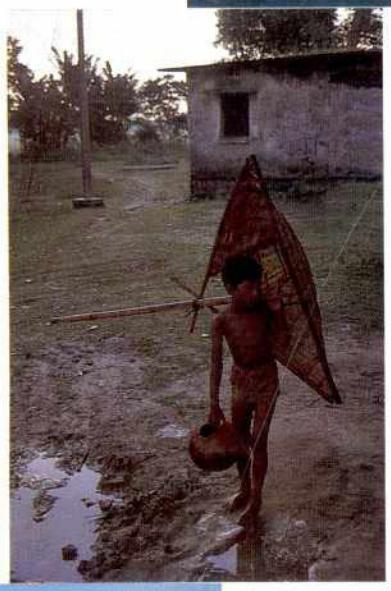
FAP 17

Fisheries Studies
and
Pilot Project



FINAL REPORT

(Draft)

JUNE 1994

Supporting Volume
No. 2

FISHERIES STUDY

SATLA - BAGDA POLDER 1

Prepared for the Government of Bangladesh

FAP 17

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SUPPORTING VOLUME No.2

** Draft **

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Satla-Bagda Polder 1

A-11

FAP 17
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AND PILOT PROJECT

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Table of contents

LIST OF FIGURES

LIST OF TABLES

SUMMARY OF PRINCIPAL FINDINGS

1. Satla-Bagda Polder 1 was subject to extensive rainfall flooding, but entry of river water via canal networks was prevented during June and July, therefore modifying the source of floodwaters compared to free-flooding areas of Bagihar beel.

2. The magnitude of the flood was reduced by 0.5m within the polder, but the area inundated was not significantly affected since most land inside the polder was inundated during 1993. Timing and duration of flooding were not altered by flood control structures.

3. Total annual catch per hectare from floodplain and beel sampling sites outside the polder (216 kg/ha) was 73% higher than that from inside (125 kg/ha).

4. Extrapolation of floodplain catch data to the total area of Polder 1 and the defined area of Bagihar beel together with the integration of these with canal catches resulted in an estimated total catch per unit area of 202 kg/ha from Bagihar beel, which was 54% higher than that in Satla-Bagda Polder 1 (131 kg/ha).

5. Catch rates of dominant gears were used as indicators of relative abundance of fish in statistical analysis of floodplain fisheries. Significantly ($p < 0.05$) lower densities of fish were recorded inside the polder compared with outside sites, indicating lower fish productivity within the polder.

6. Fishing effort was greater outside the polder and contributed to the recorded higher catches.

7. Generally, lower numbers of fish species per site were found within the polder, indicating a small reduction in biodiversity inside the FCD area compared with outside sites.

8. Flood control had little impact on the species composition of more than 90% of the annual catch. At both inside and outside sites the catch was dominated by floodplain resident (sedentary) species. Migratory species made little contribution to the total annual catch either within or outside the polder.

9. The flood control scheme prevented the entry of fish hatchlings, notably those of major carps, into the polder during June and July because sluice gates remained closed. This period coincided with the peak abundance of carp hatchlings in the Kumar River. Carp hatchlings appeared in the Kumar in mid-May, but were prevented from entering free-flooding floodplains by rainfall runoff until mid-June, when water currents reversed and river water entered the plains.

SATLA-BAGDA PROJECT

1. STUDY AREA: BACKGROUND

The Satla-Bagda Project is a flood control and drainage scheme of contiguous polders (Nos 1, 2 and 3) located in the South West Region of Bangladesh between Madaripur and Gopalganj (Fig. 1.1). Polder 1 was selected for study and compared with a control area of free-flooding land 20 km to the north in an area known locally as Bagihar beel. The land within the project and control areas is low, in some places below sea level, and flat. It forms part of the Khulna-Gopalganj beel system, which is characterised by peat deposits high in organic matter lying at or close to the soil surface.

The Satla-Bagda Project lies on the extreme eastern border of an extensively poldered region centred around Khulna. Construction work on the 55 km embankment of Polder 1, which covers an area of about 14,800 ha, started in 1974 but was interrupted by a revision of the original planning proposal (NEDECO, 1980)[1]. It was finally completed during the eighties, with modifications and improvements to drainage regulators continuing to the present day.

The primary objective of the scheme was to increase rice production by flood protection and improved drainage in the wet season, and irrigation in the dry season (EPWPDA 1969[2], NEDECO 1980). Economic appraisals of the feasibility of the project omitted potential negative impact on fisheries, because of the lack of reliable estimates of fish catches. However, the annual catch from the three polders was estimated conservatively at 1,232 tonnes, of which 615 tonnes would be derived from Polder 1. Further, it was anticipated that fish catches would decline rapidly following full poldering, and that a valuable source of animal protein for local people would be lost. It was envisaged that intensive pond culture would be the only means of compensating for the loss of capture fisheries and that at least 97 hectares of ponds would be needed, assuming a production rate of 12 tonnes/ha. The latter was an unrealistically high rate, especially in view of the fact that pond aquaculture was reportedly not practised at all in the area at that time (1980).

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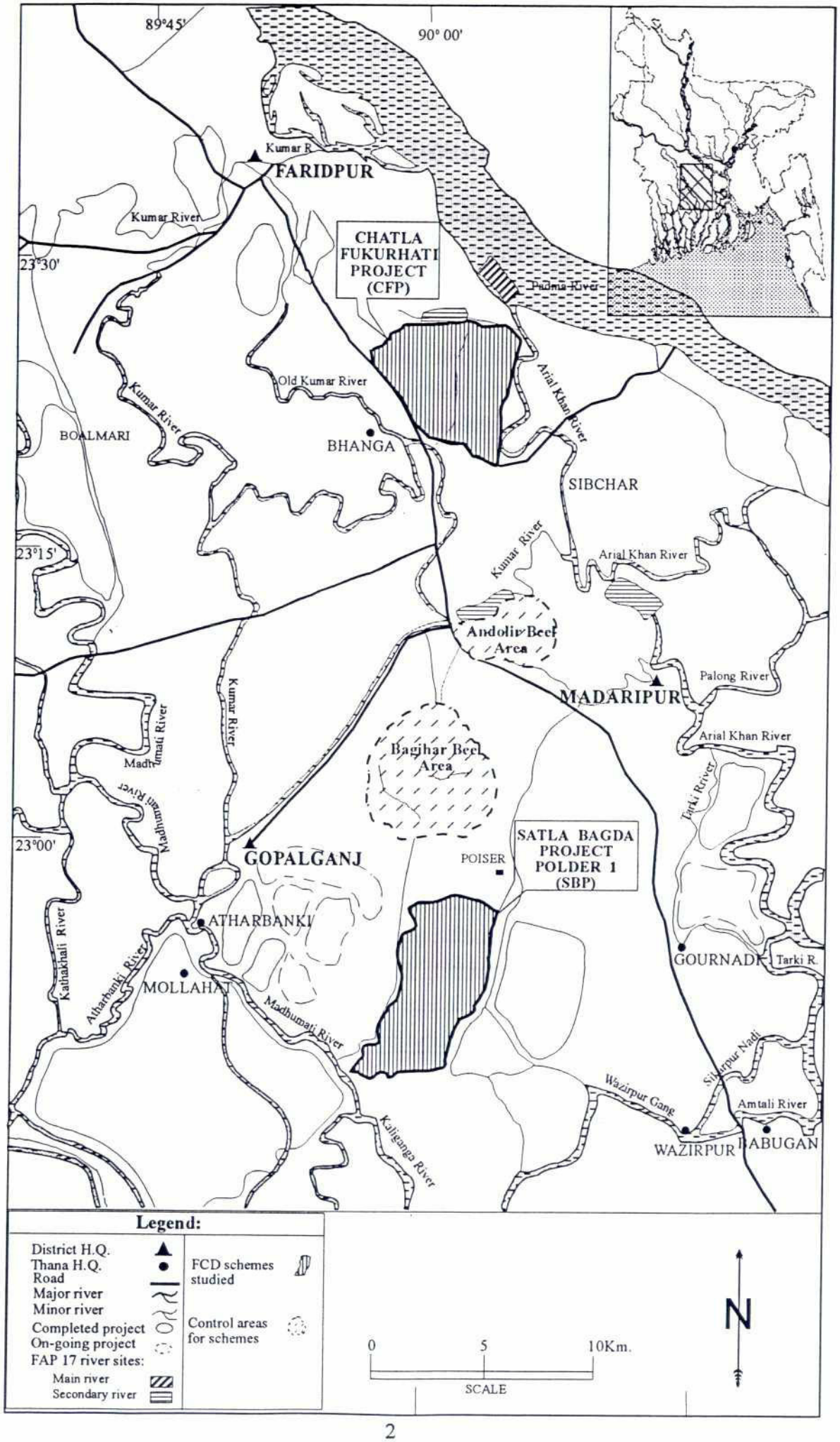
1 NEDECO 1980 Feasibility report on Faridpur-Barisal Project (Satla-Bagda Project) Vol. 1 Main Report submitted to BWDB, Directorate of Planning, November 1980.

2 EPWPDA 1969 Feasibility Study report on Satla-Bagda Project in Barisal District Report submitted to East Pakistan water and Power Development Authority, August 1969.

Figure 1.1 Location of study areas within the Southwest Region



2. DESCRIPTION OF SAMPLING SITES

Four floodplain sites were selected inside the scheme and another four outside, covering a total sampled area of 561 ha and 556 ha respectively (Table 2.1). The four sites inside the scheme were located in the north and east of Polder 1 in three spatially distinct small beel: Chitrapara, Ambola and Satla-Bagda (Fig. 2.1). The four sites outside the scheme chosen as control areas covered two small adjacent beel: Joisler and Moisler, which form a single depression bisected by Amgramer khal (Fig. 2.2). Both beel form part of the larger flooded area of the Bagihar beel system.

Drainage canals inside and outside the scheme were also sampled. Within the scheme one site was selected on Ambola khal, which drains both Chitrapara and Ambola beel and discharges through Ambola regulator into the adjacent Satla-Bagda khal. Outside the scheme Kalabari khal, which drains Joisler beel, was selected as a comparable canal site. The total lengths of canal sampled inside and outside the scheme were 4.13 km and 4.23 km respectively.

Additional sampling sites were selected on larger canals adjacent to the scheme (Satla-Bagda khal) and control area (Amgramer khal), as well as on certain rivers feeding these canals (Kumar, Arial Khan and Padma Rivers), to provide information on the patterns of fish movements between floodplain and river. The linkage between rivers, canals and floodplains is shown in Fig. 1.1. The Padma is the main river from which the Arial Khan originates, and the Bubaneswar and Kumar Rivers are in turn distributaries of the Arial Khan. Flows are perennial in the Arial Khan and Kumar, but the Bubaneswar is a seasonal river which usually dries up from February to April. Amgramer and Satla-Bagda canals are respectively direct and indirect offtakes of the Kumar River. Both are tidal, but there is no salinity intrusion. Tidal influence is greatest during the dry season. These canals supply smaller canals which connect with the floodplains.

Figure 2.1 Location of sampling sites within Satla-Bagda Polder 1

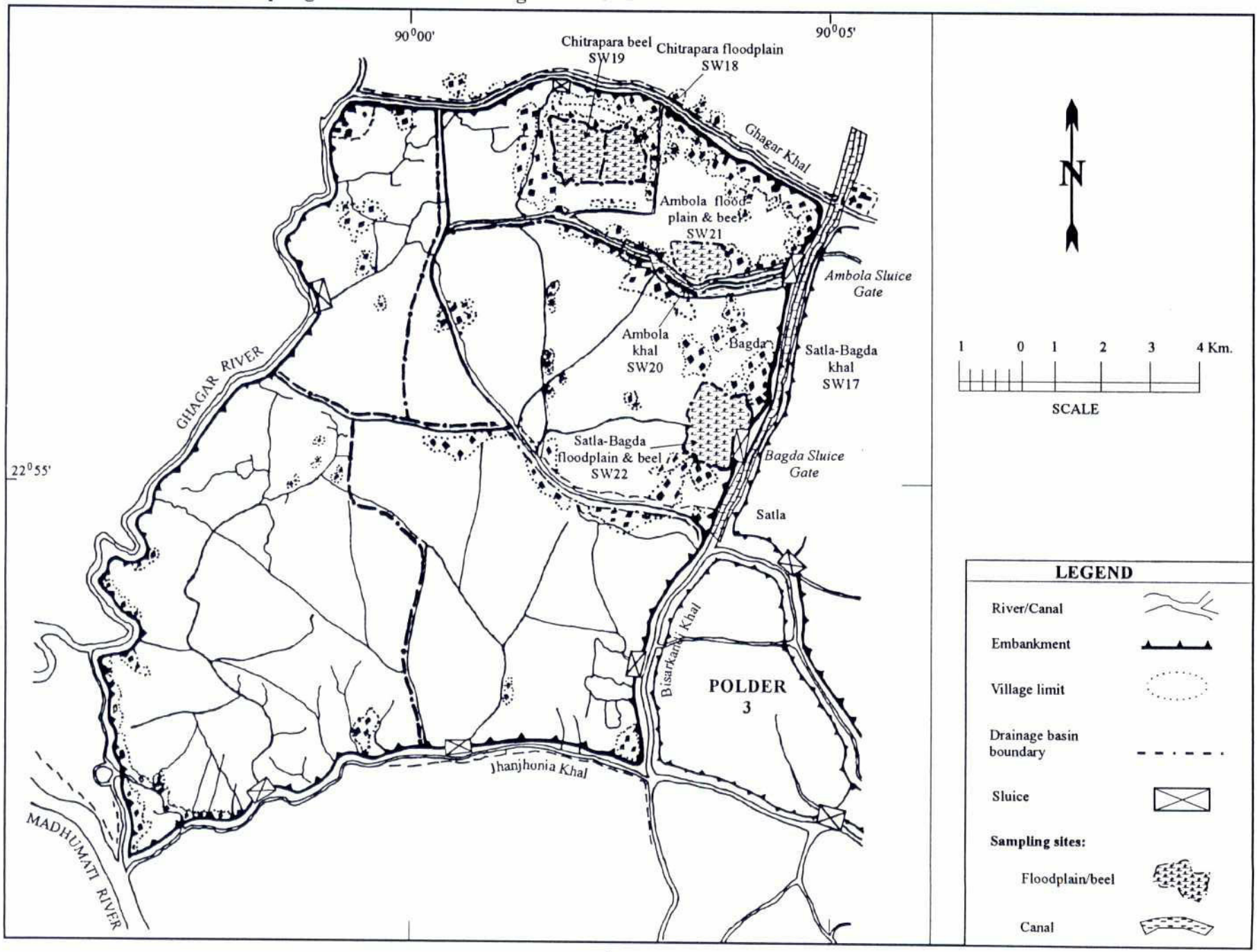
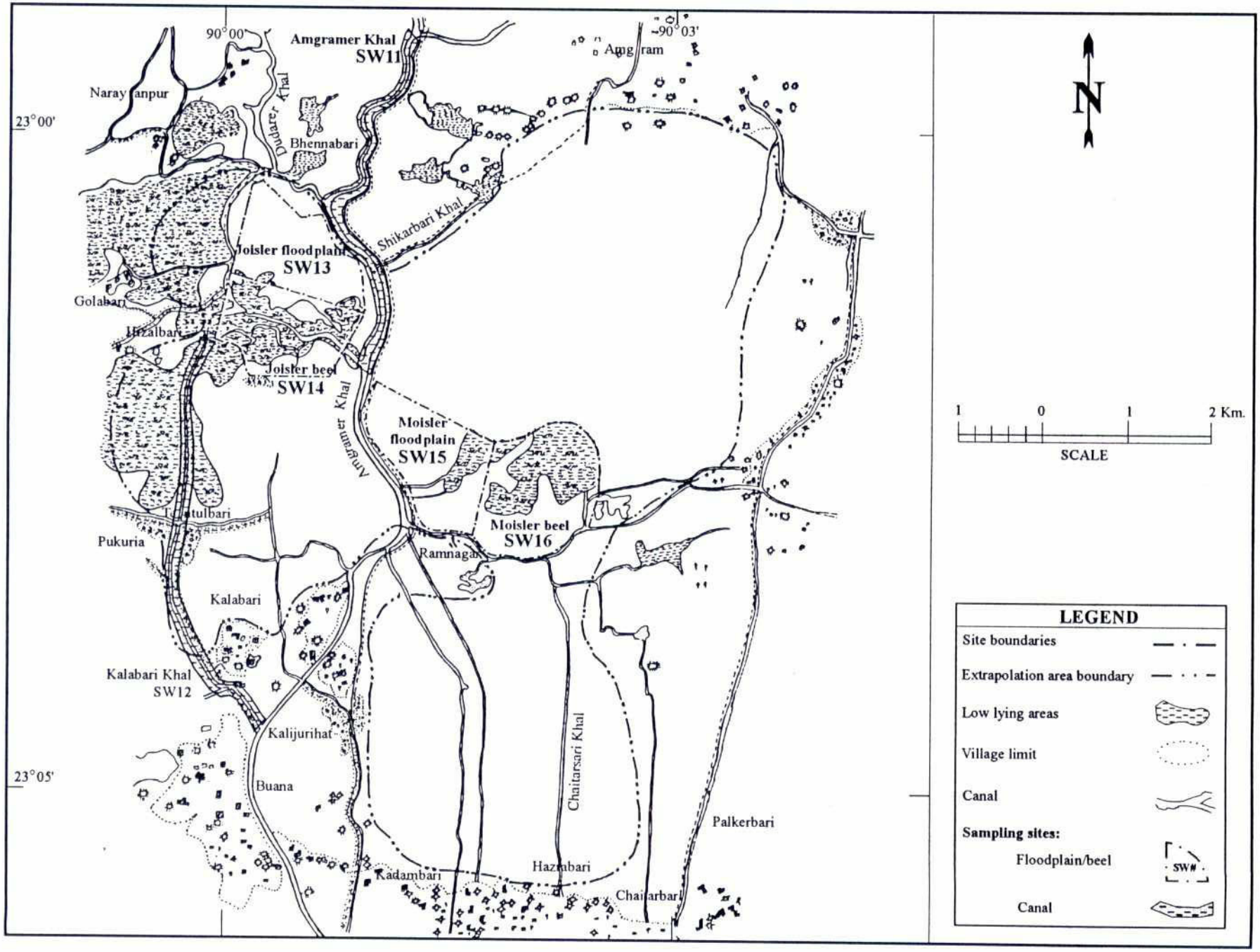


Table 2.1 Description of sampling sites

Site Code	Site Name	Habitat	In/Out CPP	Size	
				Area (ha)	Length (Km)
SW 01	Padma River	Main River	O		12.5653
SW 02	Arial Khan River	Secondary River	O		10.550
SW 03	Bhubaneswar River	Secondary River	O		5.400
SW 07	Kumar River	Secondary River	O		13.350
SW 11	Amgramer Khal	Canal	O		5.100
SW 12	Kalabari Khal	Canal	O		4.230
SW 17	Satla-Bagda Khal	Canal	O		9.680
SW 20	Ambola Khal	Canal	I		4.130
SW 13	Joisler Floodplain	Floodplain	O	1.245	
SW 15	Moisler Floodplain	Floodplain	O	1.479	
SW 18	Chitrapara Floodplain	Floodplain	I	1.030	
SW 21	Ambola Floodplain	Floodplain	I	1.070	
SW 22	Satla-Bagda Floodplain	Floodplain	I	2.020	
SW 14	Joisler Beel	Beel	O	1.130	
SW 16	Moisler Beel	Beel	O	1.704	
SW 19	Chitrapara Beel	Beel	I	1.490	

Figure 2.2 Location of sampling sites in Bagihar beel



3. HYDROLOGY

3.1 Outside the FCD Scheme

Within the control area, land heights of sampling sites ranged from 0.3 to 1.2m, which was similar to the levels of the broader surrounding area of Bagihar beel (0.3 -1.5 m).

The extent of the flood at each site was sketched by biologists each fortnight from April 1993, and water levels were measured from May onwards at fixed points covering a range of land heights within each site (Figs. 3.1 and 3.2).

Pre-monsoon rainfall flooding usually occurs between April and May. However in 1993, the year of study, heavy rainfall occurred unusually early, in February. In Bagihar beel this early rainfall had no effect on flooding patterns and its sites remained dry until further heavy rain in late March and early April caused partial flooding of low lying areas. During May most of the land was flooded and fishing activities began to increase.

During the period of pre-monsoon rainfall flooding, water drained off the floodplains into adjacent canals. This pattern was reversed in mid-June, when the first river floodwater reached the floodplain. The main source of river flooding of Bagihar beel was from the rising Padma River via the Arial Khan and Kumar Rivers into an intricate network of canals. Hydrography (Figs. 3.1 and 3.2) showed the flood peak levelling to a plateau during August, but again rising in September before the onset of the recession period between October and November.

3.2 Inside the FCD Scheme

Satla-Bagda Polder 1 is completely surrounded by water courses (Figs. 1.1 and 2.1). On its western boundary runs the Ghagar River, which is connected with the Madhumati River in the south and Amgramer khal draining Bagihar beel in the north. To the east, runs Satla-Bagda khal bisecting Polders 1 and 2. The southern boundary is formed by Jhanjhonia khal, directly connected with the tidal Swarupkati River system which runs southwards to form the Karchar River, ultimately flowing into the Bay of Bengal. A small canal forms the northern boundary between Poisa and Kotwalipara. The polder is interlaced with small canals and drainage ditches, the levels of which are still under tidal influence when regulator gates are

20

Figure 3.1 Area elevation curves of sampling sites

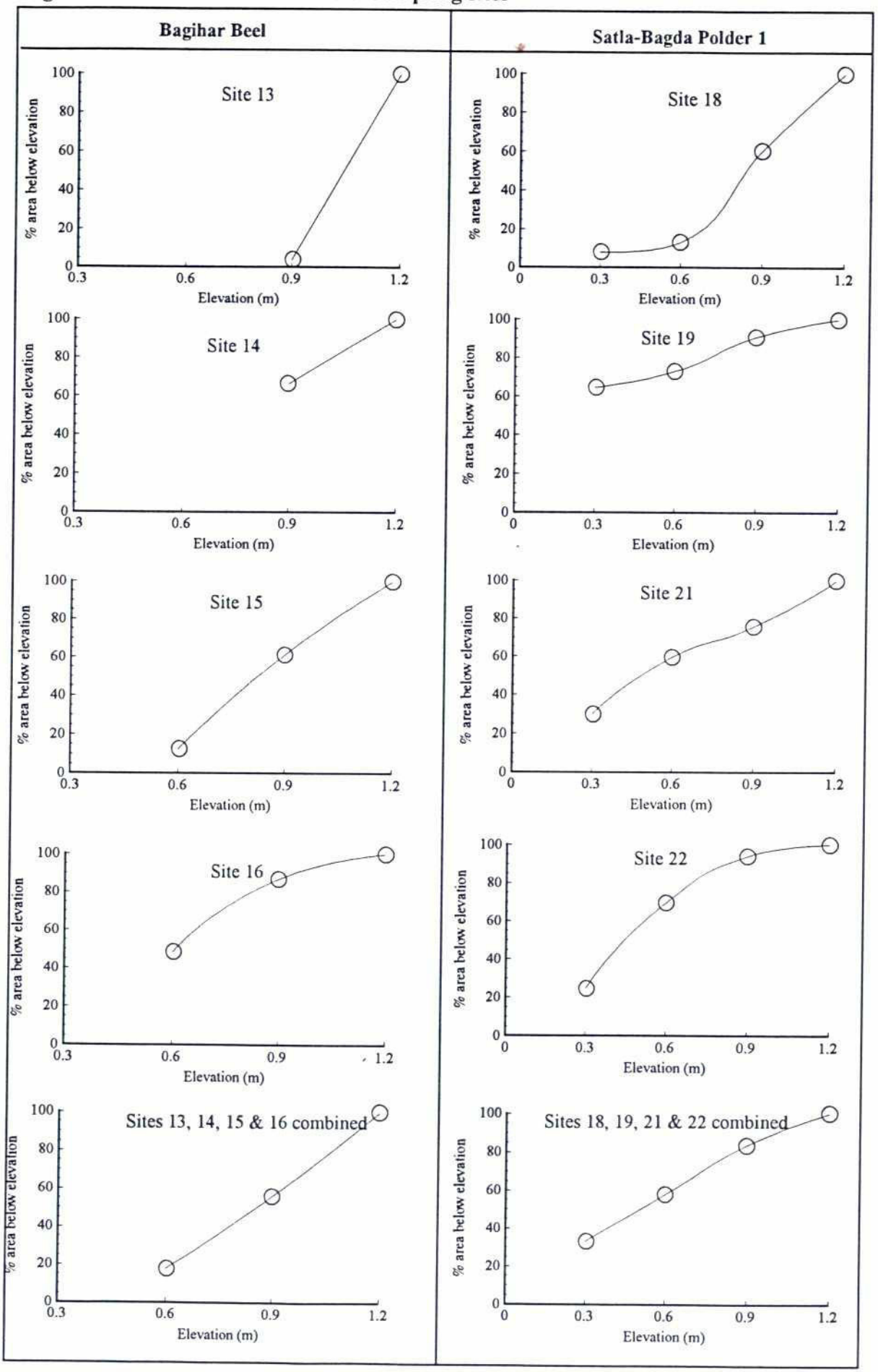
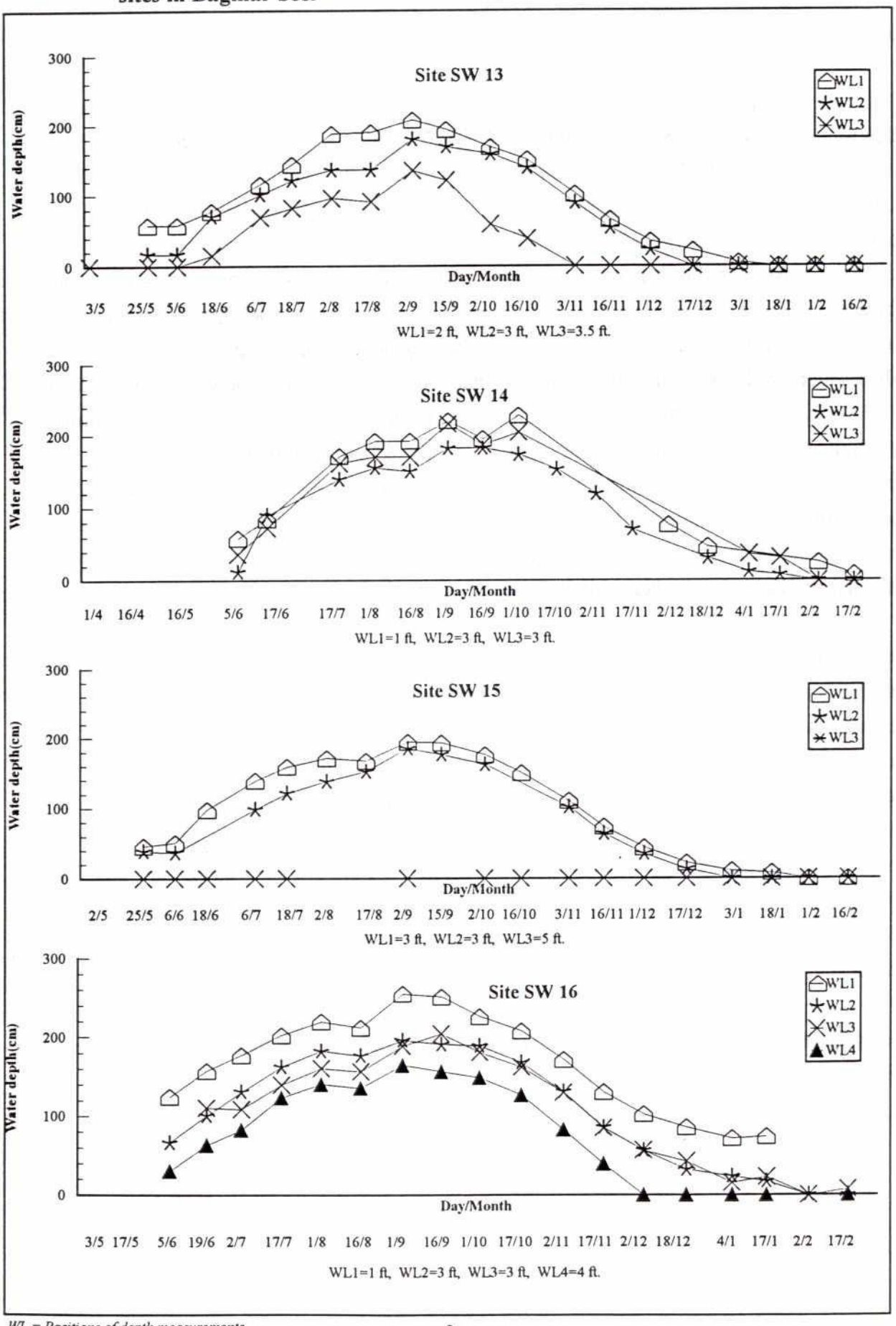


Figure 3.2 Seasonal variation in water depths at different land elevations within sampling sites in Bagihar beel



WL = Positions of depth measurements

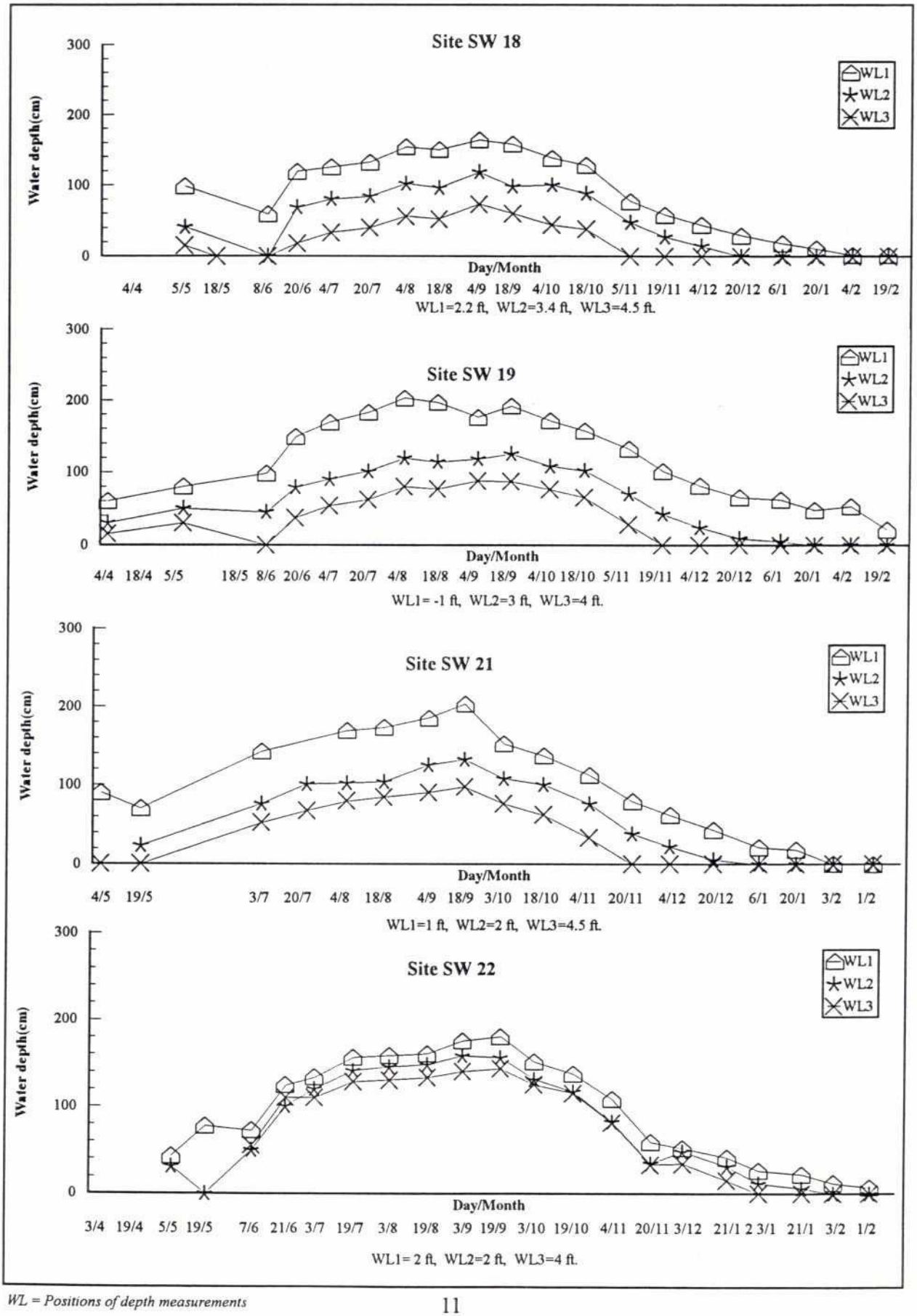
opened. Major canals of the scheme are directly linked to five main regulators, two of which were monitored in the present study. Ambola canal and Satla canal on the eastern embankment were studied.

The four floodplain sites chosen for study were located in two of five drainage basins identified by previous hydrological studies (NEDECO, 1980). The two basins comprised 39% of the total area of Polder 1. Land elevations of sampling sites within Polder 1 ranged from 0.3m below sea level to 1.2m above (Fig. 3.1). This height range covered about 85% of the total area of the scheme (NEDECO, 1980). Early pre-monsoon February rainfall had little effect on most sites, but a low-lying area in Chitrapara beel flooded, preventing the usual dry-season fishing of many kua (fish pits). Since much of this area is below sea-level, gravity flooding which occurred in April and May could only be drained during periods of low tide when water levels dropped in the adjacent canals outside the scheme. Between the first and third week of June a sharp rise in water levels was recorded (Fig. 3.3). However, in contrast to Bagihar beel sites, which were subject to free flooding through open canals, the embankment of Satla-Bagda prevented direct flooding from adjacent canals in June and July. At that time regulators were closed during high tide and opened only during low tide to drain water from the floodplain. The sharp rise in water levels, therefore, must have resulted from impeded drainage and further rainfall flooding.

Peak flooding stabilised during August, but rose again in September before receding in October and November, following the same pattern as free flooding sites in Bagihar beel. Between August and November floodwater from Satla-Bagda khal was allowed restricted entry to the floodplain during high tide periods through one of three or four gates in the two main regulators. During the same period water drained out of the regulators at low tide. Later, during the winter season (December 1993 - February 1994) daily tidal inflows of canal water were allowed through one gate in each regulator, followed by drainage out through three or four open gates at low tide. The operation of the Satla-Bagda regulator was suspended in February, when all gates were permanently closed to allow fishing by dewatering the canal system inside the scheme.

In comparison with flooding patterns in Bagihar beel, peak flooding depths inside the scheme were reduced by about 0.5 to 1.0 m.

Figure 3.3 Seasonal variation in water depths at different land elevations within sampling sites in Satla-Bagda Polder 1



WL = Positions of depth measurements

28

3.3 Impact of FCD Scheme

3.3.1 Flood source

In comparison with the free-flooding area of Bagihar beel, the Satla-Bagda Project reduced the contribution of river flooding (via canals) by preventing or restricting inflows of floodwater through regulators during the wet season (June - September). Thus, within the scheme most flooding was caused by rainfall, whereas in Bagihar beel river waters entering via canals which in places overspilled their banks greatly added to rainfall flooding between June and September.

3.3.2 Flood timing and duration

Few water level data are available relating to the pre-monsoon period, but additional information from site sketch maps of the flood extent indicate that there was little difference between flooding patterns of sites inside and outside the scheme during this period. The timing of the first rapid rise in water levels in June was also the same, although the water originated from different sources, as outlined above. Timing of the draw-down and overall duration of the flood were also similar inside and outside the scheme (Figs. 3.2 and 3.3).

3.3.3 Flood magnitude and extent

Data from hydrography and land elevation maps indicate that the magnitude of the flood was reduced by at least 0.5 metre inside Polder 1. The reduction in height of flooding had little effect on the areal extent of the flood, since all land except that occupied by villages and footpaths was submerged during 1993. Extensive flooding inside the scheme was predicted during previous feasibility studies (NEDECO, 1980). At that time it was stressed that due to high water levels in surrounding water courses it would not be possible to eliminate rainfall flooding by gravity drainage alone, (which is all that exists today), but that pumped irrigation facilities were necessary to prevent widespread inundation. This problem of rainfall inundation is reflected in the targeted crop production, which planned an allocation of 57% of cropland to B. aman, aus and late boro or early aus, and only 6.5% of the land devoted to T. aman.

4. RIVER FISHERIES

4.1 Sampling

Fishing activities in rivers, canals, floodplains and beel were monitored at fortnightly intervals between February 1993 and February 1994 using the sampling methods described in the FAP 17 Inception and Interim Reports. The following discussion deals with each habitat in turn when describing and inter-relating various features of fisheries inside Satla-Bagda Polder 1 and in the control area of Bagihar beel.

Although no rivers flowed directly through either the FCD scheme or Bagihar beel, adjacent rivers to the north (the Padma, Arial Khan, Bubaneswar and Kumar) were sampled because they supplied not only floodwaters, but possibly also fish, to the study areas through an extensive network of canals. Rivers to the south and west (the Swarupkati and Madhumati respectively) were not sampled due to logistical problems, time and manpower constraints.

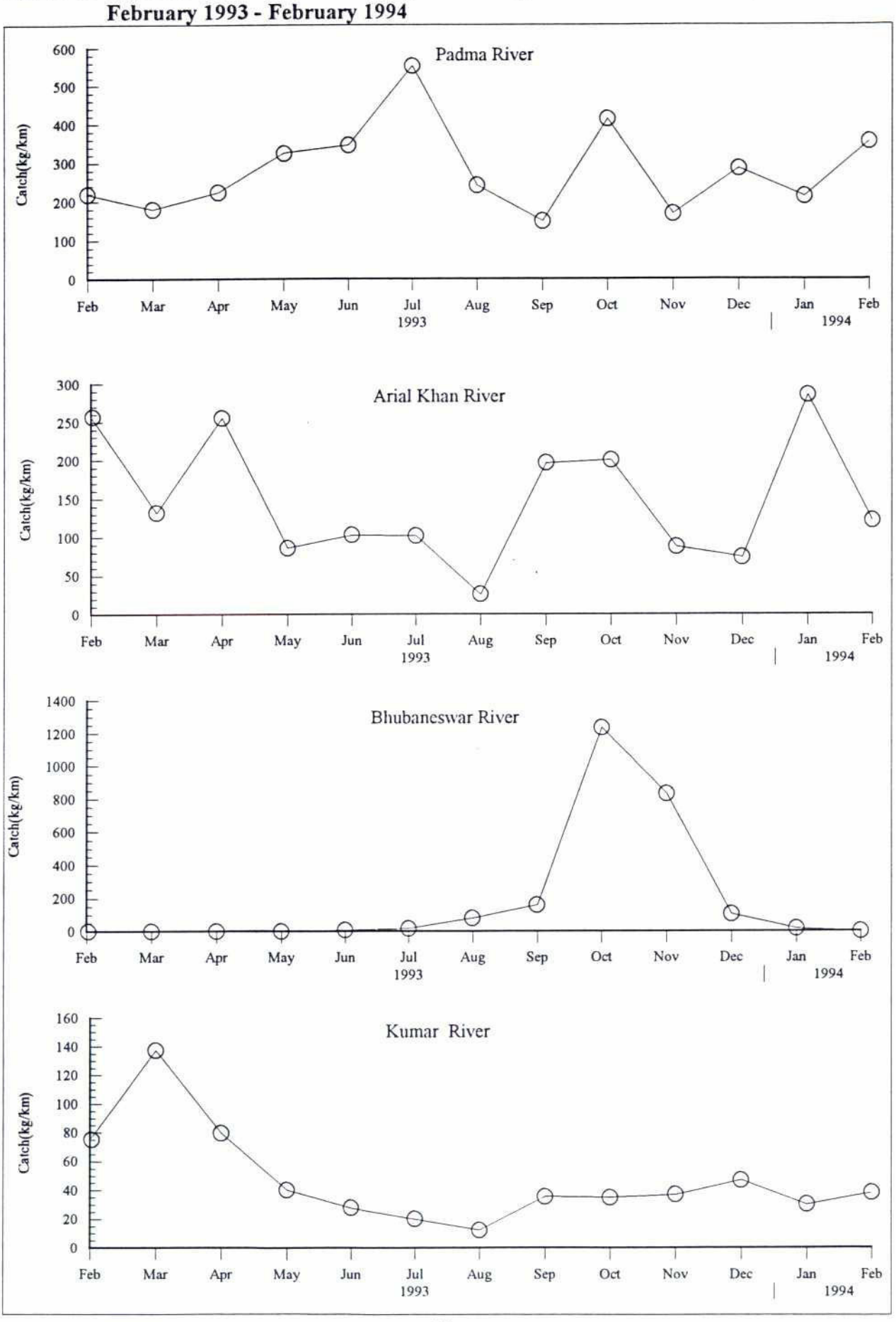
4.2 Total Catch

4.2.1 Pattern of catch

Catches from the Padma River showed much wider seasonal fluctuations than those from its distributaries (Fig. 4.1). Such large changes in monthly catches are typical of the principal rivers, the Padma and Jamuna, and are related to seasonal migrations of different fish species. A more detailed description and examination of the fisheries of these large rivers is presented in a separate report (Supporting Volume No. 10).

