

Fish faunal Diversity of Vattakkayal, A Part of Ashtamudi Lake, Kollam District, Kerala, South India

Seethal Lal. S.*, Jaya D.S. and Sherly Williams E

ABSTRACT:

Fish faunal 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). 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*, *Eetroplus surantensis*, *Eetroplus 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, Gonorrhynchiformes, 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. 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,.

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 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 to bring out the richness of fish diversity

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. 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

*Corresponding author : Seethal Lal. S.

E mail: 456seethal@gmail.com

Department of Environmental Sciences, Kariavattom Campus, Thiruvananthapuram - 695581, Kerala, India.

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).

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, Belontiiformes, 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*, *Epiplatys surantensis*, *Epiplatys 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 Belontiiformes, 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 1 – 4. 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, Belontiiformes, 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, Belontiiformes, 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, Belontiiformes, anguilliformes, Clupeiformes, Mugiliformes, Elopiformes, Cypriniformes each with

*Corresponding author : Seethal Lal. S.

E mail: 456seethal@gmail.com

Department of Environmental Sciences, Kariavattom Campus, Thiruvananthapuram - 695581, Kerala, India.

1 (5.26%) genera. 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.

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>	Orenge 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

*Corresponding author : Seethal Lal. S.

E mail: 456seethal@gmail.com

Department of Environmental Sciences, Kariavattom Campus, Thiruvananthapuram - 695581, Kerala, India.

Mugiliformes	Mugilidae	<i>Mugil cephalus</i>	Striped mullet	Kanambu
Elopiformes	Megalopidae	<i>Megalop cyprinoids</i>	Tarpon	Chavatta
Siluriformes	Claridae	<i>Clarias batrachus</i>	Walking catfish	Mushi
Siluriforms	Heteropneustide	<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	koori
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 in an order	% Genera in an order	% species in an order
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.1. Composition of different fish taxa recorded from Vattakkayal

*Corresponding author : Seethal Lal. S.

E mail: 456seethal@gmail.com

Department of Environmental Sciences, Kariavattom Campus, Thiruvananthapuram - 695581, Kerala, India.

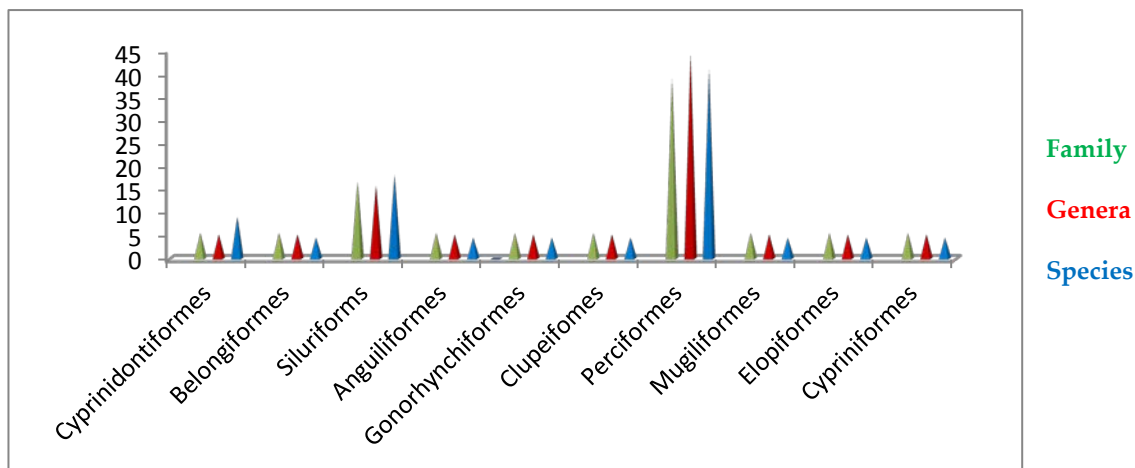


Fig.2: Percentage contribution of families to the orders

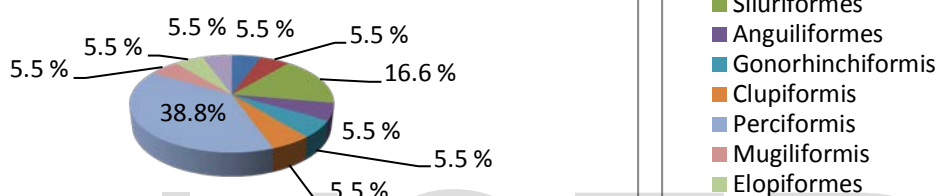


Fig.3: Percentage contribution of genera to the orders

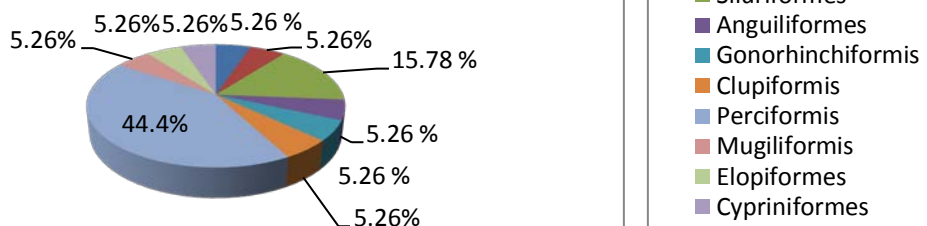
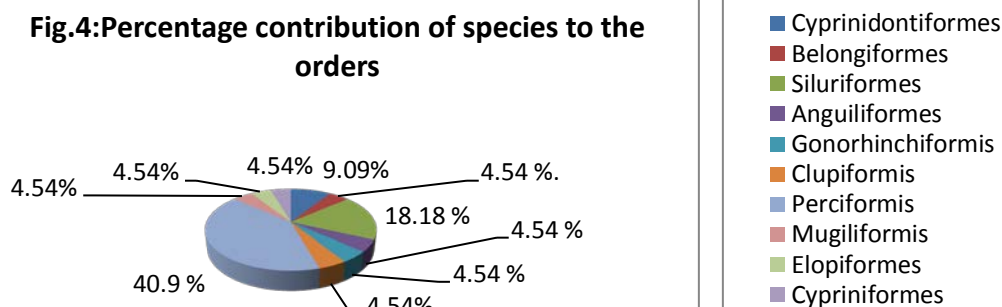


Fig.4: Percentage contribution of species to the orders



*Corresponding author : Seethal Lal. S.

