A preliminary investigation on the fisheries potential of a tropical river in Western Ghat, India

Swapna S [*], Abdul Azis P.K. [**]

[*]Department of Zoology, Sree Narayana College for Women, Kollam-691001 Kerala, India.
[**] Department of Aquatic Biology & Fisheries, University of Kerala, Karyavattom Campus- 695581 Kerala, India.

Abstract- Throughout the last century, riverine ecosystems have suffered from intense human intervention resulting in habitat loss and degradation and as a consequence, many fish species have become highly endangered, particularly in rivers where heavy demand is placed on fresh waters. River Achenkovil originating from the mighty Western Ghat mountain ranges reflecting the rich cultural heritage of Central Travancore is under the crushing pressure of environmental degradation caused by unprecedented human exploitation. A study has been conducted from February 2004 to January 2005 to document the fish diversity in the river system. A total of 52 species belonging to 5 orders and 18 families were collected. Cyprinidae was the most dominant family (68.50%) followed by Cichlidae (7.56%) and Ambassidae (6.73%). Results suggested that environmentalists and governmental agencies should pay responsiveness to protect the existing faunal wealth**.**

Index Terms- Achenkovil River, Conservation, Environmental degradation, Fish diversity

I. INTRODUCTION

Running waters support unique patterns of distribution of biological diversity among, taxonomic groups and among regions. Over all, the information is woefully incomplete. The lack of information on the ichthyofauna is a big handicap for popularizing little known fish diversity in a particular ecosystem(Manab and Patra, 2013). The state of Kerala ($8^0$17’30’’and $12^0$47’40’’N. latitudes and $74^0$24’47’’ E. longitude) located on the South -West coast of India is rich in water resources. The aquatic environment of the state is embraced not only with a total of 44 rivers along with a vast coast line of 575 Km and adjoining connected expanses of back waters but also an extensive and extremely potential water wealth such as freshwater lakes, rivers, streams, ponds and reservoirs. The freshwater fish diversity of Kerala is facing serious threats as reported by many works (Menon, 1993; Zacharias et al., 1996; Kurup et al., 2003). Biodiversity threats in the form of diverse types of human interventions are the main reason for the alarming decline of fish population in most of the rivers. Unsustainable exploitation by using fish poisoning, dynamiting and other prohibited fishing methods are very rampant together with destruction of natural spawning and breeding grounds of the fishes through sand mining were the major causes of population decline and endangerment. The River Achenkovil is the ninth largest river in terms of catchment area, and sixth in terms of length among the forty one west flowing rivers of Kerala. The Achenkovil basin lies between latitudes 9^0 01' 0" to 9^0 18' 30" North latitudes and longitudes 76^0 23' to 77^0 16' East longitudes and is spread over the districts of Kollam, Pathanamthitta and Alappuzha of Kerala state. Studies of spatial and temporal patterns of distribution and diversity of freshwater fishes are useful to analyze the factors influencing the fish community structure (Hugueny and Paugy, 1995; Belliard et al., 1997). Increased documentation of data on fish diversity has brought attention to the need of conservation measures for this group of vertebrates. The objective of the present study was to document the various fish species in Achenkovil River system in order to develop a fresh water diversity information system (Islam et al., 2013).

II. MATERIALS AND METHODS

Fish Sampling and Identification: Fish species in Achenkovil River were collected regularly over a period of one year (Feb. 2004 to Jan. 2005) on four sampling sites (Plate 1). The sites were chosen such that one on the higher elevation zone and three on the mid and lower elevation zones. Corresponding to this choice, there was also a difference in altitude along these sites- Station I was located at an altitude of 250m above mean sea level (MSL), while the remaining stations were located at < 250 m above MSL. Thus a regional comparison along the river was made across the upstream and downstream stations.

Fish were sampled by using cast net and gill net. Whole samples from at least 2 cast net operations and one gill net operation were taken and counted separately, recorded and after carefully removing ample samples from the collection, excess live fishes of the same type were released back. The mesh size of cast net was less than 1 cm and that of monofilament gill net was 50 mm. In order to avoid the possible variation in sampling, netting operations were done invariably with same duration in all stations within the same

day. Catches from the two types of gear were combined and preserved in (4% formaldehyde solution) plastic bottles. Identifications done were based on keys for fishes of the Indian subcontinent (Talwar and Jhingran, 1991; Jayaram, 1999; Kapoor et al., 2002). The number of species and number of individuals in each species from each station were recorded and expressed as mean number obtained per netting. The occurrence and the relative abundance of various fish species at different stations of the river were assessed from monthly collections.

