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CP Ansar

Regional Agricultural Research
Station, Kumorokam,
Kottayam, Kerala, India

HS Mogalekar

Department of Fisheries Biology
and Resource Management,
Fisheries College and Research
Institute, Thoothukudi,
Tamil Nadu, India

C Sudhan

Department of Fisheries Biology
and Resource Management,
Fisheries College and Research
Institute, Thoothukudi,
Tamil Nadu, India

DL Chauhan

Ukai Dam, Fisheries
Department, Ukai, Taluka: Fort-
Songadh, District: Tapti,
Gujarat, India

A Golandaj

Sisodara Farms West Coast
Frozen Food Pvt. Ltd., Village
Sisodara, Taluka: Ankaleshwar,
District: Bharuch, Gujarat, India

J Canciyal

Department of Fisheries
Resource Management, Faculty
of Fishery Sciences, West Bengal
University of Animal and
Fisheries Sciences, Kolkata,
India

Correspondence**CP Ansar**

Regional Agricultural Research
Station, Kumorokam,
Kottayam, Kerala, India

Finfish and Shellfish diversity of Vembanad Lake in the Kumarakom region of Kottayam, Kerala, India

**CP Ansar, HS Mogalekar, C Sudhan, DL Chauhan, A Golandaj and
J Canciyal**

Abstract

The status of finfish and shellfish diversity and seasonal variation in their distribution and abundance were investigated in Vembanad Lake at Kumarakom Region of Kottayam in Kerala. In total 60 species of finfishes and shellfishes belonging to 13 orders, 31 families 43 genera were recorded from the study area. Calculated values of biodiversity indices were: Shannon Wiener diversity index (H') [3.72 (August 2015) to 3.86 (July 2015)], Margalef richness index (d) [9.24 (August 2015) to 10.82 (January 2016)], Pielou's evenness index (J') [0.9671 (October 2015) to 0.9739 (April 2016)] taxonomic diversity index (D) [65.42 (June 2015) to 70.6 (November 2015)]. *Etroplus maculatus*, *E. suratensis*, *Amblypharyngodon melettinus* and *Stolephorus indicus* were found to be highly abundant species represented from 52 finfish and 8 shellfish species. The results of the present study indicated that Kumarakom Region of Vembanad Lake is endowed rich edible fish fauna.

Keywords: Fish diversity, diversity indices, Kumarakom region of Vembanad Lake

1. Introduction

Vembanad Lake is a transitional ecotone lying parallel to the Arabian Sea and encompassing mangroves, mudflats, swamps and marshes. As these ecosystems provide a harsh environment, many species of fish have found them to be an ideal place for spawning, development and growth during their early life^[1]. Rich biodiversity and ecological value made Vembanad Lake to be identified as a Ramsar site in November 2002. Vembanad Lake is among the most productive life-supporting coastal wetland in Kerala, having length of 96 km and surface area of 1512 km². Six rivers bring freshwaters into Vembanad Lake and it has two permanent opening to the Arabian Sea, one at Cochin and other at Azhikode^[2].

Fishes are living components of water bodies and are important food resource and bio indicators of the environmental health and wealth of the waters in which they inhabit. Globally aquatic ecosystems and fish diversity are adversely affected due to increase in unwise anthropogenic activities^[3]. Decline in estuarine diversity as a result of overfishing, insufficient management practices and habitat degradation, which reduces the chances of its sustainability^[4]. Therefore, knowledge on the status and trends of backwater fisheries is the key to sound policy development, better decision making and responsible fisheries management^[1]. A study on the distribution and abundance of fish diversity was lacking in Kumarakom Region of Vembanad Lake. Henceforth, in present investigation attempt has been made to identify finfish and shellfish fauna and calculate various diversity indices.

