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# Journal of Threatened Taxa



10.11609/jott.2022.14.7.21331-21486

[www.threatenedtaxa.org](http://www.threatenedtaxa.org)

26 July 2022 (Online & Print)

14(7): 21331-21486

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)

Open Access







ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher  
**Wildlife Information Liaison Development Society**  
www.wild.zooreach.org

Host  
**Zoo Outreach Organization**  
www.zooreach.org

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Cover: A female Javan Leopard *Panthera pardus melas* in rehabilitation phase at Cikananga Wildlife Center. © Yayasan Cikananga Konservasi Terpadu.



## A checklist of fish and shellfishes of the Poonthura estuary, southwestern coast of India

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**Abstract:** A systematic checklist of fish and shellfishes of the Poonthura estuary, Kerala, India is provided including notes on their conservation status. This checklist includes 66 finfish and five shellfish, belonging to 17 orders, 35 families, and 60 genera. Carangiformes is the richest order (11 species, eight genera, and three families), representing 15.4% of the total fish diversity. Carangidae, is the most diverse family with nine representatives, contributing to 12.6% of the total fish diversity. Following the IUCN Red List Categories, of the total 69 species (excluding both exotic and transplanted fish species), 59 belong to the 'Least Concern', while one species *Pampus argenteus* is listed as 'Vulnerable', four are 'Data Deficient' (*Megalops cyprinoides*, *Arius maculatus*, *Cynoglossus semifasciatus*, and *Epinephelus tauvina*) and five are 'Not Evaluated' (*Nuchequula blochii*, *Channa pseudomarulius*, *Penaeus indicus*, *P. monodon*, and *Scylla serrata*). Around 94% of the recorded fish fauna have commercial value and contribute to subsistence fisheries throughout the year. Taxonomy and diversity of fish fauna of least studied or isolated estuarine ecosystems should be updated with proper documentation of their conservation status, in order to design and implement pragmatic management and conservation programs.

**Keywords:** Brackish water, fish diversity, Ichthyofauna, Kerala estuaries.

**Editor:** J.A. Johnson, Wildlife Institute of India, Dehradun, India.

**Date of publication:** 26 July 2022 (online & print)

**Citation:** Bella, K., P. Sahadevan, G.B. Sreekanth & R. Raghavan (2022). A checklist of fish and shellfishes of the Poonthura estuary, southwestern coast of India. *Journal of Threatened Taxa* 14(7): 21409–21420. <https://doi.org/10.11609/jott.7683.14.7.21409-21420>

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**Funding:** There is no specific funding pertaining to this manuscript.

**Competing interests:** The authors declare no competing interests.

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**Acknowledgements:** We are grateful to Dr. Riji John, vice chancellor, Kerala University of Fisheries and Ocean Studies (KUFOS) Kochi, India, Dr. Rosalind George, dean, Faculty of Fisheries, KUFOS, and to Dr. M.K. Sajeevan, head of the Department of Fisheries Resource Management for providing the necessary help and support for the accomplishment of the present research work. We are thankful to Dr. Anvar Ali, assistant professor, KUFOS, for his help in taxonomic confirmation of fishes which helped to improve the quality of this manuscript. We are grateful to Dr. Karan Ramteke, scientist, ICAR CIFE- Mumbai and Mr. Ashish Sahu, PhD student, KUFOS for their technical help during the preparation of the manuscript.



## INTRODUCTION

Estuaries are transitional zones between sea and freshwater that are inhabited by both inland and marine species, including their juvenile stages (McLusky & Elliott 2006; Elliott et al. 2007; Franco et al. 2008; Potter et al. 2010; Sreekanth et al. 2018). Compared to marine or freshwater systems, estuaries are variable, complicated, and stressful habitats (Selleslagh & Amara 2008; Human et al. 2016; Kiranya et al. 2022). Many commercially important fish species benefit from the highly productive nature of estuaries as their nursery area (Harrison & Kelly 2013). Therefore, much emphasis is required to protect estuarine environments so as to ensure the growth and survival of commercially important fish and shellfish species (Elliott et al. 2007).

The estuaries, backwaters, coastal creeks and large brackishwater systems contribute to a significant part of fish production in India (Nair et al. 1983; Tudu et al. 2018). The peculiarity of Indian estuaries is that they are characterized by high species diversity with low numerical abundance (Sreekanth et al. 2019). Poonthura Estuary situated in the Thiruvananthapuram district of Kerala is comparatively small and shallow, and is formed due to the formation of a sand bar near the estuarine mouth (Kiranya et al. 2018). Previous authors who worked on this estuary have reported its ecological degradation mainly due to indiscriminate fishing and pollution from point and non-point sources (Kiranya et al. 2018).

In Kerala, considerable number of studies have dealt with taxonomic entities within estuarine systems, i.e., species composition, species distribution, and abundance, and spatial and temporal variations in fish diversity (Bijukumar & Sushama 2000; Harikrishnan et al. 2011; Regi & Bijukumar 2012; Kiranya et al. 2018; Roshni et al. 2021; Kiranya et al. 2022), with many such studies concentrated on a single estuary, the Vembanad Lake (Kurup & Samuel 1987; Menon et al. 2000; Harikrishnan et al. 2011; Roshni et al. 2021). There is considerable knowledge gap on the fish diversity and distribution patterns in many estuaries of Kerala, notably in the case of smaller systems such as Poonthura estuary, because of their isolated nature (Kiranya et al. 2018, 2022). Considering this lacuna, the present study focuses on presenting a comprehensive checklist of fish and shellfish species of Poonthura estuary, along with their systematic position, and conservation status (according to the IUCN Red List). The increasing availability of data on estuarine fish and shellfish fauna will facilitate their use in greater detail to design and implement pragmatic strategies

and programs for estuarine fisheries management and conservation.

## MATERIALS AND METHODS

### Study area

The Poonthura Estuary (0.9 km<sup>2</sup> long and 0.1 km wide) is one of the most ecologically significant, and at the same time a polluted estuary in Thiruvananthapuram, Kerala (Kiranya et al. 2022). The estuary is micro-tidal and partially mixed, with an average tidal range of 1.5 m, and separated from the Lakshadweep Sea by a sand bar at Poonthura. The sand bar opens during the monsoon due to heavy discharge of water from the River Karamana. During heavy river discharge and land drainage during the monsoon, the sand bar between sea and estuary is either naturally, or manually opened. Artificial breaching of the estuary is also a frequent practice in this area to avoid flooding into nearby human settlements (Kiranya et al. 2018). The Poonthura estuary has also been undergoing severe ecological degradation with its bottom being muddy with a pungent smell, due to the unmanaged disposal of municipal sewage, land drainage, and industrial effluents (Kiranya et al. 2018). Full-time, part time and migrant fishers of 200 families of the adjoining areas belonging to the traditional sector depend on this estuary both directly and indirectly for subsistence, almost throughout the year (Kiranya et al. 2018).

