

Check List and Status of Piscean Fauna in Pallickal River – A Wetland River of Western Ghats Ecoregion

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Abstract- *Fishes are the most diverse faunal group in aquatic ecosystems, nevertheless of their geographical, hydrological and ecological variations. By studying the fish faunal composition, it is easier to estimate the health and richness of the respective ecosystem. Studies on biodiversity draws the attention of scientific world since the wild fauna and flora are the most valuable non- reproducible natural resources-since extinction lead to the loss of gene pool- on Earth. The present study aimed to analyze the diversity and conservation and ecological status of fishes in Pallickal River. The period of study was from February 2014 to January 2016. Fish samples were collected seasonally. Non- seasonal collections were made for assessing the diversity of Piscean population. The specimens were preserved at 5-6% formalin and taxonomic identification was done using standard keys. 55 species of fishes belong to 46 genera of 28 families in 12 orders were collected and identified from Pallickal river during the present study. Single introduced species collected in the study was *Labeo rohita*, which was introduced from Gangetic basin. *Cyprinus carpio*, a true exotic species, was also collected from lower midstream sites.*

Keywords- Pallickal River, Fish fauna, Endemism

I. INTRODUCTION

Rivers are the wombs of fresh water biodiversity. The diverging roles of a river in its catchment area include water enrichment through terrine and sub-terrine levels, supporting richness of ecosystem by maintaining a diverse aquatic habitat and providing food for terrestrial consumers, enriching the soil with alluvial loads, improving the economy of local inhabitants and other various means. Hence, it is clear that the river itself can act as the indicator of its depending society. Pallickal River is a medium sized tropical river having its catchment area within Western Ghats ecoregion. The river is one among the 44 major rivers of Kerala, India, having 42 Km length and 220 square kilometre basin. The origin and source of water is the discontinuous paddy fields and cultivatable wetlands of Pathanamthitta and Kollam district of Kerala. Wide stretches of paddy fields from Kodumon to Kannyetty are interrupted by human constructions like roads, cities, buildings and land filled areas. During early periods, the river was

assumed to flow through the uninterrupted paddy fields, sharing the rich water resources from midland to lowland and finally merged with Vattakkayal, an expanded river mouth and a part of National Water Way.

Anooja et al. (2013) described Pallickal River as a fourth order coastal plain river, using the criteria of Milliman and Syvitski (1992). The recent investigations conducted in the land area between Ayroor river basin and Pallickal river basin revealed that the early and middle Holocene period was characterised by heavy rainfall and excessive sediment transport from inland areas into the coastal wetlands. This may be noted as a reason behind the origin of a river from wetlands and hill slope of Western Ghats. It was inferred that sea level rise in the study area peaked about 5,000 to 6,000 years back in time (Padmalal, 2011 and Anooja et al., 2013). Pallickal River near Karunagapally showed an age of 7270±250 years in organic sediment analysis from 6.9M depth. The study forwarded the idea that the river once debouched into Kayamkulam kayal and sea oscillations and land transformations occurred during the past lead to the connection of river to southern arm of Vattakayal (Mohan et al., 2014). Sadasivan (2003) mentioned in his book 'River Disputes in India: Kerala Rivers under Siege' about the origin and river mouth of Pallickal river and observed that the river merges with Kozhikkodu Lake at Karunagapally.

Now a day, the water wealth of the river is scanty due to the unscreened human activities in the river banks and surrounding wetlands. The priority of the river for its wetland origin is less considered by the authorities. Hence direct and indirect destruction of water resources is seriously affecting the existence and perennial nature of the river. So proper ecological monitoring of the river is a primary need in designing an action plan for protecting and conserving the largest wetland river of Kerala and its biota.

The present study is a scientific approach on identifying and monitoring the ecological status of fishes in various reaches of Pallickal River- emphasizing the species, conservation status and endemism. The result of the work can act as a tool in decision making regarding the conservation and sustainable utilization of river and its values.

II. MATERIALS AND METHODS

Collection of specimen- Total river length was divided into three segments and from each segment, 5 collection sites were determined by considering ecological specialties and convenience to approach for collection (Fig. 1). Fishes were collected with the help of local fishermen, using gillnet, cast net, hooks and lines and locally using equipments, except poisoning and dynamiting. Mutilated, damaged, cut or spoiled fishes, fry or fingerlings were avoided from samples. Primary identification was done at the site and local names of the fishes were collected from local fishermen. Live specimens of known fishes were released back to the habitat after counting. Specimens collected were categorized and packed in polytene bags labelled with vernacular name and date and place of collection and then brought to laboratory in ice boxes for systematic identification.

