

1 **ICTHYOFAUNAL DIVERSITY OF KAVVAI BACKWATERS, MALABAR**
2 **COAST OF INDIA: A PRELIMINARY STUDY.**

3
4 **ABSTRACT**

Fish faunal diversity studies are of great importance for the effective utilization of valuable natural resources and to plan different conservation strategies. Studies on the diversity and richness of fish in Kavvai backwaters are very rare. Hence, this study is aimed at exploring the fish resources, diversity and species richness of the fish fauna of Kavvai backwaters of the Kerala coast, which has not received very little attention hitherto. Monthly sample collections were made from four stations regularly for a period of one year, and the collection was done by netting with cast net and gill net. A total of 65 species under 51 genera, comprising 36 families belonging to 17 orders of fin fish fauna, were recorded from the Kavvai backwater . Further studies are required to identify other fish species and to ascertain the reasons for variations in fish faunal diversity in the Kavvai backwater ecosystem.

5 *Keywords: Kavvai backwater; fish fauna; Back water fishery ;diversity*

6 **1.INTRODUCTION**

7 Inland water resources, such as lakes, rivers, canals, reservoirs, ponds, streams , springs,
8 cave waters, floodplain wetlands, estuaries, coastal lagoons, mangrove creeks, marshes,
9 backwaters, and swamps, provide habitat for fish, amphibians, water birds, semi-aquatic
10 animals and plants, as well as highly endemic and endangered taxa. Climate regulation,
11 flood mitigation, nutrient recycling, water purification, and waste management are all
12 supported by these dynamic ecosystems. Millions of people around the world rely on them
13 for food, nutrition, and survival [1]. Proper understandings of the fish fauna and their habitats
14 are of great importance for the effective utilization of the valuable ecosystem and to plan out
15 developmental and successive Management Programs for their conservation [2].Today,
16 fishing remains the largest extractive use of wildlife in the world. In 2010, the annual capture,
17 combining both wild capture and aquaculture, was 149 million tones [3]. Fish is widely
18 regarded as a super food around the world. Fisheries and aquaculture is one of the fastest
19 expanding food sectors, and it has played an important part in economic development due to
20 its contributions to food and nutritional security, national income, job possibilities, and
21 livelihood options. Fisheries sector occupies a very important place in the socio-economic
22 condition of a country[4].Fish from India's fresh and marine waterways number 3231
23 legitimate species, accounting for 9.7% of the world's total of 33,059 species of fish, with
24 marine fish diversity accounting for 7.4%.Marine fishes account for 75.6 percent of India's
25 total fish variety, with 2443 species divided into 927 genera and 230 families divided into 40
26 orders[5]. India is the world's third-largest fish producer and the world's second-largest
27 aquaculture fish producer. India accounts for roughly 7% of global fish production. The
28 country is also home to more than 10% of the world's fish biodiversity and is one of the 17
29 countries with the most biodiversity. Around 14 million people work in the fishing industry
30 and related industries[6]. The backwaters of Kerala are a unique ecosystem in Kerala
31 wherein lagoons, lakes, canals, estuaries and deltas of several rivers meet the Arabian Sea.

32 The backwaters are made up of over 900 km of interconnected waterways, rivers, lakes and
 33 inlets [7]. The Kavvayi backwaters, also known as the Kavvayi Kayal, are a 21-kilometer-
 34 long elongated water body produced by drainages from four rivers: the Karingote, Nileswar,
 35 Kavvayi, and Peruvarnba. It is possibly the most visible element of the lacustrine system in
 36 northern Kerala's coastal tract. Edayilakad, Madackal, Vadakkekad, Chembantemedu, Oari,
 37 Thekkekad, Purathal, Kockal, and other significant islets can be found in the backwater
 38 system [8].The ichthyofaunal diversity is a good indicator of health of aquatic ecosystem. A
 39 good piscine diversity represents the balanced ecosystem [9]. Proper understandings of the
 40 fish fauna and their habitats are of great importance for the effective utilization of the
 41 valuable ecosystem and to plan out developmental and successive management programs
 42 for their conservation. Studies on the diversity and richness of fishes of Kavvai backwaters
 43 are rare. Likewise, fishery resource of Kavvai back water, Malabar region of Kerala coast
 44 has received only little attention hither to. This paper aims to explore the fish faunal diversity
 45 of Kavvai back water. This study also aims to find out various threats to fish fauna in Kavvai
 46 back waters.