### Sampling and analysis

The present study was carried out in multiple phases from June 2016 to October 2020. Three sampling stations were fixed based on the fishing activity, tidal influx, and drainage from rivers/ land. Monthly samples of fish and shellfish were collected from the selected stations (Image 1). Sampling was performed during early morning using 110 m surface and bottom set gillnets (mesh size 30 mm) and 4.5 m cast net (mesh size 8 mm) (one sampling each using both bottom set gillnet, surface gill net and cast net at a sampling station) operated from a small plank-built canoe (3 m LOA). Identification of fish and shellfishes were done at the species level by using published keys (Jayaram 1981; Fischer & Bianchi 1984). Identification of *Channa pseudomarulius* followed Britz et al. (2017). Taxonomic status and systematic position of fishes follow the Catalog of Fishes (Fricke et al. 2021) and World Register of Marine Species database (WoRMS 2021). Vernacular and local names of fish and shellfish species were collected from the traditional fishers

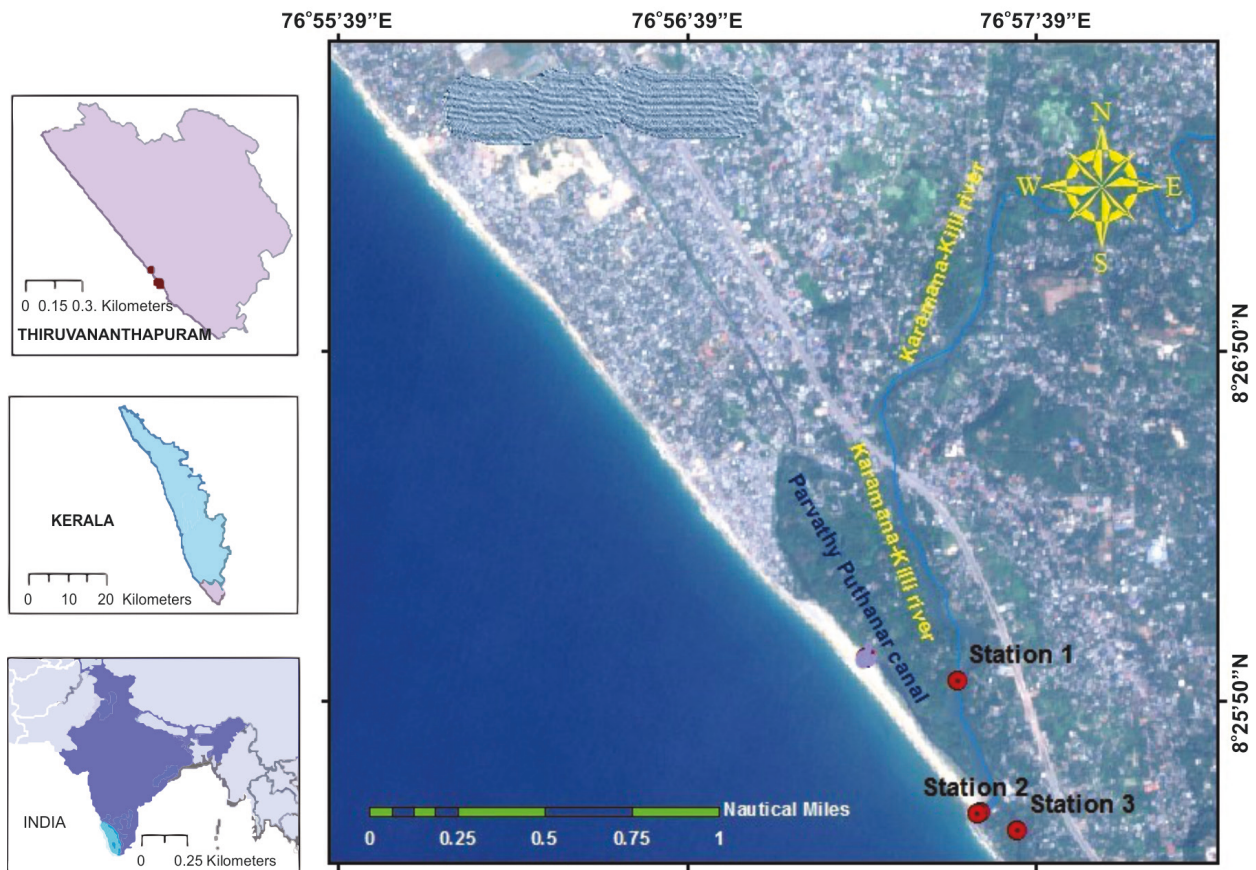


Image 1. Map of Poonthura estuary, with three sampling stations marked.

through questionnaires. The conservation status of fish species is based on the IUCN Red List of Threatened Species (IUCN 2021). Voucher specimens and photo vouchers (of those species whose specimens were not collected) are deposited in the Department of Fisheries Resource Management, Kerala University of Fisheries and Ocean Studies, Kochi, Kerala, India.

## RESULTS AND DISCUSSION

Total of 71 species (66 finfish and five shellfishes) within 17 orders and 35 families and 60 genera were recorded from Poonthura estuary (Table 1) (Image 2a–g). The dominant fish orders recorded were Carangiformes (15.4%) with 11 species followed by orders Clupeiformes (14%), Perciformes (11.2%), Mugiliformes (7.04%), Cypriniformes (7.04%), and members of the crustacean order Decapoda (7.04%) (Figure 2). Comparable results were recorded by Regi & Bijukumar (2012), who observed that Perciformes, Siluriformes, Clupeiformes, and Mugiliformes, were the most common taxonomic

orders in the Veli-Akkulam backwaters which is the adjacent backwater system (13 km away from Poonthura estuary) and shares similar characteristics with Poonthura estuary such as small size, isolated, and temporarily closed nature.

The dominant finfish families recorded in Poonthura estuary (Figure 3) were Carangidae with nine species (12.6%), Clupeidae with six species, Mugilidae and Cyprinidae with five species each (7.04%), and Leiognathidae and Ambassidae with four species (5.6%). The major species within family Carangidae were *Atule mate*, *Caranx ignobilis*, *Alepes djedaba*, and *Trachinotus blochii*.

Species such as *Eetroplus suratensis*, *Oreochromis mossambicus*, *Gerres filamentosus*, *Chelon parsia*, *Mugil cephalus*, *Arius arius*, and *Caranx ignobilis* represented the most common species of the estuarine system, with *Eetroplus suratensis* and *Oreochromis mossambicus* being recorded throughout the year during the study period. The present study also revealed the occurrence of two fish species having ornamental value, the filament barb, *Dawkinsia filamentosa* and the silver moony,



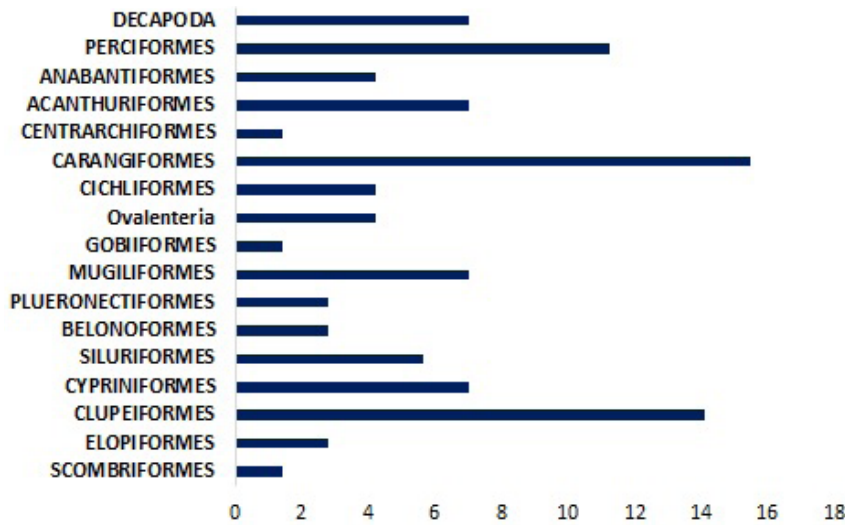


Figure 1. Order-wise composition of fish and shellfish species recorded from the Poonthura estuary.