Fixing and preservation of specimen- At laboratory, the specimens were cleaned. Photographs were taken for further use and for verification with the help of external experts. The specimens were fixed in 10% formalin for 10-12 hours and then cleaned without shedding scales or other body parts. Live fish samples were directly put into formalin solution taken in jars, which allows the proper stretching of fins and is helpful in further identification and measuring. The

cleaned specimens were preserved in 5-6% formalin (Jayaram, 1999). Healthy adults showing all taxonomic characteristics of the species were scientifically labelled and kept as standard specimens.

Identification of specimen- Identification of the collected specimen were done using standard taxonomic keys of Jayaram (1999), Easa and Shaji (2009) and Day (2006). Secondary fresh water fishes collected from downstream segments and river mouth were identified using Munro (2001). Fishes coming under the order Pleuronectiformes were identified using standard key of FAO (Munroe, 2009).

Ecological status of fish species collected -In order to understand the need and importance of the river as an ecosystem, the primary thing which should be done is to assess the uniqueness of its biota and their vulnerability. The degree of endemism and IUCN status are the major factors determining the importance of a habitat. In the present study, IUCN status of organisms, endemism and their inhabiting habitat were referred from CAMP and later redefined using IUCN official website, list of endemic fresh water fishes published by Zoosprint (Bijukumar and Raghavan, 2015).

III. RESULT

Table 1: Detailed list of fish fauna collected from Pallickal River

No.	Order	Family	Scientific name	Status	Endemism
1	Anguilliformes	Anguillidae	<i>Anguilla bengalensis bengalensis</i>	NT	-
2	Clupeiformes	Clupeidae	<i>Dayella malabarica</i>	LC	KL
3	Cypriniformes	Cyprinidae	<i>Dawkinsia filamentosa</i>	LC	WG
4			<i>Haludaria melanampyx</i>	LC	KL
5			<i>Puntius mahecola</i>	DD	KL
6			<i>Puntius vittatus</i>	LC	-
7			<i>Systomus sarana subnasutus</i>	LC	-
8			<i>Pethia ticto</i>	LC	-
9			<i>Rasbora dandia</i>	NE	-
10			<i>Devario aequipinnatus</i>	LC	-
11			<i>Devario malabaricus</i>	LC	WG
12			<i>Barilius canarensis</i>	LC	WG
13			<i>Hypselobarbus curmuca</i>	DD	WG
14			<i>Tor khudree</i>	EN	WG
15			<i>Salmostoma boopis</i>	LC	WG
16			<i>Garra mullya</i>	LC	WG
17			<i>Labeo rohita</i>	LC	-

18			<i>Labeo dussumieri</i>	LC	-
19			<i>Amblypharyngodon melattinus</i>	LC	-
20			<i>Cyprinus carpio</i>	-	-
21		Cobitidae	<i>Lepidocephalichthyes thermalis</i>	LC	-
22	Siluriformes	Bagridae	<i>Mystus montanus</i>	LC	WG
23			<i>Mystus malabaricus</i>	NT	WG
24			<i>Mystus oculatus</i>	LC	WG
25			<i>Mystus gulio</i>	LC	-
26		Horabagridae	<i>Horabagrus brachysoma</i>	VU	WG
27		Siluridae	<i>Ompok bimaculatus</i>	NT	-
28			<i>Wallago attu</i>	NT	-
29		Clariidae	<i>Clarias dussumeiri</i>	NT	KL
30		Heteropneustidae	<i>Heteropneustus fossilis</i>	LC	-
31		Cyprinodontiformes	Aplocheilidae	<i>Aplocheilus lineatus</i>	LC
32	<i>Aplocheilus blocki</i>			LC	-
33	Elopiformes	Megalopidae	<i>Megalops cyprinoides</i>	DD	
34	Perciformes	Cichlidae	<i>Eetroplus suratensis</i>	LC	-
35			<i>(Pseudo)Etroplus maculatus</i>	LC	-
36		Osphronemidae	<i>Pseudosphromenus cupanus</i>	LC	-
37		Ambassidae	<i>Parambassis thomassi</i>	LC	WG
38			<i>Parambassis dayi</i>	LC	-
39		Channidae	<i>Channa striata</i>	LC	-
40			<i>Channa micropeltus</i>	LC	-
41		Gobiidae	<i>Glossogobius guiris</i>	LC	-
42		Nandidae	<i>Nandus nandus</i>	LC	-
43		Scatophagidae	<i>Scatophagus argus</i>	LC	-
44		Anabantidae	<i>Anabas testudineus</i>	DD	-
45		Sillagidae	<i>Sillago sihama</i>	NE	-
46		Carangidae	<i>Carangus hippos</i>	DD	-
47		Siganidae	<i>Siganus javus</i>	DD	-
48	Mugiliformes	Mugilidae	<i>Liza parsia</i>	NE	-
49	Synbranchiformes	Mastacembulidae	<i>Mastacembulus armatus</i>	LC	-
50			<i>Macrognathus guentheri</i>	LC	WG
51	Beloniformes	Hydrichthidae	<i>Orysia dancena</i>	LC	-
52		Hyporhambidae	<i>Hyporhambus xanthopterus</i>	VU	KL
53		Belonidae	<i>Xenentodon cancila</i>	LC	-
54	Tetraodontiformes	Tetraodontidae	<i>Carinotetraodon travancoricus</i>	VU	WG
55	Pleuronectiformes	Solidae	<i>Brachirus orientalis</i>	NE	-

