	0	0.0	0	17	25.4	2092	11	9.2	1747
	Koi/Fashi jal	0	0.0	0	6	8.8	797	0	0.0	0
Trap	Kadum	0	0.0	0	19	27.8	1218	13	11.4	1264
Hook	Nol barsi	0	0.0	0	0	0.0	0	4	3.1	130
Cast net	Jhaki jal	0	0.0	0	0	0.0	0	6	5.3	-90
Other	Dewatering	0	0.0	0	4	5.9	2138	4	3.1	3000

Source: FAP17 Socio-Economic Monitoring

NW4-1 Krishnanagar **Main village** **Outside**

Gear Type	Bengali Name	Medium Farmers			Small Farmers			Landless		
		No.	%	Tk.	No.	%	Tk.	No.	%	Tk.
Gill net	Current jal	1	1.8	1300	0	0.0	0	0	0.0	0
Seine net	Dora jal	0	0.0	0	0	0.0	0	11	6.5	875
Lift net	Dharma jal	0	0.0	0	0	0.0	0	11	6.5	340
Trap	Kadum	9	15.6	344	11	7.8	1623	5	3.2	2615
Hooks	Sip	1	1.8	1190	12	8.8	1448	11	6.5	375
	Daun	0	0.0	0	7	5.2	2810	5	3.2	420
	Nol barsi	0	0.0	0	4	2.6	3830	0	0.0	0
Cast net	Jhaki jal	0	0.0	0	0	0.0	0	16	9.6	1294
Other	Dewatering	8	13.8	90	0	0.0	0	0	0.0	0

Source: FAP17 Socio-Economic Monitoring

2.3 Women and fisheries

Women's direct involvement in fishing in the two main villages is very limited. A few women in the nearby Muslim fishing communities admitted to actively fishing but in Durgapur and Krishnanagar any direct women's involvement is rare.

However, indications are that, in the past, there has been considerable involvement of women in fisheries related activities such as gear-making and fish-drying. Women's accounts, in Durgapur, of fish processing during periods of peak catch in the past (see Box 1) indicate a far higher level of fisheries involvement in the past. The decline in fishing activity is due both to increasing restriction of fishing activity on the floodplain by landowners and the availability of other options.

Women in Durgapur recount that, up until about 20 years ago, fishing was an important activity for people in the village although it was apparently limited to fishing for consumption. During the drawdown period, in the month of *kartik*, the men would catch large amounts of *rui*, *katla*, *boal*, *ayre* and *guga* in Dolar and Haribhanga *beel*. The women would then dry considerable quantities of this fish for use later in the year. One respondent commented on the fact that *kartik* was also the leanest period of the year (*"Aek kartik gele to aek bocor ayu barlo"*-"If you can make it through *kartik* you can make it through the rest of the year"). Outbreaks of cholera were reportedly frequent at this time of the year and one woman ruefully recalled that the period of most abundance of fish was also when people were least able to eat it.

Box 1 : Mora Kartik

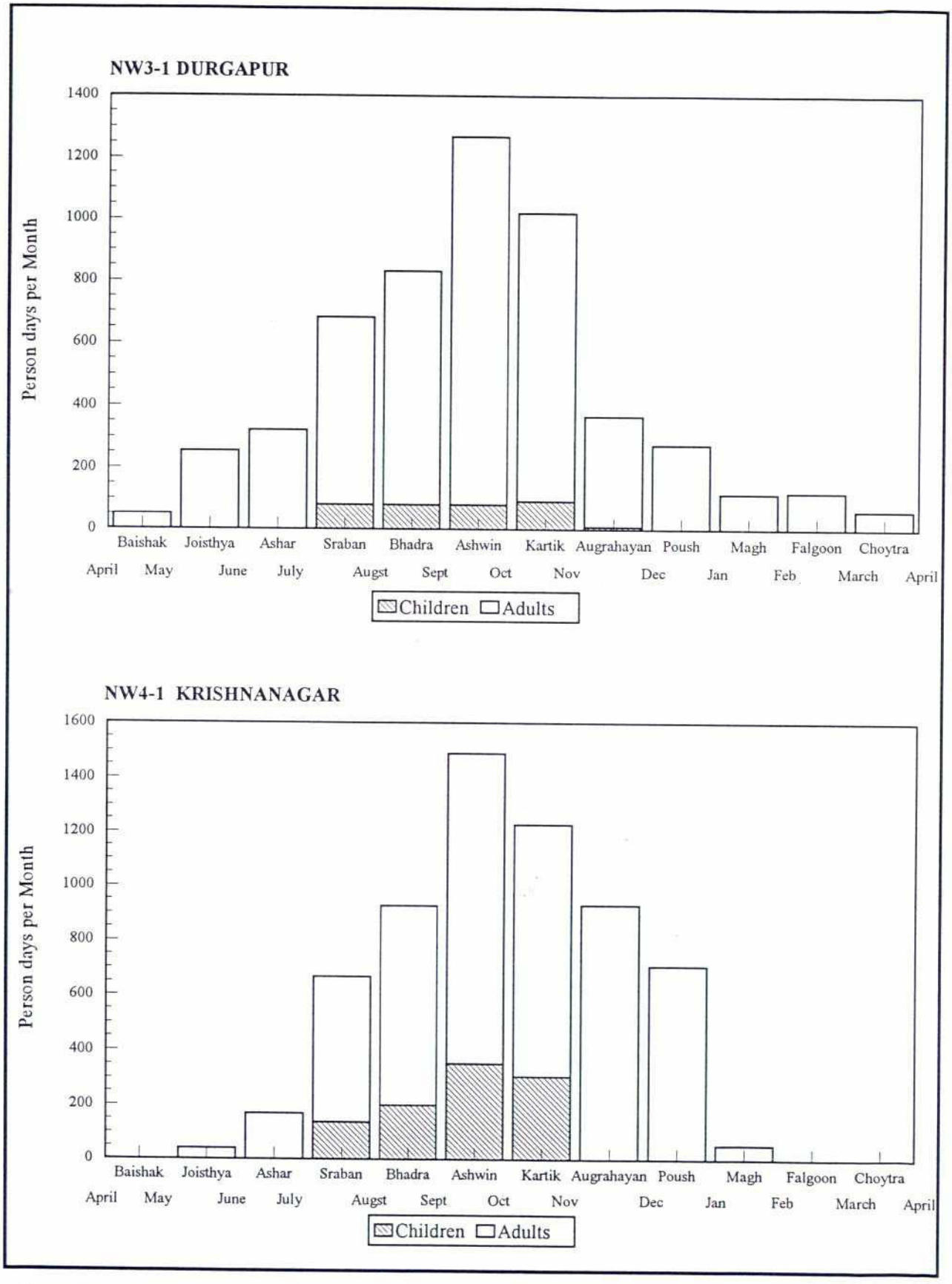
2.4 Children's involvement in fisheries

Figure 5 show the proportion of household fishing effort which is accounted for by children through the year.

Children of both sexes are active in fishing in both communities. *Current jal* and traps are readily utilised by children as well as adults. Particularly during the drawdown, from *ashwin* (September/October) to *kartik* (October/November), children are frequently involved in small-scale dewatering of periferal waterbodies around village homesteads and floodplains and in the fishing of all the channels draining water off the floodplain into the *beel* and *khal*.

Female children are able to continue fishing up until adolescence. As one seasonal fisherman in Durgapur put it : "*Chokhe dharar upajukta haile meyera aar maach dhore na*" ("When

Figure 5 Person Days Fishing per Month, Adults and Children



Source: FAP 17 Socio-Economic Monitoring

girls are grown up enough to be looked at, they stop fishing"). In Durgapur, it is again noticeable that children from small landholding families seem to be far more active in fisheries, for the same reasons that their parents show a greater reliance on fisheries as a source of supplementary income.

The levels of children's involvement are higher in the unprotected area of Chalan Beel, particularly among landless households. The proximity of the Krishnanagar *khal* and the extensive, shallowly flooded area of Chalan *beel* probably encourages fishing by children.

2.5 Access to fisheries

Although access to many of the waterbodies in the area around Durgapur and Krishnanagar is formally controlled by leasing arrangements, these do not constitute a major factor in determining levels of fishing activity among the "non-fishing" community. Wherever Muslim farmers or labourers have decided to become involved in fishing, they are able to pursue that option without any major problems regarding the leasing status of a particular waterbody.

Seasonal fishermen

All local traditional fishermen claim that the numbers of farmers and labourers who fish seasonally have increased dramatically over the last 10-20 years. Until relatively recently, few people from outside the fishing community were involved in fishing as their social status would have been severely compromised by such activities. Fishing for subsistence does not generally carry the same negative social connotations of fishing for income and has probably always been more widespread.

However, under pressure of rising population and competition for employment opportunities, some labourers and small farmers have broken the taboo associated with fishing for the sake of earning a better livelihood. In the case of Haribhanga *beel*, people may have been encouraged to move into *current jal* fishing as professional Hindu fishermen from Gurudespur and Chanchkoir have stopped coming to fish in the *beel* after the construction of the polder. The depth of the *beel* and the composition of the catches obtained since the completion of the Polder 'B' embankment make large scale *berjal* (seine net) operations unviable, leaving the waterbody open for local people with simpler gears.

Land ownership is reported to be increasingly a factor which affects access to fisheries. This is a recent phenomenon and is occurring both inside and outside of the protected area but may be more rapid inside the polder, where it is easier to check on what is happening on a plot of land in the *beel*, even during the floods. Flooded land remains, both legally and in most people's perceptions, "open-access" for fisheries, but people in both Durgapur and Krishnanagar seem more likely to fish in waters covering land which they own. This is encouraged by the predominance of passive gears such as *current jal* and traps which are more safely set in areas where a landowner can be sure that they will not be interfered with. The extension of unofficial property rights on land to the flood waters overlying that land is a general feature in the area. Local fishermen frequently complain about farmers increasingly interfering with gear, particularly traps, placed by fishermen over privately owned agricultural land. Traps are frequently simply expropriated by the landowners whereas, up until about ten years ago, this was unheard of.

Given that the majority of land in Chalan *beel* has now passed, either officially or unofficially, into private ownership, this points towards an increasingly "closed" floodplain fishery in the future. It may already explain the **relatively** limited involvement of landless people in anything beyond subsistence fishing.

Subsistance fishermen

In both areas, there are no strict limitations on subsistance fishing activity, even where this patently crosses the line from "fishing just for consumption" into "commercial" fishing activity. Setting of traps, *current jal* and *daun* in the leased areas of the Atrai River and Hardama *khal* is widespread and not contested by fishermen (although farmers frequently contest the setting of traps on "their" flooded land). *Dharma jal* (liftnet) are widely used along the river and *khal* banks.

In the rivers and *khal*, such as the Atrai River and Hardama *khal*, this reflects fishermen's low social status and consequent inability to enforce regulation of fishing effort on the *jalmahal* under their control. However, it is also clear that there is a long tradition of subsistence fishing over much of the area.

2.6 Seasonality and fisheries

Levels of fishing activity are also dictated by the annual patterns of expansion and retraction of the seasonal floods, and the movement of fish which this allows. In the area under study, patterns of **retention** of flood waters seem to be almost as important in terms of the quantity of fishing and level of fisheries dependence. The construction of embankments around lowland areas would be expected to impact on these seasonal patterns of fisheries.

In the case of Chalan Beel Polder 'B', the seasonality of fishing activity has become less marked. In Krishnanagar, fishing incomes are limited quite sharply to the period from *joistra* (May/June) to *poush* (December/January). In Durgapur, the involvement of some households in *kua* fishing draws out access to fisheries income until at least *falgoon* (February/March) and normally into *choitra* (March/April) as well. The analysis of seasonal fishing patterns below highlights the reasons for this.

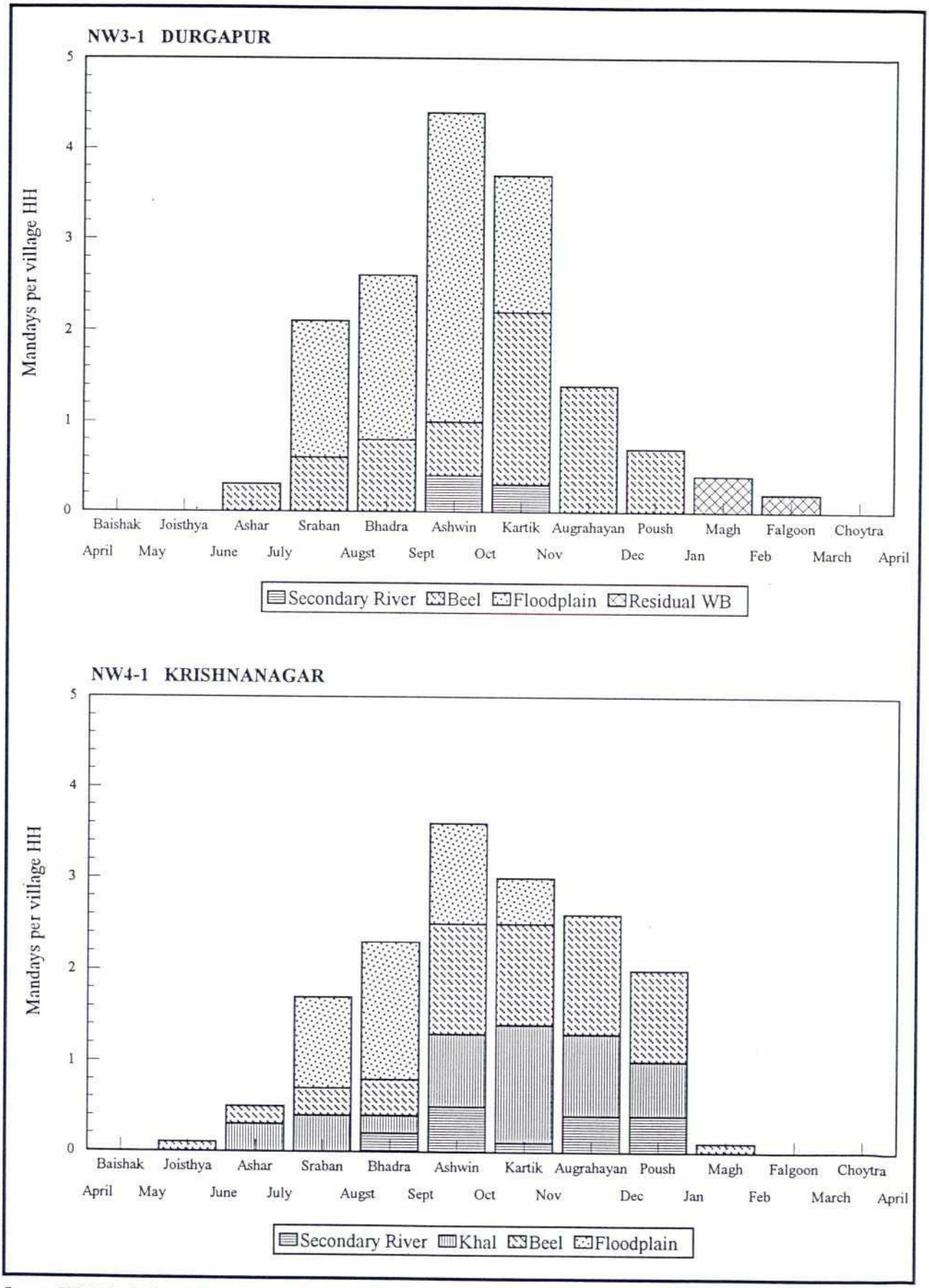
Figure 6 shows the average proportion of fishing time through the year spent by households fishing on different types of waterbody. Table 7 shows the seasonal patterns of gear use and intensity of activity.