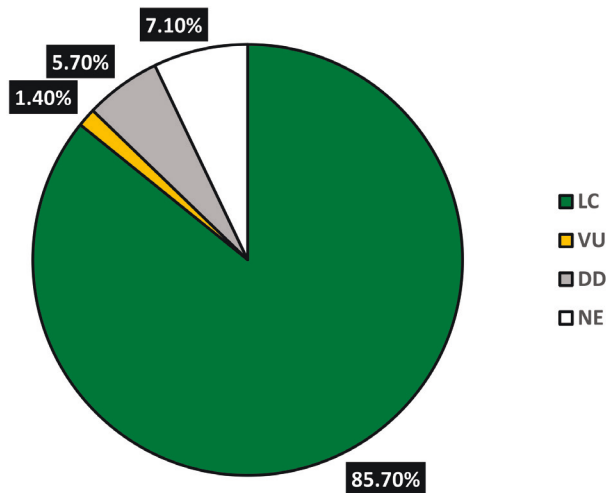


Figure 2. IUCN conservation status of fish and shellfish species recorded from Poonthura estuary.

*Monodactylus argenteus*.

Of the four species of shrimps/prawns recorded from the estuary, *Penaeus indicus* was the dominant species followed by *P. monodon* and *Macrobrachium rosenbergii*. The mud crab *Scylla serrata* was the only representative of crabs that was observed in the local catches.

Based on the IUCN Red List of Threatened Species, of the 69 species recorded (excluding exotic and translocated species) from Poonthura Estuary, 85.7% (59 species) were under the ‘Least Concern’ category, one species was under the ‘Vulnerable’ category (*Pampus argenteus*), four species under the ‘Data Deficient’

(*Megalops cyprinoides*, *Arius maculatus*, *Cynoglossus semifasciatus*, and *Epinephelus tauvina*) and five under the ‘Not Evaluated’ (*Nuchequula blochii*, *Channa pseudomarulius*, *Penaeus indicus*, *P. monodon*, and *Scylla serrata*) categories (Figure 3).

Several authors have studied estuarine fish diversity of west flowing river systems in Kerala, most of them pointing at the predominance of finfish species. Bijukumar & Sushama (2000) presented an overview of the ichthyofauna of the Ponnani estuary representing 112 finfish species belonging to 14 orders, 53 families, and 80 genera. Kurup & Samuel (1987) recorded 150 species of fishes from Vembanad lake, while a recent study by Roshni et al. (2021) reported 90 species of fish belonging to 17 orders and 40 families suggesting a 40% reduction in fish fauna since 1980s. Raj et al. (2014) reported 68 species of finfishes, five species of crabs, nine species of prawns from the Ashtamudi estuary, and stated that pearlspot and mullets supported good local fisheries. From Chettuva estuary, Johny et al. (2016) recorded 68 species of fish belonging to 45 genera while the diversity of nearby Azhikode estuary was known to comprise of 30 finfishes (Harikrishnan et al. 2011). Fifty species under 40 genera of finfish were recorded from the Akathumuri backwaters (Satheesan et al. 2014). Regi & Bijukumar (2012) also reported the occurrence of two non-native/ exotic species (*Oreochromis mossambicus* and *Clarias gariepinus*) from the Veli-Akkulam lake. According to the above authors, *O. mossambicus* has dominated the native fish species in many Indian water bodies due to its prolific breeding, voracious feeding habits, and hardy nature.

**Table. 1** Checklist of fish and shellfish recorded from Poonthura estuary, their taxonomic position, common and vernacular names, IUCN Red List status and voucher numbers.

	Order/Family/Species	Common name	Vernacular name	IUCN status	Voucher number
<b>I</b>	<b>ORDER ELOPIFORMES</b>				
<b>1</b>	<b>ELOPIDAE (Ten pounders/Lady fishes)</b>				
	<i>Elops machnata</i> (Forsskål, 1775)	Ladyfish/ten pounder	Oluvia meen	LC	Photo voucher
<b>2</b>	<b>MEGALOPIDAE (Tarpons)</b>				
	<i>Megalops cyprinoides</i> Broussonet, 1782	Indo-pacific tarpon	Kannamalavu	DD	KUFOS.FV.2019.1041
<b>II</b>	<b>ORDER CLUPEIFORMES</b>				
<b>3</b>	<b>CLUPEIDAE (Herrings, Sardines, Sprats)</b>				
	<i>Anodontostoma chacunda</i> (Hamilton, 1822)	Shortnose gizzard shad	Noona	LC	KUFOS.FV.2019.1042
	<i>Amblygaster sirm</i> (Walbaum, 1792)	Spotted sardine	Keeri chaala	LC	KUFOS.FV.2019.1045
	<i>Dayella malabarica</i> (Day, 1873)	Day's round herring	Kayal netholi	LC	KUFOS.FV.2016.1007
	<i>Nematalosa nasus</i> (Bloch, 1795)	Bloch's gizzard shad	Kuthavu	LC	Photo voucher
	<i>Sardinella albella</i> (Valenciennes, 1847)	White sardine	Chappa chaala	LC	KUFOS.FV.2019.1044
	<i>Sardinella gibbosa</i> (Bleeker, 1849)	Goldstripe sardinella	Mullan chaala	LC	KUFOS.FV.2019.1043
<b>4</b>	<b>ENGRAULIDAE (Anchovies)</b>				
	<i>Encrasicholina devisi</i> (Whitley, 1940)	Devi's anchovy	Netholi	LC	KUFOS.FV.2019.1046
	<i>Stolephorus indicus</i> (Van Hasselt, 1823)	Indian anchovy	Vella Netholi	LC	KUFOS.FV.2019.1047
	<i>Thryssa mystax</i> (Bloch & Schneider, 1801)	Moustached anchovy	Mullan manangu	LC	Photo voucher
<b>5</b>	<b>CHIROCENTRIDAE (Wolf herring)</b>				
	<i>Chirocentrus dorab</i> (Forsskål, 1775)	Dorab wolf-herring	Mulluvaala	LC	KUFOS. FV.2017.1009
<b>III</b>	<b>ORDER CYPRINIFORMES</b>				
<b>6</b>	<b>CYPRINIDAE (Minnows and Carps)</b>				
	<i>Amblypharyngodon microlepis</i> (Bleeker, 1853)	Indian carplet	Vayambu	LC	KUFOS.FV.2020.1002
	<i>Dawkinsia filamentosa</i> (Valenciennes, 1844)	Filament barb	Kayal Paral	LC	KUFOS.FV.2020.1001
	<i>Labeo catla</i> (Hamilton, 1822)	Catla	Katla	TR	KUFOS.FV.2019.1049
	<i>Puntius parrah</i> Day, 1865	Parrah barb		LC	KUFOS.FV.2019.1050
	<i>Systemus sarana</i> (Hamilton, 1822)	Olive barb	Kuruva	LC	KUFOS.FV.2019.1048
<b>IV</b>	<b>ORDER SILURIFORMES</b>				
<b>7</b>	<b>BAGRIDAE (Bagrid catfishes)</b>				
	<i>Mystus armatus</i> (Day, 1865)	Kerala mystus	Chillan thedu	LC	KUFOS.FV.2019.1051
<b>8</b>	<b>ARIIDAE (Sea catfishes)</b>				
	<i>Arius arius</i> (Hamilton, 1822)	Threadfin sea catfish	Thedu	LC	KUFOS.FV.2020.1003
	<i>Arius maculatus</i> (Thunberg, 1792)	Spotted catfish	Kadal thedu	DD	Photo voucher
<b>9</b>	<b>HETEROPNEUSTIDAE (Stinging catfish)</b>				
	<i>Heteropneustes fossilis</i> (Bloch, 1794)	Stinging catfish	Karuppan thedu	LC	KUFOS.FV.2020.1004
<b>V</b>	<b>ORDER BELONIFORMES</b>				
<b>10</b>	<b>BELONIDAE (Needle fish)</b>				
	<i>Xenentodon cancila</i> (Hamilton, 1822)	Freshwater garfish	Chundu mural	LC	KUFOS.FV.2019.1052
<b>11</b>	<b>HEMIRAMPHIDAE (Half beaks)</b>				
	<i>Hyporhamphus xanthopterus</i> (Valenciennes, 1847)	Valenciennes halfbeak	Kolaachi	LC	KUFOS.FV.2016.1001
<b>VI</b>	<b>ORDER GOBIIFORMES</b>				
<b>12</b>	<b>GOBIIDAE (Gobies)</b>				
	<i>Glossogobius giuris</i> (Hamilton, 1822)	Tank goby	Poonthi	LC	KUFOS.FV.2017.1001

