Government of the Peoples Republic of Bangladesh
Flood Action Plan

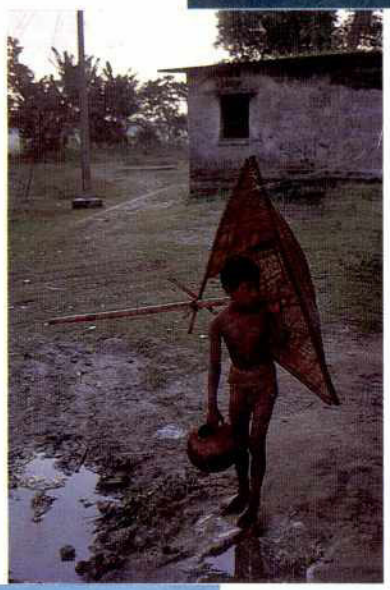
FAP 17

Fisheries Studies and Pilot Project

FINAL REPORT

(Draft)

JUNE 1994



Supporting Volume No. 18

VILLAGE STUDY

MANIKGANJ DISTRICT

ODA
Overseas Development Administration, U.K.

FAP 17

FINAL REPORT

SUPPORTING VOLUME NO. 18

** Draft **

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Manikganj District

FAP 17
FISHERIES STUDIES
AND PILOT PROJECT

June, 1994

Prepared for the Government of Bangladesh

ACKNOWLEDGEMENTS

The field work upon which the following report is based was done by the FAP 17 socioeconomic research team in the North Central Region, supported, during the course of a more intensive village appraisal, by other socioeconomic team members based in Dhaka. Other information was collected by various members of the FAP 17 team during the course of *ad hoc* surveys. Additional data from census, baseline and monitoring surveys were analyzed in Dhaka and incorporated into this report. All contributed in different ways to the following report. The contributors' names, positions on the team and areas of expertise are as follows:

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SUMMARY OF FINDINGS

1. Changes in water bodies

Water resources throughout Manikganj District have been subject to dramatic changes over the past 20-30 years. Many of these are natural changes which have presumably been taking place cyclically since the formation of the floodplains of Bangladesh. Many have also been encouraged and accelerated by current development taking place in the area. The construction of roads and pathways, the extension of homestead areas in floodplain villages and the expansion of urban centres are all bringing about permanent changes in flooding patterns and local hydrology that are influencing fisheries.

Many fishing grounds in the Dhaleswari-Kaliganga system, particularly *beel*, *baor*, *khal* and floodplains, have decreased in importance or disappeared altogether due to siltation. Since these water bodies were often the mainstay fisheries for traditional fishing communities, these changes have had impacts on these groups.

Frequently, where water bodies have become shallower and less productive, agriculture has become more important than the fishery. This has been encouraged by the increasing popularity of *boro* rice cultivation during the winter season. In lowland *beel* and floodplains that have been converted to agriculture, fishing by landowners and farmers has become an increasingly popular seasonal activity.

2. Fisheries in livelihood strategies

The strong social stigma commonly associated with occupational fishing in rural Bangladesh is less marked in the Manikganj area. Social changes in the region arising from contact with urban areas and widespread alteration of employment patterns have apparently resulted in greater acceptance of new, alternative employment among poor rural households. The large number of very poor labourers and farmers who have been forced into fishing over the past 20 years has also made occupational fishing more acceptable.

In some areas, such as Durgapur, the proximity of rich *beel* and the Padma River has encouraged an extremely high level of fisheries involvement among Muslim "non-fishermen".

Subsistence fishing is very widespread and children account for a considerable proportion of fishing effort. In some areas, women from poor labouring households are also seasonally involved in fishing, particularly in areas close to homesteads.

3. Changes in fisheries techniques and the expansion of fish culture

The diminished importance of traditional fishermen and increased number of non-traditional fishermen has been accompanied by a shift towards more managed fisheries. Pure capture fisheries, requiring such active gear as *ber jal* (seine nets) and specific fishing expertise, are being replaced by fisheries requiring tenure over land or water areas. The number of brush piles (*katha*) placed in rivers and *khal* has increased, as has the number of fish pits (*danga*) excavated in floodplain and *beel*. Stable tenure is essential to such static fisheries, and land ownership is increasingly used as a means of establishing rights to fisheries resources.

The step from the aggregation, control and enhancement of natural fish stocks in *katha* and *danga* to the culture of artificial stocks in ponds has proved to be relatively small, and fish culture is rapidly expanding throughout the area. As a result, many small, residual water bodies once exploited by landless groups and traditional fishermen are being closed. The benefits of increased fish production are considerable, but they generally are concentrated in the hands of landowners at the expense of seasonal and subsistence fishermen who previously had access to unused ponds and ditches.

4. Impacts of changes on fishing communities

Changes in water bodies and in the structure of the fisheries sector have generally had a negative impact on traditional Hindu fishermen in the Manikganj area.

Changes in fishing grounds, whether because of changes in the course of rivers, the siltation of *beel* and *khal* or the formation of new wetlands, have probably always been a feature of the area's floodplain and riverine fisheries. Nonetheless, the increasing pace of development around Manikganj has accelerated the rate at which these changes are occurring and there is little scope for compensation. The loss of *beel* and *khal* due to siltation, whether natural or by human intervention, is rarely offset by the creation of new wetlands elsewhere, as might have been the case in the past. The result seems to have been a net reduction in fishing grounds.

In addition to physical changes in fisheries, traditional fishermen have had to face expanding competition. As a low-status religious minority, traditional Hindu fishermen generally have

had difficulty sustaining control over the fisheries on which they depend. Increased competition from non-traditional Muslim fishermen has forced many of them to change fishing grounds and fishing strategies.

Many traditional fishermen have responded by shifting their focus to main rivers. The resulting concentration of effort on the Padma, Jamuna and Meghna may be contributing to the reported decline in riverine catches. The levels of migration to India among fishing communities also has been high.

5. Changes in access regulation

Even where traditional fishermen hold leases or sub-leases to *jalmahal* or water bodies with controlled fisheries access, they are often unable to enforce any restriction on fishing. Non-traditional Muslim fishermen, whether seasonal, full-time, or purely subsistence, can generally gain access to water bodies for fishing and frequently ignore nominal restrictions on fishing where Hindu fishermen control leases.

Where the depth of water bodies has decreased and connections between rivers, *khal* and *beel* have been interrupted, the value of their fisheries has generally declined as catches of migratory carps and catfish have dwindled. The impact of this on traditional fishermen, who are historically more dependent on the high-value catches for their livelihoods, is most severe. Traditional fishermen are often forced to abandon fishing grounds where the catch value has dropped, leaving the fishery more open to non-traditional fishermen.

A general decline in the presence of traditional Hindu fishermen has therefore helped encourage the influx of Muslim agriculturalists into fishing.

INTRODUCTION

The principal aim of the socioeconomic component of the FAP 17 Fisheries Studies is to evaluate how flood control measures have changed fisheries and, therefore, affected the livelihoods of people living on the floodplains of Bangladesh. Such a study is needed under the Flood Action Plan (FAP) because of concern that the massive expansion of areas protected from flooding by various flood control measures, as envisaged under the FAP, would cause a considerable reduction in the available fisheries resources. The possibility that poorer rural households in particular might be highly dependent on seasonal access to open-water fisheries in flooded areas has raised concerns that the negative impacts on fisheries caused by flood control might actually outweigh the benefits accruing through improved agricultural production and protection from flood damage.

The FAP 17 study therefore analyzed the role of fisheries in the livelihood strategies of different social and occupational groups in floodplain communities and how this has been affected by flood control measures. To do this, communities inside and outside existing flood control schemes, but 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 satellite communities specialised in fishing and sharing fisheries resources with the main community have been identified. Each of these groupings of main village (usually principally agricultural) and nearby fishing communities has been treated as a "village cluster". In each cluster, a quantitative survey of a stratified sample of households monitored labour, income and consumption over a one-year period. These quantitative surveys have been supported by village appraisals which collected information on 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 influencing it, this qualitative information provides a vital context for the quantitative data collected during the longer-term monitoring of the study villages.

The method used to select study villages was ineffective in the North Central Region, which lacked suitable, functioning flood control schemes that could be compared with unprotected areas. Around Tangail, where some appropriate comparisons could be made, researchers from FAP studies already working in the area indicated that local people would probably be resistant to any further survey work. FAP 20 (Compartmentalisation Pilot Project), FAP 16 (Environmental Study) and FAP 3 (North Central Regional Study) had all carried out

intensive socioeconomic questionnaire surveys covering large samples of the population and further research would have duplicated their efforts and put a strain on local people.

The socioeconomic component of FAP 17 therefore focused on Manikganj even though the area has no major flood control works. It was originally hoped that a valid comparison could be made with protected areas on the other side of the Jamuna River. The area on the west bank of the Jamuna inside the Pabna Irrigation and Rural Development Scheme (PIRDP), a recently completed large-scale flood control, drainage and irrigation (FCD/I) scheme, is in an agro-ecological region similar to Manikganj. As field research progressed, however, it became apparent that the patterns of fisheries exploitation are so different in the two areas that comparison would not be particularly useful. It was therefore abandoned and the analysis in this report concentrates on four village clusters in the Manikganj District. The villages studied inside the PIRDP are discussed in Supporting Volume No. 13.

While there are no major flood control projects in Manikganj District, the research identified many changes in local fisheries that effectively imitate the impacts of flood control schemes. These changes are particularly enlightening because they are the result of either natural processes or human interventions that have been made without consideration to their possible hydrological impacts. The area's road network, density of population and industrial development have created major alterations in flooding patterns and the way in which local people interact with water and fisheries resources. The study of changes in the region's fisheries therefore offers researchers an opportunity to distinguish the impacts of flood control from those of general development.

The report describes and assesses the impacts that different processes, structures and events have had on the interaction between local people and the fisheries resource. The report combines data collected during the village appraisals and the various quantitative surveys carried out during the study. It is one of a series of seven Village Studies published by FAP 17 as Supporting Volumes of the project Draft Final Report. The findings of these studies are summarised in the Main Volume of the Draft Final Report.

1. DESCRIPTION OF THE STUDY AREA

1.1 Location

Four main villages, Jhikutia, Ashapur, Jagannathpur and Durgapur, were selected for study in the North Central Region. All four are in areas of Manikganj District that are influenced by the Jamuna and Padma rivers and the network of distributaries connecting the two: the Dhaleswari, Kaliganga, Bansi and Ichhamati rivers. Figure 1 shows the location of the study area in Bangladesh.

There are no major flood control works protecting this area, but the population density and rapid development of the road network and other human interventions have greatly modified flooding patterns over the years.

Jhikutia

Jhikutia, in Harirampur *thana*, is a large *mauza* consisting of 12 *para* on the north bank of the Ichhamati River about 2 kilometres west of Jhitka, an important local market. Three of the village *para*, Maddhyapara, Sikderpara and Ujanpara, form a reasonably discrete unit at the western end of the *mauza* and were selected as a "main village". This was done to ensure a more manageable study sample and because local people considered these three *para* to constitute a distinct community.

The two satellite fishing communities for Jhikutia, Kutirhat and Ujanpara, are on the opposite bank of the Ichhamati. Kutirhat, part of Gouriboudia *mauza*, and Ujanpara, part of Uttarpara *mauza*, are both Hindu fishing communities. Although these fishermen are generally referred to, and refer to themselves, as *haldar,* they actually appear to be *malo* caste fishermen. The locations of the main village and satellite fishing communities are shown in Figure 2.

Ashapur

Ashapur, shown in Figure 3, is on the west bank of the Kaliganga River in Ghior *thana*. The village site is reported to have once been the bed of the Old Dhaleswari River. Natural changes in local hydrology have reduced this river to a small, seasonal channel to the south. The *char* land that has risen out of the old river bed, on which Ashapur is located, has been occupied for many generations.

Figure 1
Location of study areas: Jhikutia, Ashapur, Jagannathpur and Durgapur

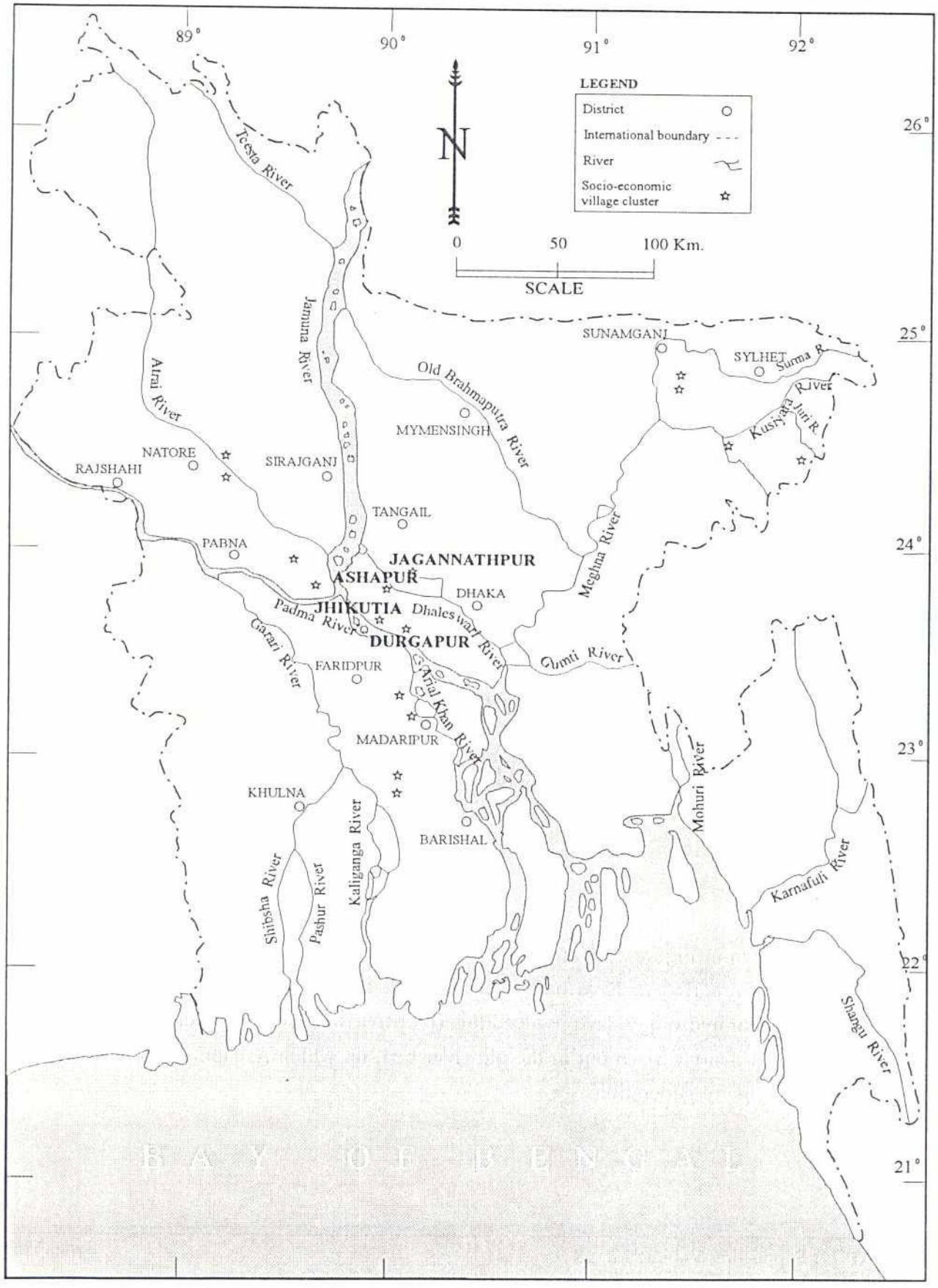
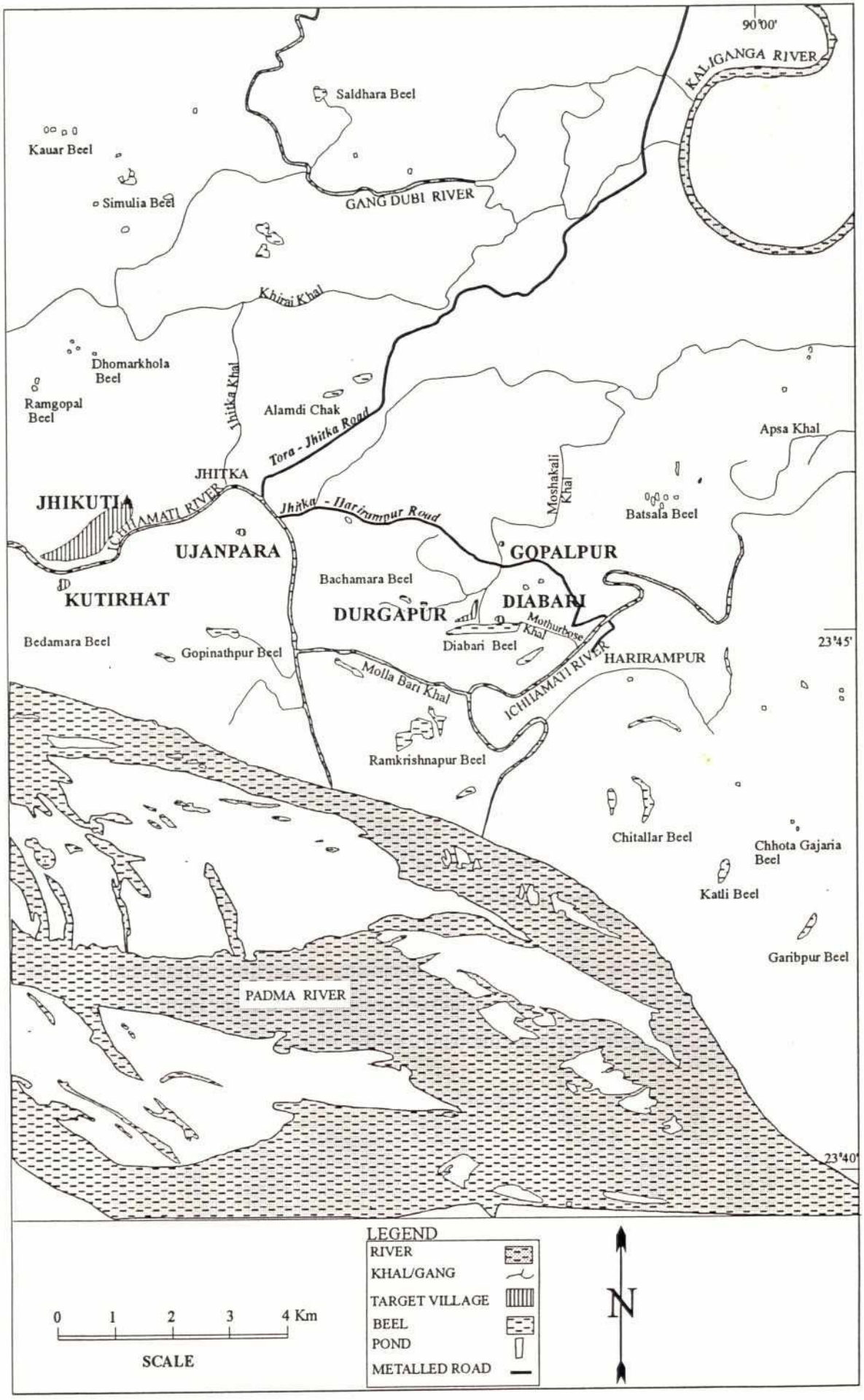


Figure 2
Location of study villages and principal water bodies: Jhikutia and Durgapur



A Hindu *rajbangshi* fishing community in Zabra, about 1 kilometre south of Ashapur, on the banks of the Old Dhaleswari River, now more commonly known as the Ghior River, was selected as a satellite fishing community.

Jagannathpur

About 15 kilometres north east of Ashapur and east of the Kaliganga, an extensive area of *beel* and lowland lies between the Choytai-Bansi and Gazikhali rivers. Jagannathpur, the third main village, is in this area, just north of Hazipur *beel* in Saturia *thana*.

The two satellite fishing communities for Jagannathpur are Bhatara, just east of Jagannathpur, and Dwimukha, about 2.5 kilometres north. Bhatara has a large community of Muslim fish traders (*nikari*) who have steadily become involved in capture fisheries and, in recent years, fish culture. Dwimukha, just over the boundary of Dhamrai District, is a small Hindu *rajbangshi* fishing community. Figure 4 shows the location of Jagannathpur, Bhatara and Dwimukha.

Durgapur

About 6 kilometres east of Jhikutia, just south of the Jhitka-Harirampur Road and 2 kilometres west of the *thana* headquarters at Harirampur, lies the small village of Durgapur, shown in Figure 2. This relatively recent settlement is on the edge of Diabari *beel*, which is apparently part of the old course of the Ichhamati River.

The village is in an area that used to be a narrow peninsula formed by a meander of the Ichhamati. Erosion by the Padma River, some three kilometres to the south, cut off part of this meander about 10 years ago, leaving two separate branches of the Ichhamati; one runs south from Jhikutia and Jhitka into the Padma at Ramkrishnapur and the other leaves the Padma a few kilometres downstream and runs north to eventually join the Kaliganga River.

Two small *rajbangshi* fishing communities were identified as satellite fishing communities: a cluster of 11 households in the neighbouring village of Diabari and eight households in Gopalpur, about one kilometre north on the banks of the Moshakali *khal*.

Figure 3
Location of study village and principal water bodies: Ashapur

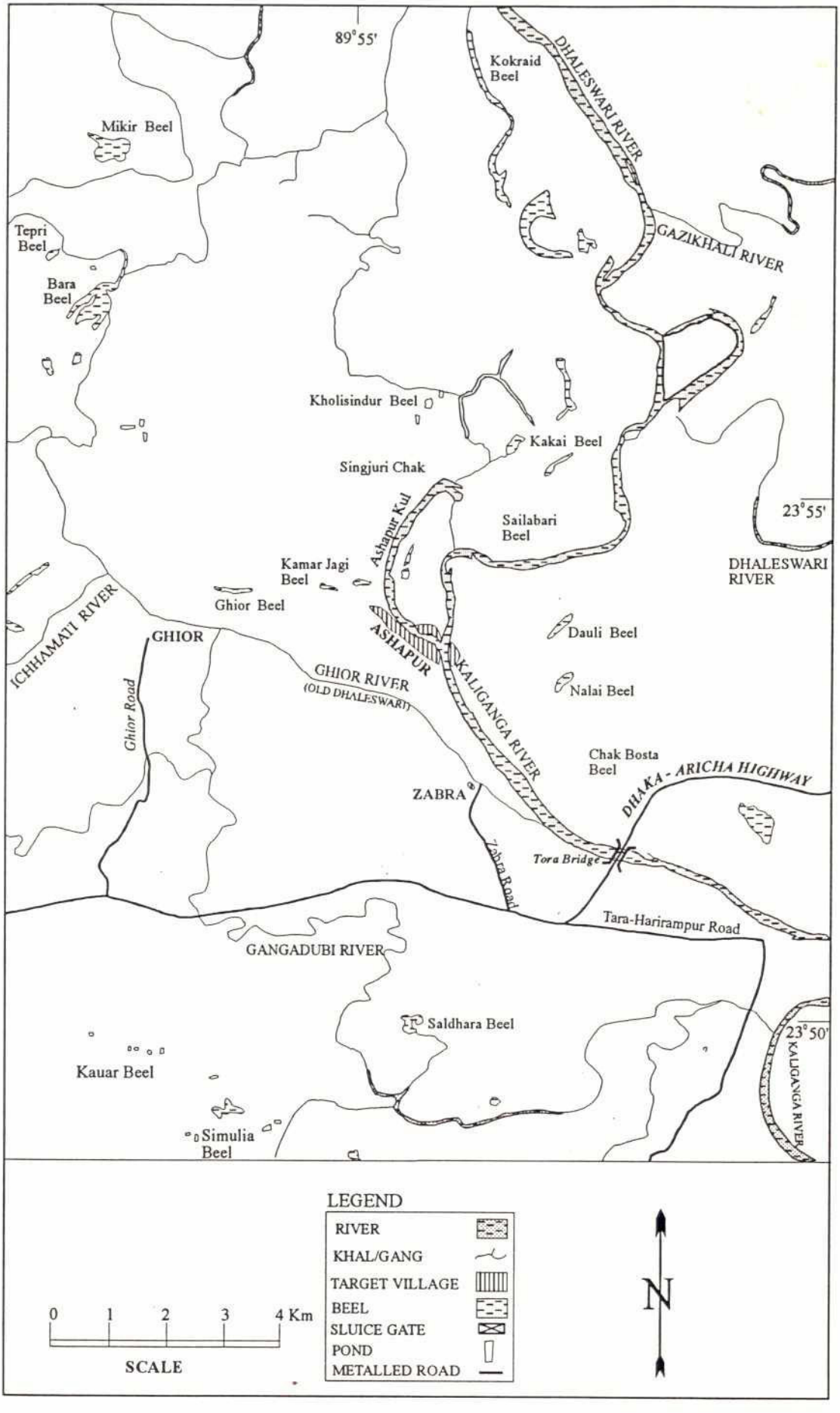
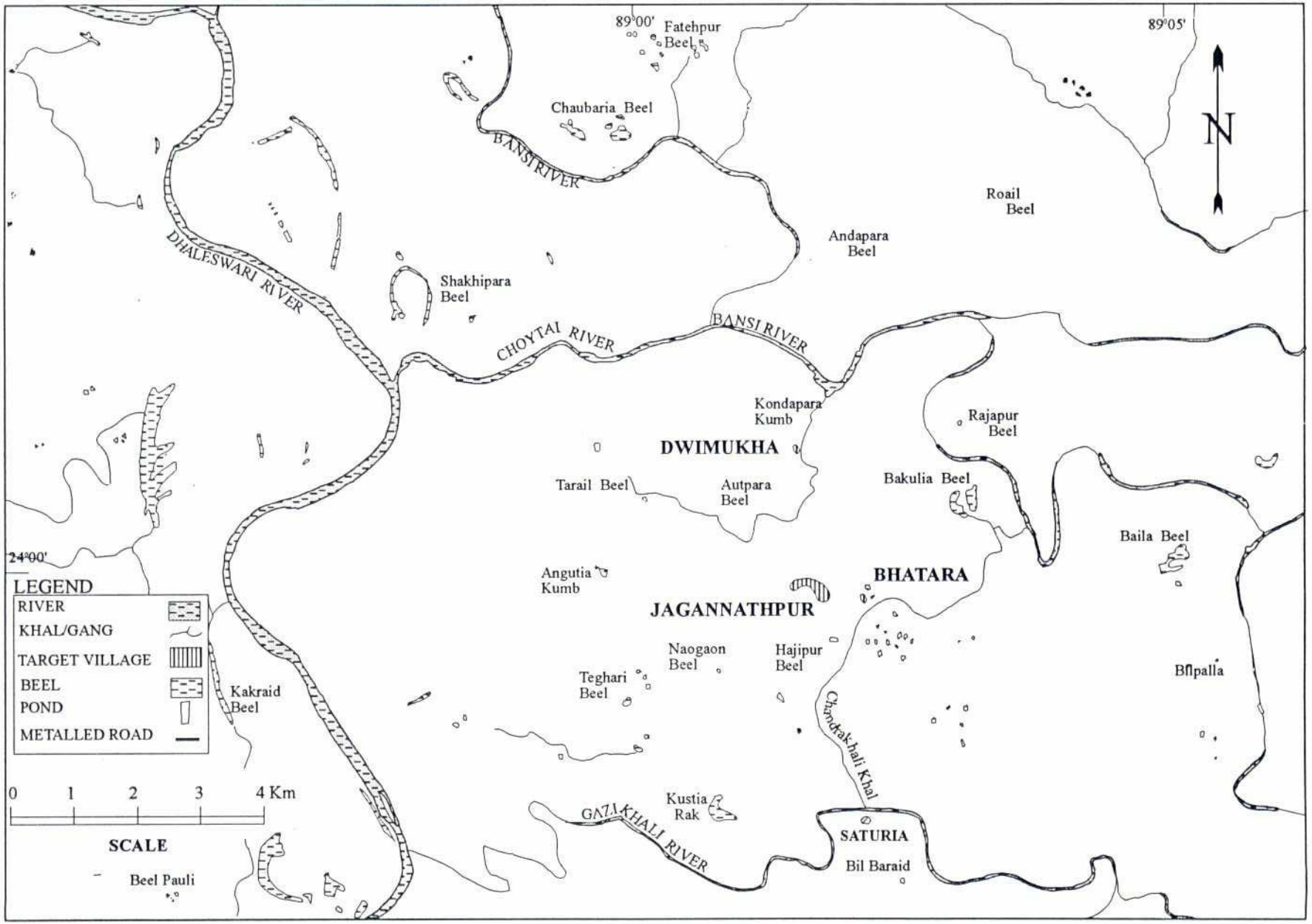


Figure 4
Location of study village and principal water bodies: Jagannathpur



1.2 Community profile

Tables 1, 2, 3 and 4 present basic socioeconomic data for the four main villages and their satellite fishing communities. For the main villages these data are disaggregated by landholding category; for the satellite fishing communities it is disaggregated by fishing category.

There is considerable variation in the land ownership patterns of the main villages. In Jhikutia and Durgapur, the amount of landlessness (48.7% and 46.3%, respectively) is close to the national level. The FAP 17 village census in Ashapur found very low levels of landlessness (only 25%), but many households claim ownership of land currently submerged by the Kaliganga River. While landless households whose homesteads have been eroded have been more inclined to move out of the village, landowners have remained in the area in the hope that their land will eventually rise out of the river again. Many households listed as small or medium landowners in the village are therefore, in fact, functionally landless.

With the exception of Bhatara, all the fishing communities selected are entirely Hindu and predominantly landless. A few wealthier households in each fishing community own small amounts of cultivable land, but most fishing households are landless. The main villages are all predominantly Muslim; only Jagannathpur has an appreciable proportion of Hindu households.

1.3 Agro-ecology

The four village clusters studied in Manikganj District are spread over three different agro-ecological units. 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. The AEUs 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 flooding depth and duration (based on land elevation) to establish the agricultural potential of different agro-ecological units.

AEUs initially were used as a basis for selecting study communities as they appeared to offer the possibility of identifying areas with similar access to water bodies as defined by land height. In practice, using AEUs for this purpose did not always prove satisfactory given the immense range of variables influencing fisheries activity.

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Table 1
Community profile: Jhikutia, Kutirhat and Ujanpara

NC1-1 Jhikutia — Main village

Land Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable Land	Ponds	Other	Total
Large	7	58.3	3.1	7.1	1.9	100.0	0.0	22	902	12	22	958
Medium	41	56.3	4.3	8.1	2.2	92.7	7.3	27	350	13	25	415
Small	72	46.7	3.3	6.0	1.7	98.6	1.4	15	100	6	6	127
Landless	114	41.4	1.5	4.9	1.4	100.0	0.0	8	6	2	1	17

Source: FAP 17 Village Census

* Landholding categories are defined as follows:
Large >7.5 acres; Medium 2.5-7.49 acres, Small 0.5-2.49 acres; Landless <0.49 acres

NC1-2 Kutirhat — Satellite fishing community

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable Land	Ponds	Other	Total
F1	38	41.4	0.2	5.2	1.4	0.0	100.0	6	0	2	1	9
F2	9	43.9	1.4	6.4	2.1	0.0	100.0	9	48	3	0	60

Source: FAP 17 Village Census

NC1-3 Ujanpara — Satellite fishing community

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable Land	Ponds	Other	Total
F1	54	42.4	0.5	5.3	1.4	0.0	100.0	7	5	1	1	14
F2	22	44.1	0.9	6.1	1.6	13.6	86.4	10	19	10	9	48
F3	6	43.5	2.0	5.5	1.5	0.0	100.0	6	0	0	2	8

Source: FAP 17 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
Community profile: Ashapur and Zabra

NC2-1 Ashapur — Main village

Land Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable land	Ponds	Other	Total
Large	7	37.6	4.0	6.0	1.6	100.0	0.0	28	795	15	367	1205
Medium	54	47.3	2.4	6.2	1.8	100.0	0.0	20	227	3	126	376
Small	101	44.4	1.7	4.9	1.4	100.0	0.0	12	58	1	56	127
Landless	54	40.6	1.4	4.1	1.2	100.0	0.0	5	4	0	2	11

Source: FAP 17 Village Census

* Landholding categories are defined as follows:
Large >7.5 acres; Medium 2.5-7.49 acres; Small 0.5-2.49 acres; Landless <0.49 acres

NC2-2 Zabra — Satellite fishing community

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable Land	Ponds	Other	Total
F1	27	40.2	0.7	4.6	1.5	0.0	100.0	7	0	1	0	8
F2	16	34.1	0.6	4.6	1.2	0.0	100.0	7	9	1	3	20
F3	17	37.1	1.8	4.7	1.3	0.0	100.0	8	8	1	0	17

Source: FAP 17 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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Table 3
Community profile: Jagannathpur, Bhatara and Dwimukha

NC3-1 Jagannathpur — Main village

Land Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable land	Ponds	Other	Total
Large	2	52.5	7.5	11.5	1.5	100.0	0.0	33	1053	64	34	1184
Medium	4	55.0	5.8	6.8	1.5	75.0	25.0	40	317	4	11	372
Small	31	49.0	3.7	5.9	1.5	96.8	3.2	26	101	2	9	138
Landless	27	40.8	1.7	4.5	1.6	88.9	11.1	7	5	0	1	13

Source: FAP 17 Village Census

* Landholding categories are defined as follows:
Large >7.5 acres; Medium 2.5-7.49 acres; Small 0.5-2.49 acres; Landless <0.49 acres

NC3-2 Bhatara — Satellite fishing community

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable Land	Ponds	Other	Total
F1	2	40.0	0.0	6.0	1.5	100.0	0.0	2	0	0	0	2
F2	34	42.9	0.4	5.5	1.6	100.0	0.0	10	37	2	0	49
F3	26	43.3	0.3	5.0	1.3	100.0	0.0	9	14	0	0	23

Source: FAP 17 Village Census

NC3-3 Dwimukha — Satellite fishing community

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earn. members	% Muslim	% Hindu	Homestead	Cultivable Land	Ponds	Other	Total
F1	5	40.6	0.0	5.6	1.6	0.0	100.0	6	0	2	0	8
F2	20	44.6	0.7	5.1	1.4	0.0	100.0	4	4	1	0	9
F3	1	50.0	2.0	5.0	1.0	0.0	100.0	0	0	0	0	0

Source: FAP 17 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 4
Community Profile: Durgapur, Diabari and Gopalpur

NC4-1 Durgapur — Main village

Land Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable land	Ponds	Other	Total
Large	2	41.0	10.0	9.5	2.0	100.0	0.0	76	903	35	0	1014
Medium	6	49.2	5.2	6.8	2.3	100.0	0.0	22	409	12	0	443
Small	14	46.3	1.3	5.3	1.2	100.0	0.0	14	122	3	9	148
Landless	19	35.7	0.3	5.3	1.4	100.0	0.0	5	12	1	0	18

Source: FAP 17 Village Census

* Landholding categories are defined as follows:
Large >7.5 acres; Medium 2.5-7.49 acres; Small 0.5-2.49 acres; Landless <0.49 acres total land owned

NC4-2 Diabari — Satellite fishing community

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable land	Ponds	Other	Total
F1	4	56.3	0.0	9.0	2.5	0.0	100.0	7	0	0	0	7
F2	6	52.3	0.5	5.3	1.3	33.3	66.7	10	17	1	0	28
F3	1	70.0	0.0	14.0	4.0	100.0	0.0	10	90	4	43	147

Source: FAP 17 Village Census

NC4-3 Gopalpur — Satellite fishing community

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years educ. H/H head	H/H members	Earning members	% Muslim	% Hindu	Homestead	Cultivable Land	Ponds	Other	Total
F2	7	56.6	2.7	8.1	2.3	0.0	100.0	17	90	32	0	139
F3	1	35.0	0.0	6.0	1.0	0.0	100.0	10	0	0	0	10

Source: FAP 17 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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It was originally hoped that AEUs could be used to identify unprotected village clusters in Manikganj District that could be compared with clusters inside the Pabna Irrigation and Rural Development Project (PIRDP). Fundamental differences in the nature of local water bodies and the socioeconomic structure of the two areas' fisheries made for a poor comparison, however.

The very differences that made comparison impossible are of considerable importance to the potential fisheries impacts of flood control. The study of the four Manikganj village clusters therefore gave special attention to hydrological changes and alterations in fishing patterns that have occurred even in the absence of formal flood control works. Two village clusters, Jhikutia and Durgapur, are in the same agro-ecological unit in the Low Ganges Floodplain series. The other two clusters, Ashapur and Jagannathpur, are on different units in the Young Brahmaputra Floodplain series.

Figures 5, 6, 7 and 8 show the agro-ecological units immediately surrounding Jhikutia, Ashapur, Jagannathpur and Durgapur. On the maps, AEUs are shaded according to their flood phase, and details of the particular AEUs where target villages are located are given in the table below the map.

1.4 Floods

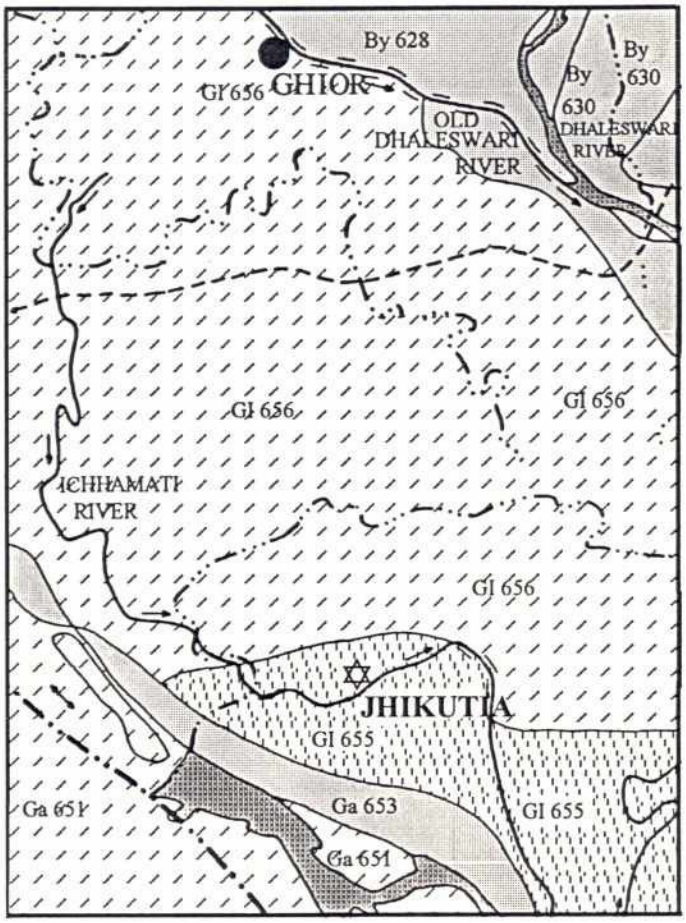
All the principal rivers flowing through Manikganj District, the Dhaleswari, Kaliganga, Bansi and Ichhamati, are distributaries of the Jamuna and their flows are therefore influenced by the rise and fall of floodwaters in that river. Peak flooding is also influenced by the relative height of the Padma River to the south. Simultaneous peak flows in the Padma and Jamuna slow drainage through the Kaliganga and Dhaleswari, causing flooding throughout the system.

The general direction of flooding is from the north and west towards the south and east, but this is often modified by changes in the relative water levels of various catchments within the area.

Local rainfall also contributes to flooding, especially where the carrying capacity of rivers has been reduced by heavy siltation, as is the case with most of the area's principal rivers.

Figure 5

Flood phases and agro-ecological units: Jhikutia



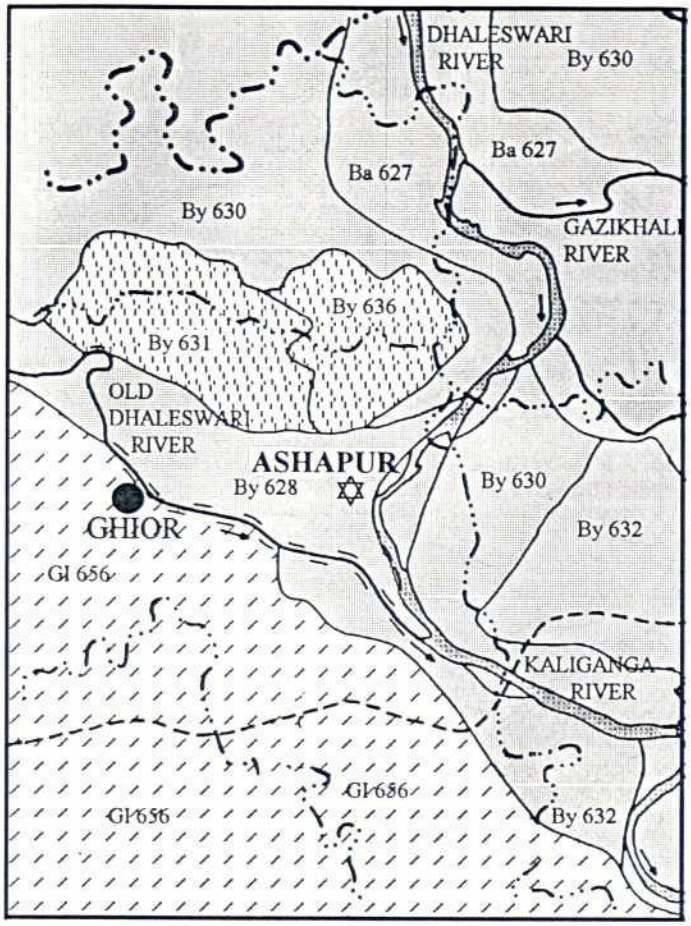
LEGEND

>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

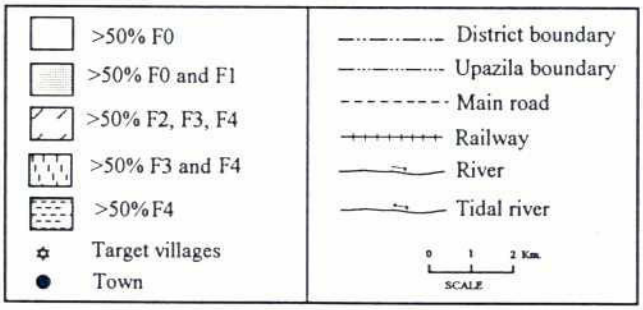
AEU	LAND TYPE DISTRIBUTION (% of land of different flooding depth)					LAND CAPABILITY (%)			
	H	MH	ML	L	VL	Land Capability I		Land Capability II	
GL 655	15	7	23	55	0	IIIWd (47%)	One good rice crop per year & one moderate to poor rice or dry land crop.	IIIWw (30%)	One or two poor to moderate wetland crops per year & rarely a moderate dryland crop.

Source: FAO Land Resource Survey

Figure 6
Flood phases and agro-ecological units: Ashapur



LEGEND

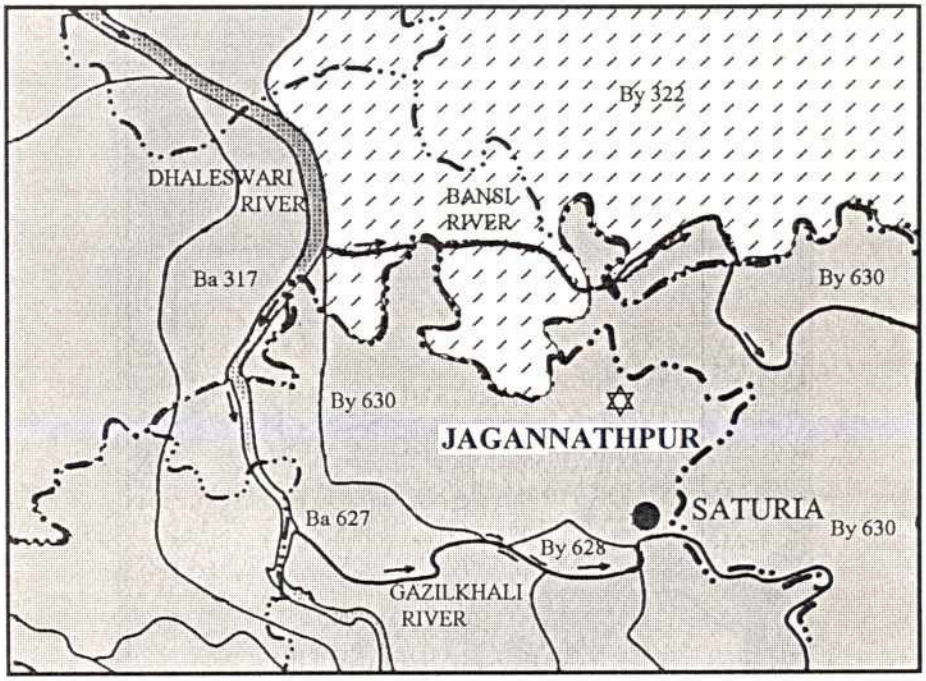


AEU	LAND TYPE DISTRIBUTION (% of land of different flooding depth)					LAND CAPABILITY (%)			
	H	MII	ML	L	VL	Land Capability I		Land Capability II	
BY 628	28	36	25	16	0	IIIWd (35%)	One good rice crop per year & one moderate to poor rice or dryland crop.	IIW (20 %)	One or two wetland crops & one moderate to good dryland crop per year.