Pre-monsoon

The pre-monsoon period in this area generally starts from mid-*baishak* (beginning of May). Heavy local rainfall can cause fluctuations in *beel*-levels. The Atrai River generally starts rising from about mid-*joisthya* (late May to early June) although it does not peak, in the stretch near Durgapur, until late *sraban* (mid-August) or early *bhadra* (late-August).

Fishing in the pre-monsoon period by villagers from both Durgapur and Krishnanagar is limited. Some villagers from Krishnanagar use *khalson* (trap) to catch *beel* fish as they follow the rising water out of their overwintering sites onto the floodplain. In the *khal* leading from the Atrai River into Chalan *beel*, fingerlings of migratory species, particularly carp, are also caught as they migrate into the floodplains and *beel* for the summer. However, demand for fingerlings for aquaculture is relatively limited in this area and the pre-monsoon fishery is not very important.

Figure 6 Distribution of Fishing Effort by Waterbody Through the Year



Source: FAP 17 Socio-Economic Monitoring

Table 7
Principal Gears, Use by Month and Waterbody

NW3–1 Durgapur

Units: Man Days per Village Household

Gear	Habitat	Baishak	Joisthya	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Md/VHh	Eff %
Current jal	Beel			0.3	**0.6**	**0.6**	0.2	**0.6**	**0.7**	0.5				3.4	21.4
	Floodplain				0.5	0.8	**2.1**	1.1						4.5	28.3
By hand/Dewatering	Residual WB										**0.4**	0.2		0.7	4.4
Koi/Fashi jal	Beel						0.1	**0.2**	**0.2**	0.1				0.7	4.4
Jhaki jal	Beel						**0.3**	0.2						0.5	3.1
Kadum	Secondary River						**0.4**	0.3						0.7	4.4
	Beel					0.2		**0.8**	0.5	0.2				1.6	10.1
	Floodplain				0.8	**0.9**	**1.2**	0.4						3.3	20.8

NW4–1 Krishnanagar

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Md/VHh	Eff %
Sip	Khal						0.4	**0.6**						0.9	5.7
	Floodplain				0.4	**0.6**	0.4							1.5	9.5
Dharma jal labour	Secondary River					0.2	**0.5**	0.1						0.9	5.7
	Khal						**0.4**	0.1						0.6	3.8
Jhaki jal	Secondary River								**0.4**	**0.4**				0.8	5.1
	Khal							0.3	0.4	**0.6**				1.3	8.2
Shangla jal labour	Khal			0.3	**0.4**	0.1								0.8	5.1
Daun	Beel			0.2	0.3	**0.4**	**0.5**	0.2						1.6	10.1
	Floodplain				**0.3**	**0.3**								0.6	3.8
Nol barsi	Floodplain				**0.3**	**0.3**	**0.3**	0.1						1.0	6.3
Kadum	Khal							**0.3**	**0.3**					0.6	3.8
	Beel		0.1					0.2	**0.9**	**0.9**	0.1			2.3	14.6
	Floodplain						**0.4**	**0.4**						0.9	5.7
Dora jal	Beel						**0.7**	0.5	0.2					1.4	8.9

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

Peak flood

The peak flood period commences in *ashar* (June/July) and continues up to mid *ashwin* (September/November). The Atrai River rises quite quickly from mid-*ashar*, generally peaking in late *sraban* (July/August) and then falling relatively gradually right through to *kartik* (October/November). The rising river waters feed into the *beel* areas through a complex of *khal*.

In Chalan Beel Polder 'B', the rising waters are generally allowed into the *beel* through the Haribhanga sluice gate from the beginning of *ashar* up until mid- *sraban*. The gate is used primarily to control the influx of waters and prevent any sudden rises in water level which might threaten recently sown deep-water *amon* or mixed *aus* and *amon*. By mid-*sraban*, most of the floodplain west of Durgapur is inundated. Most of this flooded area can apparently be freely fished with no effective restriction on the setting of *current jal*, *daun* or traps.

In Chalan *beel*, the inflow of water from the Atrai unites with the rainfall falling on the wide catchment area in the *beel* area to create a vast expanse of open water stretching from the Atrai in the west to the Taras embankment in the east. This area is open for fisheries as long as the inundation lasts. Restrictions on fishing theoretically apply to a few of the leased areas in the old bed of the Besani River, but the leaseholders (local fishemen) are unable to enforce control.

For seasonal fishermen in Durgapur and Krishnanagar during this peak period of inundation fisheries resources are readily accessible although the "catchability" of fish is low as they are widely dispersed. *Current jal* and *daun borshi* (longline) are set on floodplains and *beel* areas, apparently regardless of official access arrangements. In more shallowly flooded land, traps such as *bitti* and *khalshon* are set. There is also extensive use of *dharma jal* along the *khal* and in the river. This is particularly important along the Krishnanagar *khal*.

Previously, up until the early 1980s, there were more work opportunities during the summer with the harvesting of *aus* and then of deep-water *amon*. Now, a considerable amount of the land devoted to *kharif* rice crops has been turned over to *boro*. A greater proportion of non-fishermen seem to be involved in fishing both as a source of food and income.

Drawdown

As the rains finish in mid-*ashwin* (September/October) and the river level begins to fall, water drains off the floodplains back into the lower-lying areas and *beel* or out through connecting *khal*. This represents the peak fishing period to nearly all gears and all water bodies (see Table 7). The drawdown concentrates fish resources into periferal waterbodies and the water channels through which they try to reach perennial over-wintering sites. In these locations, fish are easily caught and catch in proportion to time spent fishing is high.

In more deeply flooded areas and in *khal*, *current jal*, *daun* and *borsi* continue to be used but during this period the trap fishery becomes dominant, and every channel through which flood waters are retreating is used. Particularly in Chalan *beel*, the gradual slope of the land lends itself particularly well to the use of traps. On the floodplain, the main features which create channels for retreating flood waters are the low bunds seperating plots of privately owned land. As these bunds appear above the water, small gaps cut in them become the most common location for the smaller types of trap, such as *bitti* and *kholsuni*. Traditionally, there has never been any control or restriction over the placement of traps in these locations. However, the increasing competition for all resources on the floodplain has encouraged landowners to assert control on this valuable resource. Farmers are, therefore, by placing their own traps on their land, displacing those of landless professional and subsistence fishermen.

Some landowners have gone one step further and excavated *kua* on their lower-lying plots and particularly in Haribhanga *beel*, restrict fishing as soon as the surrounding bunds appear above the floodwater. *Kua* are also found in Chalan *beel* but they are far fewer as almost all the land is devoted to cultivation of HYV *boro* during the winter.

Fishing activity is particularly intense whenever areas of flooded land can be easily isolated by minimal bunding and fished out by groups of farmers. Children are particularly active in these activities. *Khal* leading off the floodplain towards the river also attract a high level of fishing effort.

Dry season

By the end of *kartik* (mid-November), the bulk of the flood waters inundating the floodplain around Haribhanga *beel* have receded into the three lowest sections of the *beel*, known as Dolar, Goumarar and Bairar *beel*, or run out through the Haribhanga *khal* into the Atrai

River. Water remains, for varying lengths of time, in many other small depressions on the floodplain, around homesteads in borrow-pits and in the many *kua* excavated specifically for the purpose. The catchability of fish concentrated in these residual waterbodies is at its' maximum and they are progressively dewatered through the winter. Many natural depressions and borrow-pits are bailed out by children while the *kua* dug by landowners are more often dewatered using low-lift pumps. Water being pumped out of these remaining waterbodies is used to irrigate *boro* crops.

The borrow-pit for the Polder 'B' embankment, which is currently being re-excavated in preparation for fish stocking next year, is also harvested during this period. *Katha* located along the banks of the main river and in *khal*, both inside and outside the embankment, are fished at this time of the year. Many of the *khal* dry up as well and are also fished out and dewatered section by section as the dry season progresses.

In Chalan *beel*, dry season activity is more limited for non-professional fishermen. The major depressions are leased out by fishermen who control fishing during the critical harvest period. There are relatively few *kua* in Chalan *beel*, compared to Haribhanga *beel*, due to differences in patterns of drainage and landownership.

The flood waters in Chalan *beel* drain out more quickly than in Haribhanga *beel* where the embankment causes water to pool and stand for longer. Water is retained in the fish-pits inside the embankment for longer, allowing the fish a longer period of growth. Another important factor is the availability of suitable branches to use for the *katha* (brush piles) placed in the *kua*. Few suitable trees are found in Chalan *beel* and transporting the branches from outside is costly and difficult. Around Haribhanga *beel* the *babal* trees commonly used for *katha* in this area are readily available and close to *kua* sites.

Differences in patterns of land ownership between Chalan *beel* and Haribhanga *beel* constitute an important explanation of the lower levels of *kua* development in the former. The principal feature of landownership in the area is the dominance of the unprotected area of Chalan *beel* by large landlords. People operating such large holdings are more interested in large-scale HYV *boro* cultivation than in attempting to diversify earnings by excavating *kua* as well. On smaller landholdings in Haribhanga *beel*, investing in *kua* excavation earns higher per-*bigha* earnings and makes sound economic sense. The rising costs of HYV *boro* cultivation which many small landholders and share-croppers complain about in the area is

undoubtedly encouraging them to convert part of their land to *kua*.

From early *magh* (late January) on, fishing by Krishnanagar households is limited to the Krishnanagar *khal* running through the village. Water is retained in the *khal* throughout much of the year as the Atrai River is dammed by local farmers just south of the off-take of the *khal* in order to direct water for irrigation of HYV *boro* from the river into the *beel*.

2.7 Fisheries income

For those households who are involved in fishing as a source of income, there is a tendency for it to become a relatively important component of their livelihood. This can be seen from Figure 7 which shows how fisheries incomes in different ranges are distributed among those households who fish. Particularly in Durgapur, once households decide to sacrifice social status for fisheries income, they clearly decide to make the sacrifice worthwhile.

Income from *kua* (fish-pits) can also be quite high. It has the added advantage, for *kua* owners, that fishermen can be hired to do the harvesting without the owner losing prestige by actually having to get wet in order to earn fishing income.

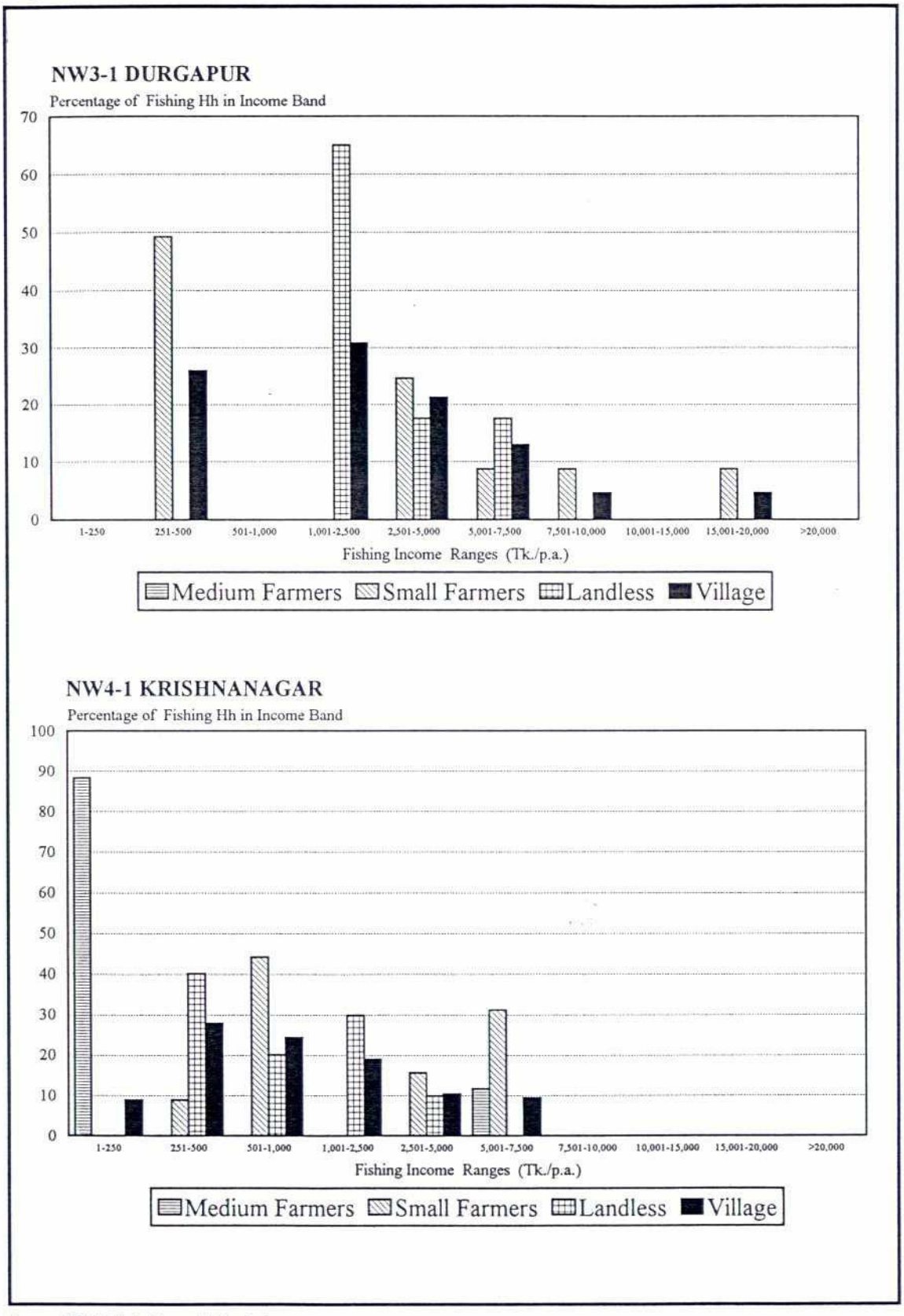
The tendency in Krishnanagar is less pronounced but the relative lack of "occasional" fishermen, except among medium households, is indicative that once households go into fishing, they tend to do it quite intensively.

Durgapur

Table 8 and Figure 8 show the balance between household income from different sources for households in Krishnanagar throughout the year. The table shows the data disaggregated by landholding category while the figures summarise for the village as a whole.

In Durgapur, fisheries is most important for small farmers. The level of average earnings from fisheries for this group is exaggerated by one particularly active farmer/fisherman using both mono- and multifilament gillnets and operating a *katha* which brings in sizeable earnings later in the year. However, even excluding this particular household, the proportion of net income which comes from fishing is greater among small landowners than among landless households.