In the Arial Khan River, a large distributary of the Padma, catches again varied widely between months and to a greater degree than its own offtake rivers, the Bubaneswar and Kumar. In these the seasonal patterns of catch were totally dissimilar. Peak catches were observed during the flood drawdown in the Bubaneswar, dropping to zero in the winter when the river dried up completely. In contrast, the Kumar is a perennial river which, oddly, did not exhibit major increases in catch during the drawdown. Instead, maximum catches were recorded in the winter period of 1993. The reasons for this remain unclear, but this pattern of catch does not conform to that found in most other rivers studied in the North Central and North West Regions.

Figure 4.1 Seasonal variation in the catch per unit length of rivers in the SWR, February 1993 - February 1994



4.2.2 Size of Catch

The highest catches (expressed in kg/km) were recorded in the Padma River (Table 4.1), followed by the Bubaneswar. In the latter, the high catches were a function of the seasonal nature of this river, which facilitated heavy fishing pressure on fish trapped in disconnected ponds during the drawdown. Despite the Arial Khan being a much larger river than the Bubaneswar, catches were lower per unit length. The lowest annual catch was found in the Kumar. The differences in catch between this river and the Bubaneswar are probably the result of the seasonality of the latter and the perennial nature of the former.

Table 4.1 Annual Catch Per Unit Length of Rivers: (March 1993 - February 1994) Outside Polder

Site	Name	Catch (kg/km)
01	Padma	3,454
02	Arial Khan	1,667
03	Bubaneswar	2,451
04	Kumar	541

Note: Only half the width of the Padma River was sampled. Therefore the estimate of catch refers only to the right bank.

4.3 Pattern of Fishing

4.3.1 Catch by gear

Dominant gears, which together captured at least 90% of the total annual catch by weight on each river, are listed in Table 4.2. Details of the catch of all gears recorded on rivers are presented in Tables 4.3 - 4.6.

Clear differences can be seen between rivers. The fisheries on the largest river, the Padma, were dominated by drifting gears, particularly the shangla jal and gill nets such as the chandi and kajuli jal and to a lesser extent ber jal and moi jal. With increasing distance away from the main river, drifting gears declined in importance. On the Arial Khan they contributed 10% to the total catch mainly through the shangla jal, whereas on the Bubaneswar and Kumar Rivers they did not appear at all in the list of dominant gears. Instead, on the Arial Khan and Kumar, which are perennial rivers, ber jal and moi jal predominated, together with

2K

Table 4.2 Percentage of total annual catch taken by dominant gears used in rivers in the SWR, March 1993 - February 1994

Gear Name	Padma	Arial Khan	Bubaneswar	Kumar
	%	%	%	%
Shangla jal	50	9		
Ber jal	20	21	7	36
Chandi jal	8			
Moi jal	7	10	2	8
Kajuli jal	3			
Veshal	2	15	43	
Thella jal		10	5	9
Doiar		8		8
Daun		8		8
Katha		4		9
Konaber jal		4		
Jhaki jal		3	15	11
Dhor jal			2	
Hand fishing			16	
Sip				5
Total No. of gear types used	21	20	15	15

small-scale gears such as traps, thella jal, jhaki jal and daun (long-lines)(Tables 4.4 and 4.5).

Table 4.3 Percentage total monthly catch by gear type: River Padma(Site SW01)

Gear Code	Gear name(Bengali)	Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		February	March	April	May	June	July	August	Septembe	October	Novembe	Decembe	January	February	Kg	%
234	Shangla jal	–	–	24.782	7.463	30.415	73.519	93.854	92.903	–	26.373	–	–	–	46096.124	51.939
45	Ber jal	52.467	56.288	60.640	–	–	–	–	–	–	53.107	47.127	53.449	57.259	16296.954	18.363
65	Chandi jal	–	–	–	1.084	64.703	–	–	–	–	–	–	–	–	7898.701	8.900
202	Moi jal	10.552	29.829	8.975	47.108	1.405	0.372	0.325	–	3.238	4.784	21.608	7.446	23.471	6027.497	6.791
316	Kajuli jal	5.439	0.319	0.780	–	–	–	–	–	1.669	10.130	24.203	12.203	4.896	2350.413	2.648
315	Par jal	–	–	–	–	0.379	0.397	–	–	–	–	1.739	9.004	5.722	1342.537	1.513
266	Veshal	8.251	6.567	3.299	11.198	0.065	–	–	–	6.150	1.781	3.397	10.980	1.014	1304.038	1.469
263	Ucha	14.262	–	–	–	0.249	5.122	2.487	1.113	9.033	–	–	–	–	1199.222	1.351
95	Doiar trap	–	–	–	–	–	9.072	1.399	1.351	9.647	–	–	–	–	1150.144	1.296
164	Jhaki jal	0.518	0.627	1.492	0.909	1.888	1.373	0.603	0.208	23.349	0.324	1.608	–	0.550	1050.171	1.183
282	Current jal (drifting)	8.512	6.370	–	4.484	0.327	0.840	0.301	0.879	4.009	0.118	0.209	1.143	3.037	1028.518	1.159
89	Dhor jal	–	–	–	4.883	0.043	6.482	0.435	1.752	1.017	–	–	–	–	756.267	0.852
105	Dharma jal	–	–	–	6.975	0.055	0.301	0.247	0.950	7.770	3.236	0.110	–	–	520.720	0.587
88	Current jal (Stationary)	–	–	–	–	–	–	–	–	20.129	–	–	1.221	1.204	490.092	0.552
30	Sip	–	–	0.031	15.897	0.014	2.250	0.046	0.247	–	0.147	–	–	–	300.052	0.338
123	Koi jal	–	–	–	–	–	–	–	–	–	–	–	–	2.604	284.228	0.320
268	Konaber jal	–	–	–	–	–	–	–	–	–	–	–	4.555	0.243	207.847	0.234
307	Hand fishing	–	–	–	–	–	–	–	–	12.820	–	–	–	–	197.470	0.222
287	Hat tana	–	–	–	–	0.131	0.219	0.014	0.597	0.510	–	–	–	–	127.033	0.143
272	Daun	–	–	–	–	0.040	0.052	0.290	–	–	–	–	–	–	77.846	0.088
255	Thella jal	–	–	–	–	0.288	–	–	–	–	–	–	–	–	35.100	0.040
149	Horgra	–	–	–	–	–	–	–	–	0.660	–	–	–	–	10.168	0.011
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	88751.1	100.0

Table 4.4 Percentage total monthly catch by gear type: Arial Khan River(Site SW02)

Gear Code	Gear name(Bengali)	Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		February	March	April	May	June	July	August	Septembe	October	Novembe	Decembe	January	February	Kg	%
266	Veshal	21.6940	–	–	–	–	–	–	–	–	–	15.7150	56.2380	56.3850	2535.0060	14.4174
45	Ber jal	63.5390	25.3780	36.3640	–	–	–	–	–	–	9.0821	22.6780	24.3070	9.4386	2443.7580	13.8984
255	Thella jal	–	–	–	3.2751	15.5480	45.3530	38.5560	4.3773	53.5860	2.3786	–	–	–	2032.3860	11.5588
202	Moi jal	7.9501	29.2720	26.8800	23.8180	11.8830	1.7478	9.5759	0.2160	1.2989	15.0930	–	2.5062	4.9233	1828.5550	10.3996
234	Shangla jal	–	–	–	–	1.3334	6.3423	27.7600	72.9140	4.9611	–	–	–	–	1771.9390	10.0776
95	Doiar trap	–	–	1.3974	43.0800	60.2560	27.1860	22.7460	7.2380	0.8692	–	–	–	–	1601.6180	9.1089
272	Daun	0.1863	20.4810	3.7213	10.1090	5.2521	17.2740	–	6.7125	4.2402	4.1361	41.9260	5.7862	5.7017	1559.5280	8.8695
270	Katha	–	8.8555	–	–	0.2045	–	–	–	–	32.1420	8.1151	9.2200	8.1859	867.9660	4.9364
268	Konaber jal	0.8483	4.4216	23.8100	2.6361	–	–	–	–	–	–	–	–	–	725.5910	4.1267
164	Jhaki jal	0.2060	–	0.5989	5.7289	3.1862	0.4950	–	4.6698	12.9010	23.8030	0.9362	–	–	703.9110	4.0034
30	Sip	2.8000	1.5549	6.1919	10.6130	1.5057	–	–	0.1432	2.1294	5.5604	8.9219	1.9420	5.0015	591.6320	3.3648
296	Tukri	–	–	–	–	0.8314	1.6018	1.3627	2.8031	12.6500	–	–	–	–	354.6740	2.0171
282	Current jal (drifting)	2.7866	10.0370	0.8795	0.7391	–	–	–	–	–	1.7639	0.8974	–	–	193.2610	1.0991
105	Dharma jal	–	–	–	–	–	–	–	0.9260	6.5534	2.5852	–	–	–	181.2680	1.0309
68	Uttar jal	–	–	–	–	–	–	–	–	–	–	–	–	10.3640	132.3000	0.7524
152	Tana barsi	–	–	–	–	–	–	–	–	–	3.3343	–	–	–	30.8390	0.1754
307	Hand fishing	–	–	–	–	–	–	–	–	0.8107	–	–	–	–	17.0960	0.0972
88	Current jal (Stationary)	–	–	–	–	–	–	–	–	–	0.0266	0.7793	–	–	6.3240	0.0360
123	Koi jal	–	–	0.1574	–	–	–	–	–	–	–	–	–	–	4.2340	0.0241
315	Par jal	–	–	–	–	–	–	–	–	–	0.0948	0.0298	–	–	1.1100	0.0063
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	17582.9960	100.0

Table 4.5 Percentage total monthly catch by gear type:Kumar River(Site SW07)

Gear		Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
Code	Gear name(Bengali)	February	March	April	May	June	July	August	Septembe	October	Novembe	Decembe	January	February	Kg	%
45	Ber jal	87.494	70.9050	21.4660	–	–	–	–	–	–	–	29.2370	60.6900	20.8940	2063.1000	28.5872
164	Jhaki jal	0.3555	2.0128	13.2030	42.5410	18.7770	5.1999	22.1160	4.5006	42.4970	29.6250	1.6720	8.8151	–	939.4200	13.0170
255	Thella jal	–	–	–	6.8614	21.4380	76.5790	31.0890	28.0560	40.4580	4.7670	–	–	–	718.6170	9.9575
270	Katha	6.0151	4.5774	5.8387	5.2025	–	–	–	–	–	23.6380	40.0940	3.3720	20.5000	660.0180	9.1455
95	Doiar trap	–	–	0.9413	14.6740	59.7850	5.5360	44.1740	47.0690	4.1134	–	–	–	–	642.4640	8.9023
202	Moi jal	1.409	7.3024	16.8270	17.2210	–	4.7189	2.6215	–	1.3358	17.4910	–	7.7736	15.5330	625.7470	8.6706
272	Daun	0.7375	8.2791	15.9650	1.9971	–	–	–	–	–	–	0.1768	16.2860	43.0730	617.7990	8.5605
30	Sip	1.1672	0.7637	14.1810	7.2922	–	4.4337	–	–	1.5600	24.4780	12.3680	3.0631	–	434.4010	6.0193
266	Veshal	–	–	11.5770	–	–	–	–	–	–	–	16.4520	–	–	226.3480	3.1364
307	Hand fishing	–	–	–	2.5688	–	–	–	9.5297	2.2301	–	–	–	–	69.5850	0.9642
282	Current jal (drifting)	1.4922	3.6785	–	–	–	–	–	–	–	–	–	–	–	67.5050	0.9354
263	Ucha	–	–	–	–	–	1.0582	–	5.5248	7.8055	–	–	–	–	65.5630	0.9085
285	Thaga	1.2514	2.4813	–	–	–	–	–	–	–	–	–	–	–	45.5340	0.6309
296	Tukri	–	–	–	–	–	2.4746	–	5.3194	–	–	–	–	–	31.9140	0.4422
152	Tana barsi	0.0777	–	–	1.6418	–	–	–	–	–	–	–	–	–	8.8450	0.1226
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	7216.86	100.0

Table 4.6 Percentage total monthly catch by gear type: Bhubaneswar River(Site SW03)

Gear Code	Gear name(Bengali)	Year: 1993							Year: 994	Total annual catch (Mar'93 – Feb'94)	
		June	July	August	September	October	November	December	January	Kg	%
266	Veshal	–	–	50.9200	66.8110	64.2740	15.0870	–	–	5756.39	43.4845
307	Hand fishing	–	–	–	–	0.0692	35.5610	90.7640	22.7890	2133.09	16.1137
164	Jhaki jal	–	–	25.3710	14.4500	19.5060	10.0540	–	67.5190	2047.16	15.4645
45	Ber jal	–	–	–	–	1.7196	19.5390	–	–	990.435	7.4819
255	Thella jal	–	–	–	0.7958	3.6520	9.4892	–	–	675.426	5.1022
202	Moi jal	–	73.8440	9.2328	5.4471	2.2339	–	–	–	306.012	2.3117
89	Dhor jal	–	–	–	4.1923	3.1252	0.9418	–	–	286.744	2.1661
88	Current jal (Stationary)	–	–	1.2442	–	4.0781	–	–	–	276.825	2.0912
263	Ucha	–	–	6.2152	5.2200	0.8147	2.3368	2.1495	5.6155	248.658	1.8784
95	Doiar jal	–	6.7363	3.5952	0.6502	–	2.5855	7.0862	4.0768	187.336	1.4152
30	Sip	65.3200	19.4200	2.0079	2.4330	0.5273	0.8913	–	–	151.265	1.1427
298	Akra	–	–	–	–	–	2.2870	–	–	102.528	0.7745
271	Suti jal	28.6200	–	–	–	–	1.1712	–	–	64.747	0.4891
272	Daun	–	–	1.4143	–	–	–	–	–	6.111	0.0462
278	Nol barsi	6.0606	–	–	–	–	–	–	–	2.592	0.0196
314	Boat katha	–	–	–	–	–	0.0552	–	–	2.477	0.0187
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	13237.817	100.0

4.3.2 Catch by gear by month

On the Padma River, 21 types of gears operated, of which only 6 contributed 90% of the catch (Table 4.3). The shangla jal captured 50% of the total catch and was responsible for a sharp increase in catches during August and September. This coincided with the upstream migration of *Hilsa* (ilish), which this gear targets. At this time shangla jal took 93% of the monthly catches. During the dry seasons of 1993 and 1994, when charland was exposed in the river, ber jal and moi jal provided the bulk of the peak catches in February each year, by concentrating fishing effort on these shallow banks.

On the Arial Khan 20 different gears were recorded, of which 10 contributed 90% of the total catch (Table 4.4). High catches were observed in February 1993, largely resulting from ber jal capturing kachki and bailla. The catch dropped in March, but a further peak was seen in April, when ber jal were joined by moi jal and konaber jal, this time taking not only kachki and bailla but also prawns, pangas and ilish. A period of low catches began at the start of the rising flood in May through to the full flood in August, when catches decreased to a monthly minimum before rising very steeply later in August as a result of the appearance of migratory ilish and its associated shangla jal fishery. Catches remained high in September. However the shangla fishery almost disappeared in this month, to be replaced by thella jal and jhaki jal catching mainly prawns and, to a lesser extent, khorsula. Catches then declined considerably in November and December, when small-scale gears such as juti (spears), daun and jhaki jal became more important. A winter peak catch was again repeated in January 1994, when veshal and ber jal once again captured mainly kachki and prawns.

Seasonal trends in fisheries on the Bubaneswar River were very clear due to the enormous hydrological change from a river in full spate in September to a desiccated sandy channel in February. Here, fisheries expanded dramatically during the drawdown. First veshal predominated in October. These were joined in November by hand fishing and, to a lesser degree, by doiar traps and thella jal (Table 4.6). By February 1994 the river no longer supported fishing activity.

The Kumar River supported the same number of different gear types as the Bubaneswar, i.e. 15, but differed in gear dominance and seasonality. High catches during February and March 1993 were due to ber jal targeting kachki, in the same way they did on the Arial Khan

in February. Catches remained high in April, but the ber jal were joined by moi jal and daun as dominant gears, catching not only kachki but more bailla and prawns. The same pattern was also observed on the Arial Khan, as too was the later decline in catches from May to August followed by a further rise again in September. In the Kumar, this rise was not great, and catches remained fairly steady, but with a further slight rise in December resulting from the capture of major carps in katha and ber jal.

4.4 Biodiversity and Species Composition

4.4.1 Species richness

A total of 76 species were recorded from the Padma River between February 1993 and February 1994, compared with 71 species in each of the Arial Khan and Kumar Rivers and 62 in the Bubaneswar. (Tables 4.7 - 4.10).

Clear seasonal patterns in the variation in total number of species were recorded in each river (Fig. 4.2). The most obvious trend seen in all rivers was the sharp rise in the number of species captured during the drawdown, when many fish migrate from the receding waters on floodplains to the shelter of large rivers. In the perennial rivers, Arial Khan and Kumar, the number of species decreased progressively after the drawdown. This suggests that some species either move out into the larger rivers, upstream to the Padma or downstream to the Meghna estuary, or else become so scarce that they are not detected in sampled catches. A slight decrease in species number was also seen in the Padma River following the flood recession.

4.4.2 Species Composition

Examination of data in Tables 4.7 to 4.10 reveals a number of important points. Prawns (species unidentified) comprised the major proportion of the riverine catch from perennial rivers (30% in the Arial Khan and Kumar). They also formed an important component of the catch (8%) in the Padma River and the small seasonal Bubaneswar River. *Hilsa* ran up the Padma and Arial Khan and contributed 53% and 14% of the total annual catch respectively, but comprised up to 94% of the monthly Padma catches during its breeding run in August and September. In smaller rivers, such as the Kumar and Bubaneswar, ilish was much less significant.

Table 4.7 Monthly species composition (% by weight): River Padma(Site SW01)

Species	Species name		Year: 1993											Year: 1994		Total actual catch (Mar'93 – Feb'94)	
Code	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
89	*Hilsa ilisha*	*Ilish*	14.2710	9.8693	3.7471	1.2242	36.0800	74.8170	94.0180	93.7840	16.9570	2.5774	5.4721	0.4198	6.1972	46937.1	52.8863
500	*Platanicus Gangeticus*	*Sishu*	–	–	–	–	59.5920	–	–	–	–	–	–	–	–	7266.59	8.1876
931	Prawn spp.	Chingri/Icha	8.2138	21.9870	7.1781	48.6610	2.6831	12.5010	3.8380	2.1184	23.4870	5.1019	19.4850	1.5295	11.0720	6908.47	7.7841
185	*Rhinomugil corsula*	*Khorsula*	13.7650	11.8530	11.4090	9.7947	0.4633	0.3025	0.4521	1.5466	8.4982	3.7091	8.9789	20.4990	26.1350	4810.81	5.4206
83	*Glossogobius giurus*	*Bailla*	23.8840	7.6277	8.4764	19.9830	0.1774	2.3034	0.4223	0.4193	2.8155	2.8763	8.0020	16.5630	26.6340	4561.78	5.1400
2	*Ailia coila*	*Kajuli*	4.5638	0.5119	0.5971	1.5805	0.4816	2.2570	0.1057	0.1617	2.1394	22.2310	14.5800	8.5152	4.0724	2991.26	3.3704
58	*Corica soborna*	*Kachki*	19.3390	33.7830	21.9550	0.5938	0.0019	0.0068	0.0025	–	–	0.1743	2.0003	0.2349	2.0338	2356.03	2.6547
51	*Clupisoma garua*	*Ghaura*	1.3844	2.4206	5.8199	6.0423	0.1907	0.6655	0.2966	0.2900	3.3438	16.4810	16.6610	0.2072	0.2617	1663.00	1.8738
10	*Apocryptes bato*	*Chiring*	–	0.3956	0.1777	–	0.0755	0.1048	–	–	–	0.0335	0.2942	5.6300	12.7340	1541.27	1.7366
135	*Aorichthys seenghala*	*Guizza*	–	–	–	–	–	–	–	–	–	26.3730	–	–	–	1086.31	1.2240
158	*Pangasius pangasius*	*Pangas*	–	–	24.7820	3.6221	0.0014	–	–	–	0.0148	0.3067	–	–	–	885.159	0.9973
196	*Silonia silondia*	*Shillong*	0.7629	2.3021	10.7680	1.4606	0.0151	0.0690	0.1174	0.3207	6.7571	3.0539	4.4727	0.0075	–	877.996	0.9893
16	*Bagarius bagarius*	*Baghair*	–	–	–	–	–	–	0.0945	–	–	–	–	–	0.5826	826.697	0.9315
188	*Salmostoma bacaila*	*Katari*	0.8649	–	–	0.2528	0.0033	0.0750	0.0251	0.3454	0.5832	0.1506	0.7136	24.9200	0.0466	826.398	0.9311
86	*Gudusia chapra*	*Chapila*	2.4908	1.4468	0.8613	0.6879	–	–	–	–	0.0952	5.4923	5.2875	1.5388	0.4478	743.394	0.8376
189	*Salmostoma phulo*	*Fulchela*	6.6300	4.9670	1.9597	0.1226	–	0.0204	–	–	0.0037	0.0550	0.6602	0.6416	4.5772	706.112	0.7956
81	*Gagata youssoufi*	*Gang tengra*	0.3148	0.3120	0.0729	0.4878	0.0074	0.0204	0.0409	0.0740	–	2.6132	5.8082	1.3711	0.7369	469.651	0.5292
130	*Aorichthys aor*	*Ayre*	–	–	–	0.5226	0.0296	0.2671	0.0683	0.2552	3.5403	1.6212	0.1389	0.4904	–	438.876	0.4945
155	*Pama pama*	*Poa*	0.0426	–	0.0442	0.8834	0.0498	–	–	0.0249	–	5.5965	1.1079	0.5077	0.4809	351.109	0.3956
48	*Cirrhinus reba*	*Raik*	–	–	1.8446	1.2760	–	0.0987	0.1085	–	5.4101	0.3325	0.3295	0.2688	1.2016	331.17	0.3731
175	*Puntius conchonius*	*Canchan puti*	–	0.1760	0.0040	0.0749	0.0009	0.2371	0.0085	0.0234	1.2108	0.1094	0.8678	6.0253	0.1954	317.313	0.3575
13	*Aspidoparia morar*	*Piali*	0.2197	1.8258	0.0812	–	0.0023	0.0068	0.0175	–	0.0237	0.0226	–	5.1940	0.2949	258.35	0.2911
102	*Labeo calbasu*	*Kalbaus*	–	–	–	–	–	–	0.0154	–	12.8870	–	–	–	–	201.212	0.2267
30	*Brachygobius nunus*	*Nunabailla*	0.5177	0.4865	0.0951	0.1743	0.0230	0.0473	0.0355	–	–	0.0030	0.6959	0.8130	1.1980	193.724	0.2183
180	*Puntius sophore*	*Puti*	–	–	–	0.1743	0.0131	2.6084	–	0.0307	0.5622	0.0045	–	1.4903	0.0587	192.379	0.2168
193	*Setipinna phasa*	*Phasa*	0.0984	0.0237	0.0040	0.7304	0.0663	–	–	–	0.4491	0.2344	0.9015	0.5430	0.0433	109.788	0.1237
132	*Mystus cavasius*	*Kabashi*	–	–	–	–	–	0.1477	0.0273	–	1.1105	0.2089	0.4860	–	0.3647	88.86	0.1001
186	*Rita rita*	*Rita*	–	–	–	0.4529	0.0041	0.9308	0.1280	–	0.0381	0.0594	–	–	0.0087	86.272	0.0972
76	*Eutropiichthys vacha*	*Bacha*	–	–	–	0.6047	0.0370	–	–	–	1.7744	0.0230	0.0518	0.5131	0.1330	78.644	0.0886
59	*Crossocheilus latius*	*Kalabata*	–	–	–	–	–	–	–	–	–	0.3359	1.3452	0.1073	0.0976	72.104	0.0812
41	*Channa punctatus*	*Taki*	–	–	–	0.4537	–	0.6370	0.0400	0.0606	0.8680	–	–	–	–	67.524	0.0761
42	*Channa striatus*	*Shol*	–	–	–	–	–	0.2319	–	0.3326	–	–	–	–	–	61.183	0.0689
32	*Catla catla*	*Catla*	–	–	–	–	–	0.5490	0.0924	–	–	–	–	–	–	50.173	0.0565
122	*Mastacembelus armatus*	*Baral baim*	–	–	–	–	–	0.1053	–	–	2.0301	0.0197	–	0.1748	0.0175	43.184	0.0487
36	*Chanda nama*	*Nama Chanda*	–	–	–	–	0.0005	0.0136	0.0025	0.0246	0.0334	0.0217	0.0425	0.4262	0.0118	32.607	0.0367
210	*Xenentodon cancila*	*Kaikka*	0.7140	–	–	–	–	–	–	–	0.0186	0.0161	0.2555	0.6994	0.0218	30.048	0.0339
79	*Gagata nangra*	*Gang tengra*	–	–	–	–	–	–	–	–	–	0.0076	0.0943	0.1638	0.0841	25.785	0.0291
202	*Taenioides buchanani*	*Raja chewa*	–	–	0.0601	–	–	–	–	–	–	–	0.7822	–	–	24.772	0.0279
123	*Macrognathus pancalus*	*Guchi*	–	–	–	0.0216	–	0.0341	–	–	0.1251	0.0121	–	0.2076	0.1576	24.17	0.0272
104	*Labeo gonius*	*Goni*	–	–	–	–	–	0.0555	–	–	1.3760	–	–	–	–	23.888	0.0269

Table 4.7 Monthly species composition (% by weight): River Padma(Site SW01) (Cont.)

Species	Species name		Year: 1993											Year: 1994		Total actual catch (Mar'93 – Feb'94)	
Code	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
147	*Ompok bimaculatus*	*Kani pabda*	–	–	–	–	–	–	–	–	1.5313	–	–	–	–	23.465	0.0264
28	*Botia dario*	*Rani*	0.2462	0.0107	–	–	–	–	–	–	–	–	0.0243	0.1512	0.0073	13.248	0.0149
131	*Mystus bleekeri*	*Golsha tengra*	–	–	–	–	–	–	0.0068	–	0.6791	–	–	–	–	12.068	0.0136
55	*Colisa fasciatus*	*Khalisha*	–	–	–	–	–	0.1055	0.0050	0.0176	0.1518	–	–	–	–	11.494	0.0130
37	*Chanda ranga*	*Lal chanda*	0.1449	–	–	0.0175	–	0.0136	0.0116	0.0246	0.1746	–	–	–	0.0108	10.954	0.0123
212	*Puntius ticto*	*Tit puti*	–	–	–	–	–	0.0068	0.0041	0.0246	0.1191	0.0030	0.0063	0.0664	0.0002	9.406	0.0106
44	*Chela laubuca*	*Kash Khaira*	–	–	–	–	–	–	–	0.0493	–	–	0.0212	–	0.0006	8.611	0.0097
43	*Chela cachius*	*Chep Chela*	–	–	0.0341	0.0347	–	0.0341	–	–	0.0334	0.0330	0.0425	–	0.0216	7.898	0.0089
169	*Pseudeutropius atherinoides*	*Batasi*	–	–	–	–	–	0.0136	–	–	–	0.0137	0.1490	–	0.0216	7.222	0.0081
5	*Amblypharygodon mola*	*Mola*	–	–	–	–	–	0.1093	0.0050	–	0.0148	–	–	–	–	6.968	0.0079
39	*Channa marulius*	*Gajar*	–	–	–	–	–	0.1357	–	–	–	–	–	–	–	6.852	0.0077
88	*Heteropneustes fossilis*	*Shingi*	–	–	–	–	–	0.0534	–	0.0251	–	–	–	–	–	6.438	0.0073
75	*Esomus danricus*	*Darkina*	–	–	–	–	–	0.0136	–	0.0246	0.0983	–	–	–	–	5.865	0.0066
35	*Chanda baculis*	*Chanda*	–	–	–	–	–	–	–	–	0.2256	–	0.0267	0.0526	–	5.731	0.0065
187	*Osteobrama cotio cotio*	*Keti*	–	–	–	–	–	0.0136	–	–	0.0717	0.0537	–	–	0.0216	5.633	0.0063
100	*Labeo bata*	*Bata*	–	–	–	–	–	–	0.0098	–	0.2004	–	–	–	–	5.452	0.0061
209	*Wallagu attu*	*Boal*	–	–	–	–	–	0.0957	–	–	–	–	–	–	–	4.834	0.0054
6	*Anabas testudineus*	*Koi*	–	–	–	–	–	0.0781	–	–	–	–	–	–	–	3.945	0.0044
184	*Rasbora rasbora*	*Leuzza darkina*	–	–	–	–	–	–	–	–	0.2563	–	–	–	–	3.928	0.0044
121	*Macrognathus aculeatus*	*Tara baim*	–	–	–	–	–	0.0750	–	–	–	–	–	–	–	3.789	0.0043
145	*Notopterus notopterus*	*Foli*	–	–	–	–	–	–	–	0.0217	–	–	–	–	–	3.239	0.0036
49	*Clarias batrachus*	*Magur*	–	–	–	–	–	0.0545	–	–	–	–	–	–	–	2.755	0.0031
139	*Nemacheilus botia*	*Balichata*	–	–	–	–	–	–	–	–	0.0770	–	0.0534	–	–	2.663	0.0030
136	*Mystus tengara*	*Bajari tengra*	–	–	–	–	–	–	–	–	–	–	0.0802	–	–	2.225	0.0025
182	*Rasbora daniconius*	*Darkina*	–	–	–	–	–	–	–	–	0.0148	–	0.0638	–	–	1.999	0.0023
154	*Securicula gora*	*Chora chela*	1.5318	–	–	0.0646	–	–	–	–	–	–	–	0.0266	–	1.781	0.0020
107	*Labeo rohita*	*Rui*	–	–	–	–	–	0.0287	–	–	–	–	–	–	–	1.453	0.0016
148	*Ompok pabda*	*Madhu pabda*	–	–	–	–	–	0.0272	–	–	–	–	–	–	–	1.378	0.0016
15	*Badis badis*	*Napit koi*	–	–	–	–	–	0.0068	–	–	0.0607	–	–	–	–	1.275	0.0014
923	*Sicamugil cascasia*		–	–	–	–	–	–	–	–	–	–	–	–	0.0134	1.189	0.0013
176	*Puntius gelius*	*Giliputi*	–	–	–	–	–	–	–	–	0.0520	0.0076	–	–	0.0001	1.158	0.0013
68	*Danio devario*	*Chebli*	–	–	–	–	–	–	–	–	0.0706	–	–	–	–	1.082	0.0012
137	*Mystus vittatus*	*Tengra*	–	–	–	–	–	0.0204	–	–	–	–	–	–	–	1.033	0.0012
954	*Cynoglossus sp*		–	–	0.0283	–	–	–	–	–	–	–	–	–	–	0.932	0.0011
178	*Puntius phutunio*	*Phutani puti*	–	–	–	–	–	–	–	–	0.0074	0.0207	–	–	–	0.865	0.0010
969	*Euryglossa pan*	*Kathal pata*	–	–	–	–	–	–	–	–	–	–	0.0166	–	–	0.518	0.0006
203	*Tetraodon cutcutia*	*Potka*	–	–	–	–	–	–	–	–	–	0.0060	–	–	–	0.22	0.0002
9	*Aplocheilus panchax*	*Kanpona*	–	–	–	–	–	–	–	–	0.0074	–	–	–	–	0.114	0.0001
77	*Gagata cenia*	*Kauwa*	–	–	–	–	–	–	–	–	–	0.0030	–	–	–	0.11	0.0001
			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	88751.096	100.0

Table 4.8 Monthly species composition (% by weight): Arial Khan River(Site SW02)

Species	Species name		Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
Code	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
931	Prawn spp.	Chingri/Icha	5.3273	22.3550	27.4940	74.0160	57.3200	48.5510	55.2230	7.4466	64.1820	14.9440	12.7980	13.1870	9.4867	5275.1020	30.0021
83	*Glossogobius giurus*	*Bailla*	17.9250	34.3100	12.3330	4.0783	17.4940	9.8822	11.7250	7.4341	3.8687	7.8334	4.9493	37.9000	59.4550	3419.2720	19.4471
89	*Hilsa ilisha*	*Ilish*	2.1507	16.4160	15.1820	3.3752	1.3339	6.3431	27.7660	72.9140	4.9611	–	0.1413	–	1.3543	2457.4550	13.9767
58	*Corica soborna*	*Kachki*	41.7630	9.6872	16.7850	–	0.0156	0.0380	–	–	–	0.0769	2.3722	14.7960	–	1051.2070	5.9787
130	*Aorichthys aor*	*Ayre*	–	1.2480	0.2320	0.1624	0.1621	2.8591	–	–	–	14.2510	25.6700	5.7282	5.1101	627.2090	3.5672
158	*Pangasius pangasius*	*Pangas*	–	–	18.1610	0.2523	–	–	–	–	0.5332	–	–	–	–	501.8810	2.8544
185	*Rhinomugil corsula*	*Khorsula*	8.6819	3.5689	2.5045	0.5675	3.8147	0.0247	0.3062	2.5191	8.0391	2.5580	0.8294	2.3818	–	487.9790	2.7754
186	*Rita rita*	*Rita*	0.4567	–	–	–	2.1796	17.4220	–	5.4521	2.8985	1.2405	0.8298	0.5091	–	418.1080	2.3780
180	*Puntius sophore*	*Puti*	0.3051	0.2248	0.0126	–	1.9984	1.9775	–	0.0026	2.5796	10.6760	0.6373	2.9124	0.6819	300.8700	1.7112
51	*Clupisoma garua*	*Ghaura*	2.5237	1.6346	0.4116	0.2951	3.1412	0.2284	–	1.0604	3.1658	2.7187	3.5938	1.2546	3.3951	295.9040	1.6829
209	*Wallagu attu*	*Boal*	–	–	–	–	–	–	–	–	–	5.3658	4.4079	1.7443	11.4840	283.1050	1.6102
120	*Macrobrachium rosenbergii*	*Golda*	0.2945	0.1065	0.2235	–	–	–	–	0.0755	1.1237	7.7913	3.6408	1.0416	3.3571	207.4150	1.1797
86	*Gudusia chapra*	*Chapila*	6.2802	2.1750	0.3727	–	–	–	–	–	–	0.0266	4.1372	2.6908	–	153.7780	0.8746
952	*Awaous grammepomus*	*Nonda Baila*	0.5108	–	1.7417	1.1320	0.8345	0.6041	–	0.3009	–	0.0162	3.5821	0.9330	0.5397	141.8890	0.8070
175	*Puntius conchonius*	*Canchan puti*	0.4921	0.0120	0.0049	0.1209	–	0.8491	–	–	2.5600	2.3350	0.6703	1.2958	0.1003	131.6080	0.7485
16	*Bagarius bagarius*	*Baghair*	–	0.1759	–	–	–	–	–	–	0.0772	–	14.6500	0.2892	–	127.0350	0.7225
182	*Rasbora daniconius*	*Darkina*	–	–	–	–	–	–	0.8937	–	–	0.0999	1.0358	3.8071	–	126.0050	0.7167
41	*Channa punctatus*	*Taki*	0.0115	0.0798	–	–	1.2138	5.9645	–	0.1734	0.1892	1.5285	0.3658	–	–	102.9230	0.5854
48	*Cirrhinus reba*	*Raik*	0.0640	0.1143	–	0.5781	6.9363	–	–	–	0.2556	–	0.9942	–	–	95.0220	0.5404
500	*Platanicus Gangeticus*	*Sishu*	–	–	–	9.8141	–	–	–	–	–	–	–	–	–	88.8070	0.5051
210	*Xenentodon cancila*	*Kaikka*	0.4286	–	–	–	–	–	1.5325	–	0.3422	0.6461	1.2096	1.2172	–	63.4100	0.3606
137	*Mystus vittatus*	*Tengra*	–	0.0674	–	–	–	0.6306	–	–	0.0729	2.8299	0.3867	0.5516	0.1579	57.0650	0.3246
999	*Unidentified*		2.5741	4.0674	–	–	–	–	–	–	–	–	–	–	–	56.5780	0.3218
196	*Silonia silondia*	*Shillong*	–	–	1.2782	–	–	0.3048	–	0.7671	–	0.2173	0.0834	–	–	56.1910	0.3196
2	*Ailia coila*	*Kajuli*	0.3649	0.1343	–	0.0433	–	0.0495	0.2553	0.1516	0.1275	3.3983	0.7341	0.2554	0.0882	55.2850	0.3144
68	*Danio devario*	*Chebli*	–	–	–	0.0105	0.1267	–	–	–	–	0.1554	–	1.7176	–	54.6010	0.3105
81	*Gagata youssoufi*	*Gang tengra*	0.1459	–	–	–	–	–	–	–	–	0.0888	1.4888	1.3531	–	53.1590	0.3023
102	*Labeo calbasu*	*Kalbaus*	–	1.2640	–	–	–	–	–	1.1174	–	0.6597	0.0437	–	–	47.1590	0.2682
122	*Mastacembelus armatus*	*Baral baim*	1.0711	0.3004	0.1068	–	–	0.7622	0.3192	0.3320	0.1050	0.1135	2.5210	–	–	45.9120	0.2611
123	*Macrognathus pancalus*	*Guchi*	0.2958	–	0.0612	0.0368	–	0.0374	–	–	1.9918	0.0307	–	–	–	44.6650	0.2540
107	*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	–	–	0.6319	–	1.2459	–	43.3450	0.2465
155	*Pama pama*	*Poa*	0.5880	0.1051	0.1224	–	0.1960	0.4282	–	0.1734	0.2264	0.2432	0.1742	0.1001	1.0186	39.4720	0.2245
998	*Unidentified*		–	–	1.3271	–	–	–	–	–	–	–	–	–	–	35.6860	0.2030
144	*Notopterus chitala*	*Chital*	–	–	–	–	–	–	–	–	–	3.8190	–	–	–	35.3220	0.2009
145	*Notopterus notopterus*	*Foli*	–	0.1184	–	–	–	–	–	–	–	1.1235	0.1622	0.7271	–	35.1890	0.2001
110	*Lepidocephalus guntea*	*Gutum*	–	–	–	–	–	–	–	–	–	3.6218	–	–	–	33.4980	0.1905
212	*Puntius ticto*	*Tit puti*	0.0055	0.0079	–	0.0487	0.0469	–	1.2772	–	0.3356	1.3671	0.9247	–	–	31.4510	0.1789
189	*Salmostoma phulo*	*Fulchela*	–	–	0.0443	0.0379	–	0.6670	0.4470	–	0.4237	0.2851	–	0.2880	0.0339	30.5890	0.1740
36	*Chanda nama*	*Nama Chanda*	–	0.5979	–	0.0162	–	0.1143	–	–	0.0876	0.5353	0.4368	0.1519	0.2943	28.2320	0.1606
187	*Osteobrama cotio cotio*	*Keti*	0.0386	0.2682	0.1402	0.1209	–	–	–	–	0.2922	0.2780	0.6218	0.0727	0.2667	27.7760	0.1580

Table 4.8 Monthly species composition (% by weight): Arial Khan River(Site SW02) (Cont.)

