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Faunal Diversity of Pulicat Lake, Southeast Coast of India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Pulicat Lagoon, located on the South-east Coast of India, indeed plays a crucial role in supporting a diverse range of aquatic and avian species. Pulicat Lagoon is known for its rich biodiversity. As mentioned, it supports a variety of species, including crustaceans, finfish, and migratory birds. These species are not only ecologically important but also contribute to the local economy through fisheries and tourism. The present study is an attempt to compile the faunal list based on the field survey conducted during 2005- 2007 & May to Dec 2022 by Marine Biology Regional Centre, Zoological Survey of India, Chennai and from the published literature. Altogether 354 species belong to six phyla are reported so far. Among them 65 species of microfauna (phytoplankton, and zooplankton) and 289 species of macrofauna (Cnidaria, Arthropoda, Mollusca, Echinodermata, Pisces, and Birds) were reported so far. The lagoon is also important for the local fishing communities. It serves as a breeding ground for many fish species, which are essential for the livelihoods of the people living in the region. Sustainable fisheries management is vital to ensure the long-term well-being of these communities. Periodical research and monitoring of the lagoon's

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biodiversity and ecological health are crucial. This can help track changes, identify emerging threats, and guide conservation efforts. Pulicat Lagoon is a valuable ecosystem that supports a wide range of species and plays a vital role in the local economy. Conservation efforts should focus on maintaining the lagoon's ecological balance, preventing further degradation, and involving local communities in sustainable management practices to ensure its long-term survival. Pulicat Lagoon faces several environmental challenges, including silt deposition, habitat degradation, soil erosion, and changes in freshwater flow. These issues can disrupt the delicate balance of the ecosystem and threaten the survival of various species

Keywords: Birds; Pulicat Lake; Faunal diversity; Southeast Coast.

1. INTRODUCTION

The biodiversity surveys offer comprehensive data on biodiversity and community composition. These surveys were made to gauge species diversity and abundance [1]. Marine fauna collections are often made by many governments and private institutes around the world to study their morphological functions and their uses for human beings [2]. The purpose is to investigate the techniques employed by researchers to ascertain the distribution and habitation of certain habitats by species, as well as their relative population abundance. Human development, pollution and overharvesting are all posing increasing risks to the coastal environment, necessitating a greater understanding of the health of coastal ecosystems. One of the most difficult challenges in managing and conserving these nearshore natural communities is balancing the necessity for protection with the significance of encouraging increasing access, which leads to improved awareness. The coastal region is a hub of human activity as a result of urbanization and industry, which has resulted in human interference with rapid growth. Coastal habitats have been severely disrupted and vulnerable in recent years due to pollution, siltation, erosion, floods, saltwater intrusion, and storm surges. Pulicat lake is not exempted from the above threats and its impact on the faunal composition. Overall, this passage highlights the importance of understanding and protecting coastal ecosystems like Pulicat Lake in the face of various environmental challenges and human activities. The study mentioned appears to be an effort to document the fauna in the area, which is valuable for conservation and management purposes. The present study is an attempt to compile the faunal list based on the field survey conducted during 2005- 2007 & May to Dec 2022 by Marine Biology Regional Centre, Zoological Survey of India, Chennai and from the published literature.

2. MATERIALS AND METHODS

Study Area: Pulicat Lake is the located 40 km north of Chennai city and is the second largest brackish water lake in India after Chilka Lake. Geographically the lake is situated in between 13º24'-13º43' N latitude and 80º03'- 80º18' E longitudes. The lagoon (172 km²) lies within the Andhra Pradesh Pulicat Lake Sanctuary (580 km²), established in September 1976. The entire portion within Tamil Nadu (60 km²) was declared as Sanctuary in October 1980. The lake is above 60 km in length and 0.2 to 17.5 km in breadth. It has a high water spread area of 460 km² and low water spread area of 250 km². Due to deltaic deposit, the lake is shallow with an average depth of above 1.5 m. The lake is separated from the Bay of Bengal, by an inland spit called the Sriharikota Island. The main source of freshwater is land runoff through three seasonal rivers that open into the lake. They are Arani at its southern end, Kalangi at its mid-western side and Swarnamukhi at its northern end. Water flows in these rivers only during the monsoon season (October to December). A man-made Buckingham canal that runs parallel to the coast passes through the Pulicat Lake from its southern end and emerges onto the Sriharikota Island. Two islands in the northern part of the lake, Venadu and Irakkam are found on bed of sub-fossilized shells. The hydrology of the Pulicat Lake is influenced by local climate, the regime of the inflowing river, the Buckingham canal which enter the lake, in addition to effect of the neritic waters of the Bay of Bengal. This wetland has a variety of ecologically important features such as lake water body, plantation, mud flat, sand bar etc [3,4].