Figure 7 Distribution of Fishing Incomes for Fishing Households

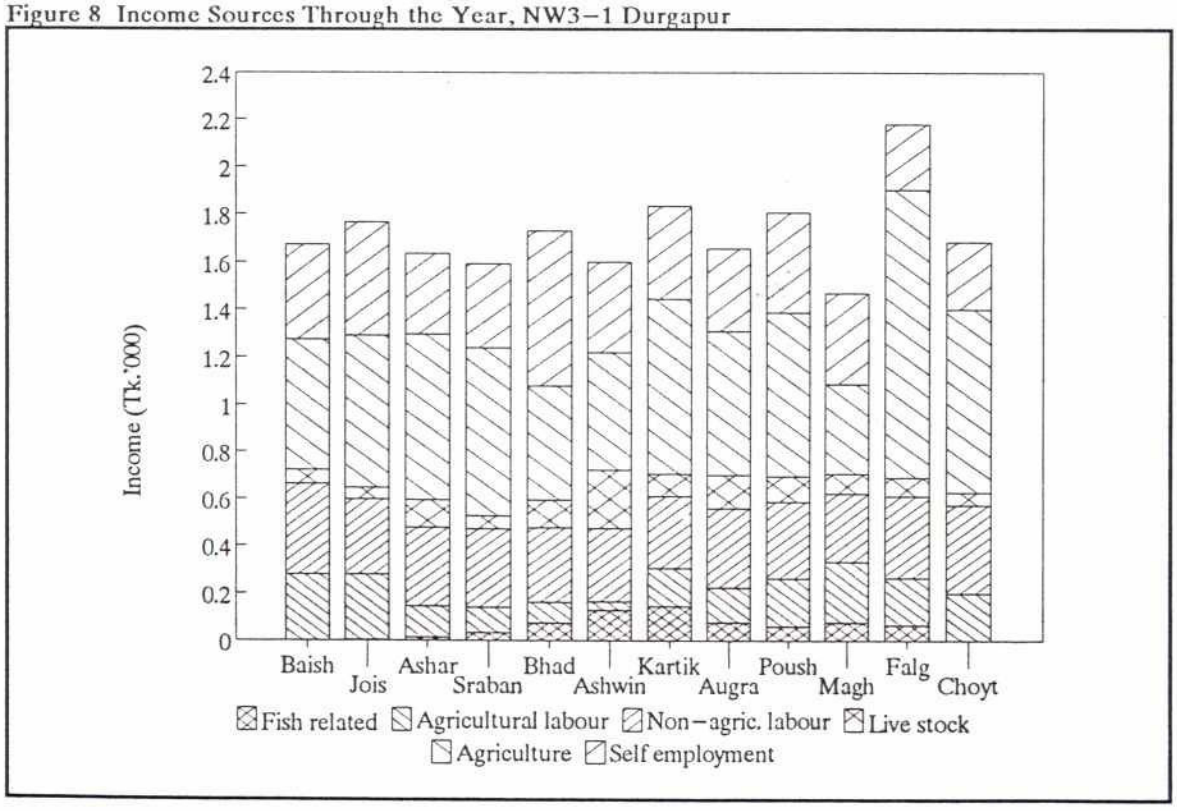


Source: FAP 17 Socio-Economic Monitoring

Table 8 Income Sources Through the Year, by Landholding Category, NW3–1 Durgapur UNIT: TK

LAND CAT.	ACTIVITY	BAISH	JOISTH	ASHAR	SRABA	BHAD	ASHWI	KARTI	AUGRA	POUSH	MAGH	PALG	CHOYT	TOTAL	%
Medium	Non–agric. labour	556	556	556	556	556	556	556	623	623	556	556	556	6,808	17.6
	Small stock	21	68	9	14	30	22	13	68	78	37	21	47	428	1.1
	Large stock	175	158	146	113	78	135	308	271	213	260	180	100	2,136	5.5
	Agriculture	1,494	1,987	1,036	3,114	1,926	2,008	2,844	1,887	2,759	1,488	6,849	1,463	28,856	74.5
	Self employment	500	–	–	–	–	–	–	–	–	–	–	–	500	1.3
	Total	2,746	2,769	1,747	3,797	2,590	2,721	3,721	2,849	3,673	2,341	7,606	2,166	38,728	100
Small	Fishing	–	–	39	73	132	257	300	99	67	58	41	–	1,066	6.0
	Agricultural labour	204	140	114	97	146	–	103	116	167	165	197	221	1,670	9.4
	Non–agric. labour	74	70	70	66	66	79	79	96	79	79	79	82	920	5.2
	Small stock	39	17	6	76	137	81	36	150	66	44	45	35	733	4.1
	Large stock	27	27	274	23	44	529	31	37	40	62	47	27	1,167	6.6
	Agriculture	727	625	1,193	552	401	469	503	754	597	363	524	966	7,673	43.1
	Self employment	346	783	296	285	328	428	432	396	374	298	289	321	4,576	25.7
	Total	1,417	1,662	1,992	1,172	1,254	1,843	1,484	1,648	1,390	1,069	1,222	1,652	17,805	100
Landless	Fishing	4	5	3	21	62	87	96	39	31	54	46	(1)	448	2.6
	Fish trading	–	–	–	–	–	–	–	46	43	55	52	–	197	1.1
	Agricultural labour	390	427	177	139	76	67	234	206	273	377	254	238	2,858	16.4
	Non–agric. labour	519	398	423	428	398	381	369	394	387	338	441	492	4,968	28.4
	Small stock	21	9	12	5	64	8	5	60	13	13	39	26	275	1.6
	Large stock	–	–	–	–	19	53	48	–	48	–	–	–	167	1.0
	Agriculture	202	297	328	170	147	113	321	188	204	100	118	484	2,674	15.3
	Self employment	404	424	458	486	1,012	453	463	411	556	535	345	336	5,882	33.7
	Total	1,540	1,560	1,401	1,249	1,778	1,162	1,536	1,344	1,555	1,472	1,295	1,575	17,469	100
Village	Fishing	2	3	14	34	75	128	146	52	38	48	38	–	578	2.8
	Fish trading	–	–	–	–	–	–	–	25	23	30	28	–	107	0.5
	Agricultural labour	275	275	132	106	87	36	159	148	201	256	200	199	2,074	10.1
	Non–agric. labour	384	318	331	333	316	311	305	333	324	288	344	372	3,958	19.2
	Small stock	27	20	9	29	82	33	16	90	39	26	38	32	441	2.1
	Large stock	33	31	107	23	35	214	80	51	69	57	41	23	764	3.7
	Agriculture	553	643	702	713	482	497	740	610	694	382	1,212	776	8,005	38.8
	Self employment	400	476	341	353	652	380	387	347	419	383	278	283	4,698	22.8
	Total	1,674	1,766	1,636	1,591	1,729	1,599	1,833	1,656	1,807	1,470	2,179	1,685	20,625	100

Figure 8 Income Sources Through the Year, NW3–1 Durgapur



Source : FAP17 Socio–Economic Monitoring

This is due to several factors. Firstly, in the wet season landless households are able to take advantage of non-agricultural labour opportunities outside the village during periods of low local labour demand but small farmers are more tied to the village. Although rice cultivation is now more concentrated on irrigated *boro* rice during the winter months, some *aus*, jute and broadcast *amon* is still cultivated by small farmers, keeping them close to their homes through the year. Occasional fishing fills in the gaps for many of these households during this period.

There is also a growing interest among small landowners in establishing property claims over potentially productive waterbodies. This is seen in the borrow-pit for the Polder 'B' embankment which runs through the village. As soon as the local fisheries department officials expressed interest in "developing" this borrow-pit for fish culture for landless households, landowners whose land is adjacent to the borrow-pits or who previously owned land used for the embankment began reclaiming tenure rights and even stocking fish themselves. Many claim that they were never properly compensated for the land they lost.

Landowners are also beginning to enforce informal restrictions on open fishing on their land in the *beel* around Durgapur. The excavation of *kua* (fish-pits) in the *beel* and use of low-lift irrigation pumps for dewatering residual waterbodies on farmers' lands seems to be spreading. This interest in fisheries, extending beyond the drawdown and into the dry season is probably encouraged by the embankment which holds water in the *beel* area for longer than in outside areas.

Among both landless and small landholding households, relatively few seem to be engaged in fisheries, but those that are involved, in both categories, earn relatively high incomes from it. Overall, there is a relatively marginal difference in income levels (from all sources) between the landless and small landholding categories in Durgapur. Non-agricultural labouring opportunities among landless households seem to largely compensate for their relative lack of access to land for agricultural activities. Self-employment is important for both groups and opportunities for this are said to have improved as a result of the embankment construction.

Krishnanagar

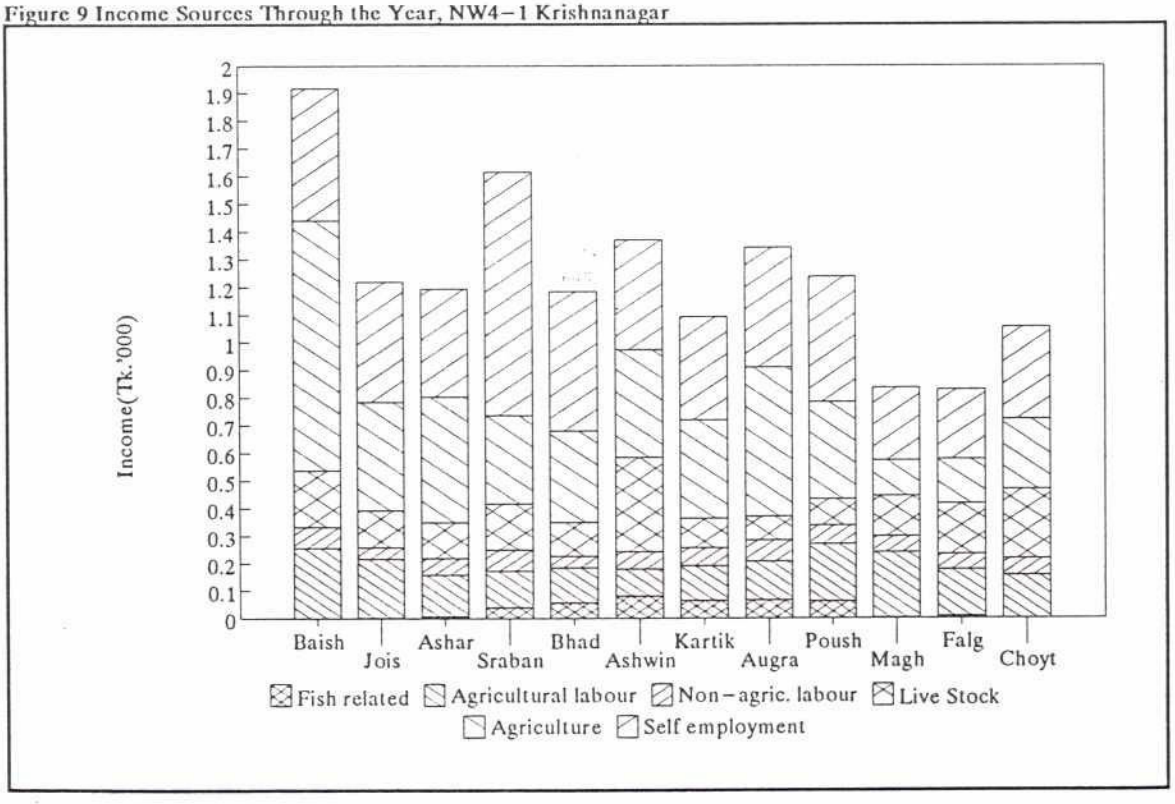
Table 9 and Figure 9 give a similar breakdown of income from different sources for Krishnanagar.

Table 9 Income Sources Through the Year, by Landholding Category, NW4–1 Krishnanagar

UNIT: TK.

LAND CAT.	ACTIVITY	BAISH	JOISTH	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
Medium	Fishing	–	–	–	20	26	–	(21)	75	11	–	–	–	111	0.5
	Fish culture	–	–	–	–	–	–	–	–	55	–	55	–	109	0.5
	Small stock	9	–	1	11	13	5	6	100	8	11	40	7	210	1.0
	Large stock	393	261	230	347	257	294	172	135	84	416	455	421	3,465	16.6
	Agriculture	2,678	905	1,113	622	866	1,261	1,473	2,453	1,506	668	833	1,135	15,512	74.3
	Self employment	212	186	117	114	131	131	138	151	138	41	38	62	1,458	7.0
	Total	3,292	1,352	1,461	1,114	1,293	1,691	1,768	2,914	1,802	1,136	1,421	1,625	20,865	100
Small	Fishing	–	4	3	71	103	101	85	35	68	7	–	–	477	2.8
	Agricultural labour	145	143	112	113	100	62	121	97	183	146	89	70	1,380	8.1
	Non–agric. labour	35	12	11	9	12	17	20	23	19	29	29	32	247	1.5
	Small stock	4	29	47	50	20	10	6	10	34	8	11	6	234	1.4
	Large stock	286	159	150	219	169	150	140	43	42	130	162	167	1,818	10.7
	Agriculture	820	444	385	363	353	317	176	309	304	66	79	127	3,741	22.1
	Self employment	575	827	615	1,797	838	683	626	635	678	540	519	718	9,051	53.4
	Total	1,865	1,618	1,323	2,622	1,595	1,340	1,174	1,152	1,328	926	889	1,120	16,948	100.0
Landless	Fishing	–	–	17	23	27	88	76	89	55	–	–	–	375	3.3
	Agricultural labour	427	341	227	183	191	162	169	219	295	385	285	272	3,155	28.0
	Non–agric. labour	135	79	118	157	79	121	123	143	131	100	98	105	1,390	12.3
	Small stock	27	21	4	4	2	–	–	17	11	5	31	15	137	1.2
	Large stock	44	31	40	26	21	501	56	52	100	58	58	246	1,233	10.9
	Agriculture	389	183	294	182	134	162	136	100	16	–	9	65	1,670	14.8
	Self employment	490	200	300	392	358	254	246	360	371	115	107	112	3,305	29.3
	Total	1,512	855	1,000	967	812	1,288	806	980	979	663	588	815	11,265	100
Village	Fishing	–	2	9	41	56	79	64	67	53	3	–	–	373	2.5
	Fish culture	–	–	–	–	–	–	–	–	8	–	8	–	17	0.1
	Agricultural labour	255	214	149	129	127	99	125	139	207	236	167	154	2,001	13.4
	Non–agric. labour	76	41	59	77	42	63	65	76	69	58	57	61	745	5.0
	Small stock	16	20	20	22	11	5	3	27	19	7	25	10	185	1.2
	Large stock	189	115	111	148	113	337	106	61	76	140	158	243	1,797	12.1
	Agriculture	903	392	454	318	329	389	357	540	353	128	162	253	4,577	30.8
	Self employment	479	434	391	879	504	397	372	432	451	264	252	333	5,188	34.9
	Total	1,918	1,218	1,193	1,614	1,182	1,369	1,092	1,342	1,236	836	829	1,054	14,883	100

Figure 9 Income Sources Through the Year, NW4–1 Krishnanagar



Source : FAP17 Socio–Economic Monitoring

Here, the pattern is rather different to that seen in Durgapur. Small farmers who fish earn considerably more income from fishing than the landless and consume a smaller proportion of what they catch. Overall, it is noticeable that fewer small landholding households seem to be fishing than in Durgapur, but those that do earn considerably higher incomes. By contrast, landless households' involvement in fishing seems to be little over the subsistence level.

The relative stability of incomes in Durgapur compared to Krishnanagar is significant. Besides the generally higher levels of overall income in all landholding categories seen in Durgapur, the variation from season to season is also considerably less. Through the year, average monthly incomes in Durgapur only vary by about 53% over the minimum, whereas in Krishnanagar the fluctuation is 124%.

2.8 Conclusions

Within Chalan Beel Polder 'B', around Durgapur village, the degree of dependence on fishing and earnings from fishing are higher overall than in the outside, unprotected area of Chalan *beel* near Krishnanagar. These higher levels of fisheries income are partly the result of the large number of *kua* (fish-pits) excavated in Haribhanga *beel*. During the peak flood season, households in Durgapur also earn a higher proportion of their incomes from fishing.

