

ICHTHYOFAUNAL DIVERSITY OF VATTAKKAYAL, A PART OF ASHTAMUDI LAKE, KOLLAM DISTRICT, KERALA, SOUTH INDIA



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Abstract: Ichthyofaunal studies were undertaken during the period from October -2012 to August-2013 in the Vattakkayal, Sakthikulangara panchayath, Kollam district. The major objective of this study was to find out the variety and abundance of fishes in Vattakkayal of Kollam district, South India. Fishes were collected from the study area and the Meristic and Morphometric characters were measured and fishes were identified up to the species level, with the help of standard keys given by Day (1967), Jayaram (1999), Talwar and Jhingran (1991). Conservation status of fishes from the Vattakkayal was assessed by following the CAMP and IUCN conservation status. The results of present investigation revealed the occurrence of 22 fish species belonging to 10 orders and 17 families. Out of 22 species recorded, the order Perciformes was found dominant and represented by 9 species, with 40.90 % contribution of the total species followed by siluriformes, with 4 (18.18 %) species, Cyprinodontiformes with 2 (9.09%) species, Beloniformes, anguilliformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes each with 1 (4.54 %) species. Out of 18 families recorded, order Perciformes contributed 7 (38.88 %) families, followed by Siluriformes with 3 (16.66 %), Cyprinodontiformes, Beloniformes, Anguilliformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes each with 1 (5.55%) families. Out of 19 genera recorded, order Perciformes contributed 8 (44.44 %) genera followed by Siluriformes with 3 (15.78 %) genera Cyprinodontiformes, Beloniformes, Anguilliformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes each with 1 (5.26%) genera. Perciformes with 9 species was the dominant group in the assemblage composed of *Pseudosphromenus cupanus*, *Channa striata*, *Anabas testudineus*, *Awaous grammepomus*, *Oreochromis mossambicus*, *Etroplus surantensis*, *Etroplus maculatus*, *Parambassis thomassi* and *Terapon jarbua*. Which was followed by Siluriformes comprises *Heteropneustes fossilis*, *Clarias batrachus*, *Mystus gulio*, *Mystus vittatus*, Cyprinodontiformes fishes like *Aplocheilichthys lineatus*, *Aplocheilichthys panchax*. The orders Beloniformes, Anguilliformes, Gonorhynchiformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes were represented by single species like *Hyporhamphus xanthopterus*, *Anguilla bengalensis*, *Chanos chanos*, *Dayella malabarica*, *Mugil cephalus*, *Megalops cyprinoides*, *Puntius sarana subnasutus* respectively. IUCN (2011) and CAMP (1988) conservation status of each fish was listed. It was found that out of 22 species reported in the present study, 13.63 % are Vulnerable, 4.54 % are Endangered, 4.54 % are at Lower Risk And Near Threatened, 27.27 % are at Lower Risk and Least Concern, 31.81% are Least Concern, 4.54% are Critically Endangered, Data Deficient for 4.54 % species and 9.0 % are Not Evaluated as per IUCN Red list category (2011). As per CAMP (1998) evaluation status, 9.09 % species are Critically Endangered, 36.36 % are Vulnerable, 4.54 % are at Lower Risk And Near Threatened, 4.54 % are at Lower Risk, 9.09 % are data deficient 36.36 % are not evaluated. This is a pioneer study on the fish diversity of Vattakkayal, a part of Ashtamudi lake and would help in adding some additional species to the previous diversity studies conducted on the diversity of fishes in the water bodies of Kollam district, South India.

Key words: Ichthyofauna, Fish diversity, Vattakkayal, Biodiversity, Conservation status, IUCN, CAMP.

INTRODUCTION

Fish constitutes half of the total number of vertebrates in the world. They live in almost all conceivable aquatic habitats; 21,723 living species of fish have been recorded out of 39,900 species of vertebrates out of these 8,411 are freshwater species and 11,650 are marine. India is one of the mega biodiversity countries in the world and occupies the ninth position in terms of

freshwater mega biodiversity (Mittermeier and Mittermeier, 1997). In India there are 2,500 species of fishes of which 930 live in freshwater and 1,570 are marine (Kar *et al.*, 2003). In spite of being a renewable resource, indiscriminate harvesting of fishes from the natural water bodies is likely to cause serious depletion, particularly of those species which are already

under the threat of extinction or endangerment. Present investigation was undertaken to study the fish diversity from Vattakkayal, A part of Ashtamudi Lake, Kollam district, Kerala, South India is the first effort in this direction. Various indigenous and commercial fishes of importance were identified in this area. Perciformes fishes are one of the most important groups of vertebrates for man and influencing his life in various ways. Considering the importance, in the present study an attempt has been made with the following major objectives: (1) to bring out the richness of fish diversity and (2) to assess the status of these fish as per (CAMP, 1998; IUCN, 2011).