	Order/Family/Species	Common name	Vernacular name	IUCN status	Voucher number
VII	<b>ORDER Incertae sedis under Ovalenteria</b>				
13	<b>AMBASSIDAE (Asiatic glassfishes)</b>				
	<i>Ambassis gymnocephalus</i> (Lacepède, 1802)	Naked- head glassy perchlet	Mullu nandhan	LC	KUFOS.FV.2020.1007
	<i>Parambassis dayi</i> (Bleeker, 1874)	Day's glassy perchlet	Nandhan	LC	KUFOS.FV.2020.1020
	<i>Parambassis thomassi</i> (Day, 1870)	Westernghat glassy perchlet	Nandhan	LC	KUFOS.FV.2020.1006
VIII	<b>MUGILIFORMES</b>				
14	<b>MUGILIDAE (Mulletts)</b>				
	<i>Chelon parsia</i> (Hamilton, 1822)	Gold spot mullet	Kadam maalvu	LC	KUFOS.FV.2020.1008
	<i>Crenimugil seheli</i> (Fabricius, 1775)	Blue spot mullet	Parichal	LC	KUFOS.FV.2020.1002
	<i>Mugil cephalus</i> Linnaeus, 1758	Grey mullet	Maalavu	LC	KUFOS.FV.2019.1055
	<i>Osteomugil perusii</i> (Valenciennes, 1836)	Long finned mullet	Kadapola	LC	KUFOS.FV.2019.1053
	<i>Planiliza subviridis</i> (Valenciennes, 1836)	Green black mullet	Kelayan	LC	KUFOS.FV.2019.1054
IX	<b>CICHLIFORMES</b>				
15	<b>CICHLIDAE (Cichlids)</b>				
	<i>Etroplus suratensis</i> (Bloch, 1790)	Banded pearl spot	Karimeen	LC	KUFOS.FV.2016.1003
	<i>Oreochromis mossambicus</i> (Peters, 1852)	Mozambique tilapia	Piloppi	EX	KUFOS.FV.2016.1002
	<i>Pseudetroplus maculatus</i> Bloch, 1795	Orange chromide	Pallathi	LC	KUFOS.FV.2020.1009
X	<b>ORDER CARANGIFORMES</b>				
16	<b>CARANGIDAE (Jacks and Pompanos)</b>				
	<i>Alepes djedaba</i> (Forsskål, 1775)	Shrimp scad	Thovi paara	LC	KUFOS.FV.2017.1011
	<i>Alepes vari</i> (Cuvier, 1833)	Herring scad	Thali paara	LC	KUFOS.FV.2020.1022
	<i>Atule mate</i> (Cuvier, 1833)	Yellowtail scad	Manjaval paara	LC	KUFOS.FV.2016.1008
	<i>Caranx heberi</i> (Bennett, 1830)	Blacktip trevally	Karuppuvalan paara	LC	KUFOS.FV.2020.1023
	<i>Caranx hippos</i> (Linnaeus, 1766)	Common jack	Neelan paara	LC	KUFOS.FV.2016.1007
	<i>Caranx ignobilis</i> (Forsskål, 1775)	Yellowfin trevally	Velaa paara	LC	KUFOS.FV.2016.1009
	<i>Decapterus russelli</i> (Rüppell, 1830)	Indian scad	Kannan kozhiyala	LC	KUFOS.FV.2017.1012
	<i>Megalaspis cordyla</i> (Linnaeus, 1758)	Torpedo scad	Vankada	LC	KUFOS.FV.2020.1024
	<i>Selar crumenophthalmus</i> (Bloch, 1793)	Big eye scad	Kaata paara	LC	KUFOS.FV.2017.1010
17	<b>SPHYRAENIDAE (Barracudas)</b>				
	<i>Sphyraena barracuda</i> (Edwards, 1771)	Great barracuda	Cheelavu	LC	KUFOS.FV.2019.1058
18	<b>LATIDAE (Lates perches)</b>				
	<i>Lates calcarifer</i> (Bloch, 1790)	Asian seabass	Kalaanji	LC	KUFOS.FV.2020.1012
XI	<b>ORDER ANABANTIFORMES</b>				
19	<b>ANABANTIDAE (Climbing gouramies)</b>				
	<i>Anabas testudineus</i> (Bloch, 1792)	Climbing perch	Karippidi	LC	KUFOS.FV.2017.1002
20	<b>CHANNIDAE (Snakeheads)</b>				
	<i>Channa pseudomaculatus</i> (Günther, 1861)	Great snake head	Chaerumeen	NE	KUFOS.FV.2020.1010
	<i>Channa striata</i> (Bloch, 1793)	Striped snakehead	Varal	LC	KUFOS.FV.2017.1003
XII	<b>PLUERONECTIFORMES</b>				
21	<b>CYNOGLOSSIDAE (Tongue fishes)</b>				
	<i>Cynoglossus semifasciatus</i> Day, 1877	Bengal tonguesole	Nangu	DD	KUFOS.FV.2017.1004
22	<b>SOLEIDAE (Soles)</b>				
	<i>Brachirus orientalis</i> (Bloch & Schneider, 1801)	Oriental sole	Kuruvan nangu	LC	KUFOS.FV.2020.1011
XIII	<b>ORDER SCOMBRIFORMES</b>				
23	<b>STROMATEIDAE (Butter fishes)</b>				