Fishing activity in both communities is higher among small landholders than among the landless. Land ownership encourages fishing activity as it facilitates the use of static gear which can be set in flood waters over land owned by those fishing. Those who become involved in fishing as a livelihood, in spite of the loss of social status this entails, make a significant portion of their income from fishing.

The fishing season for those agriculturists involved in fishing is shorter in the unprotected area of Chalan *beel* because it drains out more quickly during the drawdown. In Haribhanga *beel*, drainage congestion due to the embankment draws out the fishing season into late February.

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 interactions 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 been more strongly influenced by wider political and social changes than by changes in the fisheries resource due to flood control.

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

Social & religious structure of fishing communities

Up to the Partition of India and Pakistan in 1947, fishing as a livelihood was almost entirely limited to specific social and religious groups. Since then, many of the lines traditionally dividing fishing and non-fishing communities have steadily broken down. Hindu caste fishermen have either disappeared or changed occupation and Muslim farmers have become fishermen. Changes in resources and hydrology due to flood control constitute one of the 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, can be affected by flood control measures. In some cases, a tendency for traditional fishing communities to migrate directly due to changes in

the fisheries resource is clear, but some general points need to be made regarding migration of traditional fishing communities as an indicator of flood control impacts.

- 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. These events should not be confused with impacts of flood control.

- The general tendency 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 them to continue their traditional occupation.

- Changes in patterns of **seasonal** migration for fishing are probably better indicators of changes in the resource than wholesale out-migration by entire fishing communities. These changes are seldom the result of the introduction of flood control *per se*, but flood control is often one of a range of factors influencing changes in the areas exploited by fishermen.

Access issues

Traditional fishing communities have tended to be affected more than any others by the general changes in fisheries access arrangements which have taken place over the last 40 years. 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.

While fishing communities adapt, like any other community, to changing circumstances and change their technology accordingly, gear use among specific groups of fishermen also reflects 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.

Occupations and incomes

In spite of social and cultural barriers, traditional fishing communities do seem to 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 satellite fishing communities

The area around the lower Atrai, Haribhanga *beel* and Chalan *beel* has a history of fisheries exploitation by a heterogeneous fishing community. Different Hindu caste groups are found in the area, generally fishing water-bodies to which they have long held the rights.

In addition, there is a large community of Muslim fishermen, such as those in Jagendranagar and Bildahar, who also have long traditions of fishing in the area as well. These Muslim fishermen are generally referred to, by those from outside the community, as *jiani*, an apparently derogatory term commonly used in the Chalan *beel* area that emphasies their low status.

Jagendranagar

The village selected as a satellite fishing community for Durgapur, inside the Chalan Beel Polder 'B' is actually located **outside** the flood control embankment, on the east side of the Atrai River. But fishermen from this community are active in fishing both in Chalan *beel* and in Haribhanga *beel* inside the Polder 'B' scheme. The village was selected on the basis of identification by people in Durgapur as the group of fishermen most active in fishing in the empoldered floodplain and *beel* around their village. Fishermen from other fishing communities in Gurudespur and Biaghat also occasionally fish on Haribhanga *beel*.

Jagendranagar is a predominantly agricultural community located on the banks of the Hardama *khal* which connects the Atrai with the Besani River in Chalan *beel*. The *para* or hamlet inhabited by professional Muslim fishermen is located in the easternmost section of the village, near the edge of Chalan *beel*.

The small size of the Jagendranagar fishing community means that they have little influence in the local fisheries *samity* of which they are part. The Biaghat *matshajibi samabaya samity* is dominated by the far larger fishing communities from Biaghat and Bilsa and this is reflected in the distribution of sections of the Sadadigar *jalmahal* to different fishing groups.

Although Muslim, the fishing community in Jagendranagar and other nearby Muslim fishing communities exhibit caste-like characteristics. They are clearly differentiated from the surrounding community. Until relatively recently, the fishing groups in Jagendranagar and Bildahar were endogamous, with inter-marriage only with other Muslim fishing communities in the vicinity.

Bildahar

Bildahar, the fishing community selected as the satellite for the **outside** village of Krishnanagar is situated astride the Polder 'B' embankment on the **west** bank of the Atrai. The bulk of their fishing is carried out in unprotected areas to the east of the river. Several

other fishing communities are located in the centre of the Chalan *beel* area, such as Bilsa, but access to such communities for regular monitoring was more difficult.

Bildahar is a large fishing community of over 200 households and, as a result, their village fisheries *samity* plays an important role in determining the distribution of areas for leasing among the fishing communities participating in the Sadadigar Group Fishery. The range of waterbodies fished by Bildahar fishermen reflects this influence.

The two satellite fishing communities for Durgapur and Krishnanagar fish similar sets of waterbodies located both inside and outside the Polder 'B' embankment. Their association with the inside and outside main villages respectively is therefore based purely on their relative vicinity as opposed to being located inside or outside the flood control scheme themselves. The fact that both villages' fishing grounds cover both protected and unprotected areas enables a better analysis of changes in the relative importance of different fishing grounds as a result of flood control.

3.3 Migration

Jagendranagar

Table 10 shows the numbers of households migrating to and from Jagendranagar over the last 40 years, with the timing and causes ascribed by respondents in the communities.

Prior to Partition in 1947, Jagendranagar and the area of Chalan *beel* nearby was attracting in-migration as there were large tracts of unexploited land still available for settlement. However, from about the 1980s onwards, the tendency has been reversed, at least among the Muslim fishing community in Jagendranagar. Households have been progressively moving out, even though the village is located near to one of the few unrestricted areas left in Chalan *beel* and **should** be good for fishing. The fishing community in Jagendranagar is now smaller than it was in the 1930s.

This recent out-migration is because of a combination of declining fisheries over the entire area and increasing competition over access to fisheries from neighbouring farming

Table 10
Jagendranagar
in - & out-migration of households - 1950s to present

VILLAGE	IN-MIGRATION		OUT-MIGRATION	
Timing	H/H nos.	Reasons for in-migration	H/H nos.	Reasons for out-migration
before 1950	8-9	• Low price of land • Good fishing	0	-
1950-1970	0	-	0	-
1970-1980	0	-	0	-
1980-1990	4-5	(from Pabna) • river erosion victims	5	• Decline in fishing • Competition with non-traditional fishermen
1990-present	0	-	10	• Decline in fishing • Competition with non-traditional fishermen

Source: FAP17 Village Appraisals

communities. Although Jagendranagar fishermen have maintained formal access to their traditional fishing grounds, local farmers are reported more inclined to restrict fishing activity of outsiders on their land.

Kua development in Haribhanga *beel* has created some new fishing opportunities, with Jagendranagar fishermen sometimes able to manage *kua* on a catch-share or leasing basis. But *kua*-owners normally dewater their own *kua* using low-lift pumps, a process which does not require fisheries expertise.

Most migrating fishermen have moved "upstream" to Singra, Nandigram and Dahia, where some have continued fishing but many have changed occupation altogether.
The deterioration of the flooding situation in the area around Jagendranagar due to the effects of the Taras embankment are also said to have contributed to out-migration.

In addition to the permanent out-migration described above, 20-25 fishermen from the community migrate seasonally to other parts of Chalan *beel* in search of better fishing. Fishermen generally move eastwards into the section of the *beel* in Pabna District or to the area around Taras. These movements usually occur in *ashar* (June/July) and *sraban* (July/August). Over the last 4-5 years, 20-25 men from the fishing community have also started migrating for 10-15 days at a time from *choytra* (March/April) to *joistra* (May/June) for agricultural labouring work.

Bildahar

Table 11 shows the migration data for Bildahar. The migration history of this community is more complex. Bildahar once had a sizeable community of Hindu *rajbangshi* fishermen. The majority of these households left East Pakistan after Partition to move to West Bengal. Of those who stayed on, the majority have ended up following their co-religionists in successive waves. The nine remaining Hindu households in the village have all changed their occupation (see Box 2).

There are only 9 households left out of the *rajbangshi* fishing community in Bildahar. Most have left Bangladesh for India over the course of the last 20 years. Those that are still there have all left fishing as an occupation, unable to sustain the competition with the rapidly growing Muslim fishing community. The remaining households have taken to sweet-making as an alternative occupation and have apparently succeeded in establishing themselves. In keeping with their new occupation, they have also taken on a new name, abandoning the title *rajbangshi* for the more distinguished *sarkar*.

Box 2 : Changing caste

In addition to this out-flow of Hindu households, there has also been a steady flow of out-migrants from among the traditional Muslim fishing community in the village. The reasons for this seem to be identical to those mentioned in Jagendranagar : declining fisheries resources and increasing competition and interference from surrounding agricultural communities. The situation in Bildahar is made worse by acute overcrowding in the village homestead area. The large fishing community of 213 households is crowded into a tiny strip of land between the Polder 'B' embankment and the Atrai River and many newly formed households have chosen to move out and look for new places to settle. The majority have moved to Singra *thana*, many to a single village, Omorpur. Many are said to have given up fishing.

About 45-50 fishermen from Bildahar migrate seasonally to a variety of areas in search of better fishing grounds. This migration occurs in two distinct periods of the year : first of all

C7

Table 11
Bildahar
in- and out-migration of households - 1950s to present

VILLAGE	IN-MIGRATION		OUT-MIGRATION	
Timing	H/H nos	Reasons for migration	H/H nos.	Reasons for migration
before 1950	0	-	10-15	• communal pressure (all Hindu *rajbangshi* H/H migrating to India)
1950-1970	0	-	0	-
1970-1980	0	-	4-5	• communal pressure (all Hindu *rajbangshi* H/H migrating to India)
1980-1990	0	-	35-40	• decline in fishing • competition with non-traditional fishermen • communal conflict (some Hindu *rajbangshi* migrating to India)
1990-present	0	-	35-40	• decline in fishing • competition with non-traditional fishermen

Source: FAP17 Village Appraisals

during the early flood season in *ashar* (June/July) and then again during *augrahayan* (November/December) and *poush* (December/January). During this period, the waterbodies round about Bildahar cannot support the large number of local fishermen **and** local farmers such as those from Krishnanagar. Popular destinations for seasonal movement are down the Atrai around Baghabari, Naogaon and Rajshahi.

The progressive empoldering of large areas of Chalan *beel* is mentioned by fishermen as a factor contributing to the overall decline in fishing, forcing local fishermen to seek new fishing grounds elsewhere, but it is the level of competition for the declining resource that is generally regarded as most important.

3.4 Access for fishermen

Both Jagendranagar and Bildahar have "traditional" fishing grounds which date back, at least, to the *zamindari* period.

In Chalan *beel* it would seem that, while fishing communities **in general** face problems of this sort, within the fishing community, Hindu fishermen are relatively better off and wield more influence in the distribution of access rights among different groups of fishermen.

Figure 10 shows the distribution of fishing effort by Jagendranagar and Bildahar fishermen across waterbodies governed by different types of access arrangement.

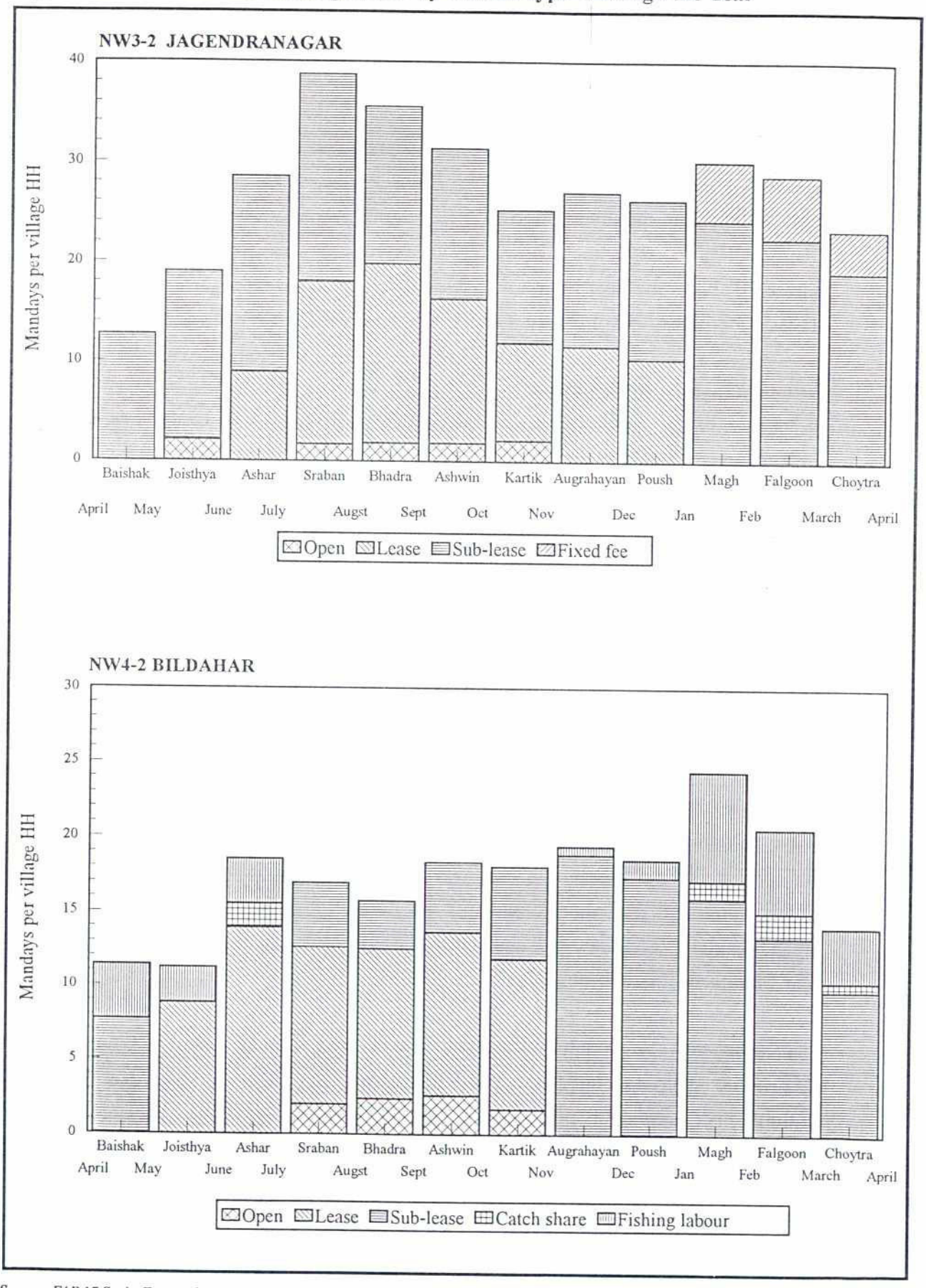
Jagendranagar - access issues

In Jagendranagar, fishermen own small, inexpensive gear such as *daun borsi* (Lines) and traps, adapted to fishing on shallower waters on the floodplain. They do have access to the deeper, more productive waterbodies in Chalan *beel*, such as the Besani-Ghumani river, but they do not have direct control of the lease which is in the hands of fishermen from Bilsa. Formal access arrangements normally guarantee Jagendranagar fishermen fishing grounds on a range of seasonal *beel* such as *beel* Tepigari, Mollagari and Doani state these are their most important fishing grounds.