2. Materials and Methods

Kumarakom is situated in the Kumarakom village of Kottayam district on the southern side of the River Kavanar. It lies at an altitude of 0.6 m below mean sea level. The nearest municipal town is Kottayam that is 15 km away from study area. About 150 ha area is utilized for culture of fishes and prawns. Fishes were collected from Kumarakom Region of Vembanad Lake with the help of local fisherman using different types of nets like gill net, drag net and cast net and hooks at the regular intervals from June 2015 to May 2016. After collection, fishes were preserved in 10% formaldehyde solution, larger fishes were given injection of same solution in their abdomen and other parts of the body to avoid bacterial contamination. Each container was labeled properly against the physical data sheet of sampling and brought to the laboratory

for identification and species confirmation [5 - 7]. PRIMER software was used to calculate biodiversity indices like species richness by Margalef index (d), Pielou's evenness (J'), Shannon index (H') and taxonomic diversity (Δ). The

different species recorded during the research work were checked for International Union for Conservation of Nature and Natural resources (IUCN) in order to assess conservation status fish species [8].

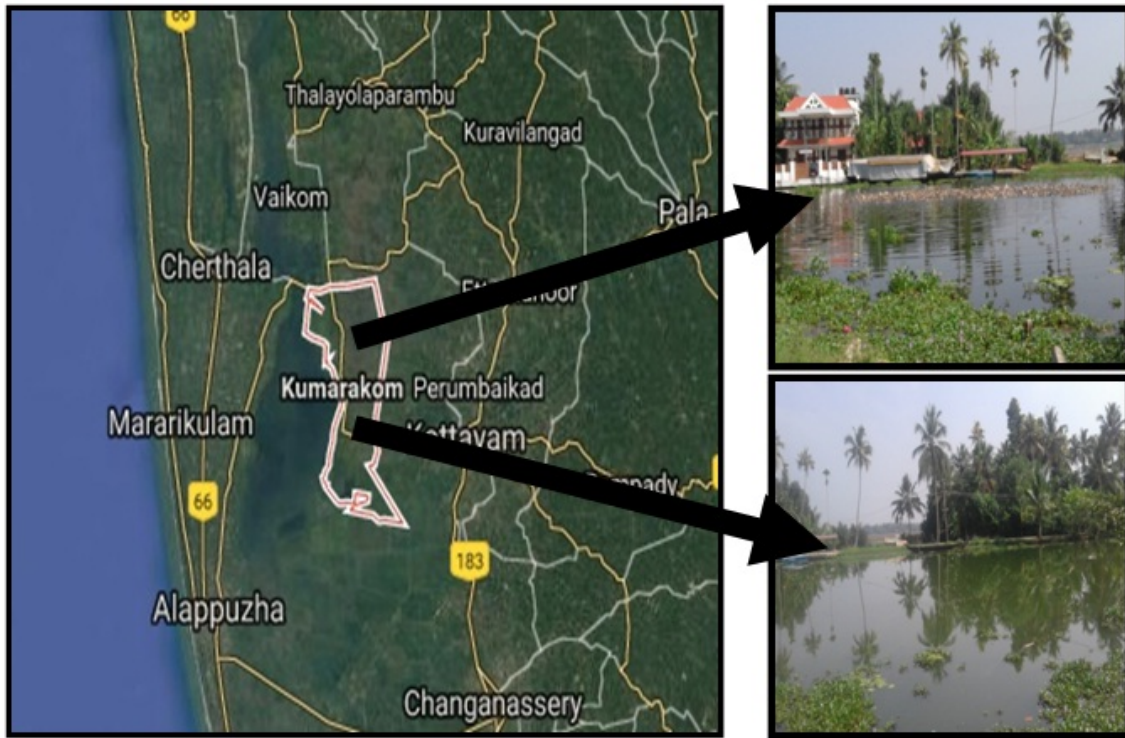


Fig 1: Study site in Vembanad Lake at Kumarakom region of Kottayam, Kerala, India.