Source: FAO Land Resource Survey

Figure 7

Flood phases and agro-ecological units: Jagannathpur



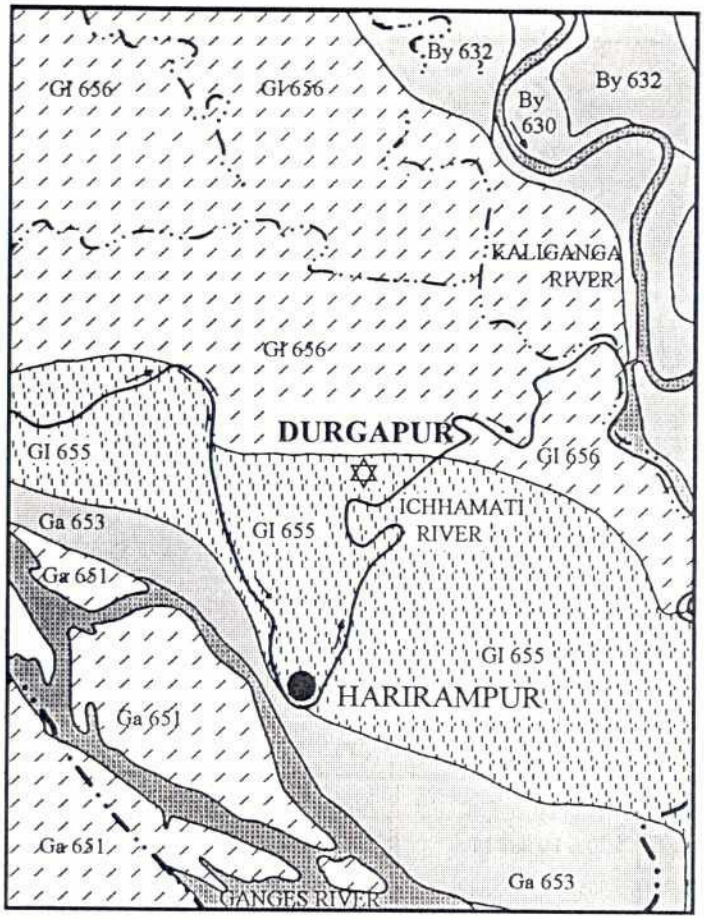
LEGEND

>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

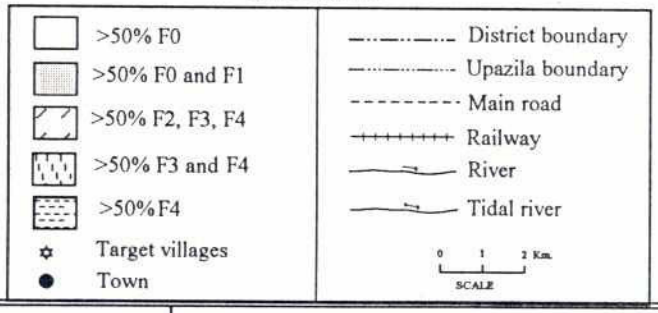
AEU	LAND TYPE DISTRIBUTION (% of land of different flooding depth)					LAND CAPABILITY (%)			
	H	MH	ML	L	VL	Land Capability I		Land Capability II	
BY 630	28	41	10	21	0	IIW (40%)	One or two wetland crops, and part one moderate to good dryland crop, per year.	IIIWd (25%)	One or two moderate or poor wetland &/or dryland crops per year.

Source: FAO Land Resource Survey

Figure 8
Flood phases and agro-ecological units: Durgapur



LEGEND



AEU	LAND TYPE DISTRIBUTION (% of land of different flooding depth)					LAND CAPABILITY (%)			
	H	MH	ML	L	VL	Land Capability I		Land Capability II	
GL 655	15	7	23	55	0	IIIWd (47%)	One good rice crop per year & one moderate to poor rice or dry land crop.	IIIWw (30%)	One or two poor to moderate wetland crops per year & rarely a moderate dryland crop.

Source: FAO Land Resource Survey

Jhikutia and the Ichhamati River

Flooding around Jhikutia has two sources. Early flooding comes down the Ichhamati River from the Jamuna, which begins to rise early in *Joisthya* (May/June). Until about 30 years ago, this was reportedly the principal source of flooding. Now, most local flooding comes directly from the Padma through the various *khal* feeding the Ichhamati from the south and from back-flow up the Ichhamati from its confluence with the Padma at Ramkrishnapur.

This change is due to the dramatic northward movement of the Padma. Fifty years ago, the area around Jhikutia is said to have been grassland and subject to limited flooding. Since then the Padma has migrated steadily northward, eroding considerable portions of Harirampur *thana*. The river, once an eight- to nine-hour boat-ride away, is now only about 2 kilometres south west of Jhikutia. The influence of direct overbank flooding from the Padma has increased as the river has worked its way nearer to the village.

The pathway linking Jhikutia with Jhitka *bazar* has also affected local flooding. Floodwaters only reach the *chak* north of this path after the road has overtopped. This affects the extent to which fingerlings of migratory fish species are able to enter the local floodplains.

According to village respondents, although proximity to the main river has tended to bring swifter and earlier flooding in recent years, flood depths are lower than 10 years ago due to the heavy silt load deposited in fields by river flooding. This has considerably raised the level of local *beel*.

Ashapur and the Kaliganga River

Flooding around Ashapur is dominated by the Kaliganga River, historically a distributary of the Dhaleswari. The Kaliganga has now effectively become the main channel and forms the main course of the Dhaleswari, and the former course of the Dhaleswari has become a relatively minor channel that practically dries up during the winter.

The flow in the Ghior River, south of the village, is also greatly reduced. In years of very high flood, as in 1988, overbank flooding from the Jamuna may come down the course of this river, but such flooding is otherwise rare. Most of the local floodwaters come from the Kaliganga and from rainfall.

The course of the Kaliganga has changed considerably over the past 20-25 years. The oxbow lake that is locally called Ashapur *kul*, around which the main part of Ashapur village is

located, was the main course of the river until about 20 years ago when the *char* now on the east bank of the *kul* began to emerge from the river. The *char* effectively redirected the river into its present course farther to the east. The maps in Figure 9 show these changes and the approximate locations of the village homestead areas at present and in the 1960s.

Jagannathpur and Hazipur *beel*

The complex of *beel* and floodplains around Jagannathpur, of which Hazipur *beel* is the largest, has also experienced flooding pattern changes over the past 20 years.

Flows in the Choytai and Bansi rivers, north of Jagannathpur, and the Gazikhali River, to the south, were once much greater than they are at present. All three, but particularly the Choytai, have silted up and become seasonal rivers. The *beel* around Jagannathpur used to flood from the north through a series of *khal* (Shakhipara, Pakutia and Dahagram), which flowed out of the Choytai River. All of these are now silted up and flooding comes entirely from the south through Chandrakhali *khal,* except in years of exceptionally high flood in the Kaliganga River.

As a result of the restricted drainage channels, flooding now arrives later, in mid-*Ashar* (late June). Siltation has also reduced the depth of most local *beel*, many of which have become seasonal.

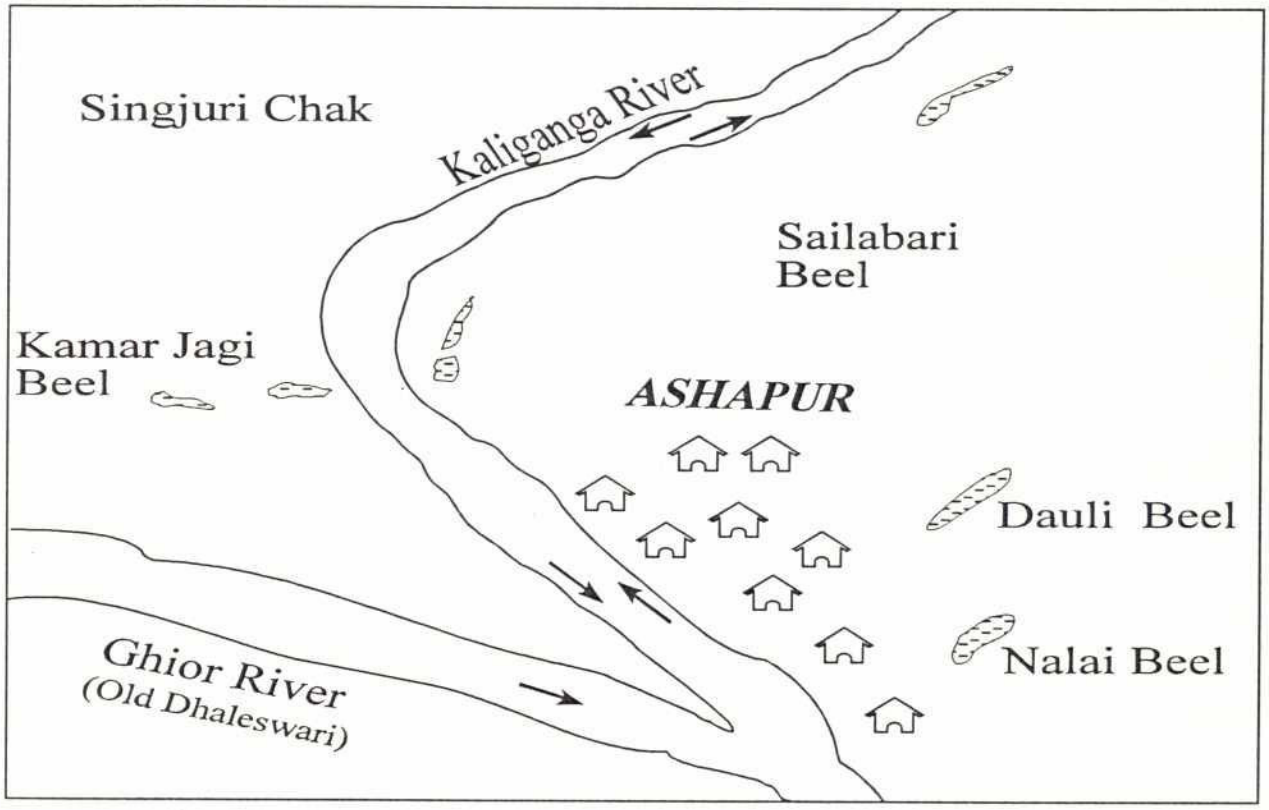
Durgapur and Diabari *beel*

Like Jhikutia, the area around Durgapur has been affected by the northward movement of the Padma River.

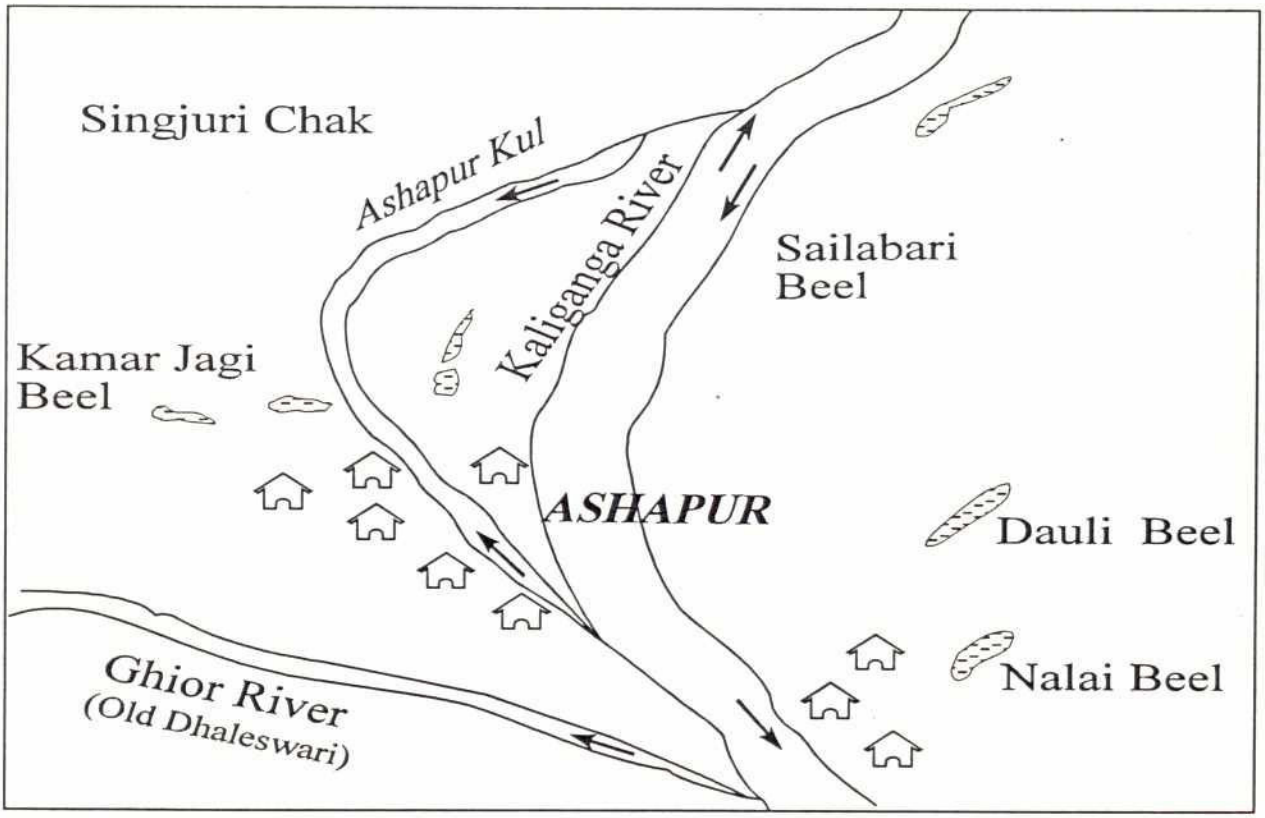
Until about 10 years ago, floodwaters always entered Diabari *beel* via the Mothurbose *khal,* which connects the eastern end of the *beel* with the Ichhamati River. The floodwater coming down the Ichhamati would have come either from the Jamuna or from local rainfall. About 15 years ago the northward movement of the Padma cut off the loop of the Ichhamati River within which Diabari *beel* lies. Since then, more direct flooding from the Padma into the Ichhamati system has brought with it a far heavier silt load, which has steadily raised the beds of local *beel*, rivers and *khal*. Mothurbose *khal* has silted up so much over the past 10 years that the first flood now enters the *beel* via Moshakali *khal,* which connects the northern part of the *beel* to the Kaliganga River. A few days later, water levels in the Ichhamati rise high enough to push water up Mothurbose *khal* as well.

Figure 9
Kaliganga River at Ashapur :
changes in course - 1970-93

Course of river : 1970



Course of river : 1993



Drainage from the *beel* and surrounding floodplains generally follows a similar pattern, although more water now drains out to the north once the sand bar at the mouth of the Mothurbose *khal* prevents further drainage southward into the Ichhamati.

The proximity of the Padma River and the turbidity of the water flowing into the local system has dramatically affected local hydrology. The depth of Diabari *beel* has steadily declined over the past 15 years. In *Ashwin* (September/October), just before drawdown, the *beel* is reported to have previously been about 75 feet deep, and even in *Choytra* (March/April) about 20 feet of water would normally have remained. The area of perennial water body has dropped from more than 60 acres 20 years ago to a mere three to four acres covered by a few feet of water during the driest part of the year.

The Ichhamati, once an important communications channel for the region, has practically become a seasonal river. Traditional boatmen on the river now dam the stream near Ramkrishnagar in *Kartik* (October/November) to prevent the western section of the river from drying out completely. During the dry season, the riverbed is increasingly being used by local farmers for *boro* rice cultivation. The eastern section of the river has been even more seriously affected. From just north of Harirampur to the Kaliganga River the Ichhamati has been completely seasonal for the past 10 years and, during the exceptionally dry year of 1992/93, even the stretch of river immediately adjacent to the mouth of Mothurbose *khal* dried up.

1.5 Fisheries access issues and the fishermen of Bangladesh

The most important source of variability between communities in terms of their dependence on fisheries is the existence and enforcement of access restrictions. The formal and informal controls over who fishes where and when are key to understanding patterns of dependence on fisheries resources and in gauging the effects changes in those resources may have on a community.

Fisheries access issues in Bangladesh are extremely complex, governed not only by law but also by tradition and local fiat. As the fish resources themselves change access also can change. To further complicate matters, access controls affect different fishing populations in different ways. To understand the basis for this it is necessary to understand the nature of these different fishing populations.

Most attempts to categorise those who fish in Bangladesh end up identifying three groups: professional fishermen, seasonal fishermen and subsistence fishermen. Given the degree of variation between regions, areas and villages, and the degree of variation in the fisheries resource from year to year, there are obviously many groups and areas that will fall outside any attempt at categorisation at any given moment. In general terms, however, the three groups, professional, seasonal and subsistence, constitute sectors of the population with identifiably different levels of dependence on fishing. Each is affected differently by access arrangements on area water bodies. Section 1.6 summarizes the existing access control arrangements. These are discussed in greater detail for seasonal and subsistence fishermen in Section 2 and for professional fishermen in Section 3.

Professional fishermen

Professional fishermen are defined by the high degree of their dependence on fishing for a livelihood. Within the category of professional fishermen there are two groups: traditional fishermen and non-traditional fishermen.

Historically, professional fishermen in Bangladesh have been a clearly circumscribed group, defined by religion, caste and their low social status. They were fishermen by tradition. Such traditional fishermen (*jele*) are frequently thought of as being almost all Hindu, but in many areas of the country there have long been extensive communities of Muslim fishermen who are either Hindu fishing communities that have converted to Islam or poor Muslim communities that have been involved in fishing for many generations.

In traditional rural Bengal society, fishing is a hunting activity, which is associated with low-caste or even non-caste (i.e., tribal) people. Those who fish, are therefore held in low social esteem and generally segregated from the majority of society. At the root of this situation is the concept of pollution. Fishermen, because they generally must get into the water to perform their occupation, are considered polluted. This concept, although generally associated with Hindu culture, is also strong among the Muslim communities of rural Bangladesh, and it is reflected in the opposition among higher status Muslim farmers to the involvement of any of their co-religionists in fishing. Distinctions are made, however, between fishing with gear in the water and fishing from the bank. Anyone can apparently drop a line or throw a *jhaki jal* (cast net) from a riverbank (keeping dry in the process) without risk of compromising their social standing. Actually getting into the water with a push net or a seine net is an entirely different matter and implies risks of pollution. The negative social connotations of fishing also appear to be strictly limited to fishing as a source

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of livelihood. Fishing as "recreation" or simply for household consumption is largely exempt from the general disapproval of fishing activity by anyone except a fisherman.

Since the 1970s, economic need and the strong demand for fish in Bangladesh have driven more and more people from outside the traditional fishing community to ignore the social stigma attached to fishing for a living and take up fishing full-time.

Seasonal fishermen

The acute seasonality in almost all fisheries in Bangladesh tends to limit new entrants to the fisheries to seasonal fishing. Few of these seasonal fishermen, who are either landless labourers or landowners (typically owning small to medium farms) actually become full-time, year-round fishermen, even though they may make substantial income from the occupation. The landowners among the seasonal fishermen have usually realized the value of the fisheries resource occupying floodwaters over their land, and have therefore decided to appropriate that part of the resource for themselves. Therefore, for the purpose of this study, seasonal fishermen are defined as those non-professional fishermen who hold no formal leases and take advantage of the seasonal availability of fisheries resources to provide some or all of their income for that part of the year.

Subsistence fishermen

Making meaningful distinctions between subsistence fishing and fishing for income can be a futile exercise. To some extent calling oneself a subsistence fisherman has become a matter of convenience. When people outside professional fishing communities want to minimise the amount of fishing they do (because they are using illegal gear or think there may be some kind of access restriction) they describe it as fishing just for consumption, although they may well be using sizeable units of fishing gear. Children's fishing is almost always said to be "just for consumption" even though many may sell some of their catch to supplement family income. The degree to which what is caught is sold for income also depends a great deal on seasonal fluctuations in the fish biomass of area water bodies. During the drawdown, for example, when fish are plentiful and concentrated in small areas where they are easily caught, a self-described subsistence fisherman can easily find himself with more fish than his family can consume. Subsistence fishermen are defined as those who fish for consumption and for whom any income from fishing is more a matter of chance than intent.

1.6 Fisheries access in the study area

Fishing is done on an extremely wide range of water bodies in Manikganj District, and access arrangements reflect this diversity. The following section describes the general features governing access. The access arrangements encountered, as well as the nominal and actual control of fisheries, are discussed in detail in Section 3.2.

The Manikganj District historically had many fisheries-rich water bodies. The distributaries of the Jamuna were key channels for the eggs and fingerlings of migratory carps which spawn along the upper reaches of the Jamuna and Brahmaputra around the Assam border. Young carp still support an important *savar* fishery on the Dhaleswari and Kaliganga, but in the past, as these rivers flooded the surrounding floodplains, they also carried rich carp resources into the local *beel*, *baor* and residual water bodies. As a result, the Land Revenue Office still formally leases out many area *jalmahal*, often to local fisheries *samity*. The value of many of these *jalmahal* is declining, however, as water bodies silt up and catches, particularly of the higher-value species, diminish. The low-status traditional Hindu fishing communities nominally controlling these *jalmahal* frequently are unable to enforce access restrictions and have to share the resource with a growing number of non-traditional seasonal and subsistence fishermen.

Most of the local rivers, as well as major perennial *beel*, are government-owned *khas* water bodies subject to annual leasing. Many *khal* also used to be *jalmahal*, but as water depths have decreased, people owning land along the banks of *khal* have tended to extend their land claims to the *khal*. These people frequently use the *khal* for *boro* cultivation during the winter or lay claim to its fisheries by placing *katha* (brush piles) or excavating *danga* (fish pits) in them. A large number of smaller *beel* and *khal* are leased out by local authorities for the support of village mosques and *madrassa*.

The section of the Padma and Jamuna rivers running from Aricha in the north to just south of Harirampur, constituting the Padma-Jamuna Barabant *jalmahal*, is under the New Fisheries Management Policy (NFMP). Under the NFMP, instituted in 1986, selected water bodies are no longer leased out to individuals or institutions by annual open auction. Instead, gear licences are issued to what the policy terms "genuine fishermen" belonging to local fisheries *samity*. In this section of the Padma River, which may be one of the most important fisheries in Bangladesh, a large district-level fisheries *samity*, the Padma-Jamuna *Matschajibi*

Samabaya Samity, an umbrella organization for 19 local *samity*, manages the *jalmahal* and distributes licences.

2. FISHERIES IN MANIKGANJ DISTRICT

2.1 Sources of information

The socioeconomic research undertaken by FAP 17 used four different means to assess levels of fishing activity and dependence on fisheries in the communities under study:

- During the census survey, each village household reported the principal occupation of the household head and ranked a selection of other income sources for the household, including fishing.

- During the baseline survey, the sample households listed income-generating and expenditure-saving activities undertaken at various times of the year by 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, expenditures and time spent by 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 rapid rural appraisals (RRAs) were done in all the study communities at several points during the study. These open-ended appraisals focused on qualitative issues and historical processes affecting fisheries. The information gathered facilitated cross-checking of available data sets, identification of distorting factors and, most important, understanding of the social, cultural and historical context of the fisheries.

The analysis in this chapter addresses four basic questions:

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

2.2 Patterns of fishing involvement

In the North Central Region, unlike most other areas studied by FAP 17, fishing activity in the main villages was extensively reported from the very beginning of the research work. The social stigma generally attached to occupational fishing in Bangladesh is less marked in Manikganj than elsewhere, and although fishing is still considered a low-status activity, people are considerably less reserved about reporting their fishing.

The area's less restrictive attitude towards fishing is also reflected in the number of people involved. Table 6 shows the first- and second-ranked sources of income for all households in the four main villages. The data, from the census survey, is arranged according to landholding category. While in practically all the villages studied by FAP 17 these data proved to be considerable understatements of fishing activity, they are broad indicators of differences between villages.

With the exception of Durgapur, few main village households reported fishing as a principal source of income, but a relatively large proportion of small farmers and landless households listed it as a secondary livelihood source. In Jhikutia and Ashapur, about 10% of households reported some fisheries income. The numbers were negligible in Jagannathpur and there was clearly some under-reporting during the census. In Durgapur, fishing is one of the principal sources of income for the entire village; more than 42% of landless households and 35% of small landowners reported fishing as their first- or second-ranked means of livelihood. As will be seen later, there are historical reasons for this extremely high level of fisheries involvement.

What these data do not show is the high level of occasional fishing done by a large proportion of the population in this area. Much of this fishing is done by children and, while a large part of the catch is used for household consumption, any excess is sold. During the period of peak fishing activity, this probably generates an appreciable amount of seasonal income that was not reported by census respondents.

Subsequent surveys and appraisals carried out in all the study villages provided an opportunity to correct these figures. Tables 6, 7, 8 and 9 use income from fishing by different gears, recorded during the income monitoring of sample households, to establish a more realistic picture of fishing gear ownership. The tables also show the average annual

Table 5
Ranking of sources of household income by landholding category: Main villages

NC1-1 Jhikutia — Main village

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	28.6	57.1
Medium	41	78.0	2.4	0.0	14.6	7.3	19.5	4.9	4.9	22.0	31.7
Small	72	48.6	0.0	12.5	15.3	23.6	36.1	9.7	18.1	12.5	11.1
Landless	114	12.3	5.3	43.0	23.7	16.7	21.1	7.9	14.9	8.8	19.3

Source: FAP 17 Village Census

NC2-1 Ashapur — Main village

Land Cat.	No.	First Rank Occupation *					Second Rank Occupation **				
		Farm	Fish	Lab	Trade	Other	Farm	Fish	Lab	Trade	Other
Large	7	57.1	0.0	0.0	14.3	28.6	42.9	0.0	0.0	28.6	14.3
Medium	54	68.5	0.0	3.7	9.3	18.5	29.6	7.4	11.1	14.8	13.0
Small	101	27.7	2.0	30.7	17.8	21.8	51.5	5.0	20.8	5.0	5.9
Landless	54	9.3	1.9	48.1	13.0	27.8	13.0	14.8	11.1	1.9	13.0

Source: FAP 17 Village Census

NC3-1 Jagannathpur — Main village

Land Cat.	No.	First Rank Occupation *					Second Rank Occupation **				
		Farm	Fish	Lab	Trade	Other	Farm	Fish	Lab	Trade	Other
Large	2	50.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	50.0
Medium	4	75.0	0.0	0.0	25.0	0.0	25.0	0.0	0.0	25.0	25.0
Small	31	54.8	3.2	9.7	12.9	19.4	29.0	0.0	16.1	3.2	22.6
Landless	27	7.4	0.0	55.6	22.2	14.8	18.5	0.0	14.8	0.0	22.2

Source: FAP 17 Village Census

NC4-1 Durgapur — Main Village

Land Cat.	No.	First Rank Occupation *					Second Rank Occupation **				
		Farm	Fish	Lab	Trade	Other	Farm	Fish	Lab	Trade	Other
Large	2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0
Medium	6	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	66.7
Small	14	71.4	7.1	7.1	7.1	7.1	14.3	28.6	0.0	7.1	35.7
Landless	19	0.0	21.1	57.9	0.0	21.1	26.3	21.1	21.1	0.0	21.1

Source: FAP 17 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

income earned from using those gears. The income figures include both fish sold and fish caught and consumed.

Jhikutia

Table 6 clearly shows the importance of the *shangla jal* (clap net) for small farmers and landless households in Jhikutia. Although local people describe the use of this gear as fishing "just for consumption", the earnings generated during the flooding season from *Ashar* (June/July) to *Ashwin* (September/October) are often substantial.

Table 6
Gear ownership and average annual income from different gear types by landholding category: Jhikutia

NC1-1 Jhikutia **Main Village**

Gear Type	Bengali Name	Medium Farmers			Small Farmers			Landless		
		No.	%	Tk.	No.	%	Tk.	No.	%	Tk.
Gill net	*Current jal*	12	29.3	190	0	0.0	0	15	13.3	1872
Hook	*Sip*	6	14.6	167	7	10.1	135	8	6.7	20
Scoop net	*Ucha*	9	22.0	313	0	0.0	0	0	0.0	0
Bag net	*Shangla jal*	3	6.5	2525	15	20.8	763	30	26.7	1808
Traps	*Doiar* *Polo*	0 0	0.0 0.0	0 0	0 10	0.0 13.9	0 185	4 8	3.3 6.7	6460 324
Spear	*Koch*	0	0.0	0	5	6.9	50	8	6.7	215
Cast net	*Jhaki jal*	17	42.3	703	22	29.9	850	11	10.0	213
Push net	*Thella jal*	17	41.5	477	32	43.8	387	19	16.7	547
Other	Hand fishing	6	14.6	105	0	0.0	0	23	20.0	382

Source: FAP 17 Socioeconomic Monitoring

The high levels of ownership of such subsistence gears as *thella jal* (push net) and *jhaki jal* (cast net) among small landowners is particularly notable. Fewer landless households than small farmers own gear, but the *shangla jal* fishery is far more vital for landless households than for landowners. Fishing is especially important among the many landless households in the village who are recent in-migrants, many of whom have been displaced by erosion from villages along the banks of the Padma. For many of these households, fishing is essential to compensate for the almost complete loss of their productive assets.

Altogether, at least 50% of the village households earn some of their annual income from fishing. An even larger proportion of households engage in seasonal subsistence fishing.

Ashapur

Gear ownership in Ashapur, shown in Table 7, is indicative of their reliance on fishing Ashapur *kul* and the nearby Kaliganga River.

Table 7
Gear ownership and average annual income from different gear types by landholding category: Ashapur

NC2-1 Ashapur **Main village**

Gear Type	Bengali Name	Medium Farmers			Small Farmers			Landless		
		No.	%	Tk.	No.	%	Tk.	No.	%	Tk.
Gill net	*Current jal*	3	5.6	230	6	6.2	2861	13	23.5	2708
Seine nets	*Deol/Dhor*	0	0.0	0	28	27.4	259	16	30.2	549
	Ferra jal	0	0.0	0	0	0.0	0	3	5.6	7885
Lift net	*Veshal jal*	0	0.0	0	3	2.6	200	0	0.0	0
Scoop	*Ucha*	6	10.8	581	0	0.0	0	3	5.6	52
Katha	*Katha*	3	5.6	494	3	2.6	10100	0	0.0	0
Trap	*Doiar*	7	13.6	1788	6	6.2	3483	11	20.4	1335
Hooks	*Sip*	0	0.0	0	0	0.0	0	3	5.6	60
	Daun	0	0.0	0	0	0.0	0	7	12.3	1685
	Nol barsi	0	0.0	0	0	0.0	0	3	5.6	1625
Cast net	*Jhaki jal*	4	8.0	90	12	12.0	500	0	0.0	0
Push net	*Thella jal*	4	8.0	485	0	0.0	0	0	0.0	0
Other	Hand fishing	0	0.0	0	0	0.0	0	3	4.6	65

Source: FAP 17 Socioeconomic Monitoring

Fishing on the surrounding floodplains is mainly done with *doiar* (traps) rather than the *thella jal* that is more typical of floodplain communities. A few households earn considerable incomes using *current jal* (monofilament gill net) in the *kul* and the river, and *deol jal* (small seine net) is the preferred subsistence gear.

The proportion of people engaged in fishing is somewhat lower than in Jhikutia, but people in Ashapur were more reticent to report fisheries earnings due to local disputes about access to the *kul* and river. Many of the village's small landowners, who are in fact functionally landless due to river erosion, were reluctant to admit their dependence on fishing even though it has become a sizeable part of their livelihood strategy since the loss of their cultivable land.

Jagannathpur

Despite the proximity of Hazipur *beel*, fishing in Jagannathpur seems to be limited to subsistence fishing, principally done by children, in the *chak* and flooded land immediately around the village. Although there are many *danga* (fish pits) in Hazipur *beel*, most are owned by people from other local communities.

Gear ownership patterns are shown in Table 8. The hand-fishing during the flood drawdown by some landless and small farming households is worth noting. This generally occurs in *maital* (borrow pits) or ditches around the homestead area. Many of these ditches are now being converted to fish culture, and this fishing opportunity seems to be in decline.

Table 8
Gear ownership and average annual income from different gear types by landholding category: Jagannathpur

NC3-1 Jagannathpur **Main village**

Gear Type	Bengali Name	Medium Farmers			Small Farmers			Landless		
		No.	%	Tk.	No.	%	Tk.	No.	%	Tk.
Gill net	*Current jal*	3	75.0	420	5	16.1	318	0	0.0	0
Seine nets	*Deol/Dhor*	0	0.0	0	5	16.1	255	6	21.5	249
	Moi jal	0	0.0	0	0	0.0	0	4	14.1	70
Scoop net	*Ucha*	3	75.0	45	0	0.0	0	0	0.0	0
Trap	*Doiar*	3	75.0	150	0	0.0	0	0	0.0	0
Cast net	*Jhaki jal*	0	0.0	0	3	8.1	15	0	0.0	0
Push net	*Thella jal*	0	0.0	0	3	8.1	110	2	7.4	120
Other	Hand fishing	0	0.0	0	3	8.1	175	4	14.1	300

Source: FAP 17 Socioeconomic Monitoring

Durgapur

The level of fishing activity in Durgapur is unusual even for this area. *Current jal* (monofilament gill net) fishing is practised intensively by large numbers of the community's small farmers and landless households. The earnings from this activity are very high, although the figure shown in Table 9 for small farmers is distorted by one respondent who has invested in extremely large amounts of *current jal* which he uses on the Padma River as well as in surrounding *beel* and floodplains.

Table 9
Gear ownership and average annual income from different gear types by landholding category: Durgapur

NC4-1 Durgapur **Main village**

Gear Type	Bengali Name	Medium Farmers			Small Farmers			Landless		
		No.	%	Tk.	No.	%	Tk.	No.	%	Tk.
Gill net	*Current jal*	0	0.0	0	5	35.7	31705	8	41.9	6908
Scoop	*Ucha*	4	66.7	474	5	37.1	326	7	34.3	317
Katha	*Boat Katha*	1	16.7	80	0	0.0	0	0	0.0	0
Traps	*Doiar*	0	0.0	0	5	35.7	1383	5	24.0	1335
	Polo	1	16.7	575	0	0.0	0	0	0.0	0
Hooks	*Sip*	0	0.0	0	0	0.0	0	3	16.5	115
	Daun	0	0.0	0	3	17.9	450	1	6.0	2335
Spear	*Koch*	1	16.7	365	1	10.0	30	0	0.0	0
Cast net	*Jhaki jal*	4	66.7	356	1	10.0	-300	0	0.0	0
Push net	*Thella jal*	1	16.7	100	0	0.0	0	1	6.0	705
Other	Dewatering	0	0.0	0	0	0.0	0	1	5.3	60
	Hand fishing	0	0.0	0	0	0.0	0	2	11.9	92

Source: FAP 17 Socioeconomic Monitoring

Durgapur has been settled relatively recently, and its inhabitants seem to be less inhibited by social norms concerning the activities in which they can engage. Many have immigrated from areas affected by river erosion and the proximity of Diabari *beel* and the Ichhamati and Padma rivers seems to have attracted them into fishing. Most importantly, access controls on nearby water bodies seem to be lax and are not generally applied to Muslim non-traditional fishermen.

While *current jal* is clearly the gear of choice in the village, other small gears such as *doiar* and *ucha* (bamboo scoop) are also commonly used on the floodplain and in the *khal* leading into the *beel*.

2.3 Women and fisheries

In the other regions of the country studied by FAP 17, women's involvement in fisheries is extremely limited. Fish processing and, in traditional fishing communities, gear-making, both of which can be done within the homestead, are the only fisheries-related tasks women perform on a fairly regular basis. Even in areas where poor women go out of the homestead to work, they very rarely engage in fishing because exposing themselves to public view on riverbanks or in the flooded *chak* is extremely uncomfortable. Only the extremely poor, such as elderly widows with no other means of support or destitute female-heads of household, are likely to fish. Even then they are usually careful to select sheltered sections of riverbank where they will not be too obvious.

It would be an exaggeration to say that women in the North Central Region have completely lost this sense of intense shame that is attached to their fishing, but important social changes in this area have somewhat altered their perception of what constitutes shameful behaviour. It should be noted, however, that this has rarely been accompanied by a concomitant relaxation of men's perception concerning what women should and should not do.

Far more women from landless and small farming households in Manikganj District seem to be involved in agricultural and non-agricultural labour than is generally the case in other areas. This is partly due to the proximity of the capital, Dhaka, and industrial centres in Dhamrai and Savar where women are preferred for some jobs. In some cases, the nearby urban and peri-urban centres also encourage more men to work outside the community, either daily or for longer periods, leaving women to take decisions more independently. The economic attraction of allowing female household members to join the work force is a contributing factor, but the high level of non-governmental organisation (NGO) activity in the area has been critical to redefining gender roles.

Manikganj District, partly because it has a history of high landlessness and acute poverty, and partly because of its proximity to Dhaka, may have the highest density of NGO activity in Bangladesh. During the selection process, FAP 17 researchers originally attempted to screen out villages where NGOs were active because of the risk that NGO activity might "distort" findings. It quickly became clear that, around Manikganj at least, doing so would constitute an even greater distortion. All of the FAP 17 main villages in Manikganj District contain active NGO groups, and most have more than one. In most communities at least two of four large NGOs—BRAC, Grameen Bank, Proshika and ASA—are present.

All of these organisations have targeted women. By establishing savings and credit groups, providing training and supporting small-scale enterprises, these NGOs have sought both to improve the social and economic standing of women and to achieve the maximum impact from their programmes as benefits extended to women have frequently been seen to have the greatest impact on the community as a whole.

The real economic impact of these activities seems to be variable, but their social impact was immediately apparent to members of the study team who had worked in rural communities in several different areas of the country. Only in Manikganj was it relatively easy for male researchers to talk to both male and female respondents. Everywhere else, the automatic reaction to the arrival of a group of strangers in the homestead was for the women to withdraw, leaving the men to talk. Most contacts with women in the study communities had to be handled by female researchers. In Manikganj, in several cases, women actually came out of homesteads to ask the team what they wanted, and discussion groups regularly consisted of women and men with both sexes participating actively. In most cases where women had the confidence to deal with outsiders in this way, it would turn out that they were participants in NGO groups.

The reaction of men to this shift in social behaviour is, not surprisingly, mixed. On several occasions, male villagers were openly hostile to FAP 17 researchers who they thought might be NGO workers coming to "organise their women". Box 1 illustrates the kind of contradictions that can arise for some women when men's attitudes have not kept pace with the shift in social norms regarding gender roles.

Most women from medium and small landowning households in Durgapur are still constrained by *purdah*, which prevents their involvement in fishing. One women said: "How could we ever go fishing in front of our brothers-in-law". For women in landless households the story is quite different. Many women of all ages are seen regularly in the shallow *chak* around their homesteads fishing with *ucha* and *thella jal*, particularly between *Ashwin* and *Kartik* as the floods begin to recede. These women still have to deal with male disapproval of their fishing, however. They report that often they have to wait for *hat* days, when their husbands are away from the village, in order to organise their fishing expeditions. Even this only applies to some families. Among many landless households there seems to be practically no restriction on women fishing; only newly married women generally would not go out.

Box 1: Only on *hat* days—women and fishing in Durgapur

Fishing by women follows particular seasonal patterns and is done in relatively specific locations. While fishing by men tends to be concentrated during the flood season, when agricultural activity is slack, and during the drawdown, when floodplain fishing is still "open-access" but fish are more easily caught, fishing among women is concentrated in the dry, winter season when

homestead ditches, *maital* and ponds are dewatered and women can take part without having to go far from their homesteads. The situation described in Box 1 is still rather unusual. Women are sometimes seen along *khal* and out in shallow floodplain areas adjacent to their homesteads, but by far the majority of women's fishing consists of participation in dewatering activities.

Women primarily use small gears like *thella jal* (push net), *ucha* (scoop net) and *sip* (rod and line), but during the dewatering of ponds and ditches they use only their hands.

The contribution women make to overall household fishing livelihood is difficult to evaluate. Although Manikganj women fish more than women in any of the other areas studied by FAP 17, their efforts are still small in comparison to that of men and children. Most women's fishing, in fact, seems to be carried out in conjunction with children and the majority of their catch is consumed by their households.

Since women's fishing concentrates on ponds and ditches near homesteads, any change in the status of these water bodies will tend to reduce their involvement. At present, the majority of homestead borrow pits are owned in common by the households surrounding them. Exploitation is usually also in common and occurs before the water bodies dry up during the period from *Poush* through *Magh* or *Falgoon* (December to March). Access controls on these residual water bodies is usually minimal and many poorer households are able to fish in them.

As fish culture techniques spread, the exploitation and control of ditches and ponds inevitably becomes more intensive, more male-dominated, and participation by women is reduced. While dewatering of a naturally stocked *maital* is frequently left to women and children, the management and harvesting of a stocked pond is invariably done by men and the product is converted into cash income controlled by men. Where fish culture activities succeed, the extra cash income coming into the household from pond culture usually more than compensates for any loss of access and for the loss of fish available for consumption for pond- or ditch-owning households. For poorer households, however, the conversion to fish culture will mean a complete loss of fisheries access with no compensation. Undoubtedly the spread of fish culture will restrict the already more limited options available to rural women.

2.4 Children in fisheries

Levels of occasional and subsistence fishing are far higher in the North Central Region than in any other area studied by FAP 17. The proportion of fishing effort and total catch accounted for by children is also highest in this area and, considering the patterns of fish catch, it seems safe to assume that a considerable proportion of the additional subsistence catch in the area is contributed by children under the age of 15.

Jhikutia

Fishing by the children of Jhikutia is relatively limited during the peak fishing period from *Sraban* to *Ashwin* (July to October). This is due to the predominance, during this period, of the *shangla jal* fishery on the Padma River, which mainly involves adult men. As fishing effort declines after the flood recession, and efforts shift to residual water bodies, adult involvement also declines and it is mainly children, and in some cases women, who harvest the fish from these water bodies.

The socioeconomic breakdown of children's involvement in fishing in Jhikutia (Figure 10) is revealing. During the flood season, fishing by children from small farming households is practically non-existent; some children from landless households fish on the floodplain, and children from medium landowning households frequently accompany their parents on the main river for *shangla jal* fishing. Children from small landowning households only make a notable contribution to fishing effort during the drawdown and early dry season, from *Kartik* to *Poush* (October to January), when they harvest residual waters on their family plots.

During the dry season from *Magh* to *Joisthya* (January to June), practically all of the fishing in Jhikutia is done by children from landless households who dewater small water bodies on the floodplain and around homesteads. With the boom in *rabi* crop cultivation in the area, it seems likely that children from landowning families are heavily involved in agricultural activities during this period, leaving more fishing activity to children from landless households.

Ashapur

Ashapur children's involvement in fishing, also shown the Figure 10, follows a quite different pattern. Children from landless households do most of their fishing during the peak flooding season and flood recession, from *Ashar* through to *Kartik* (June to November), when

they can easily fish on the surrounding floodplains and there are few restrictions on the use of small subsistence gears. During the rest of the year, although there are still fisheries resources to be exploited in the nearby river and *kul*, landless children are not involved. This is partly due to their participation in other activities, such as earth-moving, but it is also due to the tenurial controls exerted over most of the available water bodies during the winter season.

Ashapur *kul*, the most accessible perennial water body, is largely controlled by landowners who place *katha* in the *kul* and harvest them during the winter. These landowners, or the fishermen working for them, limit fishing activity by others. There are very few ponds, ditches or *maital* in and around Ashapur, leaving landless households with few options for fishing during the winter months.

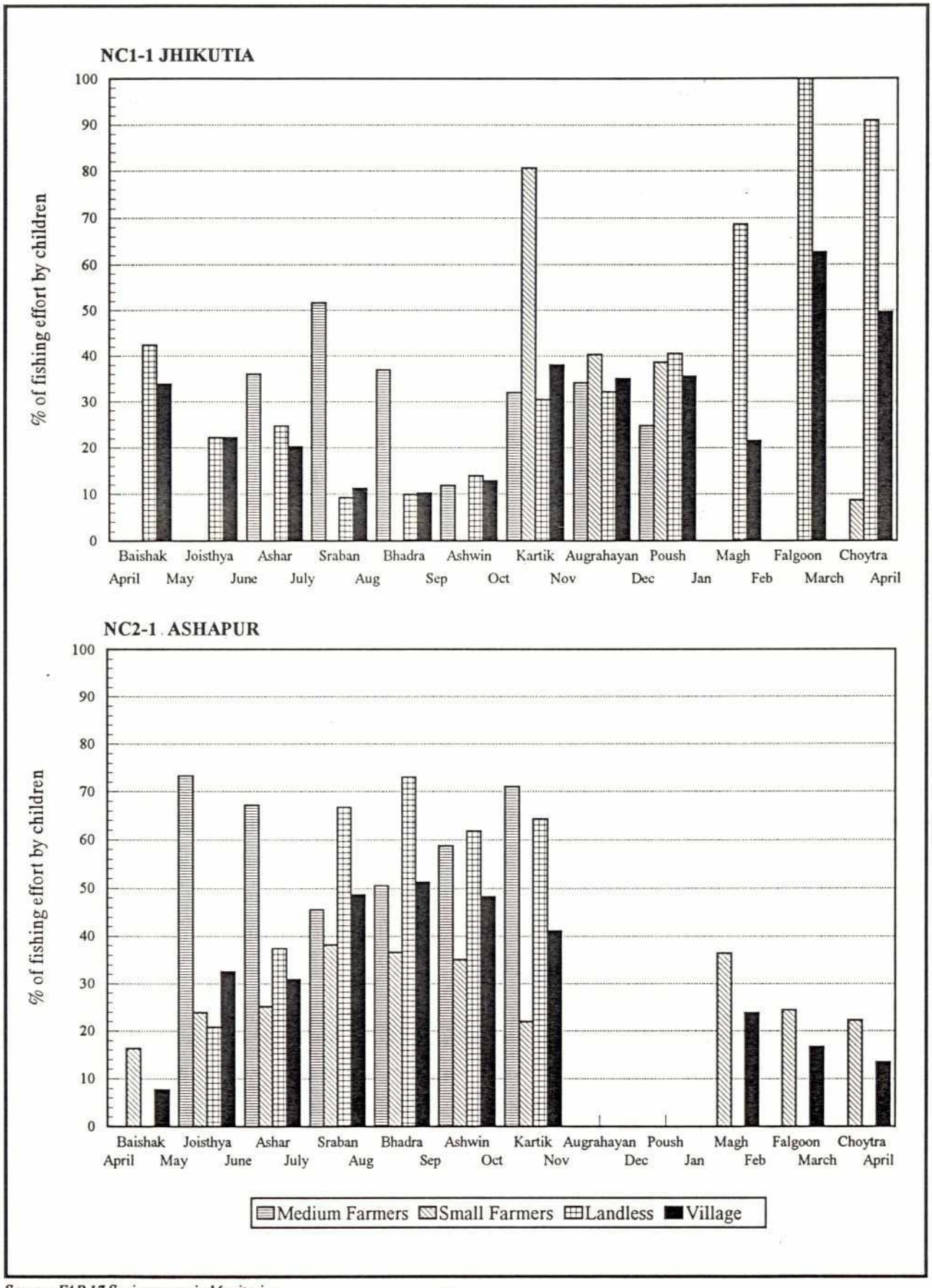
Jagannathpur

The overall level of fishing activity in Jagannathpur is far lower than in any of the other main villages studied. The socioeconomic patterns of fisheries involvement by children in Jagannathpur are shown in Figure 11.

Despite the extensive floodplains around the village and the proximity of Hazipur *beel*, even children do not take advantage of the local fisheries resources to the extent that might be expected. The very limited involvement of children from landless households is notable. This may be linked to the presence of many *danga* or fish pits in Hazipur *beel*, most of them owned by people from other villages. The lack of fishing activity suggests that *danga* owners are restricting fishing in the floodplains around their pits. Groups of children were observed fishing on floodplains immediately adjacent to their homesteads during floods, but very few venture any farther.

By contrast, children from small landowning households become increasingly active as the floods recede and water and fish are captured in residual water bodies to which their families can claim title. Children play a leading role in the harvesting of many of the ponds, ditches and *maital* around the village, but they are seldom involved in work on the cultured ponds that are beginning to spread in this area.