This is in contrast to fishermen's own accounts of the relative importance of different waterbodies and the access which the community has to them. Under normal circumstances, the Hardama *khal* running right through the community is the most important single fishing ground and the lease for this *khal* is always awarded to Jagendranagar. However, this year, when the various sections of the Satadikar *jalmahal* came to be distributed in early 1993 for the coming fishing season, the *khal* was leased to a Hindu fisherman from Bilsa who is closely connected with the secretary of the *samity*. This leasee then offered sub-leases to Jagendranagar fishermen. Few Jagendranagar fishermen have done much *khal* fishing this year, due to this new arrangement.

Jagendranagar is a community of low status, even among fishing communities. Their connections with the bureaucracy are not strong and many of the local Hindu fishing communities wield more influence, if only by virtue of their size. Connections with the marketing and credit network are important factors in ensuring access to the best fisheries.

Figure 10 Distribution of Fishing Effort by Access Type Through the Year



Source: FAP 17 Socio-Economic Monitoring

More members of the fishing community seem inclined to shift to other occupations seasonally in order to make up for these problems over fisheries access.

Bildahar - access issues

The Bildahar fishermen are not facing problems due to competition with other fishing communities to the same degree as Jagendranagar, but the low income levels in the community suggest that there is competition **within** the community for fisheries access. More Bildahar fishermen are more entirely limited to fisheries as an income source. The location of the community close to the *bazar* at Aekanno Bigha gives Bildahar fishermen better connections with local sources of informal credit and marketing channels but means that they have little space for agricultural land.

The village contained a sizeable Hindu fishing community in the past. Prior to Partition in 1947, the fishing roles in the village were clearly defined. Hindu fishermen fished primarily with *berjal*, *veshal* and *jhaki jal* and specialised in the harvesting of the deeper waterbodies in the *beel*. The Muslim fishermen were equally specialised but in trap fisheries in the shallower floodplain areas. The division into these two specialised groups has long historical roots. The Hindu fishermen were probably the first to arrive in the area and, logically, would have concentrated on exploiting the deepest *beel* where fish were congregated during the dry season and easiest to catch. This would demand the sort of big *berjal* which are predominantly owned by Hindu fishermen in the area.

The Muslims, either arriving at some later date or taking up fishing after being in the area for some time, would have lacked the gear to exploit these deeper waterbodies and may have been prevented from doing so by the Hindu fishermen. Thus they specialised in the fishery on the "open-access" floodplains and cultivated areas. The fisheries in these areas are less productive but, at that time, Muslim fishermen would have encountered no resistence to their involvement in fishing there.

In Bildahar, the departure of the bulk of the Hindu population after Partition opened up a whole new range of waterbodies to exploitation for the Muslim fishermen. The richer Muslim fishing households have taken over the gears **and** the waterbodies of the *rajbangshi*, leading to the more diverse pattern of fishing seen in the community today. However, the radical changes in the physical nature of the *gari* and *beel* which the Bildahar fishermen inherited from the *rajbangshi* has meant that, during the winter season, there are progressively fewer

fishing opportunities from their harvesting.

Land ownership and fisheries access

The changes in land ownership which have taken place in Chalan *beel*, with the bulk of the land coming under private ownership and being turned over to *boro* cultivation, have had important impacts on fisheries access for traditional fishermen. Hindu fishermen have mainly suffered as a result of the physical changes in their waterbodies. Waterbodies have silted up, their holding capacity during the dry season has been reduced and they have started drying up earlier and earlier in the year. This has greatly shortened what was traditionally the peak harvesting time for these fishermen, as well as reducing the overall productivity of the area.

The progressive drying out of the *beel* has been encouraged by the spread of irrigation and surface water withdrawal. The land under these waterbodies has also been targetted for agriculture, and here conflicts over access have arisen which have affected Muslim trap fishermen even more than the Hindu *berjal* operators. As every inch of land in the *beel* has come into private ownership, many landowners have recognised the fisheries potential of the flood waters covering their plots. During the flood recession, when fishermen traditionally could place their traps (and more recently their *current jal*) anywhere on the floodplain, more and more landowners are placing their own fishing gear and excluding that of fishermen. Tales are frequent about farmers stealing fish from the traps and nets which fishermen have laid, or simply throwing away their gear in order to replace it with their own.

Table 12 illustrates this process of change in land use in the *beel* and how it has affected people from different social groups, including the traditional Muslim fishermen.

The increasingly rapid development of *kua* is encouraging the closure of fisheries access by landowners on the floodplain. *Kua* owners know that any fish caught on the floodplain, even **before** the flood recession, will potentially reduce their later catch. The trend towards increasing regulation is inevitable as the value of the resource rises.

Fishermen do not necessarily lose out entirely as a result of this process. Besides being hired to harvest *kua*, many are able to lease out *kua* on a longer term basis. In the unprotected area of Chalan *beel*, *kua* are notably less developed than inside the Chalan Beel Polder 'B' scheme. *Kua* that do exist there are usually less well managed; and one reason given is that more of them are leased out by fishermen. The fishermen lack the capital to invest in

Table 12

Chalan *beel* : changes in fisheries access for different social groups - 1960s to present

		FISHERIES INVOLVEMENT FOR DIFFERENT SOCIAL GROUPS			OTHER
Time	**Muslim fishermen**	**Hindu fishermen**	**Landowners**	**Landless labourers**	**ACTIVITIES & CHANGES**
1960s	**Flood season** - open fishing on floodplains: leases on river & *khal* **Dry season** - open fishing of floodplain: harvesting of *beel* ⇓	**Flood season** - open fishing in floodplains: leases on rivers **Dry season** - *berjal* fishing on leased rivers, *beel* & *gari* ⇓	**Flood season** - subsistence fishing on floodplain, rivers &. *khal* **Dry season** - ditch harvesting ⇓	**Flood season** - subsistence fishing in floodplains, rivers & *khal* **Dry season** - community fishing on small ditches ⇓	**Flood season** - DWR **Dry season** - *rabi/boro* crops & cattle in *beel* & flood-plain: *khas* land fallow: ⇓
1970s	**Flood season** - open fishing on floodplains: leases on river & *khal* **Dry season** - open fishing of floodplain: harvesting of *beel* ⇓	**Flood season** -open fishing in floodplains : leases on rivers **Dry season** - *berjal* on leased rivers, *beel* & *gari*: harvesting *kua* on floodplain ⇓	**Flood season** - subsistence fishing in floodplain, rivers & *khal* **Dry season** - ditch harvesting: lowland in *beel* occupied & cultivated: *kua* on floodplain ⇓	**Flood season** - increasing subsistence fishing in floodplain, rivers & *khal* **Dry season** - community fishing on ditches: more labour on *boro* during winter: in-migration of agri.labour ⇓	All *khas* land distributed by 1974: lower land cultivated: increase in *boro* area: in-migration for *amon* harvest ⇓
1980s	**Flood season** - open fishing on floodplain: leases on river & *khal* **Dry season** - some restriction on fishing in floodplain: leased *beel* & *gari* drying up: some *kua* harvest ⇓	**Flood season** - open fishing in floodplains : leases on rivers **Dry season** - *berjal* fishing on leased rivers, *beel* & *gari*: leased areas drying up: *kua* on floodplain ⇓	**Flood season** - more subsistence fishing & fishing for income on flooplain, rivers & *khal* : **Dry season** - most of *beel* converted to *boro*: more *kua* ⇓	**Flood season** - increasing subsistence fishing & fishing for income in floodplain, rivers & *khal* **Dry season** - more agri.labour during winter: ⇓	Most of *beel* & lowland cultivated: HYV *boro* introduced: Polder 'B' completed: less in-migration: *kua* excavated: ⇓
1990s	**Flood season** - restrictions on floodplain: competition for leases on river & *khal* **Dry season** - restrictions on floodplain: *beel* & *gari* seasonal: more *kua* harvesting: seasonal out-migration	**Flood season** - restrictions on floodplain: competition for leases on river & *khal* **Dry season** - *berjal* on leased rivers, *beel* & *gari*: leased areas drying up: *kua* on floodplain: seasonal out-migration	**Flood season** - subsistence fishing & fishing for income on floodplain, rivers & *khal*: **Dry season** - HYV *boro* cultivation in *beel*: many *kua* on floodplain	**Flood season** - subsistence fishing & fishing for income on floodplain, rivers & *khal*: some seasonal out-migration **Dry season** - labour demand static: some seasonal out-migration	Widespread HYV *boro* cultivation: some shift back to DWR due to cost of *boro* inputs: *kua* excavation widespread

Source: FAP17 Village Appraisals

branches or to make longer term improvements, such as reexcavation. Lack of security of tenure also plays an important role in limiting the extent to which fishermen are willing to improve the *kua* which they operate. By contrast, in Haribhanga *beel*, landowners are directly managing their own *kua*, take greater care over them and invest time and money in maintaining and improving them.

3.5 Fisheries access and water management

Inside the Chalan Beel Polder 'B' scheme, the control of water flow as a result of the construction of sluice gates influences access to water, and therefore to fisheries, for those inside the empoldered area. Even in the unprotected Chalan *beel* area, the water flow during the dry season, - a period critical for fishermen and for fish harvesting in the *beel* - is effectively manipulated by the damming of the Atrai River and the diversion of water into the *beel* area for irrigation.

The period when the control of inflows is liable to have a particularly important impact on fisheries is immediately after the first rains of the monsoon, generally during the months of *joitha* (May/June) and early *ashar* (late June). At this time, the eggs and fry of fish whose breeding has been triggered by the onset of pre-monsoon and early monsoon rainfall are passively drifting downstream with the current. Under normal circumstances, they would be carried via connecting *khal* into the *beel*. This generally occurs during the months of *joistra* (May/June) and early *ashar* (late June).

In Polder 'B', the Haribhanga sluice gate has often been kept shut during this period in order to protect the standing boro crops in the *beel* area (which the polder was primarily designed to protect). This limits the amount of fish which can enter into the *beel* at this critical time to "repopulate" it after the dry season. The rise of flood in Haribhanga *beel* comes significantly later than in the outside area of Chalan *beel* as a result of this water regulation.

Water management mechanisms

Water management schedules are determined primarily by agricultural requirements. The Haribhanga regulator, located on Haribhanga *khal* about a kilometre south of Durgapur village, is not operated according to any predetermined schedule. Guidelines are provided

to the regulator operator by the BWDB, but decisions about the opening and closing of the regulator are taken by a local water management committee. This committee consists of nine "representatives" of water users in the *beel* area. In practice this means that one or two influential farmers from each of the villages around the *beel* are members of the committee. There is not any **horizontal** representation across categories of users i.e. land-owners, fishermen, labourers. However, user groups interviewed in the various villages around the *beel* do not seem to have any major complaints over the management of water, or none they were willing to discuss in public.

Local people feel that the existing mechanisms allow them to exert a degree of control over the operation of the sluice gate. When any particular group wants the regulator either closed or open, they address their request directly to the regulator operator who then calls on the committee to make a formal decision on operation. The sluice gate operator only has to inform the higher authorities in the BWDB *post facto*. This facilitates reasonably prompt response to water needs in the catchment area of the regulator.

This local-level control mechanism may be more responsive but, given the composition of the committee, favours the interests of farmers. It is difficult to obtain reliable data on the subject, but lower land in the *beel*, much of which was *khas* until recently, tends to be controlled by the same larger farmers. Local people recount that, even **prior** to the distribution of *khas* land in the 1960s and 70s, most of it was already controlled and utilised by local elites. The tendency for low-lying land recently brought under cultivation to end up in the hands of larger, more influential landowners has been observed in other areas. Apart from their ability to influence the distributive process for these lands, there may be economic reasons for this. Larger landowners can afford the investment required to bring these lands under the plow, pay for irrigation and the inputs such as fertiliser and pesticides required for HYV *boro* cultivation.

While most local respondents **said** that there were no conflicts over water regulation, the sluice gate operator himself, when asked if there were ever any problems over when to operate the regulator, replied : "I don't know. If there's ever a problem, I just disappear". This seems to imply that problems do occur, most probably between water users with land holdings at different elevations.

Whatever the conflicts over water use through the Haribhanga regulator, it is clear that

fisheries concerns are **not** taken account of in its operations. The fishermen from Gurudespur who has the lease to the Haribhanga *khal* behind the sluice gate occasionally requests operation of the sluice to facilitate his harvesting operations, particularly during the dry season. However, given that most irrigation within the *beel* is provided by shallow-tube wells and that the regulator does not serve any irrigation function, the potential for conflicting demands is limited.

Undoubtedly, the closing off of water connections between the river and the *beel* at the time of the *boro* harvest in June has impacted negatively the production of fish in the *beel*. All local respondents mention the near disappearance of migratory carp species from the *beel* area since the construction of the embankment, but a marked decline of these species has also been noted in the unprotected area of Chalan *beel*.

3.6 Seasonality and fisheries

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.

Table 13 Distribution of Gears, Jagendranagar

Gear Type	Bengali Name	No.	%	Tk.
Gill net	Current jal	3	7.1	5740
Traps	Deal	32	78.5	5125
	Kakila bana	3	7.1	500
	Kadum	20	49.7	4652
Hooks	Sip	3	7.1	1275
	Daun	3	7.1	1047
	Nol barsi	12	28.4	2641
Cast net	Jhaki jal	6	14.2	732
Other	Akra	6	14.2	328

Source : FAP17 Socio-Economic Monitoring

Tables 13 and 15 show the numbers of households in different fishing categories in Jagendranagar and Bildahar respectively owning different kinds of fishing gears and the average household income earned from those gears.

Jagendranagar

The traditional Muslim fishermen of Jagendranagar are specialised in the use and manufacture of traps such as *kolshani* and *vashon* (medium-sized double-sided trap), *bitti* (small box-trap for medium-sized species), and *bhaire* (large trap for large species). They also make large bamboo cages called *jiala* for the storage of live fish like *koi* and *singi* before sale. Given the waterbodies to which Jagendranagar fishermen now have access, this specialisation in traps is logical. Most of the waterbodies such as Doani, Amla *gari*, *beel* Tepigari and even the Hardama *khal* are shallow with very slight gradients and ideal for trap fishing operation. The limitation of the Muslim traditional fishermen to these shallower and less productive sites is indicative of their relatively low social status, even within the fisheries sector.