3. Results and Discussion

In total 60 species of finfishes and shellfishes belonging to 13 orders, 31 families 43 genera were recorded during the study (Table 1 and Fig. 2.1 to 2.20). *Eetroplus maculatus*, *E. suratensis*, *Amblypharyngodon melettinus* and *Stolephorus indicus* were found to be highly abundant species represented from 52 finfish and 8 shellfish species. Calculated biodiversity indices are presented in Table 2. The Shannon Wiener diversity index (H') values were found to be on higher side and varied from 3.86 (July 2015) to 3.72 (August 2015). The maximum value of Margalef richness index (d) was 10.82 (January 2016). However the minimum value was 9.24 recorded during the month of August 2015. The maximum value of Pielou's evenness index (J') was 0.9739 recorded during April 2016 and the minimum value of 0.9671 during the month of October 2015. The taxonomic diversity index (D) calculated during the various seasons varied from 70.6 (November 2015) to 65.42 (June 2015). The results of the present study indicated that Kumarakom Region of Vembanad Lake is endowed rich edible fish fauna.

Checklist was prepared and provided in Table 1. Conservation status of identified fishes comprises: 2 species (*Anabas testudineus* and *Puntius amphibious*) as Data Deficient, 3 species (*Anguilla bicolor*, *Wallago attu* and *Oreochromis mossambicus*) as Near Threatened, 5 species (*Hyporhamphus xanthopterus*, *Channa diplogramma*, *Pseudosphromenus dayi*, *Horabagrus brachysoma* and *Carinotetraodon travancoricus*) as Vulnerable, 15 species as Not Evaluated and 35 species as Least Concern. The fishery status of recorded fishes were found to be 58.33% (Food purposes), 45% (Ornamental) and followed by the least to sport activities 8.33%.

There were signs of decline of the Vembanad fishery resources, evident in the lesser number of species and decline of fishery production [9]. Nansimole *et al.* [4] recorded 134 species of finfishes, 6 species of Penaeid shrimps, 3 species of Palaemonid prawns, 7 species of crabs, 5 species of bivalves from four estuaries in Trivandrum district of Kerala. Sahadevan [10] have reported 57 species of finfishes, 19 species of crustaceans and 11 species of molluscs from the Puthuvyppeen area of Vembanad Lake. Mogalekar *et al.* [11] reported 20 species of decapod crustaceans belonging to 5 family and 10 genera from Panangad-Kumbalam Region of Vembanad Lake. However, present record of 52 species finfishes and 8 species of shellfish is lower compared to all the above reports. The lower number of species is understandable as the all the above reports covered large area of Vembanad Lake than the present study.

Narayanan *et al.* [12] reported 37 fish species belonging to 18 families and 9 orders from Aymanam panchayath, in Vembanad wetland. Mogalekar *et al.* [1] recorded 39 species of finfishes belonging to 27 families, 11 orders and 31 genera from Panangad-Kumbalam Region of Vembanad Lake in Kochi. Present record of 52 species of finfishes and 8 species of shellfish is higher than Narayanan *et al.* [12] and Mogalekar *et al.* [1]. Krishnakumar *et al.* [13] study reveals that indiscriminate and illegal farming of the African Catfish *Clarias gariepinus*, in central Kerala has now resulted in the escape and spread of the species into Vembanad Lake, a large brackish water wetland and inland fish diversity hotspot that forms a major threat to highly prized native cichlids and results in loss of biodiversity.

Table 1: Finfish and Shellfishes Diversity of Vembanad Lake at Kumarakom region of Kottayam, Kerala, India.