47 **2. MATERIALS AND METHODS**

48 **2.1.STUDY AREA :** The Kavvai backwater (12.0929° N and 75.1677° E) is situated in the
 49 northern part of Kerala, in Kannur and Kasargod District of Kerala and has a permanent
 50 connection with the Arabian Sea on both in northern and southern side.Table-1, (Fig.1)[10].
 51 The Karyamkode river, Peruvamba river, Kuniayan river and Valapattanam river drains into
 52 this water system .The backwater Kavvayi connected to Arabian Sea with the river mouth at
 53 the north at Azhithala, Nileswaram and connected to Palakkode river mouth in the south.
 54 There are 7 islands in the Kavvayi backwaters. Five (Kavvayi, Madakkal, Edayilekkad,
 55 Thekkekad and Vadakkekad) among them are having human settlements and two (Kocha
 56 Thuruthi and Kurippad Thuruthi) are not human settlements.

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Table.1. study locations

Collection sites	Descriptions
Station 1	12.08185 N, 75.17608 E
Kavvay	12.10082 N, 75.17633 E
Point 2	12.10082,N 75.17633 E
Point 4	12.08185N, 75.17608 E

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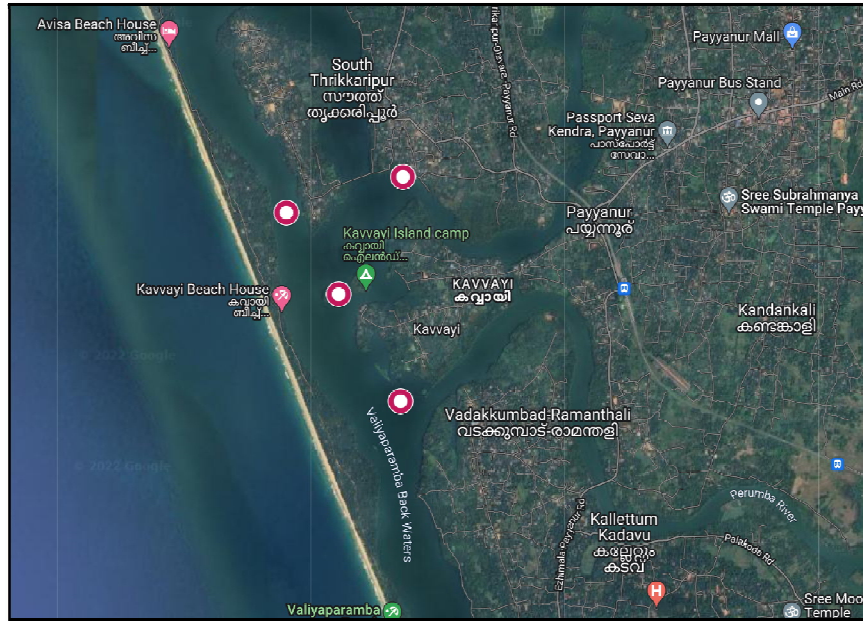


Fig. 1 : Map showing study locations

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2.2.COLLECTION AND IDENTIFICATION OF FISHES

66 With the aid of local fishermen and using a variety of nets, including gill nets, cast
67 nets, and dragnets, fish were collected from four locations in the Kavvayi backwater
68 (Figs. 2.a, 2.b, 2.c, and 2.d). For a year, monthly collections were taken on a regular
69 basis from four stations (2020-21). After being cleaned, the fish were preserved in
70 7% formalin. The 10% formalin solution was used right away to treat little fish. While
71 large fishes were given an incision in their abdomen and preserved in the
72 laboratory. Specimens were examined in detail characters were measured and
73 fishes were identified up to the species level, with the help of standard keys given by
74 Day (1878) [11]., Munro (1955) [12]., Talwar and Jhingran (1991) [13]., Jayaram
75 (1981) [14]. , and Fischer and Bianchi (1984) [15].