MATERIALS AND METHODS

Study area

Vattakkayal, a part of Ashtamudi Lake in Kollam district is selected as the study area. Vattakkayal is located at 8°55'3" North latitude and 76°32'57" East longitude, and is about 9 km away from Kollam Railway Station and 8 km from Chinnakada Junction, nearby Maruthady area in Sakthikulangara panchayant (Fig. 1). Vattakkayal occupies more or less a central position with respect to Neendakkara, Kavanadu and Maruthady area. The depth of the lake varies from 0 to 4 meters. The Kattakkal kayal on the western side is located very close to the Vattakkayal and it is connected by a channel of 6m width. Kattakkal kayal is connected with sea

by another outlet and so Vattakkayal is interconnected with the sea by the Asthamudi Lake. The existing land use of the area consists of water bodies surrounded by marshy vacant land. Previously this low lying vacant land was used for paddy cultivation and the water body is enriched with fish and aquatic life in abundance. At present this kayal is with weeds like water hyacinth as the water body receives domestic wastes, domestic drainages, wastes from nearby factories etc. and is also subjected to many ecological problems. The Vattakkayal also indirectly receives waste water through Kattakkalkayal because it receives waste water discharged from neighboring fish processing unit, ice plant and freezing plants.

Collection and Identification of Fishes

Fishes were collected from Vattakkayal with the help of local fishermen using different type of nets namely gill nets, cast nets, and dragnets. Fishes brought to laboratory were preserved in 10% formalin solution in separate specimen jar according to the size of species. Small fishes were directly placed in the 10% formalin solution. While large fishes were given an incision in their abdomen and preserved. Fishes were collected from the study area and the Meristic and Morphometric characters were measured and fishes were identified up to the species level, with the help of standard keys given by Day (1967), Jayaram (1999), Talwar and Jhingran (1991).



Fig. 1. Study area

RESULTS

In the present ichthyo-faunal diversity study, fishes of 22 species belonging to 17 families and 10 orders were identified from the Vattakkayal in number of catches carried out during the study period, October -2012 to August-2013 and was given in Table 1. The results of present investigation revealed the occurrence of 22 fish species belonging to 10 orders and 17 families. The order Perciformes found dominant with 9 species, followed by Siluriformes with 4 species, Cyprinodontiformes with 2 species and Anguilliformes, Beloniformes, Clupeiformes, Mugiliformes, Elopiformes, Gonorhynchiformes, Cypriniformes with one species each. Perciformes with 9 species was the dominant group in the assemblage composed of *Pseudosphromenus cupanus*, *Channa striata*, *Anabas testudineus*, *Awaous grammepomus*, *Oreochromis mossambicus*, *Etroplus surantensis*, *Etroplus maculatus*, *Parambassis thomassi* and *Terapon jarbua*. Which was followed by Siluriformes comprises *Heteropneustes fossilis*, *Clarias batrachus*, *Mystus gulio*, *Mystus vittatus*, Cyprinodontiformes fishes like *Aplocheilus lineatus*, *Aplocheilus panchax*. The orders Beloniformes, Anguilliformes, Gonorhynchiformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes were represented by single species like *Hyporhamphus xanthopterus*, *Anguilla bengalensis*, *Chanos chanos*, *Dayella malabarica*, *Mugil cephalus*, *Megalops cyprinoides*, *Puntius sarana subnasutus* respectively.

Number and percentage composition of families, genera and species under different orders are shown in Table 2 and Figs. 2-5. Order Perciformes was found to be the dominant group represented by 9 species with 40.90 % contribution of the total species followed by Siluriformes with 4 (18.18%) species, Cyprinodontiformes with 2 (9.09%) species, Beloniformes, Anguilliformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes each with 1(4.54%) species. Out of 18 families recorded, order Perciformes contributed 7 (38.88%) families followed by Siluriformes with 3 (16.66%), Cyprinodontiformes, Beloniformes, anguilliformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes each with 1 (5.55%)

families. Out of 19 genera reported, order Perciformes contributed 8 (44.44 %) genera followed by Siluriformes with 3 (15.78 %), Cyprinodontiformes, Beloniformes, anguilliformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes each with 1 (5.26%) genera.