Species Code	Species name		Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
5	*Amblypharygodon mola*	*Mola*	2.5218	–	–	–	–	–	0.2553	0.0301	–	0.0650	0.4485	0.6668	0.1533	27.4450	0.1561
42	*Channa striatus*	*Shol*	–	–	–	–	–	–	–	–	–	0.0645	0.1316	0.8223	–	26.3740	0.1500
55	*Colisa fasciatus*	*Khalisha*	–	0.0581	–	2.0641	–	0.2956	–	–	0.0483	0.2047	0.0311	–	–	25.8210	0.1469
193	*Setipinna phasa*	*Phasa*	–	–	0.1330	0.0479	–	–	–	–	–	1.1080	0.7926	0.1028	–	23.5360	0.1339
37	*Chanda ranga*	*Lal chanda*	0.0585	0.1573	–	–	–	0.3430	–	–	0.0438	0.5344	0.3363	0.0925	0.4763	23.2330	0.1321
132	*Mystus cavasius*	*Kabashi*	0.0140	0.0757	–	0.3417	1.2844	–	–	–	0.1607	–	–	–	–	21.4330	0.1219
35	*Chanda baculis*	*Chanda*	0.0055	0.0357	–	–	–	–	–	–	0.2858	0.8782	0.2322	–	0.3812	21.3260	0.1213
168	*Potamon*	*Kakra*	–	–	–	–	–	–	–	–	–	–	–	–	1.6444	20.9920	0.1194
131	*Mystus bleekeri*	*Golsha tengra*	–	–	–	–	–	–	–	–	0.7158	0.1374	–	–	0.2290	19.2900	0.1097
136	*Mystus tengara*	*Bajari tengra*	–	–	–	–	–	–	–	0.0086	–	2.0179	–	–	–	18.8430	0.1072
146	*Odontamblyopus rubicundus*	*Lal chewa*	–	–	0.6714	–	–	–	–	–	–	–	–	–	–	18.0550	0.1027
203	*Tetraodon cutcutia*	*Potka*	–	0.0053	0.2051	–	–	–	–	–	0.1527	0.2077	0.8225	–	–	17.1480	0.0975
10	*Apocryptes bato*	*Chiring*	–	–	–	1.6314	–	–	–	–	–	–	–	–	–	14.7620	0.0840
188	*Salmostoma bacaila*	*Katari*	1.1690	0.0394	0.1641	–	–	–	–	–	–	0.3308	–	0.1632	0.1086	14.3210	0.0815
88	*Heteropneustes fossilis*	*Shingi*	–	–	–	–	0.9017	–	–	–	–	0.4919	–	–	–	14.3070	0.0814
3	*Ailia punctata*	*Kajuli*	–	–	–	–	–	–	–	–	–	–	1.8130	–	–	14.1400	0.0804
39	*Channa marulius*	*Gajar*	–	–	–	–	–	–	–	–	–	0.8060	0.4427	–	–	10.9080	0.0620
169	*Pseudeutropius atherinoides*	*Batasi*	–	–	–	0.0270	0.0627	0.0571	–	–	–	0.3165	0.7247	–	–	10.1180	0.0575
30	*Brachygobius nunus*	*Nunabailla*	–	–	–	1.0653	–	–	–	–	–	–	–	–	–	9.6400	0.0548
70	*Eleotris fusca*	*Budh Bailla*	–	–	–	–	–	0.5742	–	–	–	0.3080	–	–	–	9.0210	0.0513
9	*Aplocheilus panchax*	*Kanpona*	–	–	–	–	0.6936	–	–	–	–	–	–	–	–	7.5050	0.0427
208	*Trypauchen vagina*	*Sada chewa*	1.6405	0.5079	–	–	–	–	–	–	–	–	–	–	–	7.0660	0.0402
211	*Colisa labiosus*	*Khalisha*	–	–	–	–	–	0.5706	–	–	0.0219	–	–	–	–	6.5950	0.0375
148	*Ompok pabda*	*Madhu pabda*	–	0.0803	–	–	–	0.4204	–	–	–	0.0330	–	–	–	5.9430	0.0338
76	*Eutropiichthys vacha*	*Bacha*	–	–	–	–	–	–	–	–	0.1315	0.0434	–	–	0.1828	5.5090	0.0313
59	*Crossocheilus latius*	*Kalabata*	–	–	0.1355	–	–	–	–	–	–	–	0.1314	–	–	4.6690	0.0266
47	*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	–	–	0.3784	–	–	–	3.5000	0.0199
38	*Channa barca*	*Tila shol*	–	–	–	–	–	–	–	–	–	0.3446	–	–	–	3.1880	0.0181
167	*Polynemus paradiseus*	*Tapasi*	–	–	–	–	0.2437	–	–	–	–	–	–	–	–	2.6370	0.0150
28	*Botia dario*	*Rani*	1.2508	–	0.0734	–	–	–	–	–	–	–	–	–	–	1.9740	0.0112
953	*Cynoglossus cynoglossus*	*Khongi*	–	–	0.0450	–	–	–	–	–	–	0.0389	–	–	–	1.5710	0.0089
139	*Nemacheilus botia*	*Balichata*	–	–	–	–	–	–	–	–	–	0.1425	–	–	–	1.3180	0.0075
85	*Gonialosa manmina*	*Goni chapila*	–	–	–	0.1155	–	–	–	–	–	–	–	–	–	1.0460	0.0059
159	*Parapocryptes batoides*	*Dali chewa*	–	–	0.0323	–	–	–	–	–	–	–	–	–	–	0.8710	0.0050
932	*Unidentified*		–	–	–	–	–	–	–	0.0400	–	–	–	–	–	0.8290	0.0047
56	*Colisa lalia*	*Lal Khalisha*	–	–	–	–	–	–	–	–	–	0.0403	–	–	–	0.3730	0.0021
13	*Aspidoparia morar*	*Piali*	0.4306	–	–	–	–	–	–	–	–	–	–	–	–	–	–
99	*Labeo angra*	*Angrot*	0.6086	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	17582.4660	100.0

Table 4.9 Monthly species composition (% by weight): Kumar River(Site SW07)

Species	Species name		Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
Code	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
931	Prawn spp.	Chingri/Icha	4.0598	10.0840	35.0200	56.1340	86.3440	86.7900	45.6620	42.8540	47.9460	14.9550	7.5416	16.6170	15.7060	2184.7060	30.2720
83	*Glossogobius giurus*	*Bailla*	7.3741	16.5470	26.5050	16.8710	3.8619	1.6440	45.2690	46.4840	11.0270	12.0150	2.5287	16.5450	42.5820	1400.5290	19.4062
58	*Corica soborna*	*Kachki*	55.8020	50.1550	15.8420	–	–	–	–	–	–	–	1.2288	18.6080	8.4528	1214.4970	16.8284
51	*Clupisoma garua*	*Ghaura*	0.5823	2.2367	1.3757	3.6390	0.0880	–	–	2.5948	3.0463	3.2914	4.8407	6.1855	–	173.7090	2.4070
130	*Aorichthys aor*	*Ayre*	–	0.3141	0.8319	0.0142	3.1393	4.4339	–	–	1.2744	2.8385	0.5425	3.3216	18.5270	169.0000	2.3417
107	*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	–	–	2.2544	24.5430	–	–	164.9670	2.2858
48	*Cirrhinus reba*	*Raik*	–	0.7493	–	–	–	–	–	–	4.9107	10.3080	8.0421	2.9619	0.2008	151.0460	2.0929
89	*Hilsa ilisha*	*Ilish*	10.6110	6.6601	1.6984	–	–	–	–	–	–	–	–	–	–	140.3030	1.9441
86	*Gudusia chapra*	*Chapila*	1.6416	2.7283	1.5655	–	–	–	–	–	–	–	7.7327	5.3292	0.6575	139.9710	1.9395
180	*Puntius sophore*	*Puti*	2.1688	0.2041	0.6527	0.8072	0.3702	0.3436	1.4615	0.5679	3.7398	5.2620	3.3897	2.6308	2.2996	109.4550	1.5166
175	*Puntius conchonius*	*Canchan puti*	1.7494	0.0603	0.5415	1.3365	–	–	–	–	6.2740	8.9190	1.6120	–	0.4878	100.1010	1.3870
155	*Pama pama*	*Poa*	0.0109	1.5930	0.0822	5.6530	1.0314	1.0152	–	0.3935	0.6243	–	0.9588	1.4879	0.1285	84.5540	1.1716
47	*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	–	–	0.4299	11.3250	–	–	73.1030	1.0129
186	*Rita rita*	*Rita*	0.0782	–	0.1143	2.5688	–	–	–	3.7228	0.2854	–	6.1567	–	–	72.6820	1.0071
185	*Rhinomugil corsula*	*Khorsula*	6.9005	1.4116	0.3469	2.1180	0.8902	0.6090	–	0.2522	3.7385	–	0.1086	0.4894	0.1279	67.9130	0.9410
187	*Osteobrama cotio cotio*	*Keti*	–	2.5953	0.3899	0.0640	–	0.1456	–	–	1.5324	0.3887	0.0571	0.0792	0.2091	63.3310	0.8775
41	*Channa punctatus*	*Taki*	–	–	0.0911	1.1856	–	0.1093	–	–	0.6648	9.9874	0.2364	–	–	61.6720	0.8545
2	*Ailia coila*	*Kajuli*	–	–	–	0.1715	0.0440	0.7479	0.7778	0.4435	0.6074	0.0686	7.4972	–	–	56.6370	0.7848
132	*Mystus cavasius*	*Kabashi*	–	–	0.7066	0.1731	–	–	–	0.4855	0.4532	8.2115	–	–	–	53.5290	0.7417
122	*Mastacembelus armatus*	*Baral baim*	0.0259	–	2.6288	–	–	–	–	–	–	3.6530	–	1.6129	–	52.5580	0.7283
193	*Setipinna phasa*	*Phasa*	–	–	0.3170	2.1289	1.0754	–	–	–	1.6107	–	1.9179	2.6529	–	49.0670	0.6799
158	*Pangasius pangasius*	*Pangas*	0.9834	–	–	–	–	–	–	–	1.4409	–	1.5384	7.0751	–	44.8350	0.6212
123	*Macrognathus pancalus*	*Guchi*	0.1181	0.3172	0.8655	0.3760	0.0528	1.1634	–	0.2163	0.3494	2.7698	0.7696	–	–	41.5620	0.5759
952	*Awaous grammepomus*	*Nonda Baila*	–	1.1825	1.2570	0.9450	0.2820	–	–	–	–	–	–	–	–	41.2240	0.5712
136	*Mystus tengara*	*Bajari tengra*	–	–	–	0.1629	–	–	–	–	7.1351	0.0137	–	–	–	34.2710	0.4749
169	*Pseudeutropius atherinoides*	*Batasi*	–	0.6656	0.5318	–	0.0354	0.4214	–	–	–	0.1066	1.2146	1.5150	–	33.3700	0.4624
189	*Salmostoma phulo*	*Fulchela*	2.1427	0.0854	1.0201	0.4386	0.3920	0.2182	–	0.0597	0.1164	0.0137	1.7181	0.8016	0.2101	32.7890	0.4543
137	*Mystus vittatus*	*Tengra*	–	–	1.6659	–	–	–	–	–	–	0.6343	0.8808	–	0.9059	30.9920	0.4294
182	*Rasbora daniconius*	*Darkina*	0.0135	–	0.4697	0.2845	1.0714	0.9455	4.7204	–	–	0.3329	–	1.8513	0.1671	30.7650	0.4263
135	*Aorichthys seenghala*	*Guizza*	–	0.1215	2.0814	0.9615	–	–	–	–	–	–	–	–	–	29.5690	0.4097
212	*Puntius ticto*	*Tit puti*	0.2195	0.7073	0.2036	0.2468	0.4360	0.5817	0.3390	–	0.4078	0.3171	–	0.6925	0.1115	27.0430	0.3747
131	*Mystus bleekeri*	*Golsha tengra*	–	0.0121	0.0405	0.0178	–	–	–	–	–	0.7396	–	0.1983	3.9021	25.0060	0.3465
5	*Amblypharygodon mola*	*Mola*	0.0817	0.0325	0.0095	–	0.4142	–	1.0926	–	–	–	0.0817	3.6313	0.1393	19.8690	0.2753
144	*Notopterus chitala*	*Chital*	–	–	–	–	–	–	–	–	–	3.3435	–	–	–	16.5500	0.2293
102	*Labeo calbasu*	*Kalbaus*	0.0777	0.0934	0.5983	–	–	–	–	–	–	0.6070	0.8477	–	–	16.4030	0.2273
210	*Xenentodon cancila*	*Kaikka*	0.4306	0.0634	0.0287	–	0.0483	–	–	–	–	0.4438	0.2088	0.9843	1.3980	16.2090	0.2246
120	*Macrobrachium rosenbergii*	*Golda*	–	0.1947	–	0.9800	–	–	–	–	–	0.8068	–	–	–	12.8480	0.1780
57	*Colisa sota*	*Khalisha*	–	–	–	–	–	–	0.3014	–	0.1329	–	–	–	1.9181	10.8480	0.1503
100	*Labeo bata*	*Bata*	–	0.0261	–	–	–	–	–	–	–	0.0933	1.5366	–	–	10.5720	0.1465
10	*Apocryptes bato*	*Chiring*	–	–	–	1.8883	–	–	–	–	–	–	–	–	–	10.1730	0.1410

Table 4.9 Monthly species composition (% by weight): Kumar River(Site SW07) (Cont.)

Species	Species name		Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
Code	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
28	*Botia dario*	*Rani*	–	–	0.3132	–	–	–	–	–	–	–	0.3668	0.7645	0.2649	10.0540	0.1393
188	*Salmostoma bacaila*	*Katari*	2.7949	0.2234	–	–	–	–	–	–	–	–	0.1405	1.1489	–	9.6040	0.1331
148	*Ompok pabda*	*Madhu pabda*	0.0941	0.2703	–	0.0222	–	–	–	–	–	0.5155	–	0.4161	–	9.3080	0.1290
159	*Parapocryptes batoides*	*Dali chewa*	–	–	0.8735	–	–	–	–	–	–	–	–	–	–	9.3000	0.1289
37	*Chanda ranga*	*Lal chanda*	0.1749	–	–	0.0013	–	0.2908	–	0.0302	0.8602	0.3234	–	0.3293	0.2787	9.2860	0.1287
39	*Channa marulius*	*Gajar*	–	–	–	–	–	–	–	–	0.2914	1.2970	–	–	–	7.7810	0.1078
121	*Macrognathus aculeatus*	*Tara baim*	–	–	0.7209	–	–	–	–	–	–	0.0040	–	–	–	7.6950	0.1066
76	*Eutropiichthys vacha*	*Bacha*	–	0.0934	0.2910	–	–	–	–	0.5791	–	–	–	–	–	7.5680	0.1049
36	*Chanda nama*	*Nama Chanda*	0.0134	0.0720	–	0.0065	–	–	0.3767	0.0706	0.6147	0.2468	0.0738	–	0.0835	7.2940	0.1011
110	*Lepidocephalus guntea*	*Gutum*	–	–	–	–	–	–	–	0.1513	–	1.0760	–	–	0.2229	7.1770	0.0994
81	*Gagata youssoufi*	*Gang tengra*	–	–	–	–	–	0.2706	–	–	–	–	0.0576	0.8292	0.5298	7.1080	0.0985
209	*Wallagu attu*	*Boal*	–	–	–	–	–	–	–	–	–	1.2627	–	–	–	6.2500	0.0866
85	*Gonialosa manmina*	*Goni chapila*	–	–	–	–	–	–	–	1.0944	–	–	–	–	–	5.2060	0.0721
999	*Unidentified*		–	0.2698	–	–	–	–	–	–	–	–	–	–	–	4.9520	0.0686
145	*Notopterus notopterus*	*Foli*	–	–	–	–	–	–	–	–	–	0.9412	–	–	–	4.6590	0.0646
13	*Aspidoparia morar*	*Piali*	–	–	–	0.1399	0.2028	–	–	–	0.5172	–	0.0767	–	–	4.4070	0.0611
35	*Chanda baculis*	*Chanda*	–	0.0234	0.1610	–	–	–	–	–	–	0.4412	–	–	–	4.3290	0.0600
945	*Crab sp*	*Kakra*	–	–	–	–	–	–	–	–	–	0.8119	–	–	–	4.0190	0.0557
6	*Anabas testudineus*	*Koi*	–	–	–	0.6218	–	–	–	–	–	–	–	–	–	3.3500	0.0464
203	*Tetraodon cutcutia*	*Potka*	0.1211	–	–	–	–	–	–	–	–	–	0.1310	–	0.4878	3.2960	0.0457
88	*Heteropneustes fossilis*	*Shingi*	0.1345	–	0.0047	–	–	–	–	–	–	0.1622	–	0.5649	–	3.1270	0.0433
196	*Silonia silondia*	*Shillong*	1.4751	0.0821	0.0473	–	0.2114	–	–	–	–	–	–	–	–	2.8000	0.0388
32	*Catla catla*	*Catla*	–	–	–	–	–	–	–	–	–	–	–	0.6753	–	2.7170	0.0376
68	*Danio devario*	*Chebli*	0.0020	0.0393	0.0815	0.0022	–	–	–	–	–	–	–	–	–	1.6020	0.0222
9	*Aplocheilus panchax*	*Kanpona*	–	0.0850	–	–	–	–	–	–	–	–	–	–	–	1.5610	0.0216
55	*Colisa fasciatus*	*Khalisha*	0.0051	–	–	–	–	–	–	–	0.2954	–	–	–	–	1.3800	0.0191
176	*Puntius gelius*	*Giliputi*	0.0134	–	0.0247	–	0.0088	–	–	–	0.0584	0.0090	0.0135	–	–	0.6990	0.0097
59	*Crossocheilus latius*	*Kalabata*	–	–	–	–	–	–	–	–	–	–	0.0831	–	–	0.5210	0.0072
101	*Labeo boga*	*Bhangan*	–	–	–	–	–	–	–	–	–	0.1034	–	–	–	0.5120	0.0071
75	*Esomus danricus*	*Darkina*	–	–	–	–	–	0.1538	–	–	–	–	–	–	–	0.4110	0.0057
953	*Cynoglossus cynoglossus*	*Khongi*	–	–	–	–	–	0.1160	–	–	–	–	–	–	–	0.3100	0.0043
56	*Colisa lalia*	*Lal Khalisha*	–	–	–	–	–	–	–	–	0.0443	–	–	–	–	0.2070	0.0029
15	*Badis badis*	*Napit koi*	0.0134	–	–	0.0252	–	–	–	–	–	–	–	–	–	0.1360	0.0019
33	*Chaca chaca*	*Cheka*	–	–	–	0.0142	–	–	–	–	–	–	–	–	–	0.0770	0.0011
99	*Labeo angra*	*Angrot*	0.0865	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	7216.9310	100.0

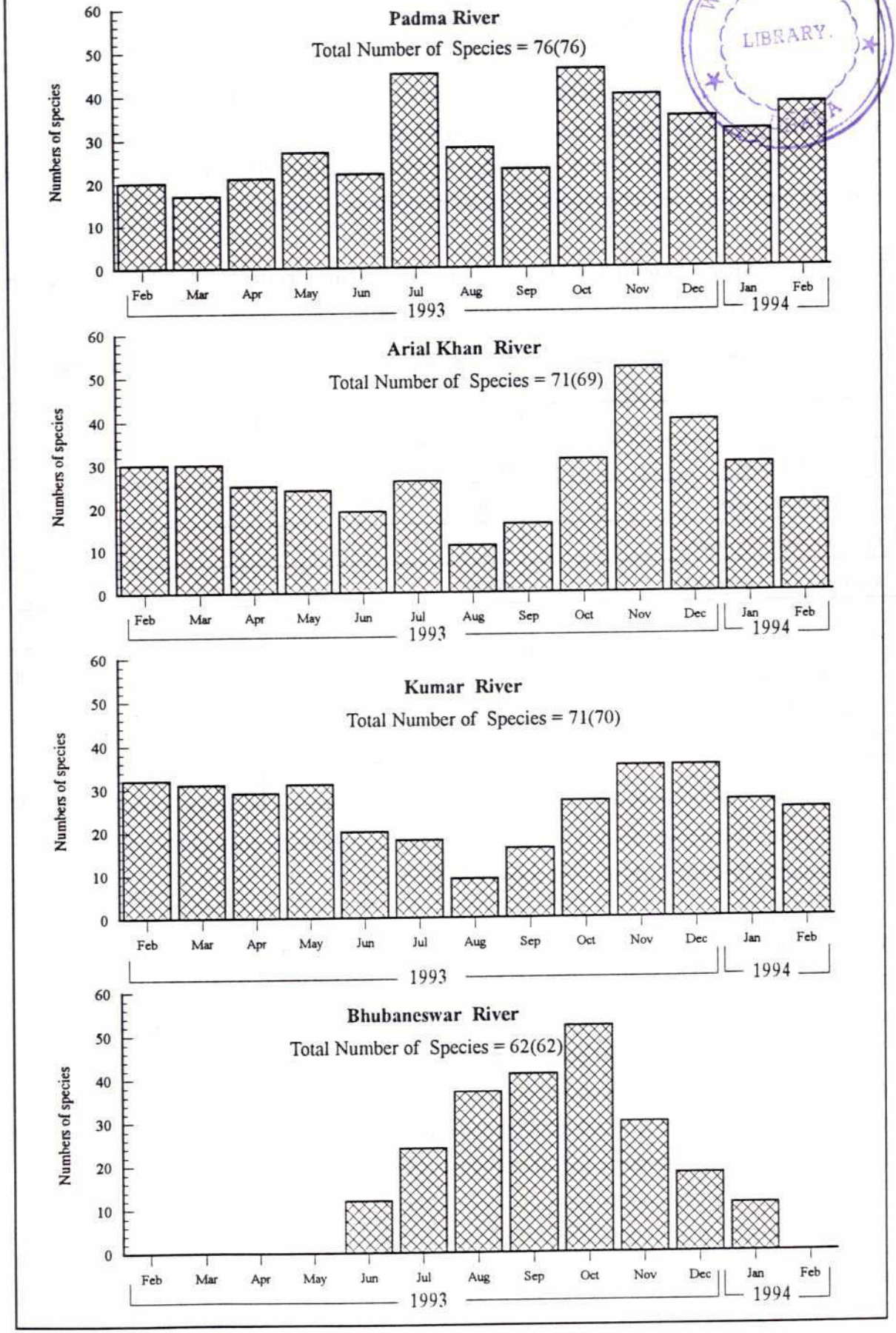
Table 4.10 Monthly species composition(% by weight):Bhubaneswar River(Site SW03)

Species Code	Species name		Year: 1993							Year: 1994	Total annual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Kg	%
210	*Xenentodon cancila*	*Kaikka*	–	–	0.1409	0.4482	18.5940	6.6887	–	–	1542.0060	11.6485
931	Prawn spp.	Chingri/Icha	–	67.0980	15.2860	9.4506	5.7914	14.8170	2.0990	12.5850	1285.2370	9.7088
48	*Cirrhinus reba*	*Raik*	–	–	1.9398	1.6313	17.1710	0.2184	–	–	1175.3290	8.8786
180	*Puntius sophore*	*Puti*	5.4714	0.1624	0.9995	4.9578	5.0354	11.2330	5.8637	52.5160	970.5780	7.3319
41	*Channa punctatus*	*Taki*	7.7441	17.3810	1.3383	0.4944	1.9360	16.8880	7.1822	4.6246	960.7390	7.2575
123	*Macrognathus pancalus*	*Guchi*	7.7441	1.4738	1.4517	0.4967	3.9294	9.8111	2.5870	2.0055	733.1820	5.5385
32	*Catla catla*	*Catla*	–	–	51.6190	31.7810	3.3187	–	–	–	720.6770	5.4441
137	*Mystus vittatus*	*Tengra*	35.9920	1.4580	2.7234	0.7696	2.7423	4.8475	39.2900	11.6320	668.0090	5.0462
83	*Glossogobius giurus*	*Bailla*	18.1820	0.1276	1.0905	0.0689	3.2014	6.9515	6.4941	3.2089	577.6330	4.3635
107	*Labeo rohita*	*Rui*	–	–	16.4290	21.5090	4.2375	–	–	–	540.3420	4.0818
39	*Channa marulius*	*Gajar*	–	–	0.0506	–	7.2577	0.9248	–	–	524.7670	3.9642
122	*Mastacembelus armatus*	*Baral baim*	–	–	0.1166	0.6700	1.0927	5.4816	4.0962	–	347.9760	2.6287
212	*Puntius ticto*	*Tit puti*	6.4324	0.2531	0.6364	0.5424	1.7570	4.1086	2.7508	9.6266	336.0860	2.5388
131	*Mystus bleekeri*	*Golsha tengra*	–	–	0.1166	0.2902	1.2811	2.0005	–	–	177.9910	1.3446
55	*Colisa fasciatus*	*Khalisha*	–	0.1898	0.2386	–	1.4850	1.6457	0.6580	–	177.5570	1.3413
110	*Lepidocephalus guntea*	*Gutum*	–	0.2352	–	–	0.7796	2.3810	2.5870	2.9458	176.2160	1.3312
175	*Puntius conchonius*	*Canchan puti*	4.2088	1.7977	0.1724	0.0780	0.5160	2.2295	4.2041	–	162.9980	1.2313
132	*Mystus cavasius*	*Kabashi*	–	0.5053	0.1777	–	–	1.7848	14.2290	–	161.7030	1.2215
145	*Notopterus notopterus*	*Foli*	–	–	0.1096	–	2.2187	0.2887	–	–	161.0990	1.2170
121	*Macrognathus aculeatus*	*Tara baim*	–	1.9622	0.2670	0.2275	1.3537	1.2808	–	–	152.5240	1.1522
100	*Labeo bata*	*Bata*	–	–	–	0.5232	2.1451	–	–	–	147.3360	1.1130
203	*Tetraodon cutcutia*	*Potka*	–	0.1076	–	0.1579	1.9376	0.2417	–	–	141.2860	1.0673
42	*Channa striatus*	*Shol*	–	–	0.0921	–	0.4550	2.4185	–	–	139.1100	1.0509
182	*Rasbora daniconius*	*Darkina*	–	0.1730	0.1134	6.0999	0.2545	0.9983	0.0903	0.6685	116.5960	0.8808
47	*Cirrhinus mrigala*	*Mrigel*	–	–	2.7417	5.8709	0.3989	–	–	–	89.5230	0.6763
68	*Danio devario*	*Chebli*	–	–	–	–	0.7064	0.8635	0.3424	–	87.6720	0.6623
189	*Salmostoma phulo*	*Fulchela*	–	–	0.0236	0.1488	0.7902	0.6143	–	–	81.5400	0.6160
36	*Chanda nama*	*Nama Chanda*	2.5860	–	0.2585	1.8025	0.8086	0.0874	–	0.1337	75.7860	0.5725
187	*Osteobrama cotio cotio*	*Keti*	–	0.9536	0.1400	0.1343	0.9835	–	–	–	68.1480	0.5148
102	*Labeo calbasu*	*Kalbaus*	–	–	–	–	1.0143	–	–	–	67.5130	0.5100
169	*Pseudeutropius atherinoides*	*Batasi*	–	–	–	0.0971	0.9992	–	–	–	67.3570	0.5088
144	*Notopterus chitala*	*Chital*	–	–	–	–	0.9944	–	–	–	66.1920	0.5000
5	*Amblypharygodon mola*	*Mola*	–	1.6268	0.0627	0.2232	0.8407	–	–	–	59.7190	0.4511

Table 4.10 Monthly species composition(% by weight):Bhubaneswar River(Site SW03) (Cont.)

Species Code	Species name		Year: 1993							Year: 1994	Total annual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Kg	%
35	*Chanda baculis*	*Chanda*	–	–	–	0.0923	0.8541	–	–	–	57.6570	0.4355
88	*Heteropneustes fossilis*	*Shingi*	3.7037	0.0727	–	–	0.6458	–	2.2636	–	57.4400	0.4339
136	*Mystus tengara*	*Bajari tengra*	–	1.4738	–	–	0.2327	0.1755	3.9885	–	47.3120	0.3574
51	*Clupisoma garua*	*Ghaura*	–	–	–	4.8521	0.0254	–	–	–	43.9410	0.3319
139	*Nemacheilus botia*	*Balichata*	–	–	–	0.0413	0.4848	–	1.1859	–	39.3390	0.2972
148	*Ompok pabda*	*Madhu pabda*	–	–	0.0530	–	0.3302	0.3593	–	–	38.3210	0.2895
211	*Colisa labiosus*	*Khalisha*	–	–	0.2929	0.6766	0.2435	0.1191	–	–	28.7110	0.2169
37	*Chanda ranga*	*Lal chanda*	3.0654	0.1730	0.0467	0.3368	0.2042	0.1835	–	0.0528	26.4860	0.2001
998	*Unidentified*		–	–	–	1.9027	–	–	–	–	16.5680	0.1252
15	*Badis badis*	*Napit koi*	–	0.0548	–	0.0933	0.2072	0.0006	–	–	14.6840	0.1109
101	*Labeo boga*	*Bhangan*	–	–	–	–	0.2114	–	–	–	14.0750	0.1063
28	*Botia dario*	*Rani*	–	–	0.0469	0.1240	0.1698	–	–	–	12.5890	0.0951
59	*Crossocheilus latius*	*Kalabata*	–	–	–	1.4031	–	–	–	–	12.2170	0.0923
6	*Anabas testudineus*	*Koi*	2.1044	–	0.0391	–	–	0.1926	–	–	9.7070	0.0733
185	*Rhinomugil corsula*	*Khorsula*	–	–	–	0.2236	–	0.1640	–	–	9.3030	0.0703
209	*Wallagu attu*	*Boal*	–	–	–	–	0.1387	–	–	–	9.2350	0.0698
9	*Aplocheilus panchax*	*Kanpona*	–	–	–	0.0826	0.0913	–	–	–	6.8010	0.0514
75	*Esomus danricus*	*Darkina*	–	–	0.5135	0.3280	–	–	–	–	5.0750	0.0383
2	*Ailia coila*	*Kajuli*	–	2.1321	–	0.1994	–	–	–	–	3.7580	0.0284
188	*Salmostoma bacaila*	*Katari*	–	–	–	0.3663	0.0081	–	–	–	3.7300	0.0282
57	*Colisa sota*	*Khalisha*	–	0.2078	–	–	0.0395	–	0.0877	–	3.3220	0.0251
217	*Lepidocephalus thermalis*	*Puiya*	–	–	–	–	0.0480	–	–	–	3.2000	0.0242
81	*Gagata youssoufi*	*Gang tengra*	–	–	0.0310	0.3168	0.0020	–	–	–	3.0260	0.0229
58	*Corica soborna*	*Kachki*	–	–	–	0.3307	–	–	–	–	2.8800	0.0218
56	*Colisa lalia*	*Lal Khalisha*	–	0.3354	0.2955	0.1409	–	–	–	–	2.8220	0.0213
106	*Labeo pangusia*	*Longu*	–	–	0.0860	–	0.0231	–	–	–	1.9130	0.0145
86	*Gudusia chapra*	*Chapila*	2.7661	–	–	–	–	–	–	–	1.1830	0.0089
43	*Chela cachius*	*Chep Chela*	–	–	–	–	0.0107	–	–	–	0.7120	0.0054
154	*Securicula gora*	*Chora chela*	–	–	0.1488	–	–	–	–	–	0.6430	0.0049
118	*Machrob. villosimanus*	*Chingri dimua*	–	–	0.0705	–	–	–	–	–	0.3050	0.0023
176	*Puntius gelius*	*Giliputi*	–	0.0453	–	0.0150	0.0013	–	–	–	0.2630	0.0020
155	*Pama pama*	*Poa*	–	–	0.0388	–	–	–	–	–	0.1680	0.0013
			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	13237.813	100.0

Figure 4.2 Seasonal variation in the number of fish species recorded from rivers in the SWR, February 1993 - February 1994



Note: Annual total number of species recorded between March 1993 and February 1994 given in parentheses

In terms of dominant species the Bubaneswar differed from others in that its catch comprised greater proportions of species more typical of floodplains, e.g. taki (7.3%), gajar (4.0%), guchi (5.5%), baim (2.6%), tengra (5.0%) and also major carps (19%). This difference probably results from the seasonal nature of its fishery, relying heavily on the flood drawdown when many species move off the floodplain to rivers. During the winter, when the river dried out leaving only a series of disconnected pools, the catch composition resembled that of the resident floodplain fish community (Table 4.11).

Table 4.11 Species composition (% weight) of catches from the Bubaneswar River during the dry season, January 1994

Chanda nama	Nama chanda	<1
Chanda ranga	Lal chanda	<1
Channa punctatus	Taki	4
Glossogobius giurus	Bailla	3
Lepidocephalus guntea	Gutum	3
Mastacembalus pancalus	Guchi	2
Mystus vittatus	Tengra	12
Puntius sophore	Puti	53
Puntius ticto	Tit puti	10
Rasbora daniconius	Darkina	<1
Prawn spp.	Chingri/Icha	13

A more typical riverine species list is provided by selection of the dominant (>1% by weight of annual catch) species in perennial rivers (Table 4.12).

Clearly, in addition to prawns and ilish, other important components of riverine catches include the cyprinid minnows such as *Salmostoma bacaila* (katari) and *Salmostoma phulo* (fulchela) in the larger rivers, and the barbs (puti) *Puntius sophore* and *Puntius conchonius* in the smaller Kumar River. Major carps such as rui, catla and mrigel were seasonally important in the Kumar and even more so in the Bubaneswar River. These were usually young fish in their first year, which presumably had escaped capture while on the floodplains only to be caught in rivers during the flood drawdown.

Table 4.12 Percentage contribution by dominant species to the total catch of perennial rivers in the SWR, March 1993 - February 1994

Species Name		River		
Scientific Name	Bengali Name	Padma	Arial Khan	Kumar
Gudusia chapra	Chapila	<1	<1	1.9
Hilsa ilisha	Ilish	53	14.0	1.9
Corica soborna	Kachki	2.7	6.0	16.8
Cirrhinus reba	Raik	<1	<1	2.1
Cirrhinus mrigala	Mrigel		<1	1.0
Labeo rohita	Rui	<1	<1	2.3
Puntius conchonius	Canchan puti	<1	<1	1.4
Puntius sophore	Puti	<1	1.7	1.5
Salmostoma bacaila	Katari	<1	<1	<1
Salmostoma phulo	Fulchela	<1	<1	<1
Rhinomugil corsula	Khorsula	5.4	2.8	<1
Notopterus chitala	Chital		<1	<1
Glossogobius giurus	Bailla	5.1	19.4	19.4
Apocryptes bato	Chiring	1.7	<1	<1
Aorichthys aor	Ayre	<1	3.6	2.3
Rita rita	Rita	<1	2.4	1.0
Wallagu attu	Boal	<1	1.6	<1
Pangasius pangasius	Pangas	1.0	2.9	<1
Ailia coila	Kajuli	3.4	<1	<1
Silonia silondia	Shillong	1.0	<1	<1
Clupisoma garua	Ghaura	1.9	1.7	2.4
Gagata youssoufi	Gang tengra	<1	<1	<1
Macrobrachium rosenbergii	Golda		1.2	<1
Prawn spp.	Chingri/Icha	7.8	30.0	30.3
Percentage of annual catch		**87.5**	**91.1**	**88.1**

The clupeid *Corica soborna* (kachki) formed the basis of important winter and pre-monsoon seine net fisheries in all rivers. It was captured together with the mullet *Rhinomugil corsula* (khorsula) and the goby, *Glossogobius giurus* (bailla) in the Padma River. In other rivers bailla also formed a high proportion of the monsoon catch exploited by small-scale gears such as traps, daun, moi jal and veshal, whereas khorsula was important only in February and October.

The schilbeid catfish *Ailia coila* (kajuli), *Clupisoma garua* (ghaura), and *Silonia silondia* (shillong) were characteristic of the Padma River pre-monsoon and drawdown fisheries, where they were captured with small or large-meshed drifting gill nets (kajuli and shilong respectively) or on baited hooks (ghaura). This group of riverine catfish was surprisingly not important in the Arial Khan, but kajuli and ghaura comprised 5.7% of the winter (December -January) catch of the Kumar. The closely related large catfish, *Pangasius pangasius* (pangas) formed an important component of the catch only in larger rivers (Padma and Arial Khan) and only at the lowest water levels in April, when it became vulnerable to capture by seine nets. Following the construction of the Farakka barrage across the Ganges in India, reduced dry season water levels in the Padma have undoubtedly increased the likelihood of capture of this important large catfish by reduction of its overwintering habitat.

The bagrid catfish, *Aorichthys aor* (ayre) constituted 25 - 30% of the Arial Khan catch after the drawdown (November - December) and 17% of the Kumar catch in February 1994. Its relative *Rita rita* (rita) was rarer, only becoming important in the Arial Khan during the high flows of July. Neither fish contributed significantly to the Padma catch.

5. CANAL FISHERIES

5.1 Sampling Sites

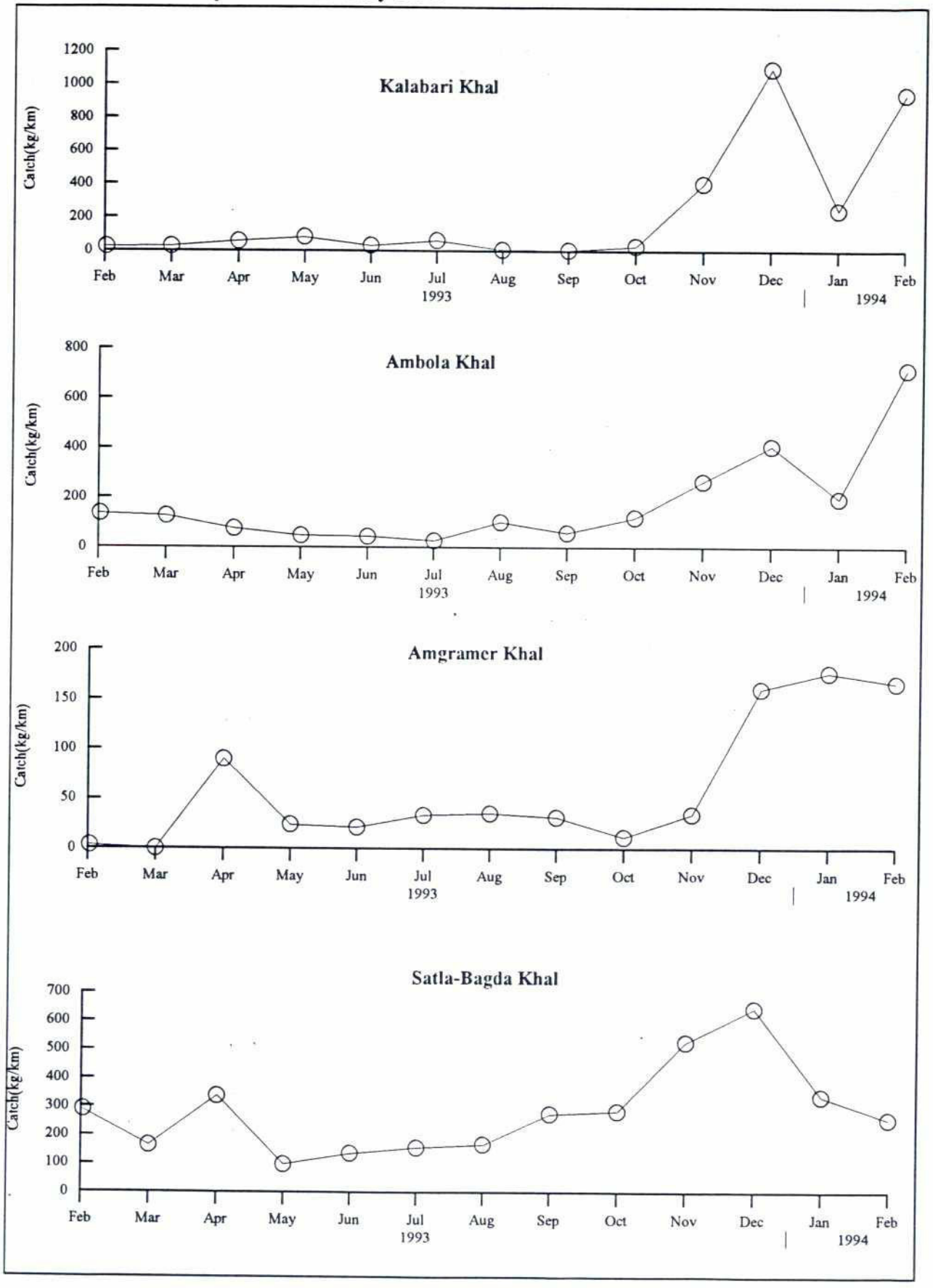
Four canal sites were selected for study during the period February 1993 to February 1994. Two of the sites outside the FCD scheme had no comparable canals within the embankment, and were selected primarily to examine the linkage between fisheries in the sampled rivers to the north with those of floodplains in the south. These two canals were Amgramer khal and Satla-Bagda khal. The former bisects floodplain and beel sites on Bagihar beel and the latter forms the eastern boundary of the poldered area (Figs. 1.1 and 2.1). Two sites which were used in a paired comparison of inside and outside sites were Kalabari khal and Ambola khal, directly draining floodplain/beel sites outside and inside the FCD scheme respectively.

The canals differ in terms of size (width, discharge) which is related to varying catchment areas (Table 2.1). Satla-Bagda khal is the largest canal of the four and an important navigation route. Amgramer khal is smaller and links the Kumar River in the north with the Ghagar and Madhumati in the south. A part of this canal became tightly packed with water hyacinth from May to November 1993, preventing almost all fishing activity and all navigation. Kalabari khal is somewhat shorter and smaller than its counterpart inside the scheme, Ambola khal.

5.2 Pattern of Catch

Seasonal changes in catch followed a clear general pattern in all four canals. During or just after the drawdown period of October and November catches rose steeply as fish which fed and grew on the floodplain moved back towards rivers when water levels decreased (Fig. 5.1). The pattern of change was identical between October and November in the paired drainage canals inside and outside the polder, indicating that the two systems behaved hydrologically in the same way in terms of timing of the flood recession. During the early part of 1993, the systems differed in that catches progressively decreased from February to July inside the polder, while they remained low and changed only slightly during this period outside. The difference again may be explained in terms of differences in hydrology. Inside the polder, the lower land holding fairly large expanses of water flooded in February, earlier than beels outside the polder. Drainage from these areas probably supported the high initial catches of February and March. Outside the polder major rainfall runoff from the floodplain did not begin until about April and May, when some increase in catches was recorded.

Figure 5.1 Seasonal variation in the catch per unit length of canal in the SWR, February 1993 - February 1994



5.3 Size of Catch

The highest catches per unit length of canal were recorded in Satla-Bagda khal, the largest khal surveyed (Table 5.1). The second highest catch was recorded from Kalabari khal draining Joisler beel. The catch from this canal was 27% higher than that of Ambola khal inside the polder.

Table 5.1 Annual catch per unit length of canals, March 1993 - February 1994

Site	Name	Catch (kg/km)
Outside Polder:		
11	Amgramer	785
17	Satla-Bagda	3,376
12	Kalabari	2,975
Inside Polder:		
20	Ambola	2,182

Catch per unit length of the linkage canals outside the polder differed greatly. The catch in Satla-Bagda khal was four times higher than that of Amgramer khal. The difference probably reflects the difference in the size of the two systems. Satla-Bagda is much wider than Amgramer. No data are available to compare annual discharge of the two canals.