	Order/Family/Species	Common name	Vernacular name	IUCN status	Voucher number
	<i>Pampus argenteus</i> (Euphrasen, 1788)	Silver pomfret	Vella avoli	VU	KUFOS.FV.2019.1059
<b>XIV</b>	<b>ORDER PERCIFORMES</b>				
24	<b>GERREIDAE (Mojarras)</b>				
	<i>Gerres filamentosus</i> (Cuvier, 1829)	Whipfin silverbiddy	Pulli prachi	LC	KUFOS.FV.2020.1013
	<i>Gerres setifer</i> (Hamilton, 1822)	Black tipped silverbiddy	Prachi	LC	KUFOS.FV.2020.1014
25	<b>SILLAGINIDAE (Sillagos or Whitings)</b>				
	<i>Sillago sihama</i> (Forsskål, 1790)	Silver whiting	Kalimeen	LC	KUFOS.FV.2020.1017
26	<b>SERRANIDAE (Groupers)</b>				
	<i>Epinephelus tauvina</i> (Forsskål, 1775)	Greasy grouper	Kalava	DD	Photo voucher
27	<b>MONODACTYLIDAE (Moon fishes)</b>				
	<i>Monodactylus argenteus</i> (Linnaeus, 1758)	Silver moony fish	Kannadimeen	LC	KUFOS.FV.2016.1004
28	<b>LUTJANIDAE (Snappers)</b>				
	<i>Lutjanus argentimaculatus</i> (Forsskål, 1775)	Mangrove red snapper	Velameen	LC	KUFOS.FV.2020.1016
	<i>Lutjanus fulviflamma</i> (Forsskål, 1775)	Dory snapper	Pulli chemballi	LC	Photo voucher
29	<b>HAEMULIDAE (Sweet lips)</b>				
	<i>Plectorhinchus gibbosus</i> (Lacepède, 1802)	Brown sweetlips	Kaili	LC	KUFOS.FV.2020.1019
<b>XV</b>	<b>ORDER CENTRARCHIFORMES (Sun fishes)</b>				
30	<b>TERAPONTIDAE (Grunters or Tigerfishes)</b>				
	<i>Terapon jarbua</i> (Forsskål, 1775)	Crescent perch	Konankora	LC	KUFOS.FV.2020.1015
<b>XVI</b>	<b>ORDER ACANTHURIFORMES (Surgeon fishes)</b>				
31	<b>LEIOGNATHIDAE (Pony fishes or Slip mouths)</b>				
	<i>Eubleekeria splendens</i> (Cuvier, 1829)	Splendid ponyfish	Mullukaara	LC	KUFOS.FV.2019.1061
	<i>Gazza minuta</i> (Bloch, 1795)	Toothed ponyfish	Chadhakaara	LC	KUFOS.FV.2019.1060
	<i>Leiognathus equulus</i> (Forsskål, 1775)	Common ponyfish	Kaara poochi	LC	KUFOS.FV.2016.1005
	<i>Nuchequula blochii</i> (Valenciennes, 1835)	Twoblotch ponyfish	Paalkaara	NE	KUFOS.FV.2019.1062
32	<b>SCATOPHAGIDAE (Scats)</b>				
	<i>Scatophagus argus</i> (Linnaeus, 1766)	Spotted butterfish	Poola	LC	KUFOS.FV.2016.1006
<b>XVII</b>	<b>ORDER DECAPODA</b>				
33	<b>PALAEMONIDAE (Palaemonid shrimps)</b>				
	<i>Macrobrachium idella</i> (Hilgendorf, 1898)	Slender river prawn	Koona konju	LC	KUFOS.CV.2020.1018
	<i>Macrobrachium rosenbergii</i> (De Man, 1879)	Giant river prawn	Kaalan konju	LC	KUFOS.CV.2017.1005
34	<b>PENAEIDAE (Penaeid shrimps)</b>				
	<i>Penaeus indicus</i> (H. Milne-Edwards, 1837)	Indian white prawn	Naaran konju	NE	KUFOS.CV.2019.1063
	<i>Penaeus monodon</i> (Fabricius, 1798)	Giant tiger prawn	Kara konju	NE	KUFOS.CV.2017.1006
35	<b>PORTUNIDAE</b>				
	<i>Scylla serrata</i> (Forsskål, 1775)	Green mud crab	Kayal Njandu	NE	KUFOS.CV.2017.1007

LC—Least Concern | DD—Data Deficient | NE—Not Evaluated | VU—Vulnerable | TR—Transplanted | EX—Exotic | B—Brackishwater | F—Freshwater | M—Marine.

The conservation and management of Poonthura estuary necessitates a holistic approach that takes in to account the ecosystem balance and function as well as the restoration of the natural fish diversity of the estuary, thus ensuring fishing activities that are economically viable in the long-term.

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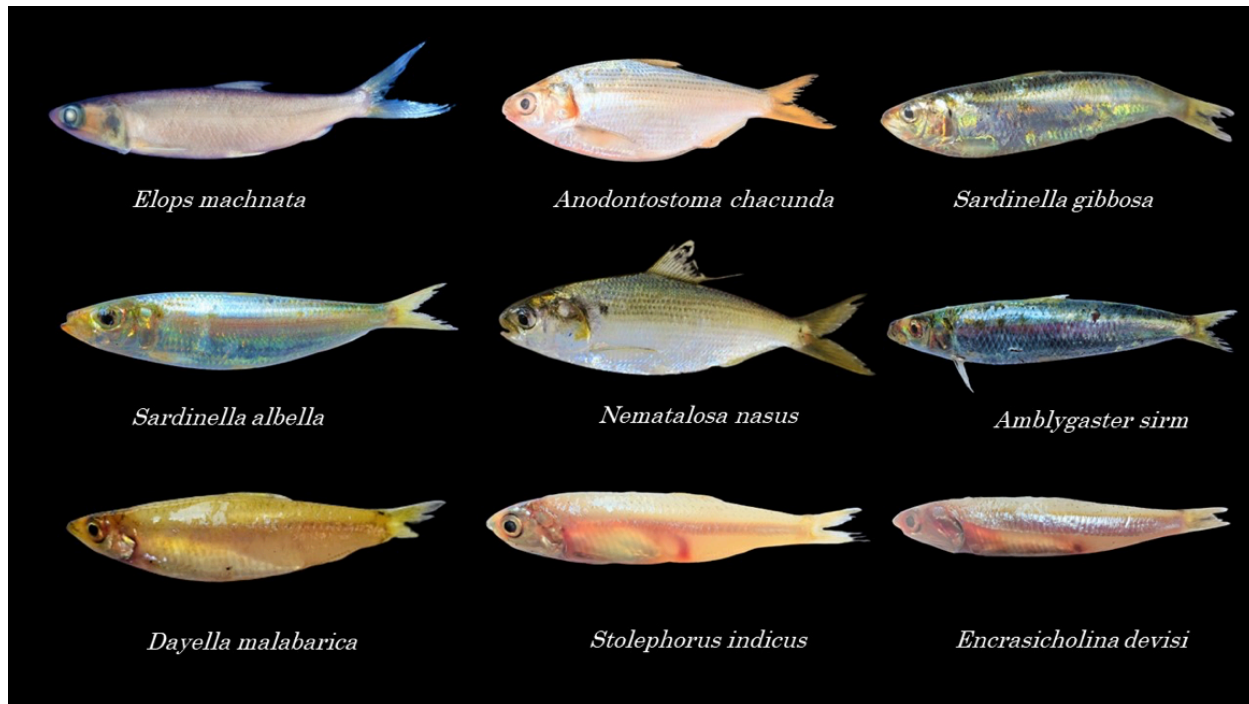


Image 2a . Fish species recorded from the Poonthura estuary. © Kiranya B.