Taxa	Common Name	Environment	Fishery Status	IUCN Status
Chordata>Actinopterygii>Anguilliformes >Anguillidae				
<i>Anguilla bicolor</i> (McClelland, 1844)*	Short-Fin Eel	F, B, M	Capture fishery, Food	NT
Beloniformes > Belonidae				
<i>Xenentodon cancila</i> (Hamilton, 1822)****	Freshwater Garfish	F, B, M	Ornamental	LC
Hemiramphidae				
<i>Hyporhamphus xanthopterus</i> (Valenciennes, 1847)*	Red-Tipped Half Beak	F, B, M	Ornamental, Food	VU
Clupeiformes > Engraulidae				
<i>Stolephorus indicus</i> (van Hasselt, 1823)*****	Indian Anchovy	B, M	Capture, Food	NE
Cypriniformes > Cyprinidae				
<i>Amblypharyngodon melettinus</i> (Valenciennes, 1844)*****	Attentive Carplet	F	Ornamental	LC
<i>Amblypharyngodon mola</i> (Hamilton, 1822)***	Mola Carplet	F	Capture fishery, Ornamental	LC
<i>Catla catla</i> (Hamilton, 1822)*	Catla	F, B	Culture fishery, Food	LC
<i>Dawkinsia filamentosus</i> (Valenciennes, 1844)****	Black Sopt Barb	F, B	Ornamental	LC
<i>Laubuka dadiburjori</i> (Menon, 1952)**	Dadio	F	Ornamental	LC
<i>Labeo dussumieri</i> (Valenciennes, 1842)****	Labeo	F	Culture fishery, Food	LC
<i>Labeo rohita</i> (Hamilton, 1822)*	Rohu	F, B	Culture fishery, Food	LC
<i>Puntius amphibius</i> (Valenciennes, 1842)**	Scarlet Banded Barb	F, B	Capture fishery, Ornamental	DD
<i>Puntius vittatus</i> (Day, 1865)***	Green Stripe Barb	F, B	Ornamental	LC
<i>Rasbora daniconius</i> (Hamilton, 1822)***	Slender Rasbora	F, B	Ornamental	LC
<i>Systemus sarana</i> (Hamilton, 1822)**	Olive Barb	F, B	Ornamental, Food	LC
Cyprinodontiformes > Aplocheilidae				
<i>Aplocheilus blockii</i> (Arnold, 1911)**	Green Panchax	F, B	Ornamental	LC
<i>Aplocheilus lineatus</i> (Valenciennes, 1846)***	Striped Panchax	F, B	Ornamental	LC
<i>Aplocheilus panchax</i> (Hamilton, 1822)**	Blue Panchax	F, B	Ornamental	LC
Gonorhynchiformes > Chanidae				
<i>Chanos chanos</i> (Forsskål, 1775)*	Milk Fish	F, B, M	Capture fishery, Food	NE
Mugiliformes > Mugilidae				
<i>Chelon planiceps</i> (Valenciennes, 1836)*	Tade Grey Mullet	F, B, M	Capture fishery, Food	NE
<i>Mugil cephalus</i> (Linnaeus, 1758)*	Flathead Grey Mullet	F, B, M	Culture fishery, Food	LC
Perciformes > Ambassidae				
<i>Ambassis ambassis</i> (Lacepède, 1802)***	Commerson's Glassy	F, B, M	Capture fishery, Ornamental	LC
<i>Parambassis dayi</i> (Bleeker, 1874)**	Day's Glassy Perchlet	F, B	Ornamental	LC
<i>Parambassis ranga</i> (Hamilton, 1822)**	Indian Glassy Fish	F, B	Ornamental	LC
<i>Parambassis thomasi</i> (Day, 1870)***	Glassy Perchlet	F, B, M	Capture fishery, Ornamental	LC
Anabantidae				
<i>Anabas testudineus</i> (Bloch, 1792)**	Climbing Perch	F, B	Ornamental	DD
Channidae				
<i>Channa diplogramma</i> (Day, 1865)*	-	F	Ornamental	VU
<i>Channa gachua</i> (Hamilton, 1822)*	-	F	Ornamental	LC
<i>Channa marulius</i> (Hamilton, 1822)*	Great Snakehead	F	Ornamental	LC
<i>Channa punctata</i> (Bloch, 1793)*	Spotted Snakehead	F, B	Culture fishery, Game fish, Food	LC
<i>Channa striata</i> (Bloch, 1793)**	Striped Snakehead	F, B	Culture fishery, Game fish, Food	LC
Cichilidae				
<i>Etilapia maculatus</i> (Bloch, 1795)*****	Orange Chromide	F, B	Ornamental	LC
<i>Etilapia suratensis</i> (Bloch, 1790)*****	Pearlsport	F, B	Culture fishery, Food	LC
<i>Oreochromis mossambicus</i> (Peters, 1852)*	Mozambique Tilapia	F, B	Culture fishery, Food	NT
<i>Oreochromis niloticus</i> (Linnaeus, 1758)*	Nile Tilapia	F, B	Culture fishery, Food	NE
Gerreidae				
<i>Gerres setifer</i> (Hamilton, 1822)*	Small Bengal Silverbiddy	B, M	Capture fishery, Food	NE
Gobiidae				
<i>Glossogobius giuris</i> (Hamilton, 1822)**	Tank Goby	F, B, M	Capture fishery, Food	LC
Osphronemidae				
<i>Pseudosphromenus cupanus</i> (Cuvier, 1831)**	Spiketail Paradisefish	F, B	Ornamental	LC
<i>Pseudosphromenus dayi</i> (Köhler, 1908)*	-	F, B	Ornamental	VU
Scatophagidae				
<i>Scatophagus argus</i> (Linnaeus, 1766)*	Spotted Scat	F, B, M	Ornamental	LC
Nandidae				
<i>Nandus nandus</i> (Hamilton, 1822)**	Gangetic Leafish	F, B	Ornamental	LC
Pleuronectiformes > Soleidae				
<i>Brachirus orientalis</i> (Bloch and Schneider, 1801)*	Oriental Sole	F, B, M	Capture fishery, Food	NE
Siluriformes > Ariidae				
<i>Arius subrostratus</i> (Valenciennes, 1840)*	Shovelnose Sea Catfish	B, M	Capture fishery, Food	NE