Figure 10 Proportion of fishing effort by children by landholding category through the year: Jhikutia and Ashapur



Source: FAP 17 Socioeconomic Monitoring

Durgapur

Children's fishing activity in Durgapur follows yet another pattern. The proportion of fishing effort children account for is not particularly high, but this is due to the far greater overall levels of effort in the village rather than lack of their involvement. The proportion of fishing effort accounted for by children is shown in Figure 11.

In contrast to Ashapur and Jagannathpur, the proportion of effort children account for is lower during the floods and drawdown, from *Ashar* to *Augrahayan* (June to December), mainly because many adults, particularly in landless households, are very active in fishing during this period. The relative levels of children's activity are far higher during the winter, when adults are engaged in working on *rabi* crops and *boro* rice.

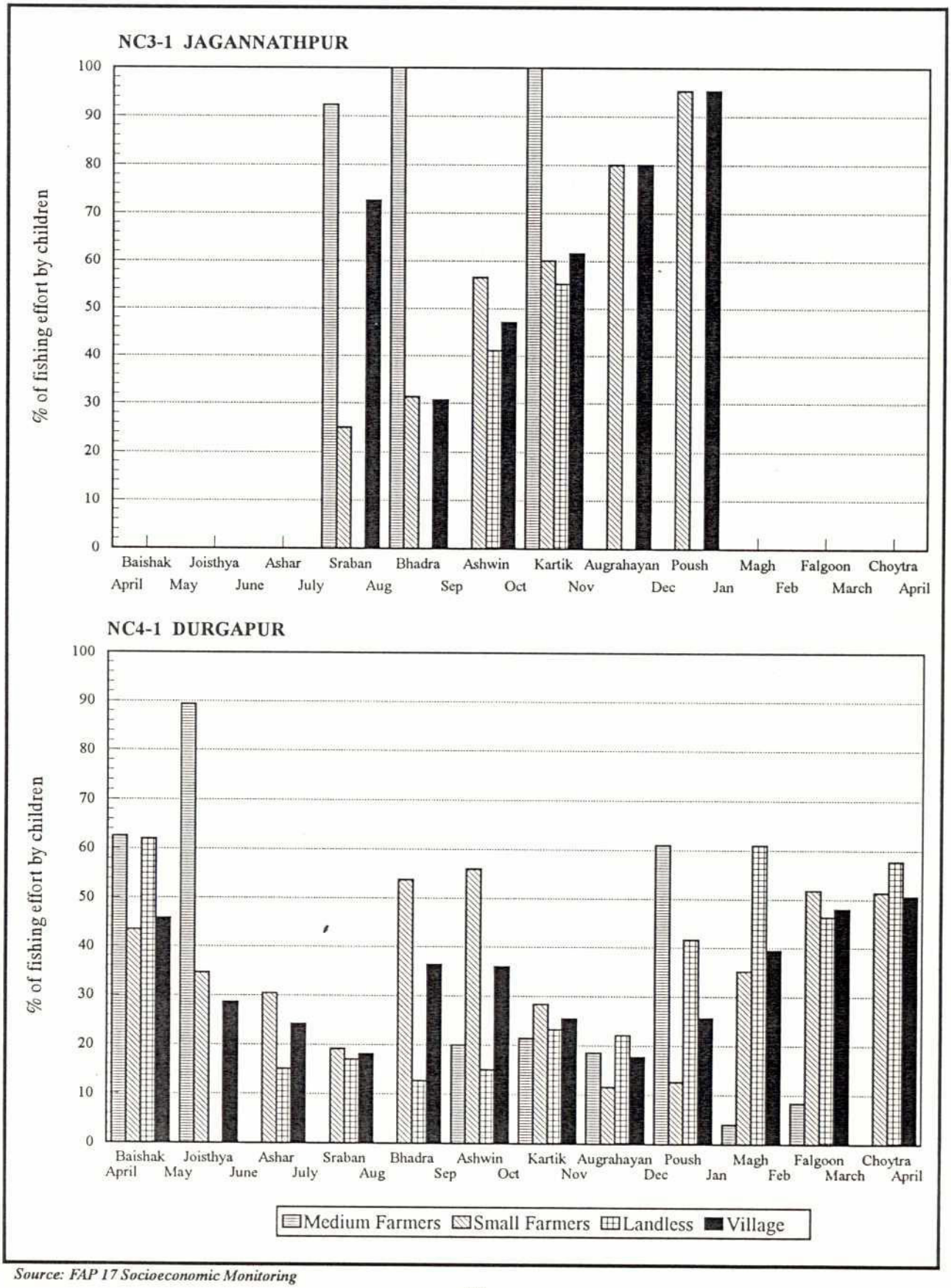
Unlike Jhikutia, fishing on the main river in Durgapur is not limited to the *shangla jal* fishery during the summer months. It is actually more active during the winter, when children seem to play an important role. Much of this fishing is done from small canoes using illegal *current jal,* a gear easily operated by children. The low water levels in the main river also facilitate children's involvement at this time of year.

2.5 Fisheries access

Fisheries access is frequently affected by the tenurial status of the land beneath water bodies or flood waters. In the North Central Region, the interaction between land tenure and fisheries access is particularly strong along the banks of rivers and *khal.* Along extremely active rivers, such as the Kaliganga and the Dhaleswari, many landowners are now effectively landless because their holdings have been eroded. Given the intense pressure on land that is typical of the region, eroded landholdings are seldom abandoned, however. Instead, families will wait years or even generations hoping to reclaim their land when the river changes course again. In many cases, such landowners take advantage of their tenure to claim fishing rights in the water covering their land. This is particularly true in locations suitable for the placement of *katha* (brush piles).

The situation is somewhat different along the banks of *khal,* where tenurial status is often ambiguous. Some *khal* are treated as *khas* water bodies and leased out, usually by such local authorities as the union *parishad.* In other cases, landowners claim *de facto* rights over fishing in the area of the *khal* adjacent to their land holdings. It is extremely difficult to

Figure 11 Proportion of fishing effort by children by landholding category through the year: Jagannathpur and Durgapur



Source: FAP 17 Socioeconomic Monitoring

establish whether there is any legal basis for this, but the arrangement appears to be generally accepted.

In addition, an informal but apparently universal distinction is made throughout the North Central Region between professional and subsistence fishing. This distinction is based, above all, on who is fishing. Virtually all access restrictions apply exclusively to professional fishermen, which in this region, generally means traditional Hindu fishermen. So-called subsistence fishing is practically unregulated even though many subsistence fishermen may actually be exploiting fisheries as intensively and effectively as the Hindu professionals.

The distinction between traditional, professional fishermen and non-traditional, subsistence fishermen nominally corresponds to the type of gear being used. Until relatively recently, the use of large gears, such as *ber jal* (seine nets), was limited to the traditional Hindu fishing community, while Muslim subsistence fishermen used small, inexpensive gears to catch fish. Over the past 10-15 years, however, large numbers of Muslim non-traditional fishermen have intensified their operations to such an extent that they are often as dependent on fishing as a source of livelihood as their neighbours in traditional fishing communities.

While the level of involvement of Muslim agriculturists in fishing has changed considerably, changes in the mechanisms for the regulation of fisheries access seem to have lagged. As a result, access controls now apply mainly to Hindu traditional fishermen, while Muslim non-traditional fishermen go largely unregulated.

Jhikutia

Jhikutia villagers are predominantly involved in the *shangla jal* fishery on the nearby Padma River. For many households, particularly the landless, this fishery has become a regular and important part of their seasonal livelihood strategy. The *shangla jal* fishery seems to have always been a feature of the flood season along most rivers where *ilish* run upstream, but it appears to have assumed its present scale in Jhikutia only over the past ten years.

The section of the river where the *shangla jal* fishing is done falls under the New Fisheries Management Policy (NFMP), which dictates that annual licences be issued for specific gears to what the policy terms "genuine" fishermen. While most large gears, such as *ber jal* (seine net) and *gulti jal* (large-mesh seine net), are effectively covered by this system, smaller gears, including *shangla jal,* are entirely unregulated. Seasonal fishermen from

predominantly agricultural communities like Jhikutia are therefore able to use the river as an open resource.

Similar anomalies seem to be frequent in other water bodies around Jhikutia as well. The Ichhamati River, running along the south side of the village, is also a leased *jalmahal* controlled by a fisheries *samity* made up of fishermen from nearby Hindu fishing communities such as Kutirhat and Ujanpara. But the nominal control exerted by these fishermen seems to have little effect on discouraging local farmers and labourers from fishing in the river with a range of gears, particularly *current jal* (monofilament gill net).

The seasonal floodplains surrounding the village are the second most important water bodies for Jhikutia villagers who fish. These floodplains continue to be predominantly open-access and are widely exploited by landless and landowning households alike. As water levels decline after the flood recession, however, landowners tend to assert more exclusive rights over residual water bodies.

Many households also rely on access to the area's ponds and ditches. Many homestead borrow pits and *maital* are not controlled or cultured as yet and harvesting arrangements are generally informal, involving neighbours and children. The spread of formal fish culture techniques, including stocking and feeding, will inevitably lead to the reduction of this fishery.

Ashapur

Fishing in Ashapur is dominated by the nearby Kaliganga River and its off-shoot, Ashapur *kul*. The Kaliganga is a government *jalmahal* and is generally leased out to local fisheries *samity*, but this does not prevent non-traditional fishermen from exploiting the river. Sometimes this is done under informal agreements with the leaseholders, but more often these fishermen use smaller gears that are tacitly accepted by the leaseholders. Traditional fishermen have accepted that they generally cannot enforce fishing restrictions on local people and usually content themselves with limiting *katha* fishing on the river. As long as non-traditional fishermen only use *current jal*, *jhaki jal* (cast net) and *doiar* (traps), their access to the Kaliganga is effectively open. Occasional efforts by local authorities to restrict the use of illegal fishing gear like *current jal,* seem to have little long-term impact on such fishing.

Ashapur *kul* is formally part of the Gang Kherai *jalmahal*, which also includes parts of the Kaliganga and Ghior rivers. Until the year prior to this study the *jalmahal* was leased to a fisheries *samity* made up of fishermen from local fishing communities, including Zabra. In 1993, control of the *jalmahal* passed into the hands of a local political leader who controls another local fisheries *samity*. The extent to which this might affect access to Ashapur *kul* is not yet clear. To date, the *kul*, although leased, has been under the *de facto* control of people owning land (or claiming to own land) along and beneath the *kul*. These landowners claim rights to the placement of *katha* on their land, and many annually "lease out" their plots as *katha* sites. This type of informal claim has become accepted since the formation of Ashapur *kul* some 10 years ago, and it does not appear to have been actively contested by the traditional fishermen who were formally supposed to control fisheries on the *kul*.

Perhaps as a result of a decline in the number of traditional fishermen, and because of the growing awareness of the value of the fisheries resource, other local people have attempted to establish rights to control of fisheries on the *kul*. The chairman of the union *parishad*, one of the wealthiest and most influential villagers in Ashapur, is said to be attempting to exact a "tax" from all people placing *katha* in the *kul*. Levels of tension and conflict surrounding fisheries, both on the *kul* and on the Kaliganga, have been accentuated by the recent intervention of fisheries officials to confiscate illegal *current jal*.

Jagannathpur

Even though the level of fishing activity in Jagannathpur is relatively low, most water bodies around the village are effectively open-access for local villagers.

In Hazipur *beel*, the principal water body south of the village, siltation has considerably reduced the area of perennial water over the past 10-15 years. All land in the *beel* is now privately owned and used for *boro* cultivation during the dry season. The *beel* landowners have many *danga* (submersible ponds or fish pits) excavated on their plots. While many of these are simply borrow pits, more and more landowners are purposefully excavating them, both to aggregate fisheries resources during the flood recession and to provide water reservoirs to irrigate *boro* crops through the winter.

The management and harvesting of these *danga* is often entrusted to groups of local fishermen under a variety of informal leasing arrangements. In theory, these arrangements give fishermen exclusive control over the fisheries in these water bodies. In practice, however, it is almost impossible for traditional fishermen to enforce any limitation on fishing

by local villagers. In the past, local people have enforced what they perceived as their rights to the open-access fishery in the *beel* and surrounding floodplain by sheer force of numbers and, on occasion, with violence. Fishermen's *katha* and *veshal* (lift net) sites are generally left alone, but everywhere else local people are able to place their *current jal* or fish by hand or *thella jal* as they please. Some fishing restrictions appear to be enforced by *danga* owners themselves. As a result, villagers from Jagannathpur, and others who do not own *danga* in the *beel,* are effectively excluded from the *beel* fishery.

Awareness of the value of fisheries resources is growing in the area around Saturia as fish culture gains in popularity. As a result, the issue of pond access is becoming increasingly important. In Jagannathpur, homestead borrow pits and *maital* have always been key fish resources, and easily accessible to practically everyone in the community. Very little in the way of control was generally exerted over these water bodies as they required no investment and were naturally stocked by flood waters. As more and more households convert their ditches and derelict ponds to fish culture operations, however, access to these water bodies is becoming more restricted. The returns generated by fish culture operations are high, but their distribution is limited to the owners of ponds and the fishermen working for them.

The village has one *khas* pond, known as Shivbari *pukur*, which covers just over an acre. The pond, which used to be smaller, dates back to the *zamindari* period. Since Partition, fishing rights to the pond have been leased to various influential families in Jagannathpur and other neighbouring villages and fish culture has been carried out in the pond for many years. Since 1990, people living around the pond have been placing their own claims to the pond, however, on the grounds that it has eroded sections of their land. As a result of this dispute, the current leaseholder has not cultured the pond since 1992.

Durgapur

The most important water body in the immediate vicinity of Durgapur is Diabari *beel*. At least since the 1950s, this water body has been leased out to the local fisheries *samity,* which draws its membership from seven local fishing communities around Diabari *beel* and along the stretch of the Ichhamati River running to the east past Harirampur *thana* headquarters. The *beel* is generally fished by Hindu *rajbangshi* fishermen from the neighbouring village of Diabari and by fishermen from Andarmanik, a community on the Ichhamati River.

Although these communities have controlled the *beel* fisheries for many generations, they are unable to effectively prevent its exploitation by a growing number of seasonal, non-traditional

fishermen from nearby agricultural communities. Traditional fishermen now concentrate on the *katha* they lay in the deepest parts of the *beel* and on the *danga* (fish pits) landowners have excavated in some parts of the surrounding floodplain. The fishermen either lease the *danga* or are hired by the owners to harvest them during the dry season.

Fisheries access generally is not a problem for Durgapur households; the local *beel* and floodplains are effectively open-access. On the many *khal*, which are also usually leased out, fishermen only control their *veshal* sites and non-traditional fishermen who set *current jal* and *barsi* (long lines) are not subject to any control. Local Hindu fishermen complain about the impact this fishing may be having on their catches, but they are unable to enforce any restrictions given the numerical superiority of the competition.

Siltation is reducing the area of permanent water in Diabari *beel*, the only part of the *beel* where fishing by local people is in any way restricted, even if only by the presence of fishermen's *katha*. As the depth of the *beel* and the area of perennial water decrease, more and more of what used to be *jalmahal* is being occupied by landowners and turned over to *boro* cultivation during the dry season. Many of the *beel* landowners are also excavating *danga* to take advantage of the fisheries resources of the flood season. While traditional fishermen are often hired to harvest the *danga*, the process of converting *khas* land to agricultural use is affecting the traditional fishermen who historically fished the *beel* during the winter. Non-traditional fishermen, who are more active during the flood season, are less affected by changes in dry season use.

This open-access situation, combined with the increasing proximity of the Padma River as it continues to move northward, has undoubtedly encouraged large numbers of poor Durgapur households to look to fishing as a livelihood source.

Flood control impacts

In all the areas studied in North Central Region, which are ostensibly unprotected by flood control, non-traditional fishing communities are becoming more and more involved in fishing for income. Among the socioeconomic pressures driving this trend are the acute competition for all means of livelihood and the relaxation of many social taboos regarding fishing. Access restrictions are ineffective as deterrents mainly because the Hindu traditional fishermen nominally controlling the area's water bodies are too few and too weak to enforce their rights.

The effect flood control might have on this situation is unclear. If flooding depths were generally reduced by flood control, more hitherto perennial water bodies would become smaller or disappear. This would further open access for non-traditional fishermen because the areas of *jalmahal,* where traditional fishermen exercise even nominal control, would also be reduced. In most of the Manikganj District villages studied, however, natural siltation and changes brought about by other human interventions are already reducing the area of *jalmahal*. Siltation already occurring in Diabari *beel*, for example, will probably lead to its eventual disappearance—if the entire area is not eroded by the Padma first.

In addition, with the spread of irrigation technology, many permanent water bodies currently used for dry season fishing are destined to be converted to agricultural use. The effect groundwater extraction may have on dry season *beel* water levels is unclear, but presumably it would have an impact as well.

A reduction in *jalmahal* areas brings some limited, short-term benefits to non-traditional fishermen by increasing the area to which they can gain free fisheries access. For the same reason, traditional fishermen are generally negatively affected.

The long-term impact of this on fish resources is uncertain. The retention of some deep water areas within each *beel* and floodplain complex is important for the sustainability of fisheries resources. Allowing *beel* to steadily grow shallower might result in a short-term boom in fishing activity by the general population, followed by collapse of the fishery as the areas where floodplain fish can shelter through the winter also disappear.

Where low-lying land in *beel* is converted to agricultural use, fish pit excavation has become widespread. These *danga* create areas of deeper, longer-lasting residual water that could ensure the dry season survival of some floodplain fish that could, during flooding, repopulate the floodplain. Theoretically, therefore, *danga* could be used to improve the condition and sustainability of floodplain fisheries resources. Where *beel* have silted up and the area of permanent water has been reduced, *danga* could be used as a fisheries management measure. Currently, however, the use of low-lift pumps to completely dewater *danga* and the more-or-less total harvest of their fish resources, is probably having little positive impact on floodplain fisheries resources and may even be encouraging long-term resource depletion.

The preceding discussion is based on the assumption that flood control would reduce the area of flooding. Although it seems contradictory, this would not necessarily be the case.

Obviously much depends on the type and scale of the intervention. Large-scale embankments certainly reduce the in-flow of river water. Such interventions more radically affect the timing and source of flooding. Where flooding from main rivers is excluded or delayed, the population of migratory fish, such as high-value carps and large catfish, tend to be reduced. This decreases the value of the resource, although the volume of catches may not be greatly affected since a compensatory increase in floodplain-resident species will offset the loss of migratory fish. The siltation of channels connecting rivers with *beel* and floodplains has a very similar impact.

A decline in high-value species has a particularly negative impact on traditional fishermen, who generally target them and whose larger gears are adapted to their capture. When this occurs, traditional fishermen tend to move away from *beel* and floodplain fisheries and onto rivers, where their gear can still be utilised to good effect. This opens the door to non-traditional fishermen, who are able to take advantage of the decreasing presence of traditional fishermen and decreasing levels of control to exploit the remaining fisheries resources.

In addition to changing catch composition, flood control measures that limit the in-flow of silt-laden river water may actually prolong the life of perennial *beel* by reducing siltation. This would be beneficial for floodplain-resident fish, those most commonly exploited by non-traditional fishermen, and it may explain why, in some other sites studied by FAP 17, catches of non-migratory species seem to be higher inside flood control schemes than outside.

Flood control measures may therefore influence a change in the structure of *beel* and floodplain fisheries. This occurs not so much as a result of changes in area or even depth of flooding but, rather, as a result of changes in catch composition and therefore in the people engaged in fishing. Flood protection generally reduces the value of catches and this effectively discourages traditional fishermen, reducing areas of controlled access, and encourages the involvement of a wider section of the local population in flood season fishing.

As is clearly illustrated by Manikganj District, an "unprotected" area, most of the changes caused by flood control can also be caused by many other processes that are commonly occurring in most floodplain areas of Bangladesh. The introduction of extensive flood control measures to protect the area around the target villages in Manikganj District would generally accelerate processes that are already under way.

2.6 Seasonality and fisheries

Fishing by non-traditional fishermen tends to be seasonal. Even households that have come to rely on fishing as a major source of income usually reduce their fishing activity during the winter dry season. This is to a large extent due to the seasonality of other income-generating opportunities. The area around Manikganj has seen considerable economic diversification over the past 10-15 years.

The agricultural shift—seen everywhere in Bangladesh—from *kharif* crops, such as jute, mixed *aus* and *aman* rice, and broadcast *aman*, to *boro* rice has changed the pattern of labour demand. The traditional peak of agricultural labour demand in *Kartik* (October/November), when *aman* is harvested, has been considerably reduced, although it is still more important in this area than in many other regions studied by FAP 17. *Boro* cultivation has become far more widespread as irrigation facilities have become available. This has helped increase dry season labour opportunities.

Increased *rabi* crop cultivation has probably had an even greater influence on seasonal labour patterns. *Rabi* crops in Manikganj have been diversified and agricultural labour demand during the winter is intense. The cultivation of vegetables to satisfy nearby urban markets has become more widespread and seems to be vital to the economies of many communities during the winter season. The demand for earth for construction and road-building is also a source of winter employment for many landless households.

The increase in winter labour opportunities has resulted in fewer activities which can be taken up during the flooding season. Some of the new cropping patterns leave less room for *kharif* crops and reduce the already limited agricultural labour demand during the summer. As a result, more and more households are resorting to fishing to supplement their income during the flooding season. Figures 12 and 13 show the distribution of fishing effort in the four main villages through the year, and Tables 10 and 11 show the relative intensity of fishing effort through the year for the principal gear-water body combinations in each village.

Fishing effort is heaviest in all four villages during the floods from *Ashar* to *Kartik* (late June to early November). Effort peaks during *Ashwin* (September/October) when flood recession begins. Differences between the villages' fishing effort are primarily in the extent to which fishing is limited to the summer months. This is dictated by differences in flooding patterns from village to village and the availability of livelihood alternatives.

The following discussion analyses the annual flood cycle and the differences in fishing activities in each of the four study areas in the North Central Region.

Pre-monsoon

The pre-monsoon period starts in early or mid-*Baishak* and lasts until the onset of flooding from the main rivers in early *Ashar* (mid-April to the beginning of June). This period is marked by intense rain storms, creating fluxes of freshwater and changes in water levels that may trigger the annual breeding of many fish. This is a particularly important period for migratory carps that run up the main rivers at this time to breed in upstream sites. Their eggs drift downstream, hatching as they go, and enter secondary rivers, *khal* and residual *beel*.

In the North Central Region, the annual flow of carp hatchlings supports an important fishery in the Dhaleswari and Kaliganga rivers, as well as in the many smaller rivers and *khal* flowing off them. Some non-traditional fishermen who are engaged in fish culture or hatchling trading set *savar* nets (small bag nets) in the rivers to collect hatchlings for sale to pond owners. For many traditional fishermen, their *veshal* (lift net) in the rivers and *khal* have assumed new importance by catching major carp fingerlings to supply fish ponds.

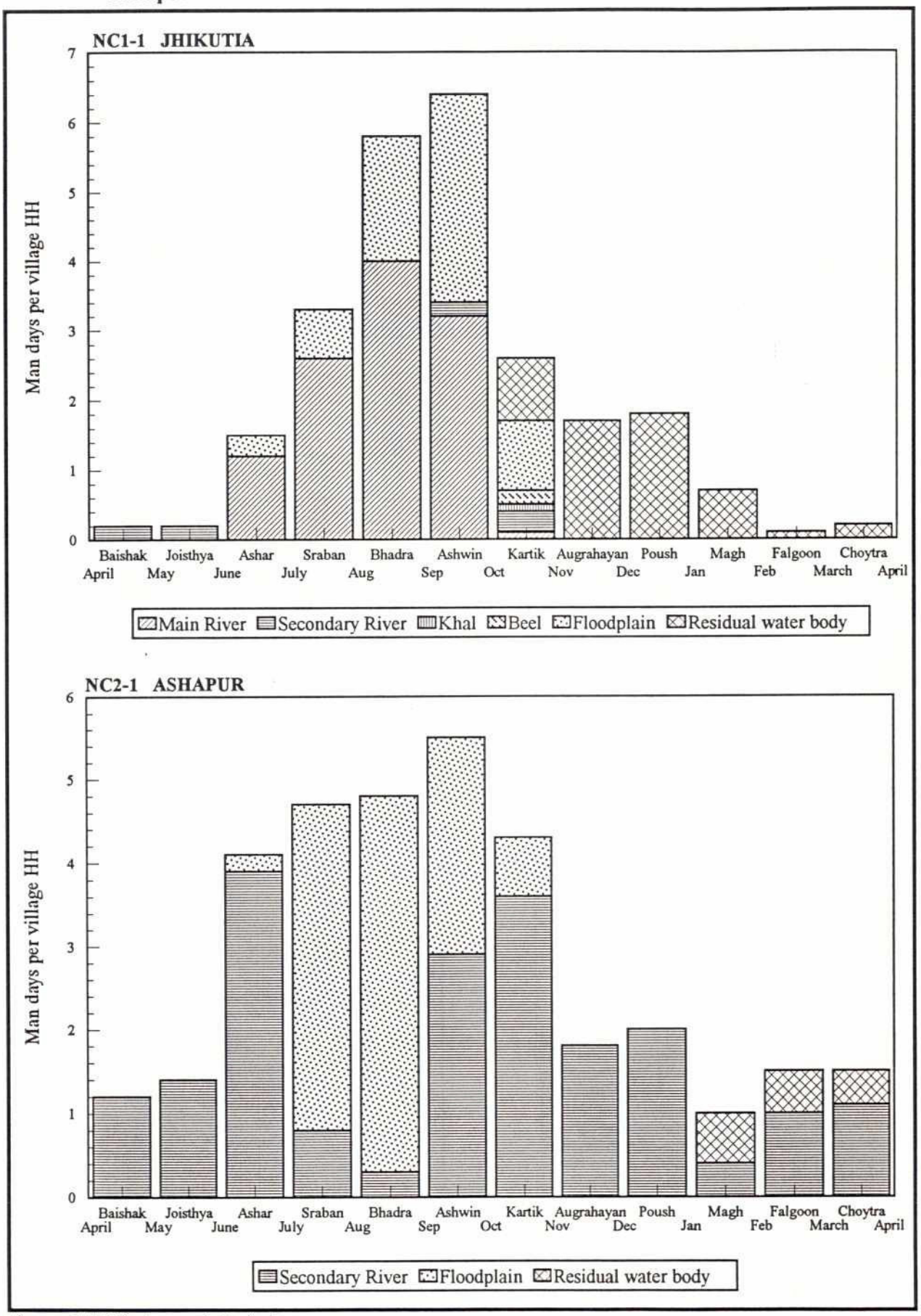
Fishing activity during this period is largely limited to the rivers and *khal* through which migrating fish run. In Manikganj District, this early season fishery is dominated by traditional fishermen, largely because it coincides with the *boro* harvest. Agricultural labour demand is sustained and the need for supplementary activities is limited.

In Jhikutia, a minimal amount of fishing occurs on the Ichhamati, as shown in Figure 12 and Table 10. Most activity on the river during this period is monopolised by traditional *veshal* fishermen.

In Ashapur, by contrast, fishing on the Kaliganga River, one of the more important channels in the region, is a more attractive option. Table 10 shows that households are involved early on the river and with a variety of gears; the intensity of their effort, however, is lower than at other times of year.

Around Jagannathpur, where practically all connections between the nearby *beel* and the nearest rivers have silted up, fishing activity is almost nonexistent.

Figure 12 Distribution of fishing effort by water body through the year: Jhikutia and Ashapur



Source: FAP 17 Socioeconomic Monitoring

Table 10
Principal gears, use by month and water body type: Jhikutia and Ashapur

NC 1–1 Jhikutia

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Current jal	Secondary River	**0.2**	**0.2**					**0.2**						0.6	2.4
	Floodplain				0.2	**1.0**	**1.3**	0.4						3.0	12.1
Doiar	Floodplain			0.2	**0.4**	0.3	0.3							1.2	4.9
Jhaki jal	Residual WB							0.1	**0.4**	**0.5**	**0.5**			1.6	6.5
Shangla jal	Main River			0.9	1.9	**2.6**	**2.5**	0.1						8.1	32.8
	Main River			0.2	0.7	**1.2**	0.7							2.8	11.3
Thella jal	Floodplain						**0.6**	0.3						1.0	4.0
	Residual WB							0.2	**0.6**	**0.5**			0.1	1.6	6.5
Hand fishing	Residual WB							0.3	0.6	**0.8**				1.7	6.9

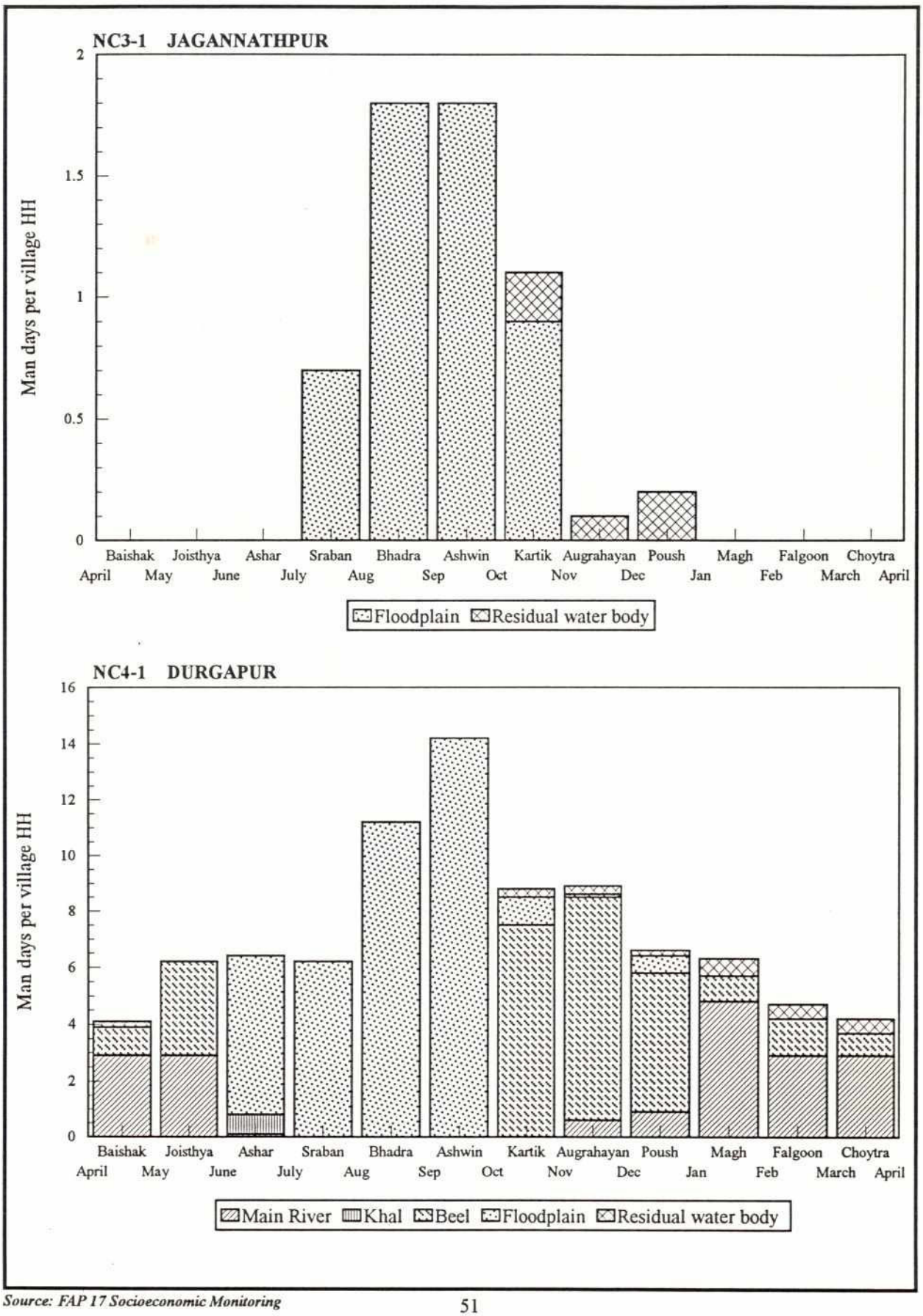
NC 2–1 Ashapur

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Ber jal labour	Secondary River	0.2	0.4	**2.1**	0.3		1.4	1.2	**1.6**	**1.8**		0.2	0.2	9.5	28.5
	Floodplain				**1.8**	**2.0**								3.8	11.4
	Residual WB										0.6	0.5	0.4	1.5	4.5
Current jal	Secondary River	**0.4**	**0.4**	**0.5**	0.1		0.1	**0.5**	0.1	0.1		**0.5**	**0.5**	3.3	9.9
	Floodplain				**0.5**	**0.6**	**0.6**							1.7	5.1
Deol/Dhor jal	Floodplain			0.2	0.4	0.5	**0.7**	0.4						2.2	6.6
Doiar	Secondary River		0.5	**0.9**	0.3	0.3	0.5	0.6						3.2	9.6
	Floodplain				**0.7**	**0.6**	0.4							1.8	5.4
Ferra jal	Secondary River	**0.3**									0.2	0.2	**0.3**	1.0	3.0
Jhaki jal	Secondary River						**0.6**	**0.5**						1.1	3.3
Ucha	Floodplain						**0.4**	0.3						0.7	2.1
Daun	Floodplain				**0.5**	**0.5**	0.2							1.2	3.6

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

Figure 13 Distribution of fishing effort by water body through the year: Jagannathpur and Durgapur



Source: FAP 17 Socioeconomic Monitoring

Table 11
Principal gears, use by month and water body: Jagannathpur and Durgapur

NC 3–1 Jagannathpur

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Current jal	Floodplain				0.6	1.0								1.6	28.6
Deol/Dhor jal	Floodplain					0.6	1.4	0.5						2.5	44.6
Moi jal	Floodplain					0.2								0.2	3.6
Thella jal	Floodplain						0.1							0.2	3.6
	Residual WB							0.1						0.2	3.6
Hand fishing	Floodplain						0.3	0.3						0.6	10.7
	Residual WB									0.2				0.3	5.4

NC 4–1 Durgapur

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Current jal	Main River	2.9	2.9						0.6	0.9	4.8	2.9	2.9	17.9	20.4
	Beel	1.0	2.1					5.8	5.6	3.3	0.4	0.8	0.6	19.5	22.2
	Floodplain			4.0	5.7	9.4	10.6	0.5						30.2	34.4
Doiar	Beel		1.2					0.7	1.2	1.2	0.2	0.2		4.9	5.6
Ucha	Floodplain				0.1	1.1	2.2	0.4		0.3				4.3	4.9

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

Fishing in Durgapur follows yet another pattern. Several of the village households most intensively involved in fishing are active during this period either on the Padma River or in harvesting *danga* and *katha* in Diabari *beel*. As Table 11 indicates, *current jal* fishing on the Padma continues during this period. In *Joisthya*, rainfall in the *beel* causes fish to move out of the *beel* onto floodplains; these fish are caught by some fishermen using *doiar* (traps).

Peak floods

In *Ashar* (June/July), river levels rise dramatically, rainfall is more sustained and the *beel* and floodplains fill up. In the Manikganj area, water levels typically rise first in the Jamuna and its distributaries, the Dhaleswari and Kaliganga. The Padma tends to rise somewhat later, although the relative peaks are variable. When the peak floods in both systems converge, the Jamuna overspills its banks and inundates the area more seriously, as occurred in 1988.

Overbank flooding from the main rivers affects local fisheries. Waters from the Jamuna or Padma reportedly carry a heavier silt load than water coming through the distributary system. Thus, overbank flooding from the two major rivers increases siltation in local *beel* and *khal*, blocking water access and drainage. In 1988, in the floodplain around Ashapur, floodwaters from the Jamuna flowed through the area from the north west, reportedly deposited several feet of silt and sand, radically changing the configuration of local *beel*.

Peak fishing effort by non-traditional fishermen coincides with peak flooding, when the fisheries resource is most widely distributed and access controls are most lax. Even where leaseholders have imposed restrictions on fishing, they are effectively unenforceable during the floods when boundaries between landholdings or *jalmahal* are invisible and tenurial rights are blurred. As floodwaters spread from *beel* and *khal* over the floodplains fishing effort increases sharply. From *Ashar* to *Ashwin* (mid-June to mid-October) fishing by non-traditional fishermen is almost entirely concentrated on the floodplains. *Current jal*, *ucha* and *thella jal* are widely used during this period. The involvement of children also tends to be high as peripheral floodplains and *chak* near homesteads, as well as the pathways and channels (*halot*) within villages, are inundated and open for exploitation.

In addition, flood season demand for agricultural labour is limited to the jute harvest and processing during *Sraban* (July/August). The cultivation of *aus* mixed with broadcast *aman*, which used to be widespread, is now greatly reduced and broadcast *aman* alone requires very limited labour inputs until harvest time. Landless labourers often seek work in urban centres or become involved in small-scale trading or transport during this period. Small farmers, who

often are less flexible and more tied to the village, and the landless people who remain, turn to fishing as a supplemental source of income during this period.

The involvement of many Jhikutia households in *ilish* fishing on the Padma, means that more effort is applied on the main river than on the floodplains, at least until the end of *Bhadra* (mid-September). As Table 10 shows, fishing with *shangla jal* (clap net) during the floods accounts for more than 40% of all fishing effort in the village.

In Ashapur, where fishing is generally concentrated on the Kaliganga River and Ashapur *kul*, the focus shifts to the floodplains from *Sraban* to mid-*Ashwin* (mid-July to the end of September). This is clearly shown in Figure 12 and Table 10; more than 30% of all fishing occurs on floodplains during the floods and drawdown.

For many Jagannathpur villagers the peak flooding season is the only time they have ready access to fisheries. Almost all their effort is concentrated on the higher sections of the floodplain near the village. Even so, as shown in Figure 13 and Table 11, it is only relatively late in the floods, in *Bhadra* and *Ashwin*, when water levels have usually stabilised or started to subside, that fishing really begins.

The floodplains around Diabari *beel* provide a rich fishing ground for Durgapur villagers during the period of inundation, and practically all fishing effort is concentrated there. As Table 11 indicates, *current jal* use on the floodplain accounts for more than 34% of fishing effort. The movement from main river and *beel* to the floodplain once the floods arrive is also clearly shown.

Drawdown

In late *Ashwin* and early *Kartik* (early to mid-October), river levels fall and water begins to recede off the floodplain. Water, and the fish it carries, is steadily concentrated into *beel*, *khal* and other residual water bodies. This has two effects on fisheries: first, fish become easier to catch and, second, boundaries on the floodplain and the tenurial claims they represent reappear as land surfaces. Titles to land underlying floodwaters are often extended to the water and fish remaining on that land. Those controlling leases and land therefore begin to restrict fishing activity whenever possible.

In the past, such restrictions would only have applied to *beel* and *khal* where traditional fishermen concentrated their efforts during drawdown. In any case, the number of people

competing for the resource was far smaller and fishing in receding floodplain waters used to be far more open than it is now. Groups of landless and small farmers seem to have been able to dewater areas of floodplain as they pleased, usually with the help of large numbers of children. As the value of the resource has increased, however, the rights to residual resources on the floodplain have gradually been claimed by the owners of the land covered by floodwaters, particularly where they have excavated *danga*.

The ease with which fish could be caught and the relatively open access to floodplains traditionally made drawdown the peak period of fish supply in floodplain villages. Much of the fishing during this period used to consist of dewatering, which required little or no specialised gear and could be done by practically anyone. As more non-traditional fishermen have become involved in fishing for income they have also tended to invest in gear that can be used early in the season as well as during the drawdown. As a result, the peak in fishing activity during the drawdown is not as marked as it would have been 10 to 15 years ago.

In Jhikutia, once the *ilish* fishery on the Padma declines, fishing effort drops off rapidly and tends to concentrate on residual water bodies such as ponds, ditches and *maital*. The exploitation of these bodies tends mostly to benefit their owners. Most of the floodplains around the village are already dry by the end of *Ashwin* (mid-October).

In Ashapur, as is apparent from Figure 12, fishing activity follows the fish from the floodplain back into the Kaliganga River from *Ashwin* (late September) on. The month of *Kartik* (October/November) sees a peak in riverine fishing, much of it accounted for by the preparation and early harvesting of *katha* in Ashapur *kul*.

The floodplains around Jagannathpur drain out rather more slowly and later, mainly due to the siltation of drainage channels. As a result, hand fishing and dewatering continue right through *Kartik*. But fishing effort declines dramatically once the floodplain has drained, as Figure 13 shows.

The shift from the floodplain fishery to the *beel* fishery in Durgapur is also quite marked. The total percentage of fishing effort accounted for by *current jal* and *doiar* fishing on Diabari *beel* is almost as high as that on the floodplain (Table 11). As in Jagannathpur, the steady siltation of drainage channels has contributed to a more protracted drawdown, which non-traditional fishermen exploit to the fullest extent.

Dry season

By mid-*Augrahayan* (late November/early December) most of the floodplains are dry and have been turned over to the cultivation of *rabi* crops. Onion and winter vegetables are planted on higher land, and *boro* rice is planted into the receding waterline as the floods retreat from the low land. The area under water continues to diminish right through the winter, further concentrating fish resources and making them easier to catch.

Winter is the peak harvest period for traditional *beel* fishermen, although the declining number of perennial water bodies has greatly diminished the possibilities compared with 10-15 years ago. For non-traditional fishermen, winter is usually the low season. Those water bodies which remain are usually more tightly controlled by their leaseholders or owners and, in any case, more alternative work is available. Agricultural labour demand is high and many non-agricultural activities, such as brickfields, road-building and earth-moving are in full swing.

For those who are able to gain access to perennial water bodies, the returns can be high. Fishing effort may decline, but the catch per unit of effort reaches its maximum.

Intensive *rabi* crop cultivation in and around Jhikutia absorbs much of the village labour that might otherwise have gone into fishing. From *Augrahayan* (November/December) fishing is limited to the dewatering of ditches and *maital* around homesteads, mostly by children, and the involvement of adults is limited. Villagers report that, in the past, before the diversification of *rabi* crops, more villagers used to fish during the winter in Gopinathpur *beel* some 3 kilometres to the south.

In Ashapur, *katha* harvesting on Ashapur *kul* continues right through the winter. As Table 10 shows, much of the fishing in *Poush* (December/January) is accounted for by labour on *ber jal* (seine nets), mainly for the harvesting of *katha*. Landowners particularly benefit from this fishing activity.

Dry season fishing in Jagannathpur is practically non-existent, although the increasing popularity of fish culture in local ponds can be expected to create more winter fishing employment in the future.

More so than in any of the other communities studied, non-traditional fishermen in Durgapur have access to water bodies that allow them to continue relatively intensive fishing right

through the dry season. Diabari *beel* retains water year-round and, although it is formally leased and restricted, local people are able to fish there with *current jal* practically all year. Even when traditional fishermen are harvesting *katha* and *danga* in *Falgoon* and *Choytra* (February to April), non-traditional fishermen are able to set their *current jal* in the *beel* with impunity. As shown in Figure 13, villagers' time is divided between the *beel* and the main river, where they also fish with *current jal*.

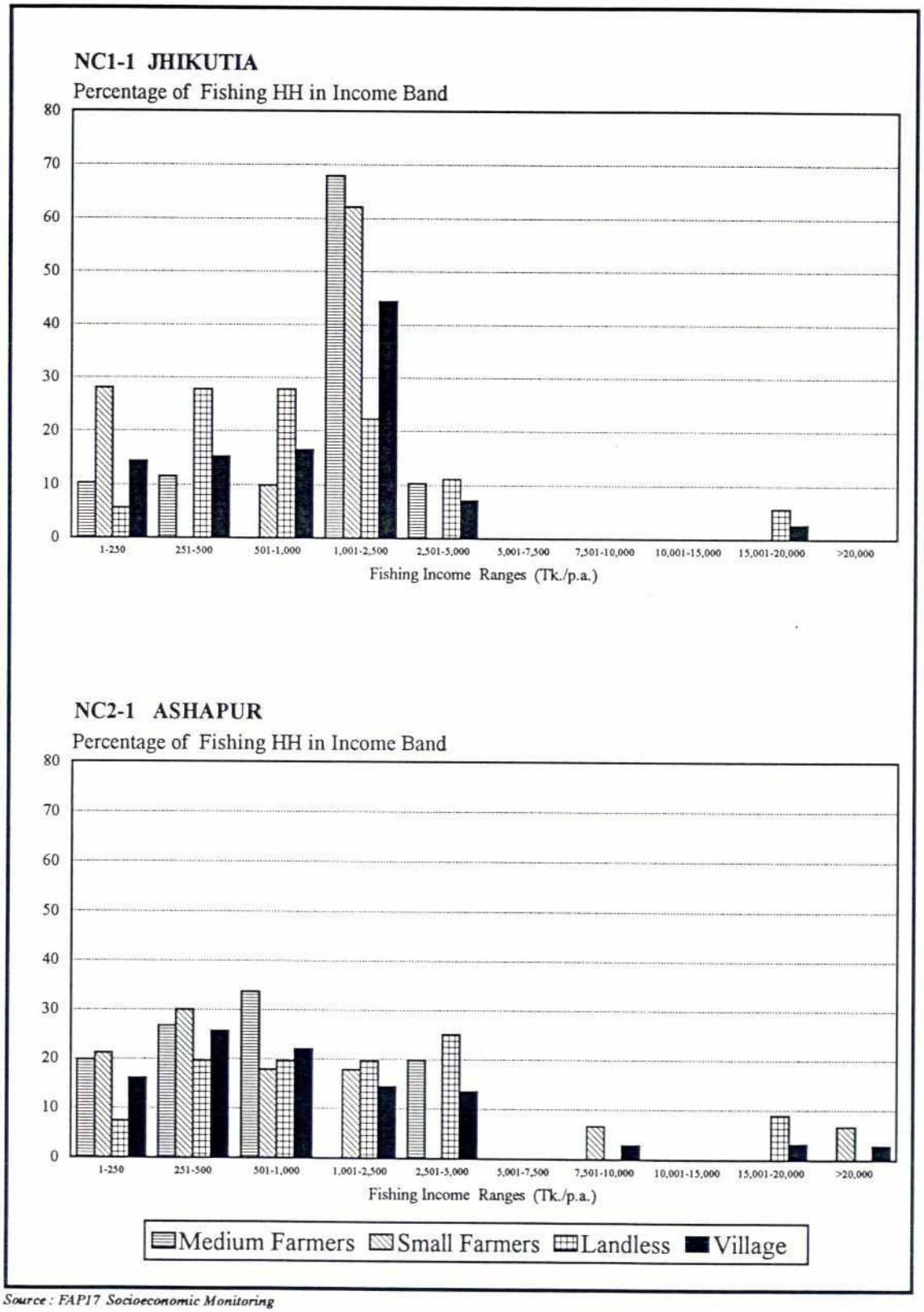
2.7 Fisheries income

Seasonal variations in fishing activity correspond with variations in levels of dependence on fisheries. The relative availability of alternative sources of income is obviously very important in determining whether households engage in fishing for consumption or for income. Figure 14 shows the distribution of households engaged in fishing in Jhikutia and Ashapur in specific ranges based on the value of the fish caught (including those that may have been consumed). The *shangla jal* fishery on the Padma, while involving large numbers of Jhikutia's landless households, generates a relatively small amount of income. Small and medium landowning households, which are far fewer in number, earn higher amounts from fishing, particularly from the dewatering of residual water bodies later in the year. More than 60% of landowning households catch between Tk.1,000 and Tk.2,500 worth of fish per year.