One important point can be drawn from comparison of catch per unit length of all four canals, i.e. even though canals directly draining floodplain areas are very short compared to canals such as Amgramer and Satla-Bagda, which basically act as conduits between different river systems, the yield from such canals can almost equal the larger conduit or linkage canals. This suggests that fishing pressure on such canals is very intense during or just after the flood drawdown, when the majority of the annual catch is taken, and that a substantial proportion of the fish population leaving the floodplain is captured at this point both inside and outside FCD schemes. These high localised catches must therefore be added to floodplain/beel catches when making spatial comparisons of floodplain yields.

Compared to yields from rivers (Tables 4.1 and 5.1), Kalabari and Satla-Bagda khal supported higher catches per unit length than all rivers except the Padma. However, the catch of Amgramer khal exceeded that of the Kumar River but was lower than those of other rivers.

5.4 Pattern of Fishing

5.4.1 Catch by gear

Those gears which contributed to 90% of the total catch are listed below in Table 5.2. More detailed lists of all gears recorded are presented in Tables 5.3 to 5.6.

Table 5.2 Dominant Fishing Gears used in Canals in the SWR, March 1993 - February 1994

Gear Name	FCD Comparison		Linkage Canals outside FCD	
	Site 12 (Out) Kalabari	Site 20 (In) Ambola	Site 11 Amgramer	Site 17 Satla-Bagda
Current jal (Stationary)		3.9		
Ber jal			20.6	
Dhor jal	19.2			
Moi jal				6.1
Uttar jal				3.3
Veshal jal	11.4		11.0	
Dharma jal	5.4			
Tukri	24.6	13.3		8.6
Shangla jal				2.9
Sip		4.4		3.0
Daun			14.6	5.3
Jhaki jal	13.8	21.0		14.5
Thella jal				9.6
Juti	7.7			
Doiar trap		22.5	15.1	15.2
Hand fishing	2.5	5.6		
Katha		3.5	30.7	23.0
Canal dewatering	4.1	16.3		

The number of gear types used in canals was similar outside and inside the polder: 16 outside in Kalabari khal and 14 in Ambola khal. Most of these gears were small-scale, cheap, and generally used by subsistence fishermen. There were, however, differences in the composition of dominant gears between canals. In Kalabari khal traps were surprisingly

Table 5.3 Percentage total monthly catch by gear: Kalabari canal(Site SW12)

Gear Code	Gear name(Bengali)	Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
296	Tukri	16.8570	5.2404	0.2226	–	–	–	–	–	–	4.9921	11.9110	68.0340	3094.5210	24.5892
89	Dhor jal	60.2780	57.6030	–	–	–	–	–	–	20.6430	25.5410	65.4430	–	2414.5290	19.1859
164	Jhaki jal	14.1200	16.9040	2.3882	64.2350	–	–	–	–	23.7140	10.7260	7.2611	15.2860	1731.7500	13.7605
266	Veshal	–	14.9140	90.1760	–	–	–	–	–	36.7110	8.8784	5.4788	–	1439.4020	11.4375
170	Juti	–	–	–	–	–	–	–	17.2510	1.7908	19.8300	0.2132	–	970.6750	7.7130
45	Ber jal	–	–	–	–	–	–	–	–	–	17.4740	–	–	809.1000	6.4291
105	Dharma jal	–	–	–	14.1320	87.6960	73.7090	–	75.0120	14.2130	1.9962	–	–	684.4090	5.4383
336	Canal dewatering	–	–	–	–	–	–	–	–	–	–	–	12.8090	510.0000	4.0525
307	Hand fishing	–	–	–	–	–	–	–	–	–	6.5797	0.7943	–	312.8610	2.4860
270	Katha	–	–	–	–	–	–	–	–	–	3.6282	4.8478	–	218.0000	1.7322
298	Akra	–	–	–	–	–	–	–	–	–	–	–	3.8706	154.1050	1.2245
30	Sip	8.7448	5.3387	7.2127	1.6741	6.3160	–	29.2320	–	–	0.3539	4.0511	–	128.0720	1.0177
95	Doiar trap	–	–	–	19.9590	5.9878	26.2910	70.7680	7.7373	2.4008	–	–	–	108.4990	0.8621
88	Current jal(Stationary)	–	–	–	–	–	–	–	–	0.5266	–	–	–	8.9770	0.0713
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	12584.9	100.0

Table 5.4 Percentage total monthly catch by gear: Ambola Canal(Site SW20)

Gear Code	Gear name(Bengali)	Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
95	Doiar trap	40.2670	0.9898	25.9110	30.0040	81.3780	53.1760	80.7700	29.1630	13.8980	44.2470	10.1570	2.7075	2026.7300	22.4889
164	Jhaki jal	29.3800	26.1290	57.6520	60.6580	14.8180	–	1.8248	13.1530	35.2170	21.0430	25.0800	13.7550	1888.8670	20.9591
336	Canal dewatering	–	–	–	–	–	–	–	–	–	–	–	49.5900	1467.4000	16.2825
296	Tukri	23.5640	56.5740	–	–	–	45.4800	7.8320	38.4890	14.6320	7.3673	4.9735	6.1741	1203.0500	13.3492
307	Hand fishing	–	–	–	–	–	–	–	–	–	0.8827	–	16.4760	502.4370	5.5751
30	Sip	6.7894	16.3060	12.2870	4.3735	3.1859	1.3439	–	–	6.3158	8.6252	5.7087	0.3646	398.3350	4.4200
88	Current jal(Stationary)	–	–	–	4.9645	0.6181	–	–	–	–	11.0500	12.3180	1.9153	352.6030	3.9125
270	Katha	–	–	–	–	–	–	–	–	–	–	33.6820	1.5616	319.4590	3.5448
170	Juti	–	–	–	–	–	–	5.7301	4.3263	4.0670	6.4949	4.9141	–	228.9800	2.5408
89	Dhor jal	–	–	–	–	–	–	–	–	–	–	–	7.4553	220.6060	2.4479
45	Ber jal	–	–	–	–	–	–	–	–	13.7240	–	–	–	150.0000	1.6644
266	Veshal	–	–	–	–	–	–	–	12.2730	5.3525	–	–	–	118.7640	1.3178
123	Koi jal	–	–	–	–	–	–	–	1.0523	6.7945	0.2894	–	–	84.3130	0.9355
255	Thella jal	–	–	4.1504	–	–	–	–	–	–	–	3.1672	–	33.7550	0.3746
272	Daun	–	–	–	–	–	–	3.8434	1.5435	–	–	–	–	16.8440	0.1869
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	9012.1430	100.0

Table 5.5 Percentage total monthly catch by gear: Amgramer canal(Site SW11)

Gear Code	Gear name(Bengali)	Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Feb	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
270	Katha	52.4200	–	–	–	–	–	–	–	52.9200	65.1290	67.0630	–	1229.0000	30.6914
45	Ber jal	–	80.6540	24.0700	–	–	–	–	–	–	–	–	50.1650	824.7880	20.5971
95	Doiar trap	–	–	10.5180	100.0000	95.5880	90.4630	73.1080	60.1320	–	–	–	–	603.4890	15.0707
272	Daun	–	–	–	–	–	9.5375	26.8920	–	36.1900	13.3890	2.7292	38.5690	585.1220	14.6120
266	Veshal	–	–	47.2320	–	–	–	–	–	–	13.6130	24.9400	5.3940	439.3320	10.9713
164	Jhaki jal	47.5800	19.3460	16.8130	–	–	–	–	–	8.8330	5.3325	1.6889	1.9181	199.9470	4.9932
30	Sip	–	–	1.3676	–	–	–	–	14.1390	–	2.5361	3.5617	2.1334	80.8550	2.0192
88	Current jal(Stationary)	–	–	–	–	–	–	–	–	–	–	0.0171	1.8211	15.5830	0.3891
296	Tukri	–	–	–	–	0.2182	–	–	25.7300	–	–	–	–	15.5000	0.3871
255	Thella jal	–	–	–	–	4.1936	–	–	–	–	–	–	–	7.1490	0.1785
170	Juti	–	–	–	–	–	–	–	–	2.0570	–	–	–	3.6150	0.0903
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	4004.3800	100.0

Table 5.6 Percentage total monthly catch by gear:Satla–Bagda Canal(Site SW17)

Gear Code	Gear name(Bengali)	Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
270	Katha	21.7600	35.9540	5.0745	29.5270	6.5222	3.4136	–	–	18.2430	17.9030	29.7850	54.4470	53.1680	7506.2790	22.9677
95	Doiar trap	45.4820	6.1578	75.1500	44.2700	26.1400	51.9560	14.7260	22.1160	1.1952	0.0358	–	–	–	4958.1860	15.1711
164	Jhaki jal	2.1744	15.7890	4.7115	8.5842	6.6788	7.3374	6.8906	3.1165	6.8826	21.1170	34.9120	9.1992	5.6666	4751.7930	14.5395
255	Thella jal	–	–	–	0.0979	–	17.2040	48.1700	26.9220	20.0480	16.3980	–	–	–	3140.1440	9.6082
296	Tukri	0.9813	–	–	–	7.4250	15.3950	27.0820	29.6020	21.4860	3.1736	7.0926	1.8040	0.6644	2822.5000	8.6363
202	Moi jal	7.8376	11.0070	3.5897	4.2436	5.7698	3.2863	–	–	–	–	7.1886	13.1140	26.1610	1979.7630	6.0577
272	Daun	6.0503	5.3367	1.3595	8.8223	2.0300	0.9992	0.4458	9.3903	9.7929	7.9271	3.6781	6.4962	4.3943	1732.3920	5.3008
68	Uttar jal	–	–	–	–	5.8379	–	–	0.2032	10.5420	6.1267	1.8550	4.7146	4.4455	1062.6010	3.2513
30	Sip	0.6878	3.5175	2.3834	2.8513	0.6899	0.4080	0.8055	3.7591	10.7240	5.0998	1.7783	0.7852	0.6648	995.5940	3.0463
234	Shangla jal	9.6226	15.1620	1.0899	–	–	–	–	–	–	2.5550	4.6765	7.3600	–	936.7000	2.8661
170	Juti	–	–	–	–	–	–	–	–	–	5.0985	5.2169	0.8582	–	611.5530	1.8712
271	Suti jal	–	–	–	–	38.9060	–	–	–	–	–	–	–	–	511.8140	1.5660
322	Char jal	3.2315	6.7279	2.5464	–	–	–	–	–	–	1.4996	0.9405	–	–	324.8320	0.9939
45	Ber jal	–	–	–	–	–	–	–	–	–	5.6855	–	–	–	289.2860	0.8852
282	Current jal (drifting)	–	–	3.6051	0.3818	–	–	–	–	–	–	–	1.2215	3.2710	242.1310	0.7409
315	Par jal	–	–	–	–	–	–	–	–	–	4.1251	–	–	–	209.8910	0.6422
307	Hand fishing	–	–	–	–	–	–	–	–	–	–	2.8767	–	–	178.7760	0.5470
88	Current jal(Stationary)	–	–	0.4896	0.3912	–	–	–	–	–	2.8927	–	–	–	166.8600	0.5106
152	Tana barsi	–	–	–	–	–	–	0.2192	3.1806	1.0861	0.2650	–	–	–	131.3880	0.4020
65	Chandi jal	–	–	–	0.8305	–	–	1.6607	1.7101	–	–	–	–	1.5643	118.8950	0.3638
123	Koi jal	2.1728	0.3476	–	–	–	–	–	–	–	–	–	–	–	5.5270	0.0169
316	Kajuli jal	–	–	–	–	–	–	–	–	–	0.0975	–	–	–	4.9620	0.0152
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	32681.8	100.0

unimportant, whereas in Ambola they captured 23% of the annual catch. Instead, small basket scoops (tukri/chalon) and small seine nets (dhor jal) took most (44%) of the annual canal catch in Kalabari, but were less important in Ambola. Lift nets (veshal and dharma jal) were also important in Kalabari, but oddly did not contribute greatly to the Ambola catch. Here, dewatering of a large section of the canal accounted for 16% of the total catch compared with only 4% of the catch from Kalabari khal.

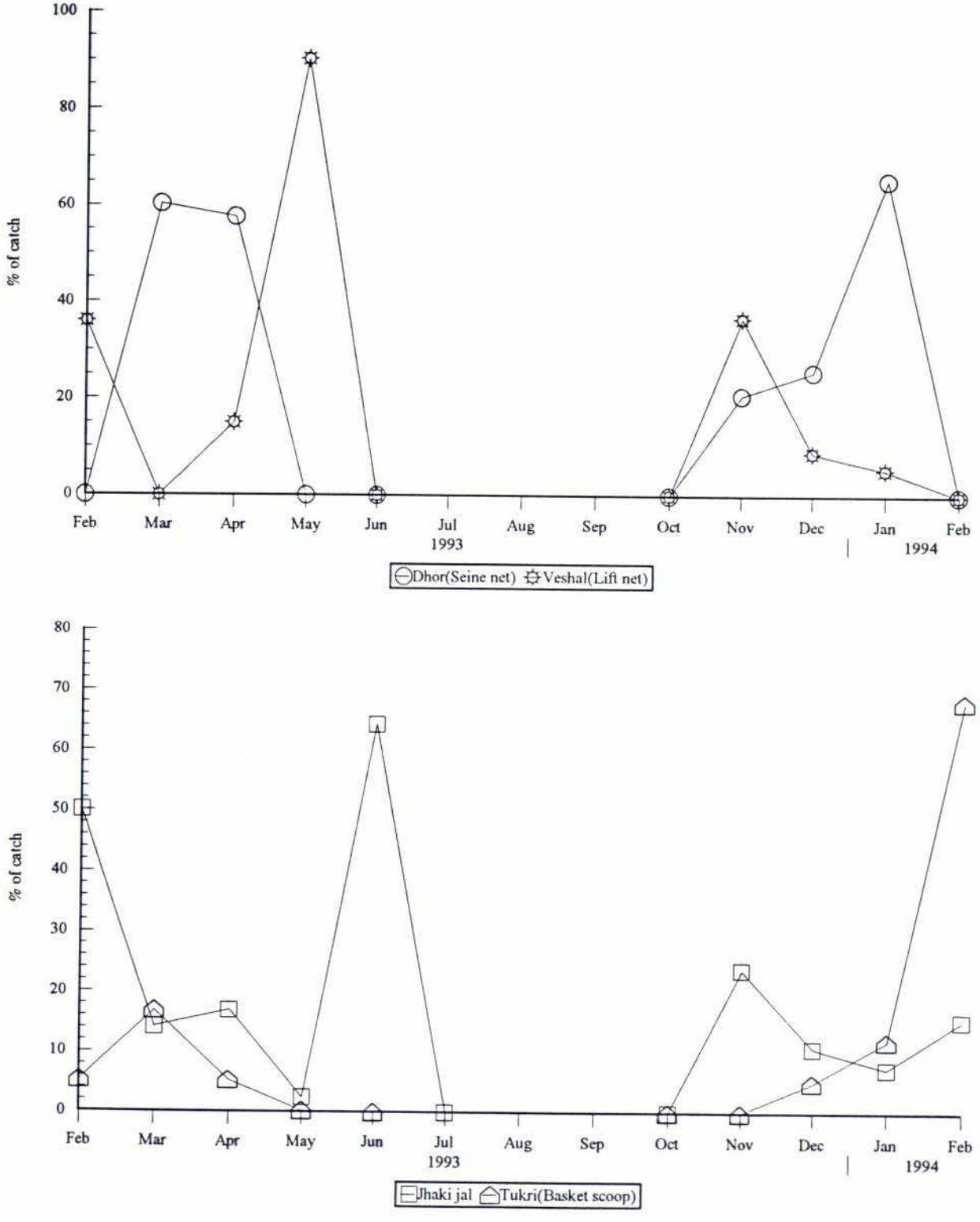
In the two linkage canals outside the scheme there were substantial differences between sites not only in terms of the number of gear types, only 11 in Amgramer khal and 23 in Satla-Bagda (Tables 5.5 and 5.6), but also in the composition of dominant gears. Of the 11 gears recorded in Amgramer, 5 accounted for 92% of the total annual catch. These were katha, ber jal, traps, daun and veshal. In contrast, on the larger Satla-Bagda khal there was a greater diversity of gears and a more equitable distribution of the total catch between gears. Three gears: katha, doiar traps and jhaki jal, took 53% of the catch, while a further 7 gears shared 39% of the catch total (Table 5.2). Katha contributed the highest proportion (23%) to the total catch, which is not surprising given the high density of katha in the khal (22 per km). Drifting gears such as uttar jal, shangla jal, kajuli, chandi and current jal featured in the list of Satla-Bagda gears, reflecting the more riverine nature of this canal.

5.4.2 Catch by gear by month

In Kalabari khal during the pre-monsoon season (March - April), when catches were low, small traps took most of the catch. As the canals filled with rainfall runoff draining the floodplain in May, the veshal contributed a very high proportion (88%) of a relatively small total catch (Fig. 5.2). During higher flows caused by river level rises between June and September the bulk of the catch, which remained low, was taken first by jhaki jal (June), then dharma (July - August), and later (September) by traps. During the latter part of the flood drawdown (November - December), when catches increased considerably, veshal, dhor jal and jhaki jal captured the bulk of the catch (Fig. 5.2). Later, during the dry season, catches initially dropped in January only to rise sharply again in February due to tukri fishing.

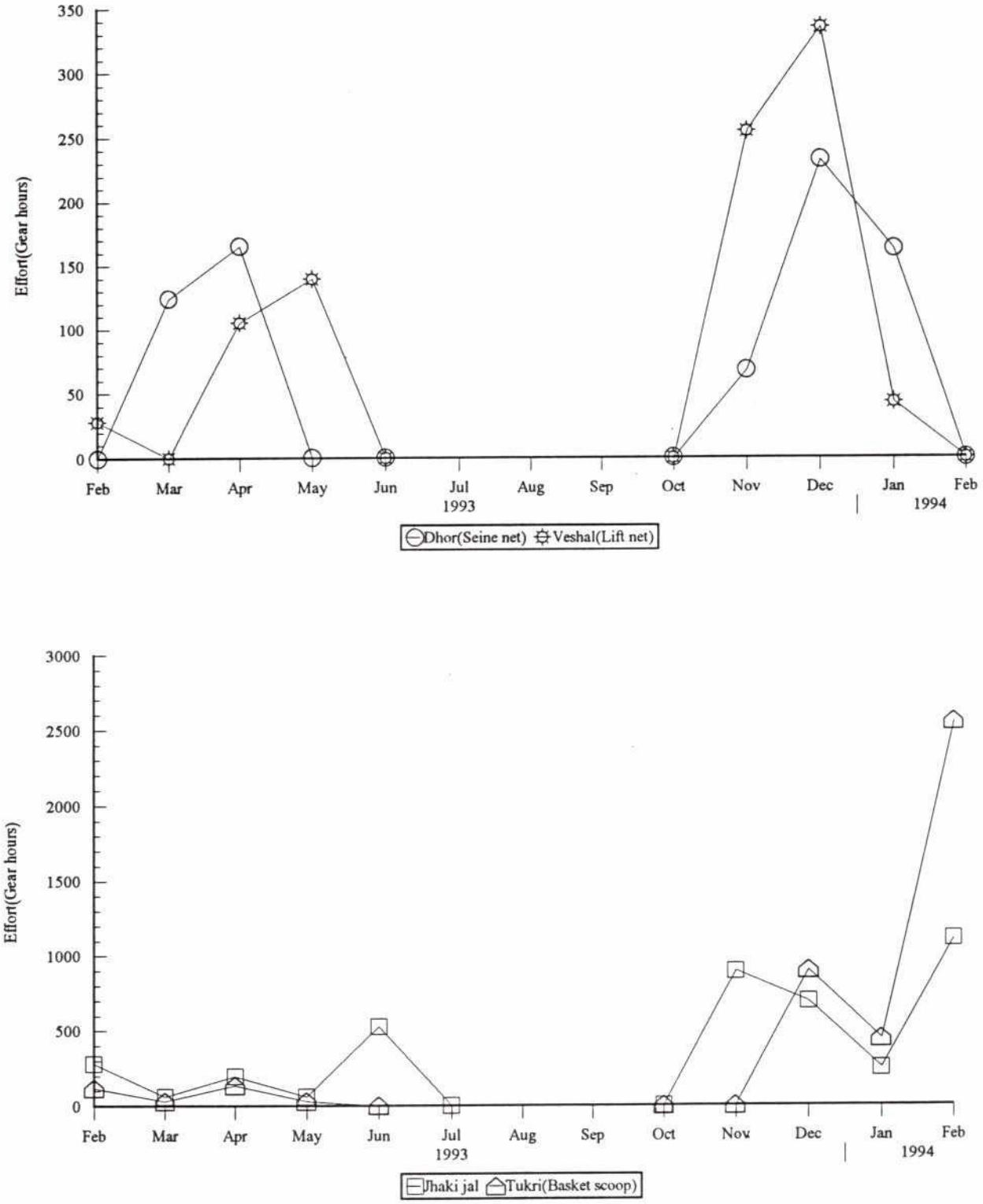
In all months of peak catches, the increase in catch was a function of both increased fishing effort (Fig. 5.3) and increased catch rates (Fig. 5.4). The levels of effort probably rose because of increased catch rates caused by the rapid concentration of fish into the canal

Figure 5.2 Percentage of total monthly catch taken by dominant gears: Kalabari canal



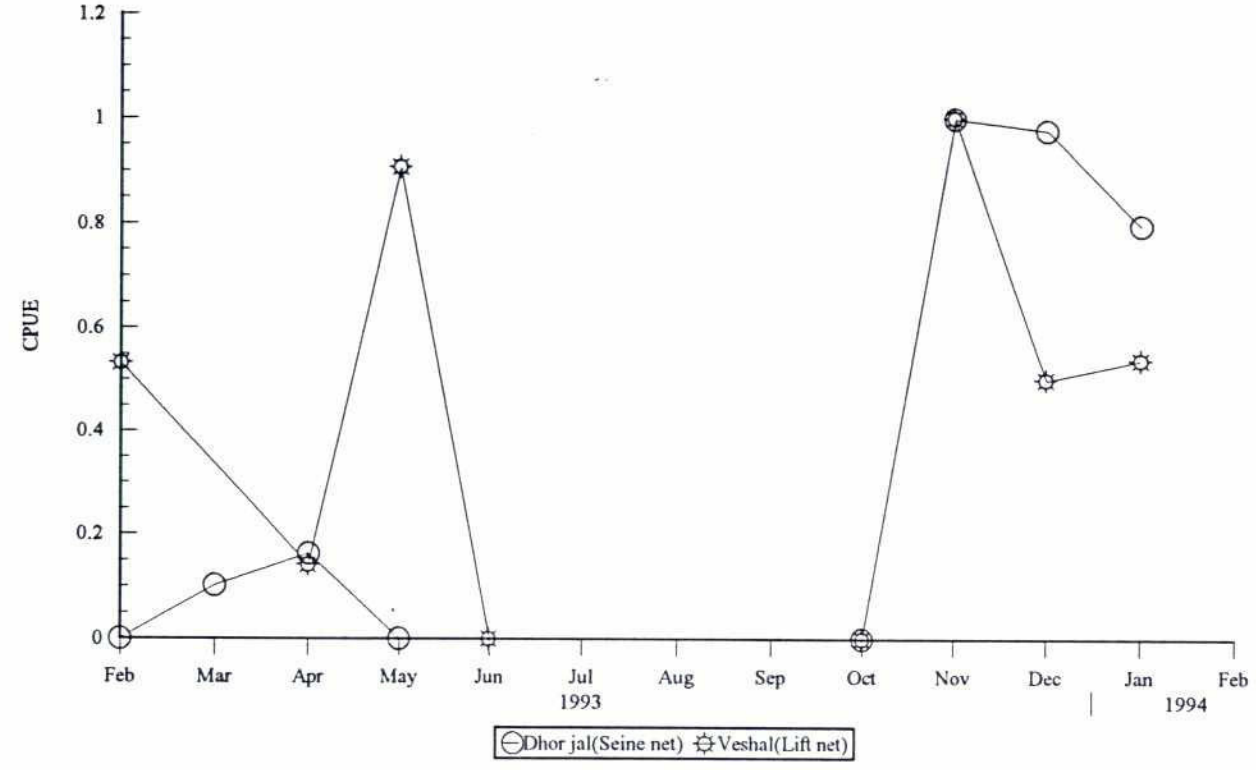
Note: Fishing activities greatly reduced during full flood (July-September) when only a few subsistence gears operated e.g. traps, handline and dharma jal.

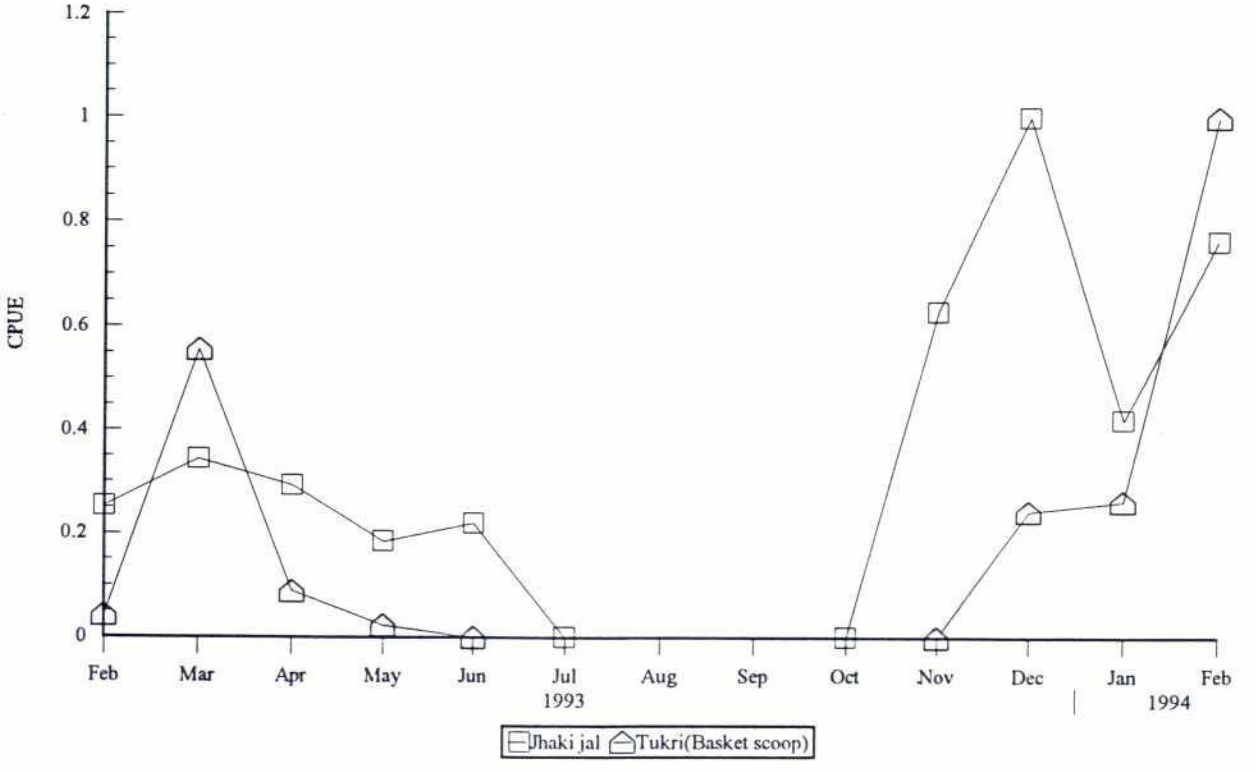
Figure 5.3 Total monthly fishing effort of dominant gears: Kalabari canal



Note: Fishing activities greatly reduced during full flood (July-September) when only a few subsistence gears operated e.g. traps, handline and dharma jal.

Figure 5.4 Catch rates (scaled CPUE) of dominant gears: Kalabari canal





Note: Scaled CPUE are values of CPUE expressed as a proportion (decimal) of the maximum monthly value recorded.

during the drawdown.

In Ambola khal, during the pre-monsoon rainfall season, dominant gears changed sequentially from traps in February and March, tukri in April to jhaki in May and June (Fig. 5.5). During the height of the flood (July - September), traps contributed most to the total catch, which at that time remained fairly low. Peak catches of November and December were produced by a combination of traps, jhaki and tukri (Fig. 5.5). In February, a section of the canal was dewatered and fished out, contributing the majority of the monthly catch.

As in Kalabari khal, catch rates of two dominant gears, traps and jhaki jal, reached their maxima during periods of peak catch (December and February respectively), but highest catch rates of the third dominant gear, the tukri, were observed in August when catches were low (Fig. 5.5). Peaks in fishing effort by jhaki jal and tukri coincided with peak catch rates and peak catches, but for traps highest effort was expended earlier in the year when catch rates were lower (Figs. 5.6 and 5.7).

5.4.3 Statistical analysis of catch rates

Of a total of seven dominant gears recorded from canals inside and outside the polder only two (jhaki jal and tukri) were common to both areas (Table 5.2). This was considered to be too few on which to base a statistical comparison of catch rates and therefore the analysis was not undertaken. However, a non-statistical examination was made of the monthly catch rates of these two gears in both canals together with those of three other gears which were less important in their contribution to the total or peak catches, but were common to both sites (Fig. 5.8). In most cases where monthly data overlapped, catch rates were either similar or, in the case of juti (spears) higher outside during months when catches were low. However, during periods of peak catches all gears showed higher catch rates outside, indicating higher densities of fish at the most important times of the year.

5.5 Biodiversity and Species Composition

5.5.1 Species richness

A total of 46 species of fish were recorded in Kalabari khal compared with 52 in the empoldered Ambola khal (Tables 5.7 and 5.8). In the larger linkage canals outside the

Figure 5.5 Percentage of the total monthly catch taken by dominant gears: Ambola canal

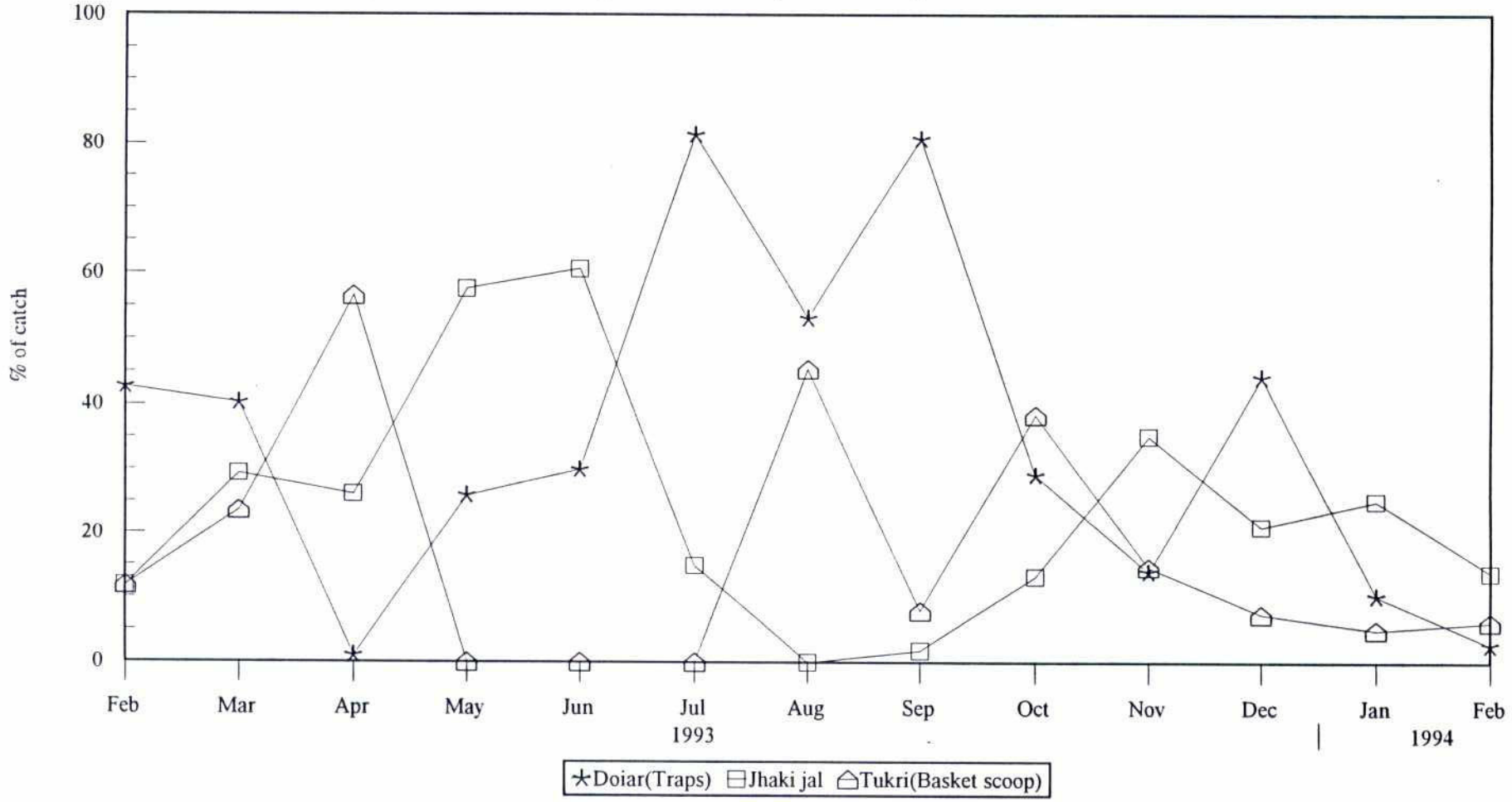
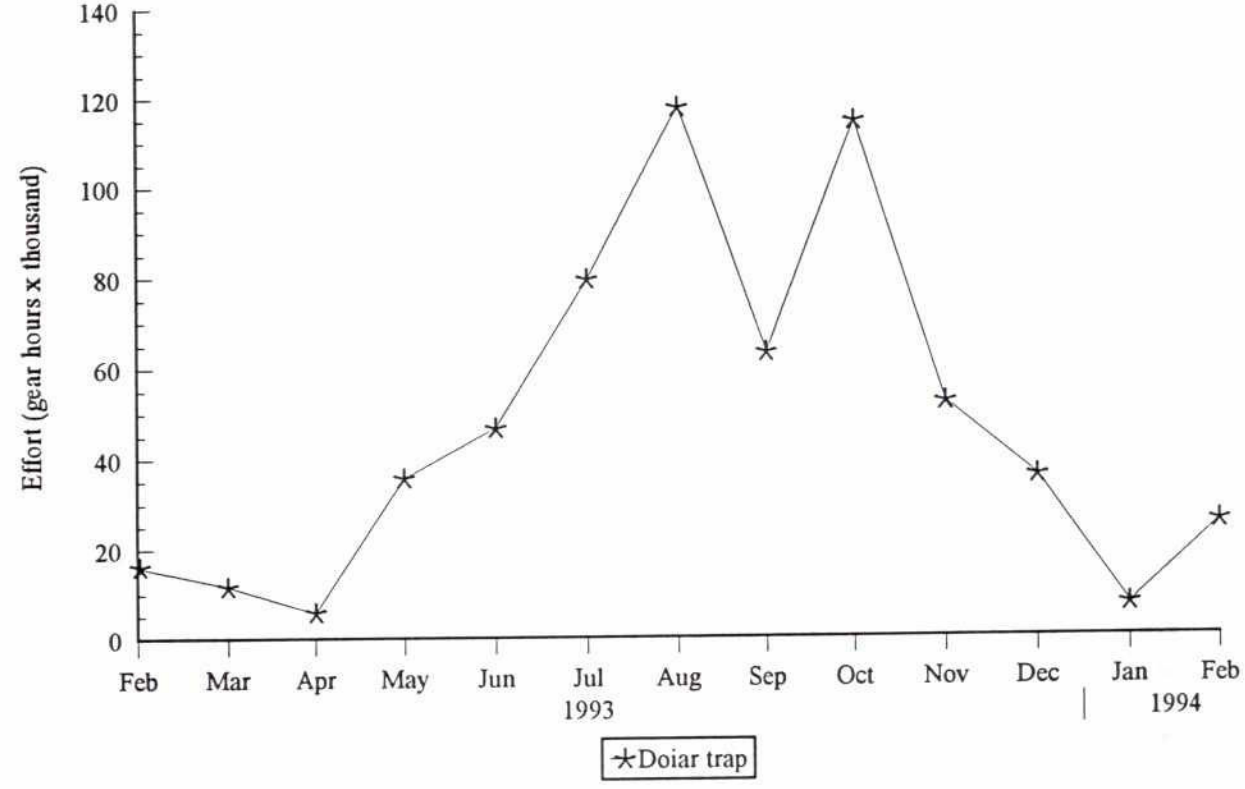