III. RESULT AND DISCUSSION

The fish population in Achenkovil River system was composed of 18 families comprising Clupeidae, Cyprinidae, Balitoridae, Cobitidae, Bagridae, Siluridae, Sisoridae, Hemiramphidae, Belonidae,Gobiidae, Ambassidae, Gerreidae, Nandidae,Cichlidae,Aplocheilidae, Anabantidae, Channidae and Mastacembelidae(Table 1 and Fig.1). Cyprinidae was the most dominant family which comprised 68.50% of the total fish fauna followed by Cichlidae (7.56%) and Ambassidae (6.73%). Other dominant groups were Bagridae (4.70%), Balitoridae (1.95%), Nandidae (1.81%) and Belonidae (1.56%). Monthly distributional pattern of the percentage composition of fish species at the four stations in the river system are given in Tables 2-5. In general, the fish species density was higher at Stations III and IV of the river system compared to other stations. The annual mean value showed that the maximum density of fish fauna was observed at Station III (37.73%) and minimum at Station I (14.52%). The percentage composition of the fish species varied from 45.98 in September to 2.55 in April at Station I and at Station II, it varied from 63.88 in October to 0.94 in July. At Stations III and IV, it varied from 46.40 in August to 0.68 in April and 47.71 in September to 1.25 in June respectively. The present study provide ample data regarding the hitherto little known aspect of fish diversity in the river system which is essential to maintain ecological/ nutritional and socioeconomic equilibrium in the river basin (Lakra, 2010).

IV. CONCLUSION

The present study concluded that River Achenkovil was one of the richest rivers in Kerala in terms of fish diversity. However indiscriminate extraction of river sand as well as flood plain clay for constructional and building activities is rampant along the river basin. Habitat destruction was a major threat to the fishes in the river system. Alteration of physical habitat is the most significant threat to biodiversity and ecosystem function in the majority of human impacted river systems (Allan& Castillo, 2007; Zeni & Casatti, 2014). The removal of bank side and instream branches/ vegetation was widespread along the river basin and this would resulted an in stream habitat alternation, increased illumination, elevated water temperature and the loss of habitat for many terrestrial organisms (eg. insects) which were important allochthonous food items for fishes(Ferreira et al., 2012). Livestock grazing was another major threat. Excessive stream side grazing and trampling activities by live stock will reduce or eliminate stream bank vegetation. Stream banks became destabilized causing slumping of soils into the stream bed and increased silt loading into the system and stream channels became wider and shallower. In order to protect the existing faunal wealth management measures aimed at conserving fresh water fishes should be a part of fisheries policies of the Government and to save some of the critically endangered species from wiping out the region brood stock maintenance centre and hatcheries should be established (Mahapatra, 2003).

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AUTHORS

First Author – Swapna S, Assistant Professor, Department of Zoology, Sree Narayana College for Women, Kollam-691001, Kerala, India . email: drsswapna@gmail.com
Second Author – Abdul Azis P.K., Former Professor, Department of Aquatic Biology & Fisheries, University of Kerala, Karyavattom Campus- 695581 Kerala, India

Correspondence Author – Swapna S email: drsswapna@gmail.com Tel: +919400287764.

Plate 1
Study sites selected in the Achenkovil River

Station I: Thura:- Located amidst in Western Ghat reserve forest - a pristine area with no to little human disturbance

Station II: Konni:- Located in midland region, facing wide range of human disturbances such as sand mining, sewage disposal etc.

Station III: Pandalam:- Located in midland region, facing serious threats of sand mining

Station IV: Payipad :- Widest and deepest part of the river, flooding and salt water intrusion constitute the important components influencing the ecology of the region

Table 1: Taxonomy, habitat, status and distribution of fish fauna from the Achenkovil River