Bagridae				
<i>Mystus gulio</i> (Hamilton, 1822)***	Long Whiskers Catfish	F, B	Capture fishery, Food	LC
<i>Mystus vittatus</i> (Bloch, 1794)*	Striped Dwarf Catfish	F, B	Ornamental, Food	LC
Clariidae				
<i>Clarias gariepinus</i> (Burchell 1822)*	North African Catfish	F	Capture fishery, game fish, Food	LC
Heteropneustidae				
<i>Heteropneustes fossilis</i> (Bloch, 1794)*	Stinging Catfish	F	Culture fishery, Food	LC
Siluridae				
<i>Ompok malabaricus</i> (Valenciennes, 1840)*	Goan Catfish	F	Culture fishery, Food	LC
<i>Wallago attu</i> (Bloch and Schneider, 1801)*	Wallago	F, B	Culture fishery, game fish, Food	NT
Horobagridae				
<i>Horabagrus brachysoma</i> (Günther, 1864)***	Günther's Catfish	F	Culture fishery, ornamental, Food	VU
Synbranchiformes > Mastacembelidae				
<i>Mastacembelus armatus</i> (Lacepède, 1800)*	Zigzag Eel	F, B	Ornamental, Food	LC
Tetradotiformes > Tetrodontidae				
<i>Carinotetraodon travancoricus</i> (Hora and Nair, 1941)*	Malabar Pufferfish	F	Ornamental	VU
Arthropoda > Malacostraca > Decapoda > Penaeidae				
<i>Fenneropenaeus indicus</i> (MilneEdwards, 1837)*	Indian White Prawn	B, M	Culture fishery, Food	NE
<i>Metapenaeus dobsoni</i> (Miers, 1878)*	Kadal Shrimp	M	Culture fishery, Food	NE
<i>Penaeus monodon</i> (Fabricius, 1798)*	Giant Tiger Prawn	B, M	Culture fishery, Food	NE
Palaemonidae				
<i>Macrobrachium idella</i> (Hilgendorf, 1898)**	Freshwater Prawn	F	Culture fishery, Food	NE
<i>Macrobrachium rosenbergii</i> (De Man, 1879)***	Giant Freshwater Prawn	F	Culture fishery, Food	NE
Atyidae				
<i>Caridina naderjoni</i> *	Vembanad lake Prawn	F, B, M	Capture fishery, Food	NE
Portunidae				
<i>Scylla serrate</i> (Forsskål, 1775)*	Giant Mud Crab	B, M	Capture, culture fishery, Food	NE
Mollusca > Bivalvia > Veneroidea > Cyrenidae				
<i>Villorita cyprinoides</i> (Gray, 1825)****	Black Clam	M	Culture, culture fishery, Food	NE

[Abundance level: *Trace, **Less abundant, ***Moderately abundant, ****Abundant, *****Highly Abundant; environment: F = Freshwater, B = Brackish water, M = Marine water; conservation status: EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, DD = Data Deficient and NE = Not Evaluated]

Table 2: Diversity indices of Finfishes and shellfishes in Vembanad Lake at Kumarakom region of Kottayam, Kerala, India.