As Figure 14 shows, landless households generally have smaller fishing incomes; about 80% of them catch less than Tk.1,000 worth of fish during the year. As discussed below, however, the seasonal distribution of this income is crucial.

In Ashapur, apart from a few landowning households that earn considerable amounts each year from *katha* in Ashapur *kul*, most landowning households catch less than Tk.1,000 worth of fish. Some landless households, on the other hand, earn substantial incomes, with about 25% earning between Tk.2,500 and Tk.5,000 annually. The proximity of the Kaliganga River evidently plays a role here. Landless households are able to engage in riverbank fishing using inexpensive gears, whereas fishing on the Padma requires at least a small boat. Several landless labourers also work seasonally as fishing labour on the *katha* harvesting which contributes to landless earnings from fisheries.

Figure 14 Distribution of fishing incomes for fishing households: Jhikutia and Ashapur



Source : FAP17 Socioeconomic Monitoring

Figure 15 shows similar data for Jagannathpur and Durgapur. Not surprisingly, earnings from fisheries in Jagannathpur are minimal and entirely directed towards consumption.

Fisheries earning in Durgapur are very high. One small landowning household reported earnings of more than Tk.20,000 during 1993/94, primarily from the culture of a pond. Several landless and small farming households involved in capture fisheries, almost entirely with *current jal*, had fisheries incomes of more than Tk.10,000. The considerable income earned by landless households is particularly striking. For these households, most of whom are recent entrants to fisheries, fishing has quickly become a key element in their livelihood strategies.

Ultimately, fisheries earnings have to be seen in the context of income from other sources in order to understand their real importance. Medium landowners may earn larger amounts from fishing in some locations, but it may constitute a minor proportion of their overall earnings. By contrast, among the very poor, minor amounts of fisheries earnings at critical times of the year may make fishing an essential part of the household survival strategy—even though the actual value of the catch may be relatively small.

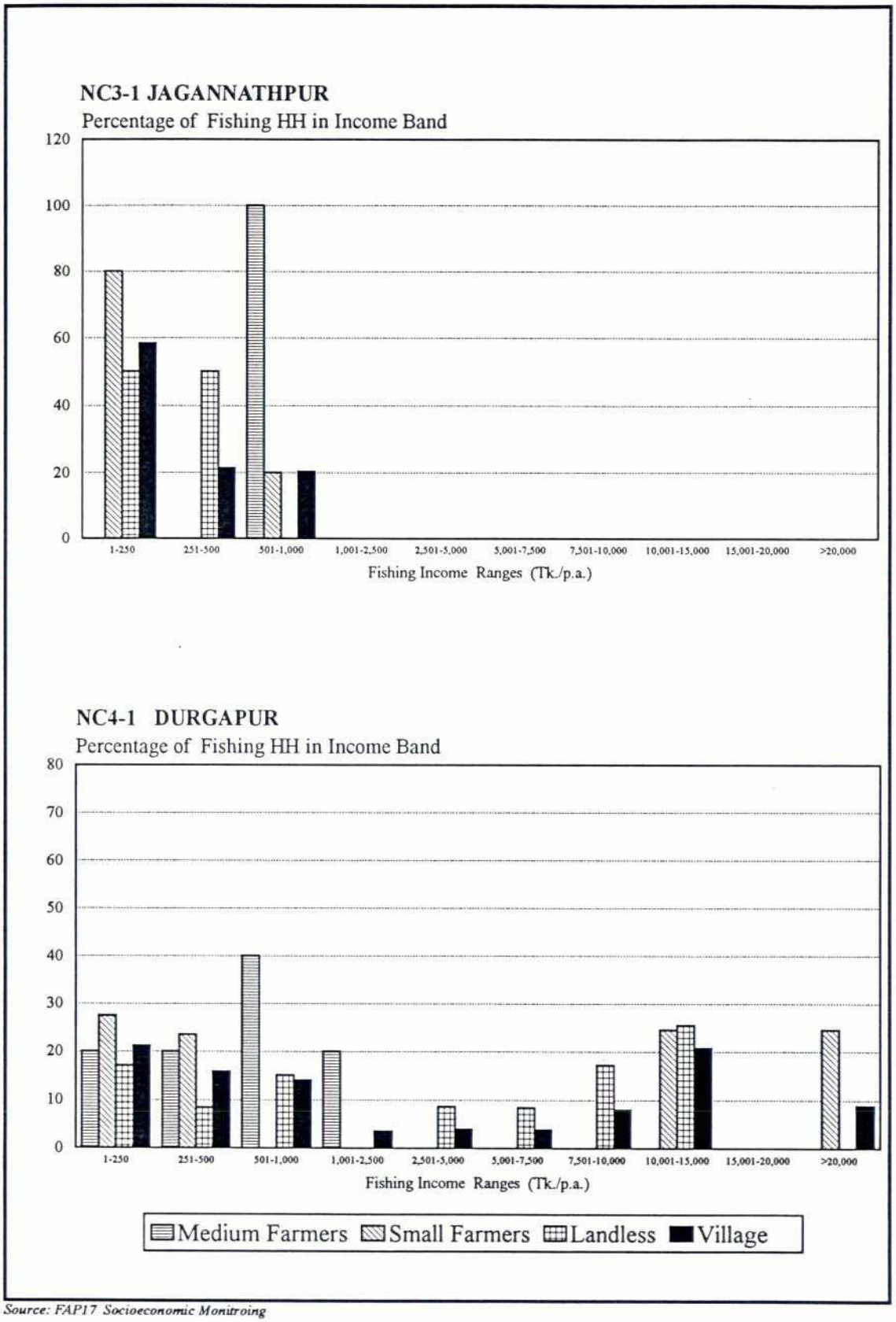
Jhikutia

Table 12 and Figure 16 show the breakdown of average household income from different sources through the year in Jhikutia. The data in the table is disaggregated by landholding category; the figure shows the village as a whole.

Income levels for the village are very high due to the figures reported by medium and small landowners (average annual earnings of Tk.69,000 and Tk.37,000 per year, respectively). For both of these groups average fisheries earnings are low across the entire category, as shown in Table 12. The number of households actually involved in fishing is also low, however, so the earnings of households that fish are quite substantial, as shown in Figure 14. For both landowning categories fishing accounts for less than 2% of total average annual household earnings, but for a few owners of residual water bodies and *danga* in local floodplains, the earnings are far higher.

The principal fisheries earnings for landowning households occur noticeably later in the year, when they are able to assert more exclusive rights to residual water bodies on their land. The peak fishing period for these households is from *Ashwin* to *Magh* (mid-September to mid-

Figure 15 Distribution of fishing incomes for fishing households: Jagannathpur and Durgapur



Source: FAP17 Socioeconomic Monitoring

February), although even in these months fishing is a minor supplement to their agricultural income.

A far larger number of landless households are involved in fishing, and earnings among those households that fish are lower, but the average across the category is relatively higher. As Table 12 shows, only 6.5% of total annual income for landless households comes from fishing, but the seasonal distribution of this income is critical. During the months of *Bhadra* and *Ashwin* (mid-August to mid-October), fishing accounts for 33% of their income and alternative sources of livelihood are limited. In both months, fishing is the single most important source of income for landless households in Jhikutia. Income from agricultural labour drops off drastically during this time and even self-employment opportunities are limited. During *Ashwin* in particular, landless household earnings are only 66% of the monthly average and the contribution of fisheries is substantial.

Two other features of Jhikutia income patterns are notable. The first is the importance of non-agricultural labour and self-employment as an income source for landless households. Non-agricultural labour accounts for over 20% of their total income. The importance of self-employment (34% of annual income) is indicative of the range of activities frequently encountered in villages in Manikganj District. Self-employment in Jhikutia includes small-scale trading, water transport along the Ichhamati River and handicraft work by women's groups.

The second notable feature is the relative stability of incomes through the year. The highly diversified cropping patterns seem to contribute to this stability; Figure 16 shows that agricultural income is fairly consistent through the year. The peaks associated with the *boro* harvest (in *Baishak*) and the *aman* harvest (in *Kartik*) are similar and only in the periods immediately after these two harvests does agricultural income diminish significantly. The diversity of other self-employment activities also has a stabilising influence.

Ashapur

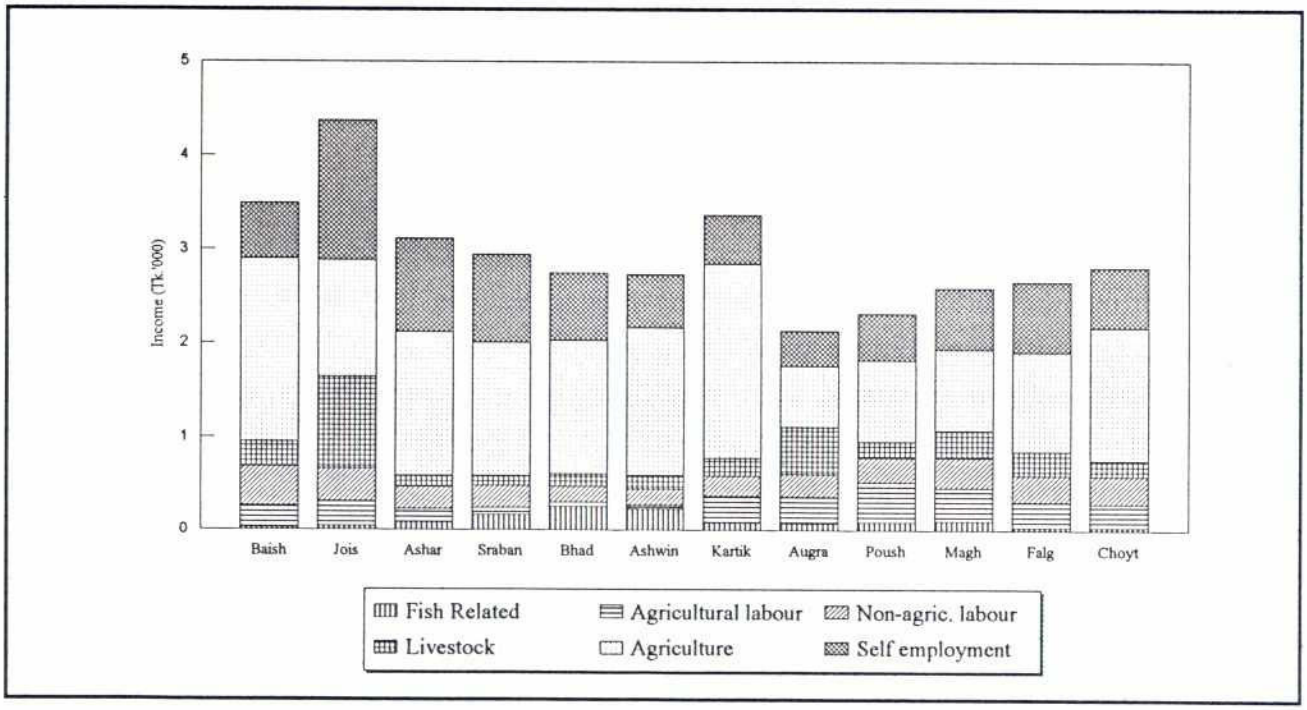
The differences in average incomes between landholding categories in Ashapur, shown in Table 13 and Figure 17, are considerably smaller than in Jhikutia. The area's generally poorer agricultural conditions seem to discourage larger landholdings, and levels of crop production are generally lower. The proportion of income from agriculture in all landholding categories is lower than in Jhikutia.

Table 12 Income sources through the year by landholding category: Jhikutia

UNIT: TK.

LAND CAT.	ACTIVITY	BAISH	JOISTH	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
Medium	Fishing	4	-	35	72	58	136	187	179	159	-	-	-	831	1.2
	Fish trading	15	117	95	124	80	-	-	-	-	-	-	-	432	0.6
	Fish culture	35	-	-	-	-	-	-	-	-	120	75	57	287	0.4
	Agricultural labour	39	63	18	16	-	-	-	215	166	92	65	64	738	1.1
	Non-agric. labour	-	220	332	361	374	390	439	439	439	-	-	-	2,994	4.3
	Small stock	22	289	42	26	256	61	90	80	64	83	52	102	1,166	1.7
	Large stock	278	1,233	194	94	137	104	253	1,747	292	435	399	370	5,536	7.9
	Agriculture	5,288	4,076	5,636	4,758	5,476	5,535	7,950	1,756	2,723	1,648	2,347	3,408	50,600	72.5
	Self employment	603	946	967	889	687	291	407	510	532	404	579	416	7,232	10.4
	Total	6,284	6,944	7,319	6,340	7,068	6,517	9,326	4,926	4,375	2,782	3,517	4,417	69,816	100
Small	Fishing	4	-	58	45	69	32	28	106	139	125	13	14	633	1.7
	Fish culture	20	-	-	-	-	-	-	-	-	35	36	30	121	0.3
	Agricultural labour	171	301	211	174	146	146	347	312	461	511	416	406	3,603	9.6
	Non-agric. labour	223	62	79	69	35	49	49	49	49	222	275	286	1,446	3.8
	Small stock	42	253	16	83	43	144	75	160	76	26	17	27	961	2.6
	Large stock	498	1,156	56	59	27	46	106	156	141	121	124	119	2,610	6.9
	Agriculture	2,338	1,260	1,362	1,374	899	1,462	1,598	772	812	1,285	1,303	1,755	16,218	43.1
	Self employment	718	3,280	1,510	1,364	1,466	1,156	604	210	290	420	546	501	12,066	32.0
	Total	4,014	6,312	3,292	3,168	2,685	3,035	2,807	1,765	1,968	2,745	2,730	3,138	37,658	100
Landless	Fishing	19	42	85	229	412	386	82	13	20	67	15	18	1,389	6.5
	Fish culture	-	-	-	-	-	-	(1)	7	18	-	-	-	24	0.1
	Agricultural labour	341	314	147	31	8	-	356	290	506	342	256	231	2,821	13.2
	Non-agric. labour	702	590	308	302	175	169	243	305	339	508	391	407	4,439	20.8
	Small stock	25	405	54	29	42	25	101	27	51	34	22	52	867	4.1
	Large stock	54	115	51	66	53	99	40	124	20	277	252	33	1,183	5.5
	Agriculture	496	196	148	235	283	193	240	169	231	301	428	471	3,390	15.9
	Self employment	517	558	697	691	265	305	509	431	614	897	937	810	7,230	33.9
	Total	2,154	2,220	1,490	1,583	1,238	1,177	1,570	1,366	1,799	2,426	2,301	2,022	21,343	100
Village	Fishing	11	21	68	142	239	229	84	73	83	73	12	14	1,048	3.0
	Fish trading	3	21	17	22	15	-	-	-	-	-	-	-	78	0.2
	Fish culture	13	-	-	-	-	-	(1)	4	9	33	25	20	102	0.3
	Agricultural labour	233	265	144	74	50	46	289	284	430	350	272	256	2,693	7.6
	Non-agric. labour	423	356	239	239	166	171	217	248	265	326	284	295	3,229	9.2
	Small stock	30	336	40	46	81	69	91	79	61	40	26	53	951	2.7
	Large stock	235	647	79	69	60	83	99	427	107	256	238	121	2,422	6.9
	Agriculture	1,946	1,234	1,524	1,413	1,416	1,560	2,063	647	865	856	1,052	1,409	15,986	45.3
	Self employment	597	1,492	1,003	940	722	572	521	375	496	656	749	641	8,764	24.8
	Total	3,491	4,372	3,114	2,945	2,749	2,730	3,363	2,137	2,316	2,590	2,658	2,809	35,273	100

Figure 16 Income sources through the year: Jhikutia



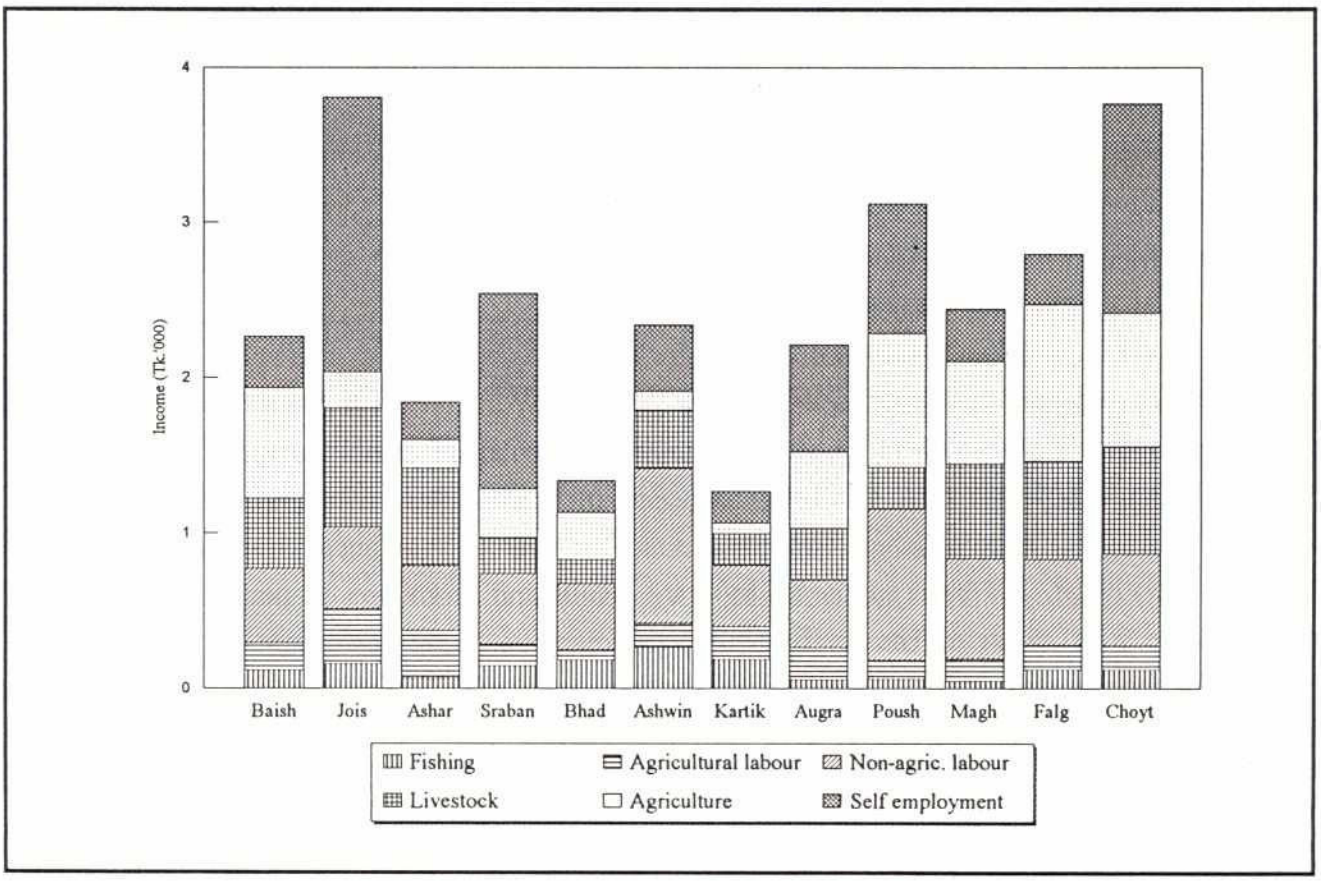
Source: FAP 17 Socioeconomic Monitoring

Table 13 Income sources through the year by landholding category: Ashapur

UNIT: TK.

LAND CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
Medium	Fishing	45	60	47	99	91	105	44	12	27	-56	40	50	566	1.5
	Agricultural labour	-	53	44	25	-	-	-	25	31	-	-	-	178	0.5
	Non-agric. labour	641	722	561	561	604	2829	604	683	2373	803	803	970	12156	32.4
	Small stock	98	90	283	13	30	11	30	50	16	174	79	89	962	2.6
	Large stock	466	347	337	285	227	918	402	369	428	762	795	767	6103	16.2
	Agriculture	1145	373	551	710	718	298	159	840	1050	1237	2474	1831	11387	30.3
	Self employment	141	2758	172	1109	99	917	135	226	228	150	151	133	6218	16.6
	Total	2536	4403	1995	2802	1769	5078	1374	2205	4153	3070	4342	3840	37570	100
Small	Fishing	45	235	27	167	201	311	236	85	94	74	167	161	1804	5.9
	Agricultural labour	178	364	251	115	25	79	215	179	96	138	132	149	1921	6.3
	Non-agric. labour	425	422	358	527	434	387	304	227	417	574	496	445	5017	16.4
	Small stock	100	152	115	42	9	49	15	142	76	47	131	50	929	3.0
	Large stock	506	1151	796	247	166	173	145	307	222	675	679	892	5957	19.5
	Agriculture	858	247	76	261	229	77	52	482	1016	714	718	788	5518	18.1
	Self employment	217	1844	155	1792	143	149	129	947	1246	254	219	2327	9421	30.8
	Total	2329	4415	1778	3151	1207	1225	1096	2369	3167	2476	2542	4812	30567	100
Landless	Fishing	319	108	147	145	234	327	231	45	22	106	124	120	1928	9.5
	Agricultural labour	361	629	675	304	215	465	425	438	268	290	365	318	4755	23.4
	Non-agric. labour	415	548	391	217	230	302	343	576	618	623	399	501	5163	25.4
	Small stock	10	52	20	26	8	105	59	24	5	21	18	13	361	1.8
	Large stock	29	20	82	26	8	6	6	22	22	35	33	29	317	1.6
	Agriculture	15	66	12	17	22	11	10	140	392	-	84	18	789	3.9
	Self employment	729	660	479	393	426	463	393	688	666	673	684	743	6997	34.5
	Total	1878	2083	1806	1128	1143	1679	1467	1933	1993	1748	1707	1742	20310	100
Village	Fishing	116	157	63	144	181	262	185	56	58	49	123	122	1516	5.1
	Agricultural labour	179	352	307	141	68	158	214	206	123	142	158	154	2203	7.4
	Non-agric. labour	479	532	419	455	425	996	392	435	974	646	551	595	6899	23.2
	Small stock	76	110	134	31	14	54	31	88	42	73	89	50	791	2.7
	Large stock	372	651	493	200	141	322	175	249	224	532	542	637	4537	15.3
	Agriculture	714	233	182	314	302	117	69	486	864	665	1008	859	5812	19.6
	Self employment	330	1774	243	1254	205	429	199	694	833	335	322	1351	7967	26.8
	Total	2266	3809	1841	2539	1336	2338	1265	2214	3118	2442	2793	3768	29725	100

Figure 17 Income sources through the year: Ashapur



Source: FAP 17 Socioeconomic Monitoring

The corresponding importance of fisheries is noticeable. Five percent of average household income for the village comes from fishing and among small farmers and landless households an even larger proportion comes from fishing. For landless households, fishing accounts for almost 10% of annual income. Seasonal peaks occur during *katha* harvesting in *Baishak* (April/May), when fishing provides 17% of income, and during the late floods in *Bhadra* and *Ashwin* (August to November), when 17% to 20% of income comes from fishing, but these peaks are not as marked as in Jhikutia.

Self-employment is a key source of income for both small landowners and landless households. Small-scale trading is particularly important in Ashapur. Although Ashapur is not far from the main Dhaka-Aricha highway, communications are poor and many villages in the hinterlands of Ashapur are relatively isolated. Residents of Ashapur frequently trade rice and other goods from markets in Ghior and Zabra to these more remote communities. Box 2 gives an example of how one village household has combined a variety of activities over the years.

In the centre of Ashapur lives a large extended family consisting of five brothers with their wives and children. They moved their *bari* to its present location about 10 years ago when their old homestead was eroded by the Kaliganga. They currently combine agricultural labour, seasonal migration to the North East during the *boro* season, loading and transporting earth on boats and small trading in molasses and rice in order to carve out a reasonably steady income through the year. One of the brothers started trading a few years ago using a loan from a local landowner. After running into problems repaying the 10% monthly interest, he started up again using a loan obtained through his wife from the Grameen Bank. In the month of *Poush* he trades in molasses, and in *Falgoon* he buys rice, husks it himself and sells it locally. Working on the boats loading and transporting earth from the river is the main source of income for the whole family; all five brothers are involved in it from *Joisthya* through to *Ashwin*. They used to spend more time fishing during the flood season, using *current jal* and reportedly earning up to Tk.50 per day each, but they gave this up two years ago reportedly due to "low catch". Since then they have become more reliant on earthwork although they have recently invested in a set of *doiar* (traps) so that they can at least catch fish for household consumption.

Box 2: Making ends meet—livelihood strategies in Ashapur

Seasonal variations in income, shown in Figure 16, are far more noticeable in Ashapur. Agriculture and agricultural labour income is highly concentrated during the *rabi* season, and even self-employment opportunities seem to be seasonally variable. Work on earth transport (non-agricultural labour) is the principal stabilising influence, particularly for landless households. Milk production from large livestock, which accounts for over 15% of average household income in the village, has been supported by local NGOs and is gaining in importance, particularly for small farmers. The nearby Milk Vita collection centre has encouraged this development considerably.

Jagannathpur

As already indicated by the levels of fishing activity recorded, capture fishing is relatively unimportant to Jagannathpur villagers. The data presented in Table 14 and Figure 18, however, shows that culture fisheries are gaining significance, particularly for small landowners. Almost 10% of the yearly earnings of small farming households now comes from fish culture, primarily in the small ditches and *maital* around homesteads. In terms of the potential for expansion, the fact that just a few households that culture fish already generate almost 6% of average household income for the village is very significant. Given the considerable returns obtained from fish culture in this area, more and more people, particularly pond owners, can be expected to take up the activity. Other fisheries-related income is extremely marginal.

As in other North Central Region villages, agriculture is less important in Jagannathpur than might be expected. For medium landowners, it accounts for more than 50% of income, but small landowners rely on farming for only just over 25% of their income. Non-agricultural labour is particularly critical for this category, accounting for 37% of annual income, almost exactly the same proportion as for landless households. Most importantly, this income is distributed very evenly through the year. This may help to explain the relatively low levels of fishing. Many villagers apparently hold fairly steady employment and may not require supplementary fisheries income.

Incomes among landless households, at Tk.15,600 per year, are not particularly high, but the small variation in non-agricultural incomes is particularly noticeable.

Durgapur

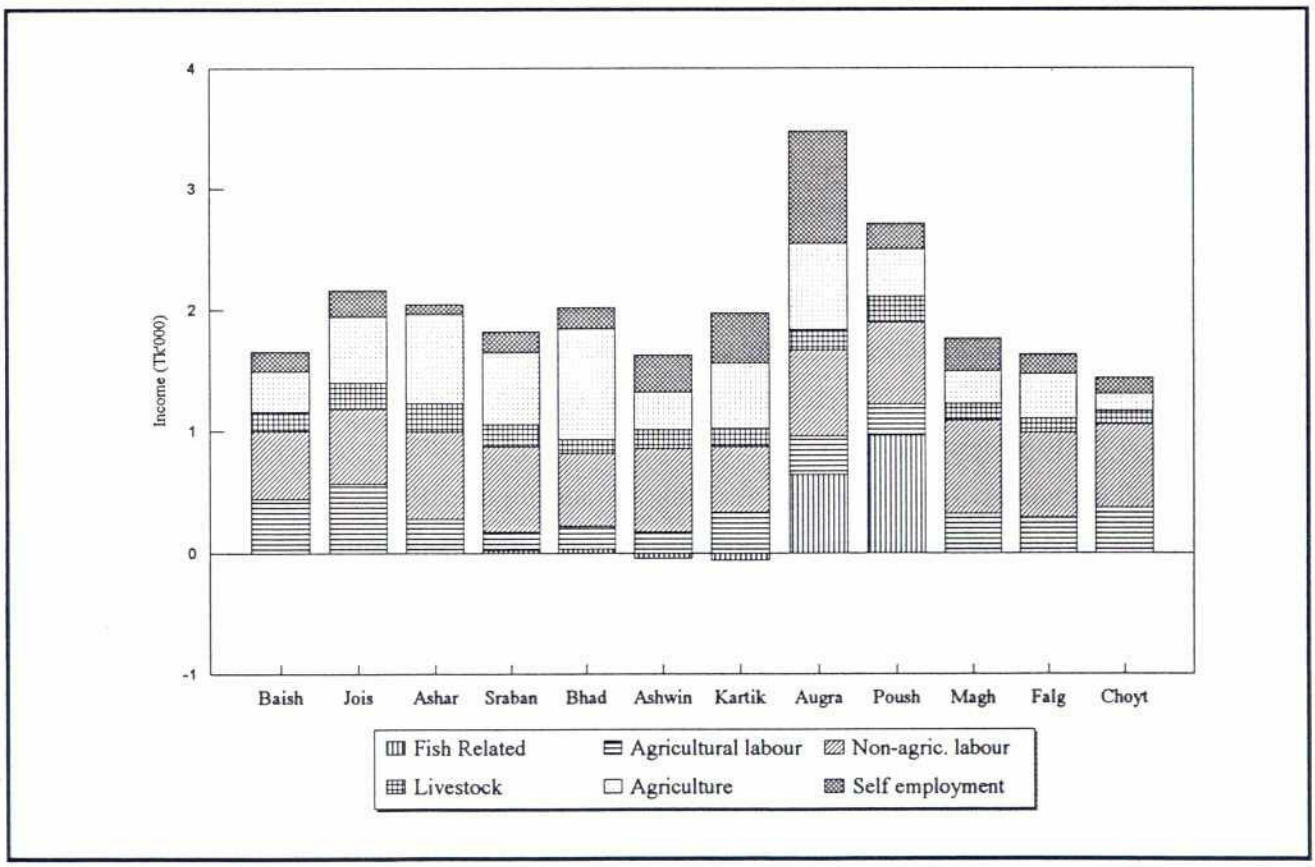
The relative levels of fishing dependence in Durgapur are completely different from any of the other main villages studied in the North Central Region. These differences stem from a combination of the settlement pattern of the village (most villagers seem to be relatively recent in-migrants from eroded areas along the Padma), its location on the edge of Diabari *beel* and the relatively lax control of access to which the surrounding water bodies are subject. This creates a situation where no less than 20% of the average household income for the village comes from fisheries. As Table 15 and Figure 19 show, however, much of this activity is concentrated among small farmers, for whom fishing provides more than 42% of annual household income.

Table 14 Income sources through the year by landholding category: Jagannathpur

UNIT: TK.

LAND CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
Medium	Fishing	-	-	-	338	90	-	34	-	-	-	-	-	461	1.1
	Small stock	10	273	-	386	-	39	195	38	13	11	10	30	1,003	2.3
	Large stock	345	381	439	338	53	-	-	30	364	503	435	360	3,247	7.6
	Agriculture	3,310	3,326	4,138	2,610	5,095	-	180	889	1,397	200	290	-	21,435	50.1
	Self employment	915	978	959	1,199	1,075	2,461	2,513	1,823	1,446	1,615	970	648	16,601	38.8
	Total	4,580	4,958	5,536	4,871	6,313	2,500	2,922	2,780	3,220	2,329	1,705	1,038	42,747	100
Small	Fishing	-	-	-	11	59	29	6	6	10	2	-	-	123	0.4
	Fish culture	-	-	-	-	-	(167)	(167)	1,303	1,950	-	-	-	2,920	9.9
	Agricultural labour	150	227	182	163	55	86	138	171	104	126	131	113	1,644	5.6
	Non-agric. labour	897	1,005	1,005	988	813	813	647	813	813	1,030	1,030	1,093	10,948	37.1
	Small stock	120	77	134	31	10	26	20	141	42	51	45	65	761	2.6
	Large stock	102	216	210	189	137	232	205	150	228	115	88	68	1,938	6.6
	Agriculture	207	594	593	698	1,073	590	958	1,297	574	402	689	179	7,853	26.6
	Self employment	113	258	29	110	162	119	374	1,531	174	214	98	106	3,288	11.2
	Total	1,589	2,377	2,153	2,190	2,309	1,728	2,181	5,412	3,895	1,940	2,081	1,624	29,475	100
Landless	Fishing	-	-	-	4	12	55	44	-	-	-	-	-	114	0.7
	Agricultural labour	846	1,033	437	147	355	305	600	508	445	596	520	712	6,504	41.7
	Non-agric. labour	251	260	482	481	435	623	493	715	638	563	405	326	5,673	36.4
	Small stock	50	13	14	9	37	22	20	18	105	48	54	44	433	2.8
	Large stock	-	51	68	42	42	38	37	27	27	-	-	-	331	2.1
	Agriculture	39	85	402	175	112	44	124	40	38	137	14	108	1,319	8.5
	Self employment	109	70	13	95	67	187	155	120	76	127	116	94	1,228	7.9
	Total	1,295	1,512	1,416	953	1,060	1,274	1,473	1,428	1,329	1,471	1,109	1,284	15,602	100
Village	Fishing	-	-	-	29	40	39	25	3	5	1	-	-	141	0.6
	Fish culture	-	-	-	-	-	(82)	(82)	641	959	-	-	-	1,436	5.9
	Agricultural labour	448	569	283	145	184	177	333	309	248	326	295	371	3,688	15.2
	Non-agric. labour	552	610	707	699	593	676	536	716	683	756	686	682	7,895	32.6
	Small stock	81	62	72	45	21	25	32	80	68	47	47	53	632	2.6
	Large stock	73	154	162	134	89	131	117	88	148	90	72	57	1,313	5.4
	Agriculture	336	548	741	592	912	309	537	714	391	271	364	136	5,851	24.2
	Self employment	164	222	83	175	180	303	417	926	214	267	163	136	3,249	13.4
	Total	1,654	2,165	2,048	1,819	2,019	1,578	1,915	3,477	2,716	1,758	1,627	1,435	24,205	100

Figure 18 Income sources through the year: Jagannathpur



Source: FAP 17 Socioeconomic Monitoring

The seasonal distribution of fisheries income varies considerably between landholding categories. For small landowners, whose fisheries earnings are highest, the peak season is winter when landowners dewater the fish pits and residual water bodies on their land in the *beel* and floodplain. Comparing this with Figure 13, which shows fishing effort in the village, it is evident that this fishery only absorbs a small portion of fishing effort, but the concentration of fish means that returns to fishing effort are far higher than at any other time of the year. From *Magh* to *Baishak* (January to May) small landowning households earn, on average, between Tk.1,500 and Tk.2,250 per month from fishing. In the peak month of *Magh* this is almost 79% of total income for the month. During the rest of the year, fisheries earnings remain high, with another smaller peak during the floods in *Bhadra* (August/September), when *current jal* fishing on the floodplains is most productive.

What is particularly significant is that, for these "farming" households, fishing is by far the most important source of income. Only during the *aman* harvest, in *Kartik* and *Augrahayan* (October to December), and during *Ashar* and *Sraban* (June to August), when *aus* and jute are being harvested, does agricultural income exceed that from fishing. Unlike most other villages studied by FAP 17, small landowners in Durgapur apparently rarely engage in agricultural labour, and even non-agricultural labour provides less than 10% of annual income. Self-employment is far less developed in this area than in the other villages studied in Manikganj District.

In some other areas small farmers and landless households were found to engage in seasonal fishing as an activity of last resort, but for small landowners in Durgapur, the decision to fish is based on the possible returns and the accessibility of the resource. Landowners in the floodplain around Diabari *beel* are able to use their land title to aggregate the resource as much as possible during the flood recession. In addition, the loose control of fishing on the *beel* and the Padma River means that they are able to use their *current jal* throughout the year to provide a steady source of income.

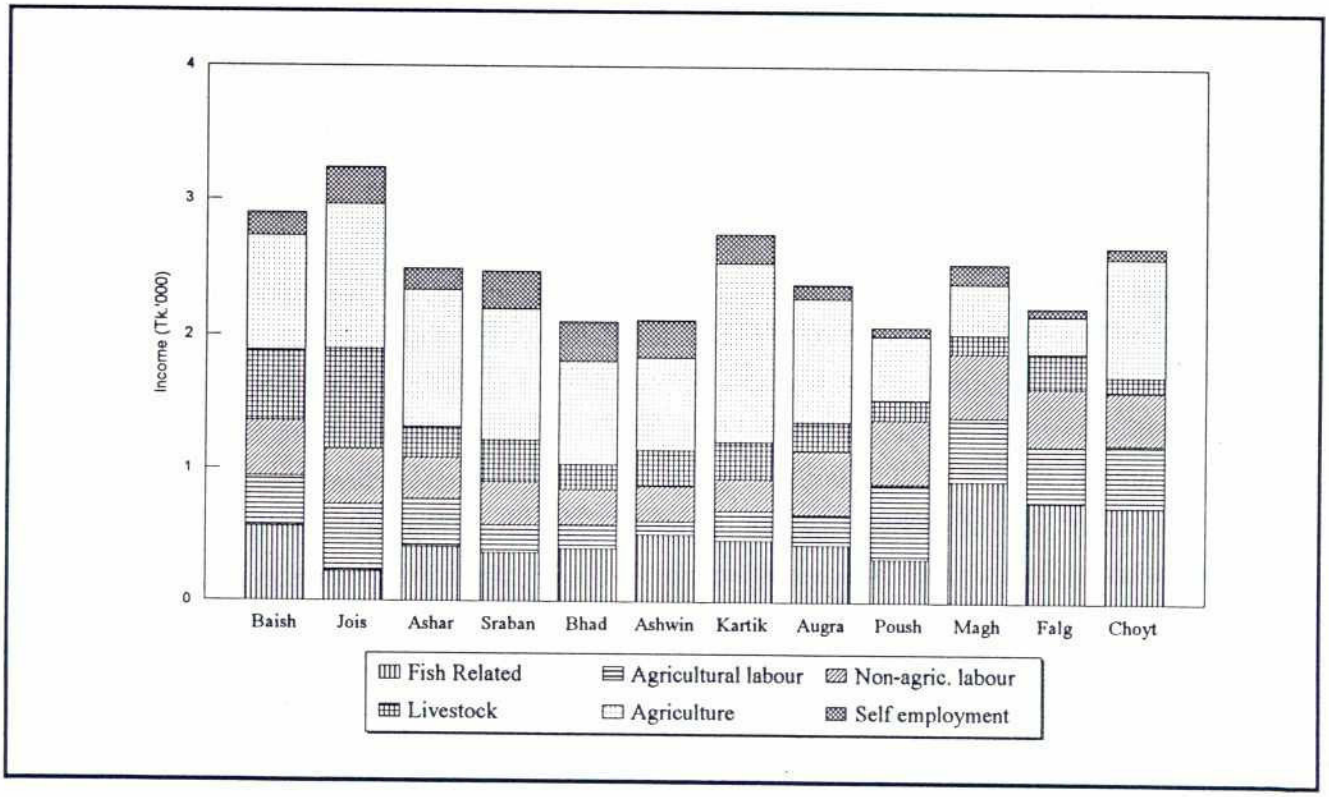
The fishing pattern is quite different for landless households. Lacking land titles, these households cannot lay claim to fisheries resources in residual water bodies during the dry season, but easy access to productive water bodies during the floods and drawdown encourages them to fish. In fact, from *Ashwin* to *Augrahayan* (mid-September to mid-December), fishing is the main source of income for landless households, accounting for more than 16% of overall annual income. Agricultural labour is still more important, providing almost 40% of household income. What is particularly interesting is the clear peak

Table 15 Income sources through the year by landholding category: Durgapur

UNIT: TK.

LAND CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
Medium	Fishing	8	14	2	2	42	153	75	55	53	157	105	76	740	1.2
	Fish culture	-	-	-	-	-	-	-	-	-	5	5	267	277	0.4
	Non-agric. labour	1150	1150	733	733	650	650	542	792	792	1150	1150	1150	10642	16.6
	Small stock	24	18	49	1141	45	76	95	125	69	33	57	87	1819	2.8
	Large stock	2042	1598	389	260	223	1192	1125	633	288	342	283	358	8733	13.7
	Agriculture	2901	4933	3987	4008	3764	3494	4430	2517	2119	1885	1147	3023	38208	59.7
	Self employment	390	415	200	183	168	205	427	464	343	218	238	280	3531	5.5
	Total	6515	8128	5360	6327	4892	5770	6694	4586	3664	3790	2985	5241	63950	100
Small	Fishing	1569	445	604	455	821	563	554	433	541	2247	1880	1879	11991	42.5
	Fish culture	-	-	-	-	-	-	-	-	-	-	-	40	40	0.1
	Agricultural labour	21	179	-	-	-	-	-	-	-	86	71	71	429	1.5
	Non-agric. labour	143	143	143	143	143	143	143	607	607	143	143	143	2643	9.4
	Small stock	47	30	106	82	71	16	112	130	76	97	27	51	845	3.0
	Large stock	500	670	123	75	106	105	85	76	77	30	520	-	2368	8.4
	Agriculture	745	604	813	764	428	337	1772	1399	309	187	250	871	8479	30.0
	Self employment	164	163	138	308	203	187	135	10	5	34	32	54	1432	5.1
	Total	3189	2234	1927	1827	1772	1351	2801	2655	1615	2824	2923	3109	28227	100
Landless	Fishing	1	123	397	426	205	589	533	557	263	159	144	-33	3363	16.4
	Fish culture	-	-	-	-	-	-	-	-	-	30	7	6	42	0.2
	Agricultural labour	764	910	740	427	374	204	454	476	1163	927	818	917	8174	39.9
	Non-agric. labour	387	387	308	330	238	232	223	287	298	509	429	345	3972	19.4
	Small stock	20	125	113	88	170	66	39	57	85	77	20	59	921	4.5
	Large stock	-	391	58	-	-	-	-	-	-	-	-	-	449	2.2
	Agriculture	262	184	234	176	84	74	18	51	68	30	15	195	1391	6.8
	Self employment	111	315	155	283	396	366	205	63	22	214	22	35	2187	10.7
	Total	1545	2435	2005	1730	1467	1531	1472	1491	1899	1946	1455	1524	20499	100
Village	Fishing	565	222	411	371	401	512	470	435	331	908	761	670	6057	20.2
	Fish culture	-	-	-	-	-	-	-	-	-	15	4	58	78	0.3
	Agricultural labour	380	507	360	208	182	100	221	232	567	482	424	473	4136	13.8
	Non-agric. labour	417	417	314	325	267	264	243	479	485	476	437	396	4521	15.1
	Small stock	31	74	101	248	116	49	74	94	79	77	28	60	1032	3.4
	Large stock	494	677	132	67	72	221	204	125	72	63	230	55	2412	8.1
	Agriculture	841	1065	1019	977	774	695	1327	915	470	372	273	873	9600	32.0
	Self employment	173	276	156	277	291	277	214	106	65	150	59	80	2123	7.1
	Total	2901	3238	2493	2473	2103	2118	2753	2386	2069	2543	2216	2665	29959	100

Figure 19 Income sources through the year: Durgapur



Source: FAP 17 Socioeconomic Monitoring

in agricultural labour income during the *rabi* season. The extensive areas around Durgapur which are still planted to traditional crops of *aus* and *aman* rice, and which provide the peak in agricultural earnings for small farmers during the harvest in *Kartik* and *Augrahayan*, apparently do not translate into a major peak in labour demand. Work on *rabi* crops and *boro* rice, from *Poush* to *Joisthya* (mid-December to mid-June) are far more demanding in terms of labour requirements.

2.8 Conclusions

Even within the small section of the North Central Region studied, there are considerable differences in fisheries dependence between communities. There are fewer social constraints on fishing in Manikganj District compared to other regions studied by FAP 17. While it is still a low-status activity, the stigma attached to it is easily overcome when the economic returns are attractive. In the absence of strong social proscriptions, decisions about involvement in fishing seem to depend more on the availability of alternatives and the relative profitability of fishing compared to other economic activities.

This seems to reflect the greater range of options open to people in the area due to the proximity of urban and industrial centres, the growth of the service sector around these centres and intensive NGO activity, which has apparently succeeded in opening up the range of income-generating activities available to poorer sections of the community. Fishing is clearly one option among many for households. The desirability of fishing depends on many factors; accessibility to water bodies, physical distance and the status of underlying land are the most important. But it is clear that, purely in terms of returns to effort, fishing remains attractive.

One reason non-traditional fishermen are attracted to fishing is that the traditional fishermen who nominally control *jalmahal* are unable to enforce access restrictions to keep them out. This will be discussed in greater length in the next chapter, but access to fishing grounds does not generally restrict fishing involvement by rural people in the Manikganj area. Restrictions may increase in the future as the number of *danga* (fish pits) grows in floodplain and *beel*.

Widespread fishing, such as found in the North Central Region, means that the potential fisheries impacts of flood control intervention could also be widespread. A considerable proportion of rural households depends on seasonal fishing for some of their livelihood. The

degree of dependence varies considerably: in Jagannathpur fishing is of minor importance, while in Durgapur it is a key income-provider for many people. Fishing for consumption is widespread, and children are intensively involved.

In three of the four villages studied, river erosion has had serious impacts, either directly on the village, as in Ashapur, or by bringing in erosion victims as settlers from outside, as in Durgapur and Jhikutia. Seasonal fishing on floodplains is particularly vital for destitute groups such as erosion victims.

Given the seasonal importance of fishing for such groups, there is no doubt that every effort should be made to ensure that fisheries are sustained in the wake of flood control interventions. It needs to be realised, however, that fisheries are already undergoing radical changes as a result of various human interventions and that the impact of flood control might well be limited in comparison with other development. In all the communities studied by FAP 17, the construction of roads and pathways has had a major impact on fisheries. In Jhikutia, the completion of the Dhaka-Aricha highway, and in Durgapur, the construction of the Tora-Jhitka-Harirampur road, are said to have radically changed flooding patterns and fish movement through Harirampur *thana*'s system of *beel* and *khal*.

Siltation processes have also had marked impacts. Hazipur *beel*, south of Jagannathpur, is said to have been an important carp fishery 20 years ago, but siltation in the *khal* connecting the *beel* to the Kaliganga River, and the reduction of the Choytai and Gazikhali rivers to seasonal channels, have completely altered the hydrology of the area and resulted in the near disappearance of migratory fish from the *beel*. Diabari *beel*, near Durgapur, is also subject to severe siltation.

Many of the changes mentioned primarily affect migratory fish species, including the major carps such as *rui*, *catla* and *mrigel*. While the decline of these fish is certainly affecting the value of the catch, the quantity of catch may have been little affected, as by far the bulk of the catch is made up of floodplain resident species. The loss of high-value species mainly affects traditional fishermen, who depended on the harvest of these fish for their livelihood. Non-traditional fishermen have always targeted the miscellaneous floodplain species and the gears they use are especially adapted to their capture. The higher-value carp fishery is also possibly adversely affected by the increasingly popular *savar* fishery, which targets carp hatchlings in order to supply the area's growing fish culture industry.