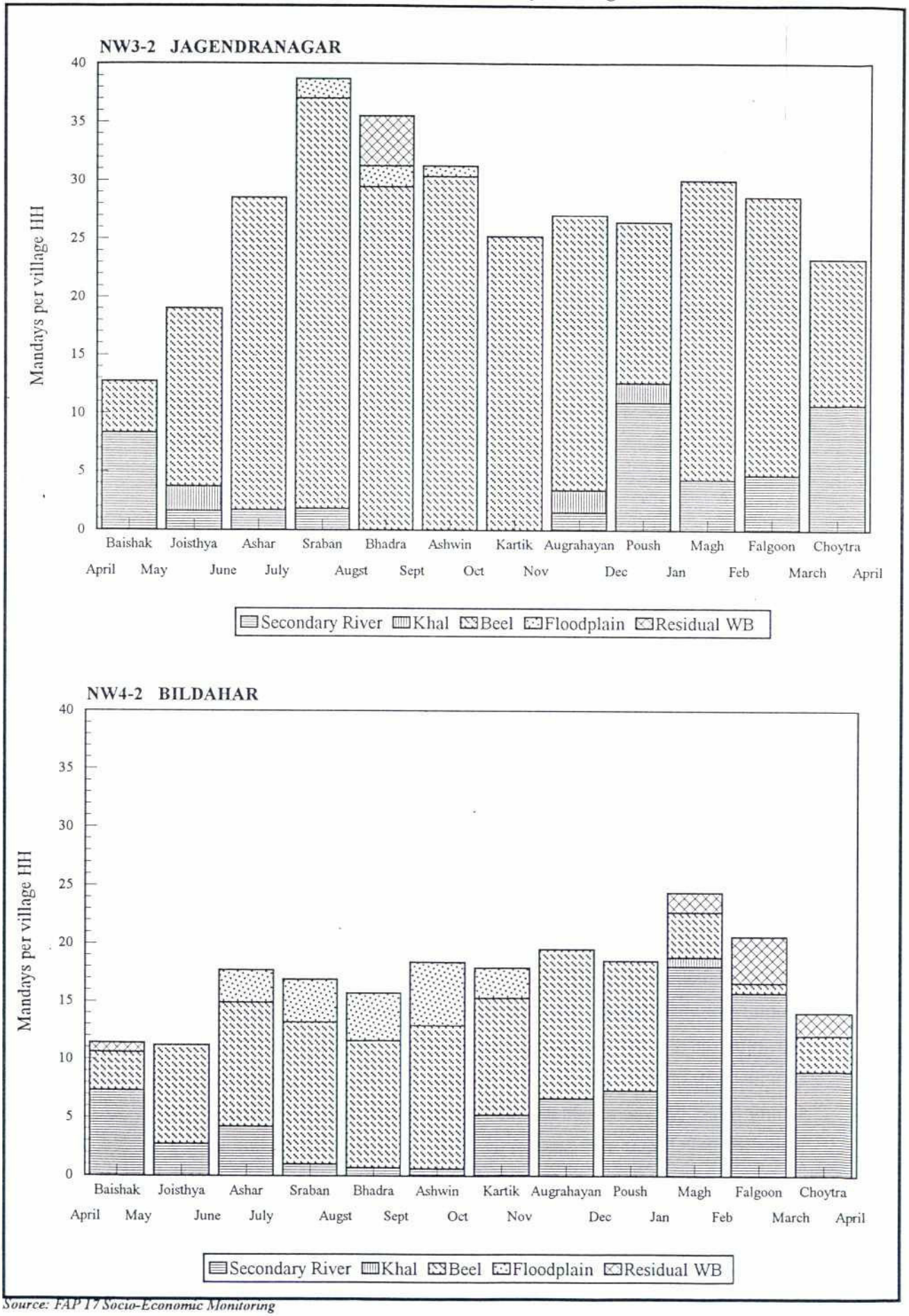
The distribution of fishing effort across different waterbodies through the year is shown in Figure 11. Table 14 indicates the peaks of effort for the most important gear/ waterbody combinations used in Jagendranagar.

The "standard" equipment for Jagendranagar fishermen consists of a combination of traps, usually numbering between 25-50 during the season which provide the mainstay of income, supplemented by either *current jal* (monofilament gillnet) or *nol borsi* (hook & line).

The pattern of gear use in the village has not changed a great deal in spite of the changes in local waterbodies due to siltation. The principal addition over the last 10 years to fishermen's equipment has been *current jal* (monofilament gillnet) which, like traps, is adaptable to use in shallow floodplains. It is probable that Muslim traditional fishermen in Chalan *beel*, such as those in Jagendranagar, have always had limited gear options open to them due to their social and economic position.

Access arrangements and the types of gear used by Jagendranagar fishermen strongly influence the seasonal pattern of fishing effort. Whereas the seasonal pattern of fishing effort for *berjal* fishermen of Bilsa would almost certainly show a big peak in the *beel* from the months of *magh* (January/ February) through to *choytra* (March/April), Jagendranagar people fish most on the *beel* during the height of the floods, in *sraban* (July/August) and *bhadra* (August/September). During this period, the floodplain area of Chalan *beel* is open for fishing practically everywhere and Jagendranagar fishermen exploit this to set their traps (in Table 13 called *deal* and *kadum*) as widely as possible. As the waters recede, their fishing

Figure 11 Distribution of Fishing Effort by Waterbody Through the Year



Source: FAP 17 Socio-Economic Monitoring

Table 14

Principal Gears, Use by Month and Waterbody

NW3–2 Jagendranagar

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Md/VHh	Eff %
Current jal	Beel					2.0	1.9	1.8			**5.9**	**6.3**	4.2	22.1	6.8
Nol barsi	Beel		0.9	2.0	5.1	**6.9**	**7.7**	4.4						26.9	8.2
Deal	Secondary River	**3.9**	1.6	1.7	1.8					**3.3**	1.9	1.8	2.8	18.7	5.7
	Beel	0.6	10.2	**19.5**	**20.9**	13.9	12.9	10.8	11.4	2.8	8.8	4.1	4.0	120.0	36.8
Kadum	Beel	3.8	4.1	5.3	7.9	4.6	4.4	4.4	**10.6**	8.4	**11.0**	**13.5**	4.4	82.4	25.3

NW4–2 Bildahar

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Md/VHh	Eff %
Current jal	Beel		**2.0**	1.7	1.7	1.6	**2.0**	**2.0**	**2.3**	**1.8**				15.1	7.3
Jhaki jal	Secondary River	2.0	1.6	2.0	1.0	0.7	0.6	3.6	4.1	4.0	**11.4**	**10.7**	4.5	46.3	22.4
	Beel	**1.7**	0.9				**1.3**	1.2	**1.5**	**1.4**	1.1	0.9	**1.7**	11.8	5.7
Daun	Beel		0.9		**3.9**	**3.3**	2.2	0.5						10.8	5.2
Deal	Beel			**6.1**	**5.2**	**4.8**	**5.7**	**5.5**	**5.1**	**5.5**	0.6			38.6	18.7

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

effort is progressively limited due to access restrictions, mainly those imposed by landowners. So, during the drawdown and dry season, when fish are easiest to catch, fishing effort diminishes due to restrictions imposed by landowners.

Table 15 Distribution of Gears, Bildahar

Gear Type	Bengali Name	No.	%	Tk.
Gill nets	Current jal	14	6.8	4565
	Koi/Fashi jal	14	6.8	300
Seine net	Ber jal	24	11.6	2519
Scoop net	Hat Tana jal	10	4.9	195
Traps	Deal	71	33.0	3994
	Kakila bana	14	6.8	720
	Kadum	42	19.5	934
Hook	Sip	10	4.9	645
	Daun	39	18.4	1635
	Nol barsi	35	16.5	3473
Cast net	Jhaki jal	110	51.5	4667
Other	Thushi	14	6.8	510

Source : FAP17 Socio-Economic Monitoring

Fishing effort on the *beel* does increase during *magh* (January/ February) and *falgoon* (February/March) as Jagendranagar fishermen harvest the residual water areas on *beel* leased in by them and on the *beel* controlled by other communities. This harvesting involves fishermen from other villages as well, with Jagendranagar fishermen using their traps and *current jal* to fish out the more periferal sections of the remaining water areas while the big *berjal* are used in the deeper sections.

During the dry season, many of the fishermen move onto the Atrai River as the *beel* dry up. Normally, the Hardama *khal* would also be heavily fished during this period but the recent change in access control has limited its importance this year.

Bildahar

The community in Bildahar presents a rather different picture. As seen above, they certainly have access to a more diverse range of waterbodies, although many of these seem to have similar characteristics to those fished by Jagendranagar fishermen. Like Jagendranagar fishermen, part of the community is specialised in trap manufacture and fishing, reflecting the importance of fisheries on the wide, gently sloping floodplains of Chalan *beel*. However, some *berjal* (seine nets) are also owned in the community and reflecting the wider range of waterbodies used, most fishermen make use of a larger range of gears than in Jagendranagar.

Most households in the village seem to combine *jhaki jal* (castnet) use and fishing with traps, such as *vashon* and *bitti*, and *daun borsi* , *current jal* or *koi jal* (multifilament gillnet). While the traps are used on the shallower floodplains, the lines, gillnets and castnets are more flexible. The use of *berjal* may have been inherited from the Hindu *rajbangshi* fishing community that previously lived in Bildahar along with the Muslim fishermen. The fact that the village is closer to a marketing centre in Akanna Bigha and that they are a larger community also means that they have connections with *mohajan* and *arotdar* who are able to finance larger gears such as *berjal*.

Use of this gear was traditionally concentrated in the winter months when it was used for the harvesting of waterbodies such as the Padda *gari* and Pitha *gari*. Now, it is being used increasingly to harvest *kua* excavated in the floodplain, particularly the Gutia Sairat inside the Chalan Beel Polder 'B'. The harvesting of *katha* in the Atrai River is also extremely important for these *berjal* operators.

Jhaki jal (castnet) is the most important single gear used by Bildahar households. It gives them considerable flexibility as it can be used in floodplains, *gari*, rivers and *khal* and in the harvesting of *katha* and *kua*. Those fishing households which migrate out seasonally to Baghabari, Naogoan and Rajshahi generally do so with *jhaki jal*.

The declining condition of the *beel* traditionally harvested in Bildahar is reflected in the pattern of fishing effort shown in Figure 11. Fishing on *beel* during *magh* and *falgoon* is now very limited. The peak in fishing effort during the latter part of the year is primarily from *katha* harvesting in the Atrai River. This fishing effort tends to benefit those households owning *berjal* whose earnings also peak dramatically at this point of the year (see section 3.7 below).

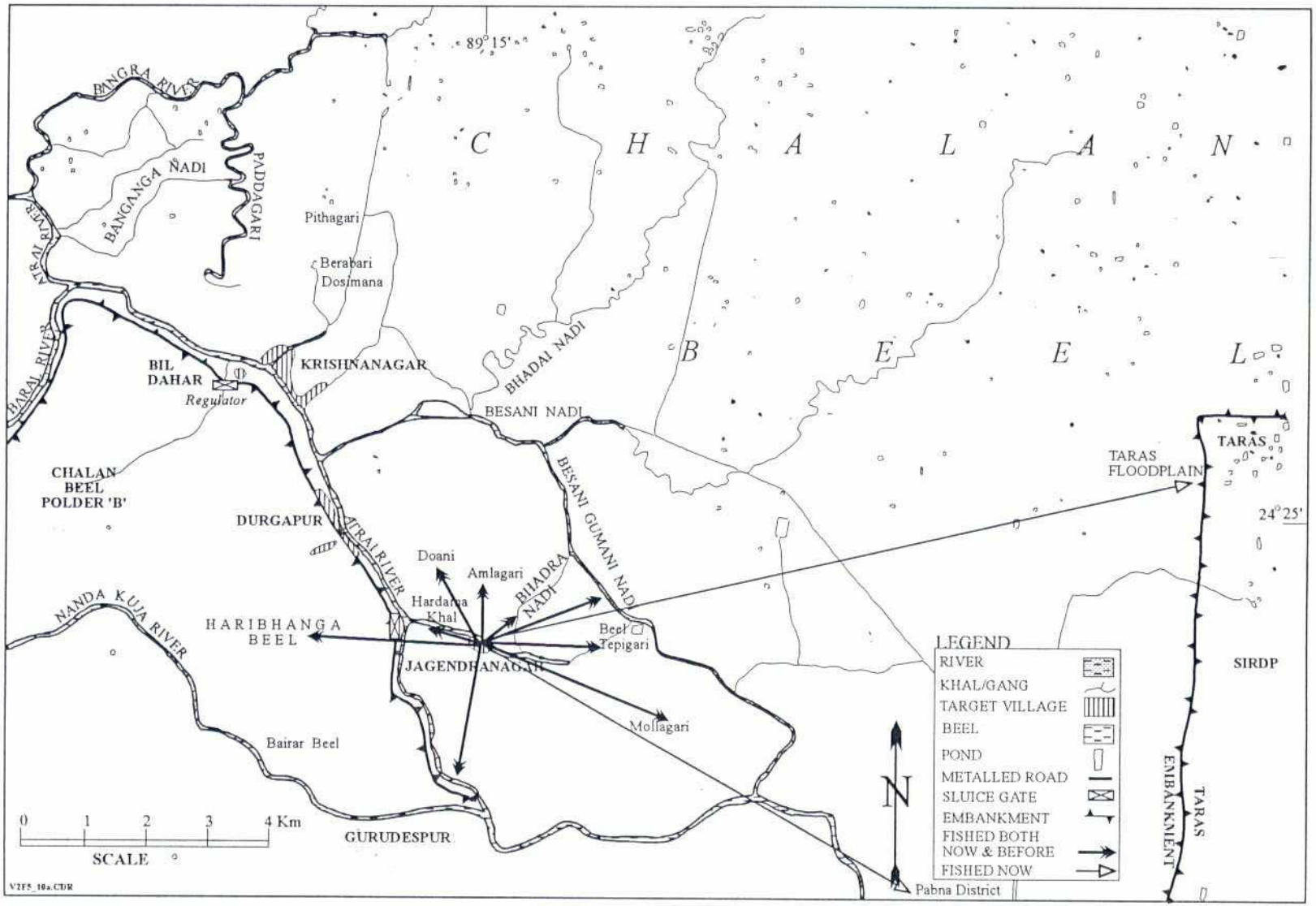
3.7 Patterns of waterbody exploitation

Jagendranagar

Figure 12 shows the waterbodies exploited by fishermen from Jagendranagar and compares them to past patterns of exploitation.

The various *beel* and old river beds (called *gari* locally) in Chalan *beel* and Haribhanga *beel*,

Figure 12
Jagendranagar
Map showing waterbodies fished - past & present



now inside the poldered area, have always played a dominant role in fisheries. During the *zamindari* period, the rights of Jagendranagar fishermen to exploit these waterbodies were widely recognised and these same rights have been awarded to the fisheries *samity* which includes Jagendranagar. The distribution of fisheries access among fishing communities in the area has remained stable.

The most important exception to this is the Hardama *khal* running immediately in front of Jagendranagar village between the Atrai River and Chalan *beel*. This is normally an important fishing ground for the village and one to which they traditionally enjoyed fishing rights. However, the change in the leasing arrangements during the year 1993/94 seems to have resulted in their exclusion. The amount of fishing effort now applied to *khal* is negligible and limited to the period of first in-flow of fish and the early dry season.

While most other fishing locations have not undergone any major changes, it is obvious that the physical characteristics of many of the most important waterbodies for Jagendranagar have changed quite radically. In particular, out of eight waterbodies listed as being most important for fishermen in the village, **all** except the Atrai River have gone from being perennial waterbodies, offering reasonably stable round-the-year fisheries access, to being seasonal, with most of them drying up earlier and earlier every year.

Increased siltation of the Chalan *beel* area is responsible for this change and a variety of processes are identified by local people as contributing to this. The most important single factor cited was the excavation of several *khal* linking the Atrai with the *beel*. These *khal* are said to have greatly increased the flow of silt-laden waters into the *beel*. Krishnanagar and Anandanagar *khal* are just two of a series of *khal* which were reportedly excavated by the BWDB in the 1960s and 70s to encourage *boro* cultivation in Chalan *beel*.

The numerous major flood control schemes in the Atrai Basin have also contributed significantly. Embankments on either side of the Atrai upstream from the area under study, as well as the Polder 'B' and Taras embankments, constrict flows of flood water into a relatively limited area. The silt loads carried by these waters and by the Atrai are therefore deposited in a far more concentrated area than previously, speeding up the process of siltation in Chalan *beel,* raising its bed.

This process has also made the provision of irrigation water through the winter more and

more of a problem. This has led local farmers to dam the Atrai River regularly in the month of *falgoon* (February/March), usually at a point about one kilometre downstream from Krishnanagar, in order to divert more water through the Krishnanagar and Anandanagar *khal* into the *beel*. This has probably accentuated the siltation problem.