Figure 5.6 Total monthly fishing effort of dominant gears: Ambola canal



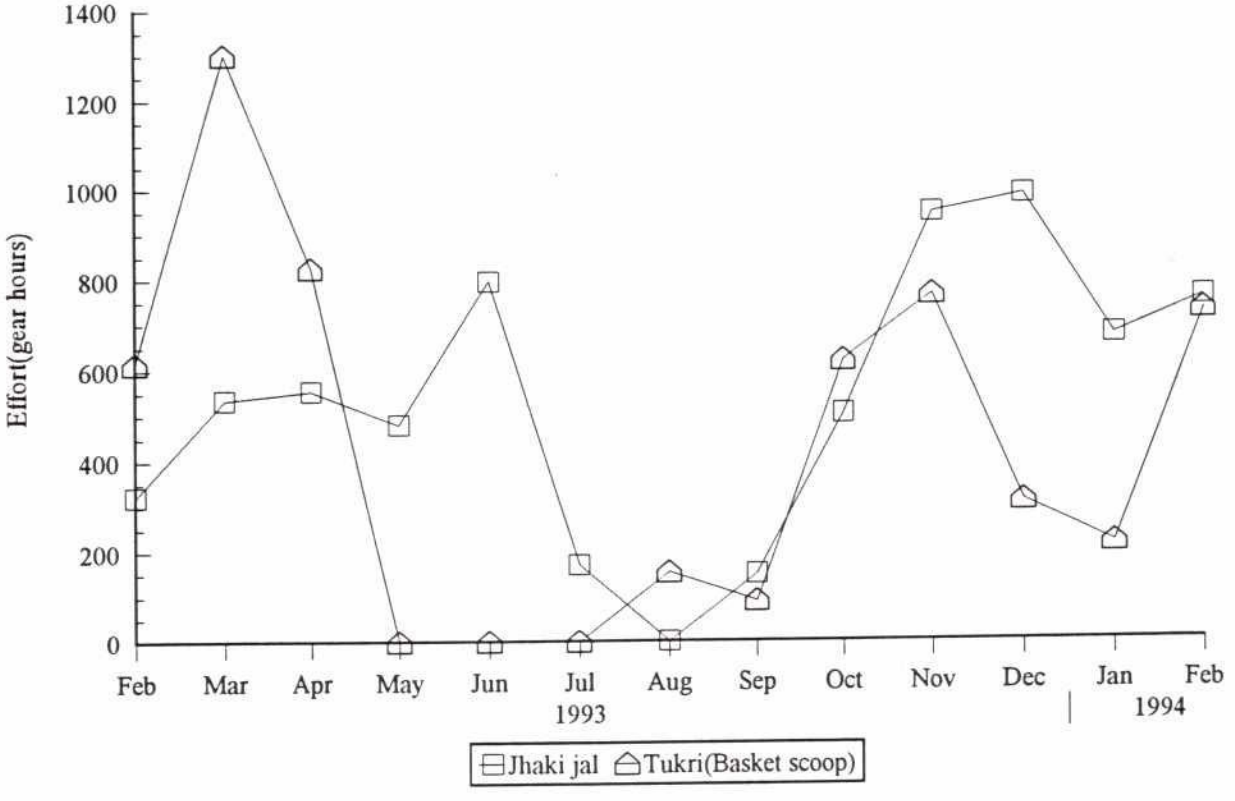
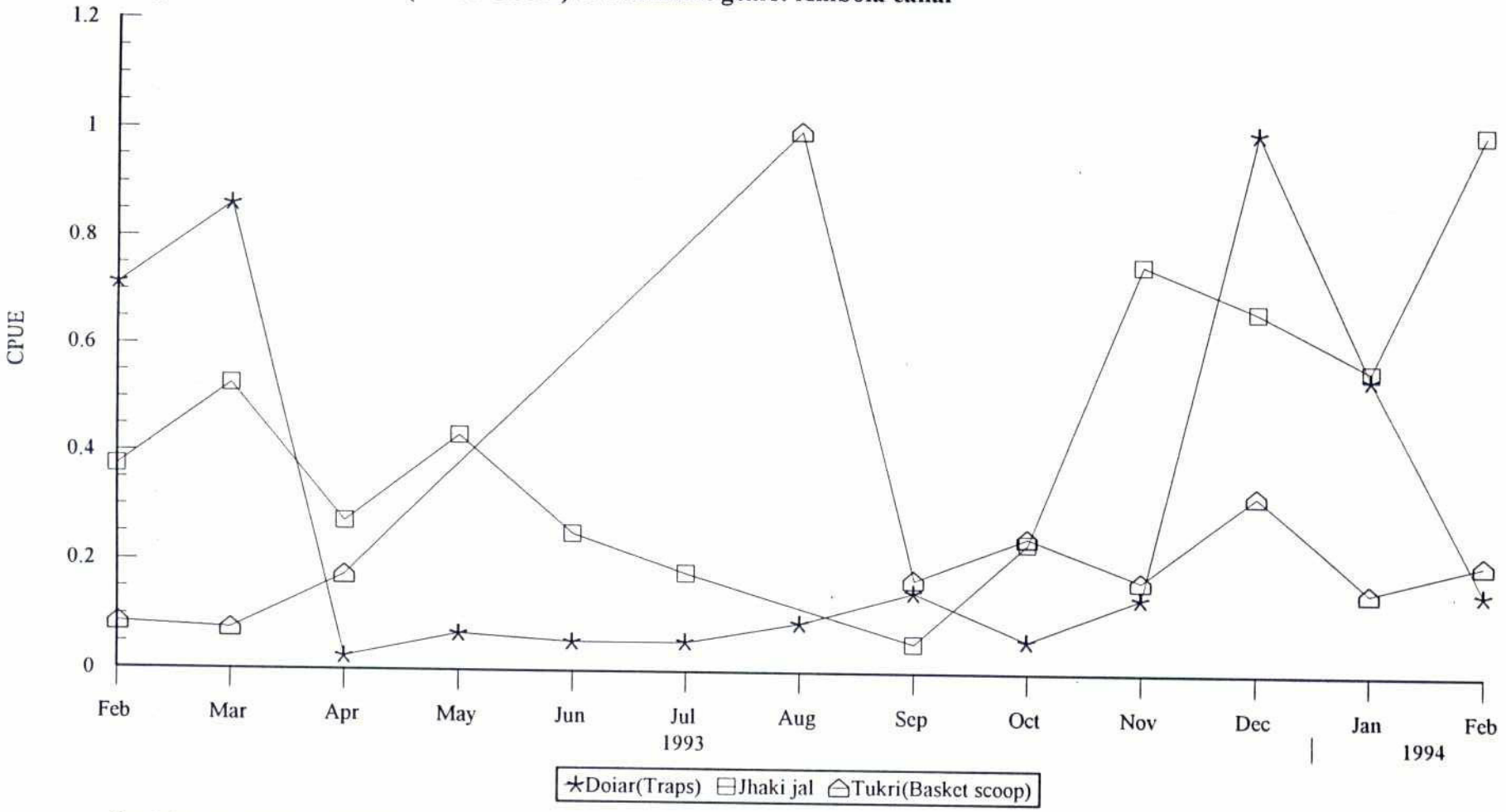
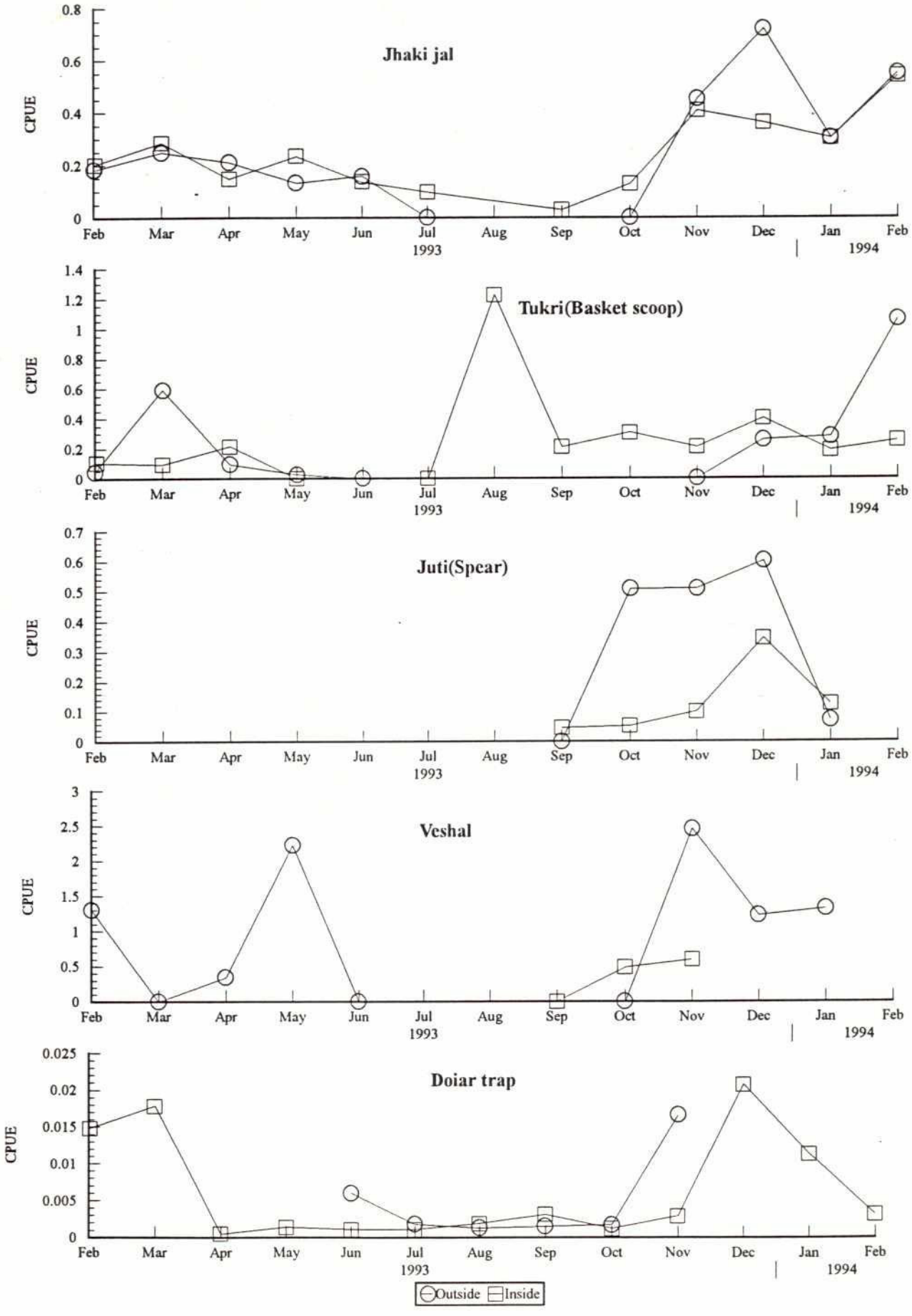


Figure 5.7 Catch rates (scaled CPUE) of dominant gears: Ambola canal



Note: Scaled CPUE are values of CPUE expressed as a proportion (decimal) of the maximum monthly value recorded.

Figure 5.8 Comparison of catch rates of dominant gears used on canals inside and outside Satla-Bagda Polder 1, February 1993- February 1994.



scheme a higher number of species was recorded (Tables 5.9 and 5.10), particularly from Satla-Bagda khal (82 species), which forms the eastern boundary of the scheme. Comparison of Kalabari and Ambola canals apparently shows no effect by FCD on species richness, measured as total number of species present. However, if their numbers are compared with those in the larger canals with which they directly connect, then a difference does emerge: there is a 16% reduction in the number of species in Kalabari compared with Amgramer, whereas in Ambola there is a reduction of 45% in the number of species compared with Satla-Bagda. The latter is particularly rich in species, exceeding all rivers sampled in the region, even including the Padma.

A similar pattern of seasonal variation in species diversity was seen in all canals (Fig. 5.9). Lowest numbers were observed during the peak flood (July - October) before rising sharply in November, coinciding with the latter part of the drawdown. During the winter period (December - February) numbers remained high in both Kalabari and Ambola khal but dropped in the other two canals. This pattern agrees with the seasonal trends seen in rivers of the South West Region (Fig. 4.2).

5.5.2 Species composition

Detailed species compositions presented in Tables 5.7 to 5.10 are summarised in Table 5.11, in which a list is presented of dominant species which contributed 1% or more of the total annual catch for each canal. These species comprised 86% - 94% of their respective total annual catches.

In comparison with the dominant riverine fish species (Table 4.12) the composition of the major part of the canal catch was quite different both inside the poldered area and outside on Bagihar beel. In these canals the catches were dominated by fish more typical of floodplain and beel fisheries; e.g. the spiny eels baim and guchi, snakehead, barbs especially *Puntius sophore* and *Puntius ticto*, the small bagrid catfish, tengra, and also bailla, foli and shing. Since most of the canal catch is taken during or just after the late drawdown when fish emigrating from the floodplain are concentrated in drainage channels, it is to be expected that canal catches resemble floodplain rather than riverine compositions. Differences between the catch of Ambola drainage canal inside the polder and that of Kalabari outside were largely in terms of variations in the degree of importance of particular species rather than in differences in the overall composition of dominant species (Table 5.11).

Figure 5.9 Seasonal variation in the number of fish species recorded from canals in the SWR, February 1993 - February 1994

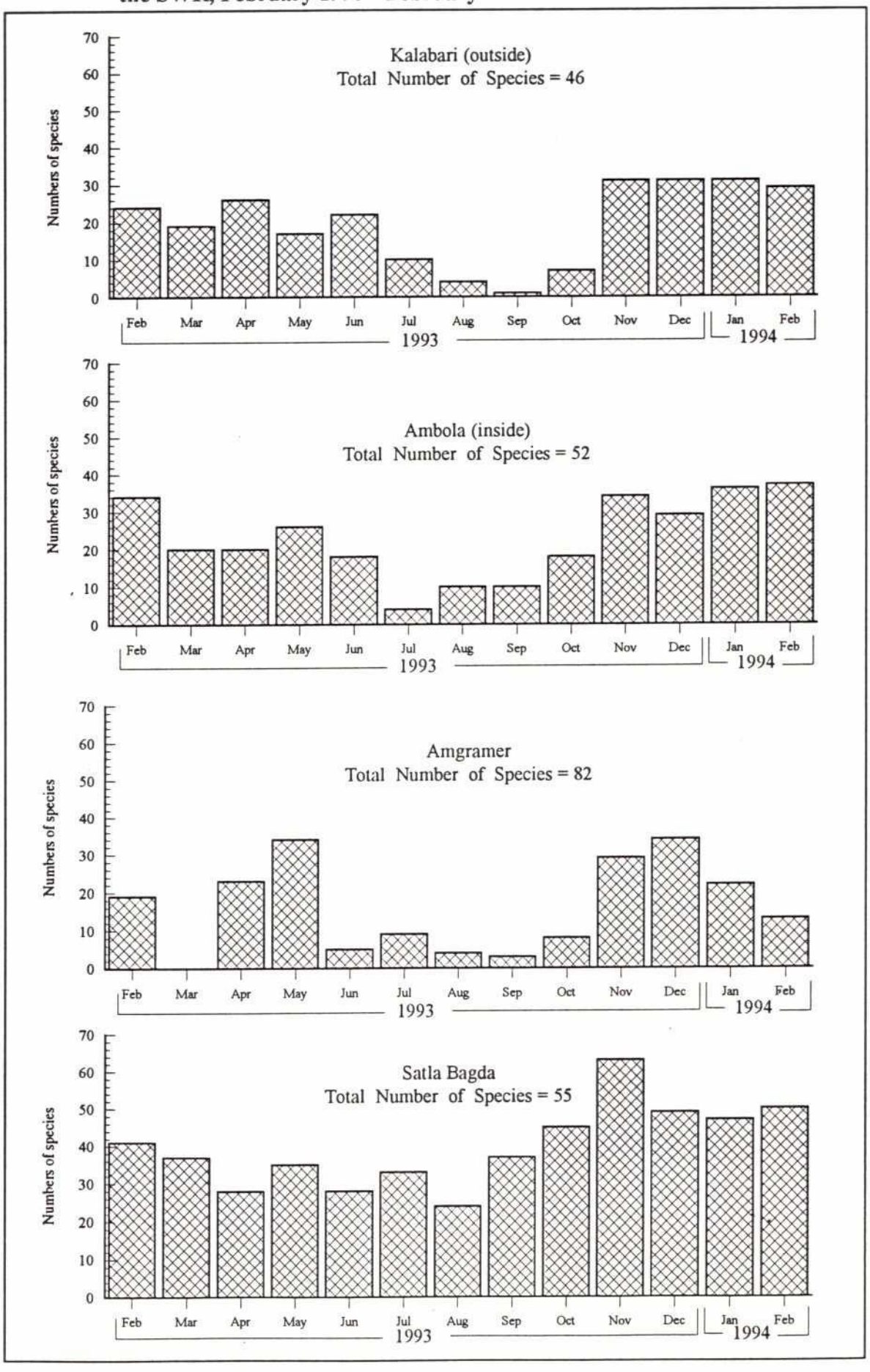


Table 5.7 Percentage total monthly catch by species: Kalabari canal(Site SW12)

Species Code	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
123	*Macrognathus pancalus*	*Guchi*	13.1080	5.2800	1.6283	4.0705	1.8032	–	–	6.3028	12.3510	9.6053	8.3288	45.5720	2605.3510	20.7022
180	*Puntius sophore*	*Puti*	–	10.0850	7.2907	12.4490	24.4810	22.4340	29.2320	69.6870	21.0910	5.5303	11.0080	6.0663	1189.2440	9.4498
210	*Xenentodon cancila*	*Kaikka*	–	0.7927	0.7718	0.8618	0.2465	–	–	–	4.7823	21.0720	0.0926	0.2920	1076.1580	8.5512
138	*Nandus nandus*	*Bheda*	–	–	–	1.3323	–	–	–	5.0857	2.7374	11.2400	3.9044	11.0650	1055.4610	8.3867
137	*Mystus vittatus*	*Tengra*	11.9200	8.3387	15.3320	0.4154	1.0286	–	–	1.3239	6.8137	7.9432	32.9300	1.5034	973.9630	7.7391
110	*Lepidocephalus guntea*	*Gutum*	19.3230	5.5306	2.1729	0.5557	–	–	–	1.1524	6.0798	1.8100	3.3666	5.8462	498.8220	3.9637
41	*Channa punctatus*	*Taki*	19.4510	11.9780	5.4325	9.0469	3.1051	11.0690	–	–	0.6862	5.4481	2.6758	2.7917	494.2120	3.9270
212	*Puntius ticto*	*Tit puti*	1.1406	0.3505	2.0300	0.6130	–	25.6390	–	–	8.3352	3.6235	2.2723	3.2433	479.3180	3.8087
203	*Tetraodon cutcutia*	*Potka*	0.1408	0.0495	0.5433	–	–	–	3.9967	1.9303	7.4030	4.1361	5.4178	0.3162	391.1180	3.1078
136	*Mystus tengara*	*Bajari tengra*	–	0.4450	13.8670	2.5739	–	–	–	–	5.8377	1.6566	5.8294	2.1158	372.6300	2.9609
55	*Colisa fasciatus*	*Khalisha*	7.2579	15.9530	1.0864	18.5180	1.8432	–	–	–	2.8722	1.7491	3.6110	2.7113	354.0340	2.8132
122	*Mastacembelus armatus*	*Baral baim*	–	0.6866	–	–	–	–	–	0.8811	2.6524	0.4018	1.0856	6.7131	344.9700	2.7411
931	Prawn spp.	Chingri/Icha	8.4041	12.5350	0.0180	6.5017	5.4345	26.2920	35.3840	–	1.9988	0.9417	3.6543	3.2932	320.7920	2.5490
175	*Puntius conchonius*	*Canchan puti*	0.4428	0.5838	–	10.7100	57.9400	14.5660	–	3.3207	3.8124	1.1089	0.4547	–	293.5220	2.3323
121	*Macrognathus aculeatus*	*Tara baim*	6.8096	3.0814	–	2.1236	–	–	–	1.2889	3.1140	0.0509	1.6134	4.7344	279.6550	2.2221
42	*Channa striatus*	*Shol*	–	–	–	–	–	–	–	–	0.5266	5.4252	0.7423	–	267.8430	2.1283
209	*Wallagu attu*	*Boal*	–	–	12.8660	–	–	–	–	–	–	4.7103	–	–	262.3150	2.0844
88	*Heteropneustes fossilis*	*Shingi*	1.6083	6.8184	–	–	1.1009	–	8.3481	2.2987	0.9704	3.3982	3.4837	0.2083	243.0660	1.9314
68	*Danio devario*	*Chebli*	–	1.8497	–	–	–	–	–	–	–	4.8604	0.5369	0.1455	240.8670	1.9139
83	*Glossogobius giurus*	*Bailla*	0.4630	1.1854	–	18.6390	–	–	–	–	1.6003	1.3258	0.3761	0.1681	126.6650	1.0065
6	*Anabas testudineus*	*Koi*	1.4195	–	–	1.0416	2.4172	–	–	–	–	0.4851	2.7826	1.0804	103.2820	0.8207
182	*Rasbora daniconius*	*Darkina*	0.3019	–	16.8690	1.3486	–	–	–	–	0.6086	0.3225	0.8901	0.1322	99.7870	0.7929
56	*Colisa lalia*	*Lal Khalisha*	0.4225	0.9661	1.6359	–	–	–	–	–	0.4963	0.6337	1.3717	0.1653	66.9540	0.5320
36	*Chanda nama*	*Nama Chanda*	–	–	–	–	–	–	–	–	1.0907	0.4201	0.5600	0.4934	63.4730	0.5044
169	*Pseudeutropius atherinoides*	*Batasi*	–	–	16.0110	3.6822	–	–	–	–	–	–	–	0.0661	62.3980	0.4958
33	*Chaca chaca*	*Cheka*	5.5972	–	–	1.9252	–	–	23.0390	5.7796	0.2914	0.3297	0.5778	0.2780	55.8130	0.4435
148	*Ompok pabda*	*Madhu pabda*	–	–	1.0864	–	–	–	–	–	0.1682	0.7612	0.6149	0.1388	53.7190	0.4269
145	*Notopterus notopterus*	*Foli*	–	–	–	–	–	–	–	–	0.9463	0.3472	0.2218	0.2975	46.3480	0.3683
132	*Mystus cavasius*	*Kabashi*	–	1.9018	–	–	–	–	–	–	1.5157	–	0.6915	0.0991	41.5270	0.3300
37	*Chanda ranga*	*Lal chanda*	–	1.1705	–	–	–	–	–	–	0.5531	0.1890	0.7591	0.1322	34.1130	0.2711
188	*Salmostoma bacaila*	*Katari*	–	4.8122	–	–	–	–	–	–	–	–	–	0.0991	15.6040	0.1240
57	*Colisa sota*	*Khalisha*	1.7068	1.3340	0.0721	0.4154	–	–	–	–	0.0611	0.1627	0.0129	–	14.5810	0.1159
211	*Colisa labiosus*	*Khalisha*	0.0800	–	–	–	0.6000	–	–	–	–	0.2100	0.0048	–	11.4080	0.0906
15	*Badis badis*	*Napit koi*	–	–	0.4575	–	–	–	–	–	0.2307	0.0411	0.1161	–	8.6070	0.0684
131	*Mystus bleekeri*	*Golsha tengra*	–	0.7122	–	1.9523	–	–	–	–	–	–	–	0.0991	8.1930	0.0651
75	*Esomus danricus*	*Darkina*	0.1408	2.1718	–	–	–	–	–	–	–	–	–	–	5.4130	0.0430
47	*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	–	–	–	–	0.1322	5.2660	0.0418
187	*Osteobrama cotio cotio*	*Keti*	–	–	0.8291	0.2487	–	–	–	–	0.0747	–	–	–	4.4450	0.0353
39	*Channa marulius*	*Gajar*	–	–	–	–	–	–	–	0.9485	0.0985	–	–	–	2.7640	0.0220
139	*Nemacheilus botia*	*Balichata*	–	–	–	–	–	–	–	–	0.1545	–	–	–	2.6350	0.0209
5	*Amblypharygodon mola*	*Mola*	–	0.7378	–	–	–	–	–	–	–	–	–	–	1.7870	0.0142
945	*Crab sp*	*Kakra*	–	–	–	–	–	–	–	–	–	0.0382	–	–	1.7690	0.0141
9	*Aplocheilus panchax*	*Kanpona*	–	0.6247	–	–	–	–	–	–	–	–	–	–	1.5130	0.0120
176	*Puntius gelius*	*Giliputi*	–	0.0247	–	–	–	–	–	–	–	0.0211	0.0130	–	1.1740	0.0093
135	*Aorichthys seenghala*	*Guizza*	–	–	–	0.6494	–	–	–	–	–	–	–	–	0.8380	0.0067
48	*Cirrhinus reba*	*Raik*	–	–	–	–	–	–	–	–	0.0448	–	–	–	0.7650	0.0061
189	*Salmostoma phulo*	*Fulchela*	–	–	–	0.3255	–	–	–	–	–	–	–	–	0.4200	0.0033
35	*Chanda baculis*	*Chanda*	0.2614	–	–	–	–	–	–	–	–	–	–	–	0.2840	0.0023
			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	12584.8860	100.0

Table 5.8 Percentage total monthly catch by species: Ambola canal(Site SW20)

Species	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
Code	Scientific	Bengali	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
180	*Puntius sophore*	*Puti*	9.0470	5.8451	5.6164	11.7860	1.1601	0.6352	–	0.7481	8.1549	33.9040	30.7720	22.5650	1683.0260	18.6754
931	Prawn spp.	Chingri/Icha	23.7740	52.3970	16.3570	7.0614	19.7500	10.1710	6.6264	12.4560	4.7640	8.0958	4.3269	5.3188	853.0780	9.4660
137	*Mystus vittatus*	*Tengra*	10.9000	10.2130	13.2790	6.1268	1.6685	0.7085	0.5474	1.3091	4.5706	10.7150	10.9030	13.3840	852.6100	9.4609
212	*Puntius ticto*	*Tit puti*	3.2924	0.8616	–	19.2960	–	–	–	0.1169	17.0030	12.3420	7.9075	5.2859	669.2200	7.4259
83	*Glossogobius giurus*	*Bailla*	–	–	0.2024	21.8100	73.5990	37.9520	74.2350	10.8530	1.2184	0.4159	0.4828	0.7959	559.9010	6.2129
123	*Macrognathus pancalus*	*Guchi*	5.6653	–	3.0284	12.1300	0.1793	0.3127	0.4176	19.1420	4.8749	3.4812	6.3965	7.8372	548.9770	6.0916
138	*Nandus nandus*	*Bheda*	–	–	0.2760	4.4715	1.4757	0.5642	1.1832	5.9003	9.3650	7.0240	1.9705	1.6200	329.1170	3.6520
110	*Lepidocephalus guntea*	*Gutum*	9.1898	4.5444	4.7435	1.3923	–	0.2010	–	14.5290	1.2410	0.9168	0.8364	3.1653	274.9330	3.0508
145	*Notopterus notopterus*	*Foli*	–	12.1440	–	–	–	–	–	–	2.0200	–	8.2303	4.9881	274.2600	3.0433
209	*Wallagu attu*	*Boal*	–	–	–	–	–	–	–	–	–	–	0.5238	7.9725	240.1560	2.6649
945	*Crab sp*	*Kakra*	–	–	–	–	–	44.2240	9.4341	–	2.0267	–	1.2288	–	239.6890	2.6597
210	*Xenentodon cancila*	*Kaikka*	–	–	–	–	–	–	2.4464	10.0210	5.6683	2.7246	3.6114	1.5557	238.3510	2.6448
41	*Channa punctatus*	*Taki*	8.7465	1.6662	11.4340	1.6598	1.3565	–	2.8048	1.9096	2.4744	0.7841	1.1747	3.2096	237.9450	2.6403
136	*Mystus tengara*	*Bajari tengra*	0.9095	1.5278	1.0620	2.7588	0.3173	–	–	–	1.5055	1.6164	2.9717	3.4110	185.5470	2.0589
88	*Heteropneustes fossilis*	*Shingi*	8.3148	1.7497	1.5817	–	–	–	–	3.3485	3.7173	0.7243	0.3428	2.0876	185.3110	2.0563
39	*Channa marulius*	*Gajar*	–	–	–	–	–	1.1852	0.4209	–	1.1054	1.3763	2.3842	3.2626	157.1600	1.7439
203	*Tetraodon cutcutia*	*Potka*	0.1060	–	–	–	–	–	0.2637	0.4183	2.3725	4.9019	1.8763	0.7054	147.9910	1.6422
182	*Rasbora daniconius*	*Darkina*	4.9182	–	4.4586	–	–	–	–	–	0.0665	2.0423	3.2166	1.3615	135.6380	1.5051
122	*Mastacembelus armatus*	*Baral baim*	3.9897	–	–	–	–	–	–	4.5236	6.7872	0.1109	1.4660	0.0354	131.8130	1.4626
42	*Channa striatus*	*Shol*	–	–	–	–	–	–	–	–	0.4757	2.2196	1.2566	1.9662	111.0330	1.2321
121	*Macrognathus aculeatus*	*Tara baim*	3.5427	–	4.4247	–	–	–	–	0.9979	2.9605	0.4617	1.3475	0.5252	98.4150	1.0920
55	*Colisa fasciatus*	*Khalisha*	1.3715	–	7.3006	1.2527	0.0815	–	1.2906	–	1.1684	0.7581	1.5751	0.9186	92.2130	1.0232
56	*Colisa lalia*	*Lal Khalisha*	1.3802	0.3333	0.3713	5.2721	–	–	–	–	0.5940	2.2894	0.6138	0.3682	79.2570	0.8795
148	*Ompok pabda*	*Madhu pabda*	–	–	–	–	–	–	–	–	3.9935	0.0185	0.1490	0.9275	72.6200	0.8058
175	*Puntius conchonius*	*Canchan puti*	2.4936	–	1.3612	1.1936	–	–	–	0.4207	0.9775	0.0872	0.5210	1.2274	72.4120	0.8035
37	*Chanda ranga*	*Lal chanda*	0.2662	0.3526	0.4949	1.1936	–	0.6032	–	–	1.3245	1.5178	0.4356	0.4076	63.7620	0.7075
6	*Anabas testudineus*	*Koi*	–	–	12.7620	–	–	–	–	–	0.2305	–	0.1256	1.0739	60.0950	0.6668
211	*Colisa labiosus*	*Khalisha*	1.3548	–	–	–	–	–	–	–	1.0677	0.2372	0.0701	1.0509	54.3360	0.6029
33	*Chaca chaca*	*Cheka*	–	1.0576	1.4715	–	–	–	–	–	1.4973	0.5252	0.9094	0.0926	41.5000	0.4605
130	*Aorichthys aor*	*Ayre*	–	–	–	–	–	0.4515	–	7.7313	–	–	–	–	39.8310	0.4420
36	*Chanda nama*	*Nama Chanda*	–	0.5141	–	–	–	–	–	–	1.3181	0.0079	0.6735	0.3523	32.0320	0.3554
5	*Amblypharygodon mola*	*Mola*	0.2210	0.4310	8.4141	1.1936	–	–	–	–	0.4773	–	0.1057	0.1059	30.1520	0.3346
131	*Mystus bleekeri*	*Golsha tengra*	–	–	–	–	–	–	–	–	–	–	0.3490	0.8251	27.2480	0.3024
176	*Puntius gelius*	*Gilliputi*	–	0.0391	–	–	–	–	–	–	1.9628	0.3355	–	–	27.2380	0.3022
68	*Danio devario*	*Chebli*	–	0.1567	0.4949	0.3980	–	–	–	–	0.6250	0.0267	0.2370	0.4701	25.2730	0.2804
75	*Esomus danricus*	*Darkina*	–	4.9411	–	–	–	–	–	–	–	–	0.1444	0.0443	17.8700	0.1983
129	*Mylopharyngodon pisceus*	*Kalo carp*	–	–	–	–	–	–	–	–	1.5233	–	–	–	16.6500	0.1848
47	*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	3.1327	–	–	–	–	15.3750	0.1706
135	*Aorichthys seenghala*	*Guizza*	–	–	–	–	–	2.9910	–	–	–	–	–	–	12.5000	0.1387
169	*Pseudeutropius atherinoides*	*Batasi*	–	–	–	0.2319	0.0842	–	–	–	–	–	0.0562	0.3834	12.3080	0.1366
188	*Salmostoma bacaila*	*Katari*	–	–	0.5567	–	–	–	–	2.0212	–	–	–	–	11.0010	0.1221
15	*Badis badis*	*Napit koi*	–	0.0831	–	–	–	–	–	–	–	0.3355	–	0.1005	8.8960	0.0987
49	*Clarias batrachus*	*Magur*	–	–	–	–	–	–	–	–	–	–	–	0.2769	8.1960	0.0909
91	*Hypophthalmichthys molitrix*	*Silver carp*	–	–	–	–	–	–	–	–	0.6487	–	–	–	7.0910	0.0787
35	*Chanda baculis*	*Chanda*	0.0180	–	–	–	–	–	–	–	–	0.0039	–	0.2155	6.5370	0.0725
57	*Colisa sota*	*Khalisha*	0.4991	0.3333	–	0.5968	–	–	–	–	0.0645	–	0.1208	–	6.3620	0.0706
124	*Monopterus cuchia*	*Kuchia*	–	–	–	–	–	–	–	–	–	–	0.6483	–	5.2600	0.0584
132	*Mystus cavasius*	*Kabashi*	–	–	–	–	–	–	–	–	–	–	–	0.1058	3.1310	0.0347
187	*Osteobrama cotio cotio*	*Keti*	–	0.3918	0.3095	0.1751	0.0215	–	0.3297	–	–	–	–	–	2.9510	0.0327
107	*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	0.4211	–	–	0.0385	–	2.3800	0.0264
61	*Ctenops nobilis*	*Neftani*	–	–	–	–	–	–	–	–	0.1549	–	–	–	1.6940	0.0188
58	Corica soborna	Kachki	–	0.4165	–	–	–	–	–	–	–	–	–	–	1.2970	0.0144
193	*Setipinna phasa*	*Phasa*	–	–	–	–	0.3057	–	–	–	–	–	–	–	0.3410	0.0038
			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	9011.9800	100.0

Table 5.9 Percentage total monthly catch by species: Angramer canal(Site SW11)

Species	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
Code	Scientific	Bengali	Feb	Mar	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
180	*Puntius sophore*	*Puti*	3.3589	5.7462	2.5252	–	–	–	–	–	1.4943	36.2180	40.2600	4.6753	730.1560	18.2346
209	*Wallagu attu*	*Boal*	–	13.0670	–	–	0.7215	–	–	–	36.1900	16.2450	4.3728	38.5690	623.6700	15.5752
931	Prawn spp.	Chingri/Icha	20.2090	17.5620	18.1250	40.4180	41.4360	51.3240	13.9010	39.9390	2.3250	9.7341	8.0570	1.3084	524.0380	13.0871
182	*Rasbora daniconius*	*Darkina*	1.4818	5.9670	8.0176	–	0.0797	–	–	–	–	0.1842	0.8198	31.7410	315.1530	7.8705
83	*Glossogobius giurus*	*Bailla*	–	6.1783	0.0563	8.7107	16.5700	33.6420	56.6040	6.1940	1.8675	0.7405	0.3557	–	235.0130	5.8691
137	*Mystus vittatus*	*Tengra*	3.3218	10.0890	4.0064	–	–	–	–	–	–	2.9046	5.5280	6.6898	181.4180	4.5306
175	*Puntius conchonius*	*Canchan puti*	0.2778	2.7762	0.0980	–	–	–	–	–	3.4682	7.6853	9.8411	–	170.3720	4.2548
132	*Mystus cavasius*	*Kabashi*	–	6.5969	20.1630	46.6900	28.0150	–	–	–	1.3850	–	0.2790	–	159.0670	3.9725
145	*Notopterus notopterus*	*Foli*	3.0440	2.8461	–	–	–	–	–	–	2.9344	2.1556	8.9738	–	116.6550	2.9133
41	*Channa punctatus*	*Taki*	1.6671	7.5635	0.9860	3.1362	0.6012	–	–	6.0562	3.4682	3.3378	2.8945	0.7241	109.5360	2.7355
136	*Mystus tengara*	*Bajari tengra*	1.7288	–	0.2263	–	–	–	–	–	–	–	0.2282	9.8542	85.8190	2.1432
42	*Channa striatus*	*Shol*	–	–	–	–	–	–	–	11.4870	–	0.0914	8.6659	–	85.5500	2.1365
210	*Xenentodon cancila*	*Kaikka*	5.3964	–	0.9574	–	–	–	–	–	2.4280	0.9201	1.1644	5.2587	67.9940	1.6980
130	*Aorichthys aor*	*Ayre*	–	–	–	–	7.9356	13.8010	–	21.5700	–	–	–	–	51.1740	1.2780
51	*Clupisoma garua*	*Ghaura*	–	–	–	–	–	0.9680	28.0870	–	–	0.3431	–	–	50.0620	1.2502
55	*Colisa fasciatus*	*Khalisha*	1.7906	–	5.0236	–	–	–	–	2.2500	1.0669	2.4633	2.1390	–	46.2850	1.1559
123	*Macrognathus pancalus*	*Guchi*	2.9020	4.7330	1.7810	–	–	–	–	–	2.8269	0.5309	0.7658	0.3086	42.7300	1.0671
187	*Ostreobrama cotio cotio*	*Keti*	–	1.7968	2.7597	–	–	–	–	–	4.6176	2.0103	–	–	36.1640	0.9031
212	*Puntius ticto*	*Tit puti*	2.2845	0.9134	8.6688	–	0.0727	–	–	–	2.1230	0.5247	1.1506	0.2692	35.5900	0.8888
37	*Chanda ranga*	*Lal chanda*	1.5992	0.5605	1.4133	–	–	–	–	–	2.7746	1.3812	1.3688	–	32.7900	0.8189
32	*Catla catla*	*Catla*	–	–	–	–	–	–	–	–	–	3.5881	–	–	29.3090	0.7319
36	*Chanda nama*	*Nama Chanda*	–	2.1746	0.0367	–	0.1190	–	–	–	2.8007	0.2989	0.9869	0.0960	27.3000	0.6818
203	*Tetraodon cutcutia*	*Potka*	–	0.6899	0.2696	–	–	–	–	–	1.6007	1.4783	0.7607	0.1992	26.9260	0.6724
122	*Mastacembelus armatus*	*Baral baim*	–	0.3408	0.4656	–	–	–	–	–	2.9561	1.7762	–	0.2195	23.6990	0.5918
169	*Pseudeutropius atherinoides*	*Batasi*	10.4350	4.4678	2.0751	–	–	–	–	–	–	–	–	–	23.0540	0.5757
48	*Cirrhinus reba*	*Raik*	–	–	10.9770	–	–	–	–	–	–	0.9580	–	–	21.2630	0.5310
6	*Anabas testudineus*	*Koi*	–	–	2.6412	0.8712	4.4488	–	–	1.7483	–	–	0.6701	0.0865	19.5730	0.4888
188	*Salmostoma bacaila*	*Katari*	–	3.1623	–	–	–	–	–	–	0.2315	0.5147	–	–	19.1320	0.4778
5	*Amblypharygodon mola*	*Mola*	–	1.2397	0.6870	–	–	–	–	–	2.3330	0.8393	–	–	17.4890	0.4368
102	*Labeo calbasu*	*Kalbaus*	–	–	–	–	–	–	–	–	5.0689	0.3502	–	–	11.7690	0.2939
148	*Ompok pabda*	*Madhu pabda*	26.6790	0.4024	0.4150	–	–	–	–	–	–	0.4669	0.3968	–	9.7440	0.2433
144	*Notopterus chitala*	*Chital*	–	–	–	–	–	–	–	–	4.0970	–	–	–	7.2000	0.1798
131	*Mystus bleekeri*	*Golsha tengra*	–	–	–	–	–	–	–	–	1.6007	0.3771	–	–	5.8940	0.1472
35	*Chanda baculis*	*Chanda*	1.1731	–	0.0980	–	–	–	–	–	1.0043	0.2431	0.2158	–	5.8150	0.1452
57	*Colisa sota*	*Khalisha*	–	0.6457	0.6037	–	–	–	–	2.3895	–	–	–	–	5.1090	0.1276
110	*Lepidocephalus guntea*	*Gutum*	–	–	0.2450	–	–	–	–	–	0.8535	0.4004	–	–	5.0710	0.1266
24	*Batasio batasio*	*Tengra*	–	–	–	–	–	–	–	–	2.7746	–	–	–	4.8760	0.1218
56	*Colisa lalia*	*Lal Khalisha*	0.5556	0.4519	0.2949	–	–	–	–	–	1.1739	–	–	–	4.4990	0.1124
47	*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	–	2.4013	–	–	–	4.2200	0.1054
120	*Macrobrachium rosenbergii*	*Golda*	–	–	–	–	–	–	–	–	–	0.4961	–	–	4.0530	0.1012
107	*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	–	–	0.3895	–	–	3.1820	0.0795
189	*Salmostoma phulo*	*Fulchela*	–	–	2.5653	–	–	–	–	–	–	–	–	–	3.1400	0.0784
76	*Eutropiichthys vacha*	*Bacha*	–	–	–	–	–	–	–	4.7705	–	–	–	–	2.8050	0.0701
88	*Heteropneustes fossilis*	*Shingi*	11.4780	–	–	0.1744	–	–	–	–	0.8535	–	0.1044	–	2.6330	0.0658
68	*Danio devario*	*Chebli*	–	–	1.8774	–	–	–	–	–	–	–	–	–	2.2980	0.0574
16	*Bagarius bagarius*	*Baghair*	–	–	–	–	–	–	1.4078	–	–	–	–	–	2.2810	0.0570
178	*Puntius phutunio*	*Phutani puti*	–	–	1.8104	–	–	–	–	–	–	–	–	–	2.2160	0.0553
945	*Crab sp*	*Kakra*	–	–	–	–	–	–	–	3.5953	–	–	–	–	2.1140	0.0528
176	*Puntius gelius*	*Giliputi*	0.1852	0.0283	0.0375	–	–	–	–	–	0.5337	0.0751	–	–	1.7280	0.0432
177	*Puntius guganio*	*Mola puti*	–	–	–	–	–	–	–	–	0.7471	–	–	–	1.3130	0.0328
121	*Macrognathus aculeatus*	*Tara baim*	–	–	0.9321	–	–	–	–	–	–	–	–	–	1.1410	0.0285
28	*Botia dario*	*Rani*	–	–	–	–	–	–	–	–	–	0.1286	–	–	1.0510	0.0262
211	*Colisa labiosus*	*Khalisha*	–	–	0.5367	–	–	–	–	–	–	0.0251	–	–	0.8620	0.0215
135	*Aorichthys seenghala*	*Guizza*	–	–	0.5669	–	–	–	–	–	–	–	–	–	0.6940	0.0173
75	*Esomus danricus*	*Darkina*	–	–	–	–	–	–	–	–	–	0.0729	–	–	0.5960	0.0149
2	*Ailia coila*	*Kajuli*	–	–	–	–	–	0.2648	–	–	–	–	–	–	0.4790	0.0120
15	*Badis badis*	*Napit koi*	–	–	–	–	–	–	–	–	–	0.0503	–	–	0.4110	0.0103
9	*Aplocheilus panchax*	*Kanpona*	0.4322	–	0.0563	–	–	–	–	–	–	–	–	–	0.0690	0.0017
			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	4004.24	100.0

Table 5.10 Percentage total monthly catch by species: Satla – Bagda Canal(Site SW17)

