

Biodiversity Status of Fishes from Vattakkayal, A Part of Ashtamudi Lake, Kollam District, Kerala, South India

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Abstract- The survey was undertaken during the period from October -2012 to September -2013 in the Vattakkayal, Sakthikulangara panchayath, Kollam district. The major objective of this study was to find out the Biodiversity status 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 survey of the studied stretch of river resulted in recording of 22 fish species belonging to 10 orders and 17 families. 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.

Index Terms- Ichthyofauna, Fish diversity, Vattakkayal, Biodiversity, Conservation status, IUCN, CAMP.

I. INTRODUCTION

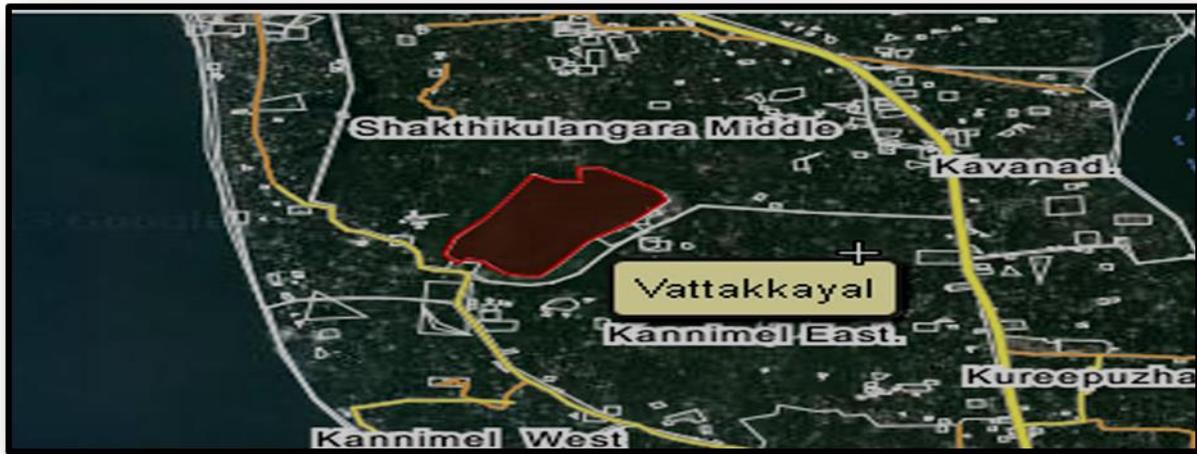
Fishes are the most dominant members of the lower vertebrates and constitute nearly about 35,000 species which inhabit the various types of water bodies. India is one of the mega biodiversity countries in the world and occupies the ninth position in terms of freshwater mega biodiversity [Mittermeier and Mitemeir, 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 major objectives was to assess the status of these fish as per [CAMP (1998)] and [IUCN (2011)].

II. 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 panchayath. 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 Ashtamudi 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.



Study area

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).

III. RESULTS

Biodiversity reflects the number, variety and variability of living organisms as well as how these change from one location to another and over time. In view of global deterioration of environment, documentation of fauna from all the ecosystems has become important to know the present status of biodiversity. The taxonomic composition of the fish fauna in Vattakkayal includes a total 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 September -2013 and was given in Table 1. Conservation status of fishes from the vattakkayal is presented in Table 2 and percent occurrence of fish under CAMP and IUCN conservation status is given Table 3 and Fig. 1 and 2. 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).

Table 1: Systematics of the Fish Fauna in vattakkayal during October 2012 to August 2013

SL NO	ORDER	FAMILY	GENUS	SPECIES
1	Cyprinodontiformes	Aplocheilidae	Aplocheilus	lineatus
2	Cyprinodontiformes	Aplocheilidae	Aplocheilus	panchax
3	Perciformes	Belontiidae	Pseudosphromenus	cupanus
4	Perciformes	Channidae	Channa	striata
5	Perciformes	Anabantidae	Anabas	testudineus
6	Perciformes	Gobiidae	Awaous	grammepomus
7	Perciformes	Cichlidae	Oreochromis	mossambicus
8	Perciformes	Cichlidae	Etroplus	surantensis
9	Perciformes	Cichlidae	Etroplus	maculatus
10	Perciformes	Chandidae	Parambassis	thomassi

11	Perciformes	Teapontidae	Terapon	jarbua
12	Beloniformes	Hermirhamphidae	Hyporhamphus	xanthopterus
13	Anguiliformes	Anguillidae	Anguilla	bicolor bicolar
14	Gonorhynchiformes	Chanidae	Chanos	chanos
15	Clupeiformes	Clupeidae	Dayella	malabarica
16	Mugiliformes	Mugalidae	Mugil	cephalus
17	Elopiformes	Megalopidae	Megalop	cyprinoids
18	Siluriformes	Claridae	Clarias	batrachus
19	Siluriforms	Heteropneustide	Heteropneustes	Fossilis
20	Siluriformes	Bagridae	Mysuts	gulio
21	Siluriformes	Bagridae	Mystus	vittatus
22	Cypriniformes	Cyprinidae	Puntius	sarana subnasutus