The demand for irrigation water itself is also playing an important role in effectively drying out the Chalan *beel* area during the winter months. Since the introduction of HYV *boro* in the 1970s, pumped irrigation using low-lift pumps has spread widely in the area. This accelerates the drawdown of waterbodies in the dry season, as well as enabling a far more complete harvesting of catches, which may have negative effects on the subsequent year's stock recruitment.

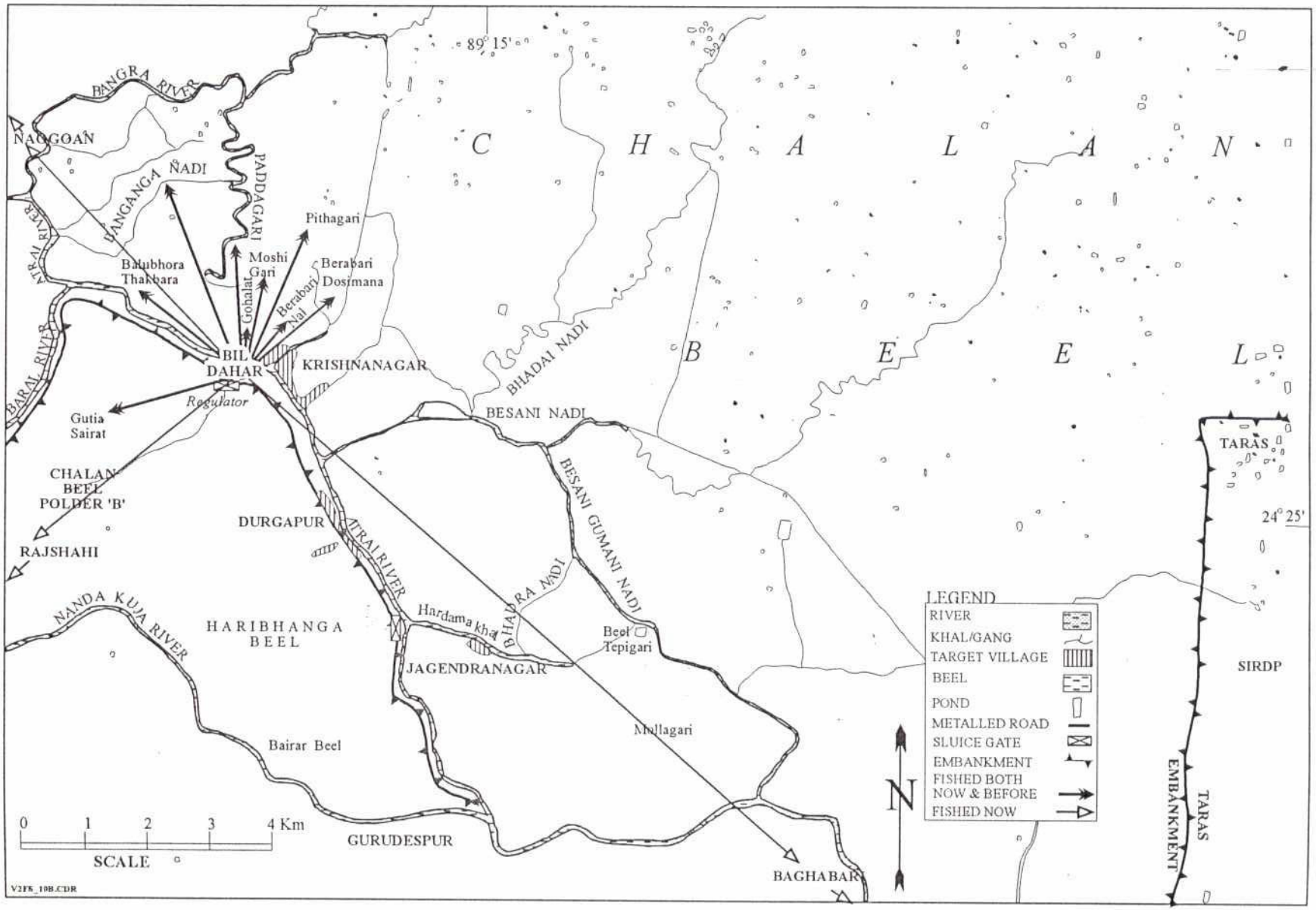
The Atrai River is being affected by siltation in much the same way. The depth of the Atrai channel has reduced significantly over the last 15-20 years and, in the dry season, the flow is minimal. In the 1992-93 dry season, which was particularly severe, the river dried up completely in a few spots, for the first time that anyone could remember. The increase in the number of mechanised boats on the Atrai River is said to have contributed as the wash from their bows erodes the banks of the river, depositing yet more earth and sand into the water column. Many respondents commented on the fact that the Atrai River channel is now wider but considerably shallower because of this effect.

Bildahar

Figure 13 shows the waterbodies fished at present and in the past by the fishermen in Bildahar. As in Jagendranagar, there has been relatively little change in the range of waterbodies fished by Bildahar fishermen, except for the seasonal migration of some 45-50 fishermen to Baghabari, Rajshahi and Naogoan. This is apparently in response to the same problems experienced by Jagendranagar fishermen. The majority of the old rivers and *gari* in Chalan *beel* traditionally fished by Bildahar fishermen have silted up dramatically over the last 10 years and have become seasonal. The Padda *gari*, Banganga *nadi*, Pitha *gari* and Berabari *nal* are all still important for Bildahar fishermen but they hold considerably less water year-round.

Bildahar fishermen exploit a slightly wider range of waterbodies than the Jagendranagar fishermen, a fact also reflected in the range of fishing gear which they operate. Bildahar fishermen have been able to benefit from an increase in the number of *kua* being excavated

Figure 13
Bildahar
Map showing principal waterbodies fished - past & present



inside the Chalan Beel Polder 'B' to a greater extent than Jagendranagar fishermen. The fishery on the Gutia Sairat, a *beel* inside the polder to the west of Bildahar, is said to have become more important over the last ten years and this is attributable to *kua* fishing and the longer retention of flood waters inside due to the embankment.

The fishery on the Atrai River is also more important for Bildahar fishermen, particularly later in the year. This shift during the winter months from the *beel* to the river illustrates the major physical changes in the *beel*. Whilst these used to be perennial and harvested intensively during the winter, they are now seasonal and fishing activity on them tends to diminish during the dry winter months.

The waterbodies exploited by fishermen from both Bildahar and Krishnanagar have not changed radically but the condition and productivity of their fishing grounds has been seriously impacted by siltation. These changes have become most marked in the last 10 years and are the cumulative effect of embankment construction, heavier silt loads in the rivers and increased surface-water withdrawal for irrigation.

There has also been a steady increase in numbers of people engaging in seasonal fishing and in farmers fishing their own land to the exclusion of traditional fishermen. As a result, fishermen from Jagendranagar and Bildahar are increasingly being forced to extend the range of their fishing operations in order to find adequate fishing grounds. Seasonal migration to a variety of areas in the North-West Region seems to be becoming a common strategy.

The fishing of fish-pits is growing in importance and fishermen will become increasingly involved in leasing and catch-share arrangements for the ponds. However, the numbers of *kua* available will be unlikely to compensate fully for the loss of natural fishing grounds.

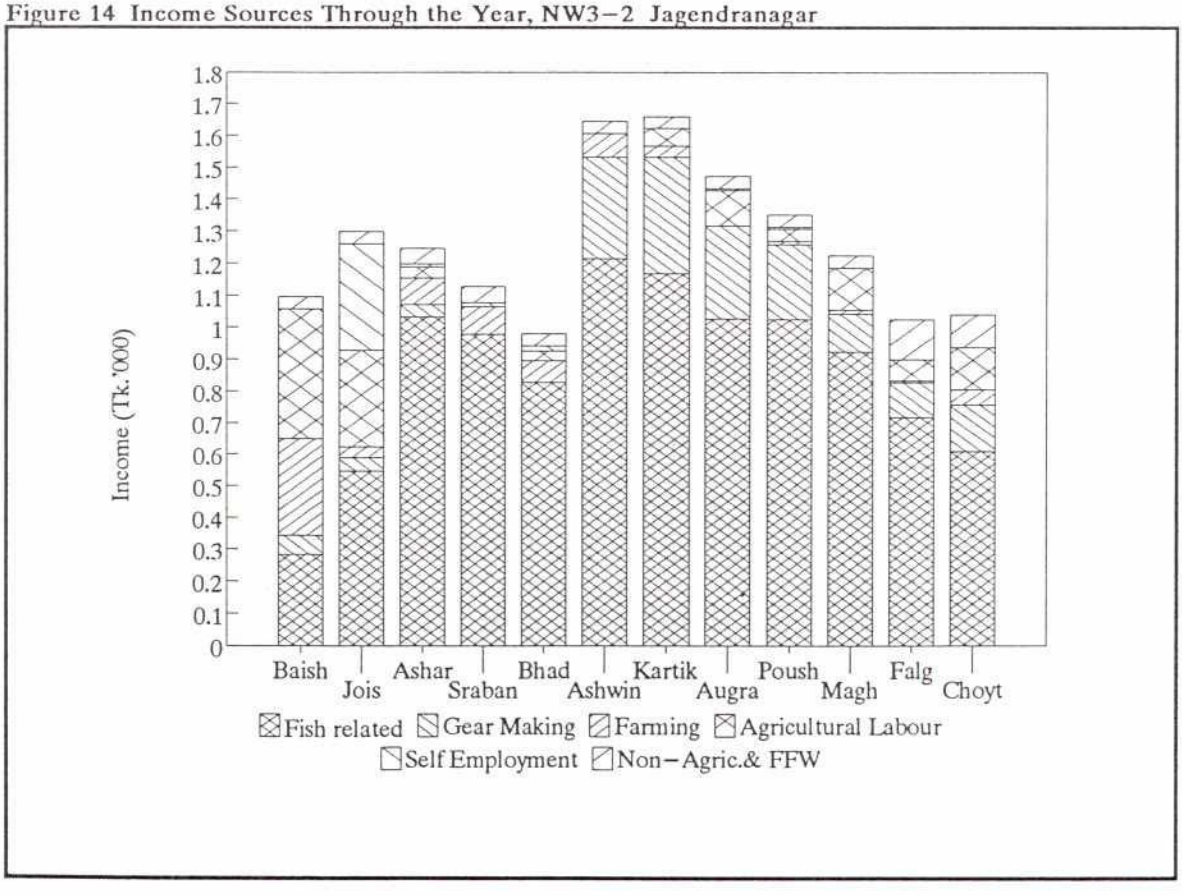
3.8 Occupations and incomes

Tables 16 and 17 and Figures 14 and 15 show the income flows from different sources for fishermen from Jagendranagar and Bildahar. In the tables, data is disaggregated by "household fishing category" in the same way as in Tables 1 and 2, based on the census data. Obviously, some households which claimed to be exclusively dependent on fisheries had some income sources other than from fisheries during the course of the monitoring.

Table 16 Income Sources Through the Year, by Fishing Category, NW3–2 Jagendranagar UNIT: TK

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABA	BHAD	ASHWI	KARTI	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
HFC2	Fishing	262	327	856	947	982	1,062	954	874	938	960	719	546	9,427	71.0
	Fishing Trading	7	50	45	–	–	–	68	89	91	45	–	55	451	3.4
	Gear Making	32	4	15	34	5	–	68	34	–	36	–	22	250	1.9
	Farming	55	–	56	60	60	88	40	1	12	–	–	18	390	2.9
	Agricultural Labour	485	365	41	–	36	–	67	130	45	155	80	158	1,563	11.8
	Self Employment	–	393	14	14	19	–	–	8	8	–	–	–	455	3.4
	Non–Agric.& FFW	45	45	58	59	45	45	45	45	45	45	147	121	749	5.6
	Total	886	1,184	1,085	1,114	1,147	1,195	1,242	1,181	1,139	1,241	946	920	13,285	100.0
HFC3	Fishing	–	1,455	1,740	1,145	–	–	–	–	–	–	–	–	4,340	27.8
	Fishing Trading	350	–	–	–	–	2,020	1,940	1,360	1,000	500	700	650	8,520	54.5
	Farming	1,650	210	224	240	120	–	–	–	–	90	40	200	2,774	17.7
	Total	2,000	1,665	1,964	1,385	120	2,020	1,940	1,360	1,000	590	740	850	15,634	100.0
Com–	Fishing	221	505	995	978	827	894	803	736	790	808	605	460	8,624	63.1
munity	Fishing Trading	61	42	38	0	0	319	364	290	234	117	111	149	1,725	12.6
	Gear Making	27	3	13	29	5	–	57	28	–	30	–	18	211	1.5
	Farming	306	33	82	88	69	74	34	1	10	14	6	47	767	5.6
	Agricultural Labour	408	307	34	–	31	–	56	109	38	130	68	133	1,316	9.6
	Self Employment	–	331	11	11	16	–	–	7	7	–	–	–	384	2.8
	Non–Agric.& FFW	38	38	49	50	38	38	38	38	38	38	124	102	630	4.6
	Total	1,061	1,259	1,222	1,156	986	1,325	1,352	1,209	1,117	1,137	914	909	13,657	100.0