Order/ family	Sl. No.	Species	Habitat	Status per IUCN	Stations			
					I	II	III	IV
Order : Clupeiformes								
Family : Clupeidae	1	***Dayella malabarica*** (Day)	F	CR	-	+	+	+
Order : Cypriniformes								
Family : Cyprinidae	2	***Amblypharyngodon melettinus*** (Valenciennes)	F	LRlc	+	+	+	+
	3	***Amblypharyngodon microlepis*** (Bleeker)	F	LRnt	+	+	+	+
	4	***Barilius bakeri*** (Day)	F	LRnt	+	+	+	+
	5	***Barilius gatensis*** (Valenciennes)	F	LRlc	+	+	+	+
	6	***Catla catla*** (Hamilton- Buchanan)	F	VU	-	+	+	-
	7	***Cyprinus carpio*** (Linnaeus)	F	LRlc	-	+	+	-
	8	***Danio malabaricus*** (Jerdon)	F	LRlc	+	+	+	+
	9	***Garra mullya*** (Sykes)	F	LRlc	+	+	+	+
	10	***Gonoproktopterus dubius*** (Day)	F	EN	-	+	+	-
	11	***Labeo dussumieri*** (Valenciennes)	F	EN	-	+	+	-
	12	***Labeo rohita*** (Hamilton-Buchanan)	F	LRlc	-	-	+	+
	13	***Osteobrama bakeri*** (Day)	F	EN	-	-	+	-
	14	***Parluciosoma daniconius*** (Hamilton - Buchanan)	F	LRlc	+	+	+	+
	15	***Puntius amphibius*** (Valenciennes)	F	LRlc	+	+	+	+
	16	***Puntius chola*** (Hamilton - Buchanan)	F	VU	-	-	+	+
	17	***Puntius denisonii*** (Day)	F	EN	+	-	+	+
	18	***Puntius fasciatus*** (Day)	F	LRlc	+	+	+	+
	19	***Puntius filamentosus*** (Valenciennes)	F	LRlc	+	+	+	+
	20	***Puntius jerdoni*** (Day)	F	VU	-	+	-	-
	21	***Puntius sarana subnasutus*** (Valenciennes)	F	VU	-	+	-	+
	22	***Salmostoma boopis*** (Day)	F	LRlc	+	+	+	+
Family :Balitoridae	23	***Balitora brucei*** (Gray)	F	DD	+	+	-	-
	24	***Nemacheilus guentheri*** (Day)	F	VU	+	+	+	-
	25	***Nemacheilus triangularis*** (Day)	F	LRnt	+	-	-	+
Family :Cobitidae	26	***Lepidocephalus thermalis*** (Valenciennes)	F	LRIc	+	-	-	-
Order: Siluriformes								
Family: Bagridae	27	***Horabagrus brachysoma*** (Gunther)	FE	EN	-	-	-	+
	28	***Mystus gulio*** (Hamilton – Buchanan)	FE	LRlc	-	+	+	-
	29	***Mystus keletius*** (Valenciennes)	F	DD	-	-	+	+
	30	***Mystus malabaricus*** (Jerdon)	F	EN	+	+	+	+
	31	***Mystus menoda*** (Hamilton - Buchanan)	F	DD	-	+	-	-
	32	***Mystus oculatus*** (Valenciennes)	FE	EN	+	-	+	+