A radical reduction in the overall flooded area and in the depth of residual water bodies would have a negative long-term impact on floodplain-resident species. The increase in the number of *danga* on most floodplains and *beel* might help counteract the general decrease in water depth by creating small over-wintering sites for floodplain fish. The widespread use of low-lift pumps to completely dewater these residual water bodies probably offsets any potential positive impacts, however.

3. FISHING COMMUNITIES AND FLOOD CONTROL

3.1 Means of comparison

Identifying fishing communities between which valid socioeconomic comparisons can be made is difficult. The strategies employed by different fishing communities for maintaining their livelihood is highly dependent on historical, social and cultural factors that are rarely replicated from one community to the next.

The complexity of the social interactions affecting fishing communities means that, in most cases, 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 political and social changes than by changes in the fisheries resource due to flood control.

There are a six basic indicators that can be studied and assessed in order to achieve a better understanding of how flood control measures have affected the livelihood of professional fishing communities. These indicators are reviewed below.

Social and religious structures of fishing communities

Until the Partition of India and Pakistan in 1947, fishing as a full-time professional 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 emigrated 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, migration due to changes in the fisheries resource is clear, but several general points need to be made regarding migration 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). 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.

- There has been a general tendency for Hindu fishing communities to remain in Bangladesh for as long as possible. Since the capture fisheries resources in Bangladesh are far more abundant than in West Bengal, even with increased competition and resource decline, there are greater opportunities in Bangladesh 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 several factors influencing changes in the areas exploited by fishermen.

Access issues

Traditional fishing communities have tended to be affected more than others by the changes in fisheries access arrangements that have occurred over the past 40 years. Flood control impacts on water bodies 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

Studying the seasonal patterns of gear use and changes in gears and fishing techniques can also serve as a useful comparative indicator for fishing communities. Different types and sizes of fishing gear are designed for use on water bodies with specific characteristics of depth, flood duration and species composition. As the water bodies change, the gears used on them must also change. In the floodplain, any change in water bodies and hydrology also implies changes in seasonal patterns of gear use and water body exploitation. Comparison of gear use and water body 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 as readily observed among seasonal fishermen or agriculturalists engaged in fishing part-time.

Patterns of water body exploitation

Changes in the types and locations of water bodies 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 impact of flood control measures on fisheries resources and the communities dependent on them. Often patterns of water body exploitation now and in the past are due to long-term changes in water bodies, 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 adverse 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 of the ways in which local resources and fishing communities' access to them has altered over time.

3.2 Social and religious composition of fishing communities

Traditional fishing communities in Manikganj District are overwhelmingly Hindu. The number of Muslim agriculturalists who are becoming, to all effects professional fishermen is increasing steadily and certainly Muslims engaged in fishing far outnumber Hindus. But a clear distinction is still made between the Hindu caste groups traditionally associated with fisheries, and Muslim fishermen who have joined the profession over the past 10 to 15 years.

Most of the traditional Hindu fishing communities live in small *para* within larger villages. The *haldar* or *jele para* is frequently a small world apart from the community in which it is located. Interactions with surrounding communities are intense, but the social and cultural differentiation is clear. Since most fishermen are landless, the settlement pattern in their communities tends to be nuclear, and most *jele para* are very overcrowded.

Muslims who have taken up fishing are not as clearly segregated from the rest of the community. As fishing tends to represent a loss of status, small groups of households, often related to each other, frequently seem to decide to make the move together. This is the case in Ujanpara, part of Jhikutia village where a group of Muslim labourers have moved together into professional fishing.

FAP 17 studied a total of six traditional Hindu fishing communities in the North Central Region and had some contact with many others. Only Bhatara, one of the satellite fishing communities for Jagannathpur, is something of an anomaly as it is a fairly clearly defined Muslim fishing community with a relatively long tradition of fishing. All other traditional fishing communities encountered were Hindu although, even within the Hindu fishing communities, some groups are more traditional than others.

Kutirhat and Ujanpara

The two satellite fishing communities for Jhikutia are closely inter-related. Both are Hindu fishing communities entirely made up of *malo* caste fishermen, locally called *haldar*. The *malo* seem to be one of the oldest and most well-established fishing groups in Bengal. They are generally associated with riverine fisheries either on secondary rivers, such as the Ichhamati, or on main rivers like the Padma and Meghna. In both villages, the fishermen themselves and people from surrounding village refer to the fishermen as *haldar*; this is not a caste term but simply an occupational title. Among the *malo* themselves, the word *haldar* is also used to refer to the leader of a *ber jal* fishing team who is responsible for organising fishing operations.

The fishing hamlets of Kutirhat and Ujanpara are both small sections of larger agricultural communities, and both *para* are inhabited exclusively by fishermen.

Several important gear and boat owners live in Kutirhat, whereas Ujanpara is dominated by fishing labourers. This indicates a distinct hierarchy within the fishing community which was confirmed by comments made in other area fishing villages: some *rajbangshi* fishermen in a village in Singair *thana*, well to the east, referred to "those rich *haldar* in Kutirhat" during a discussion of local fishing communities.

Zabra

The satellite fishing community for Ashapur is, like Kutirhat and Ujanpara, a small cluster of fishing households within the community of Zabra. The Hindu community in Zabra

extends beyond the fishermen, however. Several other caste groups, including a community of traditional potters, live nearby and there is a sizeable temple in the village.

The Zabra fishermen are *rajbangshi*, a caste group generally associated with fishing although indications are that they only became involved over the past 100 years or so. Both the name of the caste (literally "the king's people") and stories told regarding the origin of *rajbangshi* involvement in fishing seem to support this. In the past, *rajbangshi* seem to have been involved mainly in *beel* and floodplain fisheries; now they are also frequently active on main and secondary rivers like the Padma and Kaliganga.

Bhatara

The Muslim fishermen in Bhatara, one of the satellite fishing communities for Jagannathpur, refer to themselves as *nikari* and many use the title *bhepari*, indicating a long-standing involvement in trading and, in this case, particularly fish trading. Over the course of the past 30 years these *nikari* have steadily become more and more involved in capture fisheries as well as in the transport and sale of fish to local and distant markets. Even more noteworthy is the recent specialisation of several village households in fish culture.

The village seems to have had an active Hindu *rajbangshi* fishing community in the past. One *rajbangshi* household still remains in the village along with several other low-caste Hindu families, but it seems that when the majority of the *rajbangshi* left at the time of Partition (1947), members of the Muslim fish trading community stepped in to take their place on local fishing grounds.

Dwimukha

North of Jagannathpur, just over the boundary with Dhamrai District, is the *rajbangshi* fishing community of Dwimukha. The *rajbangshi* are the largest group in a more extended Hindu community made up of *namasudra*, *das*, *shaha* and *sutradahar* households.

Diabari and Gopalpur

The *rajbangshi* communities in Diabari and Gopalpur are part of a network of fishing communities around Harirampur *thana* headquarters. Most of these communities are along the Ichhamati River, but in recent years the fishing communities have been joined by groups of *malo* and *rajbangshi* fishermen forced to move out of their villages along the banks of the Padma due to river erosion.

Diabari is a large village of which the Hindu *para* is a very small section. Among the Muslim majority, a few households have moved into fishing in much the same way as their neighbours in Durgapur.

Gopalpur, although equally small, is a more self-contained community between the two *khal* where they concentrate their fishing activities. The two leading families of Gopalpur seem to be among the most influential fishing households among local *rajbangshi* as they both hold important positions in the local fisheries *samity*.

In all these villages, fishermen indicate that catches have considerably declined over the past 10-15 years and that the number of people engaged in fishing has sharply risen. It is difficult to assess whether there has been a real decline in the fisheries resource. National statistics are inevitably only a rough guide to what is happening in the field, and these indicate no significant changes in fish catch except in the main rivers where a decline has been noted for the past five years.

Whether or not the resource is genuinely under pressure, changes in the fisheries and the social structure of the fishing population make it inevitable that traditional fishermen with long-term fisheries experience will perceive a decline in catches. The scale of the changes is difficult to assess, but the rough estimates given by many respondents suggests that at least five times more people are involved in fishing (during certain periods of the year) than there were 15 years ago. More fish are also being caught earlier in their life cycle than in the past. For some species, particularly higher-value ones such as major carps, this means that the average size of fish has probably declined. This changing resource, now being divided up among many more people, creates an impression of declining catches among traditional fishermen who used to be almost exclusive exploiters of fisheries and in a position to choose which part of the resource they would fish and when.

This historical dimension needs to be fully understood. In the past, and apparently up until the 1970s, occupational fishing was tightly circumscribed. The involvement of practically anyone other than traditional caste fishermen was restricted by social taboos. Subsistence fishing during the flooding season, using hooks and lines that did not involve actually getting wet, was acceptable for non-traditional fishermen, as was dewatering of residual water bodies during the flood recession. But fishing with nets on the *beel* and floodplains, or the operation of larger gears on rivers or *khal*, would have seriously compromised the social standing not only of the individual involved but also of the entire community to which that individual

belonged. There inevitably would have been exceptions, particularly in times of acute need, but the strength of the social conditioning that limited who could be involved in commercial fishing should not be underestimated.

Thus protected from serious competition, traditional fishermen enjoyed considerable liberty in selecting fishing sites; not surprisingly, they would select the choicest locations. Around Manikganj, each fishing community would have exploited a different fishing area.

The *haldar* of communities like Kutirhat and Ujanpara were specialised riverine fishermen. For most of the year their operations would have concentrated on the Padma and Ichhamati rivers. During the summer, when the rivers were in flood, they would have used drifting gill nets to catch *ilish* on the Padma and *veshal* (lift net) to catch fish in smaller rivers like the Ichhamati. During the winter, attention would have shifted to the use of *ber jal* (seine nets) on the main river for smaller fish like *kachki* and *chapila*. Some *malo* communities in Harirampur and Sivalay *thana* traditionally specialised in the *pangas* fishery using bottom-set gill nets. Access to the riverine fisheries was apparently governed only by the fishing community's *mohajan* and by tradition. Given the constant morphological changes of major rivers like the Padma, these rights were subject to modification and dispute. Since the disputes generally involved conflicting claims by members of the same caste fishing group, however, they could usually be resolved internally.

The other principal traditional fishing group, the *rajbangshi*, seems to have specialized in fishing closed water bodies like *beel* and floodplains. Access to these water bodies usually depended on relationships between *rajbangshi* communities and the *zamindar* who controlled a particular water body and the surrounding floodplain land. Payment of a nominal tribute (*khajna*) to the *zamindar* would generally have ensured the right to harvest a particular *beel* or area of floodplain as the floodwaters receded. These fisheries were highly concentrated during the period from the flood recession in *Kartik* (October/November) to the end of the dry season in *Baishak* (April/May). During the floods many *rajbangshi* would join the riverine fisheries on main and secondary rivers.

Although the *malo* and *rajbangshi* are the main traditional fishing castes around Manikganj, in many other parts of the country the *kaibarta das* is also an important fishing caste. Few of them were found in the areas of Manikganj District studied by FAP 17. Where they were encountered, they historically seem to have been more involved in fish trading than fish capture. A small group of *das* fish traders is located just north of Ashapur. Other small caste

groups who fish are scattered throughout the area; a small community of *bagdi* fishermen was encountered just north of Ghior, and a few *namasudra* fishing households were mentioned by other respondents.

Since the early 1950s, when the *zamindari* system was abolished, the lines of demarkation in fisheries have steadily eroded. Leasing arrangements for *khas* water bodies, introduced following Partition, do not seem to have much changed fisheries control, but fishermen found themselves increasingly indebted to *mohajan* (moneylenders) from outside their communities in order to pay for *jalmahal* leases. At the same time, the emigration of many Hindu fishermen to India created vacancies in fisheries that a steadily growing number of poor Muslim households were willing to fill, despite the social ostracism they suffered as a result.

The Independence of Bangladesh in 1971 apparently had a far more profound impact on fishing operations. Auctions for fisheries leases became more competitive and lease values began to rise sharply (in part because fisheries regulations stipulated that lease values should rise a minimum 25% over each leasing period). The increasing value attached to fisheries access fostered more and more involvement by people outside the fishing community and less and less control by fishermen themselves. More importantly, deprivation and suffering during the Independence War and subsequent 1974 famine pushed far more people into fishing as a means of survival. This seems to have opened the eyes of many rural people to the potential of the fisheries resources around them and led to an enormous increase in the number of fishermen. In addition, the growth of Dhaka, increased movement of people to and from urban areas, and the expansion of NGO activities effected a change in attitude towards income-generation. People have become more willing to pursue any option which offers a reasonable livelihood without being overly concerned about the social repercussions of their involvement.

The result of these changes has been a tremendous diversification in the social background of those involved in fishing. Even as recently as 15 years ago most people who fished belonged to one of three or four Hindu fishing castes. But a fishermen on the floodplains today is just as likely to be a Muslim agricultural labourer fishing part-time or a small-farmer who has decided to fish professionally.

3.3 Migration

Considerable migration has occurred among the Hindu communities of Manikganj District; many households have emigrated to India, generally in the wake of major political changes such as the Partition in 1947 and the Independence of Bangladesh in 1971. Political changes are not alone among the reasons households have moved, however. Considerable immigration has occurred due to the effects of river erosion. Erosion along the left bank of the Padma River in Harirampur *thana* has hit traditional fishing households particularly hard and many have had to distribute themselves among other area Hindu fishing settlements.

Kutirhat and Ujanpara

Table 16 shows out-migration in the two *haldar* fishing communities in Kutirhat and Ujanpara.

Table 16
Out-migration of households - 1950s to present: Kutirhat and Ujanpara

VILLAGE	KUTIRHAT		UJANPARA	
Timing	H/H nos.	Reasons for migration	H/H nos.	Reasons for migration
Before 1950	5	• Moved to Assam-decline in fishing	4	• To join family
1950-70	9	• Partition of India	1	• To join family
1970-80	7	• Famine (1974)	16	• Famine (1974)
1980-90	0	-	0	-
1990-present	2	• Post-Babri mosque incidents (1993)	0	-

Source: FAP 17 Village Appraisals

Since Partition, there has not been a great deal of out-migration from either community. The 1974 famine, probably combined with the political situation surrounding Independence, caused several households to emigrate to India. Noticeably, however, changes in the fisheries resource have had much less influence on household migration decisions.

Migration out of Bangladesh often means a change in occupation because capture fishing opportunities are generally greater in Bangladesh than in West Bengal. Hindu fishermen who

intend to continue fishing after migration tend to move to Assam where some fishing options apparently remain open.

Fishermen in both communities complain of declining fish resources and increased competition from non-traditional fishermen, but this generally is not a principal motive for migration. The insecurity of being a low-status religious minority is the main factor causing fishermen in the area to migrate (see Box 3).

Other satellite fishing communities

Migration patterns in the traditional Hindu fishing communities of Zabra, Dwimukha, Diabari and Gopalpur are similar to those of Kutirhat and Ujanpara. Partition generally provoked some households to move to West Bengal, and successive waves of unrest and periods of political instability leading up to the Independence of Bangladesh encouraged a steady westward flow of households.

Although the influence of political and social factors far outweigh other factors, since 1971, traditional fishermen have increasingly migrated because of fisheries access problems and in response to competition with non-traditional fishermen.

The demolition of the Babri Mosque in Ayodhya, India, in late 1992 created an upsurge of anti-Hindu sentiment in many rural areas of Manikganj District. While in most cases this was manifested in the burning of Hindu temples and smashing of idols, some people took advantage of the backlash to exploit Hindu fishing households for their own ends. A Kutirhat *malo* fisherman had leased three ponds in a neighbouring village for fish culture—it was the first time anyone in the village had tried this arrangement and the results were being watched with interest by the whole community. The fisherman stocked the ponds with fingerlings caught in his own *veshal* on the Ichhamati and in Mahishakola *khal.* After improving the pond and stocking it, the results seemed to be very promising. Then, just before harvest time, the Babri Mosque Incident occurred. In early January (*Poush*), when the fisherman and his family went to harvest the ponds, two of the pond owners told him that he had no right to the ponds or the fish he had stocked and fed there. The fisherman sought recourse from the *matabar* (traditional village authority) in the village where the ponds are located but was told that nothing could be done because the two pond owners were both "powerful men".

Box 3: Innocent victims

For *rajbangshi* fishing communities, such as Zabra, Dwimukha, Diabari and Gopalpur, which have traditionally fished closed water bodies such as *beel* and *rak* (oxbow lakes), the siltation that has raised the beds of many of these water bodies has had a particularly serious impact. It seems to have encouraged a somewhat higher rate of migration out of the country than in the *malo* communities along the Padma.

In some of the Harirampur *thana* fishing communities near Durgapur that were not studied by FAP 17, local conditions have created a somewhat different pattern. Although the overall

tendency for Hindu fishermen to gradually migrate out of the country continues, there is also a localised trend toward in-migration to fishing communities along the eastern section of the Ichhamati River. This is entirely due to the effects of river erosion by the Padma River to the south, which has hit fishing communities along the banks of the river with particular severity. Most of the traditional fishing communities along the banks of the Ichhamati, such as Andarmanik, Goalnagar and Agrail, now contain considerable numbers of dislocated fishing households from villages that have vanished into the Padma. These communities frequently have also lost their traditional fishing grounds where the Padma has eroded *beel*, *khal* and sections of the Ichhamati. The movement of fishing households into the area is therefore also having an impact on remaining fishing grounds. More and more fishermen are competing for a diminishing range of water bodies. This is encouraging out-migration by traditional fishermen.

As already mentioned, until just after the Partition, the Muslim fishing community of Bhatara had a sizeable community of *rajbangshi* fishermen. With the exception of one household, the village *rajbangshi* all emigrated to India in two waves after Partition and after Independence. At this point, several of the *nikari* apparently saw the opportunity to step into the vacancies created by the departure of the fishing community. Since they were already fish traders, the low-status generally associated with fishing probably did not constitute a major problem. From this involvement in fish trading, then capture fisheries, the Muslim fishermen of Bhatara have progressed to fish culture. This is quickly becoming the primary focus of their activities, especially as capture fisheries opportunities decline due to physical changes in local water bodies.

3.4 Access for fishermen

Traditional fishermen usually operate through the leasing system and are therefore subject to official controls on their activity. Access to water bodies is almost always contingent on payment either in the form of a lease, sub-lease or fixed fee for a particular gear. Non-traditional fishermen generally must make such access payments only in the relatively rare cases where they have adopted the use of large gears like *ber jal* (seine net). The many smaller gears they habitually use are seldom controlled. In the case of the ubiquitous *current jal* this is because the gear is illegal. The lack of regulation is more often due to the fact that traditional fishermen are unable to enforce their rights to leased water bodies. Seasonal, non-traditional fishermen usually outnumber them and traditional Hindu fishermen are unable to

mobilise the kind of political and bureaucratic support that would be required to enforce their exclusive rights.

The following discussion looks at the principal water bodies in each cluster of satellite fishing communities and details the changes that have taken place in access arrangements.

Kutirhat and Ujanpara

For Kutirhat and Ujanpara, communities of predominantly riverine fishermen, access arrangements on the two rivers they exploit are naturally most important. Table 17 reviews the important water bodies in the immediate area and their access arrangements, both official and actual.

The section of the Padma River fished by the Kutirhat and Ujanpara *malo* is currently covered by a large *jalmahal* known as the Padma-Jamuna Barabant. It extends from just north of the confluence of the Padma and Jamuna rivers at Aricha to a point south of Ramkrishnapur. It constitutes a fishery of national importance as it covers key migratory routes for both major carps and *hilsa* as well as an area renowned for its *pangas* fishery.

This *jalmahal* was among the first locations selected for the introduction of the New Fisheries Management Policy (NFMP) in 1986. The NFMP was developed in response to the perception that control of fisheries resources was passing out of the hands of traditional fishermen and the management of the fisheries resource was consequently suffering. Competitive bidding for fisheries leases, it claimed, was resulting in the progressive exclusion of what the policy termed "genuine" fishermen from the bidding for *jalmahal* and the transfer of fishing titles to non-fishermen.

The NFMP attempts to redress this by replacing the auction and leasing system with a licensing arrangement. The *thana* or district level fisheries authorities draw up lists of "genuine" fishermen who can apply for gear licenses on NFMP water bodies. Theoretically, these licenses are limited to fishermen for whom the water body in question is a traditional fishing ground. In the case of the Padma-Jamuna Barabant, the determination of who is a traditional fishermen is controlled by the Padma-Jamuna *Matschajibi Samabaya Samity*, a District-level fisheries *samity* based in Aricha which is an umbrella organization for 19 local *samity* from Harirampur and Sivalay *thana*.

Table 17
Access arrangements on local water bodies: Kutirhat and Ujanpara

Water bodies	Official leaseholders/ actual controller	Leasing system	Institution responsible	Period
Padma River (Padma-Jamuna Barabant *jalmahal*)	**Official** - Padma-Jamuna *Matschajibi Samabaya Samity* **Actual** - same, although *mastan* from *char* land communities sometimes exact additional "taxes"	New Fisheries Management Policy (NFMP)	Fisheries Department	Not applicable
Ichhamati River	**Official** - fisheries *samity* **Actual** - same	Leasing system (auctioned) then sub-leased	Land Revenue Department/ADC Manikganj District	1 year
Mahishakola *khal*	**Official** - Hindu fisherman **Actual** - same	Annual lease (auctioned) then sub-leased to other fishermen and fixed fee for particular gears	Local mosque committee	Not applicable
Cultured ponds	**Official** - leasing/catch share arrangement with owners **Actual** - generally same, but precarious (see Box 3)	Various: • 75%-25% fisherman/owner if fisherman provides all inputs • 50%-50% fisherman/owners if owner provides fingerlings and feed	Privately owned	Not applicable
Maital and ditches	**Official** - owner **Actual** - not well-defined	Flexible: owner usually demands some of catch but fishermen frequently fish without prior permission	Privately owned	1 year

Source: FAP 17 Village Appraisals

According to local fishermen, while the licensing system *per se* functions reasonably well, problems have arisen over the regulation of access on the river. The ability of the traditional fishing communities themselves to enforce any kind of restriction on the river is very limited. Given the enormous upsurge in fishing activity by non-traditional fishermen, the *haldar* of Kutirhat and Ujanpara, as well as fishermen in other riverside communities, see the riverine resource being steadily eroded and their ability to exploit it threatened by indiscriminate fishing by newcomers. Illicit attempts to control fisheries on the river are also on the rise. Local *mastan* living in *char* land communities on the Padma are reported to frequently extort money from fishermen fishing in waters adjacent to their communities. Fishermen moving downriver to the Meghna also report a steadily growing network of informal "taxes" levied simply for transit rights. These pressures are making the *haldar* fishermen's hold on the resources they depend upon more and more precarious.

The lease control situation on the Ichhamati River is apparently more encouraging. A *haldar* from another nearby fishing community in Balla Union currently controls the lease to the river immediately adjacent to Kutirhat. He sub-leases sections of the river, *veshal* (lift net) and *katha* (brush pile) sites, to other fishermen from surrounding villages. This resource is particularly vital for the fishermen of Ujanpara who are more specialised in *veshal* and *katha* fisheries. This resource is being threatened by siltation in the Ichhamati, as well as the encroachment of farmers owning land along its banks. As is often the case with *khas* water bodies, people owning land around the river feel that *khas* land is nobody's land and, during the dry season, farmers set up small bunds in the river to drain sections of riverbed to plant *boro* rice. This practice threatens both fishing and water transport along the river, but Hindu fishermen are effectively powerless to stop it.

During the month of *Poush* (mid-January), researchers met a *malo* fishermen from Kutirhat and his 8-year-old son moving from *maital* to *maital* in the homestead area of Jikhutia casting his *jhaki jal* in each ditch he came to. In one *maital*, after his first cast, he pulled in a large *shol* (snakehead). He was about to head home with his catch when a small boy who had been watching called out the members of the household to whom the *maital* actually belonged. The women in the family came out and demanded an "owner's share" of half the catch. Rather than divide the single fish he had caught, the household head suggested that the fishermen try a few more casts in the *maital* to see if he could come up with anything more which could be shared out amicably. After a few unsuccessful casts, the women of the household began insisting that they should get the whole of what the fisherman had caught as he had been fishing "without prior permission". By this time people from households all around were present and joining in the debate, many of them standing up for the right of the fishermen to at least part of the catch. But in the end, tenure rights prevailed and the women took the whole *shol* into their home. As the fisherman and his son left the scene they lamented that this was a common occurrence and was even happening to them more and more on water bodies which they had legally leased.

Box 4: Whose fish?

One option increasingly adopted by *haldar* fishermen is diversification into pond fisheries. This has usually meant increasing exploitation of the area's many *maital* and ditches. Fishermen in the past have typically been able to take advantage of the farming communities' general ignorance concerning fish resources to exploit these residual water bodies after flood recession. With the growth in pond culture, and the increased competition for all rural resources, however, access to non-cultured ponds and borrow pits is steadily being restricted. The episode in Box 4 illustrates well the lack of definition which still persists concerning fisheries resources in non-cultured water bodies around homesteads and the precariousness of fishermen's rights to this resource.

Fishermen are able to set up leasing arrangements for local ponds and other residual water bodies such as *danga* (fish pits) in the *beel*. This fishery is essentially similar to the traditional *katha* fishery in the Ichhamati River in which they already have considerable experience. The step from this to the management of properly cultured ponds has not been a large one. One family in Kutirhat has already attempted to take up fish culture in leased ponds (see Box 3). While their experience ended unhappily, it is likely that others will follow suit in the future.

The main constraint to traditional fishermen's involvement in the growth of fish culture will be the availability of ponds for leasing. In other areas of the North Central Region fish culture has developed very rapidly; many non-fishermen have become involved and pond owners have quickly come to appreciate the value of their ponds and take control of their development themselves. This can quickly lead to a rise in lease values and a reduction in the number of ponds available for leasing.

Figure 20, showing the distribution of fishing effort in Kutirhat and Ujanpara by access arrangement, indicates that the amount of fishing effort accounted for by such leasing arrangements is still small. The time spent on leased water bodies in Kutirhat is concentrated during the rainy season and accounted for by leased *beel* fishing. In both communities, fixed-fee access is by far the most common. This access type covers the licensing arrangements on the Padma as well as *veshal* and *katha* fishing on the Ichhamati. The Padma fishery under NFMP is by far the most important, particularly during the winter months from *Magh* to *Baishak* (January to May).

The figure also clearly shows Ujanpara fishermen's greater dependence on open-access fisheries. This is a consequence of the fact that the *haldar* of Ujanpara have the resources

necessary to ensure access to leased water bodies. They are therefore more reliant, during the flooding season, on floodplains and open-access *beel* and, during the drawdown and dry season, on residual water bodies where owners do not restrict access. In the past, both communities apparently fished more on *beel* and floodplains during the floods, but this has declined over the past 10 to 15 years. As private land ownership and cultivation have extended into previously fallow lowland, and as many landowners have started excavating *danga* in their lowland plots, open-access fishing has steadily become more restricted.

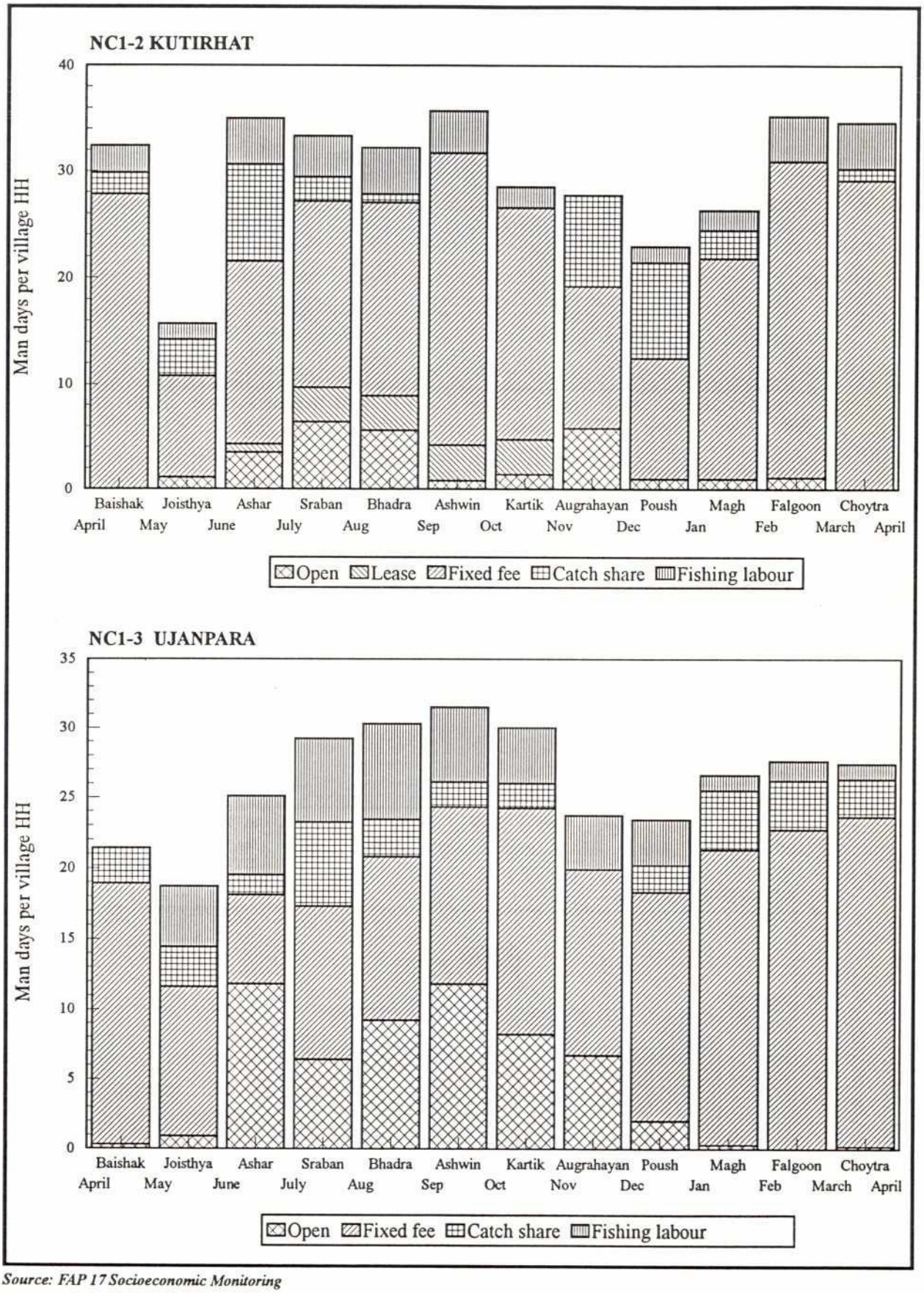
The relatively limited amount of fishing labour in both villages is interesting. Even in Ujanpara, although markedly poorer than Kutirhat, most fishermen are able to fish either under license, using their own gears or under a catch-share agreement. This reflects the highly cooperative nature of the *haldar* fishermen. The large *ber jal* used on the Padma River are assembled from many individual sections of net owned by different fishermen and the team of net owners and operators is regarded as a single unit which pays a license fee for access to the river (even though within the unit, the division of income is done on a catch-share basis depending on the contribution of each fisherman).

Zabra

Zabra fishermen in the past focused their efforts on three water bodies: the Gang Kherai *jalmahal*, Chak Bosta *rak* and Sailabari *rak*. The Gang Kherai *jalmahal* encompasses a section of the Kaliganga River from the Tora bridge north to Pakutia, part of the Ghior River and Ashapur *kul*, a relatively young oxbow lake still connected to the Kaliganga and regarded, for administrative purposes, as part of the Kaliganga River. This *jalmahal* remains the *rajbangshi*'s most important fishing ground. Chak Bosta *rak*, just east of the Kaliganga, and Sailabari *rak*, north of Ashapur *kul*, silted up and disappeared about 10 years ago.

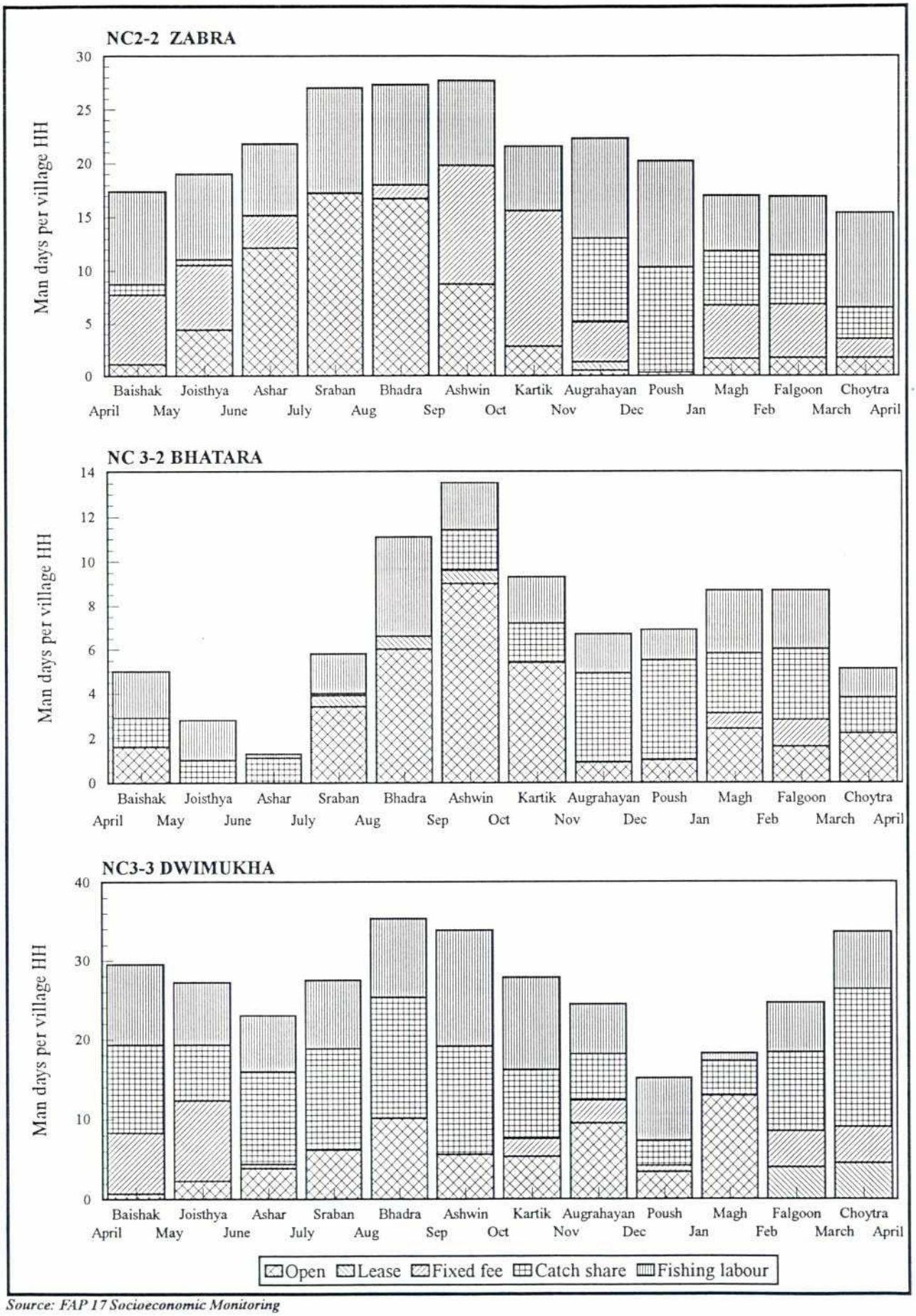
Fishing labour accounts for a sizeable proportion of the fishing effort of the Zabra *rajbangshi* (Figure 21). There are two principle factors at work here. First, access to the Gang Kherai *jalmahal* was more limited than normal during the year of the FAP 17 study because the lease had been acquired by another fisheries *samity*. In order to gain access to the fishery many Zabra fishermen took work as labourers for fishing teams from neighbouring villages. Second, ownership of large gear, such as *ber jal*, is concentrated in the hands of a few fishing households while others either work for these households on their fishing teams or fish independently using smaller gears.

Figure 20 Distribution of fishing effort by access type through the year: Kutirhat and Ujanpur



Source: FAP 17 Socioeconomic Monitoring

Figure 21 Distribution of fishing effort by access type through the year: Zabra, Bhatara and Dwimukha



Source: FAP 17 Socioeconomic Monitoring

The *rajbangshi* fishermen traditionally tend to focus their fishing on open-access floodplain during the flooding season from *Ashar* to *Ashwin* (June to October). The loss of direct access to their traditional fishing ground on the Kaliganga and Ghior rivers in 1993-94 exacerbated this dependence. Access to the river seems to have been limited to fixed-fee payment during the drawdown. The winter season involvement of many Zabra fishermen in the management and harvesting of *katha* on the Ghior and Kaliganga rivers and in Ashapur *kul* is reflected in the large proportion of fishing effort under catch-share arrangements. The harvesting of ponds and other residual water bodies is usually done under the same arrangement. Several of the non-gear owners in the community also move to the Padma River to work as fishing labourers.

The pattern of fishing effort in Zabra is of interest because it indicates how fishing communities might react to the loss of their traditional fishing grounds. If there are suitable floodplains and *beel* in the area, fishermen may seek out open-access fisheries. If not, as will be seen in other fishing communities, the main river represents the principle fishing option. Concentration on pond fisheries is possible for some, but this option is only available during the winter from *Augrahayan* to *Choytra* (November to April).

Table 18 shows the principal water bodies around Zabra and the formal and informal access arrangements in force on them.

Bhatara and Dwimukha

The Dwimukha *rajbangshi* fishing community traditionally was linked to a local *zamindar* through whom they had regular access to a series of extremely productive water bodies in the immediate vicinity of the village. Until about 10 years ago the key water body for these fishermen was a *baor* or oxbow lake, locally called Shakhipara *beel* (although not a *beel*), about 5 kilometres north west of the village. This lake was once part of the Choytai River and remained connected to it by Shakhipara *khal*. Over the past 15 years, the lake and the *khal* have silted up to the point that, for the past five years, Dwimukha fishermen have been unable to fish there at all. The disappearance of this water body is a major loss for the traditional fishermen as it has occurred at the same time as access to alternative local water bodies has been increasingly contested with non-traditional fishermen from surrounding Muslim farming communities.

The entire area was once dotted with highly productive *rak* or *baor* (oxbow lakes) formed by the constant movement of the Kaliganga, Choytai, Bansi and Dhaleswari rivers. The

regular flooding of the area recharged these water bodies' fisheries resources and ensured a stable livelihood for the area's traditional fishermen. Now many of these *rak* have silted up or are being fished intensively by non-traditional fishermen, making access increasingly difficult for the *rajbangshi*. Those *beel* and *rak* where the water level has dropped are also increasingly being brought under *boro* cultivation during the winter, further limiting the area available for fishing.

A similar process has deprived Dwimukha fishermen of their second most important fishing ground, the Choytai River, once a major distributary of the Kaliganga River.

Fishing in the past seems to have followed the classic pattern for floodplain fishing communities: exploit the *khal* and rivers during the rising flood, fish the open-access floodplain and *beel* during the full flood period, exploit *khal* and rivers during flood recession and, finally, harvest *beel* and *rak* during the winter dry season. This fishing pattern has been upset over the past two decades by dramatic changes in water depth, siltation and competition from non-traditional fishermen.

Siltation, while almost certainly encouraged by human interventions, has presumably always been a feature of the floodplains and *beel* areas of Bangladesh. The increasing competition for fisheries resources is a more recent development. Under the ever-increasing pressure on all potential sources of livelihood, more and more local farmers and labourers have taken to fishing, greatly increasing competition for access to what remains of local fisheries resources. In this situation, the *rajbangshi* fishermen inevitably find themselves at a disadvantage because they are a low-status religious minority and seldom able to mobilise the political and bureaucratic support required to ensure fisheries access through official channels.

As is evident from the distribution of fishing effort shown for Bhatara and Dwimukha in Figure 21, the newer Muslim fishermen of communities like Bhatara feel far less bound by access regulations than Hindu fishermen. Open-access fishing by the *rajbangshi* is relatively limited, but Bhatara fishermen rely extensively on such fisheries, especially during the flooding season and flood recession from *Sraban* to *Kartik* (July to November). According to the *rajbangshi*, the water bodies Bhatara fishermen call "open-access" are often actually leased to traditional fishermen. The Muslim fishermen simply fish without regard to the rights of the lessees.

Table 18
Access arrangements on local water bodies: Zabra

Water bodies	Official leaseholders/ actual controller	Leasing system	Institution responsible	Period
Kaliganga River, Ghior River & Ashapur *kul* (Gang Kherai *jalmahal*)	**Official** - local fisheries *samity* **Actual** - local Muslim political leader; on Ashapur *kul* local landowners & union chairman also impose restrictions	Leasing system (auctioned), then sub-leased (*katha* sites) or fixed-fee payments	Land Revenue Department/ADC Manikganj District	1 year
Char Ghior *beel* and other perennial *beel*	**Official** - fisheries *samity* **Actual** - local elite	Leasing system (auctioned), then sub-leased or fixed-fee	Land Revenue Department/ADC Manikganj District	1 year
Katha sites	**Official** - leaseholder **Actual** - sub-leased out; in Ashapur *kul* often controlled by landowners	Various: • leased by operator • catch-share arrangements	Not applicable although often on *khas* water body	1 season
Cultured ponds	**Official** - leasing/catch-share arrangement with owners **Actual** - generally same, but precarious (see Box 3)	Various: • 75%-25% fisherman/owner if fisherman provides all inputs • 50%-50% fisherman/owner if owner provides fingerlings and feed	Privately owned	Various; usually 1 year
Maital and ditches	**Official** - owner **Actual** - not well-defined	Flexible: owner usually demands some of catch, but fishermen frequently fish without prior permission	Privately owned	1 year

Source: FAP 17 Village Appraisals

Dwimukha fishermen now rely far more on fixed-fee and catch-share arrangements to maintain a reasonable degree of access through the year. Leasing arrangements play a role in the later part of the year when a few fishermen have leased local ponds for fish culture.

The significance of this development is more clearly seen in the patterns of fisheries access in Bhatara. Three types of access occur in this community. First, during the floods the open-access fishery on surrounding floodplains and *beel* is crucial, accounting for the majority of fishing effort during the summer months. Once drawdown begins, attention shifts to ponds and residual water bodies. Many non-gear owners find fishing labour opportunities in these water bodies. Fishing drops off in *Joisthya* and *Ashar* (May to July), when agricultural labour is more attractive for most Bhatara households as demand for workers on the *boro* harvest is high and fishing opportunities are limited.

Current access arrangements for the two communities on principal local water bodies are shown in Table 19.

Pond culture is spreading quickly in this area. Initially it seems to have been encouraged by the proximity of urban markets, the widespread availability of unexploited ponds and *maital* and, at least in Baliati Union, the availability of credit from both NGO and informal sources. Fish culture may presently be booming, but the limits of its expansion are already apparent. While a handful of key operators in Bhatara have been able to lease a large number of ponds and *maital*, often at very favourable terms, newcomers are already finding it difficult to lease ponds. Pond and ditch owners were previously happy to lease their water bodies for five or six years, making it worthwhile for lessees to invest in major pond improvements. Now lease periods are steadily becoming shorter as pond owners seek to get someone to improve their pond and make it culturable so that they themselves can then take up culture activities. This is reducing the incentive for operators to make proper improvements.

A host of pond leasing arrangements have developed in response to the growth of aquaculture. These arrangements constantly change in response to the shifting demands of pond owners and operators. At least 16 different leasing arrangements were recorded in Bhatara alone. Most are variants on catch-share agreements with varying catch proportions going to owner and operator depending on who provides certain inputs such as feed, fingerlings, harvesting labour and physical improvements to the pond. One of the most interesting variants, the *dow ani* system, is described in Box 5.

Table 19
Access arrangements on local water bodies: Bhatara and Dwimukha

Water bodies	Official / actual controller	Leasing system	Institution responsible	Period
Main & secondary rivers - (Padma, Meghna & Kaliganga)	**Official** - fisheries *samity* **Actual** - same or local elite; frequent demands for additional payments by local people.	Leasing system (auctioned) or NFMP, then sub-leased (*katha* sites) or fixed-fee payments; NFMP license payments	Land Revenue Department/ADC Manikganj District; NFMP - Fisheries Department	1 year
Rak and perennial *beel* - (Angutia *rak*, Kondapara *kumb*, Outpara *bil*)	**Official** - fisheries *samity* **Actual** - local elite	Leasing system (auctioned), then sub-leased or fixed-fee	Land Revenue Department/ADC Manikganj District; some *thana*- or union-level authorities	1 year
Pradhanpur *kumb* (Gazikhali River), other local *khal*	**Official** - local mosque committee **Actual** - sub-leased annually to Jagatnagar fisheries *samity*	Leasing system (*thana*- or union-level), then sub-leased or fixed-fee	*Thana*-level authorities or union *parishad*	1 year
Katha sites	**Official** - leaseholder **Actual** - sub-leased out; in *khal* often controlled by landowners on adjacent land	Various: • leased by operator • catch-share arrangements	Not applicable although often on *khas* water body	1 year
Cultured ponds	**Official** - leasing/catch-share arrangement with owners **Actual** - same	Various	Privately owned	Various; usually 1 year
Maital and ditches	**Official** - owner **Actual** - not well-defined	Flexible: owner usually demands some of catch but fishermen frequently fish without prior permission	Privately owned	1 year

Source: FAP 17 Village Appraisals

The intensive use local aquaculture systems make of existing water bodies has bred some interesting developments. Some of the more experienced fish culturists are already specialising in raising fingerlings as opposed to growing fish to their full marketable size.

These specialists lease or rent large numbers of small water bodies and use them as nursery ponds, moving the fingerlings from one location to another as they grow. They generally then leave a limited number of fish in a few of the larger ponds to grow to full size through the winter. This intensive use of small water bodies removes them from exploitation by local people or traditional fishermen, who would often tour the surrounding villages during the winter fishing in homestead *maital* and borrow pits and sharing the catch with their owners.

Apparently in response to the increasing desire of pond owners to culture their own ponds (as opposed to leasing them out to others), a variant on the traditional catch-share arrangement has developed which makes use of the skills and expertise of those members of the Bhatara fishing community who have been involved in fish culture the longest. The *dow ani* system sets aside two (*dow*) sixteenths (*ani* from *anna*) of the value of the pond production to pay for the "technical assistance" of an experienced fish culturist. The handful of local people with experience in the field are given responsibility for supervising the improvement of ponds, their stocking, management and harvesting. The pond owner provides all the required inputs: feed, fertiliser, fingerlings and labour. This system seems to be becoming increasingly popular among pond owners, although it obviously tends to limit the number of fishermen who can become involved in fish culture since most of the work is carried out by members of the pond owner's own family or employees under the direction of one "expert".