The hydrology of Pulicat lake is influenced by the depth of the lake mouth during summer, pre monsoon, monsoon and post monsoon seasons. Accordingly, the salinity and the dissolved oxygen vary significantly. Influence is also felt in primary productions, constituents of plankton and

faunal and floral biodiversity of the lake. During summer months due to high rate of evaporation the lake water reaches higher saline levels. During monsoon months due to flood, salinity of the lake water is very low. The bottom habitat of Pulicat lake ranges from sandy in the southern part, muddy in the northern region and muddy sand with patches of weeds in the central region. The major ecological factor in Pulicat lake is siltation. The rate of siltation is high during Northeast monsoon. The siltation leads depletion of biodiversity of the lake and shrinking of the lake area. A perusal of literature reveals that Chacko et al. [5] Joel and Sanjeevaraj [6,7] kalyani [8], Krishnamoorthy [9], Raman et al. [10], Sanjeevaraj [11,12], Sanjeeva Raj and Penner [13], Sanjeeva Raj and Azariah [14], Sanjeeva Raj et al. [15,16,17], Sunder Raj and Sanjeeva Raj [18], Thangavelu and Sanjeeva Raj [19,20,21,22] Thangavelu [23] Terdalkar et al. [24], Venkatraman and Jothinayagam [25] Kannan et al. [26], Nagarjuna et al. [27], Kannan and Pandiyan [28] Batvari et al. [29] Jeba Kumar et al. [30] have made valuable contributions to the study of the hydrography and biodiversity of the Pulicat lake.

The phytoplankton samples were collected by filtering water through 40µ mesh sized boltic silk plankton net while zooplankton were collected by operating Heron-Tranter plankton net. The meiofaunal samples were collected by using metal corer, whereas the macrobenthic communities were sampled by operating Van-Veen grab. All the faunal samples were identified. Photographs of marine organism were taken whenever it was possible, gathered in zip bags with nets, and returned to the zoological survey of India, Chennai. It was studied, preserved in spirit and kept in the collection storage room. No samples were collected during high tide due to high wind and strong current. All the sample were collected in ocean and coastal area on low tide only.

Based on the accessibility to the habitats, different techniques were used to census the birds. Area known for higher concentration of birds was measured by direct counts [31]. In marshy areas and open waters, the total number of birds was estimated from boat [32,33]. Total count on the main core area was taken along the Sulurupet-Sriharkota road along 10kms which formed the main transect. A smaller transect of 2kms between Atakanithippa and Venadu islands was set to take regular counts of the flamingo populations. In order to avoid double counting or missing birds a vantage point was used. There was a possibility of missing birds reported here were usually found on the edges of the vegetation i.e., on the open water vegetation interface. Birds were identified and counted with the help of binocular during early and late hours of the day. Boat was also used wherever it is possible. Counts were not made on days with rain, strong wind or extreme temperatures to minimize the bias caused by effects of weather.

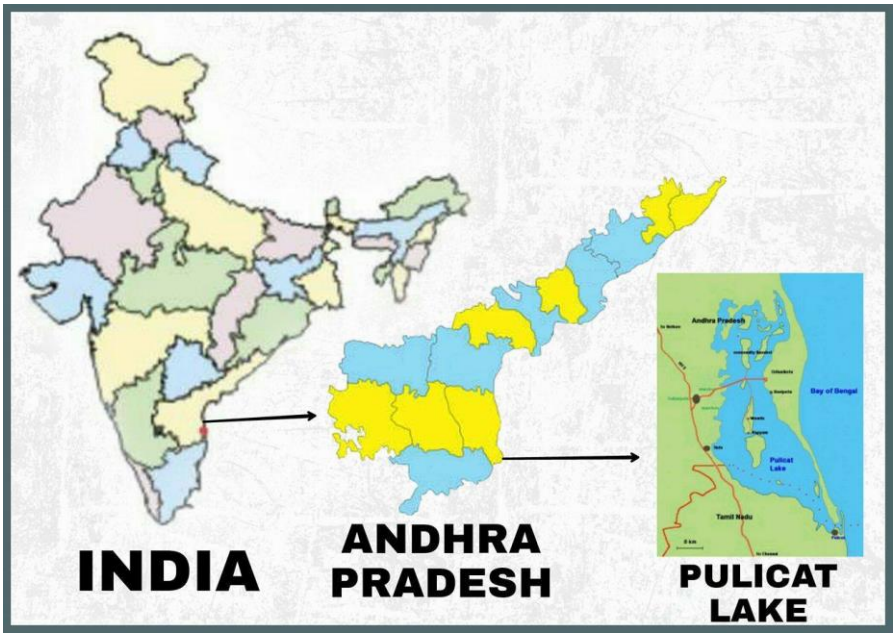


Fig. 1. Map of study area

3. MICROFAUNA

Phytoplankton: A total of 21 species of phytoplankton belongs to 16 genera were recorded during the survey. However, the average cell count of phytoplankton varied from 18.24×10^2 L^{-1}. The dominant species of phytoplankton among the surveyed area were *Coscionodiscus eccentricus, Coscinodiscus gigas, Ceratium furca, Navicula clavata Nitzschia longissima* and *Biddulphia heteroceros* (Table 1).