Family : Siluridae	33	***Ompok bimaculatus*** (Bloch)	F	VU	-	-	+	+
	34	***Ompok malabarius*** (Valenciennes)	F	CR	-	-	+	+

Family : Sisoridae	35	***Glyptothorax housei*** (Herre)	F	EN	+	-	-	-
Order: Cyprinodontiformes	36	***Hyporhamphus limbatus*** (Valenciennes)	M	DD	-	-	+	+
Family : Hemiramphidae								
Family : Belonidae	37	***Xenentodon cancila*** (Hamilton - Buchanan)	FEM	LRnt	-	+	+	+
Family : Aplocheilidae	38	***Aplocheilus lineatus*** (Valenciennes)	F	LRlc	+	+	-	+
Order : Perciformes								
Family : Ambassidae	39	***Chanda nama*** (Hamilton - Buchanan)	FE	LRlc	-	+	+	+
	40	***Parambassis thomassi*** (Day)	M	LRlc	-	+	+	+
Family : Gerreidae	41	***Gerres filamentosus*** (Cuvier)	M	LRlc	-	-	-	+
Family : Nandidae	42	***Nandus nandus*** (Hamilton - Buchanan)	F	VU	-	-	+	+
	43	***Pristolepis marginata*** (Jerdon)	F	VU	-	+	+	-
Family : Cichlidae	44	***Etroplus maculatus*** (Bloch)	FEM	LRlc	+	+	+	+
	45	***Etroplus suratensis*** (Bloch)	FEM	LRIc	-	+	+	+
	46	***Oreochromis mossambicus*** (Peters)	FE	Intr	-	-	-	+
Family : Gobiidae	47	***Awaous gutum*** (Hamilton - Buchanan)	FEM	VU	-	-	-	+
Family : Anabantidae	48	***Anabas testudineus*** (Bloch)	F	LRnt	+	-	-	+
Family : Channidae	49	***Channa marulius*** (Hamilton - Buchanan)	F	LRnt	-	-	+	+
	50	***Channa punctatus*** (Bloch)	F	LRnt	-	-	+	-
	51	***Channa striatus*** (Bloch)	F	LRlc	-	-	+	-
Family : Mastacembelidae	52	***Mastacembelus armatus*** (Lecepede)	FE	LRlc	-	-	-	+

F- Fresh water, M- Marine LRlc- LowRisk least concern D-Data Deficient + presence - absence
FE- Freshwater -Estuarine EN- Endangered CR- Critically endangered
FEM- Fresh water- Estuarine-Marine VU-Vulnerable LRnt-Low Risk near threatened

Functional group assignation according to Talwar and Jhingran (1991)

Figure. 1 : Overall percentage composition of various fish family in Achenkovil river system

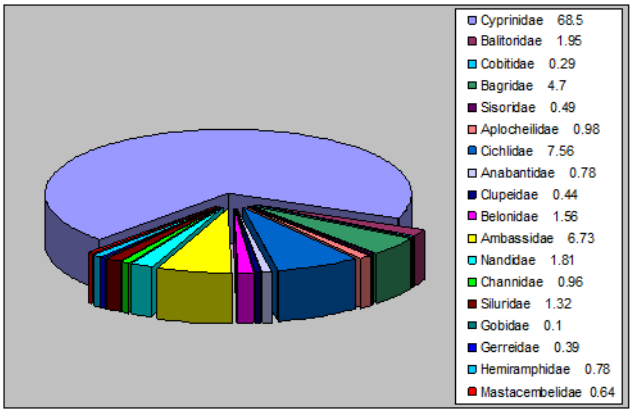

Table 2 : Monthly variations in the percentage composition (mean no. /netting)of fish species at Station I