Box 5: The *dow ani* system: pond culture in Bhatara

Bhatara fishermen have evidently found themselves in a better position to take advantage of aquaculture opportunities than many of the area's traditional fishing communities. This is probably due to their well-established links with the fish trading network and their ability, through these channels, to mobilise resources for the purchase of inputs. The practice is also spreading to other groups, however. During the 1993-94 season one *rajbangshi* group from Dwimukha had obtained the lease of a local pond for the first time and the results of this experiment were being watched with great anticipation by the rest of the traditional fishing community.

Diabari and Gopalpur

In the area along the banks of the Padma River, fishing communities are generally dominated by *malo* or *barman* caste fishermen, traditional specialists in riverine fisheries, who use large *ber jal*, large drift nets and *veshal*. The two satellite fishing communities for Jhikutia (Kutirhat and Ujanpara) are typical examples. Around Durgapur the situation is somewhat different as the Padma River was relatively distant from the village until about 10 years ago.

Since that time, the northward movement of the river, which has cut off the loop of the Ichhamati River south of Ramkrishnapur, has brought the main river into an area previously dominated by *beel* fisheries and the *rajbangshi* fishermen associated with them.

The *rajbangshi* fishing communities of Diabari and Gopalpur retain the characteristics of the fishing communities which probably dominated the area around Durgapur and Harirampur *thana* until relatively recently. Together with fishermen from Maniknagar and Baherchar, Diabari fishermen concentrate their efforts on Diabari *beel*, immediately in front of the village and apparently formed from a section of dead river as it is also locally known as Diabari *baor*. The form of the *beel* and the depth of its central portion seem to bear this out. The area of perennial water in the *beel* was once more than 60 acres and even in the month of *Choytra* (March/April) it was about 22 feet deep. During flood season the central part of the *beel* was more than 75 feet deep. Siltation over the past 15 years has greatly reduced the water body's depth and extent, and flood season depths are now about 30-37 feet and the dry season extent is only about three or four acres.

Now, as in the past, Diabari fishermen fish the floodplains surrounding the *beel* during the flooding season and flood recession and then move onto the *beel* proper once fish resources concentrate there after the month of *Kartik* (October/November). Access to the *beel* always seems to have been reasonably guaranteed, first by the relationship between the fishing community and the local *zamindar* and later through leasing arrangements and the local fisheries *samity*. Fishermen generally rely on funds from the local *mohajan* to pay for the lease to the *beel* but they at least have the right to place their *katha* in the *beel* and harvest them at the end of the year. This movement from generally open-access floodplain fishing to more controlled leased or fee-paying fisheries is clearly shown in the breakdown of fishing effort by access type in Figure 22.

The changes Diabari fishermen have experienced have principally been in the physical status of the *beel* on which they are almost entirely dependent and in the level of competition for the fisheries resource. As in the *beel* and *khal* around Jagannathpur, all the principal water bodies and channels around Diabari have been severely affected by siltation. Over the past 15 years the Ichhamati River, which feeds Mothurbose *khal,* once the principal inlet and outlet for Diabari *beel*, has been reduced from a major waterway to a relatively minor seasonal river that is increasingly being encroached upon during the dry season. In order to keep some water in the channel during the winter months and thus ensure water transport links, local boatmen regularly dam the river near Maniknagar south of Jhitka from *Kartik* to

Augrahayan (October to December), otherwise the western section of the river would probably dry out completely. Mothurbose *khal* is completely blocked by a sandbar from *Kartik* on. This means that water supply into (and drainage out of) the *beel* is now also dependent on the Moshakali *khal* flowing in from the Kaliganga River to the north.

As water levels have dropped, winter season cultivation of the floodplains around the *beel* has expanded, and *boro* rice is being planted farther and farther into the *beel*. Some of the previously *khas* land in the *beel* has already been distributed to farmers, reducing the area of *jalmahal* controlled by fishermen. In addition, more and more farmers are excavating fish pits on their land. This is leading to the progressive closure of the floodplain fishery to traditional fishermen. Landowners feel that the use of large *ber jal* disturbs the fish that might end up in their *danga* at the end of the season.

Over and above the steady reduction of Diabari fishermen's fishing grounds, they are also having to share those grounds with growing numbers of non-traditional fishermen. The theoretical restrictions on fishing activities on the *jalmahal* are practically impossible to apply to these newcomers. The gears they use (*current jal* and *barsi*) are difficult to control and, in any case, Hindu fishermen are too few in number to adequately enforce their legal rights against the far greater numbers of non-traditional fishermen now crowding their fishing grounds.

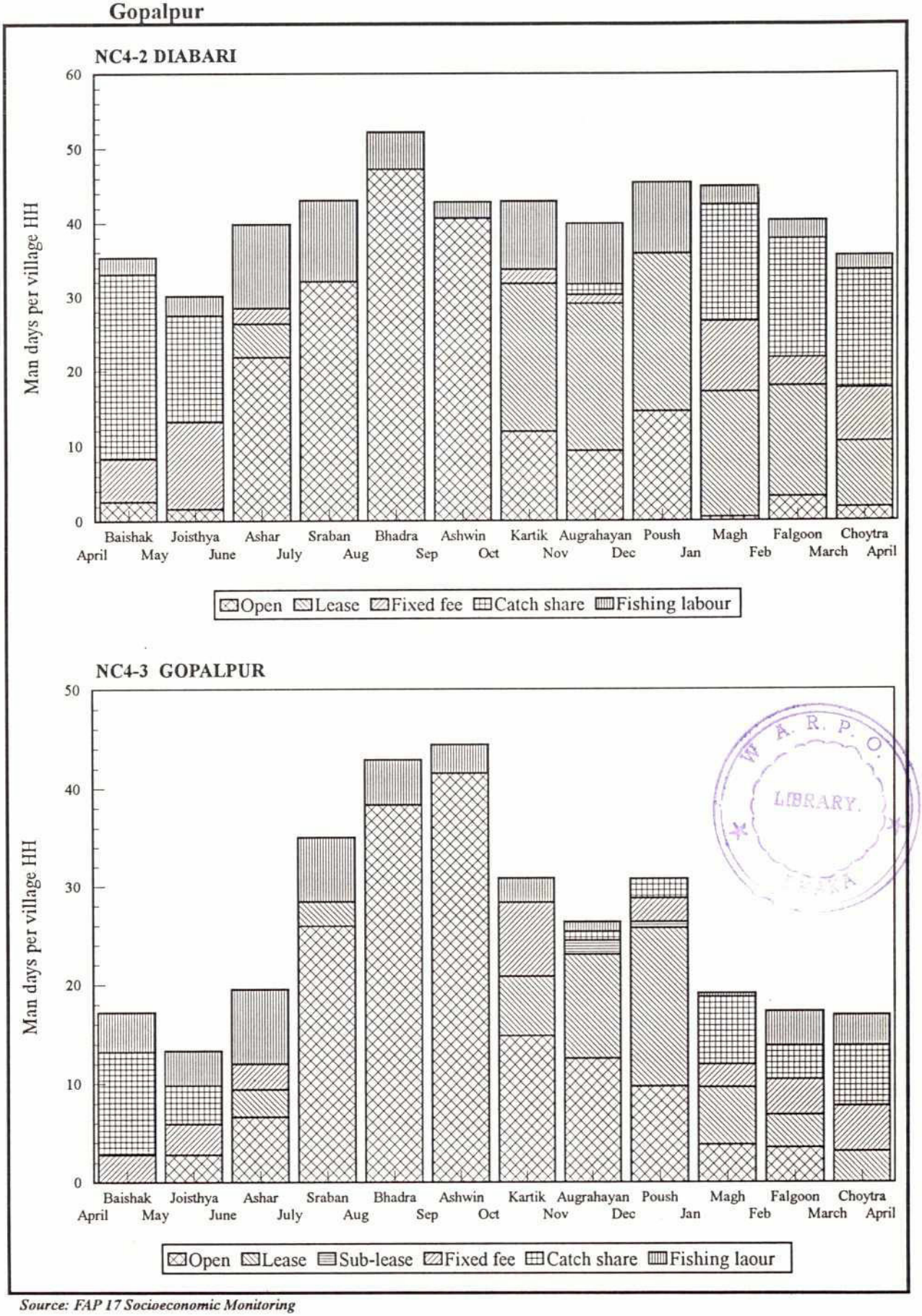
The *chak* on the north side of Diabari *beel* is divided into five recognised "fishing grounds". Each contain several *danga* which are fished in different ways and which have changed to different extents over time.

1. Boer *gara* has four seasonal *danga*, all dewatered directly by their owners. Twenty years ago there were two perennial *danga*, both leased out annually to traditional fishermen.
2. Boon Chatla has two seasonal *danga*, both fished by their owners. Twenty years ago these were perennial and leased annually to traditional fishermen.
3. Komar *gara* has one seasonal *danga* dewatered by the owner. Twenty years ago this *danga* was perennial and rented out to traditional fishermen.
4. Madan *gara* has six *danga*, all seasonal. One or two are occasionally rented out to traditional fishermen, but they are usually dewatered and fished out by their owners. Twenty years ago there were two perennial *danga* that were fished by traditional fishermen on a catch-share basis.
5. Doal has one seasonal *danga* dewatered by its owner. It previously had no *danga*.

Box 6: *Danga* and *chak* around Diabari *beel*

The Diabari fishermen have only limited options to deal with these changes. Many of the other local *beel* that might have provided alternatives have either been eroded by the Padma and disappeared altogether or have suffered the same fate as Diabari *beel*. Moreover, fishermen displaced by the Padma have crowded the area and are often competing for the same resources. Diabari *rajbangshi* have been able to take advantage of some opportunities created by the expansion in *danga* excavation, but these are limited by the fact that many *danga* owners do their own fishing. Many fish pits are also subject to the same siltation

Figure 22 Distribution of fishing effort by access type through the year: Diabari and Gopalpur



Source: FAP 17 Socioeconomic Monitoring

problems as the area's larger *beel* and *baor*. Box 6 analyses the condition of some of the principal *chak* or areas of floodplain around Diabari *beel* and the *danga* located on them in order to give an idea of the limitations of this option.

Gopalpur fishermen seem to be in a somewhat more secure position, although even they are threatened by changes in their fishing grounds and by competition. From their location on a strip of homestead dividing two branches of the Moshakali *khal,* Gopalpur fishermen have always concentrated their fishing efforts on the *khal* adjacent to their village. *Veshal* (lift net) fishing is historically a key activity as they control, and apparently have controlled for generations, a series of important sites along the Moshakali *khal*. As Figure 22 shows, however, these *veshal* fisheries, usually on leased sites, only account for a limited amount of fishing effort. During the flooding season from *Sraban* to *Ashwin* (July to October), open-access floodplain fisheries are extremely important, as they are in Diabari. Only when the drawdown has commenced in *Kartik* do Gopalpur fishermen shift their attention to the *veshal* and *katha* sites in the surrounding *khal*. These locations, too, are suffering from siltation and many of the key *katha* sites where Gopalpur *rajbangshi* fish frequently have to be re-excavated.

3.5 Seasonality and fisheries

The preceding review of fisheries access has indicated some of the principle patterns of fishing activity in the Manikganj District fishing communities. It has also shown how those patterns have changed due to shifts in access arrangements and alterations in fishing grounds. In general, fisheries access arrangements influence the seasonal distribution of fishing effort and the gears that fishermen use.

As would be expected, the fishing communities studied demonstrate very different patterns of fishing activity through the year and use different types of fishing gear.

Kutirhat and Ujanpara

Tables 20 and 21 show the breakdown of gear ownership in Kutirhat and Ujanpara, along with the average annual household earnings (according to FAP 17 monitoring) obtained from each gear type.

The difference between the two communities is clear from these data. Kutirhat fishermen are highly focused on the main river fishery. Eighty percent of the community members own *ber*

jal and 28% own *moi jal*. As already mentioned, this frequently means ownership of a very small section of net which can be joined to others to form a single gear. Four different types of *ber jal* are used by Kutirhat fishermen: *khaora ber jal*, a medium-sized seine net around 1,200 *hat* long (1,800 feet); *kona ber jal*, a slightly larger, multi-purpose seine net of 1,600 *hat* (2,400 feet); *jogoth ber jal*, a large seine net often over 2,000 *hat* long (3,000 feet) used specifically in *Poush* and *Magh* (December to February) to catch smaller riverine species such as *kachki*, *kajuli*, *bailla*, and small *chingri* (prawns); and finally, *gulti jal*, an increasingly rare large-mesh seine net of between 1,500-2,000 *hat* (2,250-3,000 feet) that is used for high-value species such as *rui*, *catla* and *pangas*.

Table 20 Gear distribution, Kutirhat

Gear Type	Bengali Name	No.	%	Tk.
Seine nets	*Ber jal*	37	80.0	14,543
	Moi jal	13	28.1	3,388
Lift net	*Veshal jal*	8	7.7	12,548
Cast net	*Jhaki jal*	27	56.2	3,505

Source: FAP 17 Socioeconomic Monitoring

Table 21 Gear distribution, Ujanpara

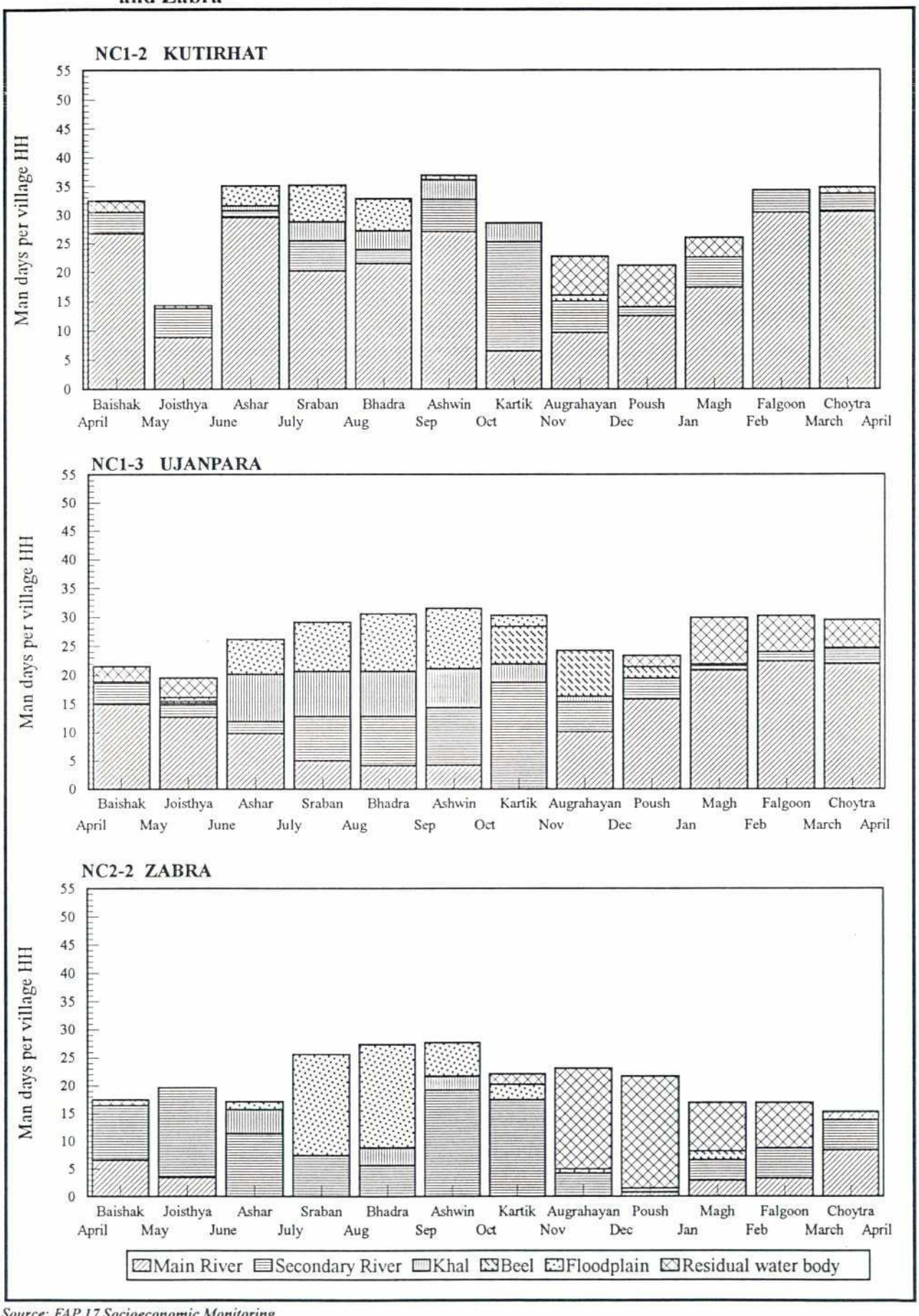
Gear Type	Bengali Name	No.	%	Income
Gill net	*Current jal*	12	6.7	8,985
Seine nets	*Ber jal*	45	54.6	4,160
	Moi jal	31	36.6	709
Lift net	*Veshal jal*	50	60.6	8,168
Clap net	*Shangla jal*	10	12.0	3,940
Katha	*Katha*	16	19.4	4,825
	Boat Katha	5	6.0	2,830
Hook	*Daun*	6	6.7	1,440
Cast net	*Jhaki jal*	26	30.7	2,193

Source: FAP 17 Socioeconomic Monitoring

Figure 23, showing the distribution of fishing effort on different types of water body through the year, indicates Kutirhat's overwhelming dependence of fishing on the main river. Only for a brief period during the flood recession in *Kartik* and *Augrahayan* (October to December) do fishermen spend more time on the Ichhamati, where they use *veshal* (lift net) and *jhaki jal* (cast net) in addition to their large *ber jal*.

The main river fishery has two peaks. One during the floods from *Ashar* to *Ashwin* when the *ilish* run upriver and then again during the winter from the month of *Magh*, when smaller fish like *kachki*, *kajuli* and *bailla* are caught. The reported steady decline in river catches

Figure 23 Distribution of fishing effort by water body through the year: Kutirhat, Ujanpara and Zabra



Source: FAP 17 Socioeconomic Monitoring

have modified the fishing patterns of Kutirhat fishermen. Box 7 describes how one of the most important annual fisheries rituals among the *haldar* is becoming a luxury.

The contribution of different gear/water body combinations is shown in Table 22. This emphasises the degree to which the Kutirhat *haldar* specialise. Almost 70% of their annual fishing effort is dedicated to *ber jal* fishing on the Padma, either in owner-operated fishing teams or as labourers.

The use of *moi jal* (small drag net) is apparently declining in both communities, although it is still widely owned (28% in Kutirhat and almost 37% in Ujanpara). This gear was traditionally used on floodplains and in the Ichhamati during the flood season and drawdown, but steady siltation of the river is diminishing its utility. The higher level of *moi jal* ownership in Ujanpara reflects the community's greater dependence on the Ichhamati River. Over 60% of fishermen in Ujanpara own *veshal* on the Ichhamati, on *khal* connecting the river with Gopinathpur *beel* to the south or along the banks of the Padma. The *katha* and boat *katha* operated by more than 25% of the community are also key components of their fishing strategy.

Once a year, during the first week of *Magh* (mid-January), the *malo* fishermen along the banks of the Padma observe a ritual known as *nilay deya* (literally "giving rest"). On the last day of *Poush*, the Hindu New Year's Eve known as *Poush shangkranti*, all nets and boats are withdrawn from the river and each household spreads soaked and mashed rice on its doorstep and courtyard. The *nilay* traditionally lasts for a week until the seventh day of *Magh*. During this time no fishing takes place. But, in current circumstances, most fishermen can only permit themselves two or three days without fishing. At the end of the *nilay*, Ganga *puja* is performed on all the fishing craft in the village. The traditional final ceremony consisted of throwing salt on the fishing grounds in the river. This is sometimes replaced by a shorter ceremony in the river by the village.

Box 7: Resting the river

As Table 22 shows, the main river *ber jal* fishery is still vital to *haldar* livelihood strategies, but *veshal* fishing accounts for more than 40% of fishing effort. Moreover, unlike many *veshal* operators who leave their lift nets in one location year-round and therefore often only use it during the flooding season, Ujanpara fishermen move their gear from the Ichhamati and *khal* onto the Padma during the winter and are thus able to use their *veshal* all year.

According to Ujanpara fishermen, they used to fish far more on Gopinathpur *beel* from *Kartik* to *Poush* (October to January), but siltation of the *beel* has greatly reduced its importance.

Table 22
Principal gears, use by month and water body: Kutirhat, Ujanpara and Zabra

NC 1–2 Kutirhat

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Ber jal	Main River	24.1	6.8	25.1	16.2	17.0	23.1	6.5	9.7	11.0	16.9	26.0	25.9	208.3	59.0
Ber jal labour	Main River	2.6	1.5	4.4	3.9	4.2	4.0			1.5	0.5	4.3	4.4	31.4	8.9
Ber jal	Secondary River	3.7	1.9	1.0	4.8	1.0	3.7	6.8	1.8		2.5	3.9	3.2	34.1	9.7
Jhaki jal	Residual WB	2.0	0.5						6.7	7.1	2.6		1.1	20.1	5.7

NC 1–3 Ujanpara

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Ber jal	Main River	5.7	2.7	1.7					5.1	7.6	8.1	7.3	8.4	46.6	14.3
Ber jal labour	Main River		4.0	3.7	1.9	1.9	1.8		0.7	1.9		0.7	1.1	17.7	5.4
	Floodplain			2.0	5.0	5.6	3.6	1.0						17.3	5.3
Veshal jal	Main River	8.9	0.5						4.2	6.4	12.7	12.6	11.1	56.4	17.3
	Secondary River	0.5		1.3	7.8	8.7	10.1	15.4	0.6					44.4	13.6
	Khal		0.3	8.2	7.8	7.8	6.8	3.2	1.0					35.2	10.8

NC 2–2 Zabra

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Ber jal labour	Main River	4.1	1.7								1.5	1.8	5.2	14.2	5.7
Ber jal	Secondary River	2.1	3.4	1.7			3.2	3.8	2.2					16.4	6.5
Ber jal labour	Secondary River	4.2	5.4	5.2	7.0	4.2	7.1	6.0	0.5	0.4	3.7	3.7	3.7	51.1	20.4
	Residual WB								7.5	7.6				15.2	6.1
By hand/Dewatering	Residual WB							1.9	6.2	5.1	5.1	5.1		23.3	9.3
Jhaki jal	Residual WB	1.0							2.4	2.6	3.6	3.2	1.5	14.3	5.7
Moi jal	Floodplain				7.9	4.0	2.1	1.5						15.5	6.2
Veshal jal	Secondary River					1.3	8.0	7.6	1.0					17.9	7.1

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

Zabra

Zabra fishermen, as Table 23 shows, are less reliant on any one type of fishing gear. *Ber jal*, *moi jal*, *veshal* and *jhaki jal* are all owned by substantial proportions of households. The use of smaller, more flexible gear, like *current jal* and *doiar* traps is expanding as Zabra fishermen are forced to diversify their fishing strategy.

Table 23 Gear distribution, Zabra

Gear Type	Bengali Name	No.	%	Tk.
Gill nets	*Current jal*	10	8.9	2600
Seine nets	*Ber jal*	12	20.1	10126
	Moi jal	16	27.2	4010
Lift net	*Veshal jal*	19	32.8	3920
Trap	*Doiar*	18	14.2	3539
Cast net	*Jhaki jal*	30	25.8	2431
Other	Dewatering	7	11.3	353

Source: FAP 17 Socioeconomic Monitoring

Figure 23 and Table 22 show the seasonal distribution of fishing in the community. Particularly noticeable is that Zabra fishermen have almost no access to *beel* fisheries, despite the fact that until about 10 years ago their two principal fishing grounds were *beel*. Following the siltation of Chak Bosta *rak* and Sailabari *rak*, no alternative *beel* were available and the Zabra fishermen have been forced to seek other options. The levels of fishing effort in the village are low in comparison with the *haldar* communities of Kutirhat and Ujanpara and with most of the other *rajbangshi* communities studied. This suggests that the Zabra fishermen are seeking opportunities outside of fishing. As will been seen later, fish trading is increasing among Zabra fishermen.

Despite their losing control of the Gang Kherai *jalmahal* in 1993-94, the Kaliganga River fishery remains among the most important for the community, especially early in the year from *Baishak* to *Ashar* (April to July) and during the flood recession from *Ashwin* to *Kartik* (September to November). Over 34% of the *ber jal* and *veshal* fishing occurs on the Ghior or Kaliganga rivers (Table 22).

During peak flooding, Zabra fishermen rely on floodplains (*chak*) around the village, and during the winter the harvesting of residual water bodies is increasingly important. The latter has likely been substituted for the *beel* fishery. It occurs more or less during the period when the community previously would have fished the *rak* and *beel*. Fishing on residual water bodies absorbs more than 20% of annual fishing effort.

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The movement of some groups of fishermen out onto the Padma and Meghna during the winter and pre-monsoon months from *Magh* to *Joisthya* (January to June) has a long tradition, but community respondents indicate that this has increased as the options available for harvesting local *beel* have declined. Most Zabra fishermen work as fishing labourers on main river *ber jal* teams from other villages.

Bhatara and Dwimukha

Bhatara fishermen concentrate on *ber jal* fishing (Table 24), having undoubtedly inherited the use of this gear from *rajbangshi* fishermen who moved out of the village. Their continuance in this tradition has no doubt been encouraged by the development of pond culture in the area. Small, fine-mesh *ber jal* are most widely used for this activity.

Table 24 Gear distribution, Bhatara

Gear Type	Bengali Name	No.	%	Tk.
Seine net	*Ber jal*	24	39.4	15,581
Lift net	*Veshal jal*	11	18.8	12,442
Katha	*Katha*	4	6.9	4,550
Cast net	*Jhaki jal*	13	19.7	651

Source: FAP 17 Socioeconomic Monitoring

The *veshal* owned by almost 19% of the community are also inherited, as are many of the *veshal* sites in *khal* draining the surrounding *beel* and floodplains.

The seasonal distribution of fishing effort in Figure 24 and Table 26 indicate the importance of fish culture in Bhatara. Unlike all the other area fishing communities, Bhatara fishermen work residual water bodies from the end of flooding in *Kartik* (October/November) to the start of flooding the following year in *Ashar* (June/July). These ponds and ditches absorb more than 40% of fishing effort. During the floods and drawdown Bhatara fishermen move their gear and fishing effort onto the local *beel* and floodplains.

The level of fishing effort in Bhatara is far lower than in the Hindu fishing communities studied. This is partly attributable to the involvement of many households in fish trading. Land ownership is also more common in the community, and fishing is seldom the sole source of income for Bhatara households.

Gear ownership among Dwimukha fishermen, shown in Table 25, follows the pattern typical of *rajbangshi* fishermen. *Ber jal* is the primary gear, and fishing strategies in the village

focus on the operation of a few larger gears owned by one or two families. The *ram jal*, a type of *ber jal* with pockets at the end of the net, is used on secondary rivers such as the Choytai and used to be a speciality of the community. With the decline of suitable water bodies for its operation, *ram jal* is apparently falling into disuse and being replaced by the more versatile small-mesh *ber jal*. The *ber jal* fishery on the nearby Kaliganga River is certainly the community's most important fishery, accounting for more than 40% of effort. As Figure 24 shows, it is also active nearly year-round. Only in *Poush* and *Magh* (December and January) does fishing activity shift from the river to residual water bodies and *beel*. The only *beel* remaining open to Dwimukha fishermen are Outpara *beel* and Kondapara *kumb*, an old riverbed just north of the village. *Jhaki jal*, which can be used practically anywhere, is owned by nearly everyone in the village.

Table 25 Gear distribution, Dwimukha

Gear Type	Bengali Name	No.	%	Tk.
Seine nets	*Ber jal*	8	30.8	13288
	Moi jal	8	30.8	998
Lift net	*Jhali jal*	2	7.7	975
	Veshal jal	2	7.7	6000
Cast net	*Jhaki jal*	14	53.8	2090
Push net	*Thella jal*	2	7.7	1375
Other	Hand fishing	2	7.7	562

Source: FAP 17 Socioeconomic Monitoring

Diabari and Gopalpur

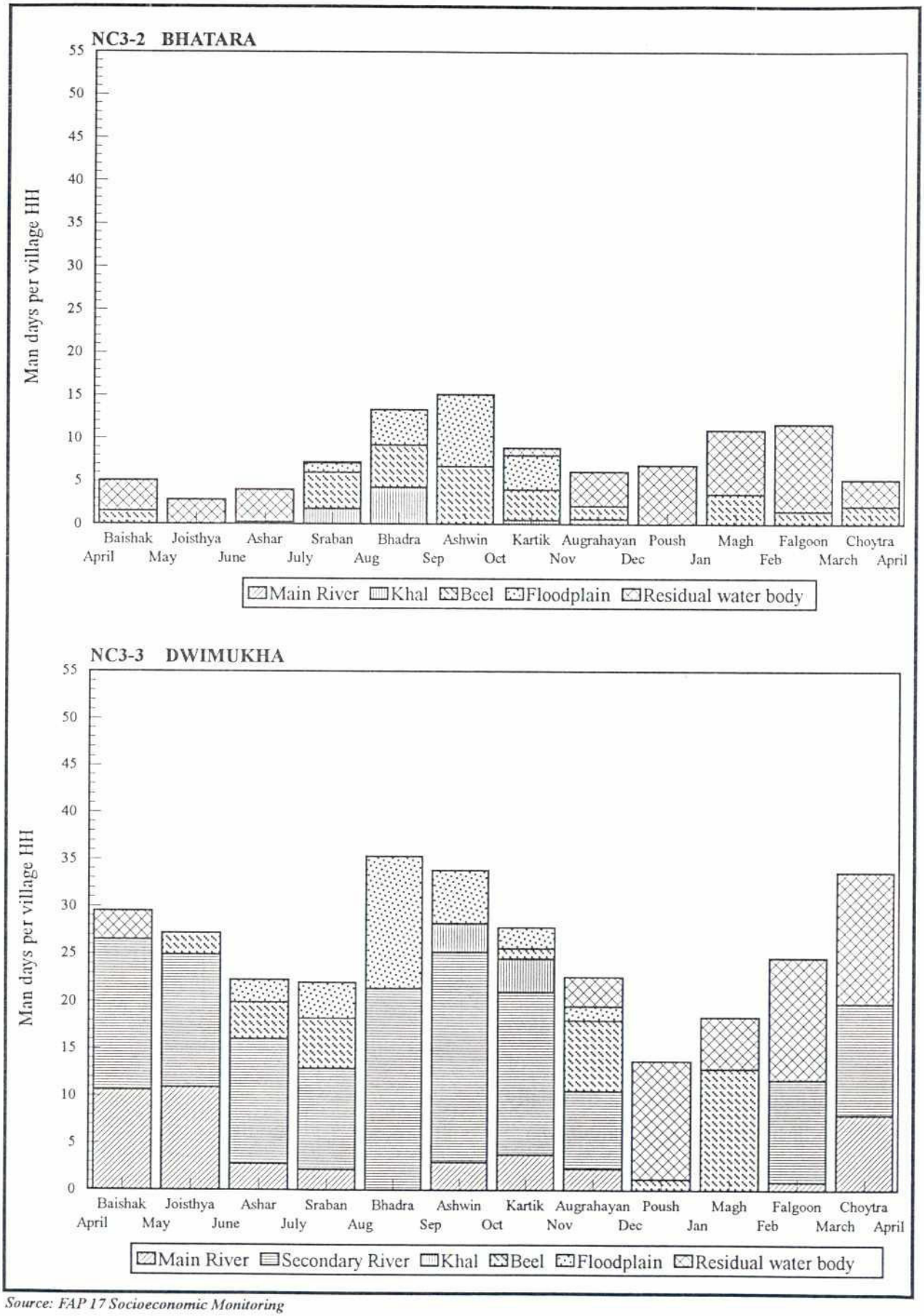
The gear ownership patterns in Diabari and Gopalpur (Tables 27 and 28) reflect the location of these communities and the nature of the water bodies on which they depend. In both villages *katha* are key elements in their fishing strategy, whether they are being placed in Diabari *beel* or in local *khal*. The *ber jal* owned by 45% of Diabari fishermen and 50% of Gopalpur fishermen are frequently used in tandem with these *katha*.

Table 27 Gear distribution, Diabari

Gear Type	Bengali Name	No.	%	Tk.
Gill net	*Current jal*	3	27.3	16683
Seine nets	*Ber jal*	10	45.5	25212
	Moi jal	4	18.2	2665
Lift net	*Veshal jal*	3	27.3	6758
Katha	*Katha*	14	63.6	2711
Hook	*Daun*	2	18.2	942
Cast net	*Jhaki jal*	7	63.6	2483

Source: FAP 17 Socioeconomic Monitoring

Figure 24 Distribution of fishing effort by water body through the year: Bhatara and Dwimukha



Source: FAP 17 Socioeconomic Monitoring

Table 26

Principal gears, use by month and water body: Bhatara and Dwimukha

NC 3–2 Bhatara

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Ber jal	Beel	1.5					1.8	1.0	0.4		2.9	1.5	2.1	11.2	11.6
Ber jal labour	Beel						2.1	2.1	1.1		0.6			5.9	6.1
Ber jal	Floodplain				1.1	3.8	3.4	2.2						10.5	10.8
	Residual WB	1.2	1.0	3.8	0.1			0.9	3.0	4.5	4.7	5.2	1.5	25.9	26.7
Ber jal labour	Residual WB	2.1	1.8						0.7	1.4	1.6	3.7	1.3	12.7	13.1
Veshal jal labour	Khal			0.2	1.8	4.3								6.2	6.4
Veshal jal	Beel				4.2	4.9	2.7	0.4						12.1	12.5
	Floodplain						5.0	1.9						6.8	7.0

NC 3–3 Dwimukha

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Ber jal	Main River	8.0	7.0					2.3	2.3			0.9	8.0	28.4	9.2
Ber jal labour	Main River	2.6	3.9	2.8	2.2		3.0	1.5						16.0	5.2
Ber jal	Secondary River	4.5	7.7	6.5	2.5	12.3	13.5	8.5	5.8			4.5	4.5	70.1	22.7
Ber jal labour	Secondary River	7.6	4.0	4.3	4.8	7.4	7.2	8.7	2.4			6.3	7.3	60.0	19.5
	Floodplain				2.7	7.8	4.2	2.2						16.9	5.5
Ber jal	Residual WB								0.9	1.1	4.2	7.0	8.0	21.1	6.8
Jhaki jal	Beel			1.0				1.1	3.6		11.7			17.4	5.6

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

Gopalpur fishermen rely more on *veshal* fishing, most of which is done in the two branches of the Moshakali *khal* running on either side of their homestead area. The distribution of fishing effort shown in Figure 25 and Table 29 corroborates this pattern. Fishing effort by Diabari fishermen is overwhelmingly concentrated on Diabari *beel* and its surrounding floodplains. The pattern of fishing in this village is probably similar to that of most *rajbangshi* communities up until 10 to 15 years ago. They fish the floodplains during peak flooding, *beel* during the drawdown and early dry season, and some move onto the main rivers during the winter months. The movement from floodplain to *beel* is clearly illustrated in Table 29, which shows very sharp peaks in *ber jal* fisheries on floodplains and *beel*.

Table 28 Gear distribution, Gopalpur

Gear Type	Bengali Name	No.	%	Tk.
Seine net	*Ber jal*	8	50.0	8303
Lift net	*Veshal jal*	6	75.0	4299
Katha	*Katha*	10	62.5	4502
Traps	*Doiar* *Kakila bana*	2 4	12.5 50.0	490 719
Hook	*Daun*	2	12.5	2313
Cast net	*Jhaki jal*	4	50.0	4985
Other	Dewatering	2	25.0	2150

Source: FAP 17 Socioeconomic Monitoring

Table 29 shows the predominance of the *veshal* fishery on the surrounding *khal* for Gopalpur, particularly during the peak flood season from *Sraban* to the end of *Ashwin* (July to October). Fishing on the floodplain, using *ber jal* and *veshal,* is important during the same period.

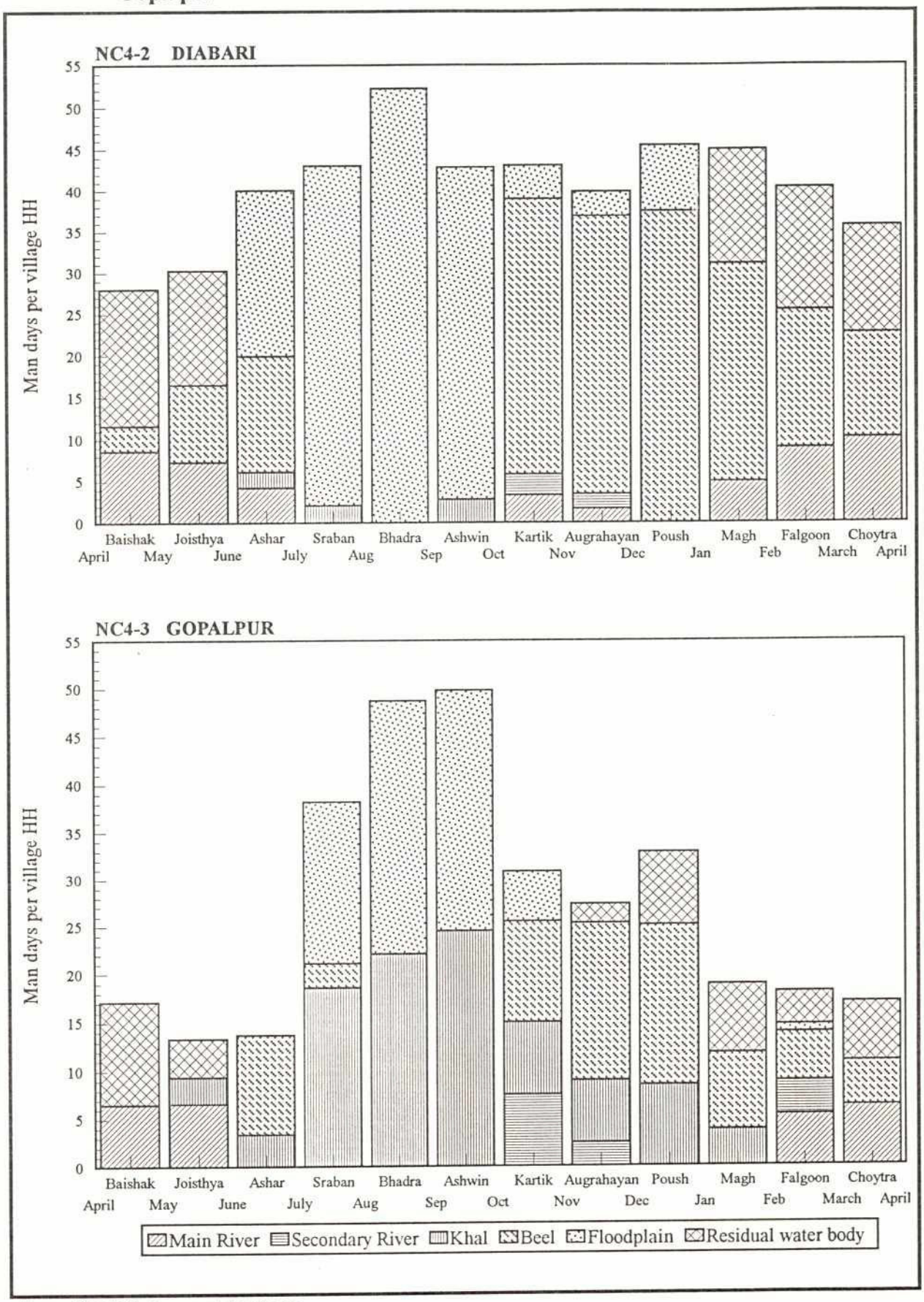
3.6 Patterns of water body exploitation

The potential impacts of flood control interventions can be seen by comparing past and present fishing locations used by the studied fishing communities. Each community has had to adjust its fishing strategy to a different extent depending on changes in water bodies and the level of competition for fishing grounds. Although none of these changes are directly attributable to flood control, many of them imitate the impacts of flood control and enable researchers to understand what might happen following flood control interventions.

Kutirhat and Ujanpara

Figure 26 shows the changes in fishing grounds for the *haldar* fishermen of Kutirhat and Ujanpara. The main river fishery on the nearby Padma has always been paramount for these

Figure 25 Distribution of fishing effort by water body through the year: Diabari and Gopalpur



Source: FAP 17 Socioeconomic Monitoring

Table 29

Principal gears, use by month and water body: Diabari and Gopalpur

NC 4–2 Diabari

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Ber jal	Beel			4.5				20.0	19.6	19.3	8.7	8.6	5.6	86.4	17.8
Ber jal labour	Beel		0.5	9.3				2.7	5.3	9.6				27.4	5.6
Ber jal	Floodplain			8.0	15.3	20.0	16.1							59.4	12.2
Ber jal labour	Floodplain				11.0	10.4	7.1							28.5	5.9
Current jal	Beel	3.0	8.7					7.7	4.6	5.0	9.5	1.8	3.7	44.1	9.1
	Floodplain			6.4	8.5	10.5	10.7							36.1	7.4
Jhaki jal	Residual WB	16.4	9.8								7.4	9.5	8.9	51.9	10.7
Veshal jal	Floodplain			5.7	6.1	10.5	5.3	4.1						31.7	6.5

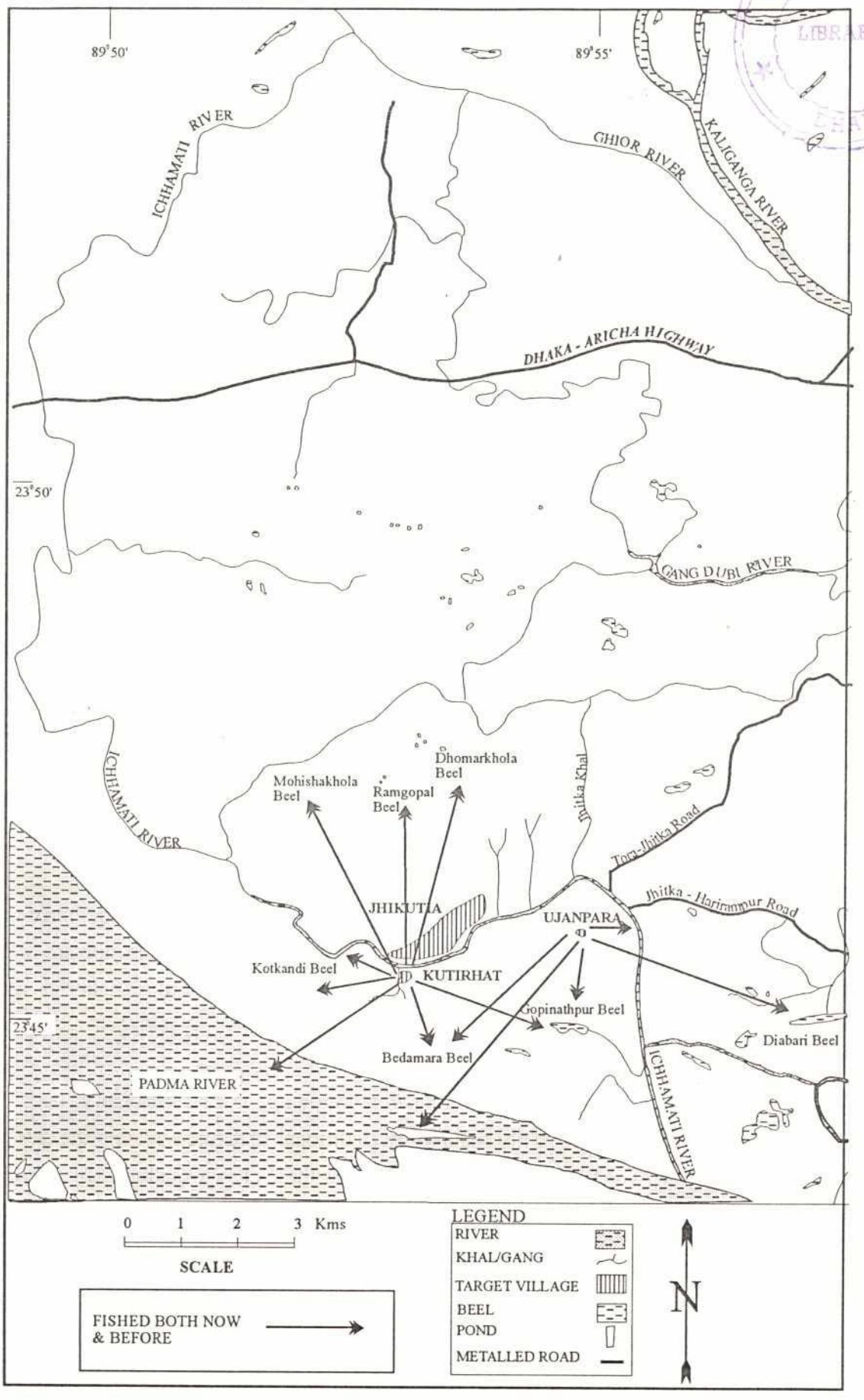
NC 4–3 Gopalpur

Units: Man Days per Village Household

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgoon	Choytra	Total	Eff %
Ber jal	Beel			2.8	2.5			6.0	7.5		2.8			21.5	6.6
	Floodplain				5.8	11.4	10.9							28.0	8.6
Jhaki jal	Khal		2.8						5.6	8.5	3.8			20.6	6.3
	Residual WB	9.4	3.9							3.8	6.8	3.4	6.1	33.4	10.3
Veshal jal	Khal			1.0	18.6	22.1	24.5	7.5						73.8	22.7
	Floodplain				4.8	8.4	7.8	5.3						26.1	8.0
Katha	Beel								0.8	15.4	5.3	5.0	4.6	31.0	9.5

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

Figure 26
Water bodies fished - past and present: Kutirhat and Ujanpara



fishermen. Even when the Padma was considerably farther from the village than at present, these fishermen would travel overland to riverside fishing villages where they kept their craft or along the Ichhamati River to fish.

The principal change experienced by the *haldar* is the reduction in *beel* fishing opportunities. This has affected Ujanpara fishermen more than Kutirhat fishermen because they have historically been more dependent on *beel* harvesting during the winter. Several Kutirhat fishing teams also did this until siltation and the increasing intervention of non-traditional Muslim fishermen effectively closed the *beel*.

Zabra

The Zabra *rajbangshi* were once far more dependent on *beel* fisheries, but siltation has practically eradicated their two principal *beel*. As a result, they have been forced to diversify their range of activity. Now they rely more on the Gang Kherai *jalmahal* on neighbouring rivers, on nearby open-access floodplains and, increasingly, on harvesting ponds and *danga*.