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Fig.2. a,b,c and d Collection sites

83 3. RESULTS AND DISCUSSION

84 In the present study 65 species of fishes belonging to 36 families were found to
 85 occur in the study area. Among fishes Engraulidae was the most dominant family followed
 86 by Lutjanidae , Platycephalidae , Leiognathidae, Cichlidae and Clupeidae .The information
 87 collected in the present study are expected to act as a baseline data for future studies on
 88 the impact of the various factors, on the aquatic environment.The common name ,scientific
 89 name , family in which the fish belongsand the IUCN status is given in the Table -2. Out of
 90 sixty five species identified six species belongs to Engraulidae ,followed by Lutjanidae
 91 (5),Platycephalidae (4) Leiognathidae(4), Cichlidae(3), Clupeidae(3), Ophichthidae(3) and
 92 Mugilidae (3).Order Ambassidae, Bagridae ,Cynoglossidae ,Gerreidae, Gobiidae , and
 93 Scatophagidae having two species each.The Composition of various family of fishes in
 94 Kavvai back is given in the table.-3. Out of the 65 species listed 25 species belongs to the
 95 order Perciformes,followed by Clupeiformes (10), Siluriformes (4) and Pleuronectiformes (4).
 96 Order Acanthuriformes, Anguilliformes,Cichliformes and Mugiliform having three species
 97 each,Beloniformes,Carangiformes,Centrarchiformes,Elopiformes,Gobiiformes,
 98 Gonorynchiformes and Mulliformes with one species each..Percentage composition of
 99 various orders of fishes in Kavvai back water is showed in Fig. 3. Ashtamoorthy, Sreejith[19]

100 reported 27 species belongs to the order Perciformes, followed by Cypriniformes (9),
 101 Tetraodontiformes (6) and Siluriformes (4). Order Clupeiformes, Beloniformes, Mugiliformes,
 102 Synbranchiformes and Pleuronectiformes having three species each, Cyprinodontiformes
 103 and Anguilliformes having two species .Order Batrachoidiformes, Scorpaeniformes,
 104 Atheriniformes and Lophiformes are with one species each. According to IUCN status, of the
 105 65 species described, 43 are classified as Least Concern (LC), four are vulnerable, twelve
 106 have not been evaluated, and six are classified as data deficient. According to Out of this 68
 107 species one species, According to Ashtamoorthy, Sreejith [16] *Oreochromis mossambica*
 108 (Peters, 1852), is coming under the IUCN category Near Threatened. 43 species were least
 109 concern, 18 species were not evaluated and 6 species were data deficient. One species of
 110 belongs to invasive category namely *Oreochromis mossambicus*, was collected during the
 111 study. Invasive fishes may change the aquatic environment by altering the water quality and
 112 may drive native fish to extinction through predation and resource competition [17]. Fish life
 113 can be harmed by changes in the environment. Human activities affect backwater fish fauna
 114 in a variety of ways. Chemical pollution and littering, as well as urbanization,
 115 industrialization, dam construction, river diversion, and sand mining, have all been
 116 discovered to have a substantial impact on the fate of thousands of back water fish species.
 117 More knowledge on this aquatic ecosystem in sustaining fisheries is required.

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Table-2. Table showing common name , scientific name , family of identified fish species and their IUCN status

Sl No	COMMON NAME	SCIENTIFIC NAME	FAMILY	IUCN STATUS
1	Asiatic glassfish.	<i>Ambassis ambassis (Lacepède, 1802)</i>	Ambassidae	LC
2	Bald glassy	<i>Ambassis gymnocephalus (Lacepède 1802)</i>	Ambassidae	LC
3	Thread fin sea catfish	<i>Arius arius (Hamilton 1822)</i>	Ariidae	LC
4	Kerala mystus	<i>Mystus armatus (Day 1865)</i>	Bagridae	LC
5	Long whiskered mystus	<i>Mystus seengtee (Sykes 1839)</i>	Bagridae	LC
6	Coastal trevally	<i>Carangoides coeruleopinnatus (Rüppell 1830)</i>	Carangidae	LC
7	Milkfish	<i>Chanos chanos (Forsskål 1775)</i>	Chanidae	
8	Orange chromide	<i>Pseudetroplus maculatus (Bloch 1795)</i>	Cichlidae	
9	Mozambique tilapia	<i>Oreochromis mossambicus (Peters 1852)</i>	Cichlidae	VU