No.	Species	Feb 04	Mar.	Apr.	May	Jun.	July	Aust.	Sept	Oct.	Nov.	Dec.	Jan. 05
1	***Amblypharyngodon melettinus***	2.62	-	2.55	-	-	4.14	-	-	-	-	-	-
2	***Amblypharyngodon microlepis***	2.62	-	-	4.13	-		-	-	-	-	-	-
3	***Anabas testudineus***	-	-	-	-	5.54		-	8.31	-	-	-	2.62
4	***Aplocheilus lineatus***	2.62	4.15	2.55	-	22.32	-	16.67	-	-	2.92	-	10.32
5	***Awaous gutum***	-	-	-	-	-	-	-	-	-	-	-	-
6	***Balitora brucei***	2.62	-	2.55	-	-	-	-	-	-	-	-	-
7	***Barilius bakeri***	10.56	-	2.55	-	-	16.69	-	-	-	-	22.24	36.98
8	***Barilius gatensis***	2.62	8.29	2.55	-	5.54	-	16.67	-	20.0	-	2.76	-
9	***Catla catla***	-	-	-	-	-	-	-	-	-	-	-	-
10	***Chanda nama***	-	-	-	-	-	-	-	-	-	-	-	-
11	***Channa marulius***	-	-						-	-	-	-	-
12	***Channa punctatus***	-	-	-	-	-	-	-	-	-	-	-	-
13	***Channa striatus***	-	-	-	-	-	-	-	-	-	-	-	-
14	***Cyprinus carpio***	-	-	-	-	-	-	-	-	-	-	-	-
15	***Danio malabaricus***	2.62	4.15	7.74	-	22.32	-	-	9.14	-	23.54	-	10.56
16	***Dayella malabarica***	-	-	-	-	-	-	-	-	-	-	-	-
17	***Etroplus maculatus***	2.62	16.71	5.11	4.54	-	12.55	-	-	-	2.92	5.52	2.62
18	***Etroplus suratensis***	-	-	-	-	-	-	-	-	-	-	-	-
19	***Garra mullya***	10.56	-	10.29	27.51	-	33.38	-	-	-	2.92	25.08	15.87
20	***Gerres filamentosus***	-	-	-	-	-	-	-	-	-	-	-	
21	***Glyptothorax housei***	2.62	-	5.11	-	5.54	-	-	9.14	20.0	-	11.12	-
22	***Gonoproktopterus dubius***	-	-	-	-	-	-	-	-	-	-	-	-
23	***Horabagrus brachysoma***	-	-	-	-	-	-	-	-	-	-	-	-
24	***Hyporhamphus limbatus***	-	-	-	-	-	-	-	-	-	-	-	-
25	***Labeo dussumieri***	-	-	-	-	-	-	-	-	-	-	-	-
26	***Labeo rohita***	-	-	-	-	-	-	-	-	-	-	-	-
27	***Lepidocephalus thermalis***	2.62	-	5.11	4.54	-	4.14	-	-	-	-	2.76	-
28	***Mastacembelus armatus***	-	-	-	-	-	-	-	-	-	-	-	-
29	***Mystus gulio***	-	-	-	-	-	-	-	-	-	-	-	-
30	***Mystus keletius***	-	-	-	-	-	-	-	-	-	-	-	-
31	***Mystus malabaricus***	7.94	4.15	2.55	-	5.54	-	-	-	20.0	2.92	-	7.94
32	***Mystus menoda***	-	-	-	-	-	-	-	-	-	-	-	-
33	***Mystus oculatus***	7.94	-	2.55	-	-	4.14	-	-	-	-	-	-
34	***Nandus nandus***	-	-	-	-	-	-	-	-	-	-	-	-
35	***Nemacheilus guentheri***	2.62	-	2.55	4.54	5.54	-	-	9.14	-	-	-	-
36	***Nemacheilus triangularis***	13.17	-	2.55	-	5.54	-	16.67	-	-	-	2.76	2.62
37	***Ompok bimaculatus***	-	-	-	-	-	-	-	-	-	-	-	-
38	***Ompok malabarius***	-	-	-	-	-	-	-	-	-	-	-	-
39	***Oreochromis mossambicus***	-	-	-	-	-	-	-	-	-	-	-	-
40	***Osteobrama bakeri***	-	-	-	-	-	-	-	-	-	-	-	-
41	***Parambassis thomassi***	-	-	-	-	-	-	-	-	-	-	-	-
42	***Parluciosoma daniconius***	2.62	4.15	2.55	-	-	8.28	16.67	-	-	20.62	2.76	2.62
43	***Pristolepis marginata***	-	-	-	-	-	-	-	-	-	-	-	-
44	***Puntius amphibius***	2.62	12.56	5.11	4.54	11.07	-	16.67	-	-	11.77	2.76	2.62
45	***Puntius chola***	-	-	-	-	-	-	-	-	-	-	-	-
46	***Puntius denisonii***	2.62	8.29	2.55	4.54	-	-	-	9.14	-	2.92	-	-
47	***Puntius fasciatus***	7.94	29.27	28.33	22.83	11.07	12.55	16.67	45.98	20.0	5.84	-	-
48	***Puntius filamentosus***	5.24	4.15	2.55	22.83	-	-	-	9.14	20.0	26.55	11.12	2.62
49	***Puntius jerdoni***	-	-	-	-	-	-	-	-	-	-	-	-
50	***Puntius sarana subnasutus***	-	-	-	-	-	-	-	-	-	-	-	-
51	***Salmostoma boopis***	2.62	4.15	2.55	-	-	4.14	-	-	-	-	11.12	2.62
52	***Xenentodon cancila***	-	-	-	-	-	-	-	-	-	-	-	-