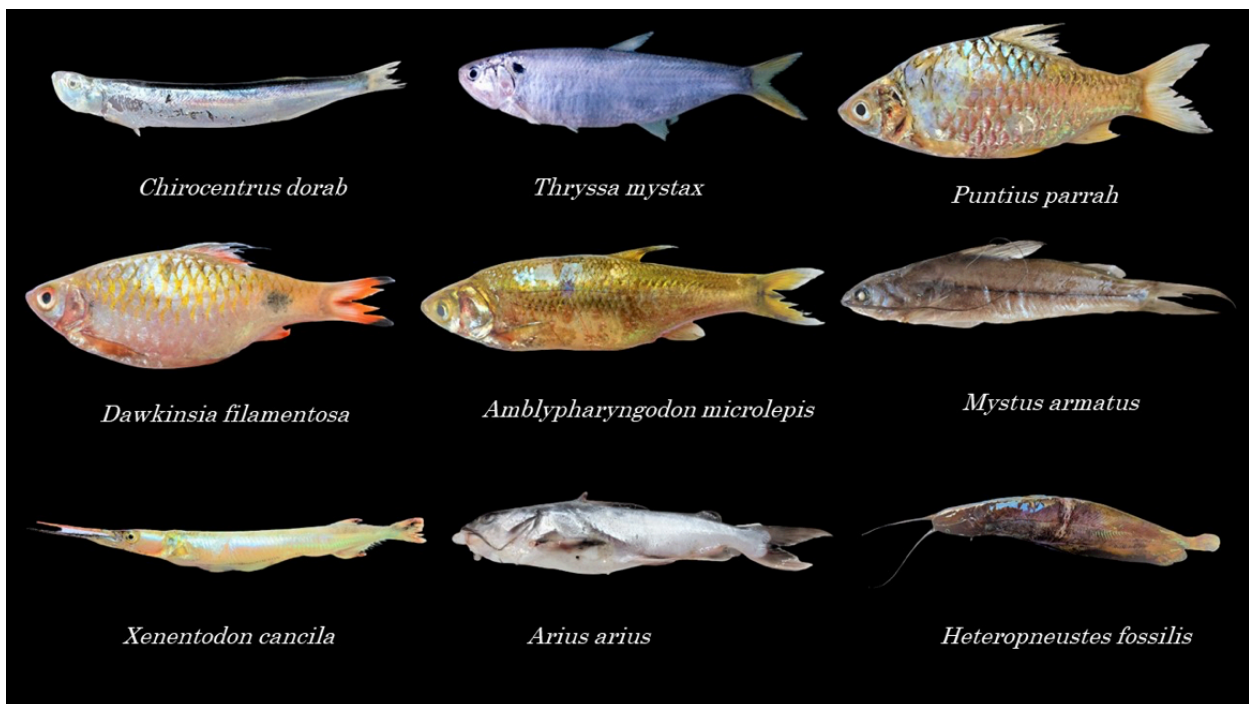


Image 2b. Fish species recorded from the Poonthura estuary. © Kiranya B.



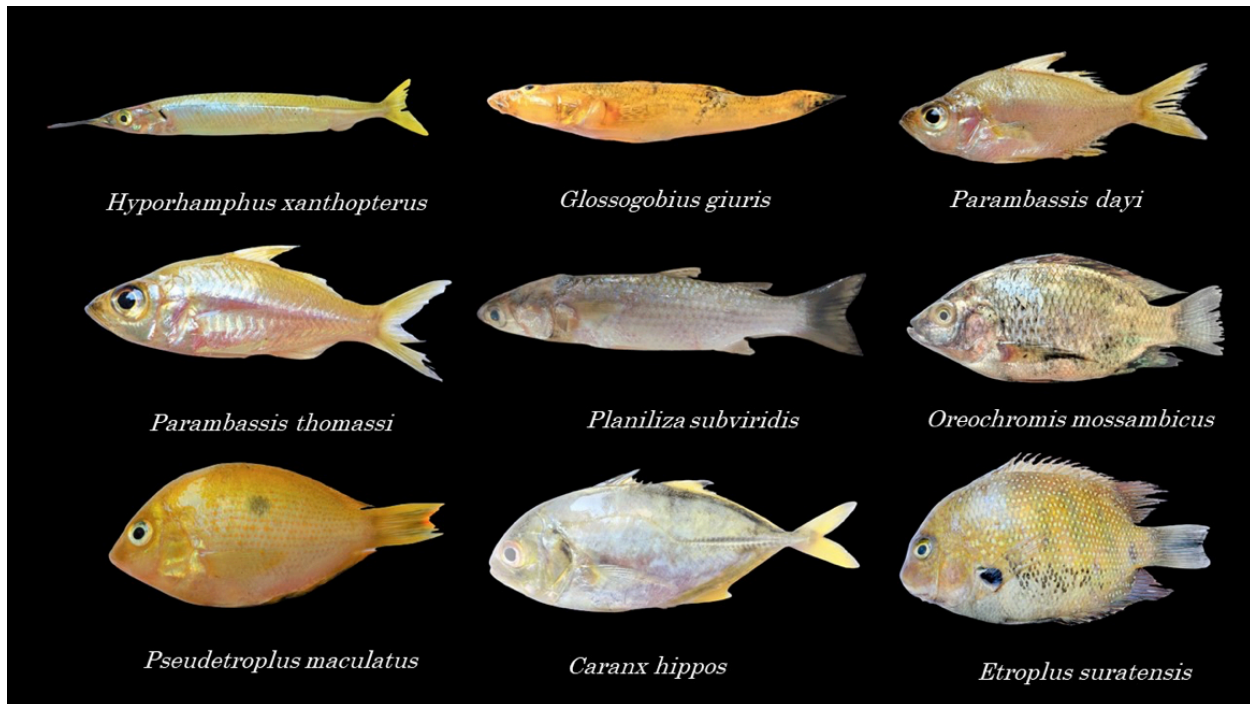


Image 2c. Fish species recorded from the Poonthura estuary. © Kiranya B.

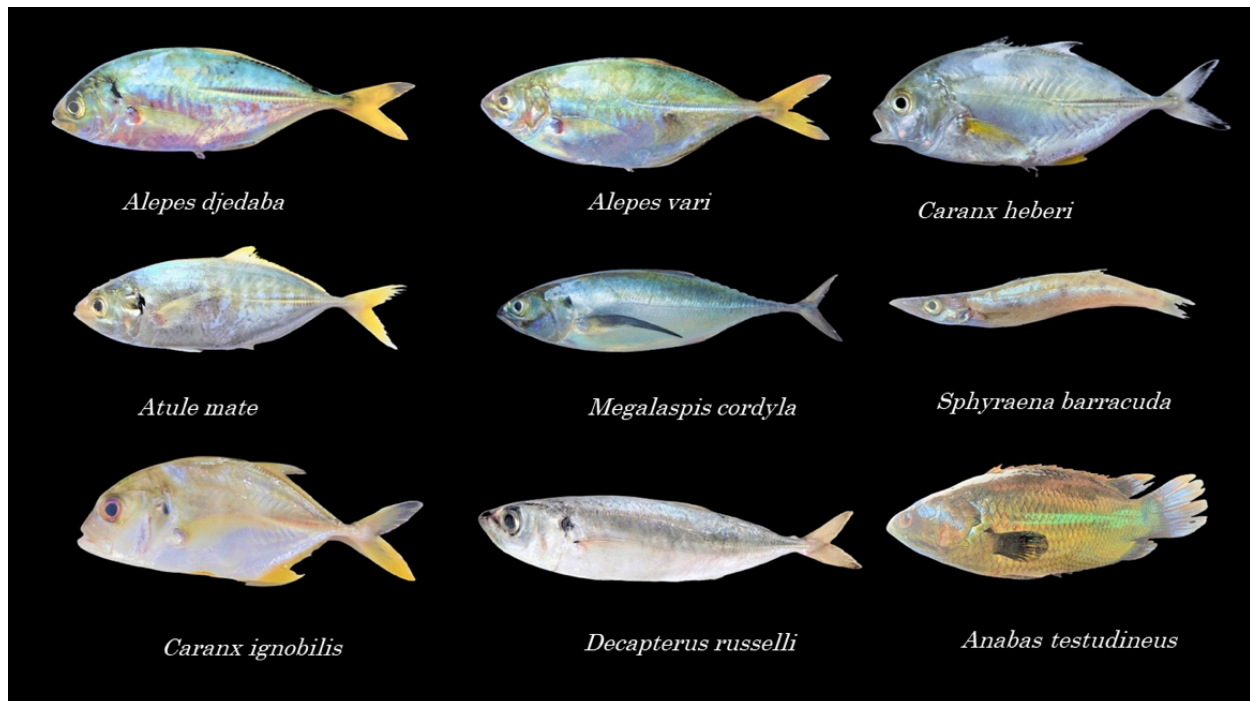


Image 2d. Fish species recorded from the Poonthura estuary. © Kiranya B.