LC- Least Concerned; VU- Vulnerable; NE- Not Evaluated; KL- Endemic to Kerala; WG- Endemic to Western Ghats; DD- Data Deficient; EN- Endangered

A total of 55 species of fishes belong to 46 genera of 28 families in 12 orders were collected and identified from Pallickal river during the present study (Table 1). Among the collected species, 50 were fresh water fishes and 5 were marine fishes. Number of non natives and exotic species were very less in the ecosystem during study period. Single introduced species collected in the study was *Labeo rohita*, which was introduced from Gangetic basin during early periods and later found as a good culture fish. *Cyprinus carpio*, a true exotic species, was also collected from lower midstream sites.

Among the collected fishes, majority belong to two orders, Cypriniformes and Perciformes. In between two, true fresh water fishes were dominated in Cypriniformes and Perciformes representatives were present in both true and secondary fresh water fishes. Non- native species were in order Cypriniformes. Order Cypriniformes has 19 species in the present collection, belong to 16 genus of two families. Family Cyprinidae dominated with 18 species and family Cobitidae with single representative, *Lepidocephalichthys thermalis*. 14 Perciformes representatives were belongs to 11 genus of 11 families, most of them were single species families in present collection. Cichlidae (*Ectopoma suratensis* and *E. maculatus*), Ambassidae (*Parambassis thomassi* and *P. dayi*) and Channidae (*Channa striata* and *C. micropeltus*) were having two species in collection and the remaining eight families were mono species families. In 14 species, five species were secondary fresh water or estuarine fishes and remaining nine were true fresh water fishes. Secondary fresh water fishes were collected from lower downstream sites including river mouth.

Order Siluriformes, the fishes with evolutionary significance, has nine members in the present study, belongs to six genus of five families. Among them, Bagridae has four representatives, of the genus *Mystus* (*Mystus malabaricus*, *M. oculatus*, *M. montanus* and *M. gulio*). *Horabagrus brachysoma* from Horabagridae, *Clarias bathrachus* from Clariidae and *Heteropneustes fossilis* from Heteropneustidae are the representatives of mono species families. *Ompok*

bimaculatus and *Wallago attu* collected from midstream segment represented family Siluridae.

Order Anguiliformes has single species, *Anguilla bengalensis bengalensis*, in collection. *Dayella malabarica* of

family Clupeidae was another representative of a single member order, Clupeiformes. Other single member orders were Tetraodontiformes (*Carinotetraodon travancoricus*), Elopiformes (*Megalops cyprinoides*), Mugiliformes (*Liza parsia*) and Pleuronectiformes (*Brachirus orientalis*). Order Cyprinodontiformes (*Aplocheilus lineatus* and *A. blockii*), and Synbrachyiformes (*Mastacembulus armatus* and *Macrognathus guentheri*) were found to have two members in collection. Three members of three different families were present in order Beloniformes (*Oryzia dancena*, *Hyporhamphus xanthopterus* and *Xenentodon cancila*). Species of Beloniformes were belonging to three different families Hydrichthidae, Belonidae and Hyporhamphidae.

On considering the family diversity, Order Perciformes showed maximum number of families (12) followed by Siluriformes (5) and Cypriniformes (2). Detailed list of Piscean fauna collected from Pallickal River was given in table 1.

IV. DISCUSSION AND CONCLUSION

Pallickal River was observed on the habitat of 55 freshwater and secondary fresh water fishes, including all major native species of the hotspots area. The riverine ecosystem comes in the catchment area of southern Western Ghats, the presence of *Horabagrus*, *Mystus* and *Puntius* were noted with special reference as they are the native and representing species of the ecoregion. Absence of certain species in the collection like *Puntius denisonii*, recently renamed as *Sahyadria denisonii* was marked during this study, indicating the variation of Pallickal river origin and riverine ecology from the neighboring rivers, Achancovil and Kallada. The studies on Piscean diversity of Achancovil by Kurup et al. (2003), Sanalkumar et al. (2012) etc noted the presence *S. denisonii*.