Table3 : Monthly variations in the percentage composition (mean no. /netting)of fish species at Station II

SL. No.	Species	Feb. 04	Mar.	Apr.	May	Jun.	July	Aust.	Sept	Oct.	Nov.	Dec.	Jan. 05
1	***Amblypharyngodon melettinus***	12.54	11.17	10.96	4.75	18.13	-	58.94	-	63.88	-	2.43	-
2	***Amblypharyngodon microlepis***	5.01	1.84	24.71	14.39	-	36.85	-	29.48	-	-	14.71	6.85
3	***Anabas testudineus***	-	-	-	-	-	-	-	-	-	-	-	-
4	***Aplocheilus lineatus***	1.24	1.84	-	4.75	-	0.94	-	-	-	-	2.43	-
5	***Awaous gutum***	-	-	-	-	-	-	-	-	-	-		-
6	***Balitora brucei***	1.24	1.84	-	-	9.07	-	-	-	-	-	2.43	-
7	***Barilius bakeri***	2.49	1.84	1.36	4.75	-	-	5.84	5.86	-	4.52	-	-
8	***Barilius gatensis***	2.49	5.59	-	19.14	9.07	0.94	5.84	5.86	1.44	4.52	-	-
9	***Catla catla***	1.24	1.84	1.36	4.75	-	-	-	-	-	-	2.43	2.26
10	***Chanda nama***	1.24	1.84	-	-	-	-	-	-	-	-	2.43	2.26
11	***Channa marulius***	-	-	-	-	-	-	-	-	-	-	-	-
12	***Channa punctatus***	-	-	-	-	-	-	-	-	-	-	-	-
13	***Channa striatus***	-	-	-	-	-	-	-	-	-	-	-	-
14	***Cyprinus carpio***	1.24	3.69	2.72	4.75	-	-	-	-	2.88	-	4.85	2.26
15	***Danio malabaricus***	2.49	1.84	-	-	-	0.94	5.84	-	-	-	-	-
16	***Dayella malabarica***	1.24	1.84	-	-	-	0.94	-	-	1.44	4.52	-	-
17	***Etroplus maculatus***	1.24	-	1.36	4.75	-	-	-	-	-	-	2.43	2.26
18	***Etroplus suratensis***	1.24	1.84	1.36	4.75	9.07	0.94	-	-	-	-	2.43	2.26
19	***Garra mullya***	1.24	1.84		4.75	-	--	-	-	1.44	-	2.43	2.26
20	***Gerres filamentosus***	-	-	-	-	-	-	-	-	-	-	-	-
21	***Glyptothorax housei***	-	-	-	-	-	-	-	-	-	-	-	-
22	***Gonoproktopterus dubius***	3.77	7.43	1.36	4.75	9.07	0.94	-	-	2.88	-	2.43	-
23	***Horabagrus brachysoma***	-	-	-	-	-	-	-	-	-	-	-	-
24	***Hyporhamphus limbatus***	-	-	-	-	-	-	-	-	-	-	-	-
25	***Labeo dussumieri***	3.77	1.84	-	4.75	-	-	5.84	5.86	-	-	2.43	2.26
26	***Labeo rohita***	-	-	-	-	-	-	-	-	-	-	-	-
27	***Lepidocephalus thermalis***	-	-	-	-	-	-	-	-	-	-	-	-
28	***Mastacembelus armatus***	-	-	-	-	-	-	-	-	-	-	-	-
29	***Mystus gulio***	2.49	-	1.36	4.75	-	1.87	-	5.86	-	4.52	-	2.26
30	***Mystus keletius***	-	-	-	-	-	-	-	-	-		-	
31	***Mystus malabaricus***	1.24	3.69	-	-	-	1.87	-	11.72	-	4.52	2.43	2.26
32	***Mystus menoda***	1.24	1.84	-	4.75	-	-	-	-	-	-	-	2.26
33	***Mystus oculatus***	-	-	-	-	-	-	-	-	-	-	-	-
34	***Nandus nandus***	-	-	-	-	-	-	-	-	-	-	-	-
35	***Nemacheilus guentheri***	1.24	1.84	-	4.75	-	-	-	-	-	-	2.43	2.26
36	***Nemacheilus triangularis***	-	-	-	-	-	-	-	-	-	-	-	-
37	***Ompok bimaculatus***	-	-	-	-	-	-	-	-	-	-	-	-
38	***Ompok malabarius***	-	-	-	-	-	-	-	-	-	-	-	-
39	***Oreochromis mossambicus***	-	-	-	-	-	-	-	-	-	-	-	-
40	***Osteobrama bakeri***	-	-	-	-	-	-	-	-	-	-	-	-
41	***Parambassis thomassi***	1.24	3.69	-	-	-	1.87	-	-	1.44	-	2.43	6.85
42	***Parluciosoma daniconius***	1.24		1.36	-	-	1.87	-	-	-	-	2.43	2.26
43	***Pristolepis marginata***	-	1.84	-	-	-	-	-	-	-	-	-	2.26
44	***Puntius amphibius***	1.24	1.84	-	-	-	3.77	-	-	-	-	2.43	2.26
45	***Puntius chola***	-	-	-	-	-	-	-	-	-	-	-	-
46	***Puntius denisonii***	-	-	-	-	-	-	-	-	-	-	-	-
47	***Puntius fasciatus***	23.83	-	21.95	4.75	9.07	-	-	5.86	1.43	-	24.49	18.22
48	***Puntius filamentosus***	6.25	14.86	1.36	-	36.54	-	17.70	29.48	20.31	22.74	9.78	2.26
49	***Puntius jerdoni***	1.24	-	1.36	-	-	-	-	-	-	-	-	-
50	***Puntius sarana subnasutus***	1.24	3.69	-	-	-	0.94	-	-	1.44	-	2.43	2.26
51	***Salmostoma boopis***	12.54	14.86	27.43	-	-	45.35	-	-	-	45.62	7.35	27.4
52	***Xenentodon cancila***	1.24	3.69	-	-	-	-	-	-	1.45	9.04	-	2.26