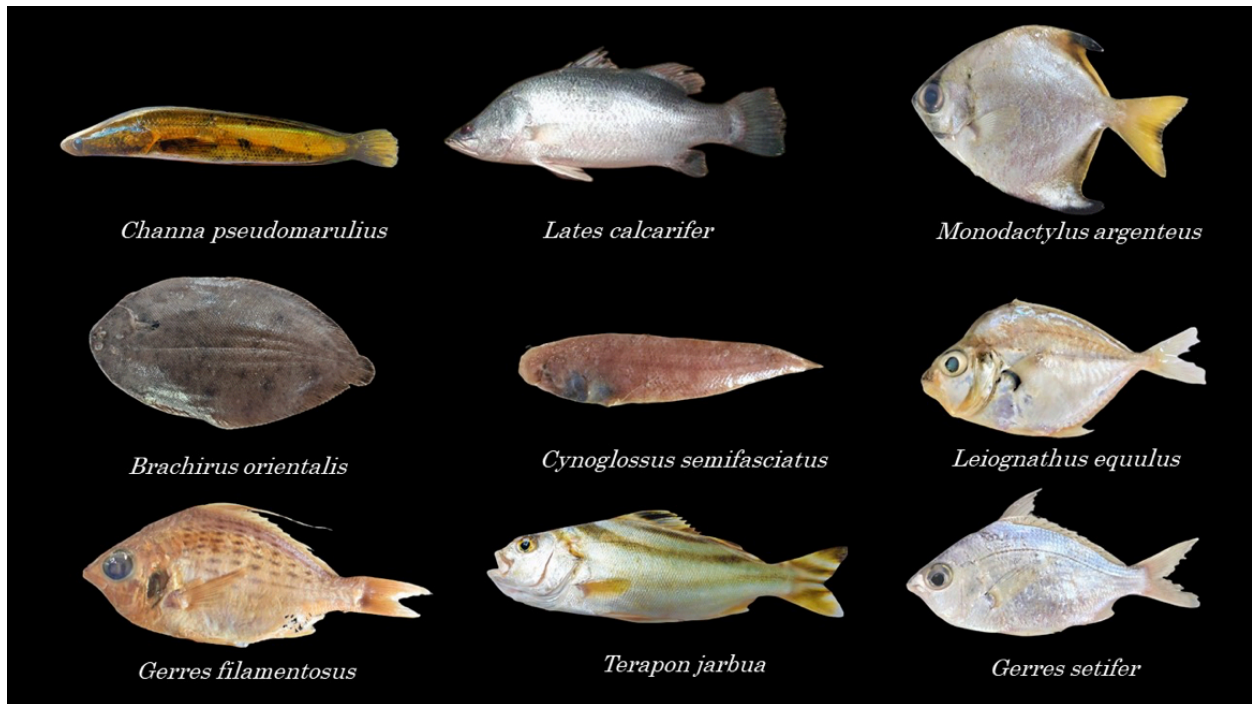


Image 2e. Fish species recorded from the Poonthura estuary. © Kiranya B.

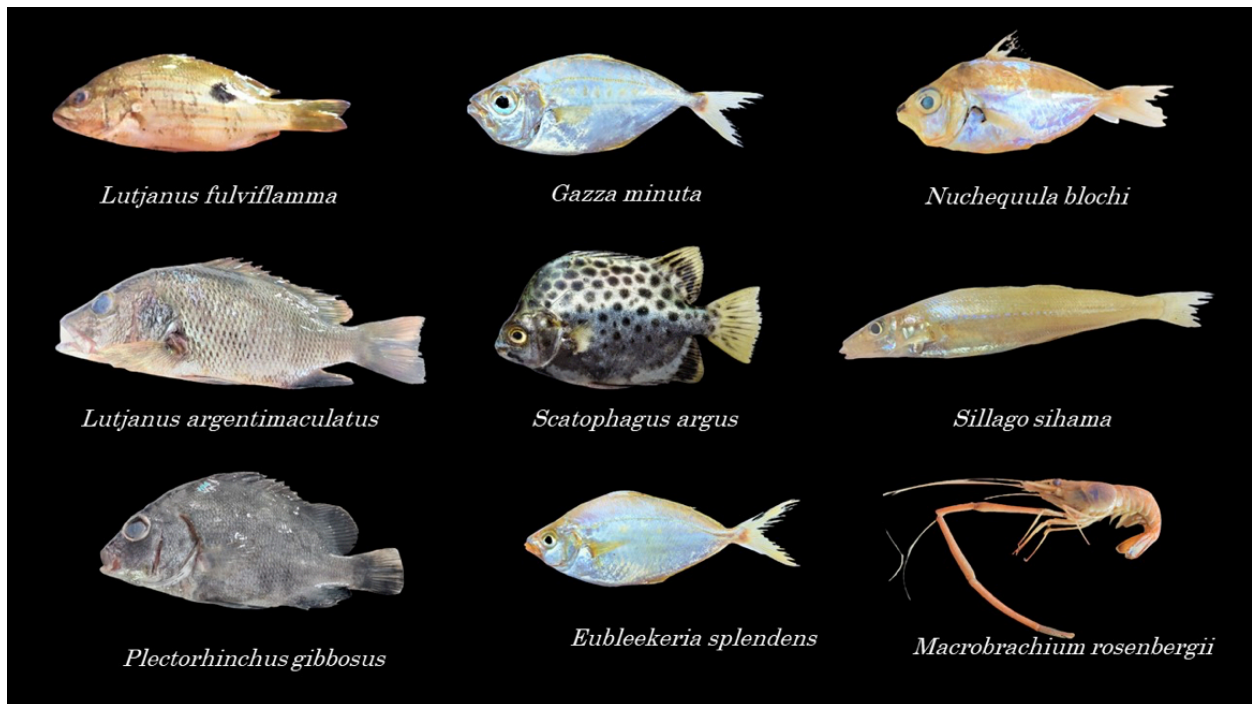


Image 2f. Fish species recorded from the Poonthura estuary. © Kiranya B.