Since the *rajbangshi* face considerable competition from non-traditional fishermen on all these fishing grounds, this change has caused considerable problems. This is typified by the recent loss of control of the Gang Kherai *jalmahal* lease. Summer season floodplain fisheries have always been precarious, but flooding still seems to provide sufficient water area to ensure a reasonable level of fishing activity. Catch rates during the flooding season are generally low, however, as the fisheries resource is widely dispersed. As soon as the flood waters recede and fish resources are concentrated, competition from landowners and agriculturists increases.

On residual water bodies, which are increasingly important for Zabra fishermen, more and more pond owners are harvesting their ponds themselves. As a result, there appear to be definite limits to the extent to which the *rajbangshi* can depend on culture fisheries as a secure source of livelihood.

Given this situation, sizeable numbers of *rajbangshi* are moving, at least seasonally, onto the main rivers. There access is more easily secured by traditional fishermen owning the *ber jal* (seine nets) required for river fishing. Figure 27 illustrates these changes in the Zabra fishing grounds.

Bhatara and Dwimukha

The Dwimukha *rajbangshi* have experienced water body changes similar to those found in Zabra, and for the same reasons. Moreover, the fisheries patterns in Bhatara are illustrative of how non-traditional fishermen are increasingly competing with traditional fishing communities. Figures 28 and 29 show the changes that have occurred in the fishing grounds for Bhatara and Dwimukha.

As the figures show, the Muslim fishermen of Bhatara exploit an extremely wide range of local *beel* and *chak*. There are very few restrictions on their activity. Increasingly, the harvesting of almost all residual water bodies in the immediate vicinity, whether ponds, *maital* or areas of receding water on the floodplain, is monopolised by this group. This is particularly true on *beel* where the siltation of water access routes and of the *beel* themselves has reduced the area of perennial water and resulted in fewer formal leasing arrangements.

The Dwimukha fishing community is only one of the many local Hindu fishing groups who have suffered from this competition. Even on water bodies they have leased, traditional fishermen often find themselves having to share the resource with relative newcomers. Leasing arrangements at least give traditional fishermen a nominal right to control of the fishery, which means that they cannot be excluded from access. Where such arrangements do not exist and fisheries are nominally "open-access", Hindu fishermen increasingly find themselves preempted and excluded by non-traditional fishermen who, if only by force of numbers, are able establish *de facto* rights to fisheries access.

Bhatara fishermen are also specialising in aquaculture, but for the same reasons that the opportunities for Zabra fishermen are inevitably limited, Bhatara fishermen are likely to face problems finding suitable ponds to lease in the near future.

Dwimukha fishermen, like Zabra fishermen, have responded to their diminished options by moving away from local fishing onto the Padma and Meghna or to more remote locations on the Kaliganga, where they are able to secure more stable access arrangements. Some Dwimukha fishermen have regularly gone to work on the Meghna River fishery near Chandpur for almost 30 years, but seven years ago this option became critical for the community. According to village respondents this is because competition became a serious problem and several of the most important water bodies traditionally fished by the community were seriously affected by siltation.

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Figure 27
Water bodies fished - past and present: Zabra

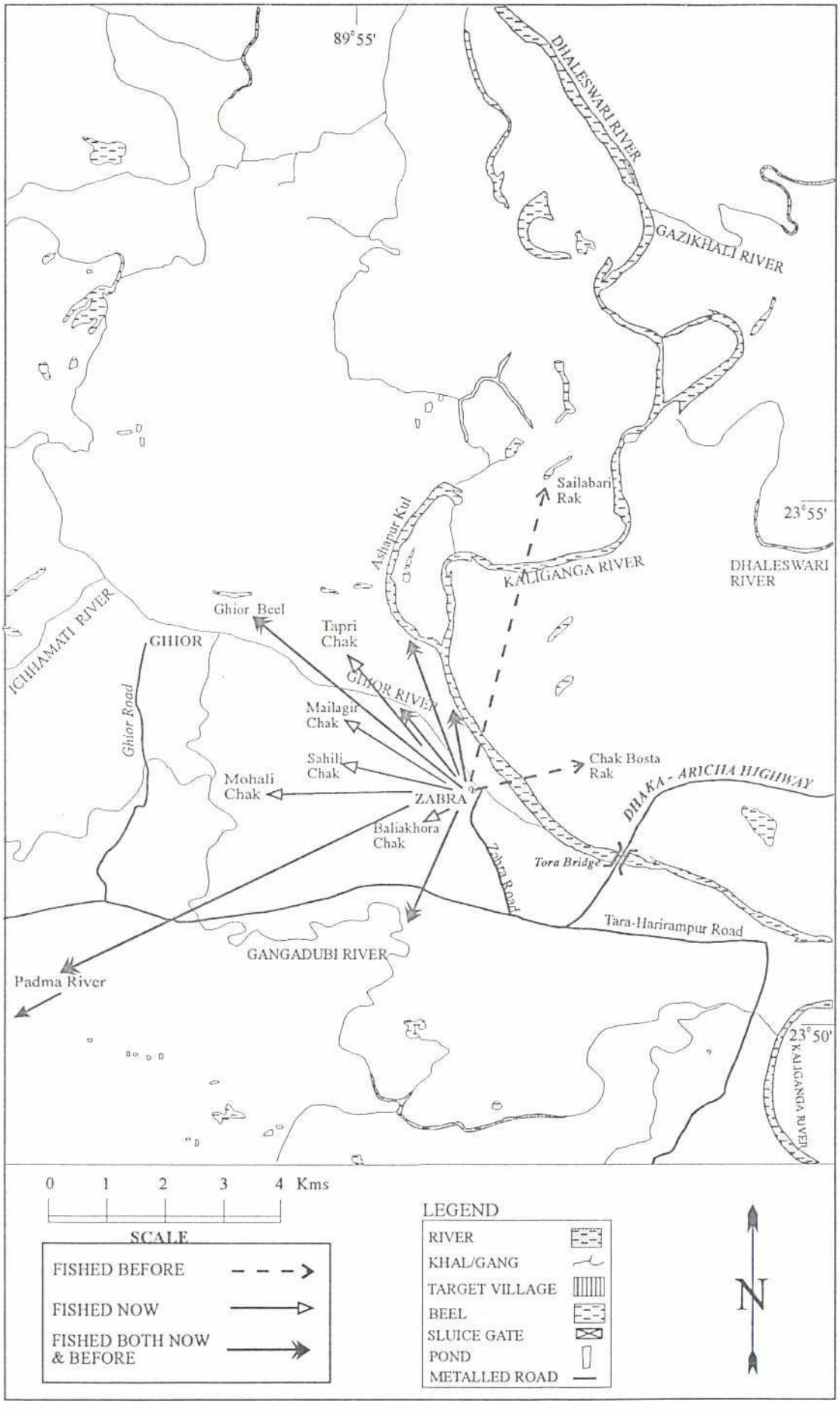


Figure 28
Water bodies fished - past and present: Bhatara

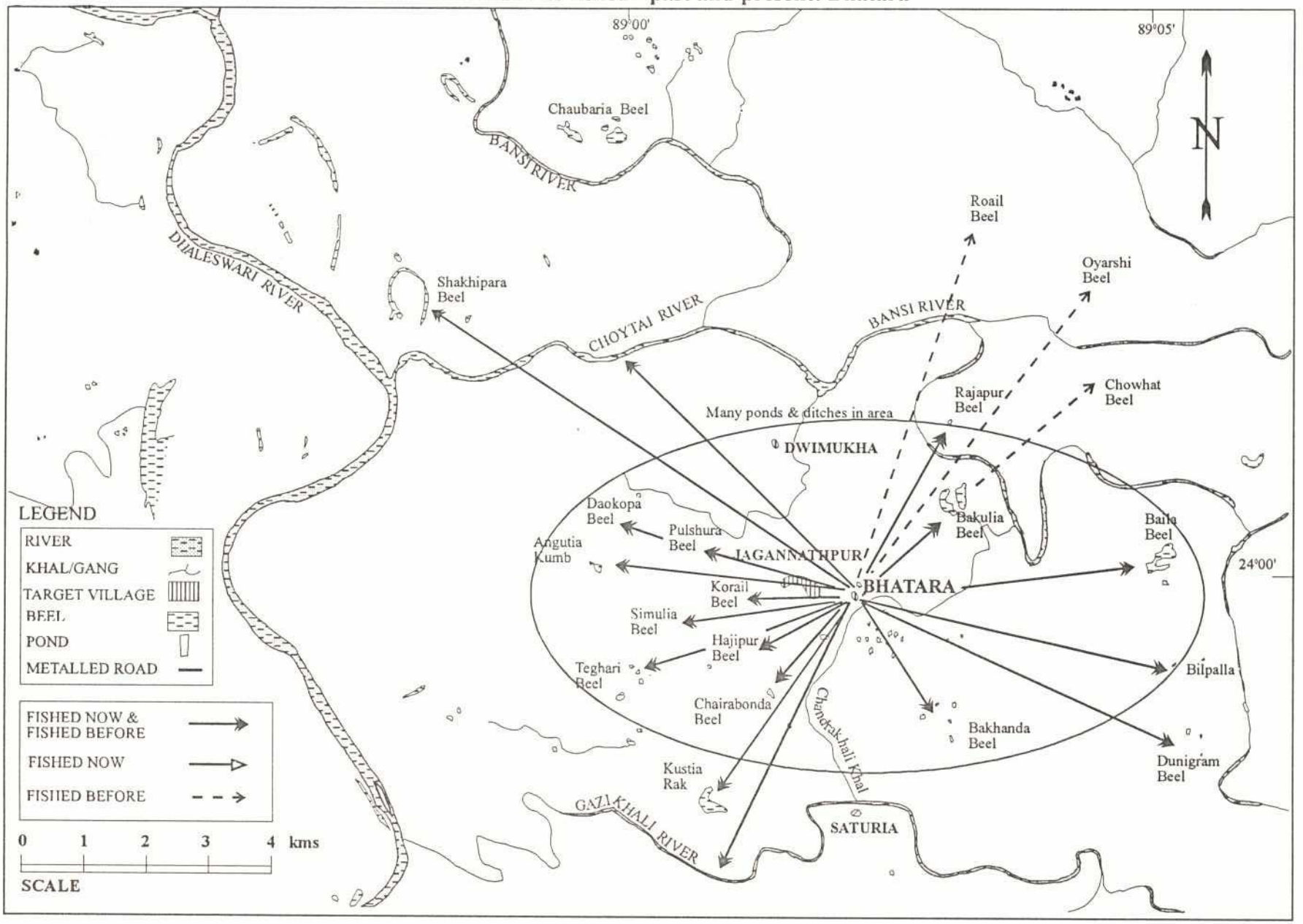
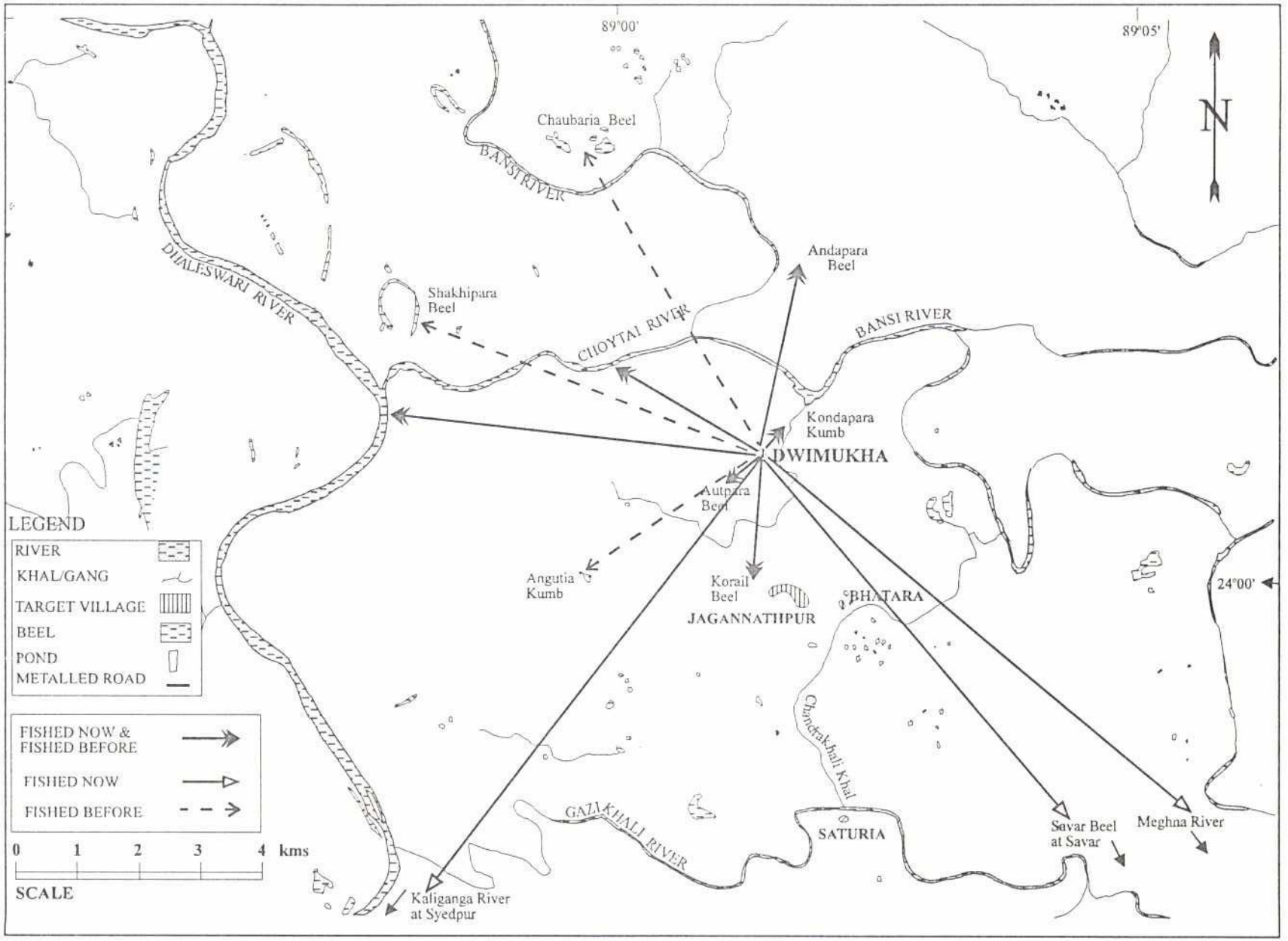


Figure 29
Water bodies fished - past and present: Dwimukha



Diabari and Gopalpur

Diabari *beel* and its surrounding floodplain have always been the most important fishing grounds for the *rajbangshi* of Diabari and Gopalpur, and they remain so today. Fishermen from both communities have been forced to diversify, however, in the face of competition. Their progressive diversification is clearly shown in Figures 30 and 31.

Some 40 years ago, the *beel* and *chak*, along with the nearest sections of the Ichhamati River and the Moshakali *khal*, were practically the exclusive preserve of these two fishing communities. The radical reduction of the Ichhamati fishery due to siltation, and increasing competition on Diabari *beel*, which now attracts fishermen from a considerable distance, has changed the situation. Now these fishermen work a variety of floodplains during flood season and the Padma River during the winter.

3.7 Occupations and incomes

Fishermen primarily have dealt with changing fisheries access, fishing grounds and levels of competition by altering their fishing strategy, as discussed above. Although the social and cultural boundaries of traditional Hindu fishing communities are gradually weakening, changing occupational strategy, at least for the *haldar* and *rajbangshi* caste fishermen, remains difficult. Fishing has clear social and cultural implications that historically limited mobility out of the profession. To a considerable extent, these limitations have been carried over to the present day. The fishing community is still regarded as a very low-status group that is set apart from the rest of rural society by their involvement in fisheries.

Thus, despite the widespread difficulties fishing communities face and the intense competition they meet on their fishing grounds, changes in occupation remain relatively rare. As previously mentioned, migration out of Bangladesh is frequently accompanied by a change of profession, but doing so is easier with a complete change of social context. Within the country, fishermen are lucky if they can expand their activity to fish trading or aquaculture. The lack of NGO involvement in income-generation in the fishing communities studied—in stark contrast to the surrounding villages—is probably indicative of the deeply rooted resistance, both within fishing communities and among their neighbours, to the idea of fishermen doing anything other than fishing.

The continuing overwhelming dependence of traditional fishing communities on fishing and fish-related occupations is discussed in the following section.

Figure 30
Water bodies fished - past and present: Diabari

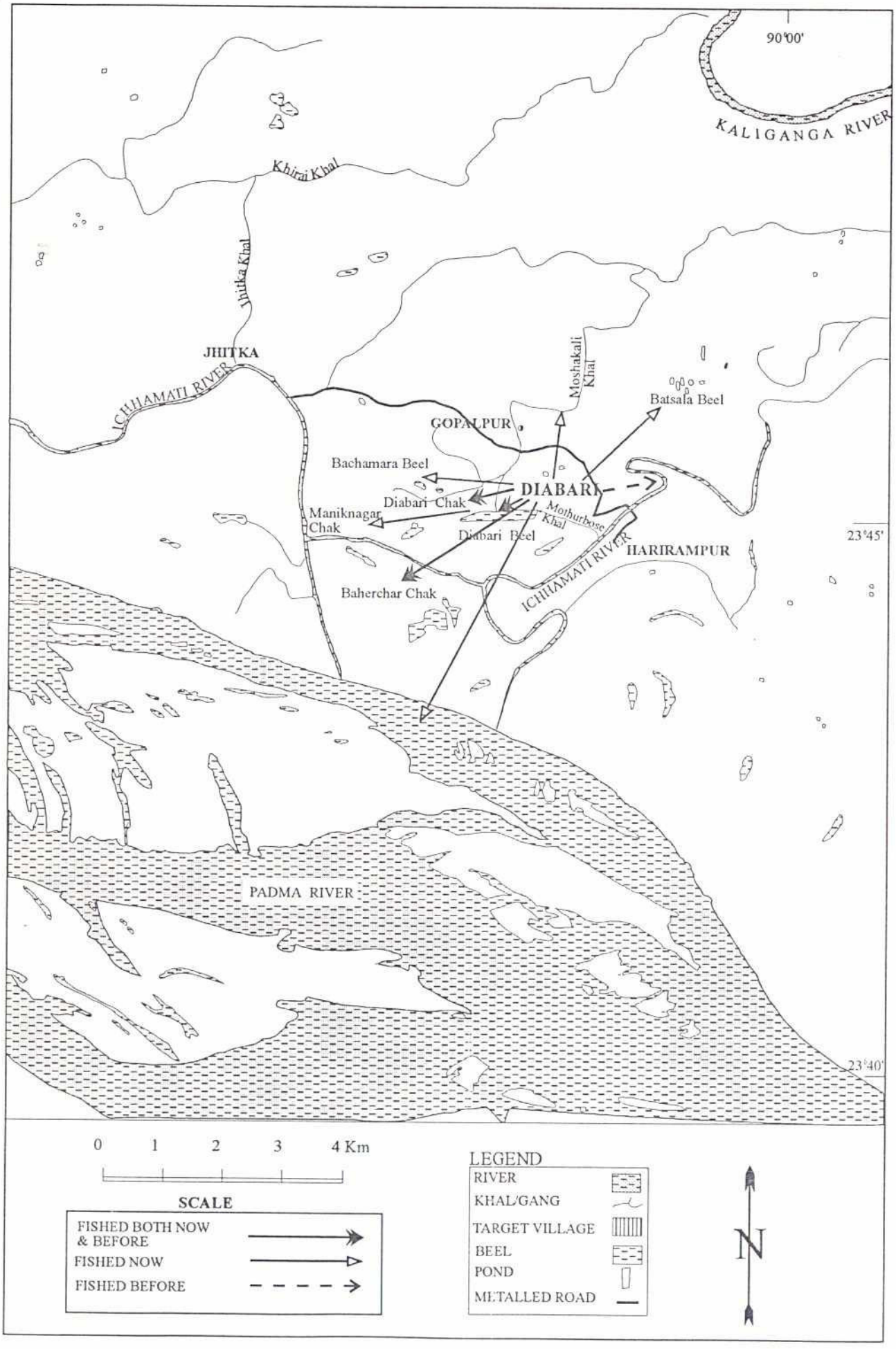
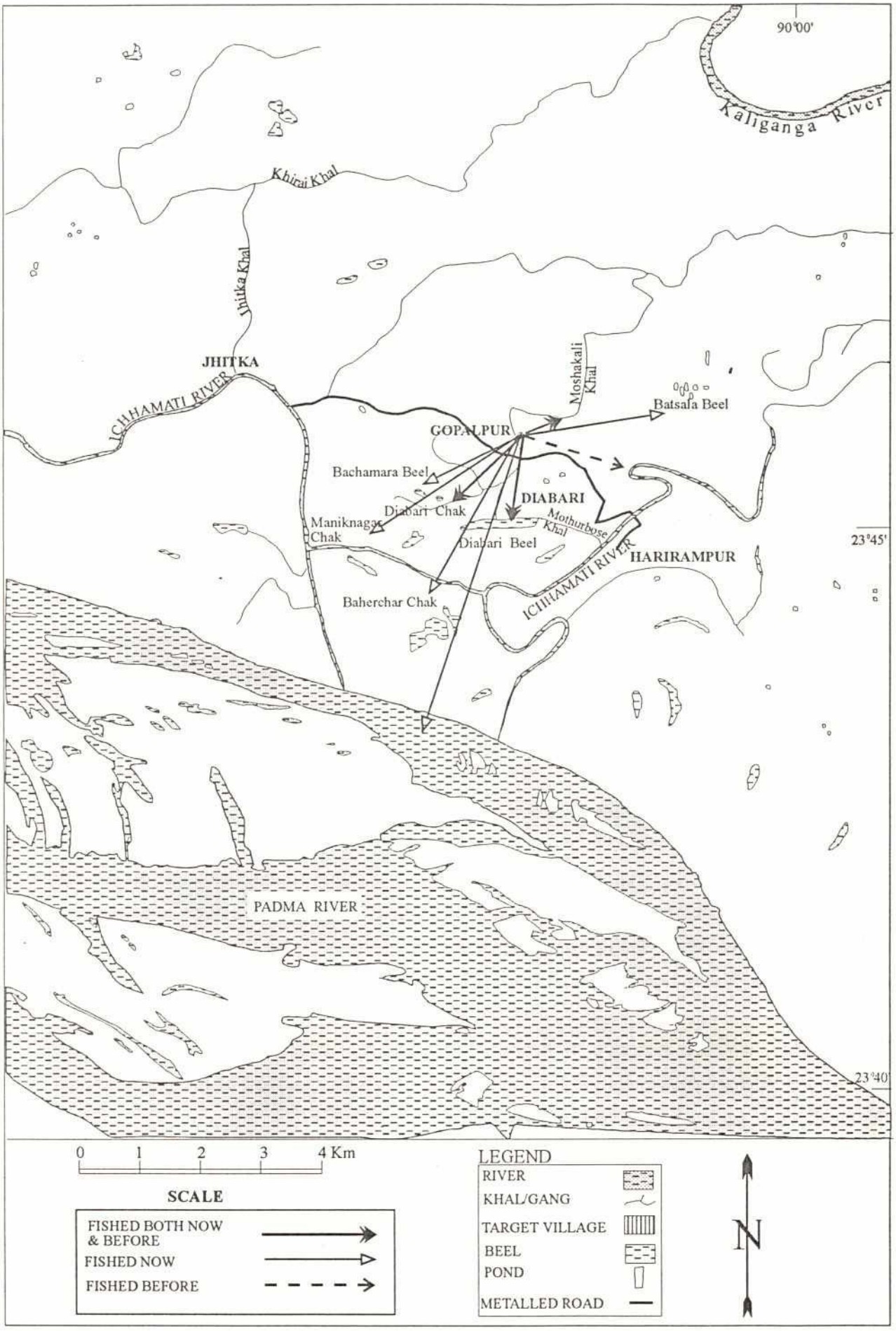


Figure 31
Water bodies fished - past and present: Gopalpur



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Kutirhat and Ujanpara

The levels of fisheries dependence among the *haldar* of Kutirhat and Ujanpara are among the highest in the communities studied. The *haldar* have by far the longest and most deeply rooted association with fishing of any of the Hindu fishing castes encountered in the Manikganj area, and although they are generally better off than many of the nearby *rajbangshi* communities, occupational changes have been rare.

As Tables 30 and 31 and Figures 32 and 33 show, direct involvement in fishing operations on a catch-share or fee-paying basis accounts for 77% of village income in Kutirhat and more than 80% in Ujanpara. If other fisheries-related activities are included, the figures rise to 87% and 90%, respectively.

The income data also emphasise the intense stratification within the *haldar* community. In Kutirhat, a few households own large quantities of fishing gear and craft, as well as land from which they derive some income. For this very small group in the F2 category, farming contributes more than 15% of annual income. The very high annual income reported for this category in Kutirhat (Tk.42,000) seems to justify the references by some *rajbangshi* fishermen in surrounding villages to "those rich *haldar* in Kutirhat".

Such cases are relatively exceptional, however, and the vast majority of households in both communities fall into category F1, on average depending on fisheries for 97.5% of income in Kutirhat and 93% in Ujanpara. The income levels among these households are more typical of poorer rural households.

Income levels are also seasonally variable: varying by more than 170% in Kutirhat and 110% in Ujanpara. The drop in income during *Magh*, at the time of the *nilay deya* ceremony, is more marked in Kutirhat than in Ujanpara. This is indicative of the fact that, on the one hand, Ujanpara fishermen are less able to afford the ritual "resting of the river" than Kutirhat *haldar* and, on the other, that more Ujanpara fishermen at that time are engaged in fishing on Gopinathpur *beel* where the ritual restrictions on fishing do not apply.

Gear-making, which is generally in decline throughout the country due to the introduction of extruded, factory-made nets, is still done in both communities. Most of the gear made are the small *jhaki jal* (cast net), and women are frequently involved in the activity.

Table 30 Income sources through the year by fishing category: Kutirhat

UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
F1	Fishing	1,108	424	1,469	857	974	1,480	1,159	1,423	1,372	(267)	1,396	1,395	12,788	86.2
	Fishing Labour	92	42	90	135	141	139	170	-	21	119	183	205	1,336	9.0
	Gear Making	-	130	35	17	43	25	8	-	70	20	-	-	347	2.3
	Farming	5	56	36	14	1	43	7	12	22	46	50	27	318	2.1
	Self Employment	5	2	4	2	-	-	-	-	2	15	13	3	45	0.3
	Total	1,210	654	1,634	1,025	1,159	1,687	1,344	1,435	1,487	(67)	1,642	1,630	14,834	100
F2	Fishing	3,235	1,753	2,183	1,216	2,199	3,393	3,207	1,774	240	(21)	3,445	4,410	27,034	63.4
	Fishing Labour	-	-	50	60	59	-	-	-	-	-	-	-	169	0.4
	Fish Trading	255	241	28	60	40	220	-	460	185	255	417	498	2,659	6.2
	Fish Culture	315	-	-	-	-	-	-	(80)	(65)	920	520	415	2,025	4.7
	Farming	52	248	422	418	2,777	304	606	285	251	911	106	197	6,575	15.4
	Self Employment	300	440	300	500	400	400	340	360	200	320	308	306	4,174	9.8
	Total	4,157	2,682	2,983	2,254	5,475	4,317	4,153	2,799	811	2,385	4,796	5,826	42,636	100
Com-	Fishing	1,515	679	1,605	925	1,209	1,846	1,551	1,490	1,155	(220)	1,788	1,972	15,516	77.0
munity	Fishing Labour	74	34	82	121	125	113	137	-	17	96	148	166	1,112	5.5
	Fish Trading	49	46	5	11	8	42	-	88	35	49	80	95	509	2.5
	Fish Culture	60	-	-	-	-	-	-	(15)	(12)	176	100	79	388	1.9
	Gear Making	-	105	28	13	34	20	6	-	57	16	-	-	281	1.4
	Farming	14	93	110	91	532	93	122	64	66	211	61	59	1,516	7.5
	Self Employment	61	86	60	97	77	77	65	69	40	73	69	61	835	4.1
	Total	1,773	1,043	1,890	1,258	1,985	2,191	1,881	1,696	1,358	401	2,246	2,432	20,157	100

Figure 32 Income sources through the year: Kutirhat

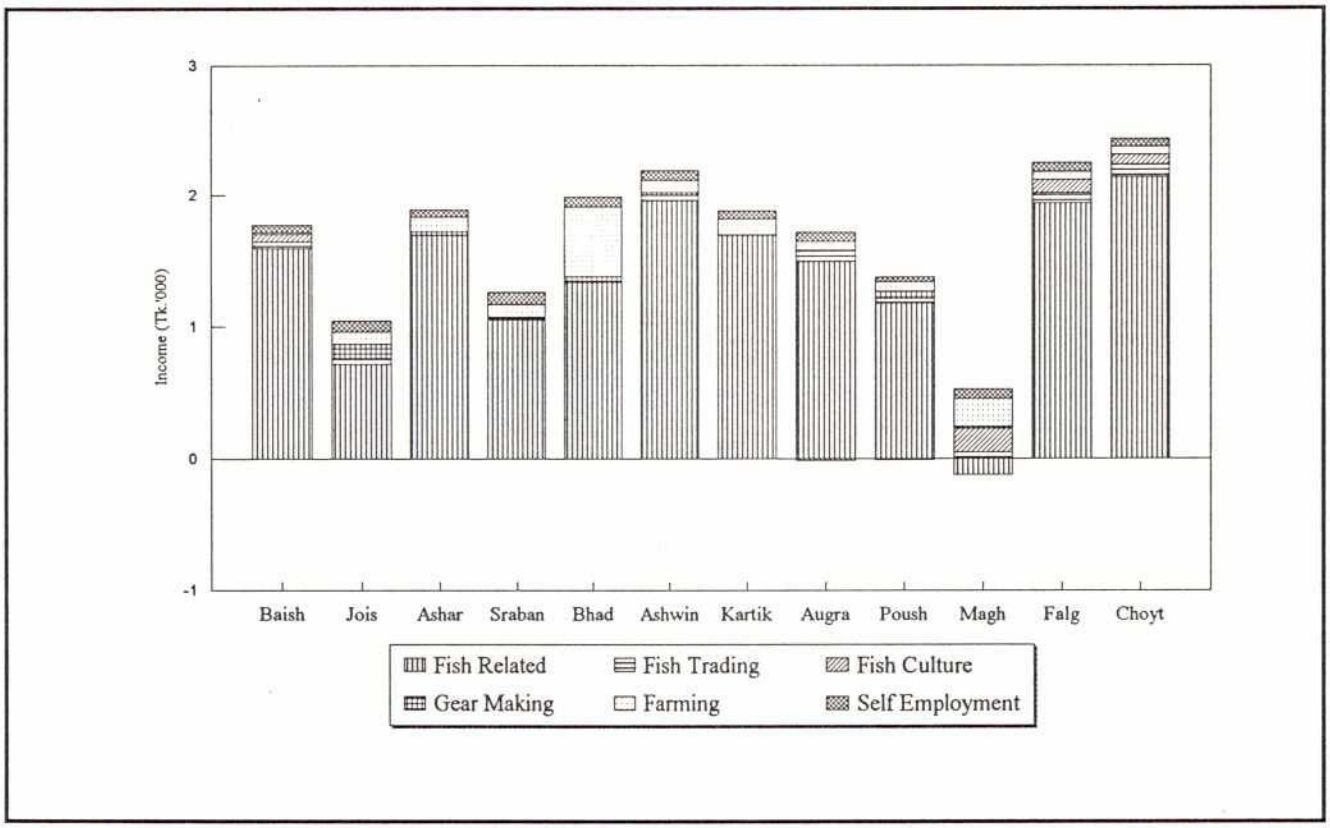
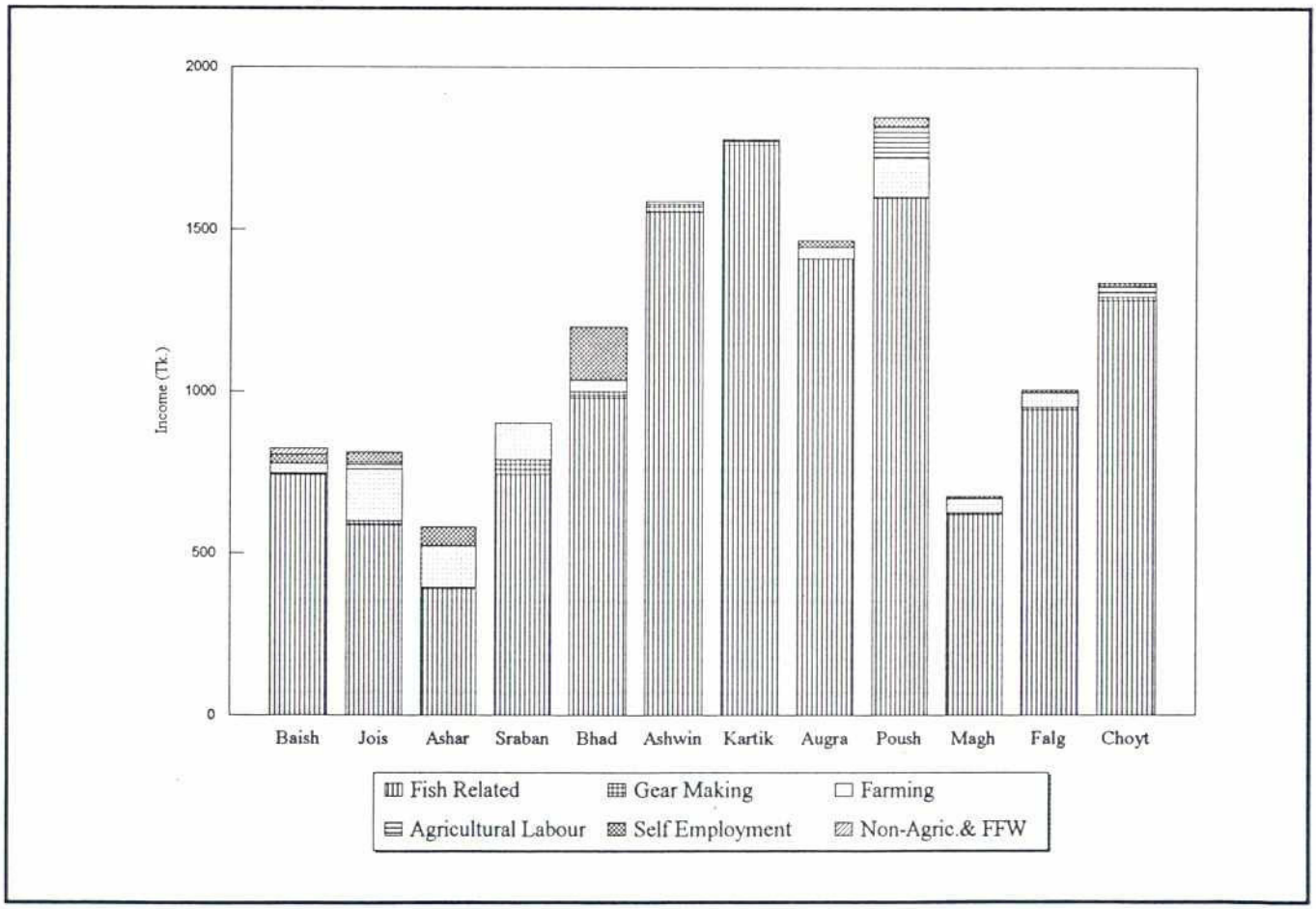


Table 31 Income sources through the year by fishing category: Ujanpara

UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
F1	Fishing	703	413	322	633	932	1,633	1,876	1,280	1,546	615	756	1,322	12,030	86.0
	Fishing Labour	6	57	80	80	76	121	64	138	110	-	-	-	733	5.2
	Fish Trading	-	-	-	-	-	-	-	-	-	-	95	-	95	0.7
	Gear Making	7	18	8	65	24	25	9	-	5	7	12	12	191	1.4
	Farming	12	182	134	98	50	12	3	40	79	34	24	17	685	4.9
	Agricultural Labour	-	29	-	-	-	-	-	-	-	-	-	-	29	0.2
	Self Employment	36	42	72	2	8	-	-	17	37	5	3	1	224	1.6
	Total	764	741	616	878	1,090	1,791	1,952	1,475	1,777	661	890	1,352	13,987	100
F2	Fishing	823	773	199	450	476	738	1,155	1,030	1,155	523	1,016	1,078	9,414	66.8
	Fishing Labour	-	98	158	369	436	325	163	363	290	113	155	113	2,580	18.3
	Fish Culture	-	-	-	-	-	-	-	3	11	-	-	-	14	0.1
	Gear Making	-	-	-	-	10	25	25	-	-	-	-	-	60	0.4
	Farming	66	105	105	148	-	-	7	23	220	60	95	11	838	5.9
	Agricultural Labour	-	-	-	-	-	-	-	-	331	-	-	61	393	2.8
	Self Employment	15	9	26	-	555	-	-	33	11	15	28	35	725	5.1
	Non-Agric.& FFW	61	-	-	-	-	-	-	-	-	-	-	-	61	0.4
	Total	965	985	488	967	1,477	1,088	1,350	1,452	2,018	711	1,294	1,298	14,085	100
Com-	Fishing	738	517	287	580	800	1,374	1,668	1,207	1,433	588	831	1,251	11,273	80.4
munity	Fishing Labour	4	69	103	164	180	180	92	203	162	33	45	33	1,268	9.0
	Fish Trading	-	-	-	-	-	-	-	-	-	-	68	-	68	0.5
	Fish Culture	-	-	-	-	-	-	-	1	3	-	-	-	4	0.0
	Gear Making	5	13	5	46	20	25	14	-	3	5	8	8	153	1.1
	Farming	28	160	126	112	35	8	4	35	120	42	44	15	729	5.2
	Agricultural Labour	-	21	-	-	-	-	-	-	96	-	-	18	134	1.0
	Self Employment	30	32	59	1	166	-	-	22	29	8	10	11	369	2.6
	Non-Agric.& FFW	18	-	-	-	-	-	-	-	-	-	-	-	18	0.1
	Total	823	812	580	903	1,201	1,587	1,778	1,468	1,846	676	1,006	1,336	14,016	100

Figure 33 Income sources through the year: Ujanpara



Source: FAP 17 Socioeconomic Monitoring

Zabra

The income data for the Zabra *rajbangshi* are shown in Table 32. *Rajbangshi* in general seem to feel less restricted to fishing. They still feel a need to account for their entry into fisheries, and do not have the deep-seated cultural link with the profession that is evident among the *malo* and *barman* fishermen. The income data illustrate the varying strategies adopted by different groups within the community in response to the losses in fishing grounds already described.

Many members of the fishing community have increased their reliance on working as labourers in distant fisheries, particularly on the Meghna during the winter. The earnings of members of the F1 category are divided almost equally between fishing with their own gear and fishing labour. This group, which is most dependent on fishing, has clearly had trouble replacing the two *beel* that were their most important fishing grounds. Those *beel* previously would have provided peak earnings during the months of *Magh* and *Falgoon*; now these months are the leanest of the year.

The principle means of ensuring a continued livelihood for members of the other two fishing categories, has been diversification into fish trading. The group of F2 households who have divided their time between fishing and fish trading are clearly in the worse situation, earning very low overall average incomes (Tk.11,859 per year) and suffering sharp seasonal income variations [an acute lean season from *Magh* to *Choytra* (January to April) and moderate peaks in *Ashwin* (September/October) and *Poush* (December/January)]. The contrast in average fish trading earnings between F2 households (about Tk.3,750 per year) and F3 households (more than Tk.21,500 per year) is striking. The latter consists of relatively few households who have been able to set themselves up as *aratdar* and who control and support the fish trading activities of other village members.

Bhatara and Dwimukha

The income data for the Muslim village of Bhatara, shown in Table 33 and Figure 35, is dominated by the extraordinarily high earnings reported by a few villagers intensively involved in aquaculture. Given the scale of these households' operations, the reported income is not unreasonable and helps to explain the growing enthusiasm for fish culture throughout the entire area around Baliati Union.