10	Pearlspot	<i>Etroplus suratensis</i> (Bloch 1790)	Cichlidae	LC
11	Toli shad	<i>Tenualosa toli</i> (Valenciennes 1847)	Clupeidae	VU
12	Arabian gizzard shad	<i>Nematalosa arabica</i> Regan 1917	Clupeidae	DD
13	White sardine	<i>Escualosa thoracata</i> (Valenciennes 1847)	Clupeidae	LC
14	Malabar tonguesole	<i>Cynoglossus macrostomus</i> Norman 1928	Cynoglossidae	VU
15	Bengal tongue sole	<i>Cynoglossus cynoglossus</i> (Hamilton 1822)	Cynoglossidae	LC
16	Surf perch	<i>Amphistichus</i> sp.	Embiotocidae	LC
17	Moustached thryssa	<i>Thryssa mystax</i> (Bloch & Schneider 1801)	Engraulidae	LC
18	Indian anchovy	<i>Stolephorus indicus</i> (van Hasselt 1823)	Engraulidae	LC
19	Malabar thryssa	<i>Thryssa malabarica</i> (Bloch 1795)	Engraulidae	DD
20	Hamilton's thryssa	<i>Thryssa hamiltonii</i> Gray 1835	Engraulidae	LC
21	Orangemouth anchovy	<i>Thryssa vitrirostris</i> (Gilchrist & Thompson 1908)	Engraulidae	LC
22	Short anchovy	<i>Anchoa curta</i> (Jordan & Gilbert 1882)	Engraulidae	LC
23	long-rayed silver biddy	<i>Gerres filamentosus</i> (Cuvier, 1829)	Gerreidae	LC
24	Deep-bodied mojarra	<i>Gerres erythrourus</i> (Bloch 1791)	Gerreidae	LC
25	Racer goby	<i>Babka gymnotrachelus</i> (Kessler, 1857)	Gobiidae	LC
26	Yellowfin goby	<i>Acanthogobius flavimanus</i> (Temminck & Schlegel 1845)	Gobiidae	LC
27	Lutke's halfbeak	<i>Hemiramphus lutkei</i> (Valenciennes, 1847)	Hemiramphidae	NE
28	Günther's catfish	<i>Horabagrus brachysoma</i> (Günther 1864)	Horabagridae	VU
29	False trevally	<i>Lactarius lactarius</i> (Bloch & Schneider 1801)	Lactaridae	NE
30	Barramundi	<i>Lates calcarifer</i> (Bloch 1790)	Latidae	LC
31	Deep pugnose ponyfish	<i>Secutor ruconius</i> (Hamilton, 1822)	Leiognathidae	NE

32	Common Ponyfish	<i>Leiognathus equulus</i> (Forsskal, 1775)	Leiognathidae	LC
33	Twoblotch ponyfish	<i>Nuclequula blochii</i> (Valenciennes 1835)	Leiognathidae	NE
34	Shortnose ponyfish	<i>Leiognathus brevirostris</i> (Valenciennes 1835)	Leiognathidae	NE
35	Mangrove red snapper	<i>Lutjanus argentimaculatus</i> (Forsskal 1775)	Lutjanidae	LC
36	John's snapper	<i>Lutjanus johnii</i> (Bloch 1792)	Lutjanidae	LC
37	Blacktail snapper	<i>Lutjanus fulvus</i> (Forster 1801)	Lutjanidae	LC
38	Mangrove red snapper	<i>Lutjanus argentiventris</i> (Peters 1869)	Lutjanidae	LC
39	Onespot Snapper	<i>Lutjanus monostigma</i> (Cuvier 1828)	Lutjanidae	LC
40	Indo-Pacific tarpon	<i>Megalops cyprinoides</i> (Broussonet, 1782)	Megalopidae	DD
41	Flat-tail mullet	<i>Gracilimugil argenteus</i> (Quoy & Gaimard, 1825)	Mugilidae	NE
42	Flat head grey mullet	<i>Mugil cephalus</i> Linnaeus 1758	Mugilidae	LC
43	Bluespot mullet	<i>Crenimugil seheli</i> (Forsskal 1775)	Mugilidae	LC
44	Sulphur goatfish	<i>Upeneus sulphureus</i> Cuvier 1829	Mullidae	LC
45	Indian pike conger	<i>Congresox talabonoides</i> (Bleeker 1853)	Muraenesocidae	NE
46	Serpent eel	<i>Ophisurus serpens</i> (Linnaeus 1758)	Ophichthidae	LC
47	Snake eel	<i>Muraenichthys gymnopterus</i> (Bleeker 1853)	Ophichthidae	NE
48	Rice-Paddy Eel	<i>Pisodonophis boro</i> (Hamilton, 1822)	Ophichthidae	LC
49	Bartail flathead	<i>Platycephalus indicus</i> (Linnaeus 1758)	Platycephalidae	DD
50	Dusky flathead	<i>Platycephalus fuscus</i> Cuvier 1829	Platycephalidae	NE
51	Southern bluespotted flathead	<i>Platycephalus speculator</i> Klunzinger 1872	Platycephalidae	NE
52	Small-eyed flathead	<i>Cymbacephalus bosschei</i> (Bleeker 1860)	Platycephalidae	NE