Months / Indices	No. of species	No. of individuals	Margalef richness	Pielou's evenness	Shannon Wiener diversity	Taxonomic diversity
June-2015	55	158	10.66	0.9707	3.89	65.42
July-2015	54	145	10.66	0.9687	3.864	66.06
August-2015	46	130	9.245	0.9715	3.72	67.39
September-2015	50	131	10.06	0.973	3.806	69.9
October-2015	53	137	10.57	0.9671	3.84	69.22
November-2015	51	132	10.23	0.9711	3.818	70.6
December-2015	50	123	10.18	0.9698	3.794	69.1
January-2016	53	122	10.82	0.9708	3.854	68.18
February-2016	47	109	9.804	0.9688	3.73	66.67
March-2016	48	111	9.974	0.9701	3.755	68.28
April-2016	49	104	10.34	0.9739	3.79	70.16
May-2016	49	104	10.34	0.9709	3.778	68.29

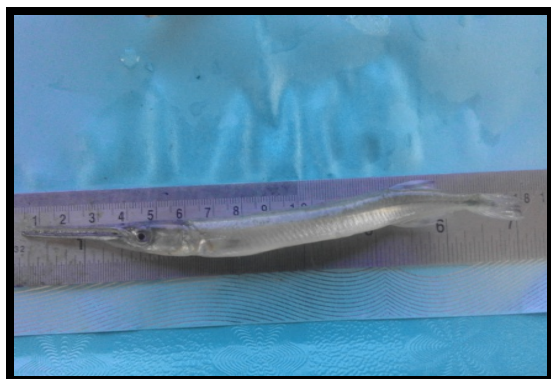


Fig 2.1: *Xenentodon cancila* (Hamilton, 1822)



Fig 2.2: *Stolephorus indicus* (van Hasselt, 1823)



Fig 2.3: *Labeo dussumieri* (Valenciennes, 1842)



Fig 2.7: *Aplocheilus lineatus* (Valenciennes, 1846)



Fig 2.4: *Labeo rohita* (Hamilton, 1822)



Fig. 2.8: *Etroplus maculatus* (Bloch, 1795)

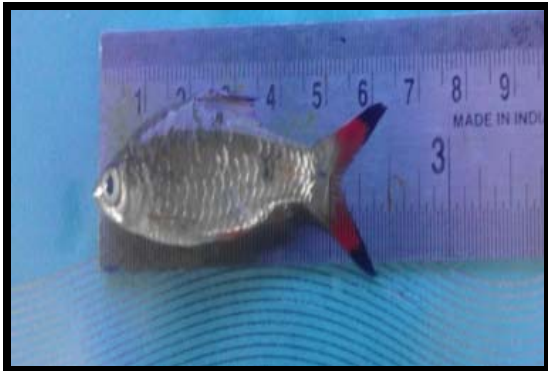


Fig. 2.5: *Dawkinsia filamentosus* (Valenciennes, 1844)



Fig 2.9: *Etroplus suratensis* (Bloch, 1790)



Fig. 2.6: *Systomus sarana* (Hamilton, 1822)



Fig 2. 10: *Channa marulius* (Hamilton, 1822)



Fig 2. 11: *Glossogobius giuris* (Hamilton, 1822)



Fig 2.15: *Mastacembelus armatus* (Lacepède, 1800)



Fig 2.12: *Brachirus orientalis* (Bloch and Schneider, 1801)



Fig 2.16: *Carinotetraodon travancoricus* (Hora and Nair, 1941)



Fig. 2.13: *Horabagrus brachysoma* (Günther, 1864)



Fig. 2.17: *Metapenaeus dobsoni* (Miers, 1878)



Fig 2.14: *Brachirus orientalis* (Bloch and Schneider, 1801)