Conservation status of fishes from the vattakkayal is presented in Table 3 and percent occurrence of fish under CAMP and IUCN conservation status is given Table 4 and Fig. 6 and 7. The status of fishes of India in Conservation Assessment and Management Programme [CAMP] were categorized into 10 different groups of fish viz., Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Lower risk near threatened (LRnt), Lower risk least concern (LRlc), Lower risk conservation dependent (LRcd), Data deficient (DD) and Not Evaluated (NE). Out of 22 species reported in the present study, 9.09 % species are critically endangered, 36.36 % are vulnerable, 4.54% are at lower risk and near threatened, 4.54% are at lower risk, and 9.09 % are data deficient 36.36 % are not evaluated. While 13.63% are vulnerable, 4.54 % are Endangered, 4.54% are at low risk and near threatened, 27.27% are at low risk and least concern, 31.81 are least concern, 4.54 are Critically endangered, data deficient for 4.54% species and 9.0% are not evaluated as per IUCN Red list category (2011). The highest abundance was noted during post monsoon season and the lowest during the monsoon. *Oreochromis mossambicus* was the most abundant fish in all the seasons.

DISCUSSION

Biodiversity is essential for stabilization of ecosystem protection of overall environmental quality for understanding intrinsic worth of all species on the earth (Ehrlich and Wilson, 1991). Fish diversity essentially represents the fish faunal diversity and their abundance. Fishes are the keystone species which determine the distribution and abundance of other organisms in the ecosystem they represent and are good indicators of the water quality and the health of the ecosystem (Moyle and Leidy, 1992). In the present Ichthyofaunal study, 22 species of different 17 families and 10 orders were recorded from the Vattakkayal during the period, October

Table 1. The Ichthyofaunal diversity of vattakkayal during October 2012 to August 2013

Order	Family	Species	Common name	Vernacular name
Cyprinodontiformes	Aplocheilidae	<i>Aplocheilus lineatus</i>	Panchax minnow	Manathukanni
Cyprinodontiformes	Aplocheilidae	<i>Aplocheilus panchax</i>	Striped panchax	Poonjan
Perciformes	Belontiidae	<i>Pseudosphromenus cupanus</i>	Spike tail paradise fish	Karati
Perciformes	Channidae	<i>Channa striata</i>	Striped snake head	Varal
Perciformes	Anabantidae	<i>Anabas testudineus</i>	Climbing perch	Kaithakkora
Perciformes	Gobiidae	<i>Awaous grammepomus</i>	Scribbled goby	Cheru poolan
Perciformes	Cichlidae	<i>Oreochromis mossambicus</i>	Mossambique tilapia	Sillopy
Perciformes	Cichlidae	<i>Etroplus surantensis</i>	Pearl spot	Karimeen
Perciformes	Cichlidae	<i>Etroplus maculatus</i>	Oreng chromidae	Pallathi
Perciformes	Chandidae	<i>Parambassis thomassi</i>	Poonandan	Nandal
Perciformes	Teapontidae	<i>Terapon jarbua</i>	Tigerperch	Keeli
Beloniformes	Hermirhamphidae	<i>Hyporhamphus xanthopterus</i>	Gost half beak	Mural
Anguiliformes	Anguillidae	<i>Anguilla bicolor</i>	Karutha malinjil	Blang
Gonorhynchiformes	Chanidae	<i>Chanos chanos</i>	Milk fish	Poomen
Clupeiformes	Clupeidae	<i>Dayella malabarica</i>	Day's round herring	Chooda
Mugiliformes	Mugalidae	<i>Mugil cephalus</i>	Striped mullet	Kanambu
Elopiformes	Megalopidae	<i>Megalop cyprinoids</i>	Tarpon	Chavatta
Siluriformes	Clariidae	<i>Clarias batrachus</i>	Walking catfish	Mushi
Siluriformes	Heteropneustidae	<i>Heteropneustes fossilis</i>	Stinging cat fish	Kari
Siluriformes	Bagridae	<i>Mysuts gulio</i>	Catfish	Ootha koori
Siluriformes	Bagridae	<i>Mystus vittatus</i>	Zebra catfish	Manjakoore
Cypriniformes	Cyprinidae	<i>Puntius sarana subnasutus</i>	Olive barb	Kuruva

Table 2. Number and percent composition of families, genera and species of fishes under various orders

order	families	genus	order	% Genera	% Genera	% species
Cyprinodontiformes	1	1	2	5.55	5.26	9.09
Beloniformes	1	1	1	5.55	5.26	4.54
Siluriformes	3	3	4	16.66	15.78	18.18
Anguiliformes	1	1	1	5.55	5.26	4.54
Gonorhynchiformes	1	1	1	5.55	5.26	4.54
Clupeiformes	1	1	1	5.55	5.26	4.54
Perciformes	7	8	9	38.88	44.44	40.9
Mugiliformes	1	1	1	5.55	5.26	4.54
Elopiformes	1	1	1	5.55	5.26	4.54
Cypriniformes	1	1	1	5.55	5.26	4.54
Total	18	19	22			