Species	Species name		Year: 1993								Year: 1994					Total annual catch (Mar'93 – Feb'94)	
Code	Scientific	Bengali	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
931	Prawn spp.	Chingri/Icha	63.0890	41.7430	87.7800	50.3560	38.9730	60.2000	59.2830	64.8310	32.6420	9.7131	14.2470	24.3240	37.0110	12092.4790	37.0016
209	*Wallagu attu*	*Boal*	0.6914	13.7600	0.2668	–	–	1.3986	–	–	8.0858	18.5590	4.8781	7.8263	14.3130	2327.7430	7.1226
83	*Glossogobius giurus*	*Bailla*	3.2380	5.6144	1.9068	7.8014	6.2535	13.3690	12.4470	11.4390	16.5550	4.4669	4.6615	4.1188	1.7761	2164.5290	6.6232
130	*Acrichthys aor*	*Ayre*	0.4474	18.6090	3.1430	9.6649	0.0221	–	–	0.5374	2.5733	8.0618	8.5212	12.6010	4.3665	2032.8830	6.2204
180	*Puntius sophore*	*Puti*	1.8565	0.1890	–	2.1990	1.2524	0.0444	0.5390	0.0313	1.6712	6.6547	11.3850	10.8150	7.3666	1676.9840	5.1314
137	*Mystus vittatus*	*Tengra*	0.3457	2.2989	–	0.0131	0.2478	0.4843	0.0191	0.1536	0.7203	5.2572	4.6247	3.0991	2.4208	787.1850	2.4087
120	*Macrobrachium rosenbergii*	*Golda*	0.3453	1.3899	0.0864	8.4640	0.6374	0.2075	–	–	9.3283	2.5522	2.8112	2.0542	1.3947	778.7040	2.3827
107	*Labeo rohita*	*Rui*	–	5.1877	–	–	–	–	–	0.0677	10.5420	1.2903	2.1274	1.3070	2.7647	682.9760	2.0898
212	*Puntius ticto*	*Tit puti*	0.7204	0.0993	0.0463	0.0243	1.0673	0.7146	2.6141	0.6832	0.2993	1.6187	4.8611	3.4264	1.2974	624.8950	1.9121
70	*Eleotris fusca*	*Budh Bailla*	–	–	0.6111	0.9672	12.5950	11.4910	12.3580	–	0.9614	0.0405	–	0.1347	0.2459	607.1020	1.8577
51	*Clupisoma garua*	*Ghaura*	0.6555	0.0592	0.9177	0.1753	–	0.3963	0.6140	9.6634	4.5832	0.4161	–	0.2051	3.0791	535.3730	1.6382
122	*Mastacembelus armatus*	*Baral baim*	0.0489	0.0693	–	0.5405	–	1.4743	–	0.1014	2.6297	0.3635	5.7794	0.3672	0.6312	508.7230	1.5566
138	*Nandus nandus*	*Bheda*	0.0559	0.0359	–	–	–	–	–	0.1058	0.6721	1.9442	3.5495	2.6383	0.5486	440.8110	1.3488
123	*Macrognathus pancalus*	*Guchi*	0.4292	2.2645	0.0190	0.2103	–	0.6251	1.4077	0.2780	0.2045	2.7714	1.0783	3.6989	0.9877	436.6710	1.3362
210	*Xenentodon cancila*	*Kaikka*	0.0271	0.1254	0.0013	–	0.2768	0.0129	–	0.1019	–	6.5069	0.9662	0.5127	0.3103	424.0870	1.2977
203	*Tetraodon cutcutia*	*Potka*	0.1193	–	0.1029	–	–	0.0617	0.0196	0.0565	0.1524	2.1232	4.0706	0.8659	0.5012	411.9110	1.2604
37	*Chanda ranga*	*Lal chanda*	2.0461	0.3496	0.0089	0.1859	0.1858	0.1061	–	0.0391	0.6047	1.9879	3.6870	0.5227	0.4533	387.8450	1.1868
144	*Notopterus chitala*	*Chital*	15.6730	–	–	3.4571	–	–	–	–	–	4.4967	0.4630	–	0.6678	306.7600	0.9387
145	*Notopterus notopterus*	*Foli*	0.2506	0.0391	–	0.7272	–	–	–	–	0.7600	1.6872	1.0805	1.9294	2.1591	297.6770	0.9109
41	*Channa punctatus*	*Taki*	0.3481	–	0.1164	2.0871	–	2.5174	0.3611	0.1587	0.9371	2.3406	1.0381	0.1193	0.0938	287.1630	0.8787
175	*Puntius conchonius*	*Canchan puti*	–	0.0598	–	0.3122	0.0968	–	–	0.0557	0.1983	1.0610	2.2395	1.2946	1.4323	282.8930	0.8656
132	*Mystus cavasius*	*Kabashi*	–	–	0.0167	0.0536	0.0265	–	–	–	0.1101	1.7254	2.5380	0.1472	–	254.7370	0.7795
36	*Chanda nama*	*Nama Chanda*	0.0806	0.0379	0.0013	0.0036	0.0138	0.1441	0.0047	0.1691	0.2382	0.6009	2.4749	0.6087	1.0651	244.7480	0.7489
32	*Catla catla*	*Catla*	–	–	–	–	–	–	–	–	0.5702	0.2841	–	4.9251	2.0037	240.0470	0.7345
89	*Hilsa ilisha*	*Ilish*	–	0.3777	2.7145	0.7804	8.7513	–	0.0575	0.0286	–	0.0423	–	–	0.7646	239.8980	0.7341
88	*Heteropneustes fossilis*	*Shingi*	0.0783	0.4462	0.2406	0.6102	–	1.0737	2.7907	1.4060	1.1164	0.2497	0.8517	0.5260	0.2804	239.7800	0.7337
86	*Gudusia chapra*	*Chapila*	0.9920	–	0.1154	–	0.2996	–	0.0654	0.1912	0.1219	0.4473	1.7227	1.7077	0.9952	227.2600	0.6954
62	*Cyprinus carpio*	*Karfu*	–	–	–	–	–	–	–	–	–	3.7595	–	0.3432	0.9965	227.1640	0.6951
952	*Awaous grammepomus*	*Nonda Baila*	–	–	0.3435	0.5897	6.3575	0.4019	1.3254	2.4668	–	0.1571	–	0.7613	–	226.2080	0.6922
55	*Colisa fasciatus*	*Khalisha*	1.0151	0.0414	–	2.1943	–	0.0242	–	0.0046	0.0129	0.0848	1.5059	2.1016	1.3235	221.3040	0.6772
5	*Amblypharygodon mola*	*Mola*	0.6341	0.1221	–	0.0442	0.0142	–	2.1781	0.1083	–	0.1304	1.6625	0.3141	0.2258	166.4050	0.5092
196	*Silonia silondia*	*Shillong*	–	0.0278	–	0.2778	7.7723	0.4996	–	0.9134	0.2016	0.1508	–	–	0.0172	150.7710	0.4613
193	*Setipinna phasa*	*Phasa*	0.4682	0.1913	0.4190	0.7694	1.8968	0.1403	2.4490	0.1982	0.8676	0.2758	–	0.0455	0.5450	148.7800	0.4552
187	*Osteobrama cotio cotio*	*Keti*	0.0612	–	–	0.3190	0.2428	0.0512	0.0271	0.0488	0.1990	0.3710	0.7581	1.0830	0.9522	139.0220	0.4254
136	*Mystus tengara*	*Bajari tengra*	0.2819	1.2108	0.0019	1.4242	0.0582	–	–	–	0.0431	0.3256	0.8602	0.4095	0.5394	131.4300	0.4022
131	*Mystus bleekeri*	*Golsha tengra*	0.0301	0.2158	–	0.0179	–	–	–	–	0.4661	0.5196	0.5670	0.7818	1.1176	131.2420	0.4016
155	*Pama pama*	*Poa*	–	–	0.4971	0.7079	0.2194	2.7331	0.8840	0.3383	0.2597	0.0032	0.1763	0.1396	0.3187	121.0750	0.3705
945	*Crab sp*	*Kakra*	–	–	–	–	–	0.4340	–	1.7912	–	0.8875	0.1717	–	0.3015	117.4540	0.3594
58	*Corica soborna*	*Kachki*	–	–	–	–	8.3219	–	–	–	–	–	–	–	–	109.4750	0.3350
39	*Channa marulius*	*Gajar*	–	1.7936	–	1.4305	–	–	–	–	0.0907	0.7033	0.3287	0.1832	–	106.6880	0.3265
148	*Ompok pabda*	*Madhu pabda*	0.5155	0.7551	0.0217	0.0072	–	0.0783	–	–	0.0052	0.2004	0.6085	0.4434	0.8531	97.7050	0.2990
110	*Lepidocephalus guntea*	*Gutum*	0.2006	0.4921	–	–	0.4266	0.1891	0.1618	–	0.5359	0.1752	0.2931	0.6089	0.5136	93.3190	0.2855
182	*Rasbora daniconius*	*Darkina*	0.4906	0.0054	0.0675	1.6998	0.0076	0.0886	0.2588	–	–	0.1566	0.4713	0.5058	0.4707	89.3480	0.2734

Table 5.10 Percentage total monthly catch by species: Satla – Bagda Canal(Site SW17) (Cont.)

Species Code	Species name		Year: 1993								Year: 1994					Total annual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
35	*Chanda baculis*	*Chanda*	0.1486	–	0.0374	–	–	0.0185	–	–	0.1191	0.3128	0.1923	0.9082	0.8767	83.9340	0.2568
56	*Colisa lalia*	*Lal Khalisha*	–	0.0444	–	0.0499	–	0.0273	–	–	0.0054	0.7885	0.2673	0.3676	0.3251	78.5000	0.2402
47	*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	1.4973	–	0.4879	0.0423	–	0.1933	72.0310	0.2204
42	*Channa striatus*	*Shol*	–	–	–	–	–	–	–	–	–	0.8537	0.2561	0.0823	0.1406	65.5260	0.2005
158	*Pangasius pangasius*	*Pangas*	–	–	–	–	–	–	–	–	–	–	0.8951	–	–	55.6320	0.1702
71	*Eleotris lutea*	*Kuli*	–	–	–	–	–	–	–	1.8738	–	–	–	–	–	49.7840	0.1523
998	*Unidentified*		–	0.1378	0.1716	–	3.1562	–	–	–	–	–	–	–	–	49.3130	0.1509
57	*Colisa sota*	*Khalisha*	0.0356	–	–	–	–	–	0.0159	0.0352	0.3152	0.7505	–	–	–	48.0490	0.1470
169	*Pseudeutropius atherinoides*	*Batasi*	2.8093	0.9431	0.0769	0.1679	0.6143	0.0456	–	–	–	0.1212	0.0955	0.0813	0.1898	47.3260	0.1448
6	*Anabas testudineus*	*Koi*	–	0.6155	–	–	–	–	–	–	–	–	0.5771	–	–	45.6530	0.1397
75	*Esomus danricus*	*Darkina*	0.1030	0.1515	–	0.1240	–	–	–	0.1234	0.0164	0.5033	0.0300	0.0265	–	35.6530	0.1091
121	*Macrognathus aculeatus*	*Tara baim*	–	–	0.1365	0.3798	–	0.0777	–	0.1394	0.1395	0.0080	0.1260	0.0957	–	28.1150	0.0860
68	*Danio devario*	*Chebli*	–	0.1750	–	–	0.0415	–	–	0.0062	–	0.0737	0.0415	0.3993	0.1811	27.3120	0.0836
147	*Ompok bimaculatus*	*Kani pabda*	–	–	–	–	–	–	0.0590	–	–	0.3073	–	–	–	16.5920	0.0508
189	*Salmostoma phulo*	*Fulchela*	–	–	0.0124	0.0436	–	0.0221	–	0.0139	0.0609	–	–	0.3083	–	13.2310	0.0405
76	*Eutropiichthys vacha*	*Bacha*	0.3120	–	–	–	–	–	0.0287	0.2032	0.1266	0.0088	–	–	0.1383	13.2280	0.0405
951	*Botia sp*		–	–	–	–	–	–	–	–	–	–	0.1060	–	0.2550	12.9130	0.0395
211	*Colisa labiosus*	*Khalisha*	–	–	0.0004	–	–	–	–	–	–	0.0712	0.0351	–	0.2463	11.9330	0.0365
176	*Puntius gelius*	*Giliputi*	0.1225	–	–	0.0036	–	–	–	–	0.1599	0.1389	–	–	–	11.5010	0.0352
102	*Labeo calbasu*	*Kalbaus*	–	–	–	–	–	–	–	–	–	0.0981	0.0744	0.0508	–	11.2720	0.0345
48	*Cirrhinus reba*	*Raik*	–	0.0117	–	–	–	–	–	–	–	0.0131	0.0251	0.1828	–	8.3680	0.0256
160	*Paratelphusa sp*	*Kanta kakra*	–	–	–	–	–	0.5104	–	–	–	–	–	–	–	7.7120	0.0236
100	*Labeo bata*	*Bata*	–	–	–	–	–	–	–	–	–	–	0.1133	–	–	7.0470	0.0216
33	*Chaca chaca*	*Cheka*	–	–	–	0.5126	–	–	–	–	–	–	–	–	0.0820	6.8720	0.0210
179	*Puntius sarana*	*Sarputi*	–	–	–	–	–	–	–	–	–	0.0845	0.0208	–	–	5.5990	0.0171
185	*Rhinomugil corsula*	*Khorsula*	–	–	0.0374	0.4295	–	–	–	–	–	–	–	–	–	5.2750	0.0161
999	*Unidentified*		0.2796	0.3020	–	–	–	–	–	–	–	0.0050	–	–	–	5.0590	0.0155
60	*Ctenopharyngodon idellus*	*Gheso carp*	–	–	–	–	–	–	–	–	–	0.0968	–	–	–	4.9290	0.0151
188	*Salmostoma bacaila*	*Katari*	0.0716	–	–	0.0668	–	–	–	0.0162	0.0445	0.0304	–	–	0.0434	4.9170	0.0150
9	*Aplocheilus panchax*	*Kanpona*	0.0134	0.0008	0.0085	–	–	0.0799	–	0.0881	–	0.0153	–	–	–	4.6230	0.0141
15	*Badis badis*	*Napit koi*	0.0379	–	–	–	–	0.1158	–	0.0336	–	0.0128	–	–	–	3.3010	0.0101
135	*Acrichthys seenghala*	*Guizza*	–	–	0.0720	–	–	0.0579	–	–	–	–	–	–	–	3.2250	0.0099
2	*Ailia coila*	*Kajuli*	0.1405	0.0057	–	–	0.0614	0.0823	–	–	0.0351	–	–	–	–	3.1100	0.0095
28	*Botia dario*	*Rani*	–	–	–	–	–	–	–	–	–	–	0.0403	–	–	2.5090	0.0077
186	*Rita rita*	*Rita*	–	–	–	–	–	–	–	–	–	0.0484	–	–	–	2.4640	0.0075
208	*Trypauchen vagina*	*Sada chewa*	–	–	–	–	–	–	–	–	–	0.0018	–	–	0.0948	2.4440	0.0075
10	*Apocryptes bato*	*Chiring*	–	–	–	–	–	–	–	–	–	–	–	–	0.0982	2.4350	0.0075
156	*Pampus argenteus*	*Fali chanda*	–	–	–	–	0.0874	–	–	–	–	–	–	–	–	1.1500	0.0035
44	*Chela laubuca*	*Kash Khaira*	–	–	–	0.1060	–	–	–	–	–	–	–	–	–	1.0010	0.0031
81	*Gagata youssoufi*	*Gang tengra*	–	–	–	–	–	–	–	–	–	–	–	–	0.0292	0.7260	0.0022
159	*Parapocryptes batoides*	*Dali chewa*	–	–	–	–	–	–	0.0303	–	–	–	–	–	–	0.4910	0.0015
93	*Ichthyocampus carce*	*Kumirer khil*	–	–	–	–	–	–	–	–	0.0168	–	–	–	–	0.4630	0.0014
954	*Cynoglossus sp*		–	–	–	–	0.0217	–	–	–	–	–	–	–	–	0.2860	0.0009
30	*Brachygobius nunus*	*Nuna bailla*	–	–	–	–	–	–	–	–	–	0.0025	0.0010	–	–	0.1930	0.0006
			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	32680.951	100.0

Table 5.11 Percentage contribution to the total annual catch of canals made by dominant species, March 1993 - February 1994

Species Name	Kalabari (Out)	Ambola (In)	Link Canals	
			Satla-Bagda	Amgramer
Macrognathus pancalus	20.7	6.1	1.3	
Puntius sophore	9.4	18.7	5.1	18.2
Xenentodon cancila	8.6	2.6	1.3	1.7
Nandus nandus	8.4	3.7	1.3	
Mystus vittatus	7.7	9.5		4.5
Lepidocephalus guntea	4.0	3.1		
Channa punctatus	3.9	2.6		2.7
Puntius ticto	3.8	7.4	1.9	
Tetraodon cutcutia	3.1	1.6		
Mystus tengara	3.0	2.1		2.1
Colisa fasciatus	2.8	1.0	<1	1.2
Mastacembelus armatus	2.7	1.5	1.6	
Prawn	2.5	9.5	37.0	13.1
Puntius conchonius	2.3		<1	4.3
Macrognathus aculentus	2.2	1.1		
Channa striatus	2.1	1.2		2.1
Wallagu attu	2.1	2.7	7.1	15.6
Heteropneustes fossilis	1.9	2.1		
Danio devario	1.9			
Glossogobius giurus	1.0	6.2	6.6	5.9
Notopterus notopterus		3.0	<1	2.9
Channa marulius		1.7	<1	
Rasbora daniconius		1.5		7.9
Macrobrachium rosenbergii			2.4	
Aorichthys aor			6.2	1.3
Labeo rohita			2.1	
Chanda ranga			1.2	<1
Chanda nama			<1	
Mystus bleekeri			<1	
Osteobrama cotio cotio			<1	<1
Catla catla			<1	
Ompok pabda			<1	
Mystus cavasius				4.0
Clupisoma garua				1.3

However, when the compositions of the dominant species in these canals are compared with those in their respective linkage canals clear differences emerge. Compared with Kalabari, Amgramer canal provided a greater proportion of species found more typically in rivers e.g. ayre, ghaura, kabashi, puti *(P. conchonius)* and darkina. There were also very much higher proportions of boal and prawns than in Kalabari.

The same pattern can be seen between Satla-Bagda and Ambola canals. In Satla-Bagda there were much higher proportions of ayre and the smaller bagrid catfish such as *M. bleekeri,* kabashi, major carps such as rui and catla, *Ompok pabda* and the migratory giant prawn golda chingri. Higher proportions of boal and small prawn species were also found in Satla-Bagda.

Comparisons were also made of the rather longer list of rarer species not included as dominant species. In terms of presence and absence there were very few fish restricted to one canal. In Kalabari, only one rare species *Nemacheilus botea* occurred which was not found in either Ambola canal or the floodplain/beel sites inside the polder. Species found in Ambola but not in Kalabari or its adjacent floodplain/beel sites included two exotic carps, the silver carp *H. molitrix* and the black carp, *M. pisceus,* which were possibly escapees from fish ponds inside the FCD scheme, the mud eel, kuchia, and two riverine clupeids, kachki and phasa. The presence of the clupeids, albeit in very low numbers, suggests that access through regulators was sufficient to allow some entry into the canal system inside Satla-Bagda polders.

6. FLOODPLAIN/BEEL FISHERIES

6.1 Sampling Sites

Four sites inside the polder and four sites outside in Bagihar beel were selected for study. Topographical and hydrological descriptions have been presented earlier in the report (Sections 2.1, 3.1 and 3.2). Other factors which may influence the composition, magnitude and dynamics of floodplain fish populations include various limnological parameters, particularly nutrient levels which in turn influence phytoplankton and zooplankton abundance. The latter are important as a food supply not only for planktivorous adult fish but, more importantly, as a major component in the diet of fish fry. Rotifers are especially vital as the first food of many species. Agricultural practices and the abundance and distribution of aquatic vegetation may influence both nutrient levels and plankton populations. In this study, no quantitative investigations of nutrient supply and plankton populations were attempted. However, simple descriptions of water quality in terms of temperature, pH, oxygen levels and conductivity were made. In addition, qualitative observations were made on type and abundance of aquatic vegetation and on the cropping patterns at each site (Table 6.1).

Table 6.1 Qualitative Estimate of the Proportion of the Area of Each Sampling Site Covered by Rice and Water Hyacinth

Site No.	Name	In/Out of Polder	% Area Covered		
			B. Aman	Irri	Water Hyacinth
13	Joisler FP	O	40	95	50
14	Joisler beel	O	5	90	80
15	Moisler FP	O	5	85	70
16	Moisler beel	O	0	85	80
18	Chitrapara FP	I	60	90	20
19	Chitrapara beel	I	30	60	20
21	Ambola FP/beel	I	20	95	30
21	Satla-Bagda FP/beel	I	10	95	30

The most obvious difference between sites inside and outside the polder was the greater proportion of the land supporting B. aman in the monsoon season inside. In order to grow

this crop, water hyacinth must be cleared and its spread controlled. This shows clearly in the reduction in the area covered by hyacinth in the poldered sites compared with an 80% cover on the deeper water sites of Moisler and Joisler beels. The implications of these differences in rice and hyacinth distribution will be discussed in more detail in Section 6.3.1.

In terms of the water quality parameters monitored during the study, there was little difference between sites in and out of the scheme. Despite being located in regions where peat outcrops occur at the soil surface, pH levels remained above 6.0 at all sites. Oxygen levels were generally low but this is not uncommon in rice fields and under heavy bankets of hyacinth where deoxygenation often occurs early in the morning (ODA, 1987).[3]

6.2 Total catch

6.2.1 Pattern of catch

In the free-flooding Bagihar beel, even though the range of land heights was small (1.2 m or less) there were distinct differences in seasonal patterns of fishing related to flooding patterns and water depth (Fig. 6.1). In site 16, the site with the greatest proportion of low land and thus area of beel, 83% of the annual catch was taken between November 1993 and February 1994, coinciding with the latter part of the flood drawdown and early winter season. In contrast, in site 13, the site with the greatest proportion of higher land, and the first of the four sites to dry out after the drawdown, 72% of the catch was taken during the peak flood and early drawdown (July - October), with the remaining 28% of the annual catch taken later between November and February. In two sites with intermediate flooding patterns (14 and 15) most of the catch was taken after October (71% and 63% respectively), but more fishing occurred during the peak flood season than at the deepest site of Moisler beel.

Inside Satla-Bagda Polder 1, temporal changes in catch were generally similar to those observed in Bagihar beel, but with one or two differences. In the site which retained the largest expanse of water in the dry season, Chitrapara beel (site 19), catches rose steadily from the drawdown onwards until the end of the study. This was unlike all other sites both inside and outside the polder, which exhibited sharp falls in catch during February or, as at Chitrapara floodplain (site 18), in January.

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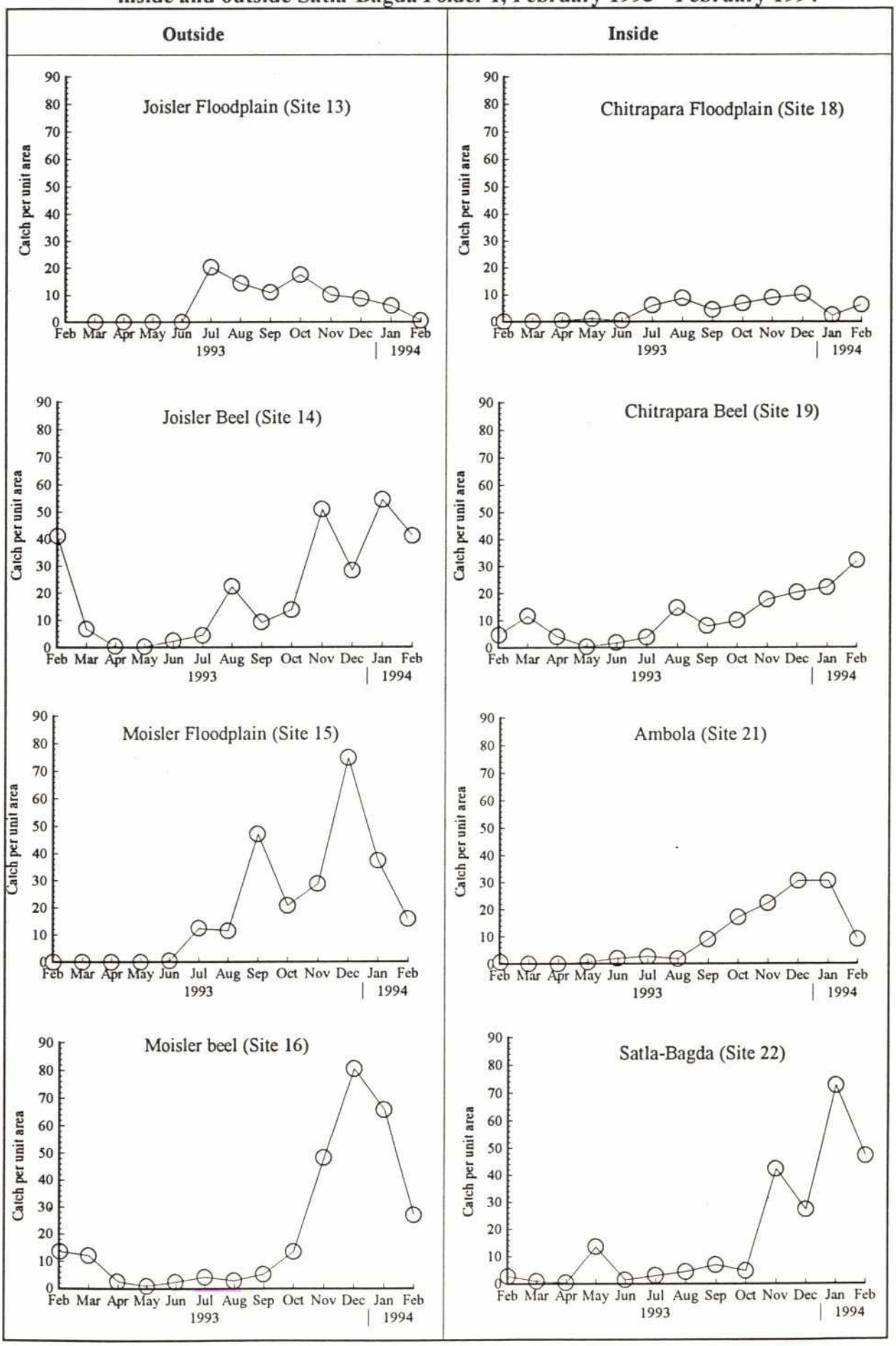
[3] ODA, 1987 Deep Water Rice Project, Phase 2. Annual Technical Report for 1987.

Figure 6.1 Seasonal variation in the catch per unit area (kg/ha) at each floodplain/beel site inside and outside Satla-Bagda Polder 1, February 1993 - February 1994



Chitrapara beel differed in another respect from the lowest-lying sites in Bagihar beel, in that the early rain in February and March 1993 resulted in the flooding of unfished kua (fish pits) and increased fishing in the beel itself, especially in March.

The site adjacent to Chitrapara beel, Chitrapara floodplain (site 18) had the greatest area of higher land of all sites within the polder and, as with higher sites in Bagihar beel, proportionately more of the annual catch (50%) was taken during the peak flood and early drawdown. This may be compared with lower sites, where 63 - 83% of total catch was taken from November onwards.

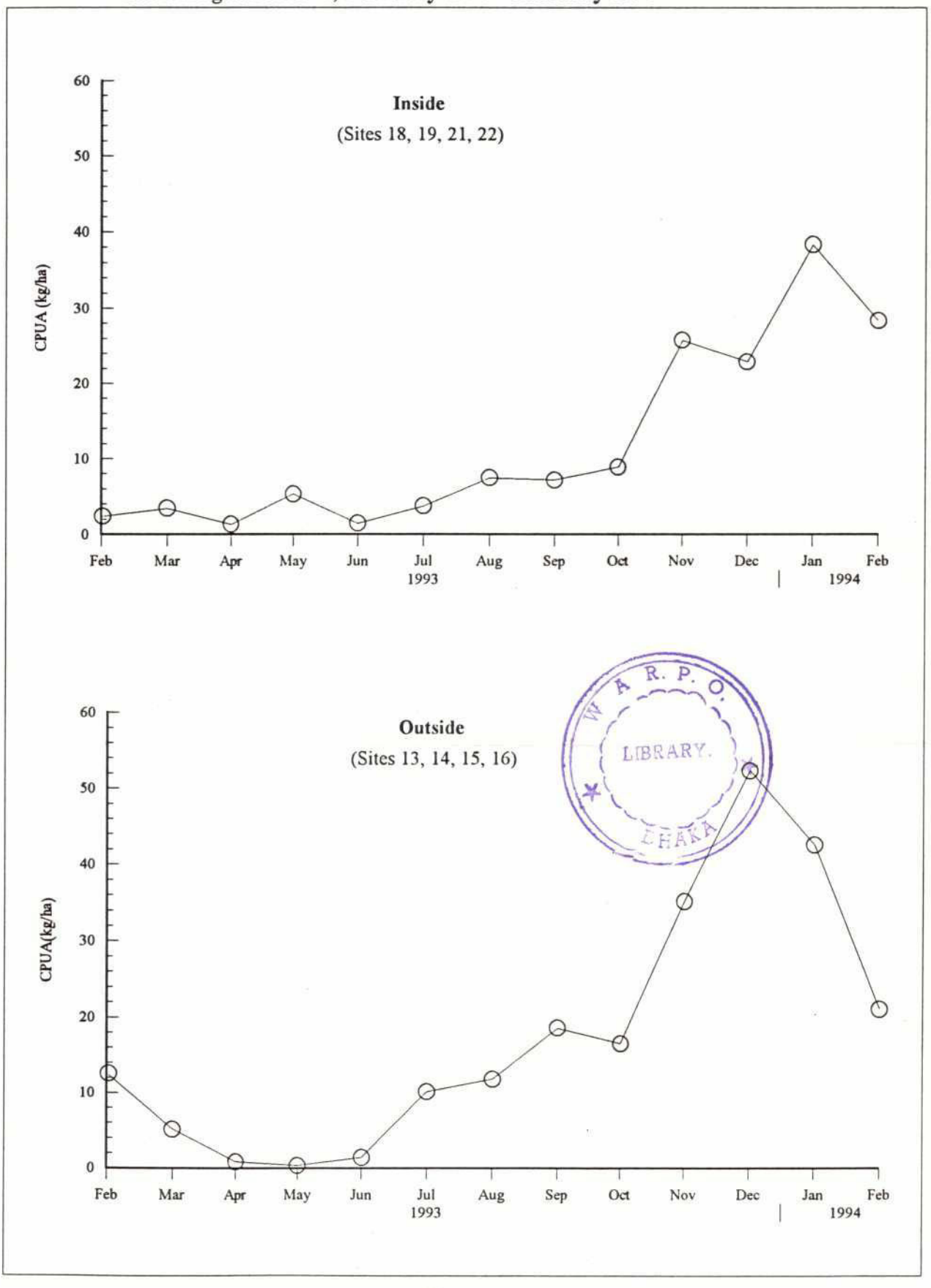
6.2.2 Size of catch from sampled sites

Annual catch per unit area (kg/ha) from the combined areas of four sites for the period March 1993 to February 1994 was 73% higher outside the FCD scheme than inside (Table 6.2 and Fig. 6.2). This compares with an increase of 27% in catch from canals outside the scheme. Sites with the greatest proportion of relatively higher ground (sites 13 and 18) generated the lowest catches both inside and outside the polder, whereas catches from lower-lying outside sites yielded catches which were fairly similar to each other (range 235 - 266 kg/ha) but consistently higher than equivalent inside sites (which ranged from 126 - 147 kg/ha).

Table 6.2 Estimated Annual Catch Per Unit Area (kg/ha) at sites in Satla-Bagda Polder 1 and Bagihar Beel

Satla-Bagda				Bagihar Beel			
Site	Total Catch (kg)	Area (ha)	Catch (kg/ha)	Site	Total Catch (kg)	Area (ha)	Catch (kg/ha)
18	5,665	103	55	13	11,125	125	89
19	21,903	149	147	14	26,555	113	235
21	13,482	107	126	15	37,000	148	250
22	29,088	202	144	16	45,220	170	266
Total:	**70,138**	**561**	**125**		**119,900**	**556**	**216**

Figure 6.2 Seasonal variation in the catch per unit area of pooled sites inside and outside Satla-Bagda Polder 1, February 1993 - February 1994



6.2.3 Size of catch from Satla - Bagda Polder 1 and Bagihar beel

Extrapolation of catch estimates from site level to larger areas was made difficult by the absence of detailed hydrological information on the flood magnitude and extent from either remote sensing sources or flood modelling techniques. An alternative approach was therefore adopted using area elevation curves and water depth data collected at known land heights at each sampled site. The areas to which catch estimates were extrapolated included the whole of Satla - Bagda Polder 1 and a defined area of Bagihar beel (see Fig. 2.2 for boundary). An area elevation curve for the polder was obtained from a previous (1980) feasibility study and that for the defined control area in Bagihar beel was established during this study (Fig. 6.3). Any attempt to estimate the total annual catch of these larger areas must be based on site estimates which cover the full range of land elevations occurring in the larger areas. Ideally, the total sampled area should exhibit the same, or very similar, area elevation curve as the extrapolation area. In practice, however, this is difficult to achieve because of the widespread small-scale topographical variability which generally results in a range of land heights sampled within a single site. This does not present a serious problem if individual sites represent a certain defined range of elevations within the extrapolation area. For Satla - Bagda, these sites are shown in Table 6.3 and the CPUA values derived from one or more sites and applied to different elevation ranges of the polder are given in Table 6.4. This process was repeated for the defined control area of Bagihar beel (Tables 6.5 and 6.6).

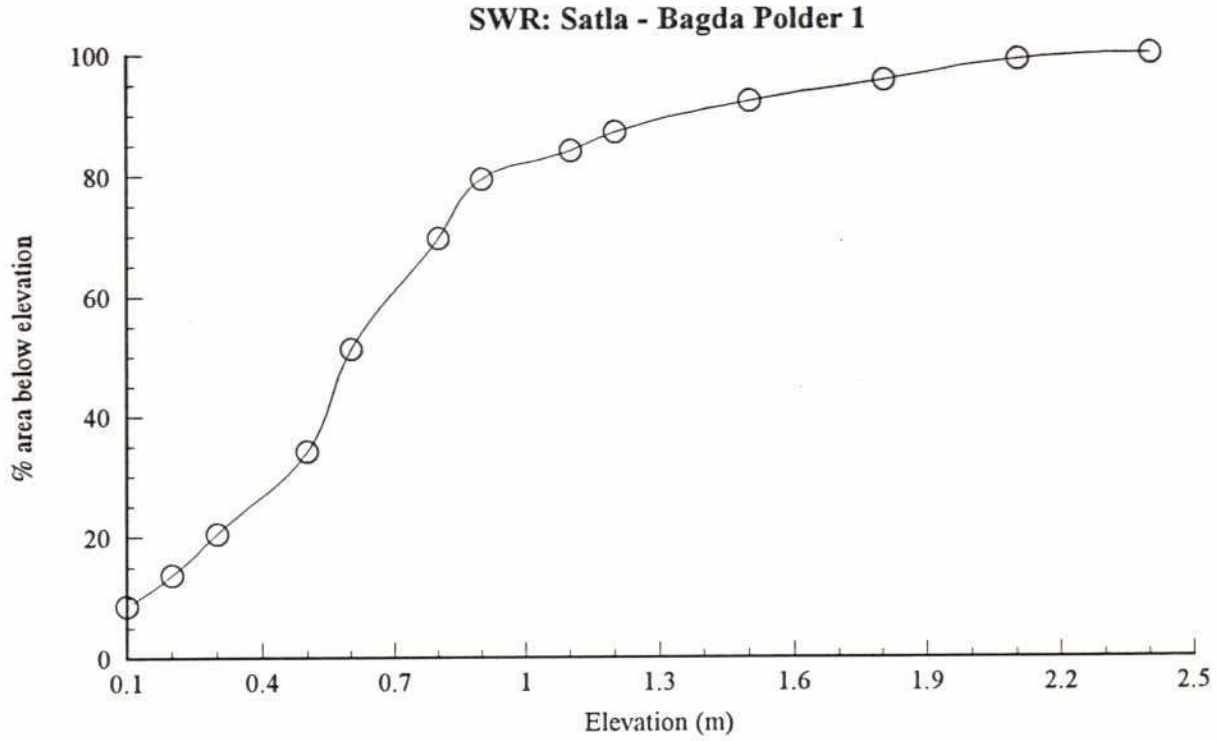
Table 6.3 Catch Per Unit Area at Different Land Elevation in Sampling Sites of Satla-Bagda Polder 1 : March 1993 - February 1994

Site	Catch/ha (kg)	Land Elevation (m)			
		Below 0.3	0.3 - 0.6	0.6 - 0.9	0.9 - 1.2
		% of Area	% of Area	% of Area	% of Area
18	55	8.5	5.0	47.3	39.5
19	147	64.5	8.4	17.9	9.2
21	126	29.9	29.7	16.1	24.3
*22	144	24.7	45.1	24.3	6.0

Note: 1. Shading denotes those sites selected to provide CPUA estimates within the defined land elevation range.

2. * Excludes ditch dewatering catch in January/February 1994.

Figure 6.3 Area elevation curves of Satla-Bagda Polder 1 and control area of Bagihar beel



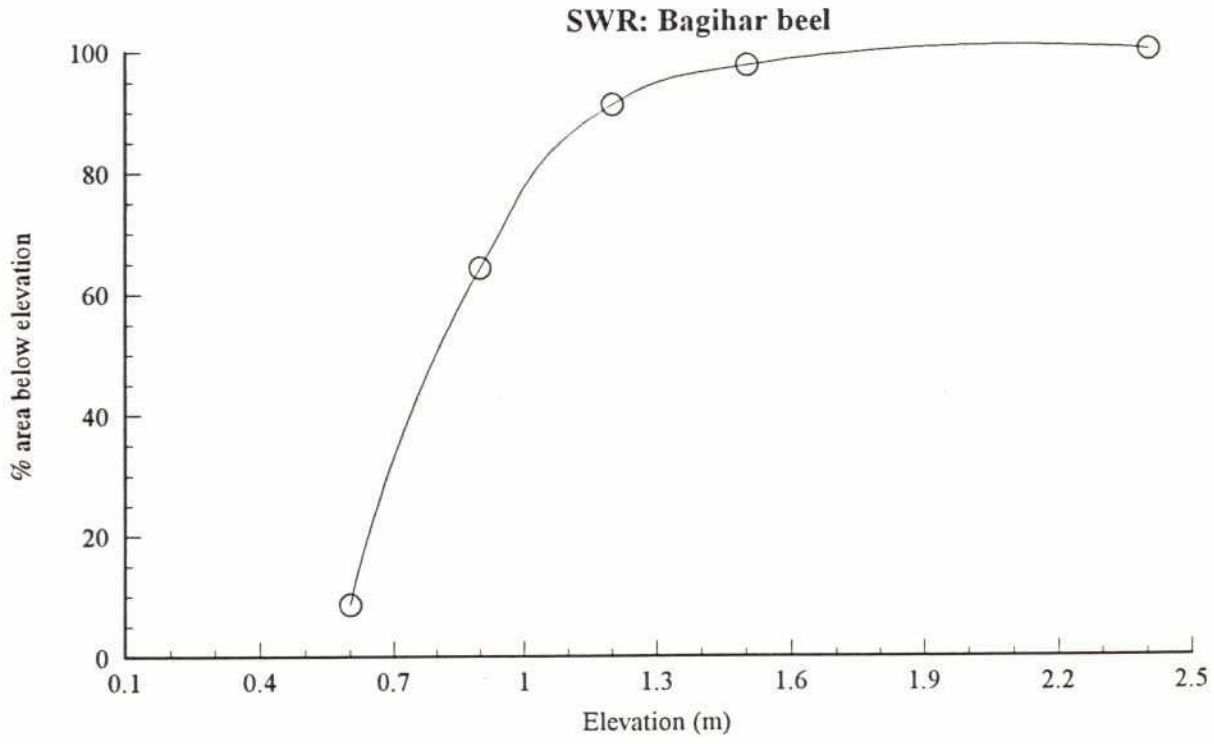


Table 6.4 Estimated Total Annual Catch from Satla-Bagda Polder 1 : March 1993 - February 1994

Elevation Range	Area (ha)	% of Total Area	Catch (CPUA) (kg/ha)	Total Catch (tonnes)
0 - 0.3	3,035	21	147	446
0.3 - 0.6	4,553	31	138	628
0.6 - 0.9	4,174	28	114	476
0.9 - 1.2	1,138	8	91	104
1.2 - 1.5	758	5	55	42
1.5 - 1.8	506	3	55	28
1.8 - 2.4	648	4	0	0
Total	**14,812**	**100**		**1,724**

Notes: 1. Estimates of CPUA obtained from Table 6.1.

2. Elevation range 1.8 - 2.4 m mainly consists of villages therefore floodplain catch assumed to be nil.

Table 6.5 Catch Per Unit Area (kg/ha) at Different Land Elevation in Sampling Sites of Bagihar Beel : March 1993 - February 1994

Site	Catch (kg/ha)	Land Elevation (m)		
		0.3 - 0.6	0.6 - 0.9	0.9 - 1.2
		Percent of Area	Percent of Area	Percent of Area
13	89	0	4.0	96.0
14	235	0	66.4	33.6
15	250	12.4	48.9	38.7
16	266	48.3	38.5	13.2

Note: 1. Shading denotes those sites selected to provide CPUA estimates within the defined land elevation range.

Table 6.6 Estimated Total Annual Catch from Part of Bagihar Beel: March 1993 - February 1994

Elevation Range	Area (ha)	Catch (CPUA) (kg/ha)	Total Catch (tonnes)
0.3 - 0.6	315	266	84
0.6 - 0.9	2,036	244	497
0.9 - 1.2	984	89	88
1.2 - 1.5	235	89	21
1.5 - 2.4	91	0	0
Total	**3,660**		**690**

Notes: 1. Estimates of CPUA obtained from Table 6.1
2. Elevation range 1.5 - 2.4 m mainly consists of villages therefore floodplain catch assumed to be nil.

The estimated total annual catch from the flooded land in the polder obtained by this method was 1,724 tonnes, considerably higher than the estimate made during the Satla-Bagda project feasibility study of 1980. The present estimate does not include the catch from major drainage channels, the total length of which, estimated from SPOT images and engineering maps, is about 83 km. Applying the catch rate of Ambola canal (site 20) of 2,182 kg/km to the total canal length provides an annual catch estimate for canals of 180 tonnes.

In addition, canals leading to major regulators offer the opportunity for very high localised catches during the dry season at strategic exit points from the polder. One such exit point was at the Satla-Bagda regulator, where dewatering of a short length of canal and some ditches immediately in front of the sluice gate yielded 13.844 tonnes of fish in January and February 1994. Such high catches are not representative of canals further from and more indirectly connected to regulators. Ambola Canal was not fished by dewatering as intensively as Satla khal, but its total catch estimate includes a degree of dewatering at some distance from the sluice gate. It seems likely that two regulators draining the larger southern basins of the scheme (Fig. 2.1) offered the same opportunities as the Satla-Bagda sluice for intensive dewatering. Therefore, assuming similar fishing occurred at each, the total estimated catch from dewatering near sluices is 42 tonnes p.a.