E mail: 456seethal@gmail.com

Department of Environmental Sciences, Kariavattom Campus, Thiruvananthapuram - 695581, Kerala, India.

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 contribute 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).

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.

REFERENCE

- Ali, A., Raghavan R and Dahanukar, N. (2011). *Puntius denisonii*. In: IUCN Red List of Threatened Species. Version 2011. 1. www.iucnredlist.org. Downloaded on 24th June 2011
- Allen, L.G and Horn M.H. (1975). Abundance, diversity and seasonality of fishes in Colorado Lagoon, Alamiton Bay, California. *Est. Coastal Mar. Sci.*: 371-380.
- Bijukumar, A. (2000). Exotic fishes and freshwater fish diversity. *Zoos' Print Journal*, 15(11): 363 – 367.
- CAMP (1998). Conservation and Management Plan for Freshwater Fishes of India". Organized by Zoo Outreach Organisation, NBFGR, Lucknow.
- Day F. (1967). The fishes of India vol. 1 and 2 Jagamander agency New Delhi.
- Easa P.S. and Shaji C.P. (1995). Fresh water fish diversity in Kerala part of the Nilagiri biosphere reserve. Research report. Peechi. Kerala Forest Research Institute.

*Corresponding author : Seethal Lal. S.

E mail: 456seethal@gmail.com

Department of Environmental Sciences, Kariavattom Campus, Thiruvananthapuram - 695581, Kerala, India.

IUCN (2011). IUCN Red list of Threatened Species. version 2011.1.

<<http://www.iucnredlist.org>> (Accessed on 12.06.2012).

Jairam, K. C. (1981). The freshwater fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka – A Handbook. Zoological Survey of India, Calcutta, 475pp.

Jayaram K.C. (1999). The fresh water fishes of the Indian Region, Narendra Publishing house. Delhi-551.

Kar D. A Kumar., C. Bohra and Sigh L. K, (Eds). (2003). Fishes of Barak drainage, Mizoram and Tripura. In: Environment, Pollution and Management, APH Publishing Corporation, New Delhi, 604: 203-211.

Kurup, M.B (2001). River and streams of Kerala part of western ghats as a hot spot of exceptional biodiversity with a great degree of endemism. In M.R. Meena kumary. B. Joseph. J, Sankar. P.V., Pravin. P and L. Edwin Eds. P 204-217. Society of fisheries technologies India, Cochin.

Kurup, M.B, Radhakrishnan K.V. And Manojkumar T.G (2002). Biodiversity status of fishes inhabiting rivers of Kerala (South India) with special reference to endemism, threat and conservation measures.

Mittermeier R. A. and Mittermeier, C.G. (1997). Megadiversity Earth's biologically wealthiest Nation. In M. Allister, D.E. A. Lott and B. Harvery (Eds). Global fresh water Biodiversity sea wind cemex, Mexico city," pp:1-140.

Molur, S. & Walker, S. (1998). Report of the Workshop "Conservation and Management Plan for Freshwater Fishes of India". Zoo Outreach Organisation, Conservation Specialist Group of India, Coimbatore, India.

Moyle, P.B. and Leidy R.A. (1992). Loss of biodiversity in aquatic ecosystems: evidence from fish faunas. In: Fiedler, P.L. and S.K. Jain (eds.). Conservation Biology: The Theory and Practice of Nature Conservation, Preservation and

Management, Chapman and Hall, New York. pp. 127-169.

Raghavan R, Prasad G, Ali A and Pereira B. (2008b). Exotic Fishes in global biodiversity hotspot-a case study from river Chalakkudy, part of Western Ghats, Kerala, India. *Biological Invasions*, **10**(1): 37-40

Stephens, J.R., Terry, C., Subber S. and Allen M.J. (1974). Abundance, Distribution, Seasonality, Productivity, of the fish Population in Los Angeles Harbour 1972-1973. In: *Marine Studies of San Pedro Bay, Part 1V* 1-42. *Environmental Field Investigation*, (Soule and Oguri, Eds.) Allen Hancock Foundation Publication USC-SG-72.

Stephenson, W. and Dredge M.C.L. (1976). Numerical Analysis of fish catches from Serpentine Creek. *Proc. R. Soc. Qd.*, **87**: 33-43.

Talwar P.K. and Jhingran A. (1991). Inland fishes of India and adjacent countries. Oxford and I.B.H publishing Co. New Delhi, 12: 115-6.

Zacharias V.J, Bhardwaj A.K and Jacob P.C (1996). Fish fauna of Periyar Tiger Reserve. *Journal of the Bombay Natural History Society*, **93**:38-43.

*Corresponding author : Seethal Lal. S.

E mail: 456seethal@gmail.com

Department of Environmental Sciences, Kariavattom Campus, Thiruvananthapuram - 695581, Kerala, India.

IJSER

*Corresponding author : Seethal Lal. S.

E mail: 456seethal@gmail.com

Department of Environmental Sciences, Kariavattom Campus, Thiruvananthapuram - 695581,
Kerala, India.