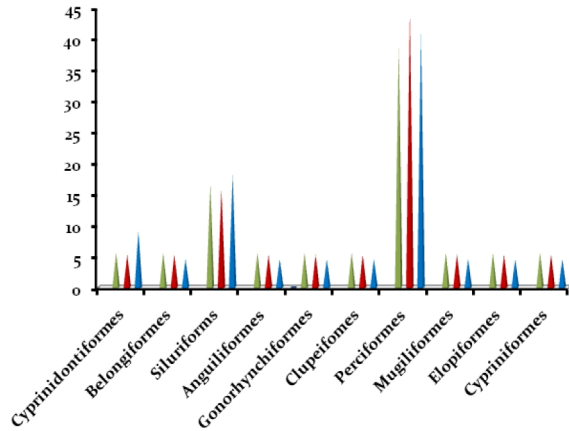


Fig. 2. Composition of different fish taxa recorded from Vattakkayal

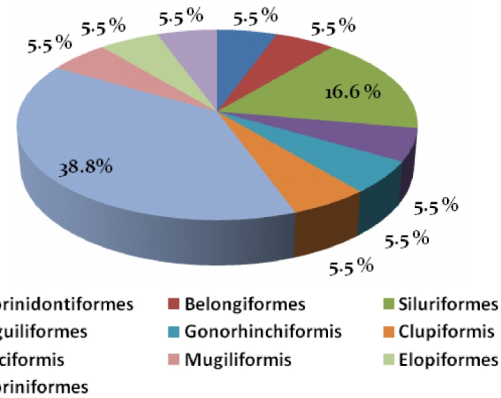


Fig. 3. Percentage contribution of families to the orders

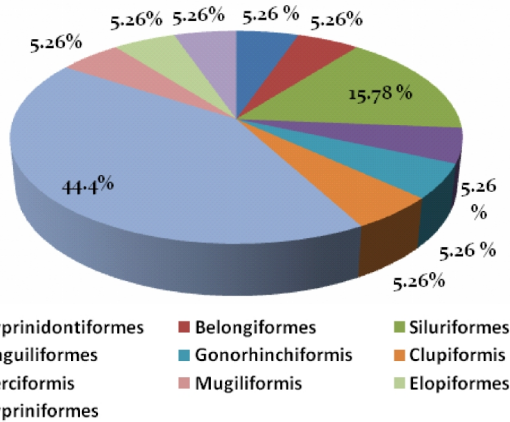


Fig. 4. Percentage contribution of genera to the orders

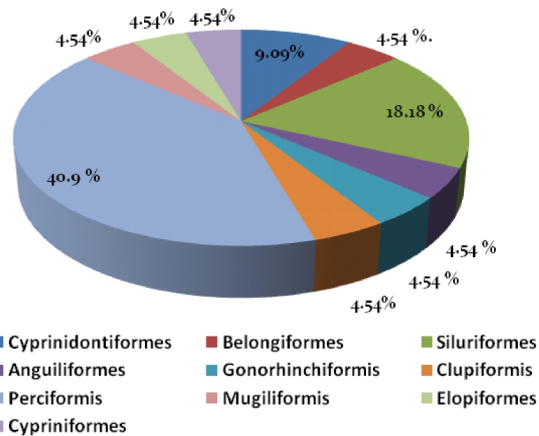


Fig. 5. Percentage contribution of species to the orders

2012 to August 2013. The general pattern of distribution and abundance has been reported from other lakes also (Stephens *et al.*, 1974; Allen and Horn, 1975; Stephenson and Dredge, 1976). The high quantity of fish obtained during the post monsoon season could be attributed to the breeding pattern of the lake fishes in the tropics. Many of the lake fishes breed during the monsoon season (Mary, 1970) and juveniles and sub adult of these fishes may contributed to the fishery during post monsoon season. While assessing the threat status of these fishes according to the IUCN red list and CAMP status some species are included in the list of Critically endangered, some are vulnerable, some others are lower risk and near threatened, and others in lower risk, data deficient categories. Similar

studies were also reported from Chalakkudi river (Raghavan *et al.*, 2008) Periyar tiger reserve (Radhakrishnan and Kurup, 2010) and by Ali *et al.* (2011). The informations collected from the fisherman and local people also show that the number and species of fishes in Vattakayal is decreasing year after year. This may be due to the pollution of the water body with domestic wastes and waste water. Previous studies on the fresh water fish fauna of Kerala are those of Kurup (1994), Easa and Shaji (1995), Biju *et al.* (2008), Radhakrishnan and Kurup (2010) and Ali *et al.* (2011) Various biodiversity threats for fresh water fish fauna were also reported by many workers (Zacharias *et al.*, 1996; Kurup, 2001,2002).