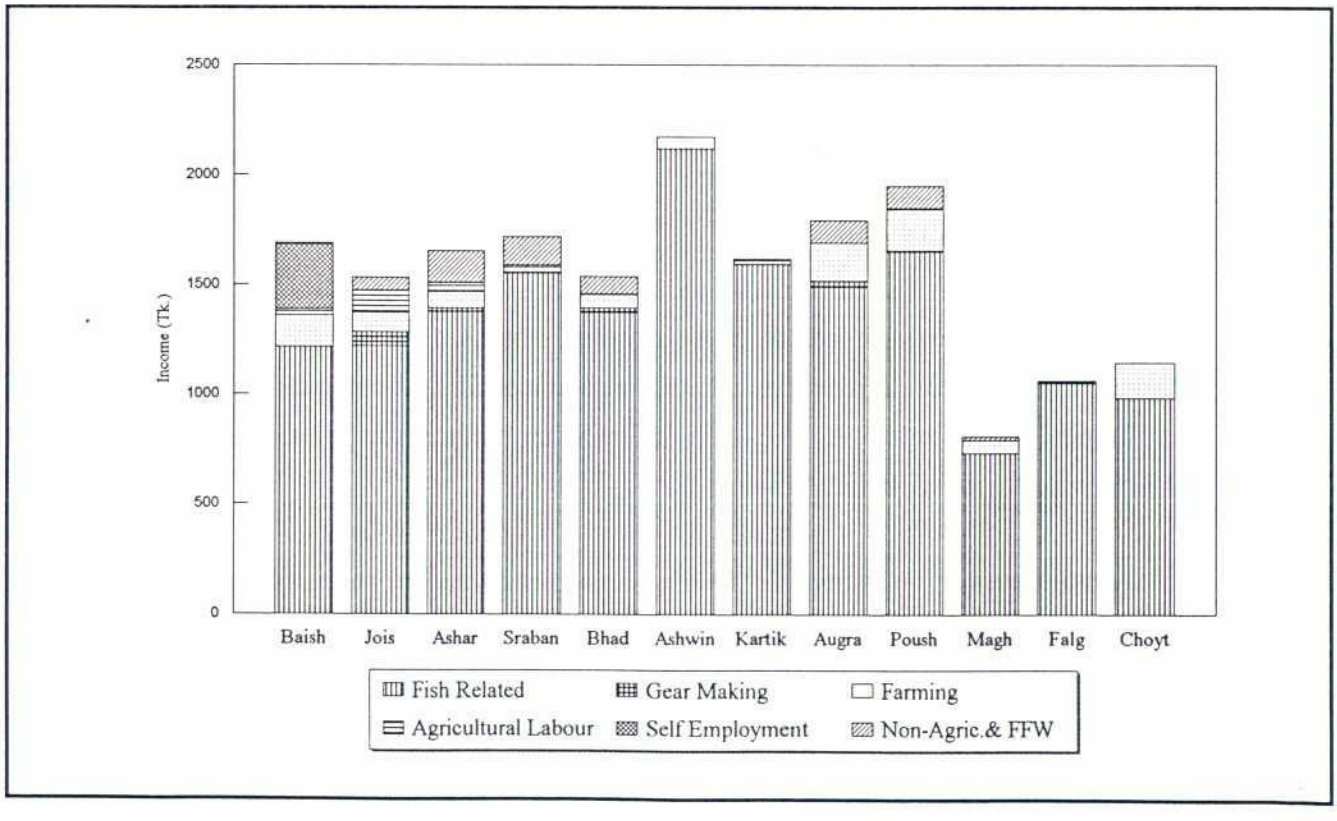
The average earnings reported for fishing activities alone are more typical of households dependent on capture fisheries, but even among these households the average is relatively

Table 32 Income sources through the year by fishing category: Zabra

UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
F1	Fishing	335	621	668	749	778	1,500	698	956	770	(418)	503	253	7,412	43.5
	Fishing Labour	517	630	591	624	583	578	399	400	606	533	485	1,085	7,030	41.2
	Fish Trading	-	-	-	-	-	-	-	-	38	-	-	-	38	0.2
	Gear Making	-	-	-	15	-	-	-	68	13	-	-	-	95	0.6
	Farming	92	56	134	44	134	13	6	81	109	-	5	195	868	5.1
	Agricultural Labour	22	88	5	-	-	-	55	-	-	-	-	-	169	1.0
	Self Employment	659	1	2	4	6	-	-	-	6	6	-	-	683	4.0
	Non-Agric.& FFW	8	126	318	110	-	-	-	83	75	38	-	-	756	4.4
	Total	1,633	1,522	1,718	1,546	1,501	2,091	1,158	1,588	1,617	159	993	1,533	17,051	100
F2	Fishing	777	863	532	593	(343)	1,458	1,183	437	150	90	87	(163)	5,663	47.8
	Fishing Labour	33	67	-	-	-	-	-	317	317	-	-	-	733	6.2
	Fish Trading	283	207	267	267	200	167	138	183	983	587	287	200	3,768	31.8
	Gear Making	-	-	-	-	80	-	-	-	-	-	-	-	80	0.7
	Agricultural Labour	70	240	150	40	-	-	-	-	-	-	-	-	500	4.2
	Self Employment	-	-	-	-	-	-	-	-	-	-	15	-	15	0.1
	Non-Agric.& FFW	-	-	-	300	300	-	-	250	250	-	-	-	1,100	9.3
	Total	1,163	1,377	949	1,200	237	1,625	1,321	1,187	1,700	677	389	37	11,859	100
F3	Fishing	-	463	899	640	525	600	300	-	-	-	-	-	3,427	12.3
	Fishing Labour	-	213	-	-	-	-	-	-	-	-	-	-	213	0.8
	Fish Trading	1,914	570	1,210	1,848	2,305	2,050	2,338	2,235	2,220	1,774	1,798	1,318	21,578	77.7
	Gear Making	-	225	60	-	-	-	-	-	-	-	-	-	285	1.0
	Farming	363	223	48	-	-	175	-	474	494	203	10	260	2,248	8.1
	Self Employment	-	-	5	-	-	-	-	-	8	-	8	-	20	0.1
	Total	2,277	1,694	2,222	2,488	2,830	2,825	2,638	2,709	2,722	1,977	1,816	1,578	27,771	100
Com-	Fishing	358	641	697	676	407	1,234	715	546	386	(164)	250	70	5,817	31.1
munity	Fishing Labour	241	361	266	281	262	260	180	264	357	240	218	488	3,419	18.3
	Fish Trading	618	217	414	595	706	625	699	682	908	659	586	427	7,135	38.1
	Gear Making	-	64	17	7	21	-	-	30	6	-	-	-	145	0.8
	Farming	144	88	74	20	60	55	3	171	189	57	5	161	1,027	5.5
	Agricultural Labour	29	103	42	11	-	-	25	-	-	-	-	-	210	1.1
	Self Employment	296	-	2	2	3	-	-	-	5	2	6	-	317	1.7
	Non-Agric.& FFW	3	57	143	129	80	-	-	104	100	17	-	-	633	3.4
	Total	1,689	1,531	1,655	1,721	1,539	2,174	1,622	1,797	1,951	811	1,065	1,146	18,703	100

Figure 34 Income sources through the year: Zabra



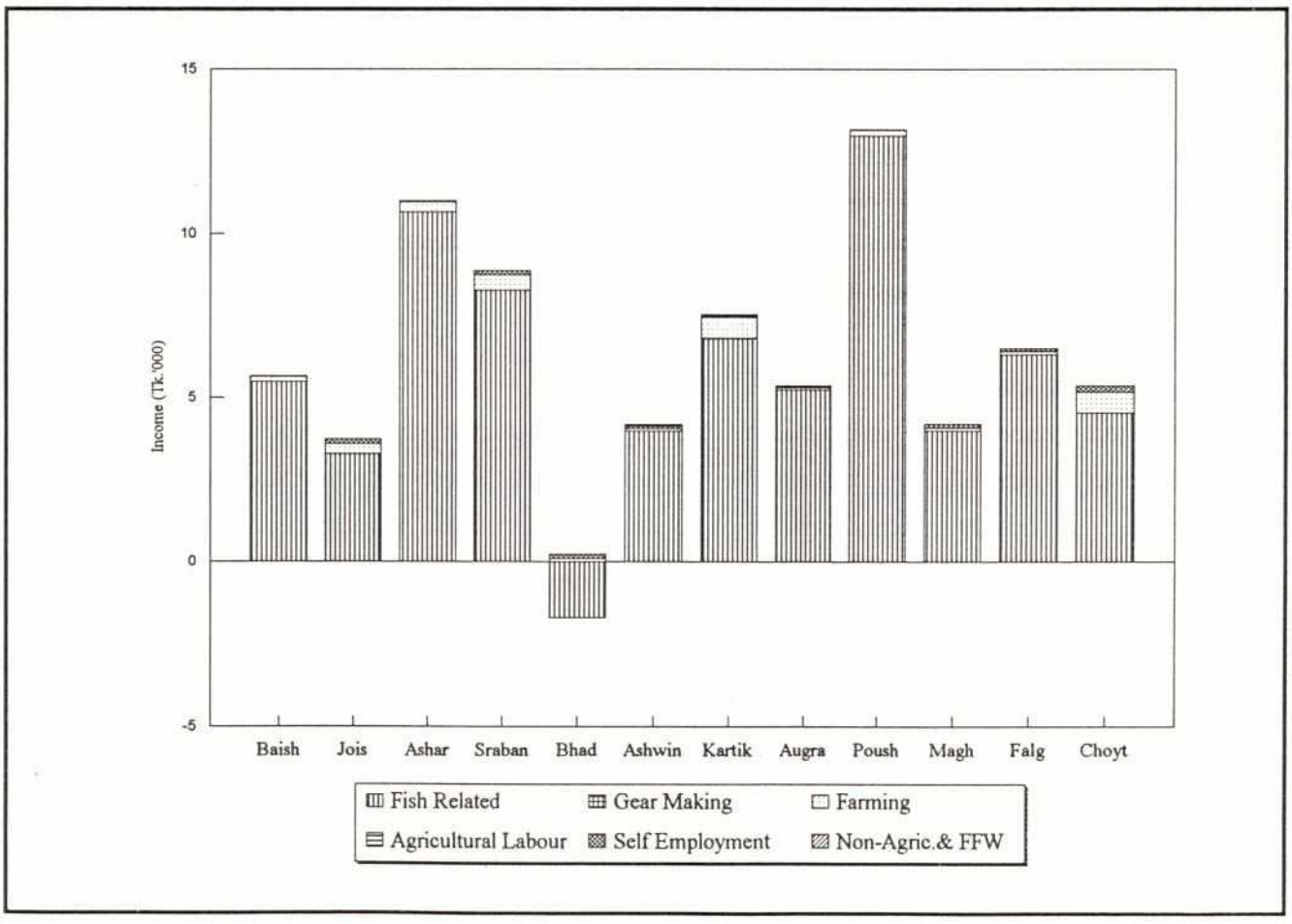
Source: FAP 17 Socioeconomic Monitoring

Table 33 Income sources through the year by fishing category: Bhatara

UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
F2	Fishing	239	136	1,694	986	1,971	2,725	1,089	894	1,574	776	1,229	441	13,754	12.6
	Fishing Labour	238	225	6	84	196	169	131	154	269	416	496	103	2,486	2.3
	Fish Trading	490	628	1,168	993	386	983	836	1,159	1,533	1,088	361	490	10,114	9.3
	Fish Culture	6,744	4,254	12,825	10,807	(6,267)	1,835	9,014	5,323	17,218	2,544	7,306	4,756	76,358	70.1
	Farming	273	506	529	782	153	124	1,122	108	261	69	45	183	4,153	3.8
	Agricultural Labour	-	-	-	-	-	-	-	-	10	-	-	-	10	0.0
	Self Employment	19	250	41	191	231	178	86	86	11	216	188	313	1,809	1.7
	Non-Agric.& FFW	-	-	-	-	-	70	80	20	-	-	-	-	170	0.2
	Total	8,003	5,999	16,263	13,843	(3,330)	6,084	12,358	7,744	20,876	5,109	9,625	6,286	108,854	100
F3	Fishing	10	-	14	222	484	1,387	728	199	114	221	66	8	3,455	12.1
	Fishing Labour	79	130	-	-	-	-	-	-	-	171	213	79	671	2.3
	Fish Trading	845	874	434	586	844	607	614	1,633	1,564	876	925	857	10,658	37.3
	Fish Culture	1,607	(316)	3,610	1,489	(384)	(313)	(129)	400	1,314	1,614	1,078	1,964	11,936	41.7
	Gear Making	-	-	-	-	-	-	43	-	-	-	-	-	43	0.2
	Farming	19	37	26	14	16	3	-	35	39	131	146	1,240	1,706	6.0
	Self Employment	-	14	23	30	33	-	-	-	14	4	-	9	127	0.4
	Total	2,560	739	4,107	2,341	993	1,684	1,256	2,267	3,045	3,017	2,428	4,157	28,596	100
Com-	Fishing	140	77	966	655	1,327	2,145	932	593	941	536	725	253	9,291	12.5
munity	Fishing Labour	169	184	4	48	111	96	74	87	152	310	373	92	1,700	2.3
	Fish Trading	644	734	850	816	585	820	740	1,364	1,547	996	606	649	10,350	14.0
	Fish Culture	4,518	2,274	8,832	6,769	(3,718)	904	5,052	3,189	10,326	2,141	4,608	3,546	48,442	65.4
	Gear Making	-	-	-	-	-	-	19	-	-	-	-	-	19	0.0
	Farming	163	303	311	449	93	72	636	76	165	96	88	641	3,093	4.2
	Agricultural Labour	-	-	-	-	-	-	-	-	6	-	-	-	6	0.0
	Self Employment	11	148	33	121	145	101	49	49	12	124	106	181	1,080	1.5
	Non-Agric.& FFW	-	-	-	-	-	40	45	11	-	-	-	-	96	0.1
	Total	5,645	3,720	10,996	8,858	(1,457)	4,178	7,547	5,369	13,149	4,203	6,506	5,362	74,077	100

Figure 35 Income sources through the year: Bhatara



Source: FAP 17 Socioeocnomic Monitoring

high. This is due to the extremely wide range of local water bodies the village fishermen are able to exploit and the considerable freedom of access they enjoy compared with most Hindu traditional fishermen.

Fish trading, the "traditional" activity of this community, remains important. In the two fishing categories shown, fish trading earnings are roughly similar, and for the F3 category trading accounts for more than 37% of yearly earnings. This activity is obviously benefitting from the spread of fish culture, the demand for fingerlings early in the season and the quick sale of large amounts of fish over short periods during the winter season.

While data from the sample indicates that aquaculture earnings (65% of annual average earnings) far exceed other sources in Bhatara, the figure is distorted by a few extremely successful fish farmers. A fairly even distribution of earnings between capture fishing, fish trading and fish culture would be more representative, although the share of fish culture is destined to grow steadily.

Patterns of earnings for Dwimukha fishermen are probably typical of most *rajbangshi* communities in the past: steady earnings from mostly open-access fisheries during the flood season and drawdown, followed by a sharp peak during the harvest of *beel* in *Choytra* (March/April). The indebtedness during *Magh* (January/February) is due to expenditure on leases for local water bodies and the preparation for harvesting operations later in the year.

As in most other *rajbangshi* communities, there is little diversification beyond fishing labour and fish trading. The concentration on fishing activities is clear in Table 34 and Figure 36. The level of farming involvement is similar to that found in other fishing communities and limited to a few wealthier households.

Diabari and Gopalpur

Average earnings among the *rajbangshi* of Diabari and Gopalpur, shown in Tables 35 and 36 and Figures 37 and 38, are considerably higher than in the other fishing communities studied. This is primarily indicative of the richness of Diabari *beel*. In spite of siltation and growing competition, the *beel* continues to yield relatively good catches of high-value species, particularly during the flood season.

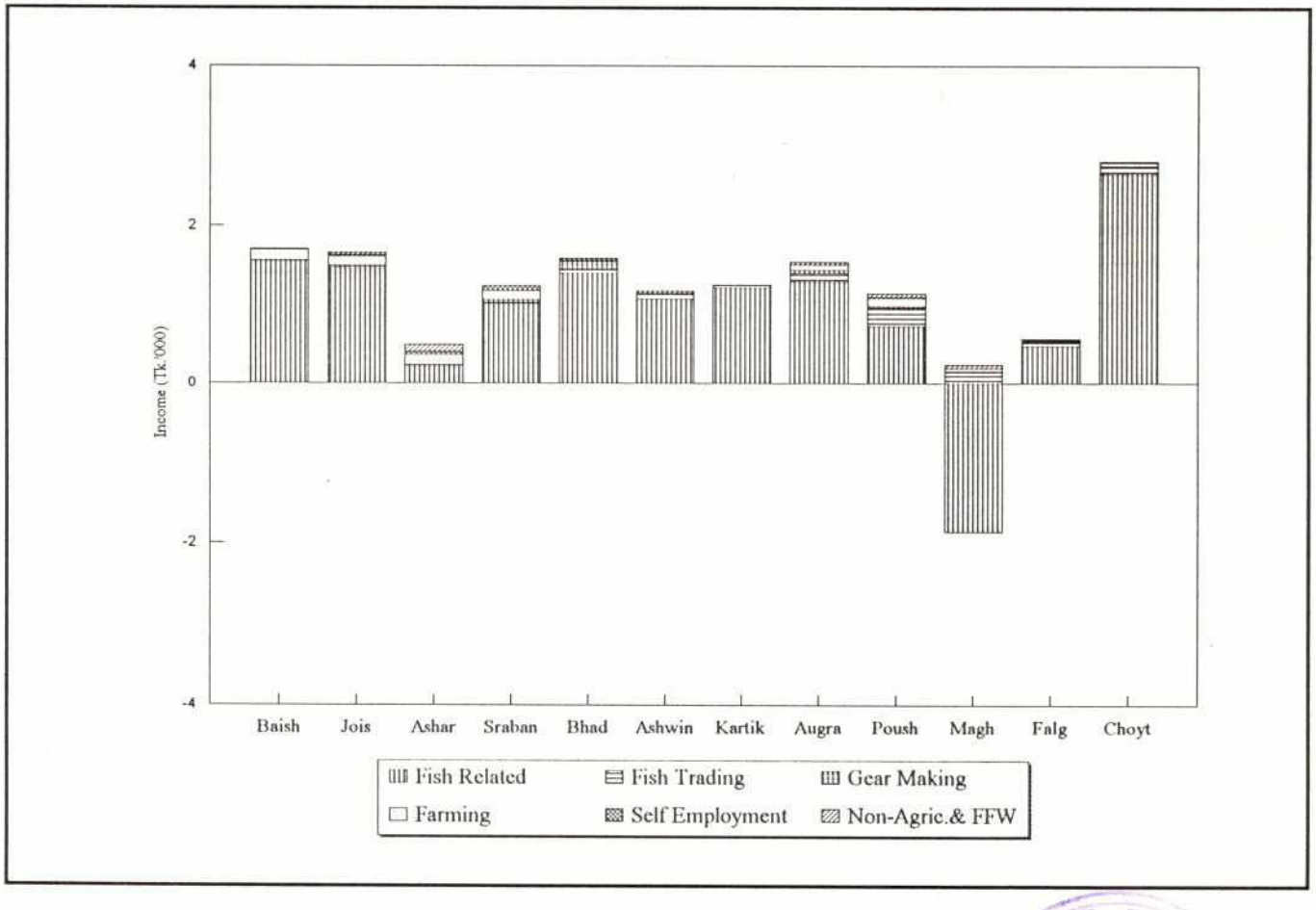
In the presence of reasonably secure access and a healthy resource, the *rajbangshi* of Diabari have had little cause to diversify. Fish trading constitutes only 1.5% of earnings in Diabari

Table 34 Income sources through the year by fishing category: Dwimukha

UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
F2	Fishing	1,294	1,272	23	723	1,010	738	876	1,035	382	(1,901)	368	2,395	8,213	60.5
	Fishing Labour	260	189	204	294	394	340	342	257	355	40	118	249	3,041	22.4
	Fish Trading	10	20	10	15	50	62	30	115	230	142	56	100	840	6.2
	Gear Making	-	14	-	31	89	-	-	40	23	20	-	6	223	1.6
	Farming	131	115	131	119	20	11	7	58	109	39	15	36	789	5.8
	Self Employment	-	20	35	57	30	-	-	-	2	-	-	-	144	1.1
	Non-Agric.& FFW	15	33	95	-	-	27	-	38	47	41	16	15	326	2.4
	Total	1,710	1,663	498	1,239	1,593	1,178	1,255	1,543	1,148	(1,619)	573	2,801	13,576	100
Com-	Fishing	1,294	1,272	23	723	1,010	738	876	1,035	382	(1,901)	368	2,395	8,213	60.5
munity	Fishing Labour	260	189	204	294	394	340	342	257	355	40	118	249	3,041	22.4
	Fish Trading	10	20	10	15	50	62	30	115	230	142	56	100	840	6.2
	Gear Making	-	14	-	31	89	-	-	40	23	20	-	6	223	1.6
	Farming	131	115	131	119	20	11	7	58	109	39	15	36	789	5.8
	Self Employment	-	20	35	57	30	-	-	-	2	-	-	-	144	1.1
	Non-Agric.& FFW	15	33	95	-	-	27	-	38	47	41	16	15	326	2.4
	Total	1,710	1,663	498	1,239	1,593	1,178	1,255	1,543	1,148	(1,619)	573	2,801	13,576	100

Figure 36 Income sources through the year: Dwimukha



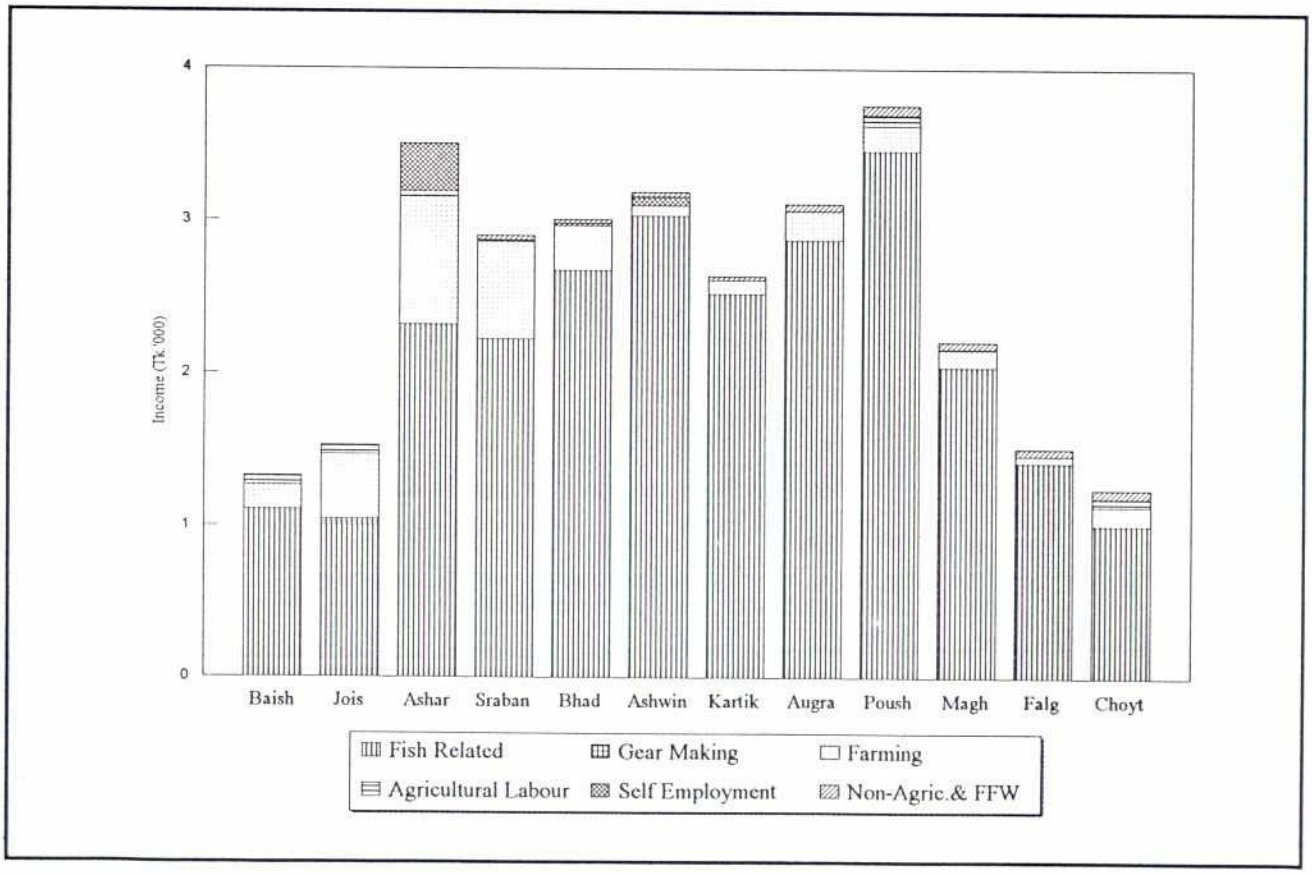
Source: FAP 17 Socioeconomic Monitoring

Table 35 Income sources through the year by fishing category: Diabari

UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
F1	Fishing	1,545	1,181	2,283	1,988	3,500	3,618	3,531	1,881	3,117	1,387	1,126	828	25,983	72.5
	Fishing Labour	106	44	1,544	1,341	1,732	1,446	615	751	933	70	13	90	8,685	24.2
	Gear Making	-	100	-	-	-	-	-	-	-	-	-	-	100	0.3
	Farming	30	-	71	129	75	93	-	45	-	68	50	20	579	1.6
	Agricultural Labour	160	150	-	-	-	-	-	-	-	-	-	150	460	1.3
	Self Employment	-	-	25	25	-	-	-	-	-	-	-	-	50	0.1
	Total	1,841	1,475	3,923	3,483	5,307	5,157	4,146	2,677	4,050	1,525	1,189	1,088	35,857	100
F2	Fishing	720	774	1,646	1,868	1,072	1,594	1,149	2,896	3,134	1,922	1,694	1,039	19,506	80.2
	Fishing Labour	-	-	-	-	-	-	45	190	267	-	-	-	502	2.1
	Fish Trading	-	-	-	-	-	8	283	300	238	-	-	-	829	3.4
	Farming	96	404	577	706	301	63	134	177	193	174	44	42	2,911	12.0
	Self Employment	5	7	12	7	33	108	-	-	-	10	3	2	187	0.8
	Non-Agric.& FFW	-	-	-	50	50	50	50	83	117	-	-	-	400	1.6
	Total	821	1,185	2,235	2,631	1,456	1,823	1,661	3,646	3,949	2,106	1,741	1,083	24,335	100
F3	Fishing	1,260	1,525	331	-	2,050	3,480	2,300	750	-	5,150	950	1,190	18,986	47.7
	Farming	1,042	2,275	5,427	2,155	1,100	-	159	880	690	-	-	1,055	14,783	37.1
	Agricultural Labour	-	-	375	-	-	-	-	-	750	-	-	-	1,125	2.8
	Self Employment	-	-	3,300	-	-	-	-	-	-	-	-	-	3,300	8.3
	Non-Agric.& FFW	-	-	-	-	-	-	-	-	-	500	500	600	1,600	4.0
	Total	2,302	3,800	9,433	2,155	3,150	3,480	2,459	1,630	1,440	5,650	1,450	2,845	39,794	100
Com-	Fishing	1,069	990	1,758	1,742	2,044	2,501	2,120	2,332	2,843	2,021	1,420	976	21,814	72.9
munity	Fishing Labour	39	16	561	488	630	526	248	377	485	26	5	33	3,432	11.5
	Fish Trading	-	-	-	-	-	5	155	164	130	-	-	-	452	1.5
	Gear Making	-	36	-	-	-	-	-	-	-	-	-	-	36	0.1
	Farming	158	427	834	628	291	68	87	193	168	119	42	126	3,142	10.5
	Agricultural Labour	58	55	34	-	-	-	-	-	68	-	-	55	270	0.9
	Self Employment	3	4	315	13	18	59	-	-	-	5	2	1	420	1.4
	Non-Agric.& FFW	-	-	-	27	27	27	27	45	64	45	45	55	364	1.2
	Total	1,327	1,528	3,502	2,898	3,010	3,186	2,637	3,111	3,758	2,216	1,514	1,246	29,930	100

Figure 37 Income sources through the year: Diabari



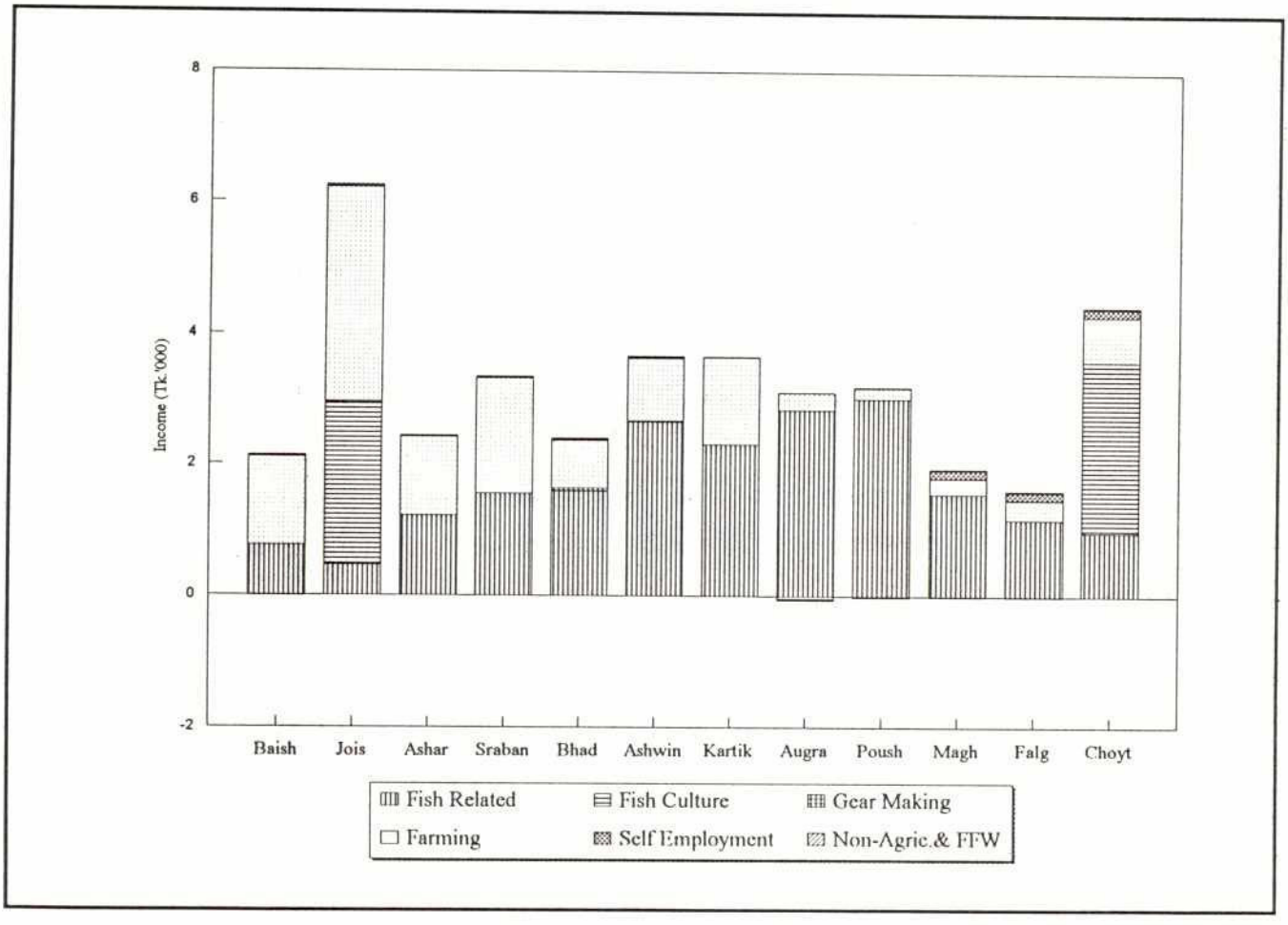
Source: FAP 17 Socioeconomic Monitoring

Table 36 Income sources through the year by fishing category: Gopalpur

UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABAN	BHAD	ASHWIN	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	Total	%
HFC2	Fishing	469	176	452	435	1294	2259	1829	2325	2559	1252	756	643	14448	34.5
	Fishing Labour	120	125	286	843	114	129	141	59	-	20	96	61	1993	4.8
	Fish Trading	132	114	564	383	309	420	726	618	714	303	292	278	4853	11.6
	Fish Culture	-14	2857	-	-	-	-	-	-75	-25	-14	-14	3000	5715	13.7
	Gear Making	-	-	-	-	53	21	-	-	-	-	-	-	74	0.2
	Farming	1548	3724	1387	2019	844	1093	1528	312	186	274	341	793	14049	33.6
	Self Employment	-	10	10	17	22	21	-	-	-	153	154	154	542	1.3
	Non-Agric.& FFW	14	14	14	14	14	14	14	-	14	14	14	14	157	0.4
	Total	2269	7020	2713	3711	2650	3957	4238	3239	3448	2002	1639	4943	41831	100
HFC3	Fishing	960	720	490	430	355	1528	-450	1650	1220	1350	1220	820	10293	92.1
	Fishing Labour	-	-	-	310	285	-	-	-	-	-	-	-	595	5.3
	Farming	-	-	20	10	-	-	-	-	-	-	-	-	30	0.3
	Non-Agric.& FFW	110	150	-	-	-	-	-	-	-	-	-	-	260	2.3
	Total	1070	870	510	750	640	1528	-450	1650	1220	1350	1220	820	11178	100
Com-	Fishing	530	244	457	434	1176	2168	1544	2241	2391	1264	814	665	13929	36.7
munity	Fishing Labour	105	109	250	776	136	113	123	51	-	18	84	53	1818	4.8
	Fish Trading	116	100	494	336	270	368	635	541	625	265	256	243	4247	11.2
	Fish Culture	-13	2500	-	-	-	-	-	-66	-22	-13	-13	2625	5000	13.2
	Gear Making	-	-	-	-	46	19	-	-	-	-	-	-	65	0.2
	Farming	1354	3259	1216	1768	739	957	1337	273	163	240	299	694	12296	32.4
	Self Employment	-	9	9	15	19	19	-	-	-	134	135	135	474	1.2
	Non-Agric.& FFW	26	31	13	13	13	13	13	-	13	13	13	13	170	0.4
	Total	2118	6252	2439	3342	2399	3657	3652	3040	3170	1921	1588	4428	37999	100

Figure 38 Income sources through the year: Gopalpur



Source: FAP 17 Socioeconomic Monitoring

and fishing and fishing labour, overwhelmingly concentrated on the *beel* and its surrounding floodplains, accounts for more than 84% of average household income.

In Gopalpur, perhaps in response to the increased competition on local water bodies, several households have invested in land and become extensively involved in farming. They have been supported in this endeavour by the apparently high status of the leaders of the Gopalpur *rajbangshi*. For the village as a whole, which only consists of 12 households, this translates into 32% of average household earnings coming from agriculture compared to just over 41% from fishing and fishing labour and 11% from fish trading.

One Gopalpur household has also used its superior access to resources to invest in fish culture, which generated considerable earnings and suggests that the fish culture boom is arriving in Harirampur *thana* as well.

3.8 Conclusions

All the fishing communities studied have been forced to shift their fishing grounds to some extent over the past 40 years. In most cases, the principal reason has been increased competition for the fisheries resource coupled with natural changes in the water bodies due to siltation.

Fishermen from Zabra and Dwimukha have been particularly affected by the siltation and disappearance of important fishing grounds. In Dwimukha, this has been compounded by intense competition from Muslim non-traditional fishermen on practically all surrounding water bodies. This has forced a radical change in the *rajbangshi*'s fishing strategies.

Similar changes are in progress for Diabari and Gopalpur. Diabari *beel* is silting up, and the level of competition, both from traditional and non-traditional fishermen, is steadily growing.

The riverine fishermen of Kutirhat have suffered as fishermen who traditionally exploited *beel* and *khal*, like those from Zabra and Dwimukha, have moved out onto the main rivers that were traditionally the preserve of the *malo* and *barman* fishermen.

These changes effectively imitate the impacts of flood control seen in some protected areas. The obstruction of water access routes between rivers and wetland or *beel* areas, whether

caused by such natural processes as siltation or change in river morphology, or by such man-made interventions as roads and embankments, generally affect traditional fishermen most seriously. This is both because of their impact on the migratory fish species traditional fishermen are more dependent upon, as well as the weak socioeconomic position of Hindu fishermen, who are therefore less able to adapt to such changes.

4. CONCLUSIONS AND THE IMPLICATIONS FOR FUTURE FLOOD CONTROL SCHEMES

As noted at the beginning of this report, since there are no flood control structures *per se* in Manikganj District the study of its fisheries was not pursued in order to directly reveal fisheries impacts of flood control. Rather, this study has sought to examine how other changes, natural and artificial, might have affected fisheries in floodplain areas and so gauge the relative importance of flood control as a factor. It is, in fact, clear from this study that fisheries are in a constant state of flux in the floodplain even under natural circumstances. Moreover, many human interventions can result in changes that are probably more lasting. By comparing this area with areas where flood control has been implemented, the relative importance of different factors can be clarified.

The original intention of comparing protected areas inside the PIRDP in Pabna with the unprotected areas in Manikganj District was abandoned as there are major differences both in the nature of water bodies in the two areas and in the socioeconomic structure of fisheries. Given the proximity of the two areas, however, and the fact that the PIRDP is one of the few flood control schemes studied by FAP 17 which appears to have had an appreciable impact on fisheries, a brief comparison of the two areas is justified. The fisheries and socioeconomic impacts of the PIRDP are discussed in detail in, Draft Final Report, Supporting Volume Nos. 4 and 13.

Changes in fisheries in the Pabna Irrigation and Rural Development Project and in Manikganj District

The changes noted in fisheries inside the PIRDP subsequent to its construction in many ways imitate the changes that have occurred in the area around Manikganj due to "natural" processes such as changes in the course of rivers and, in particular, siltation of *beel* and the *khal* connecting *beel* and floodplains to main and secondary rivers.

In the two areas of the PIRDP studied, around Gandahasti *beel* in the south-eastern corner of the scheme and on the Ichhamati River in Santhia *thana* nearer the centre of the project area, the extent of annual flooding has not radically changed since construction of the project, but the sources of flooding and its timing have shifted. Inflows from rivers outside the scheme, such as the Jamuna and the Baral, are restricted until after the main spawning migration of the major carps. As a result, the presence of these fish in floodplain and *beel* catches inside the PIRDP has declined considerably. Efforts have been made to re-stock some

areas but the sustainability of this practice is yet to be established and artificial enhancement of capture fisheries resources certainly increases the conflicts and distributional problems surrounding fisheries.

Rainfall flooding and the continued access of riverine flood waters through sluice gates later in the season seem to ensure that floodplain areas are still inundated during the flood season and that floodplain-resident fish continue to repopulate the floodplain every year as long as some residual water remains over the winter in which these fish can take refuge.

The major rivers running through the Manikganj area, the Dhaleswari, Kaliganga and Ichhamati, and the complex system of *khal*, *beel* and *baor* fed by these rivers have been subject to serious siltation over the past 30 years. The causes of this are the subject of considerable debate and range from deforestation and increased run-off in the headwaters of the Brahmaputra to changes in the hydrological system caused by flood control interventions on the Jamuna. Whatever the factors in play outside the Manikganj area, however, the impacts within the area are very similar to those seen inside the PIRDP. Riverine flooding tends to arrive later in *beel* and floodplains, migration by high-value carps has often been blocked early in the season and catches of carps have declined considerably.

The many roads and pathways constructed in the area over the past 15 years have generally been built with little or no regard for their impact on fisheries resources. Often road embankments have resulted in major changes in local hydrology and radically affected the access of migratory fish to floodplains. Village pathways, which are less likely to be constructed with culverts or bridges have probably been particularly damaging to the fisheries system. Their immediate impacts may be localised, but cumulatively they have probably had a greater impact than many major flood control embankments.

Socioeconomic trends in fisheries exploitation

The socioeconomic structure of fisheries has also been affected in very similar ways in the two areas. In Pabna, the reduced value of the fishery, caused by the interruption of migration routes for higher-value fish, has most affected the traditional Hindu fishermen who fish the deep-water areas where these higher-value fish congregate during the dry season. As these fisheries have declined, Hindu fishermen have tended to move to new fishing grounds or to emigrate. They have left behind them a fishery still rich in smaller, lower-value fish. This fishery is increasingly exploited by non-traditional fishermen; either seasonally by children,

labourers, traders and farmers during the floods and drawdown, or full-time by poor members of surrounding communities in response to increasing landlessness and poverty.

This shift in the social structure of the fishing population is even more marked around Manikganj. Here, long-term social changes encouraged by the proximity of urban areas and the intense activity of NGOs have reduced the influence of social taboos on fishing and encouraged large numbers of Muslim non-fishermen to move into fishing on a professional or semi-professional basis. In response to the increasing competition and declining catch values, traditional fishermen have tended to shift their activities onto the main rivers, joining the increasingly congested fisheries of the Meghna and Padma rivers.

The ability of traditional fishermen to guarantee their access to their traditional water bodies is increasingly threatened in both areas. On the main rivers, riverine fishermen from the *haldar* communities along the Padma are having to share the resource with more and more fishermen. Some of these newcomers are other traditional fishermen displaced from the *beel* and *khal* they used to exploit, but far more are non-traditional and occasional fishermen who are not subject to any form of regulation. On closed water bodies such as *beel*, the areas that fishermen can effectively control have steadily shrunk as more and more lowland is converted to agricultural use during the dry season and increasing numbers of local people become involved in fishing.

Landowners are increasing their control of the fisheries resource by excavating *danga* (fish pits) on their lowland plots. The rapid expansion of aquaculture also favours landowners who control ponds. While this development is greatly increasing the production of high-value fish for urban markets, it is also restricting access to residual water bodies around homesteads, a traditional resource for poor households used primarily for consumption and fished mainly by children and women.

Implications for the Flood Action Plan

Concern over the impacts of flood control on fisheries has tended to focus on the potential reduction of open-access floodplain fisheries, which are perceived to be an important food resource and source of livelihood for poor households in floodplain communities. Quite correctly, attention has focused on the wide range of floodplain resident fish that find their way into the diet of rural households via the nets of children and seasonal fishermen, particularly at times when other sources of food and livelihood are scarce.

Changes in floods, whether brought about by flood control (as in the PIRDP) or by siltation and road construction (as in Manikganj District) do adversely affect fisheries. Their impact seems to be particularly concentrated on migratory species such as the major carps and large catfish. The effect this has on the value of the fisheries is of great concern to fisheries planners and traditional fishermen, however, the effect seems to be less for the far larger number of labouring and farming households who catch mostly small, low-value, floodplain resident fish.

The long-term consequences of these changes are less clear. The changes that have impacted migratory fish also encourage (and, in the case of flood control, are intended to encourage) changes in agriculture, cropping patterns and the demand for water resources by facilitating the conversion of lowland areas to agriculture. This has many effects on fisheries resources. Conflicts between fishermen and farmers over water use during the dry winter season tend to increase as cultivation of winter *rabi* and *boro* crops expands. To sustain the fisheries resource, during the dry season some permanent water in *beel* areas needs to be left as a refuge for floodplain fish that can repopulate the floodplain during the next season. Such areas of permanent water are becoming increasingly rare as more and more floodplain is converted to irrigated winter rice crops. Fish-pits could compensate for this steady reduction in perennial water, but most of these are drained using low-lift pumps before the end of the winter to irrigate land and ensure as complete a harvest of fish as possible.

The floodplain resident fish making up the bulk of floodplain and *beel* catches are extremely resilient and have adapted, even under natural conditions, to enormous variations in water extent and depth from year to year. These species may be so adaptable that they are perfectly capable of surviving changes in the floodplain environment and intense fishing effort—at least as long as some flooding is ensured each year. It seems likely, however, that without some form of management, these resources will decline under the twin impacts of increasing fishing effort and environmental change.

Changes in land use in lowland areas and, above all, the spread of private ownership and concomitant reduction in *khas* land areas is already starting to have implications for access to and tenure of the fisheries resource. For the moment, most people have open access to the floodplain fisheries; the exception, rather ironically, is traditional Hindu fishermen, who generally have to purchase fisheries access. There already are signs that, as uncultivated or *khas* land in *beel* is converted to agriculture, and as the number of *danga* increases, restrictions on open-access fishing are tending to grow. The returns often obtained from

danga make it almost inevitable that their owners will try to ensure that as much fish as possible are left on the floodplain to be concentrated in the *danga* once the floods recede.

This movement towards increasing private control of all possible resources in the floodplain is liable to have the greatest impact on the distribution of the fisheries resource. Clearly, this change is primarily taking place due to growing population pressure, but flood control measures that facilitate the conversion of lowland areas to agriculture and private ownership will accelerate the process.

Mitigation measures

The widespread and rapid development of fish culture in some parts of the North Central Region seems to indicate that improvements in aquaculture could constitute an important element in compensating for fisheries losses due to flood control. As fish culture will inevitably concentrate on the production of high-value species, it probably does have the potential for compensating for at least some of the losses due to flood control.

Aquaculture requires ponds and ditches, however, and while it is frequently said that the many ponds and ditches in rural communities in Bangladesh are under-utilized, it needs to be remembered that they are not unutilized. The multitude of homestead borrow pits, *maital*, *pagar* and other residual water bodies are all fished by someone. They are an open-access resource frequently used by the poorest members of the community. These water bodies can certainly be more intensively cultured and can produce far more fish than they do at present. But the benefits will quite clearly be taken from poorer members of the community and come to be monopolised by those who are better off. Most ponds are owned, and as the value of their product increases, their owners will take control of their use.

Having said this, where fish culture is possible and viable in rural Bangladesh, it will almost certainly develop by itself. Attempts to direct poorer groups towards aquaculture should certainly be encouraged, but it is clear from what is already occurring in Manikganj District that, once the potential value of culturable water bodies is realised, access to those water bodies will become very restricted.

GLOSSARY

The following is a glossary of Bangla terms encountered during the course of FAP 17 research. It is not a definitive taxonomy of Bangla terms concerned with fisheries and aquatic resources. Such an undertaking would require taking into account the fact that terminologies and usages change radically from region to region and even from village to village. The aim, rather, is to highlight the different meanings some of these words and terminologies may have in different parts of the country. The region(s) where the term occurs is (are) indicated. Cross references to other entries in the glossary are indicated in small capital letters.

The Roman alphabet is rather poor as a vehicle for communicating Bangla terms, and 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 spellings of the same word may be equally "correct" in terms of the sound of the word.

Terms used to describe fishing castes/groups

bagdi	NC/SW	Hindu caste group brought from West Bengal in the 19th century to work on indigo plantations. Involved in fishing in the North Central Region since Partition.
barman	NC/NW/ NE/SW	Hindu caste fishermen generally associated with riverine fishing. Very close to *MALO* with intermarriage. Apparently a "genuine" fishing caste.
gain	SW	Hindu caste group often, but not necessarily, involved in fishing in the South West Region. Apparently low sub-caste (*NAMASUDRA*).
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* and *BARMAN* fishermen, refers to the lead fisherman or skipper of a riverine fishing team (the *HALDAR*). Always refers to Hindu fishermen.
jala das	NC/NW/SW	Sub-caste of the Hindu *KAIBARTA DAS* caste fishing group.
jele/jaola/ jeola	NC/NW/ NE/SW	Generic terms for fishermen.
jiani	NW/SW	Derogatory term used for Muslim professional fishermen, particularly around Chalan *BEEL*.

kaibarta das	NC/NW/ NE/SW	One of the largest groups of traditional Hindu caste fishermen; found all over the country.
maimul	NE	Muslim traditional fishermen and 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*.
matsya das	NE	Hindu caste fishermen encountered in the *HAOR* region. Possibly the same as *KAIBARTA DAS*.
namasudra	NE/SW	Hindu caste group often, but not necessarily, involved in fishing. Most commonly found in the North East Region, particularly the Sylhet Basin, but also occurring in the South West. A generic term for a large group of *sudra* sub-castes.
patni	NE	Hindu caste boatmen who are sometimes involved in fishing as well; often found living with caste fishing communities.
rajbangshi	NC/NW/SW	Hindu caste fishermen. Apparently relatively recent entrants to fisheries. Possibly a tribal group from Northern Bihar/West Bengal that moved onto the plains in the last century and took up fishing. Often, but not exclusively, fishing on "closed" water bodies such as *BEEL* and floodplains.

Terms used to describe actors in fish trading system

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 wholesale 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 fish traders taking fish from the *BEEL* shore to the road where they are loaded on buses or trucks for transport to towns or larger marketing centres.

mahajan	NC/NW/ NE/SW	A very generic but important term that is most commonly used for moneylenders. Effectively it means almost any rich, influential person in rural areas (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 water body, the owner of or major shareholder in a particular fishing operation. Also used for many *ARATDAR* who are generally moneylenders 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.
paikar	NC/NW/	Fish trader.
paharadar	NE	Guards hired by leaseholders to prevent fishing and theft of fish from *JALMAHAL*. Normally hired for the period from flood recession (October/November) until the completion of harvesting in February or March, but increasingly hired for the whole year to prevent all fishing on leased areas. Usually, but not necessarily, hired from fishing communities. Can become a position of considerable influence as *paharadar* can broker fisheries access for local people behind the leaseholder's backs.

Terms used to describe water bodies

beel	NC/NW/ NE/SW	Officially, a "back swamp" or depression. Can be either perennial or seasonal. In reality it used for a wide variety of freshwater bodies (oxbow lakes, old river beds, *KHAL*, even artificial channels). Often refers to flooded areas with no obvious deeper section or depression that used to have perennial areas of water.
bandh	NC/NE	Floodplain (same as *CHAK*); used in *HAOR* region near Sunamganj and around Tangail in the North Central Region.
baor	NC/SW	An oxbow lake; a cut-off curve or meander of a river. Sometimes completely isolated, sometimes connected seasonally or at one end to the parent river. Also used for old river beds now far from the present course of the river (may also be called a *BEEL*).
chak	NC/NW/ NE/SW	Floodplain; often used for a portion of floodplain. Tends to be used for floodplains with fairly clearly defined boundaries.

danga	NC/SW	Artificial or natural ditch often formed from homestead borrow pit, usually in floodplain. Shallower than *KUA*. Used very commonly in the North Central Region around Manikganj. Most common usage is for high land.
dubi/doba	NE	Artificial ditch in the floodplain or *HAOR*; relatively shallow. Used very commonly in *HAOR* region around Sunamganj.
gang	NC/NW/ NE/SW	River; colloquial word for *NADI*. Frequently used for smaller rivers.
gara	NE	Artificial pit or ditch in the floodplain or *HAOR*; deeper than a *DUBI*. Specific to *HAOR* area. Sometimes used as a fish pit but usually originating from a borrow pit or other section of land where earth has been excavated.
gari	NW	Used for a range of water bodies in *BEEL* areas, especially Chalan *BEEL*. Normally refers to small rivers and *KHAL*. Also sometimes used for artificial ditches and borrow pits.
gopat	NW/SW	Grazing land within homestead area of village; generally under community ownership.
halot	NC/SW	Depressed pathway running through the village homestead area, generally under community ownership. Dry pathway during the dry season also used for grazing livestock, when inundated used for open-access fishing.
jala	NC/NW	General term for water body, used for water bodies 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* water body controlled by the government and normally leased out for fisheries.
joar pani	SW	High tide.
khal	NC/NW/ NE/SW	Artificial or natural channel, small river or canal.
khandi	NE	Ridge, often covered with low bushes, in the floodplain or *HAOR*. Sometimes used as a pathway during dry season. Specific to *HAOR* region.
khara	NE	Artificial or natural channel, usually connecting two *BEEL* in the *HAOR*. Specific to the *HAOR* region around Sunamganj.
kua	NC/NW/SW	Artificial fish pit excavated in the floodplain or *BEEL*. Deeper than a *DANGA*. In the South West Region, sometimes used for borrow pits near homesteads or roads.

kul	NC/SW	Same or similar to *BAOR*. Dead river or oxbow lake. Most *kul* appear to be connected with the parent river at one end, but it is unclear whether this is a defining feature.
maital	NC/NW/SW	Small natural or artificial ditch. In North Central and North West regions usually used for ditches and borrow pits near homesteads. In South West, also used for ditches and fish pits in *BEEL* and floodplain.
nadi	NC/NW/ NE/SW	River.
nal	NW	A few cases found in North West in the Chalan *BEEL* area where it apparently means a small channel like a *KHAL*.
nala	NE	A drain; usually near a homestead.
pukur	NC/NW/ NE/SW	Artificial pond, usually of fairly regular shape and near a homestead. In South West, also widely used for artificial, submersible ponds (*KUA*) excavated in *BEEL* or floodplain.
pushkunni	NC/SW	Same as *PUKUR*. Used frequently in South West Region.
tala	NC/NW/ NE/SW	Bottom land; used for the bottom of any water body, also often used for the lowest part of the *BEEL*.

Terms used to describe administrative divisions and human settlements

mauza	NC/NW/ NE/SW	The smallest 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 12 or more villages.
para	NC/NW NE/SW	Usually a subdivision 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 an important role in allocating fisheries leases and, under the NFMP, in the identification and licensing of fishermen.
union	NC/NW/ NE/SW	The lowest level of government administration. Usually groups together anything between five and 30 *MAUZA*. Important for fisheries as it is the lowest level at which *khas* land and water bodies can be administered.