Zooplankton: A total of 23 species of zooplankton belonging to 22 genera and seven classes were recorded from the Pulicat lake. Among them, Copepods, Ostracods, Foraminerans, Tintinids, Gastropods and Bivalves were recorded during all the seasons of study. The average numerical density, biomass and volume of zooplankton were recorded as 4325 No/100$m^{3,}$ 263 mg/100 m^3 and 3.2 ml/100m^3 respectively. Among the zooplankton, Copepods and Formainiferan's were the dominant group.

4. MEIOFAUNA

A total of 21 species of Meiofauna belonging to 20 genera and five classes were recorded along the Pulicat Lake during the study. Among them Foraminiferans and Copepods were commonly observed at all the stations of Pulicat Lake (Table-2).

5. MACROFAUNA

A total of 163 species belonging to 127 genera and 78 families were recorded during. the study. An average numerical density and biomass of benthic community were calculated as 435 No./m^2 and 22.11g/m^2 respectively. 6 Species of Cnidaria belonging to 2 Classes 3 Order 4 Families and 5 Genera were recorded. Order Malacalcyonacea has maximum species. 33 Species of Arthropoda belonging to 3 Classes 5 Order 16 Families and 25 Genera were recorded. Order Decapoda has maximum number of species. 101 Species of Mollusca belonging to 3 Classes 11 Order 29 Families and 75 Genera were recorded. Order Cardiida, Venerida, Arcida and Ostreida has major species. Molluscan group was dominant. Among them, *Meretrix meretrix, Catelysia opima, Crossotrea madrasensis, Cerithidea fluviatilis* and *Turitella attenuata* were commonly occurred throughout the Pulicat Lake. 10 Species of Echinodermata belonging to 2 Classes 5 Order 6 Families and 9 Genera were recorded. Order Camarodonta and Valvatida has major species. 13 Species of Fishes belonging to 2 Classes 10 Order 11 Families and 13 Genera were recorded. Order Actinopteri has maximum species (Table-3).

Avifauna: A total of 126 species belongs to 15 orders and 31 families were identified during the survey.

The major groups of birds encountered were Storks, Flamingos, Ducks, Gulls and Terns and most of them were palaearctic migrants. The threatened species namely Spot-billed Pelican, near threatened species such as Darter, Painted Stork, and Flamingo were observed. The Spot-billed Pelican is concentrated mainly in the northern and north-west region of the lagoon. The Little Stint is the commonest wader species in the Pulicat Lake. Population trend suggest that the movement of the species is dependent mainly on the North-East monsoon. The core area of the lake near Venadu Island supports the maximum number of flamingoes through the winter months. Most of the wader species is distributed in the extensive mudflats of Shriharkotta-Sullurupet road in the South-West part of the lagoon. Greater flamingo, Painted Stork and Spot-billed Pelican are found throughout the year (Table-4).

Table 1. List of Microfauna (Phytoplankton and Zooplankton) in Pulicat lake

S. No.	Groups	Class	Genus	Scientific Name
1.	**Phytoplankton**		*Amphora*	*Amphora lineolata* ('Ehrenberg' [sensu] Kützing, 1844)
2.				*Amphora ostrearia* (Brébisson, 1849)
3.			*Eupodiscus*	*Eupodiscus sculptus* (W.Smith, 1853)
4.			*Bacteriastrum*	*Bacteriastrum hyalinum* (Lauder, 1864)
5.			*Biddulphia*	*Biddulphia heteroceros* (Grunow in Van Heurck, 1882)
6.				*Biddulphia sinensis* (Greville, 1866)
7.			*Campylodiscus*	*Campylodiscus iyengarii* (Subrahmanyan, 1946)
8.			*Tripos*	*Tripos furca (Ehrenberg)* (F.Gómez, 2013)