In Bagihar beel, only short lengths (totalling about 11 km) of canals remained unsampled, mainly running south of Moisler beel. Applying catch rates from Kalabari Canal (site 12) to these areas gives an estimate for total annual canal catch of 50 tonnes.

Table 6.7 summarises the findings. The total annual fish catch from Polder 1 was estimated to be 1,946 tonnes, and catch per unit area 131 kg/ha. This compares with a catch per unit area of 202 kg/ha estimated for the free flooding control area of Bagihar beel. The difference represents an overall increase of 54% in the catch per unit area recorded outside the polder. This is rather lower than the increase of 73% calculated using a comparison of floodplain/beel sites only.

Table 6.7 Total Annual Catch of Satla-Bagda Polder 1 and of a defined part of the Control Area, Bagihar Beel, March 1993 - February 1994

	Polder 1	Bagihar Beel
Floodplain/Beel	1724	690
Canals (General)	180	50
Canals at Sluice gates	42	0
Total	**1946**	**740**

6.3 Fishing Patterns

6.3.1 Catch by gear

A total of 22 different types of gear were used on floodplains and beel outside the polder compared with 15 types found inside (Tables 6.8 and 6.9). In terms of dominant gears, there was a good degree of similarity in and out(Table 6.10). Gill nets were the most favoured gear, accounting for 28% of the total catch in and 30% out of the scheme. Monofilament gill nets (current jal) were particularly common, taking about five times the catch of their multifilament counterpart, the koi jal. Hooks were used in two ways, either set on a bamboo rod (sip) driven into the mud or hyacinth or left on a bamboo float (nol barsi). Both methods involved passive settings not requiring the continued presence or action of fishermen and therefore very large numbers of gears could be set.

The densities of these passive-set gears (gill nets, trap and hooks) were examined in relation to the percentage cover of rice and water hyacinth at each site (Table 6.11). The results indicated that as the areal coverage of aman increased the numbers of nets and traps decreased despite the concomitant decrease in cover of hyacinth, whereas hook numbers were unaffected. This is to be expected since gill net and trap fishing would be allowed only on

Table 6.8 Percentage total monthly catch by gear: combined floodplain/beel sites in Bagihar Beel

Gear Code	Gear name(Bengali)	Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		February	March	April	May	June	July	August	Septemb	October	November	Decembe	January	February	Kg	%
88	Current jal (Stationary)	0.142	0.143	3.027	33.528	37.451	34.745	46.463	45.542	58.803	23.066	17.668	15.915	6.254	29558.597	24.519
302	Kua	93.390	90.846	82.077	–	–	–	–	–	–	–	4.802	35.214	78.964	22695.270	18.826
278	Nol barsi	–	–	–	1.615	3.472	11.370	14.007	4.535	15.261	21.496	16.521	4.127	–	13418.086	11.130
266	Veshal	–	–	–	26.796	–	–	0.320	3.457	12.282	14.663	14.458	11.595	0.374	11402.328	9.458
95	Doiar trap	2.220	3.270	10.808	32.756	53.141	13.352	2.413	1.399	0.040	6.531	10.104	14.307	3.405	9672.468	8.023
332	Patar savar	–	–	–	–	–	–	–	–	–	13.031	23.997	–	–	9515.700	7.893
30	Sip	–	–	–	–	4.3951	35.023	17.741	32.628	2.2275	0.3017	–	–	–	6779.248	5.623
123	Koi jal	–	–	–	–	0.884	4.116	12.807	10.589	9.098	6.416	6.382	1.603	–	6482.060	5.377
170	Juti	0.564	–	–	–	–	0.452	–	–	–	5.822	1.408	4.682	1.382	2838.281	2.354
105	Dharma jal	–	–	–	–	–	0.278	2.209	0.017	–	6.928	1.345	0.318	–	1980.180	1.643
222	Polo	–	–	–	–	–	–	–	–	–	–	1.888	3.676	0.536	1479.443	1.227
45	Ber jal	–	–	–	–	–	–	0.771	–	–	–	–	3.989	–	992.887	0.824
296	Tukri	3.282	3.569	–	–	–	–	–	0.045	1.202	0.920	0.648	1.514	0.087	951.373	0.789
336	Canal dewatering	–	–	–	–	–	–	–	–	–	–	–	–	7.0506	820.500	0.681
255	Thella jal	–	–	–	5.305	0.657	–	2.495	0.268	0.907	0.631	0.585	0.223	–	635.439	0.527
270	Katha	0.077	–	–	–	–	–	–	–	–	–	–	1.731	1.701	607.000	0.504
89	Dhor jal	–	–	–	–	–	–	–	–	–	–	–	0.706	–	166.905	0.138
164	Jhaki jal	0.324	0.513	–	–	–	–	–	–	–	0.109	0.194	0.260	–	153.550	0.127
272	Daun	–	–	–	–	–	0.445	0.774	0.014	0.180	0.085	–	–	–	109.932	0.091
307	Hand fishing	–	1.659	4.089	–	–	–	–	–	–	–	–	0.141	–	105.765	0.088
327	Foot jal	–	–	–	–	–	0.218	–	0.877	–	–	–	–	–	102.504	0.085
328	Bhuti jal	–	–	–	–	–	–	–	0.630	–	–	–	–	–	64.800	0.054
291	Urani	–	–	–	–	–	–	–	–	–	–	–	–	0.198	23.032	0.019
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	120555.348	100.000

Table 6.9 Percentage total monthly catch by gear: combined floodplain/beel sites within Satla–Bagda Polder 1

Gear Code	Gear name(Bengali)	Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		February	March	April	May	June	July	August	September	October	November	December	January	February	Kg	%
88	Current jal (Stationary)	3.474	4.824	11.904	6.599	42.796	16.786	32.433	25.513	63.221	24.783	34.013	7.197	1.295	16286.394	18.860
336	Canal dewatering	–	–	–	–	–	–	–	–	–	–	–	28.438	48.562	13843.800	16.031
296	Tukri	49.806	78.865	74.495	0.652	4.871	0.237	–	1.815	3.254	6.401	16.594	9.951	23.225	11244.364	13.021
302	Kua	40.340	0.481	0.453	–	–	–	–	–	–	–	–	31.185	23.779	10504.628	12.164
95	Doiar trap	–	13.393	–	88.079	21.574	10.648	6.089	6.278	2.230	4.952	15.140	7.648	1.275	8390.624	9.716
266	Veshal	–	–	–	–	–	–	–	–	–	43.057	2.399	–	–	6532.506	7.565
278	Nol barsi	–	–	1.109	0.131	24.903	28.524	41.437	23.145	4.144	6.591	5.821	1.204	–	5622.703	6.511
164	Jhaki jal	5.408	1.297	6.629	4.245	4.207	0.865	0.609	18.027	5.414	4.751	10.981	3.431	1.752	4379.610	5.072
30	Sip	–	–	0.331	–	0.556	42.939	19.390	22.777	12.865	0.200	1.571	–	–	3491.285	4.043
123	Koi jal	–	–	–	–	–	–	0.043	1.591	5.476	7.888	10.795	1.671	0.055	3231.556	3.742
170	Juti	–	–	–	0.087	1.094	–	–	0.592	3.285	0.691	1.469	2.900	–	1110.688	1.286
307	Hand fishing	0.972	–	–	–	–	–	–	–	–	–	0.440	4.122	–	943.236	1.092
255	Thella jal	–	1.140	5.078	0.188	–	–	–	0.261	–	–	–	2.254	0.057	569.055	0.659
333	Kore	–	–	–	–	–	–	–	–	–	–	0.777	–	–	99.720	0.115
328	Bhuti jal	–	–	–	–	–	–	–	–	0.111	0.461	–	–	–	72.121	0.084
272	Daun	–	–	–	0.018	–	–	–	–	–	0.226	–	–	–	33.260	0.039
		100	100	100	100	100	100	100	100	100	100	100	100	100	86355.544	100

Table 6.10 Percentage of the Total Annual Catch Captured by Dominant Gears used on Floodplain and Beel Sites of the SWR, March 1993 - February 1994

Gear	Bagihar Beel					Satla-Bagda Polder 1				
	13	14	15	16	Annual Total	18	19	21	22	Annual Total
Current jal (Stationary)	42	27	27	18	25	23	35	26	13	19
Koi jal	7	4	7	5	5	5	8	5	2	4
Nol barsi	18	6	6	17	11	24	13	4	3	7
Sip	17	3	11	<1		19	1	11	2	4
Doiar trap	2	9	7	10	8	2	2	20	18	10
Veshal		9	9	13	10	0	0	4	21	8
Kua	10	26	9	24	19	11	4	22	12	12
Patar savar	0	2	18	5	8	0	0	0	0	0
Tukri	<1	2	<1	<1	<1	12	36	5	7	13
Jhaki jal	0	0	<1	<1	<1	<1	<1	<1	15	5
Canal dewatering		3			<1				31	16

Table 6.11 Range of gear Densities (nos/ha) Recorded Sites Inside and Outside Satla-Bagda polder 1

Gear	Bagihar beel				Satla-Bagda Polder 1			
	Sites				Sites			
	13	14	15	16	18	19	21	23
Gill Nets	1-1.5	1-2.5	5	5	2.5	4	2.5-4	2-3.5
Traps (Doiar)	0.1-0.2	0.3-1.0	2-8	1-5	0.1	<0.1	0.8-1.5	1.0
Hooks (Sip and nol barsi)	10	10-15	10-12	50-60	10.30	10.30	10-25	5-15
%Cover: Hyacinth	50	80	70	80	20	20	30	30
Aman	40	5	5	0	60	30	20	10

the boundaries of the rice fields to prevent possible crop damage, whilst floating hooks such as nol barsi could be set inside the field without causing damage. The results also suggest that fishing was possible with short set gill nets (length 5 - 10 m) and traps even in the fairly dense cover of hyacinth. However, where the weed became densely packed then fishing by traps and nets was impossible.

The lift net, veshal, used both in small channels running through the floodplain or less commonly on the floodplain itself, contributed a similar proportion of catch outside and inside. Kua took more of the catch outside than inside, however some kua remained to be fished after the study ended in February 1994, so the full contribution of this gear to the annual (1993 - 1994) catch cannot be accurately estimated.

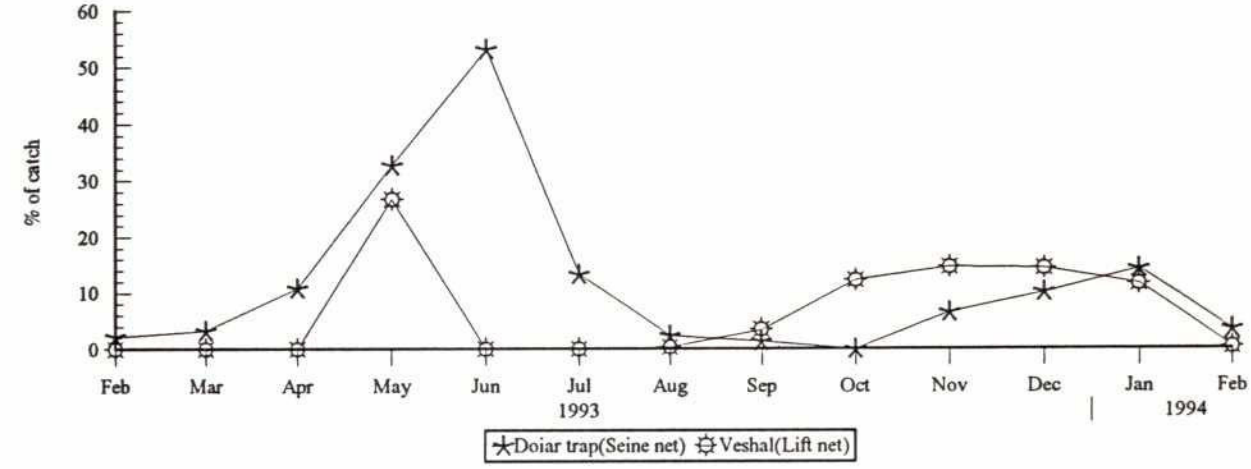
The principal difference between overall gear compositions was the greater use of the small basket scoop, tukri, within the poldered sites and the absence of the patar savar, a large surrounding fence used like a ber jal after clearing hyacinth from within the surrounded area. This was used mainly on Moisler floodplain (site 15).

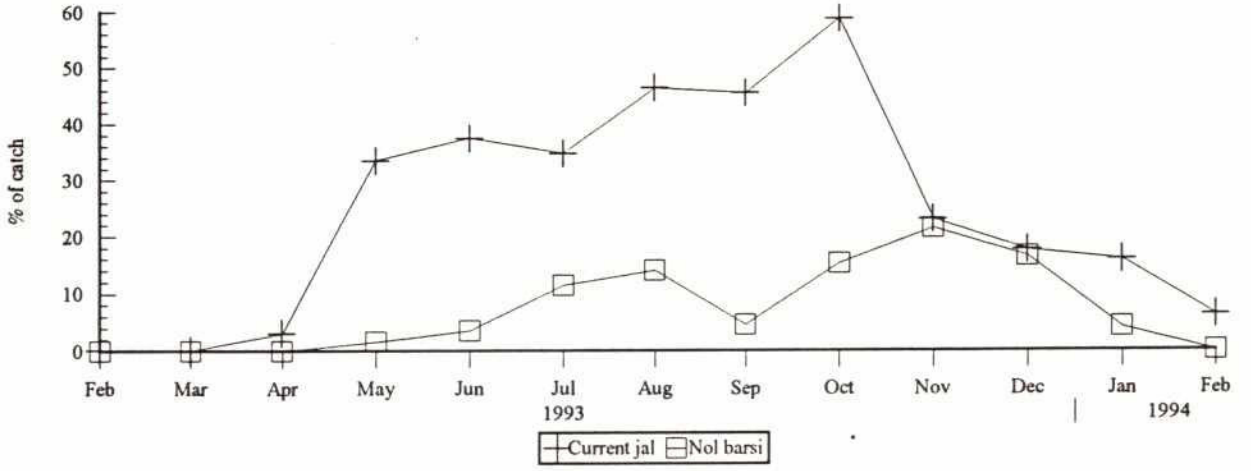
Gears commonly used on floodplains and beel elsewhere in Bangladesh, but which were rare or absent from the sampled sites of the SWR, included the ber jal, thella jal and daun. The tukri (locally named chalon) replaced the thella jal to some extent in the sampled sites, since both are small hand-held scooping gears. Nol barsi and sip may have been selected instead of daun because of the dense cover of hyacinth and other aquatic macrophytes at many sites, making it difficult to set long lines of hooks. It would also be difficult or impossible to use the ber jal in such dense blankets of weed.

6.3.2 Catch by gear by month

The seasonal pattern of gear usage was generally similar inside and outside the polder, with certain differences appearing during and just after the flood drawdown (Tables 6.8 and 6.9). As the overall catches from the four sites in and out of the polder increased during the monsoon season (Fig. 6.2) the main gears contributing to the bulk of the catch were current jal and two types of hooks, sip and nol barsi (Figs. 6.4 and 6.5). During November and December, veshal became increasingly important within and outside the polder. These were deployed even on the open shallow waters of Moisler floodplain, indicating that high densities of fish were emigrating to adjacent canals and rivers. Inside the polder, veshal was mainly used in the drainage canals and ditches leading to the Satla-Bagda regulators (site 22). The patar savar fence trap accounted for almost one quarter of the peak combined monthly catch in December. This is a large gear requiring many fishermen to clear hyacinth and operate the surrounding trap. It also required permission and payment to local land owners to operate in the shallow waters. In contrast, such a large-scale gear was not found within the polder. Instead, small-scale gears such as tukri and doiar became more important during

Figure 6.4 Percentage of the catch taken by dominant gears: combined floodplain/beel sites in Bagihar beel





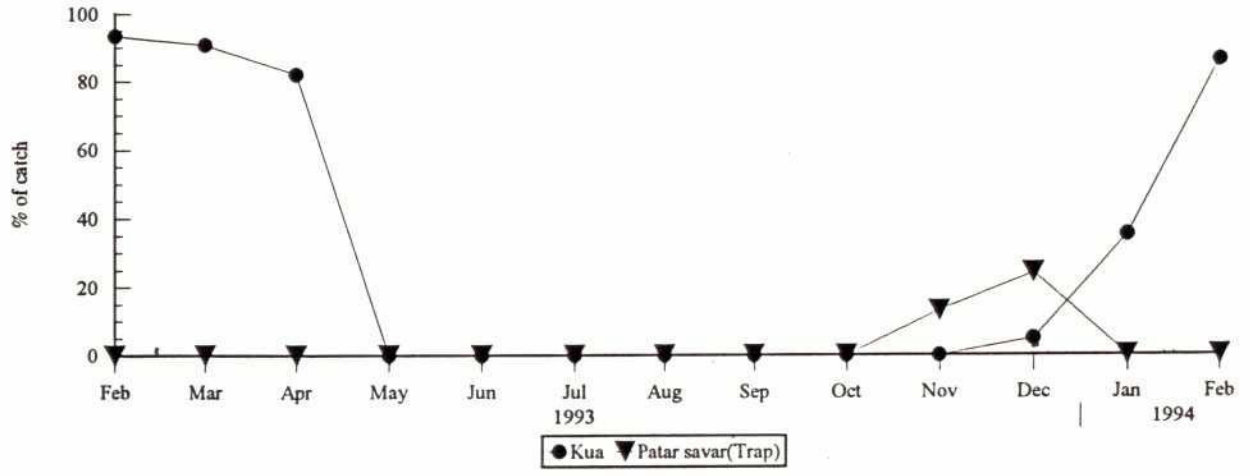
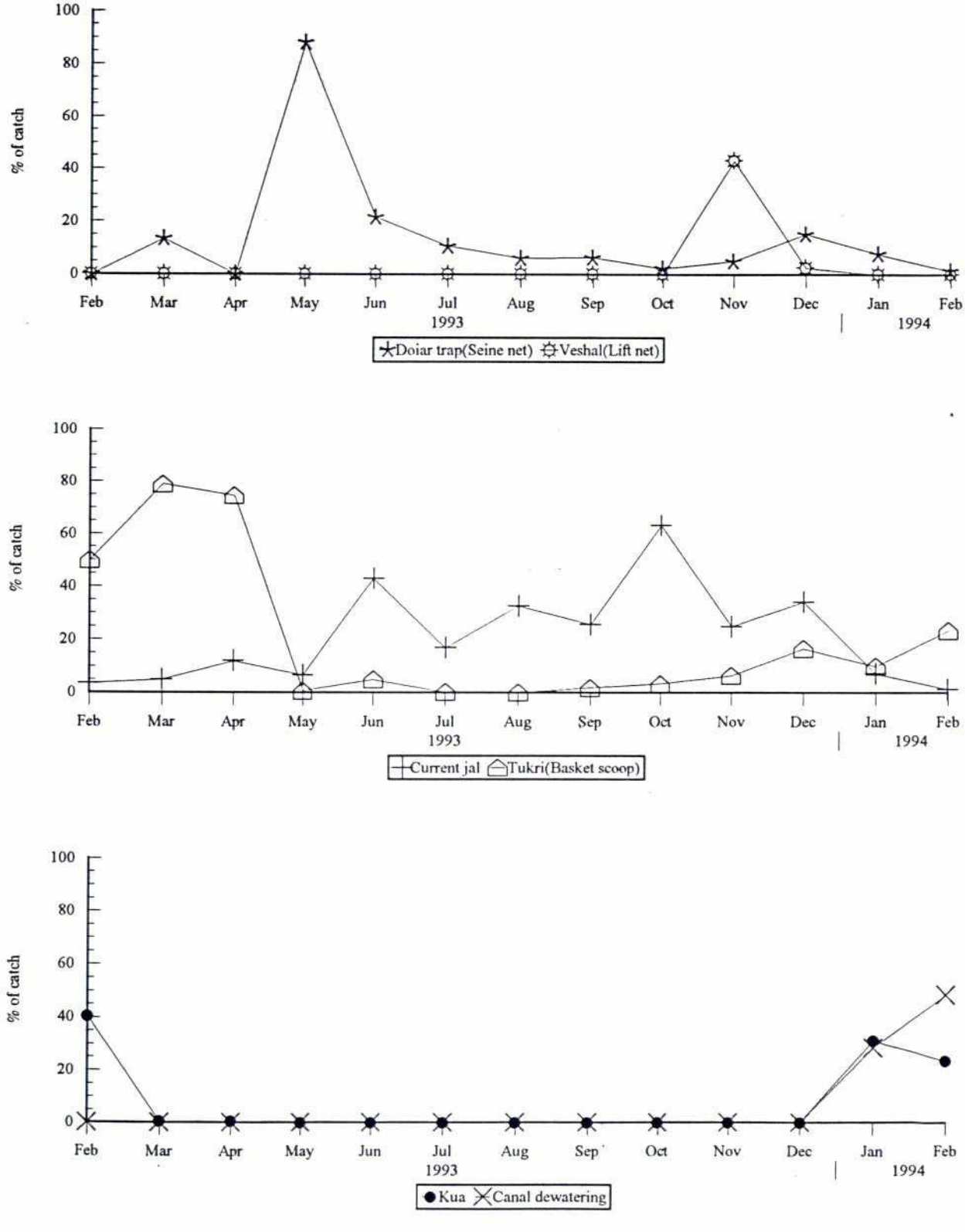


Figure 6.5 Percentage of the catch taken by dominant gears: combined floodplain/beel sites in Satla-Bagda Polder 1



the same period. Operation of these gears did not require permission from local landowners. During the winter months kua became the dominant gear both inside and outside the polder.

Peak catches attained between November and January in Bagihar beel sites were largely the result of increased fishing effort of the dominant gears (Fig. 6.6) rather than through an increase in catch rate (Fig. 6.7), which for current jal and nol barsi declined markedly during this period.

On the poldered sites, peak catches were attributable to an increase in effort of dominant gears (Fig. 6.8) combined with an increase in catch rate of some, e.g. veshal and tukri, but not others, e.g. current jal (Fig. 6.9).

6.3.3 Statistical comparison of catch rates

Statistical analyses of pooled catch rates of gears operating on floodplains and beel inside and outside Satla-Bagda Polder 1 were carried out following the methods outlined in the Appendices of the Final Report.

At the inside sites for this habitat type, over 90% of the total catch per hectare for the period March 1993 to February 1994, excluding katha and kua, was taken by 7 gears. At the outside sites, over 90% of the total catch per hectare over the same period was also taken by 7 gears. In all, 9 gears were used in the statistical analysis of catch rates, as listed in Table 6.12. Five gears appeared in both lists: monofilament gill nets, hooks (sip and nol barsi separately), lift nets, and traps (Fig. 6.10). Monofilament gill nets took 27% of the catch per hectare at the inside sites, and 31% at the outside sites. A total of 2,199 individual catch rate observations were used in this analysis.

Comparison of the seasonally pooled catch rates by gear between inside and outside sites indicated that the main assumptions of statistical analysis were reasonably satisfied. Only one discrepancy between observed and predicted catch rates could not be traced to single catch rate observations, the omission of which did not affect the analysis. The exception was for lift nets in season 4, where the observed inside catch rate was much higher and the outside catch rates much lower than expected.

Figure 6.6 Total monthly fishing effort of dominant gears: combined floodplain/beel sites in Bagihar beel

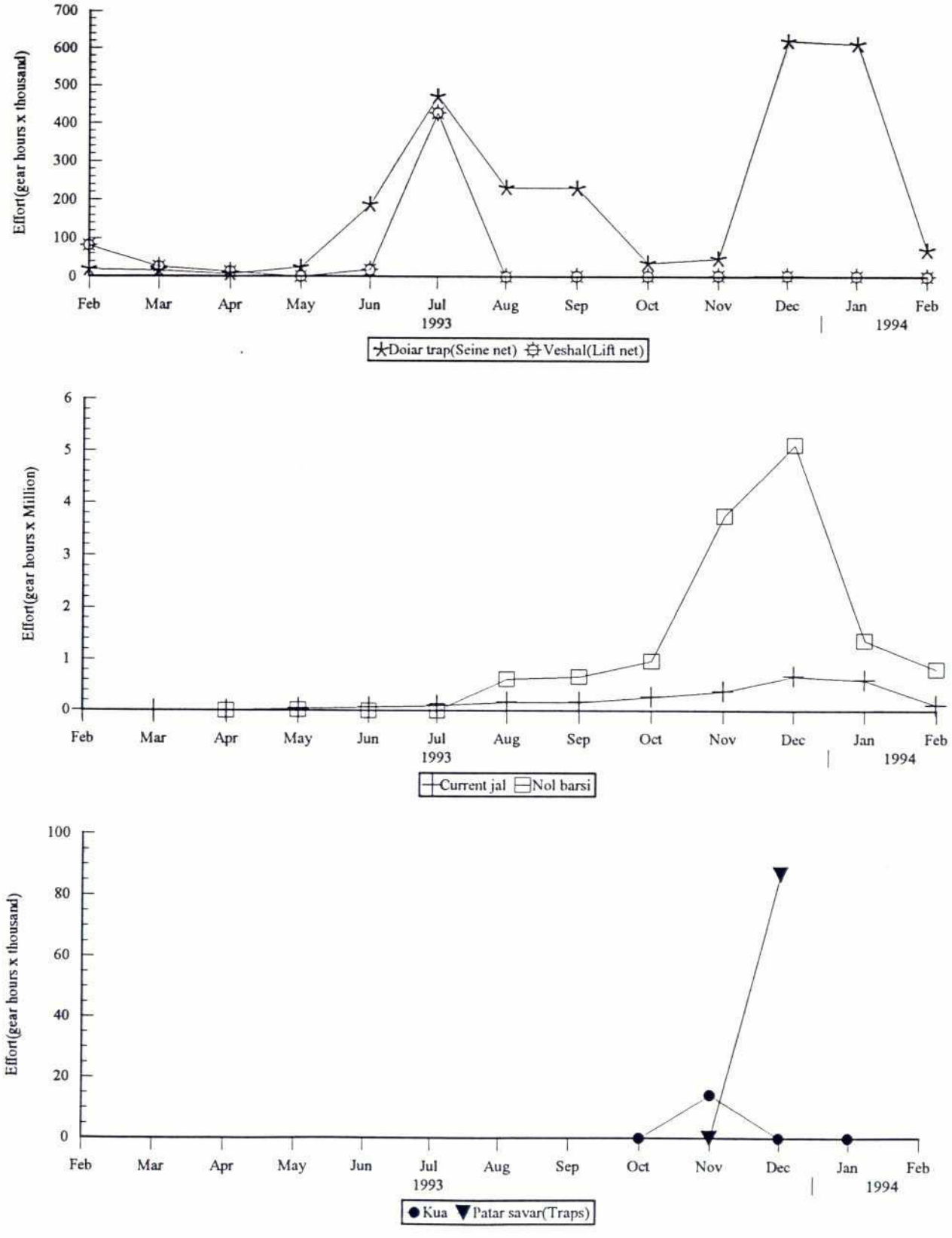
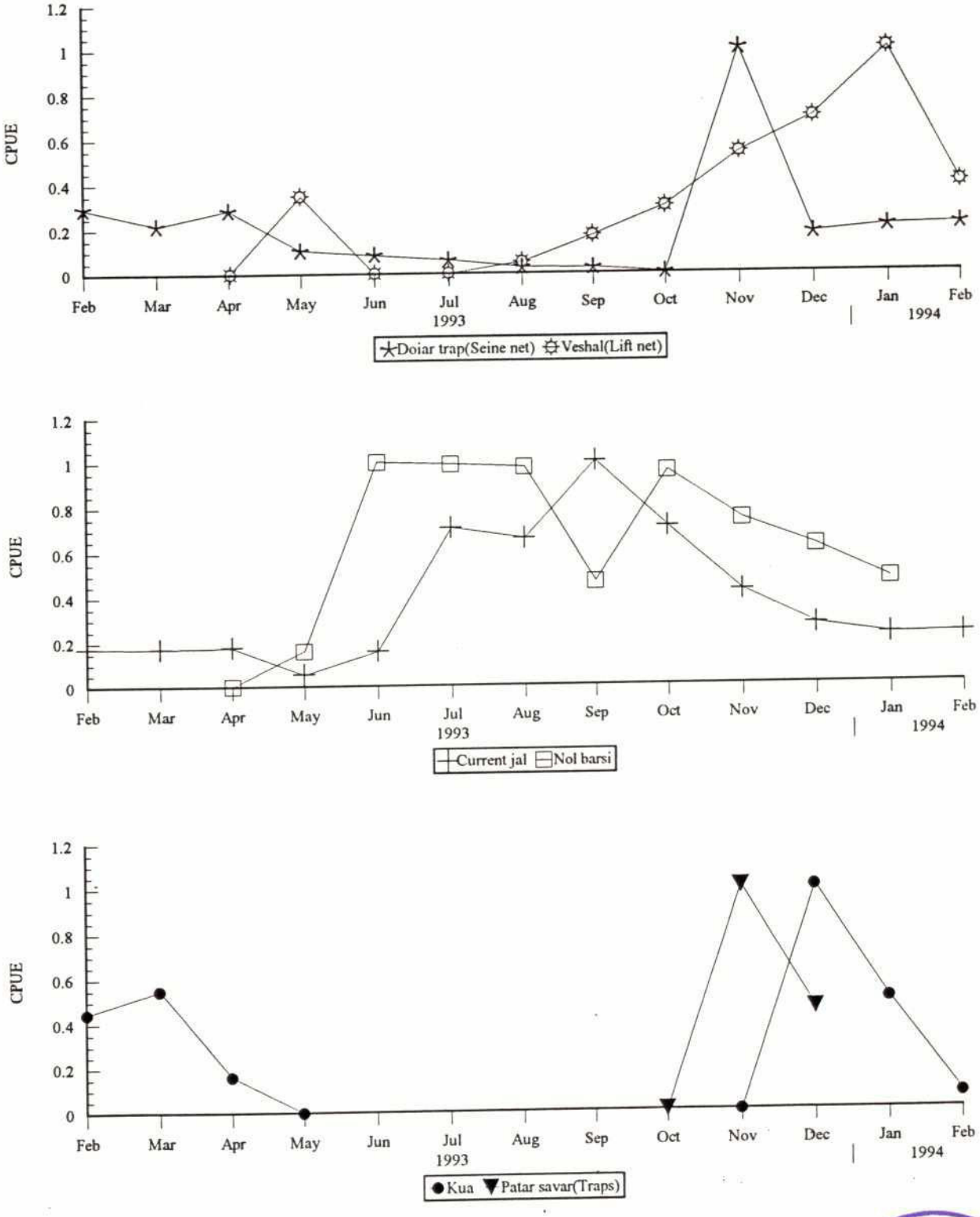
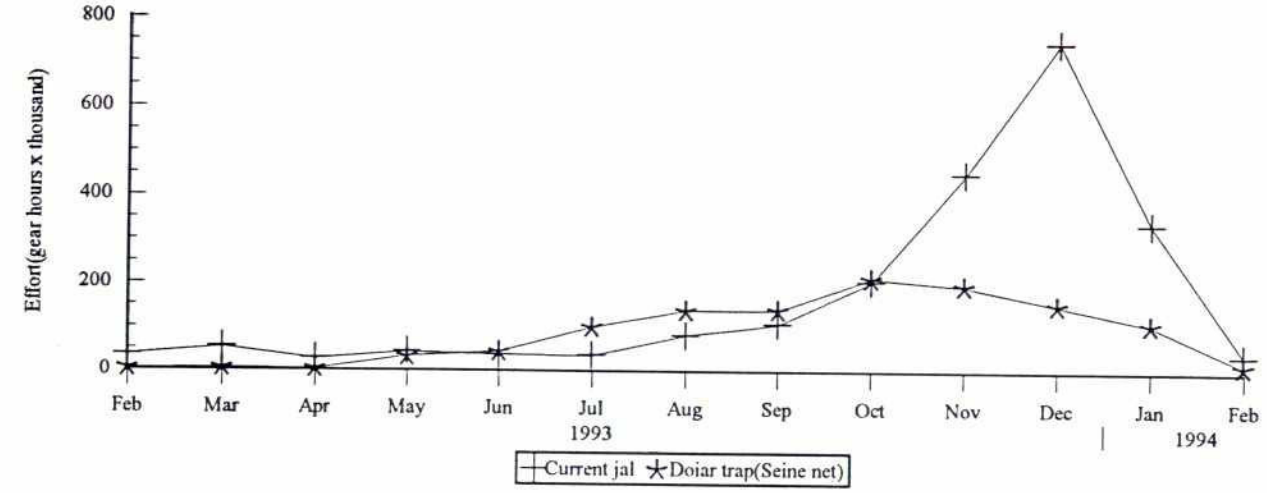


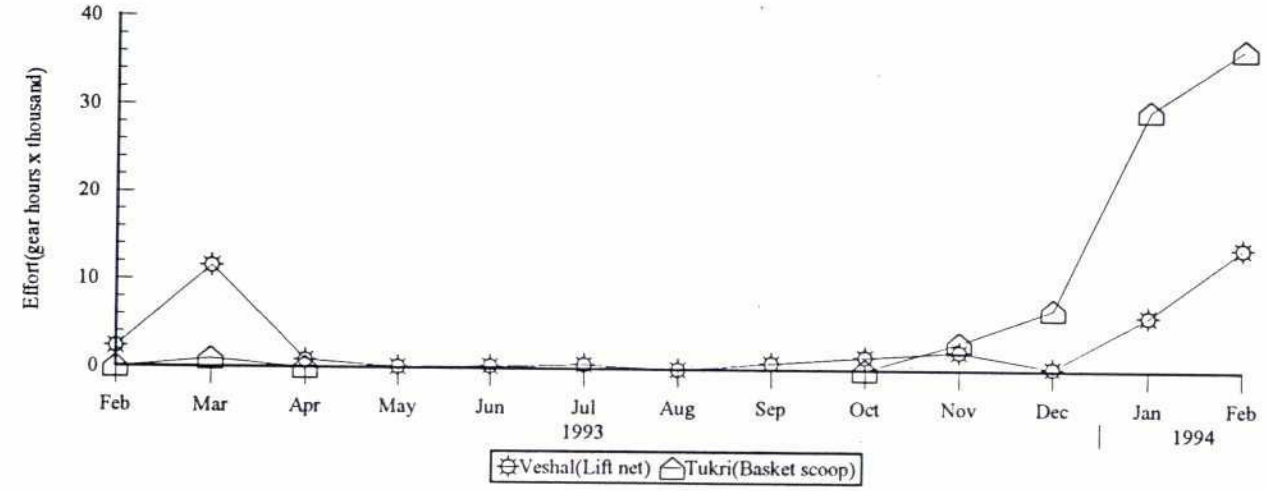
Figure 6.7 Catch rates (scaled CPUE) of dominant gears: combined floodplain/beel sites in Bagihar beel



Note: Scaled CPUE are values of CPUE expressed as a proportion (decimal) of the maximum monthly value recorded.

Figure 6.8 Total monthly fishing effort of dominant gears: combined floodplain/beel sites in Satla-Bagda Polder 1





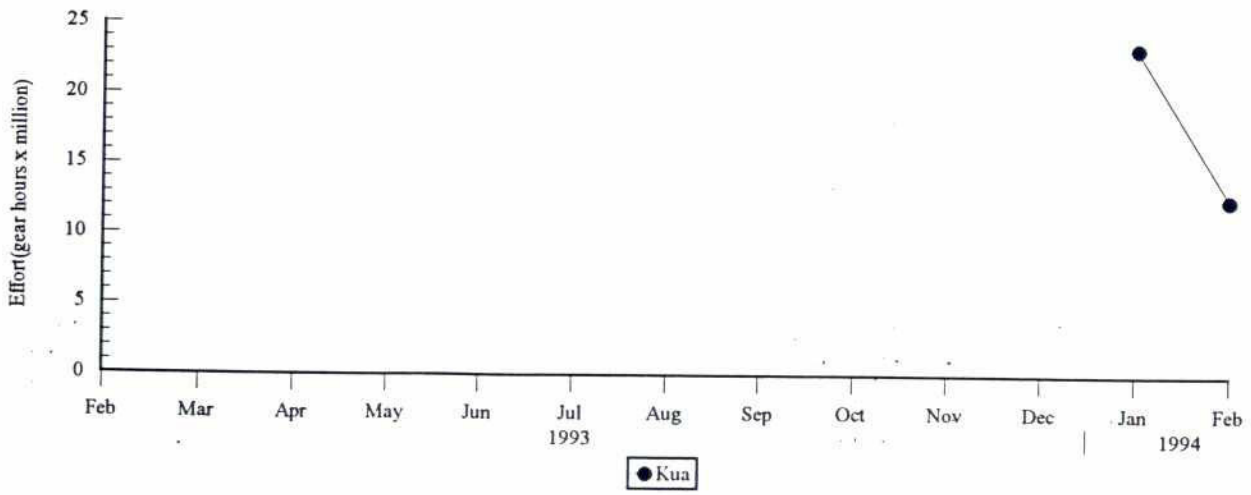
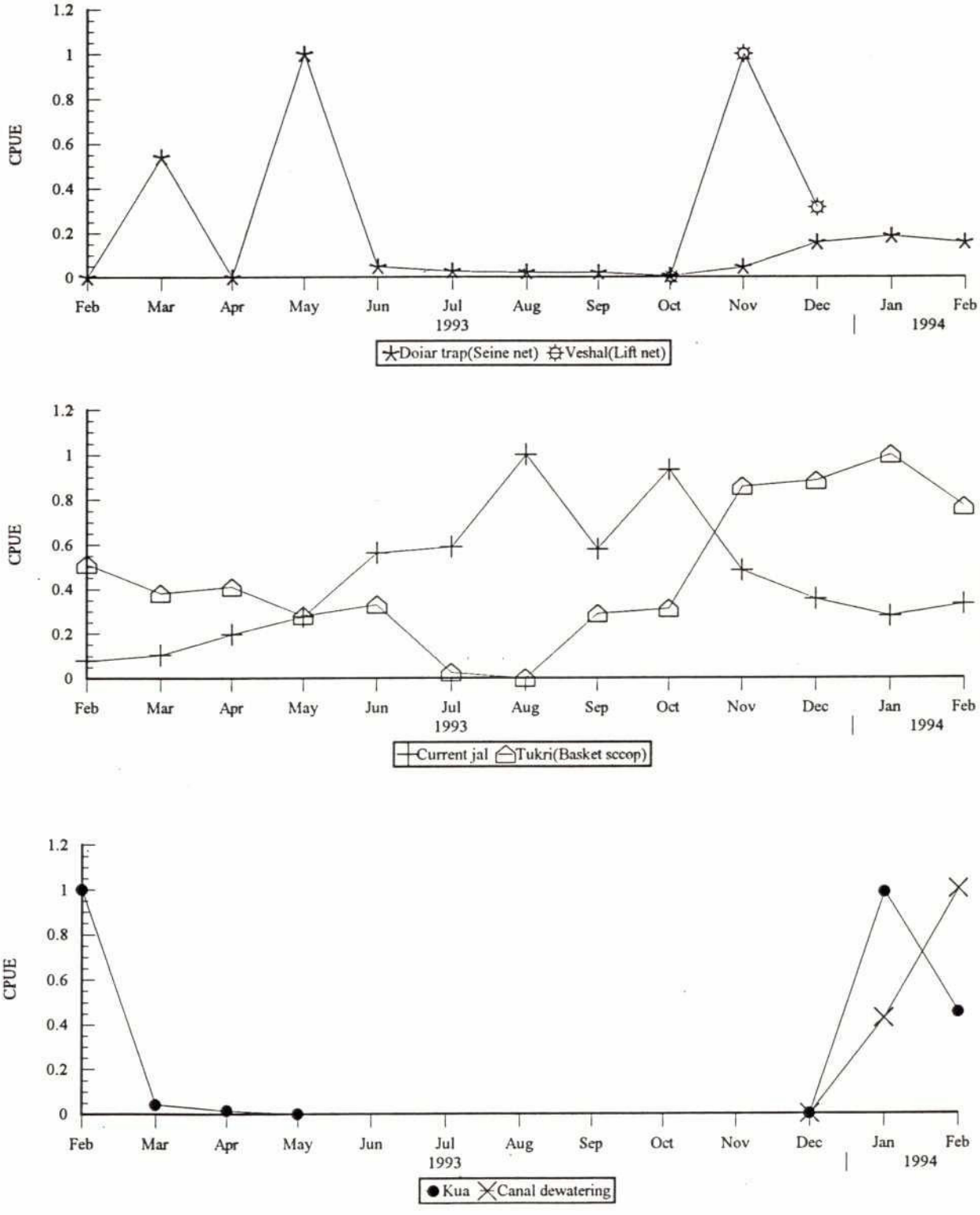


Figure 6.9 Catch rates (scaled CPUE) of dominant gears: combined floodplain/beel sites in Satla-Bagda Polder 1

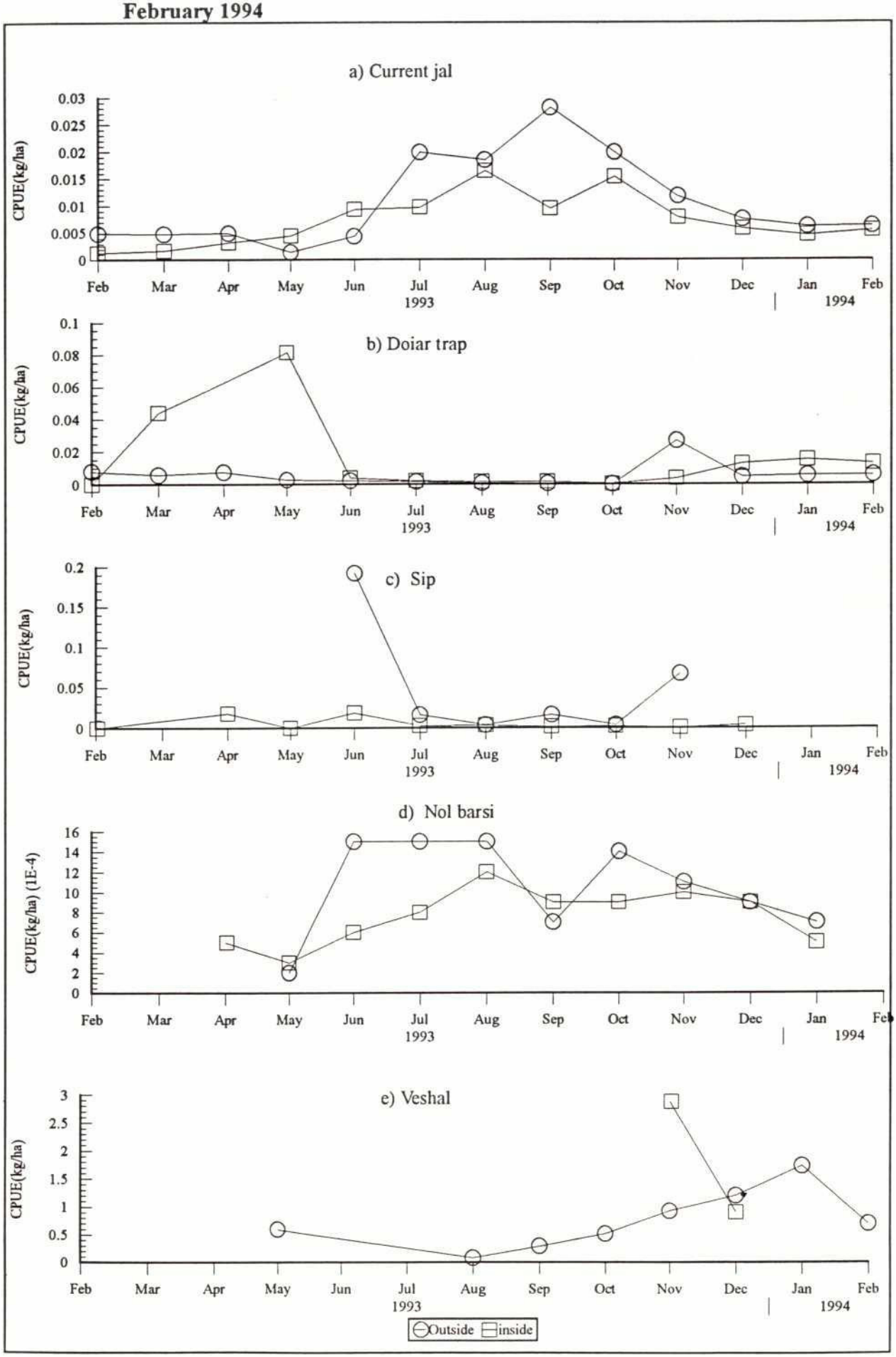


Note: Scaled CPUE are values of CPUE expressed as a proportion (decimal) of the maximum monthly value recorded.