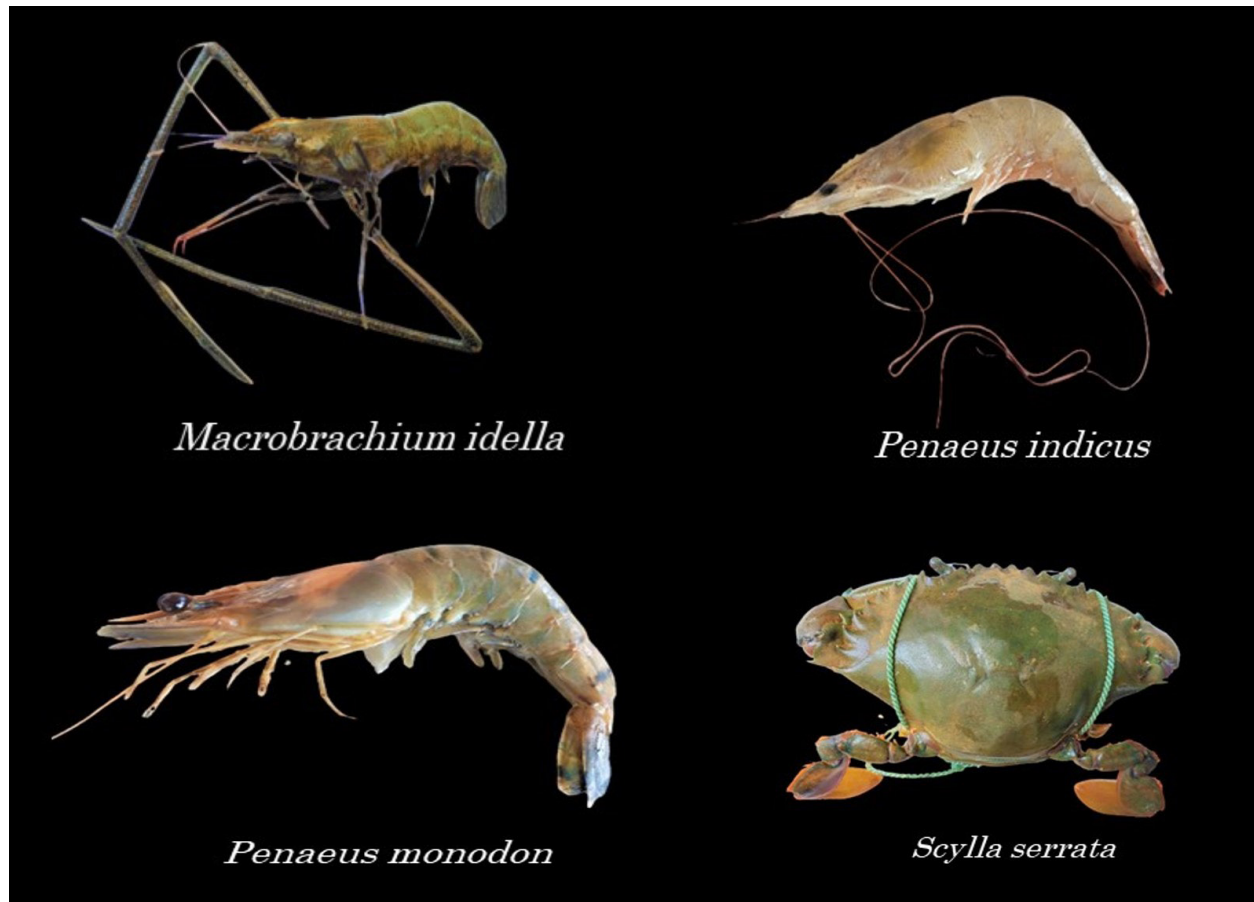


Image 2g. Shellfish species recorded from the Poonthura estuary. © Kiranya B.

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**Journal of Threatened Taxa** is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64

Print copies of the Journal are available at cost. Write to:  
The Managing Editor, JoTT,  
c/o Wildlife Information Liaison Development Society,  
No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road,  
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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

July 2022 | Vol. 14 | No. 7 | Pages: 21331–21486

Date of Publication: 26 July 2022 (Online & Print)

DOI: 10.11609/jott.2022.14.7.21331-21486

## Articles

**The Javan Leopard *Panthera pardus melas* (Cuvier, 1809) (Mammalia: Carnivora: Felidae) in West Java, Indonesia: estimating population density and occupancy**

– Anton Ario, Senjaya Mercusiana, Ayi Rustiadi, Robi Gumilang, I Gede Gelgel Darma Putra Wirawan & Toni Ahmad Slamet, Pp. 21331–21346

**Breeding phenology and population dynamics of the endangered Forest Spiny Reed Frog *Afrivalus sylvaticus* Schiøtz, 1974 in Shimba Hills, Kenya**

– Alfayo Koskei, George Eshiamwata, Bernard Kirui & Phylus K. Cheruiyot, Pp. 21347–21355

**Ichthyofaunal diversity of Senkhi stream, Itanagar, Arunachal Pradesh: a comparative status between 2004–05 and 2018–19**

– Koj Taro, Lakpa Tamang & D.N. Das, Pp. 21356–21367

**First record of *Proceratium* Roger, 1863, *Zasphinctus* Wheeler, 1918, and *Vollenhovia* Mayr, 1865 (Hymenoptera: Formicidae) from the Western Ghats of peninsular India, description of three new species, and implications for Indian biogeography**

– Kalesh Sadasivan & Manoj Kripakaran, Pp. 21368–21387

## Communications

**New queen? Evidence of a long-living Jaguar *Panthera onca* (Mammalia: Carnivora: Felidae) in Tikal National Park, Guatemala**

– Carlos A. Gaitán, Manolo J. García, M. André Sandoval-Lemus, Vivian R. González-Castillo, Gerber D. Guzmán-Flores & Cristel M. Pineda, Pp. 21388–21395

**First camera trap record of Striped Hyena *Hyaena hyaena* (Linnaeus, 1758) (Mammalia: Carnivora: Hyainidae) in Parsa National Park, Nepal**

– Pramod Raj Regmi, Madhu Chetri, Haribhadra Acharya, Prakash Sigdel, Dipendra Adhikari, Naresh Subedi & Babu Ram Lamichhane, Pp. 21396–21401

**Range extension and new ecoregion records of the Crocodile Monitor *Varanus salvadorii* (Peters & Doria, 1878) (Reptilia: Varanidae) in Papua New Guinea**

– Borja Reh & Jim Thomas, Pp. 21402–21408

**A checklist of fish and shellfishes of the Poonthura estuary, southwestern coast of India**

– Kiranya Bella, Pramila Sahadevan, Giri Bhavan Sreekanth & Rajeev Raghavan, Pp. 21409–21420

**A new species of *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) from Western Ghats, India**

– Kalesh Sadasivan, Vinayan P. Nair & K. Abraham Samuel, Pp. 21421–21431

**A case study on utilization and conservation of threatened plants in Sechu Tuan Nalla Wildlife Sanctuary, western Himalaya, India**

– Puneet Kumar, Harminder Singh & Sushil Kumar Singh, Pp. 21432–21441

**A survey of ethno-medicinally important tree species in Nauradehi Wildlife Sanctuary, central India**

– Tinku Kumar, Akash Kumar, Amit Jugnu Bishwas & Pramod Kumar Khare, Pp. 21442–21448

## Short Communications

**Effects of a Bengal Slow Loris *Nycticebus bengalensis* (Primates: Lorisidae) bite: a case study from Murlen National Park, Mizoram, India**

– Amit Kumar Bal, Anthony J. Giordano & Sushanto Gouda, Pp. 21449–21452

**First record of *Garra birostris* Nebeshwar & Vishwanath, 2013 (Cypriniformes: Cyprinidae) from Doyang and Dikhu rivers of Brahmaputra drainage, Nagaland, India**

– Sophiya Ezung, Metevinu Kechu & Pranay Punj Pankaj, Pp. 21453–21457

**Two new records of Lilac Silverline *Apharitis lilacinus* (Lepidoptera: Lycaenidae) from northeastern India**

– Monsoon Jyoti Gogoi, Ngulkhola Khongsai, Biswajit Chakdar & Girish Jathar, Pp. 21458–21461

**Illustrated description of the mantis *Mesopteryx platycephala* (Mantodea: Mantidae) collected from West Bengal, India**

– Gauri Sathaye, Sachin Ranade & Hemant Ghate, Pp. 21462–21466

***Cetrelia isidiata* (Asahina) W.L. Culb. & C.F. Culb. (Parmeliaceae) – an addition to the Indian lichen biota**

– Gaurav K. Mishra, Pooja Maurya & Dalip K. Upreti, Pp. 21467–21469

## Notes

**A new southern distribution record for Pacific Marten *Martes caurina***

– Maximilian L. Allen, Brianne Kenny, Benjamin Crawford & Morgan J. Farmer, Pp. 21470–21472

**First Asian record of Light-mantled Albatross *Phoebastria palpebrata* (Foster, 1785) from Rameswaram Island, Tamil Nadu, India**

– H. Byju & N. Raveendran, Pp. 21473–21475

***Salvia misella* Kunth (Lamiaceae) - a new record for Eastern Ghats of India**

– Prabhat Kumar Das, Pradeep Kumar Kamila & Pratap Chandra Panda, Pp. 21576–21579

***Salsola oppositifolia* Desf. in Great Rann of Kachchh, Gujarat – a new record for India**

– Rakesh Gujar, Vinesh Gamit, Ketan Tatu & R.K. Sugoora, Pp. 21580–21483

**Extended distribution of *Impatiens scapiflora* (Balsaminaceae) to the flora of Eastern Ghats, India**

– T.S. Saravanan, S. Kaliamoorthy, M.Y. Kamble & M.U. Sharief, Pp. 21484–21486

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