Table 4: Monthly variations in the percentage composition (mean no. /netting)of fish species at Station III

SL. No.	Species	Feb. 04	Mar.	Apr.	May	Jun.	July	Aust.	Sept	Oct.	Nov.	Dec.	Jan. 05
1	***Amblypharyngodon melettinus***	5.07	2.69	0.68	7.00	21.12	17.58	-	-	2.69	9.63	-	1.21
2	***Amblypharyngodon microlepis***	12.70	10.84	16.57	-	1.74	-	-	-	27.14	9.63	20.40	1.21
3	***Anabas testudineus***	-	-	-	-	-	-	-	-	-	-	-	-
4	***Aplocheilus lineatus***	-	-	-	-	-	-	-	-	-	-	-	-
5	***Awaous gutum***	-	-	-	-	-	-	-	-	-	-	-	-
6	***Balitora brucei***	-	-	-	-	-	-	-	-	-	-	-	-
7	***Barilius bakeri***	1.26	1.35	-	2.31	3.49	4.06	-	-	-	-	5.10	1.21
8	***Barilius gatensis***	1.26	-	-	2.31	1.74	1.34	7.66	3.69	-	-	-	1.21
9	***Catla catla***	1.26	-	0.68	-	-	-	-	-	-	-	-	1.21
10	***Chanda nama***	1.26	2.69	2.07	2.31	-	-	-	-	2.69	1.20	1.68	1.21
11	***Channa marulius***	1.26	-	0.68	7.00	-	-	-	-	-	-	3.37	-
12	***Channa punctatus***	2.52	-	-	-	1.74	-	-	3.69	-	-	1.68	1.21
13	***Channa striatus***	-	2.69	-	-	-	-	-	3.69	-	-	1.68	-
14	***Cyprinus carpio***	1.26	2.69	-	-	-	-	-	-	-	-	-	-
15	***Danio malabaricus***	1.26	-	-	-	-	-	-	-	-	-	-	1.21
16	***Dayella malabarica***	-	-	0.68	-	-	1.34	-	-	-	-	-	-
17	***Etroplus maculatus***	20.32	8.15	28.29	2.31	1.74	-	-	-	5.38	1.20	-	2.42
18	***Etroplus suratensis***	1.26	2.69	2.07	2.31	-	-	-	3.69	2.69	1.20	1.68	1.21
19	***Garra mullya***	1.26	2.69	-	-	-	-	-	-	-	-	1.68	1.21
20	***Gerres filamentosus***	-	-	-	-	-	-	-	-	-	-	-	-
21	***Glyptothorax housei***	-	-	-	-	-	-	-	-	-	-	-	-
22	***Gonoproktopterus dubius***	1.26	1.35	0.68	-	3.49	4.03	7.66	3.69	-	-	-	-
23	***Horabagrus brachysoma***	-	-	-	-	-	-	-	-	-	-	-	-
24	***Hyporhamphus limbatus***	2.52	1.35	-	7.00	-	-	-	-	-	-	1.68	1.21
25	***Labeo dussumieri***	1.25	1.35	-	2.31	-	-	7.66	3.69	2.69	7.24	1.68	-
26	***Labeo rohita***	2.52	4.08	0.68	-	-	-	-	-	2.69	-	-	1.21
27	***Lepidocephalus thermalis***	-	-	-	-	-	-	-	-	-	-	-	-
28	***Mastacembelus armatus***	-	-	-	-	-	-	-	-	-	-	-	-
29	***Mystus gulio***	-	-	0.68	-	-	-	-	-	-	-	-	-
30	***Mystus keletius***	1.26	-	-	-	-	1.34	-	-	-	-	-	-
31	***Mystus malabaricus***	-	1.34	-	2.31	-	-	-	7.38	-	-	-	-
32	***Mystus menoda***	-		-	-	-	-	-	-	-	-	-	-
33	***Mystus oculatus***	-	1.34	-	-	3.49	4.06	-	-	-	-	5.09	-
34	***Nandus nandus***	3.81	2.69	-	-	1.74	-	-	-	-	-	-	-
35	***Nemacheilus guentheri***	1.26	1.34	-	-	-	-	-	-	2.69	1.20	1.68	-
36	***Nemacheilus triangularis***	-		-	-	-	-	-	-	-	-	-	-
37	***Ompok bimaculatus***	-	1.35	-	-	-	-	-	-	2.69	-	1.68	-
38	***Ompok malabarius***	-	1.35	-	2.31	-	-	-	7.38	-	-	-	1.21
39	***Oreochromis mossambicus***	-	-	-	-	-	-	-	-	-	-	-	-
40	***Osteobrama bakeri***	-	-	-	-	-	-	-	-	2.69	1.19	-	-
41	***Parambassis thomassi***	1.26	-	15.87	18.63	12.3	33.82	7.66	3.69	2.69	7.24	1.68	-
42	***Parluciosoma daniconius***	3.81	2.69	3.44	2.31	7.02	6.74	7.66	3.69	8.15	1.19	1.68	1.21
43	***Pristolepis marginata***	1.26	2.69	-	-	-	-	-	-	-	-	-	1.21
44	***Puntius amphibius***	16.51	1.35	13.79	4.62	5.28	13.52	46.40	29.75	8.15	19.3	16.98	42.79
45	***Puntius chola***	2.52	9.50	8.30	11.62	17.58	1.34	7.66	7.38	5.38	28.56	-	20.77
46	***Puntius denisonii***	1.26	2.69	2.07	-	1.74	1.34	-	3.69	2.69	1.20	-	-
47	***Puntius fasciatus***	1.26	1.35	2.07	-	-	-	-	3.69	2.69	1.20	-	-
48	***Puntius filamentosus***	1.26	23.06	0.68	23.52	14.04	8.12	7.66	11.19	8.15	8.44	28.86	13.43
49	***Puntius jerdoni***	-	-	-	-	-	-	-	-	-	-	-	-
50	***Puntius sarana subnasutus***	-	-	-	-	-	-	-	-	-	-	-	-
51	***Salmostoma boopis***	3.81	1.35	-	-	-	-	-	-	5.38	1.20	1.68	1.21
52	***Xenentodon cancila***	1.26	1.35	-	-	1.74	1.34	-	-	5.38	1.20	1.68	1.21

Table 5 : Monthly variations in the percentage composition (mean no. /netting)of fish species at Station IV