Table 6.12 Statistical Comparison of Catch Rates of Dominant Gears Used on Floodplains and Beel within Satla-Bagda polder and Outside on Bagihar Beel, March 1993 - February 1994

		SEASON																	
		March - April			May - June			July - Sept			Oct - Nov			Dec - Feb					
		1			2			3			4			5			Total		
Gear		Obs C/E	Pred	Pred Out	Obs C/E	Pred	Pred Out	Obs C/E	Pred	Pred Out	Obs C/E	Pred	Pred Out	Obs C/E	Pred	Pred Out	Obs C/E	Sum Pred	Pred Out
OUTSIDE	Current jal	0.0	0.0		0.5	0.5		16.3	13.8		17.0	15.8		15.3	14.8		49.2	45.0	
	Nol barsi	0.0	0.0		0.0	0.0		3.3	3.8		9.9	9.7		10.3	10.1		23.6	23.7	
	Veshal	0.0	0.0		0.1	0.1		0.7	0.7		7.3	15.5		14.4	14.0		22.5	30.2	
	Doiar	0.2	0.4		0.8	0.9		1.5	2.9		1.0	0.4		13.6	22.9		17.1	27.5	
	Sip	0.0	0.0		0.1	0.0		3.9	3.0		0.4	0.3		0.0	0.0		4.4	3.3	
	Koi jal	0.0	0.0		0.0	0.0		3.7	0.0		4.6	4.6		3.8	3.8		12.1	12.1	
	Tukri	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
	Jhaki jal	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
TOTAL		**0.3**	**0.4**		**1.5**	**1.6**		**29.4**	**27.9**		**40.2**	**46.3**		**57.5**	**65.6**		**128.8**	**141.8**	
SE			**0.4**			**0.4**			**1.6**			**2.8**			**3.6**			**4.9**	
INSIDE	Current jal	0.3	0.3	0.3	1.2	1.0	0.4	4.1	5.4	7.2	11.2	12.0	15.8	6.5	6.8	6.9	23.2	25.5	30.5
	Nol barsi	0.0	0.0	0.0	0.4	0.4	0.1	5.6	5.4	7.2	1.8	1.8	2.4	1.7	1.8	1.8	9.4	9.4	11.5
	Veshal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	4.8	6.3	3.5	5.8	5.8	14.2	10.6	12.1
	Doiar	0.5	0.1	0.1	1.0	0.9	0.3	1.3	0.9	1.2	1.1	1.4	1.9	10.7	7.2	7.2	14.5	10.5	10.7
	Sip	0.0	0.0	0.0	0.0	0.1	0.0	3.8	4.3	5.7	1.2	1.3	1.7	2.3	2.3	0.0	7.3	8.0	7.4
	Koi jal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tukri	3.7	3.7	3.4	0.1	0.1	0.0	0.2	0.2	0.3	1.7	1.7	2.2	2.6	2.6	2.6	8.4	8.4	8.7
	Jhaki jal	0.1	0.1	0.1	0.3	0.3	0.1	1.5	1.5	2.0	2.6	2.6	3.4	2.6	2.6	2.6	7.1	7.1	8.3
TOTAL		**4.6**	**4.3**	**3.9**	**3.0**	**2.8**	**1.1**	**16.5**	**17.7**	**23.5**	**30.2**	**25.5**	**33.7**	**29.9**	**29.2**	**26.9**	**84.2**	**79.5**	**89.2**
SE			**0.6**	**1.6**		**0.6**	**0.2**		**0.9**	**1.3**		**1.4**	**1.9**		**1.7**	**1.7**	**0.0**	**2.5**	**3.3**

Figure 6.10 Comparison of catch rates of dominant gears used on floodplains and beels within Satla-Bagda Polder 1 and outside on Bagihar beel, March 1993-February 1994



Parameter estimates measuring the seasonal differences in underlying density of fish at the inside and outside sites indicated higher densities at the inside sites in seasons 1 and 2, and lower densities at the inside sites in seasons 3 and 4. Densities in season 5 were almost identical in and out. Only the individual comparisons for seasons 2 and 3 were statistically significant at the 5% level; the others were far from significant. Taken together, however, there were highly significant seasonal differences in fish densities at inside and outside sites ($p < 0.01$).

Total annual catches per hectare by the 9 gears were higher at the outside sites than at the inside sites (Table 6.12), but this in part is a reflection of higher effort at the outside sites. Estimates of standardised effort per hectare, summed across all 9 gears and seasons, were derived from the statistical analysis. For the inside sites, the total standardised effort (measured in monofilament gill net hours per hectare) was 11,422, compared with 15,831 for the outside sites. Observed and predicted catches per hectare are shown in Table 6.12.

To make allowance for this difference in effort, estimates of the total annual catch per hectare at inside sites, based on the observed effort pattern by gear at the inside sites, were calculated using both the predicted densities at inside and outside sites. The results are shown in Table 6.12. The predicted total catch per hectare using the inside densities was 79.5 kg (s.e. 2.5), while the corresponding figure predicted using the outside densities was 89.2 kg (s.e. 3.3). This difference is significant statistically at the 5% level, and demonstrates that the outside sites were more productive than the inside sites.

6.4 Species Composition and Biodiversity

6.4.1 Species richness

A total of 63 fish species were recorded outside the polder and 60 inside, from four sampling sites combined in each area. Therefore, in terms of species richness there appears to be little impact by FCD. However, if each site is examined individually, then greater differences appear (Table 6.13).

Table 6.13 Total Number of Fish Species Recorded at each Site Inside and Outside Satla-Bagda Polder, March 1993 - February 1994

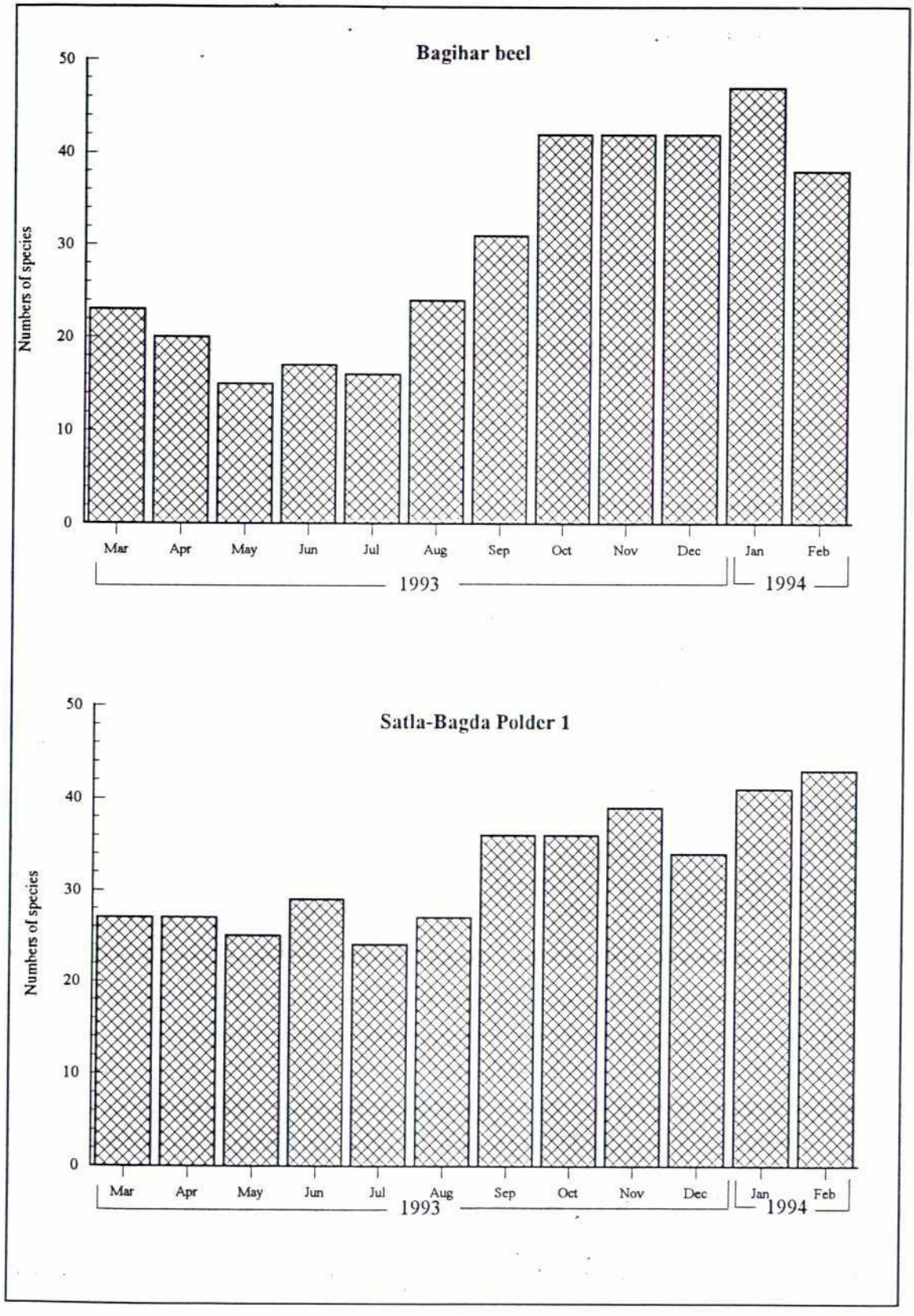
Outside		Inside	
Site	No. of Species	Site	No. of Species
13	40	18	40
14	50	19	42
15	52	21	45
16	51	22	55

Within the polder, site 22 (Satla-Bagda floodplain/beel) is situated immediately alongside the embankment and is bisected by a canal which connects directly with the outside Satla-Bagda khal via a main regulator. Since at least one sluice gate was opened to drain water during low tide and occasionally opened to allow restricted entry of floodwater at high tide, then fish had the opportunity to enter. The proximity to the sluice gate may explain why this site supported a higher number of species than other sites in the polder (Table 6.13). Excluding site 22, the remaining sites within the polder supported about 10-20% fewer species than the sites outside the polder. Thus, the more detailed site results suggest that biodiversity has been reduced inside the FCD scheme.

Seasonal changes in species richness on floodplains and beel did not follow closely the pattern observed in rivers and canals, which exhibited a sharp increase during and immediately following the flood drawdown. Instead, species numbers on the floodplains and beel increased more gradually, coinciding with the water rise and full flood period (Fig. 6.11). Maximum species numbers were recorded during the winter both inside and outside the polder, when kua dominated monthly catches.

These trends suggest that the number of species recorded in the catches from inside Satla-Bagda polder expands from residual stocks which are able to over-winter inside the polder and explosively increase during their pre-monsoon breeding season before being recruited into the subsistence and commercial fisheries. It is possible that these same populations were enhanced by recruitment of upstream migrating adults from khal to floodplain during the pre-monsoon period when sluice gates were opened to allow the drainage of rainwater. However, no direct evidence of such migrations was obtained during the present study. With the exception of barrier (bana) and spear (juti) fishing for boal, no other fishing methods were recorded which specifically targeted pre-monsoon upstream migrants in drainage canals.

Figure 6.11 Seasonal variation in species richness in floodplains and beel in the SWR, March 1993 - February 1994



6.4.2 Species composition

Detailed breakdowns of the catch compositions by month of four sites pooled together inside and outside the polder are presented in Tables 6.14 and 6.15. Species dominating the pooled annual catches are listed in Table 6.16. The 20 species listed, together with prawns, contributed between 92% and 95% of the total annual catch inside and outside the embankment respectively.

Clearly, the species composition of the major part of the catch was very similar inside and outside the polder. With the exception of one species, i.e. the large silurid catfish boal, all species listed in Table 6.16 are capable of overwintering on the floodplain, and therefore characterise the floodplain and beel resident fish community. Several species contained in this list have been identified as floodplain residents in other areas of Bangladesh in the course of the FAP 17 fisheries studies.

Species compositions were also determined with catches from dry season fish aggregating devices such as katha and kua excluded. This made little difference to the list of dominant species, other than to include the major carp, *Labeo rohita*, which then comprised 2.4% of the total annual catch of Bagihar beel and 0.03% in the polder.

A decrease in the catch of rui within the polder is almost certainly the result of embankments blocking the entry of carp hatchlings. The activities of commercial savar (drift nets designed to collect carp hatchlings) fisheries provide an accurate indication of the timing of the first appearance of hatchlings, their relative abundance and their disappearance from rivers. Savar nets were recorded during fishing effort surveys on the Kumar River. The nets (and therefore hatchlings) first appeared between 11 and 23 May, reached a peak abundance between 25 June and 10 July, and disappeared early in August. Because of rainfall runoff from floodplain to rivers, carp hatchlings could not enter any floodplains, whether embanked or free flooding, during May and early June. Only when the current direction reversed as a result of rising river and canal levels, around mid-June, did river waters enter floodplains. On Bagihar beel the timing of river flooding coincided with peak abundance of hatchlings. However, because the regulators of the Satla-Bagda Polder were closed on high tides during June and July, only being opened on low tides to drain out rainwater, then carp hatchlings could never enter the scheme and reach its floodplains and beel.

The situation regarding the other important migrant species *Wallagu attu,* or boal, is different. This species moves from river to floodplain during the pre-monsoon and early monsoon season to breed on the floodplains. Its movement onto the floodplain and beel of

Table 6.14 Percentage total monthly catch by species: combined floodplain sites in Satla–Bagda Polder 1

Species Code	Species name		Year: 1993											Year: 1994		Total actual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
180	*Puntius sophore*	*Puti*	7.340	1.335	0.336	62.291	23.068	29.906	29.816	22.979	48.797	48.687	22.078	27.646	11.701	24955.963	28.901
41	*Channa punctatus*	*Taki*	20.227	20.635	8.150	3.877	11.763	25.504	34.609	16.293	4.831	4.859	11.346	8.163	12.365	9411.036	10.899
88	*Heteropneustes fossilis*	*Shingi*	10.873	9.292	6.810	2.054	11.982	7.067	8.137	6.511	2.391	8.715	14.181	10.264	13.875	8744.730	10.127
931	Prawn spp.	Chingri/Icha	1.624	9.662	56.309	0.136	2.817	1.538	0.741	1.937	1.763	1.193	5.173	13.603	10.684	6314.836	7.313
6	*Anabas testudineus*	*Koi*	9.886	5.317	4.440	3.385	14.566	16.697	9.262	4.687	3.871	3.915	5.487	2.231	3.060	3701.908	4.287
138	*Nandus nandus*	*Bheda*	0.044	–	0.018	–	2.481	0.461	1.048	3.674	13.759	6.754	5.880	2.830	1.839	3536.891	4.096
42	*Channa striatus*	*Shol*	1.686	–	0.126	0.158	1.095	0.773	1.655	0.334	1.115	1.792	2.873	8.042	4.766	3284.131	3.803
55	*Colisa fasciatus*	*Khalisha*	5.095	7.188	1.889	4.382	5.139	1.355	2.566	3.294	3.150	0.799	2.506	3.826	6.813	3090.451	3.579
137	*Mystus vittatus*	*Tengra*	1.601	0.154	0.003	0.054	4.268	0.711	0.338	0.587	0.604	0.586	2.932	6.065	4.769	2645.340	3.063
56	*Colisa lalia*	*Lal Khalisha*	5.458	13.259	5.356	17.721	1.251	–	–	0.492	0.017	1.177	5.347	1.139	4.147	2610.946	3.024
210	*Xenentodon cancila*	*Kaikka*	–	–	0.221	0.075	0.356	0.062	0.111	0.250	1.793	7.523	3.469	2.503	1.543	2428.387	2.812
123	*Macrognathus pancalus*	*Guchi*	1.983	5.227	0.669	0.200	2.645	0.629	0.410	0.355	0.322	1.036	3.541	1.725	2.423	1552.802	1.798
212	*Puntius ticto*	*Tit puti*	0.226	0.639	0.538	–	3.743	3.420	0.544	0.544	0.100	1.207	3.901	1.844	0.998	1396.967	1.618
145	*Notopterus notopterus*	*Foli*	0.594	1.773	0.224	–	–	0.035	3.439	5.374	2.558	0.513	0.415	0.685	2.684	1223.369	1.417
39	*Channa marulius*	*Gajar*	–	–	–	–	–	1.137	1.055	5.806	5.064	0.853	1.129	0.513	1.327	1141.305	1.322
175	*Puntius conchonius*	*Canchan puti*	–	0.422	1.961	0.103	0.095	0.076	0.557	0.501	1.738	0.507	1.689	1.009	2.736	1099.919	1.274
203	*Tetraodon cutcutia*	*Potka*	–	–	–	–	–	–	–	0.128	0.239	2.068	1.612	1.969	0.724	1061.450	1.229
83	*Glossogobius giurus*	*Bailla*	–	–	0.249	–	6.160	9.212	4.828	9.432	0.619	0.151	0.224	0.010	0.014	907.185	1.051
136	*Mystus tengara*	*Bajari tengra*	–	0.071	0.062	0.039	0.219	0.192	0.043	–	0.095	0.436	1.881	1.129	1.600	816.989	0.946
110	*Lepidocephalus guntea*	*Gutum*	2.514	6.128	0.751	0.118	0.830	–	0.011	0.084	0.017	0.026	0.768	1.423	0.861	682.815	0.791
32	*Catla catla*	*Catla*	–	–	–	–	–	–	–	12.855	3.242	–	–	–	–	675.381	0.782
182	*Rasbora daniconius*	*Darkina*	0.109	1.258	2.710	0.453	0.890	0.259	0.184	0.071	0.021	0.103	0.848	0.735	1.275	566.032	0.656
211	*Colisa labiosus*	*Khalisha*	0.012	1.006	0.400	1.818	1.027	0.329	–	0.070	0.275	0.781	0.913	0.222	0.688	494.874	0.573
148	*Ompok pabda*	*Madhu pabda*	0.016	0.011	–	0.014	–	0.058	0.063	0.348	0.256	0.374	0.278	0.495	1.500	466.116	0.540
57	*Colisa sota*	*Khalisha*	18.852	12.897	6.905	1.738	0.657	–	–	–	–	0.044	0.178	0.242	0.128	456.258	0.528
49	*Clarias batrachus*	*Magur*	6.339	–	–	–	0.420	–	0.053	0.206	0.002	–	0.085	0.563	1.335	358.406	0.415
121	*Macrognathus aculeatus*	*Tara baim*	–	–	–	0.467	0.592	0.107	0.163	0.041	0.130	0.330	0.192	0.176	0.901	289.187	0.335
945	*Crab sp*	*Kakra*	–	–	–	–	–	–	–	–	1.612	0.998	0.444	–	–	281.364	0.326
209	*Wallagu attu*	*Boal*	3.711	–	–	–	–	0.082	–	–	–	1.530	–	0.207	0.049	275.340	0.319
131	*Mystus bleekeri*	*Golsha tengra*	–	–	–	–	–	–	–	–	–	–	–	0.116	1.547	271.107	0.314
122	*Mastacembelus armatus*	*Baral baim*	–	–	–	–	–	–	–	0.846	0.680	0.504	0.078	0.193	0.412	257.670	0.298
91	*Hypophthalmichthys molitrix*	*Silver carp*	–	–	–	–	–	–	–	–	–	1.386	–	–	–	200.438	0.232
37	*Chanda ranga*	*Lal chanda*	0.058	0.071	1.088	0.609	0.057	–	0.005	–	0.021	0.049	0.408	0.076	0.557	193.336	0.224
36	*Chanda nama*	*Nama Chanda*	–	0.180	0.044	–	–	–	–	0.113	0.060	0.073	0.011	0.114	0.878	187.463	0.217
75	*Esomus danricus*	*Darkina*	1.434	2.505	–	–	0.404	–	0.001	0.013	–	–	0.015	0.049	0.552	151.966	0.176

Table 6.14 Percentage total monthly catch by species: combined floodplain sites in Satla–Bagda Polder 1 (Cont.)

Species Code	Species name		Year: 1993											Year: 1994		Total actual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
107	*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	0.512	0.175	0.351	–	–	–	79.877	0.093
33	*Chaca chaca*	*Cheka*	–	–	–	–	–	0.105	–	0.091	0.038	0.366	–	0.048	0.053	79.310	0.092
5	*Amblypharygodon mola*	*Mola*	–	0.038	–	0.159	0.268	–	–	0.230	–	–	–	0.004	0.313	67.491	0.078
176	*Puntius gelius*	*Giliputi*	0.004	–	0.337	–	–	–	–	0.032	–	0.015	0.026	0.002	0.207	42.626	0.049
170	*Pseudapocryptes lanceolatus*	*Chewa*	–	–	–	–	–	–	–	0.052	–	0.234	0.038	–	–	40.707	0.047
35	*Chanda baculis*	*Chanda*	–	0.036	0.023	–	0.017	–	–	–	0.059	0.011	–	0.016	0.172	36.211	0.042
68	*Danio devario*	*Chebli*	–	–	–	0.117	–	–	0.052	–	0.018	0.005	0.004	0.036	0.130	36.176	0.042
187	*Osteobrama cotio cotio*	*Keti*	–	0.264	–	0.009	–	0.047	0.040	–	–	–	–	–	0.170	35.010	0.041
47	*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	0.777	–	–	–	–	–	31.083	0.036
15	*Badis badis*	*Napit koi*	0.043	0.141	0.053	–	0.039	–	–	–	–	–	0.039	0.020	0.066	23.181	0.027
70	*Eleotris fusca*	*Budh Bailla*	–	–	–	–	2.832	–	–	–	–	–	–	–	–	22.620	0.026
946	*Turtle*	*Dur kasim*	–	–	–	–	–	–	–	0.131	0.326	–	–	–	–	21.426	0.025
9	*Aplocheilus panchax*	*Kanpona*	0.243	0.460	0.058	0.003	–	0.237	–	–	–	–	–	0.001	0.019	17.594	0.020
188	*Salmostoma bacaila*	*Katari*	–	–	–	–	–	–	–	0.021	–	0.019	0.011	0.044	0.018	17.167	0.020
169	*Pseudeutropius atherinoides*	*Batasi*	–	0.020	–	0.009	0.132	–	–	–	–	0.018	–	–	0.062	14.191	0.016
108	*Leiognathus equulus*	*Tak chanda*	–	–	–	–	–	–	–	0.273	–	–	–	–	–	10.918	0.013
189	*Salmostoma phulo*	*Fulchela*	0.030	0.013	–	–	–	–	–	–	0.063	0.011	–	0.014	–	7.933	0.009
130	*Aorichthys aor*	*Ayre*	–	–	–	–	–	–	0.180	–	–	–	–	–	–	7.499	0.009
48	*Cirrhinus reba*	*Raik*	–	–	–	–	–	–	–	–	0.129	–	–	–	–	6.414	0.007
24	*Batasio batasio*	*Tengra*	–	–	–	–	–	–	–	–	–	–	–	–	0.034	5.481	0.006
120	*Macrobrachium rosenbergii*	*Golda*	–	–	–	–	–	–	0.068	–	–	–	–	–	–	2.827	0.003
132	*Mystus cavasius*	*Kabashi*	–	–	–	–	–	–	0.022	–	0.023	–	–	–	–	2.054	0.002
124	*Monopterus cuchia*	*Kuchia*	–	–	–	–	–	–	–	0.012	0.030	–	–	–	–	1.984	0.002
61	*Ctenops nobilis*	*Neftani*	–	–	0.269	–	–	–	–	–	–	–	–	–	–	1.973	0.002
40	*Channa orientalis*	*Cheng*	–	–	–	–	–	–	–	0.044	–	–	–	–	–	1.767	0.002
89	*Hilsa ilisha*	*Ilish*	–	–	–	–	0.189	–	–	–	–	–	–	–	–	1.506	0.002
80	*Gagata viridescens*	*Gang tengra*	–	–	–	–	–	–	–	–	–	–	–	0.006	–	1.350	0.002
134	*Mystus menoda*	*Ghagla*	–	–	–	–	–	–	–	–	–	–	–	–	0.006	0.950	0.001
999	*Unidentified*		–	–	–	–	–	–	–	–	–	–	–	0.003	–	0.727	0.001
86	*Gudusia chapra*	*Chapila*	–	–	–	–	–	–	–	–	–	0.002	–	–	–	0.328	0.000
178	*Puntius phutunio*	*Phutani puti*	–	–	–	0.008	–	–	–	–	–	–	–	–	–	0.248	0.000
			100	100	100	100	100	100	100	100	100	100	100	100	100	86350.984	100

Table 6.15 Percentage total monthly catch by species: combined floodplain/beel sites in Bagihar beel

Species Code	Species name		Year: 1993											Year: 1994		Total actual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
180	*Puntius sophore*	*Puti*	0.370	1.140	0.219	3.027	3.232	1.228	4.253	12.877	19.201	28.989	25.707	12.115	8.693	20497.193	17.118
55	*Colisa fasciatus*	*Khalisha*	3.707	6.875	7.974	3.321	17.258	22.462	38.911	32.598	37.105	7.935	8.782	11.272	10.252	18884.890	15.772
6	*Anabas testudineus*	*Koi*	5.412	15.744	11.531	8.714	40.403	62.648	25.302	40.059	11.686	4.892	6.972	9.406	9.254	17477.308	14.596
41	*Channa punctatus*	*Taki*	8.741	11.292	20.520	19.792	13.701	6.531	16.423	4.941	9.322	17.005	15.079	14.840	13.355	16130.963	13.472
88	*Heteropneustes fossilis*	*Shingi*	50.335	32.231	40.827	21.148	16.971	3.734	4.113	4.098	5.514	10.578	9.871	16.707	15.541	13381.702	11.176
42	*Channa striatus*	*Shol*	2.822	7.197	1.218	–	0.046	1.772	8.932	0.526	4.286	4.416	7.273	8.705	10.961	7647.132	6.386
145	*Notopterus notopterus*	*Foli*	2.044	2.433	0.016	–	–	–	0.353	0.473	3.029	1.230	1.991	3.879	8.106	3096.246	2.586
138	*Nandus nandus*	*Bheda*	–	–	–	–	–	0.009	0.063	0.117	0.497	1.818	2.122	2.461	4.134	2096.353	1.751
175	*Puntius conchonius*	*Canchan puti*	0.069	0.603	0.691	0.054	0.424	0.226	0.008	0.150	0.597	2.962	2.489	1.787	0.298	1865.420	1.558
210	*Xenentodon cancila*	*Kaikka*	0.015	–	–	1.442	–	–	0.082	0.790	1.897	2.095	3.483	0.351	0.501	1825.345	1.524
931	Prawn spp.	Chingri/Icha	0.115	0.487	0.753	2.003	0.373	–	–	–	1.130	0.794	1.601	4.026	1.016	1817.840	1.518
212	*Puntius ticto*	*Tit puti*	0.135	0.156	0.158	0.741	0.023	–	0.002	0.268	0.335	1.975	2.578	1.664	0.842	1691.128	1.412
49	*Clarias batrachus*	*Magur*	21.615	16.051	4.304	–	2.596	0.745	0.114	0.131	0.211	0.006	0.623	1.044	3.727	1440.277	1.203
123	*Macrognathus pancalus*	*Guchi*	0.743	1.971	4.026	5.145	0.145	–	0.184	0.782	0.762	1.754	1.964	0.869	0.524	1428.613	1.193
137	*Mystus vittatus*	*Tengra*	1.048	0.506	1.114	1.667	–	0.290	0.434	0.270	0.470	1.053	0.869	2.461	1.887	1397.893	1.167
209	*Wallagu attu*	*Boal*	0.448	0.367	–	–	–	0.038	–	–	–	2.717	0.181	1.423	3.917	1387.785	1.159
182	*Rasbora daniconius*	*Darkina*	0.239	0.138	1.189	29.154	–	–	0.104	0.207	0.037	1.792	1.828	1.112	0.490	1302.788	1.088
56	*Colisa lalia*	*Lal Khalisha*	0.842	0.136	2.105	1.119	2.131	–	0.023	–	0.667	1.140	1.780	0.517	0.320	994.826	0.831
107	*Labeo rohita*	*Rui*	–	0.138	–	–	–	–	–	–	0.894	0.705	0.086	0.683	2.546	705.972	0.590
110	*Lepidocephalus guntea*	*Gutum*	0.296	0.394	0.158	0.518	–	–	–	0.007	0.037	1.134	0.218	1.399	0.350	672.924	0.562
203	*Tetraodon cutcutia*	*Potka*	–	–	–	–	–	–	–	–	0.073	0.745	0.661	0.453	0.423	500.330	0.418
57	*Colisa sota*	*Khalisha*	0.096	0.337	0.992	1.704	0.725	–	–	0.203	0.608	0.424	0.830	0.203	0.177	492.431	0.411
39	*Channa marulius*	*Gajar*	0.215	–	–	–	–	–	–	–	0.327	0.078	0.358	0.845	0.953	459.636	0.384
211	*Colisa labiosus*	*Khalisha*	0.018	–	–	–	–	–	0.078	–	0.175	0.310	0.828	0.258	0.046	388.517	0.324
148	*Ompok pabda*	*Madhu pabda*	0.148	–	–	0.451	0.806	0.014	0.036	0.014	0.050	0.115	0.191	0.437	0.923	304.808	0.255
37	*Chanda ranga*	*Lal chanda*	0.015	–	–	–	0.113	–	–	0.015	0.055	0.859	0.326	0.074	0.065	294.999	0.246
176	*Puntius gelius*	*Giliputi*	0.050	0.020	0.200	–	–	–	–	–	0.004	0.631	0.082	0.127	0.010	180.031	0.150
36	*Chanda nama*	*Nama Chanda*	–	–	–	–	–	–	–	–	0.026	0.384	0.301	0.036	0.051	179.204	0.150
122	*Mastacembelus armatus*	*Baral baim*	–	0.036	–	–	–	–	0.126	0.030	0.143	0.222	0.093	0.123	0.088	135.254	0.113
121	*Macrognathus aculeatus*	*Tara baim*	0.074	0.117	–	–	0.484	0.021	0.149	0.296	0.088	0.134	0.041	0.039	0.049	109.525	0.091
83	*Glossogobius giurus*	*Bailla*	0.007	–	0.545	–	–	–	0.249	0.037	0.262	0.039	0.055	0.060	0.009	85.399	0.071
136	*Mystus tengara*	*Bajari tengra*	–	0.004	–	–	–	–	–	–	–	0.015	0.084	0.125	0.233	83.985	0.070
945	*Crab sp*	*Kakra*	–	–	–	–	–	–	–	–	–	0.039	0.237	–	–	76.408	0.064
5	*Amblypharygodon mola*	*Mola*	–	–	–	–	–	–	–	0.085	0.161	0.179	0.034	0.009	0.025	73.225	0.061
75	*Esomus danricus*	*Darkina*	0.226	0.557	0.327	–	0.435	–	–	0.015	0.028	0.030	0.111	0.009	–	64.924	0.054
35	*Chanda baculis*	*Chanda*	–	–	–	–	–	–	–	–	0.008	0.232	0.030	0.039	–	63.988	0.053
33	*Chaca chaca*	*Cheka*	0.123	0.319	0.349	–	–	–	–	0.034	0.013	–	0.106	0.048	0.035	61.420	0.051

Table 6.15 Percentage total monthly catch by species: combined floodplain/beel sites in Bagihar beel (Cont.)

Species Code	Species name		Year: 1993										Year: 1994		Total actual catch (Mar'93 – Feb'94)	
	Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
32	*Catla catla*	*Catla*	–	–	–	–	–	–	–	–	–	0.115	–	0.046	0.185	54.806	0.046
40	*Channa orientalis*	*Cheng*	–	–	–	–	–	0.094	0.041	–	0.023	0.031	0.008	0.090	–	39.733	0.033
131	*Mystus bleekeri*	*Golsha tengra*	–	–	0.683	–	–	–	0.017	–	–	–	0.084	0.039	–	37.960	0.032
47	*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	0.369	–	–	–	–	–	37.946	0.032
9	*Aplocheilus panchax*	*Kanpona*	0.016	0.383	0.095	–	0.134	–	–	–	–	–	0.006	0.089	0.001	35.339	0.030
95	*Johnius coitor*	*Koitor*	–	–	–	–	–	–	–	0.295	–	–	–	–	–	30.358	0.025
132	*Mystus cavasius*	*Kabashi*	–	–	–	–	–	0.159	–	0.040	0.051	0.064	–	–	–	30.170	0.025
188	*Salmostoma bacaila*	*Katari*	–	–	–	–	–	–	–	0.205	0.013	0.028	–	–	0.005	28.519	0.024
15	*Badis badis*	*Napit koi*	0.013	0.093	–	–	–	–	–	–	–	0.107	0.010	0.003	0.003	27.536	0.023
187	*Osteobrama cotio cotio*	*Keti*	–	–	–	–	–	–	–	0.005	0.069	0.082	0.003	–	–	23.775	0.020
144	*Notopterus chitala*	*Chital*	–	–	–	–	–	–	–	–	–	–	–	0.061	–	14.308	0.012
120	*Macrobrachium rosenbergii*	*Golda*	–	–	–	–	–	–	–	0.057	0.069	–	–	–	–	12.186	0.010
48	*Cirrhinus reba*	*Raik*	–	–	–	–	–	–	–	–	0.035	0.041	–	–	0.007	11.970	0.010
68	*Danio devario*	*Chebli*	0.003	0.006	–	–	–	–	–	0.006	–	0.039	0.004	0.000	–	9.775	0.008
174	*Puntius chola*	*Chala puti*	–	–	–	–	–	–	–	–	–	–	0.021	0.008	–	8.110	0.007
178	*Puntius phutunio*	*Phutani puti*	–	0.269	–	–	–	–	–	–	–	–	–	–	–	7.614	0.006
38	*Channa barca*	*Tila shol*	–	–	–	–	–	–	–	–	–	0.037	–	–	–	7.187	0.006
130	*Aorichthys aor*	*Ayre*	–	–	–	–	–	–	–	–	–	0.029	–	–	–	5.684	0.005
112	*Lobotes surinamensis*	*Samudra koi*	–	–	–	–	–	–	–	–	–	–	–	0.021	–	5.054	0.004
8	*Anodontostoma chacunda*	*Koi puti*	–	–	–	–	–	–	–	–	–	–	–	0.021	–	4.915	0.004
102	*Labeo calbasu*	*Kalbaus*	–	–	–	–	–	–	–	–	0.023	–	–	–	–	2.110	0.002
135	*Aorichthys seenghala*	*Guizza*	–	–	–	–	–	0.030	–	–	–	–	–	–	–	1.697	0.001
52	*Clupisoma naziri*	*Muri Bacha*	–	–	–	–	–	–	–	–	–	–	–	0.006	–	1.513	0.001
46	*Chitra indica*	*Chhim Kachhim*	–	–	–	–	–	–	–	–	–	–	–	0.006	–	1.299	0.001
3	*Ailia punctata*	*Kajuli*	–	–	–	–	–	–	–	–	–	–	–	0.005	–	1.065	0.001
189	*Salmostoma phulo*	*Fulchela*	–	–	–	–	–	–	–	–	0.009	–	–	–	–	0.817	0.001
10	*Apocryptes bato*	*Chiring*	–	–	–	–	–	–	–	–	0.007	–	–	–	–	0.684	0.001
61	*Ctenops nobilis*	*Neftani*	–	–	–	–	–	–	–	–	0.006	–	–	–	–	0.505	0.0004
86	*Gudusia chapra*	*Chapila*	–	–	–	–	–	–	0.006	–	–	–	–	–	–	0.360	0.0003
169	*Pseudeutropius atherinoides*	*Batasi*	–	–	0.010	–	–	–	–	–	–	–	–	–	–	0.046	0.00004
			100	100	100	100	100	100	100	100	100	100	100	100	100	119739.725	100

Table 6.16 Dominant Species of Floodplains and Beel of the SWR, March 1993 - February 1994

Species Name	Bagihar Beel (Outside)	Satla-Bagda Polder 1
Colisa fasciatus	15.8	3.6
Channa punctatus	13.5	10.9
Heteropneustes fossilis	11.2	10.1
Channa striatus	6.4	3.8
Anabas testudineus	14.6	4.3
Notopterus notopterus	2.6	1.4
Puntius sophore	17.1	28.9
Wallagu attu	1.2	<1
Nandus nandus	1.8	4.1
Clarias batrachus	1.2	<1
Mystus vittatus	1.2	3.1
Channa marulius	<1	1.3
Prawn spp.	1.5	7.3
Xenentodon cancila	1.5	2.8
Macrognathus pancalus	1.2	1.8
Colisa lalia	<1	3.1
Tetraodon cutcutia	<1	1.2
Puntius ticto	1.4	1.6
Puntius conchonius	1.6	1.3
Glossogobius giurus	<1	1.1
Rasbora daniconius	1.1	<1

the Bagihar beel complex was unrestricted. However, its access onto the floodplains of the Satla-Bagda project was restricted by the large reduction in the number of entry points via drainage regulators. The same is true regarding its emigration as both adults and juveniles during the flood drawdown.

That part of the total annual catch comprising dominant species was divided into resident "sedentary" and migratory groups for floodplains/beel and canal habitats within the Satla-Bagda Polder and outside on Bagihar beel (Table 6.17).

Table 6.17 Percentage of Migratory and Resident Groups of Fish Species in Floodplains and Canals in the SWR, March 1993 - February 1994

	Habitat	Migratory	Resident
Floodplain/Beel	Outside FCD	1.2	93.3
	Inside FCD	0.3	91.2
Canal	Outside FCD	2.2	97.8
	Inside FCD	2.6	97.4

Clearly, migratory species made very little contribution to the bulk of the catch. This phenomenon has also been identified during the FAP 17 study of the North West and North Central Regions of Bangladesh, as well as in other areas in the South West region. In the North East Region certain migratory species, e.g. the clupeid, chapila (*Gudusia chapra)* forms an important part of floodplain catches. The reasons for its insignificance in other regions are not known.