Figure 14 Income Sources Through the Year, NW3–2 Jagendranagar

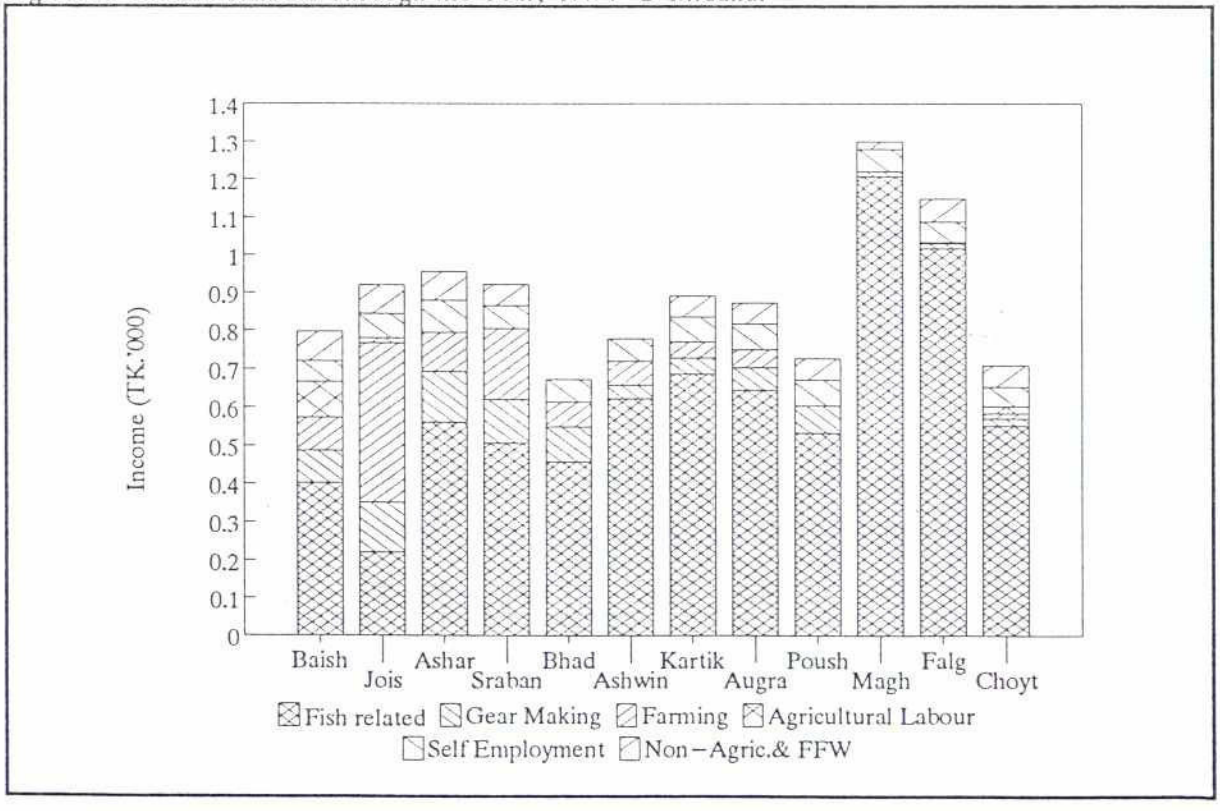


Source : FAP17 Socio–Economic Monitoring

Table 17 Income Sources Through the Year, by Fishing Category, NW4–2 Bildahar UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOISTH	ASHAR	SRABA	BHAD	ASHWI	KARTI	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
HFC1	Fishing	454	159	578	506	481	638	762	605	373	1,690	1,543	778	8565	74.8
	Fishing Labour	8	33	26	–	–	–	–	–	56	56	62	11	251	2.2
	Fishing Trading	–	–	55	63	76	40	48	114	63	–	–	–	458	4.0
	Gear Making	57	34	34	86	33	39	49	57	83	–	–	13	485	4.2
	Farming	–	–	3	9	–	–	–	–	–	–	6	4	23	0.2
	Agricultural Labour	90	–	–	–	–	–	–	–	–	–	–	41	131	1.1
	Self Employment	38	38	28	28	31	25	34	40	38	31	26	28	383	3.3
	Non–Agric.& FFW	170	170	170	125	–	–	125	125	125	45	45	58	1158	10.1
	Total	817	434	894	817	621	742	1,018	941	738	1,822	1,682	933	11,454	100
HFC2	Fishing	233	212	411	455	376	503	526	537	544	544	352	229	4,923	48.9
	Fishing Labour	120	29	66	–	–	71	61	43	21	221	181	126	939	9.3
	Gear Making	106	214	211	135	139	34	35	61	61	23	26	24	1,070	10.6
	Farming	156	756	187	331	120	114	78	87	–	–	–	21	1,851	18.4
	Agricultural Labour	96	23	–	–	–	–	–	–	–	–	–	–	119	1.2
	Self Employment	67	86	129	89	82	86	92	89	92	83	79	70	1,044	10.4
	Non–Agric.& FFW	–	–	–	–	–	–	–	–	–	–	71	54	125	1.2
	Total	778	1,320	1,004	1,010	717	808	792	817	718	871	709	524	10,071	100
Com–	Fishing	333	188	487	478	423	564	632	568	467	1061	889	477	6,566	61.4
munity	Fishing Labour	70	31	48	–	–	39	33	24	37	147	127	74	629	5.9
	Fishing Trading	–	–	25	28	34	18	21	51	28	–	–	–	206	1.9
	Gear Making	84	133	132	113	91	36	41	59	71	13	14	19	806	7.5
	Farming	86	415	104	186	66	63	43	48	–	–	3	13	1,026	9.6
	Agricultural Labour	93	13	–	–	–	–	–	–	–	–	–	18	124	1.2
	Self Employment	54	64	83	62	59	58	66	67	67	59	55	51	746	7.0
	Non–Agric.& FFW	77	77	77	56	–	–	56	56	56	20	60	55	591	5.5
	Total	797	921	956	923	673	778	892	873	726	1,300	1,148	707	10,694	100

Figure 15 Income Sources Through the Year, NW4–2 Bildahar



Source : FAP17 Socio–Economic Monitoring

Jagendranagar

In spite of relatively poor control of access, Jagendranagar fishermen earn relatively high and consistent earnings from fisheries through the year. Although their fishing effort peaks in the high flood period of *sraban* (July/August) and *bhadra* (August/September), earnings continue to be high through the drawdown during *ashwin* (September/October) and *kartik* (October/November).

Traps account for about 70% of fishing income for the community, and almost all of this comes from their use on the shallow, seasonal *beel* around the village.

Agricultural labour during the *boro* season plays an important role in sustaining fishermen during the winter period when fishing activity is relatively slack for fishermen using gears such as traps, lines and gillnets.

Bildahar

Incomes among households involved almost exclusively in fishing peak in *magh* and *falgoon*. These high incomes are relatively concentrated among the larger *berjal* owners who are either harvesting residual *gari* and *beel* or *katha* in the river during this period. Until relatively recently, this peak would have been even sharper and accounted for mainly by fishing in the *beel*. Siltation has affected this fishery seriously.

A greater range of gears contribute to fishing income in Bildahar. The importance of *jhaki jal* is due to its widespread use in the harvesting of *beel*, *kua* and *katha* in the Atrai River. Given the physical changes affecting waterbodies fished by Bildahar fishermen, the flexibility of *jhaki jal* seems to make it especially attractive.

Gear making is an important seasonal activity for many households. Particularly early in the flooding season, the manufacture of traps constitutes an important source of income to which all members of the household contribute. Trap making is done on a production-line basis, with different household members making up different parts of the individual traps. Women and female children have clearly defined roles to play in the fabrication of the finer, delicate parts of the traps which have to be fitted inside. Men make the frames and external parts.

The relatively limited involvement of fishermen in agriculture is notable. Self-employment also makes a minor contribution of household incomes suggesting a limited range of

alternatives available to fishing households in spite of their vicinity to the local *bazar*.

3.9 Conclusions

The fishermen of Jagendranagar seem to be economically better off than those in Bildahar. This is primarily due to their position on the edge of Chalan *beel* which gives them some scope for agriculture. People in Bildahar are limited to fishing as an activity and their access to cultivable land is minimal. The Bildahar fishing community is acutely overcrowded also and the range of waterbodies available may simply not be sufficient for the numbers of fishermen.

The progressive tightening of access options for traditional fishermen in the face of changing agricultural circumstances both inside and outside the Chalan Beel Polder 'B' scheme are clear. Given growing population and increasing competition for all available rural resources, the exclusion of relatively lower status and less numerous social groups, such as professional fishermen, from resources to which they have always enjoyed access rights is inevitable.

Fishermen are adapting to these changing circumstances using a variety of strategies. Many Hindu fishermen, such as the *rajbangshi* fishermen from Bildahar, have either migrated out to India or changed profession. Muslim fishermen, where possible, have filled in the niches left by departing Hindu fishermen. Others are becoming more mobile and travelling further in order to seek out fishing grounds. The scope for mobility is, inevitably, limited as the same processes are affecting fishermen practically everywhere in the country.

As fishermen, particularly Muslim trap fishermen such as those from Jagendranagar, are pushed off the floodplains by farmers becoming involved in fishing, some are attempting to specialise in *kua* harvesting. As this activity increases, opportunities are likely to arise in the sector. However, *kua* owners, almost invariably **non**-fishermen, will tend to carry out their own harvesting operations. The dewatering of *kua* is not particularly demanding in terms of fishing skills and, with easy access to low-lift pumps, most landowners will tend to harvest their own *kua* rather than leasing to fishermen or hiring them as harvesters. The opportunities in this sector are not likely to compensate for declining fisheries.

4. CONCLUSIONS AND THE IMPLICATIONS FOR FUTURE FLOOD CONTROL SCHEMES

The preceding analysis will have made clear that the social and economic conditions of communities that fish are too variable for the impact of flood control to be measured by any simple paired comparison of those inside with those outside - other factors are too important. Nonetheless, an understanding of the socio-economic characteristics of the fishery and the processes affecting it is a prerequisite in any attempt to identify the likely impacts of any future schemes. This study has tried to provide such an understanding.

Trends in the socio-economics of fisheries exploitation

Bangladeshi inland fisheries are in the process of change in terms of both species composition and the socio-economics of their exploitation. These changes are discernable both inside and outside flood control schemes. But the introduction of flood control acts as a catalyst to accelerate these changes.

Traditional fishing communities that specialised in the use of larger gears more suited to fishing of deeper, perennial waterbodies are being progressively disadvantaged by changes in hydrology, siltation rates and land use. Shallower flooding, combined with the spread of irrigated *boro*, particularly onto former *khas* land, give rise to opportunities for those outside traditional fishing communities to capitalise on remaining fish stocks. This process has been given added impetus by economic hardship that has eroded traditional taboos on fishing that previously constrained the farming community from engaging in this activity on a commercial basis. Members of these communities now adopt a number of stratagies to take advantage of their ownership or control of land lying beneath the floodwaters to capture the benefits from this still valuable resource. One option, exercised particularly on bottom lands, is to dig pits (*kua*) in which fish take refuge or become stranded during the drawdown. Another is for farmers to set *current jal* or traps on their land; sometimes preempting fishermen from doing so, sometimes ejecting them forcibly first. Even where fishermen have formal access rights, their objections to these practices carry little weight, due to their great numerical disadvantage and perceived social inferiority.

These changes clearly have important implications for the traditional fishing communities and - in so far as the new opportunities are monopolised by land owners - for landless households that had come to rely on fishing as a source of seasonal income, though this group is

considerably smaller in the North-West than in the South-West or North-Central.

It is apparent that the introduction of flood control into Chalan *Beel* Polder 'B' has accelerated this process.

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

The main villages show little difference in their relative dependence on fisheries. Though farmers have been moving into fishing in sufficient numbers to disturb the historical patterns of access, it still does not constitute a major source of income for either village taken as a whole, accounting for 1.2% of annual income in Durgapur (inside) and 2.5% in Krishnanagar (outside), see Tables 8 and 9. The households that are engaged in fishing are however relatively few, so for them fishing incomes can be (seasonally) important. This is particularly true in Krishnanagar, where there are relatively fewer households annually catching fish worth less than Tk.1,000 and rather more in the higher ranges, Tk.7,501 and over, see Figure 7 for details.

In the satellite communities incomes from fishing are, unsurprisingly, the dominant source. In both Jagendranagar and Bildahar over 75% of total income comes from fishing or fish related activities (fish trading, gear making etc.). Average incomes, at Tk.10,700 in Bildahar and Tk.13,600 in Jagendranagar, are fractionally below those of landless households in the two main villages.

Implications for the flood action plan

Were this process simply a product of flood control - happening inside but not outside schemes - the policy implications for fisheries would be clear and, from a distributional perspective, almost wholly adverse. Wealth and land ownership are closely correlated in rural Bangladesh, so the richer segment of the community who already benefit, in functioning schemes, from increased agricultural production would also benefit from their capture of a greater share of fisheries benefits. The poorer segment - fishermen and landless households without access to agricultural land - would tend to be disadvantaged with respect to fisheries. But the net effect for them would depend on the extent to which they gained from improvements in agricultural productivity and the increased scope for self-employment arising from better communications. For the fishing communities studied, their limited reliance on these sources would surely leave them at a net disadvantage. For the landless, the reverse position is more likely.

However, the fact that this process is already occurring outside flood control schemes complicates the analysis. Were flood control introduced into an area where this shift of floodplain fisheries benefits to the landed members of community was already complete, its impacts - both positive and negative - would be felt by the same households; the distributional twist to arguments over flood control would therefore disappear. As things stand, in many areas into which flood control might be introduced this process may have only started. The implication is that many fishing communities, though already under considerable pressure will find themselves forced to adapt ever more quickly. Many have already done so, by changing fishing grounds or by reducing their dependence on fishing, either through marginal adjustments - into fish culture or trading - or by making a complete break with their past. A number of the other studies in this series document communities that are making such changes.

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

jele/jaola/ jeola	-	NC/NW/ NE/SW	-	Generic terms for fishermen.
jiani	-	NW/SW	-	Derogatory term used to refer to Muslim professional fishermen, particularly around Chalan *beel*.
maimul	-	NE	-	Muslim traditional fishermen & traditional leaseholders. A caste-like group sometimes extended, for bureaucratic convenience, to anyone involved in, or wishing to become involved in, fisheries, including leaseholders.
malo	-	NC/NW/SW	-	Hindu caste fishermen very close to *barman*.
rajbangshi	-	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 & took up fishing as occupation. Often, but not exclusively, fishing on "closed" water-bodies such as *beel* & floodplains.

Terms used to describe actors in fish trading system

		Regions where term used		
aratdar	-	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 wholsesale markets.
chalani	-	NC/NW/ NE/SW	-	People who transport fish from district wholesale markets to higher level markets. Limited to the carriers.
furial	-	NC/NW/ NE/SW	-	Someone who transports fish from the landing to a primary market or secondary shipment point. In the *haor* often used for the fish traders taking fish from the *beel* side after landing to the road where it is loaded on buses or trucks for transport to towns or larger marketing centres.
mahajan	-	NC/NW/ NE/SW	-	A very generic but very important term. Mostly 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 share-holder in a particular fishing operation. Also used for many *arotdar* who are generally money-lenders in their own right.

nikari	-	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.
paikar	-	NC/NW/	-	Fish trader.

Terms used to describe different types of waterbody

		Regions where term used		
beel	-	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, *khal*, 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.
chak	-	NC/NW/ NE/SW	-	Floodplain. Often used for a portion of floodplain. Tends to be used for floodplains with fairly clearly defined boundaries.
gang	-	NC/NW/ NE/SW	-	River. Colloquial word for *nadi*. Frequently used for smaller rivers.
gari	-	NW	-	Used for a range of waterbodies in *beel* areas, especially Chalan *beel*. Normally refers to small rivers and *khal*. Apparently also used for man-made ditches and borrow-pits.
gopat	-	NW/SW	-	Grazing land within homestead area of village

generally under community ownership.

jala	-	NC/NW	-	General term for waterbody, used for waterbodies like *beel*, *khal*, ponds but **not** for rivers. Comes from the word *jal* used in Hindu communities for water.
jalmahal/ jalkor	-	NC/NW/ NE/SW	-	A "water estate", now referring to any area of *khas* waterbody controlled by the government and normally leased out for fisheries.
kua	-	NC/NW/SW	-	Man-made fish-pit excavate d in the floodplain or *beel*. Deeper than a *danga*. In SW, sometimes used for borrow-pits near homesteads or roads.
khal	-	NC/NW/ NE/SW	-	Man-made or natural channel, small river or canal.
maital	-	NC/NW/SW	-	Small natural or man-made ditch. In NC & NW usually used for ditches and borrow-pits near homesteads. In SW, also used for ditches and fish-pits in *beel* and floodplain.
nadi	-	NC/NW/ NE/SW	-	River.
nal	-	NW	-	A few cases found in NW in the Chalan *beel* area where it apparently means a small channel like a *khal*.
pukur	-	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 (*kua*) excavated in *beel* or floodplain.

Terms used to describe administrative divisions & human settlements

		Regions where term used	
mauza	-	NC/NW/ NE/SW	The lowest recognised administrative unit. It **not** the same as a village. Some *mauza* in the *haor* area have **no** villages in them at all although a *mauza* can cover anything from a single village or hamlet to twelve or more seperate villages.
para	-	NC/NW NE/SW	Usually a sub-division of a village or *gram*. Sometimes constitutes a village or hamlet in its own right. Fishing communities frequently live in their own *para*, often referred to as the *jele para*.
thana	-	NC/NW/	Equivalent of a sub-district or county. Groups together between 10 and 20 unions. Seat of the *thana nirbahi* 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 *mauza*. Important for fisheries as it is the lowest level at which *khas* land and waterbodies can be administered.