SL. No.	Species	Feb. 04	Mar.	Apr.	May	Jun.	July	Aust.	Sept.	Oct.	Nov.	Dec.	Jan. 05
1	***Amblypharyngodon melettinus***	1.52	2.04	-	-	-	-	-	-	-	-	-	1.60
2	***Amblypharyngodon microlepis***	1.52	2.04	1.72	-	-	-	14.22	4.73	8.29	9.13	4.53	1.60
3	***Anabas testudineus***	3.04	6.17	1.72	5.55	12.50	-	-	-	-	-	4.53	4.86
4	***Aplocheilus lineatus***	1.52	2.04	-	-	-	-	-	-	-	-	-	-
5	***Awaous gutum***	1.52	2.04	-	-	-	-	-	-	-	-	-	-
6	***Balitora brucei***	-	-	-	-	-	-	-	-	-	-	-	-
7	***Barilius bakeri***	1.52	4.07	5.20	-	-	-	-	-	-	3.01	2.26	1.60
8	***Barilius gatensis***	1.52	2.04	1.72	-	1.25	4.97	7.11	4.73	-	3.01	-	-
9	***Catla catla***	-	-	-	-	-	-	-	-	-	-	-	-
10	***Chanda nama***	1.52	2.04	-	-	-	-	-	-	-	-	-	1.60
11	***Channa marulius***	3.04	2.04	1.72	-	-	4.97	-	-	-	6.03	-	-
12	***Channa punctatus***	-	-	-	-	-	-	-	-	-	-	-	-
13	***Channa striatus***	-	-	-	-	-	-	-	-	-	-	-	-
14	***Cyprinus carpio***	-		-	-	-	-	-	-	-	-	-	-
15	***Danio malabaricus***	1.52	-	-	-	-	-	-	-	-	-	-	1.60
16	***Dayella malabarica***	1.52	2.04	-	-	-	-	-	-	-	-	-	-
17	***Etroplus maculatus***	1.52	10.25	1.72	5.55	-	20.03	-	-	-	12.15	25.10	11.32
18	***Etroplus suratensis***	3.04	2.04	1.72	-	-	-	-	-	-	-	-	-
19	***Garra mullya***	6.12	2.04	1.72	-	-	-	-	-	-	3.01	2.26	1.60
20	***Gerres filamentosus***	3.04	2.04	-	-	-	-	-	-	-	-	2.26	4.86
21	***Glyptothorax housei***	-	-	-	-	-	-	-	-	-	-	-	-
22	***Gonoproktopterus dubius***	-	-	-	-	-	-	-	-	-	-	-	-
23	***Horabagrus brachysoma***	1.52	2.04	-	-	12.50	-	14.22	4.73	4.15	-	-	4.86
24	***Hyporhamphus limbatus***	1.52	2.04	3.43	-	12.50	4.97	-	-	8.29	-	-	-
25	***Labeo dussumieri***	-	-	-	-	-	-	-	-	-	-	-	-
26	***Labeo rohita***	1.52	2.04	-	-	-	-	-	-	-	-	-	-
27	***Lepidocephalus thermalis***	-	-	-	-	-	-	-	-	-	-	-	-
28	***Mastacembelus armatus***	4.60	4.07	1.72	5.55	-	-	-	-		9.13	4.53	1.60
29	***Mystus gulio***	-	-	-	-	-	-	-	-	-	-	-	-
30	***Mystus keletius***	1.52	-	3.43	-	-	-	-	-	-	-	-	1.60
31	***Mystus malabaricus***	1.52	2.04	3.43	5.55	-	-	-	-	25.13	3.01	2.26	3.21
32	***Mystus menoda***	-	-	-	-	-	-	-	-	-	-	-	-
33	***Mystus oculatus***	1.52	2.04	1.72	-	-	-	-	-	12.56	3.01	-	6.46
34	***Nandus nandus***	7.64	2.04	12.11	5.55	-	-	7.11	4.73	-	3.01	6.86	8.06
35	***Nemacheilus guentheri***	-	-	-	-	-	-	-	-	-	-	-	-
36	***Nemacheilus triangularis***	7.64	2.04	1.72	-	-	-	-	-	-	-	2.26	1.60
37	***Ompok bimaculatus***	1.52	2.04	5.20	5.55	-	-	-	-	-	3.01	4.53	4.86
38	***Ompok malabarius***	1.52	2.04	3.43	5.55	-	-	-	-	-	3.01	-	-
39	***Oreochromis mossambicus***	1.52	4.07	-	5.55	-	4.97	-	-	-	6.03	-	-
40	***Osteobrama bakeri***	-	-	-	-	-	-	-	-	-	-	-	-
41	***Parambassis thomassi***	11.97	4.07	12.11	5.55	12.50	-	-	-	4.15	30.41	2.26	6.46
42	***Parluciosoma daniconius***	1.52	2.04	-	-	-	-	-	-	-	-	-	1.60
43	***Pristolepis marginata***	-	-	-	-	-	-	-	-	-	-	-	-
44	***Puntius amphibius***	3.04	4.07	13.83	22.35	25.00	20.03	21.55	28.65	16.71	-	18.24	11.32
45	***Puntius chola***	1.52	2.04	3.43	-	-	-	-	-	-	-	-	1.60
46	***Puntius denisonii***	1.52	2.04	-	-	-	-	-	-	-	-	-	-
47	***Puntius fasciatus***	4.60	2.04	1.72	5.55	-	-	-	-	-	-	4.53	4.86
48	***Puntius filamentosus***	2.76	6.17	8.63	11.09	12.50	40.06	28.66	47.71	-	3.01	4.53	-
49	***Puntius jerdoni***	-	-	-	-	-	-	-	-	-	-	-	-
50	***Puntius sarana subnasutus***	1.52	2.04	-	-	-	-	-	-	-	-	2.26	6.46
51	***Salmostoma boopis***	1.52	2.04	-	-	-	-	-	-	8.29	3.01	2.26	1.60
52	***Xenentodon cancila***	1.52	4.07	5.20	11.09	-	-	7.11	4.73	8.29	3.01	4.53	1.60