53	Peppered flounder	<i>Paralichthodes algoensis</i> Gilchrist 1902	Pleuronectidae	LC
54	Indian pellona	<i>Pellona ditchela</i> Valenciennes, 1847	Pristigasteridae	LC
55	Spotted scat	<i>Scatophagus argus</i> (Linnaeus)	Scatophagidae	LC
56	Spotbanded scat	<i>Selenotoca multifasciata</i> (Richardson 1846)	Scatophagidae	LC
57	Southern meagre	<i>Argyrosomus hololepidotus</i> (Lacepède, 1801)	Sciaenidae	DD
58	Indo-Pacific king mackerel	<i>Scomberomorus guttatus</i> (Bloch & Schneider 1801)	Scombridae	DD
59	Malabar grouper	<i>Epinephelus malabaricus</i> (Bloch & Schneider, 1801)	Serranidae	LC
60	Vermiculated spinefoot	<i>Siganus vermiculatus</i> (Valenciennes 1835)	Siganidae	LC
61	Silver sillago	<i>Sillago sihama</i> (Forsskål 1775)	Sillaginidae	LC
62	Oriental sole	<i>Brachirus orientalis</i> (Bloch & Schneider 1801)	Soleidae	LC
63	<u>The Yellowtail Barracuda</u>	<i>Sphyræna obtusata</i> Cuvier, 1829	Sphyrænidae	NA
64	Jarua terapon	<i>Terapon jarbua</i> (Forsskål 1775)	Terapontidae	LC
65	Largehead hairtail	<i>Trichiurus lepturus</i> Linnaeus 1758	Trichiuridae	LC

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125 Fig.3.Percentage composition of various orders of fishes in Kavvai backwater

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127 **Table.3.Composition of various family of fishes in Kavvai back water**

Sl.No.	FAMILY	Number
1	Ambassidae	2
2	Ariidae	1
3	Bagridae	2
4	Carangidae	1
5	Chanidae	1
6	Cichlidae	3
7	Clupeidae	3
8	Cynoglossidae	2
9	Embiotocidae	1
10	Engraulidae	6
11	Gerreidae	2

12	Gobiidae	2
13	Hemiramphidae	1
14	Horabagridae	1
15	Lactaridae	1
16	Latidae	1
17	Leiognathidae	4
18	Lutjanidae	5
19	Megalopidae	1
20	Mugilidae	3
21	Mullidae	1
22	Muraenesocidae	1
23	Ophichthidae	2
24	Platycephalidae	5
25	Pleuronectidae	1
26	Pristigasteridae	1
27	Scatophagidae	2
28	Sciaenidae	1
29	Scombridae	1
30	Serranidae	1
31	Siganidae	1
32	Sillaginidae	1
33	Soleidae	1
34	Sphyraenidae	1

35	Terapontidae	1
36	Trichiuridae	1

128 **4. CONCLUSION**

129 The Kavvayi backwater, is kerala's third largest and the largest in north kerala and
130 are rich in religious, ecological, genetic, environmental, and economic potentials.
131 This backwater, known as kavvayi kayal, is supplied by five rivers: the river kavvayi
132 and its tributary streams Kankol, Vannathichal, Kuppithodu, and Kuniyan.the
133 backwater of kavvayi and its surrounding region are deemed ecologically significant.
134 The current study was carried out to establish an inventory of fish faunal diversity in
135 this major ecological variety rich location. The diversity of the ichthyofauna is a
136 reliable measure of the health of the aquatic ecosystem. A diverse population of fish
137 indicates a healthy ecosystem.in the present study 65 species of fishes belonging
138 to 36 families were found to occur in the study area. Among fishes engraulidae was
139 the most dominant family followed by lutjanidae , platycephalidae , leiognathidae
140 ,cichlidae and clupeidae. The data gathered in this study will serve as a baseline for
141 future research on the effects of numerous influences on the aquatic environment.
142 Effective use of this data in policy creation, management, research, and
143 conservation could, at many levels, assist to alleviate the current situation in light of
144 the growing pressure that diverse human activities are placing on water resources.
145 The current research and development plan is insufficient for the conservation,
146 development, and management of this complex aquatic environment. To maintain
147 the fish faunal diversity of this aquatic ecosystem continuous monitoring is needed.

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