Fig. 2.18: *Macrobrachium idella* (Hilgendorf, 1898)

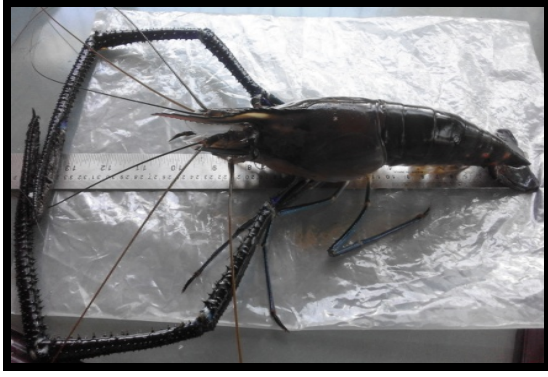


Fig 2.19: *Macrobrachium rosenbergii* (De Man, 1879)



Fig 2.20: *Scylla serrata* (Forsskål, 1775)

Fig 2: Most abundant finfishes and shellfishes in Vembanad Lake at Kumarakom region of Kottayam, Kerala, India.

4. References

1. Mogalekar HS, Ansar CP, Raman NN, Jayachandran KV, Dinesh K, Kolhe S. Fish Diversity of Vembanad Lake in the Panangad-Kumbalam Region of Kochi, Kerala, India. *Pollution Research*. 2015; 34(2):345-349.
2. Krishnakumar K, Rajan PD. Fish and Fisheries in Vembanad Lake. Consolidated report of Vembanad Fish count 2008- 2011, Community Environment Resource Centre (CERC), Ashoka Trust for Research in Ecology and the Environment (ATREE), Ammankovil Street, Mullakkal Alappuzha. 2012, 50.
3. Nansimole A, Sruthi S, Devi GTV, Radhakrishnan T. First report on fishery resources from four estuaries in Trivandrum district, Kerala, India. *International Journal of Scientific Research*. 2014; 3(12):129-131.
4. James EJ. Studies on estuarine dynamics on the southeast coast of India. *Proc. of National Seminar on Estuarine Management*. Trivandram. 1987, 76-82.
5. Jayaram KC. *The Fresh water fishes of Indian Region*. Second Edition. Narendra Publishing house, New Delhi. 2010, 616.
6. Talwar PK, Jhingran AG. *Inland Fishes of India and Adjacent Countries*. Oxford and IBH Publishing Co., New Delhi, 1991; 1(2):1-1158.
7. Eschmeyer WN, Fricke R, Laan RVD. (eds). *Catalog of fishes: genera, species, references*. <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. Electronic version accessed July 2016.
8. IUCN. *The IUCN Red List of Threatened Species*. IUCN, Gland, Switzerland and Cambridge, UK, <http://www.iucnredlist.org>. July 2016.
9. Asha CV, Suson PS, Retina CI, Nandan SB. Decline in diversity and production of exploited fishery resources in Vembanad wetland system: strategies for better management and conservation. *Open Journal of Marine Science*. 2014; 4:344-357.
10. Sahadevan P. Diversity of fishes, Crustaceans and Molluscs of Puthuvypeen of Ernakulam District, Kerala, South India. *International Journal of Fisheries and Aquatic Studies*. 2016; 4(6):101-107.
11. Mogalekar HS, Ansar CP, Gollandaj A, Dinesh K. Biodiversity of Decapod Crustacean in the Vembanad Lake at Panangad-Kumbalam Region of Kochi, Kerala. *Environment and Ecology*. 2015; 33(4B):1920-1923.
12. Narayanan SP, Thapanjith T, Thomas AP. A study on the Ichthyofauna of Aymanam panchayath, in Vembanad wetland, Kerala. *Zoos' Print J*. 2005; 20(9):1980-1982.
13. Krishnakumar K, Ali A, Pereira B, Raghavan R.

Unregulated aquaculture and invasive alien species: a case study of the African Catfish *Clarias gariepinus* in Vembanad Lake (Ramsar Wetland), Kerala, India. *Journal of Threatened Taxa*. 2011; 3(5):1737-1744.