Among the orders representing primary fresh water fishes, Cypriniformes dominated in the concerned eco system with 18 species from 14 genus as western Ghats rivers are shallow and fast moving, compared to other major rivers of the eco regions. It was followed siluriformes the decendance of primitive fishes represented with *Horabagrus*, *Mystus*, sheath fishes like *Wallago* and *Ompok* and true air breathing fishes like *Heteropneustes fossilis* and *Clarias*. Among them, *Mystus* represented with three species (*oculatus*, *montanus* and *malabaricus*). *Horabagrus brachysoma*, a vulnerable fish of Western Ghats region, often collected from midstream and upper downstream segments of major rivers was showed

healthy sustainable population margins and often caught in gillnets and hooks and lines..

This highlights the importance of revisions and further studies regarding the classification of Western Ghats fishes in detail for assessing and conserving the total riverine wealth we have. Former studies on the catchment area and related ecosystems by Bhat, 2003; Ajith et al., 2001; Abraham et al., 2013; Dahanukar et al., 2012; Kurup et al., 2004; Sanalkumar et al., 2012; and many more emphasized the Western Ghats as an enriched ecosystem for different *Puntius* species.

Puntius filamentosus (Valenciennes, 1844), recently renamed as *Dawkinsia filamentosa*, was cosmopolitan in the river, collected from the river during all seasons from all sites. Large collections of *Puntius mahecola* (Valenciennes, 1844) was obtained throughout the river. *P. mahecola* was recently reported from Kallada River by Abraham et al. (2011) and from Achencovil River by Sanalkumar et al (2013). Both species were collected in present study and resemblance and variations were analyzed and confirmed using Easa and Shaji (2003), Jayaram (1999) for validation of species.

Puntius sarana subnasutus, a medium sized food fish, previously placed under genus *Puntius*, were collected during all seasons from mid and downstream segments of the river. *Puntius fasciatus*, mentioned as *Haludaria fasciatus* is a true fresh water ornamental fish and active swimmers seen in shallow clean water and in small ponds and ditches. *H. fasciatus* is commonly using to describe fish with three vertical bands over body. Jayaram (2013) included the fish as *Puntius melanampyx* and other species showing close resemblance with the species are *P. afasciatus* and *P. negrofasciatus*. The fingerlings of *D. filamentosa* shows similar body striations and colour pattern and can be easily identified with the presence of caudal colouration and comparably small size.

Genus *Dayella* is endemic to Western Ghats (Dahanukar et al., 2012) and the species representing the taxon in present study was *Dayella malabarica*, inhabitant of both fresh and brackish water ecosystems. Distributed throughout the river and from midstream and downstream, premonsoon and postmonsoon collection showed major proportions of the species. Genus *Garra* represented with single member in collection *Garra mullya* a common fresh water fish collected from all segments. The species is described to have distribution throughout India except Assam and the Himalayas (Jayaram, 2013). The broad lateral band, dark narrow stripes in the posterior half of the body and presence of two distinct blotches, one behind the angle of operculum and other at the

caudal fin base are the morphological features describing the species (Jayaram, 2009).

Single endangered species collected in the present study was *Tor khudree*, collected from upper midstream stretches, with the help of hook and line. Only two species were collected during the study, indicating the unusual presence of the species as it is the inhabitant of water bodies with rocky floor and having location above 80MSL. *T. khudree* (Sykes, 1839) endemic to Western Ghats and IUCN enlisted as endangered species.

Single exotic species in collection was *Cyprinus carpio* (Communis) collected from midstream and downstream part of Pallickal River. Fish seed introduction by Fisheries Department in major fishing areas of Pallickal River and other neighboring rivers in 2012 and 2013 may be the reason for the presence of alien species in this natural biota, since the river shares less connections with neighboring fluvial ecosystems. *Labeo rohita*, an introduced culture fish from Gangetic plains was also present in midstream collections. Indigenous cogenetic species *L. dussumieri* specimens were collected from all segments of the river during the study.

The marine invaders and secondary fresh water fishes collected during the study were belonging to order Perciformes. *Scatopagus argus*, commonly known as 'Scat' or 'spotted Scat' was a member of lower downstream segment during all seasons. The species is Indo-Pacific in origin and was described by Linnaeus in 1831. Identification of the species was done using Day (1999), and Jayaram (2009). Another secondary fresh water fishes collected during the study were *Sillago sihama*, *Siganus javus* and *Caranx caranus*.

Smallest fish obtained in the study was *Carinotetraodon travancoricus* (Hora and Nair) (TL3.1♂2.3♀). Ample collections of Dwarf puffer, *Carinotetraodon travancoricus*, were observed during pre monsoon season at midstream and the specimen was collected from upstream during monsoon season. Small and medium sized fishes like *Puntius*, *Devario*, *Rasbora* etc established themselves successfully in the upstream stretches of the river. As moves downwards, more stable population with medium sized and large fishes of Siluriformes and Perciformes were dominated in collection. Downstream collections dominated with order Perciformes and more estuarine and marine fishes were observed in the collection.

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