Table 2: List of fishes recorded from Vattakkayal and their IUCN and CAMP Status

Sl.No	Species	IUCN status	CAMP Status
1	Aplocheilus lineatus	LRIc	LR
2	Aplocheilus panchax	LC	DD
3	Pseudosphromenus cupanus	LC	DD
4	Channa striatus	LRIc	LRnt
5	Anabas testudineus	VU	VU
6	Awaous grammepomus	LC	NE
7	Oreochromis mossambicus	NE	NE
8	Etroplus surantensis	LRIc	NE
9	Etroplus maculatus	LRIc	NE
10	Parambassis thomassi	LRnt	VU
11	Hyporhamphus xanthopterus	CR	CR
12	Heteropneustes fossilis	VU	VU
13	Anguilla bicolar	DD	NE
14	Chanos chanos	NE	NE

15	Dayella malabarica	EN	CR
16	Terapon jarbua	LC	VU
17	Mugil cephalus	LC	VU
18	Clarias batrachus	LC	VU
19	Megalops cyprinoides	LRIC	NE
20	Mystus gulio	LRIc	NE
21	Mystus vittatus	LC	VU
22	Puntius sarana subnasutus	VU	VU

Table 3: Percentage occurrence of fishes of Vattakkayal under the conservation status CAMP(1998) IUCN (2011)

IUCN Status		LRIC	LC	VU	EN	DD	CR	LRNT	NE
	Number of species	6	7	3	1	1	1	1	2
	% Contribution	0.2727	0.3181	0.1363	0.0454	0.0454	0.0454	0.0454	0.09
CAMP Status		LR	LC	VU	EN	DD	CR	LRNT	NE
	Number of species	1	-	8	-	2	2	1	8
	% Contribution	0.04	-	0.3636	-	0.0909	0.0909	0.0454	36.36

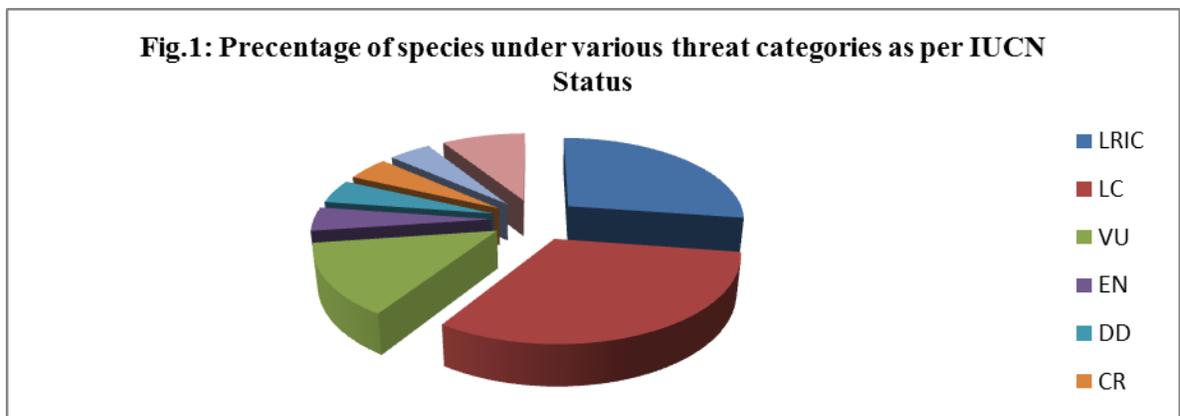
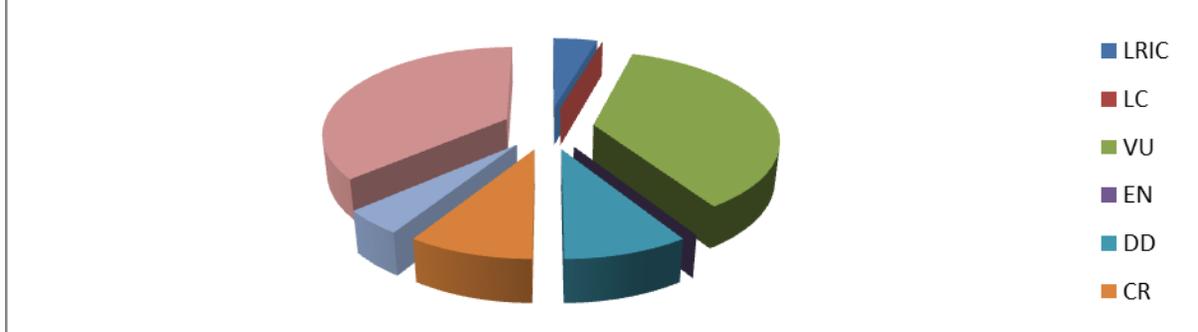


Fig.2: Percentage of species under various threat categories as per CAMP
Status



IV. 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 & 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 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.* Various biodiversity threats for fresh water fish fauna were also reported by many workers (Zacharias *et al.*, 1996; Kurup, 2001 & 2002).

V. 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 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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