CONCLUSION

The present study shows that the Vattakkayal hosts a number of freshwater fish species. But the fish fauna of this lake are being threatened due to several anthropogenic activities including introduction of exotic fish species, habitat degradation, pollution, irrational fishing. Due to different anthropogenic activities the fish

Table 3. List of fishes recorded from Vattakkayal and their IUCN and CAMP Status

No.	Species	IUCN status	CAMP Status
1	<i>Aplocheilus lineatus</i>	LRlc	LR
2	<i>Aplocheilus panchax</i>	LC	DD
3	<i>Pseudosphromenus cupanus</i>	LC	DD
4	<i>Channa striatus</i>	LRlc	LRnt
5	<i>Anabas testudineus</i>	VU	VU
6	<i>Awaous grammepomus</i>	LC	NE
7	<i>Oreochromis mossambicus</i>	NE	NE
8	<i>Etroplus surantensis</i>	LRlc	NE
9	<i>Etroplus maculatus</i>	LRlc	NE
10	<i>Parambassis thomassi</i>	LRnt	VU
11	<i>Hyporhamphus xanthopterus</i>	CR	CR
12	<i>Heteropneustes fossilis</i>	VU	VU
13	<i>Anguilla bicolor</i>	DD	NE
14	<i>Chanos chanos</i>	NE	NE
15	<i>Dayella malabarica</i>	EN	CR
16	<i>Terapon jarbua</i>	LC	VU
17	<i>Mugil cephalus</i>	LC	VU
18	<i>Clarias batrachus</i>	LC	VU
19	<i>Megalops cyprinoides</i>	LRlc	NE
20	<i>Mystus gulio</i>	LRlc	NE
21	<i>Mystus vittatus</i>	LC	VU
22	<i>Puntius sarana subnasutus</i>	VU	VU

Table 4. Percentage occurrence of fishes of Vattakkayal under the conservation status CAMP(1998) IUCN (2011)

		LRlc	LC	VU	EN	DD	CR	LRnt	NE
IUCN Status	Number of species	6	7	3	1	1	1	1	2
	% Contribution	27.27%	31.81%	13.63%	4.54%	4.54%	4.54%	4.54%	9%
CAMP Status		LR	LC	VU	EN	DD	CR	LRnt	NE
	Number of species	1	-	8	-	2	2	1	8
	% Contribution	4.54%	-	36.36%	-	9.09%	9.09%	4.54%	36.36%

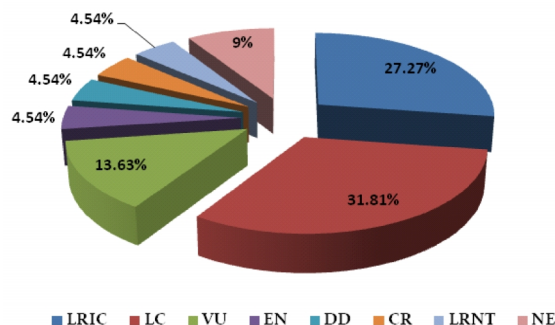


Fig. 6. Percentage of species under various threat categories as per IUCN Status

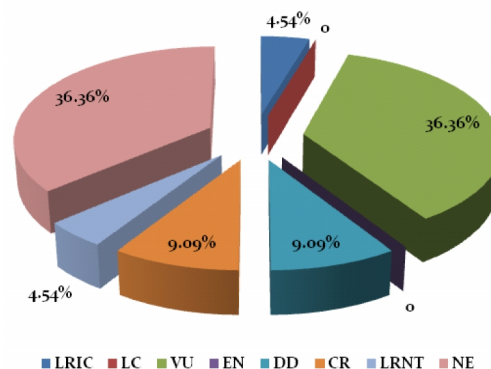


Fig. 7. Percentage of species under various threat categories as per CAMP Status

diversity of this water body is in declining mode. To conserve this inherent treasure of Ashtamudi lake, the wetland of international importance, a long term management plan should be adopted. Effective implementation on the regulation on mesh size and fishing gear is much needed to prevent over exploitation. Strict management measures with large public awareness would be essential to save the fish germplasm and its time to make proper policies and take necessary actions to improve conservation measures so that the future generations get the fish live on the earth rather than the photographs in the

literature. This study would serve as a frame of reference for future initiatives in studying fish biodiversity and conservation management.

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