S. No.	Groups	Class	Genus	Scientific Name
9.				*Tripos macroceros (Ehrenberg)* (F.Gómez, 2013)
10.			*Climacosphaenia*	*Climacosphaenia moniligera* (Ehrenberg, 1843)
11.			*Coscinodiscus*	*Coscinodiscus eccentricus* (Ehrenberg, 1840)
12.				*Coscinodiscus gigas* (Ehrenberg, 1841)
13.				*Coscinodiscus sol (C.G.Wallich, 1860)*
14.			*Eupodiscus*	*Eupodiscus jonesianus* (Greville, 1862)
15.			*Cymeblla*	*Cymeblla marina* (Castracane, 1886)
16.			*Diploneis*	*Diploneis robustus* (Subrahmanyan, 1946)
17.			*Laudaria*	*Laudaria annulata* (Cleve, 1873)
18.			*Lyrella*	*Lyrella clavata* (Gregory, D.G.Mann, 1990)
19.			*Nitzschia*	*Nitzschia longissima* (Brébisson, Ralfs, 1861)
20.			*Prorocentrum*	*Prorocentrum maximum* (Gourret, Schiller, 1937)
21.			*Protoperidinium*	*Protoperidinium conicum* (Gran Balech, 1974)
22.	**Zooplankton**	Bivalves	*Magallana*	*Magallana bilineata* (Röding, 1798)
23.			*Pediveliger*	*Pediveliger larvae*
24.			Sunetta	Sunetta effossa (Hanley, 1843)
25.		Copepods	*Paracalanus*	*Paracalanus parvus parvus* (Claus, 1863)
26.			*Temora*	*Temora discaudata* (Giesbrecht, 1889)
27.			*Nannocalanus*	*Nannocalanus minor* (Claus, 1863)
28.			*Microsetella*	*Microsetella norvegica* (Boeck, 1865)
29.			*Macrosetella*	*Macrosetella gracilis* (Dana, 1846)
30.			*Rhincalanus*	*Rhincalanus cornutus* (Dana, 1849)
31.			*Metis*	*Metis jousseaumei* (Richard, 1892)
32.			*Acartia*	*Acartia spinicauda* (Giesbrecht, 1889)
33.		Foraminiferan	*Amhistegina*	*Amphistegina lessoni* (d'Orbigny in Deshayes, 1830)
34.			*Nonion*	*Nonion depressulum* (Walker & Jacob, 1798)
35.			*Rosalina*	*Rosalina bradyi* (Cushman, 1915)
36.			*Globigerina*	*Globigerinoides ruber* (d'Orbigny, 1839)
37.			*Trilobatus*	*Trilobatus sacculifer* (Brady, 1877)
38.			*Calcarina*	*Calcarina calcar* (d'Orbigny in Deshayes, 1830)
39.		Gastropod	*Janthina*	*Janthina janthina (Linnaeus, 1758)*
40.		Ostracod	*Conchoecia*	*Conchoecia indica* (Merrylal James, 1972)
41.		Tintinnids	*Tintinopsis*	*Tintinnopsis cylindrata* (Kofoid & Campbell, 1892)
42.				*Tintinnopsis tubulosa* (Levander, 1900)
43.		Crustaceans	*Penaeus*	Mysis larva of *Penaeus indicus*
44.			*Metapeaneus*	Post larvae of *Metapeaneus dobsoni*

Table 2. List of meiofauna in pulicat lake

S. No.	Class	Genus	Scientific Name
1.	Harpacticoid Copepods	*Microsetella*	*Microsetella gracilis* (Dana, 1846)
2.		*Macrosetella*	*Macrosetella gracilis* (Dana, 1846)
3.		*Paracalanus*	*Paracalanus parvus parvus* (Claus, 1863)
4.		*Temora*	*Temora discaudata* (Giesbrecht, 1889)
5.		*Nannocalanus*	*Nannocalanus minor* (Claus, 1863)
6.	Foraminiferans	*Cribroelphidium*	*Cribroelphidium selseyense* (Heron-Allen & Earland, 1911)
7.		*Quinqueloculina*	*Quinqueloculina seminulum* (Linnaeus, 1758)
8.		Spiroloculina	*Spiroloculina antillarum* (d'Orbigny, 1839)
9.		*Rosalina*	*Rosalina bradyi* (Cushman, 1915)
10.			*Rosalina globularis* (d'Orbigny, 1826)

S. No.	Class	Genus	Scientific Name
11.		*Peneropsis*	*Peneroplis pertusus* (Forsskål in Niebuhr, 1775)
12.		*Spirillina*	*Spirillina decorata* (Brady, 1884)
13.		*Sejunctella*	*Sejunctella lateseptata* (Terquem, 1875)
14.		*Lobatula*	*Lobatula lobatula* (Walker & Jacob, 1798)
15.		*Amhistegina*	*Amphistegina lessoni* (d'Orbigny in Deshayes, 1830)
16.	Polychaetes	Setiger	Setiger larva
17.		*Hediste*	*Hediste diversicolor* (O.F. Müller, 1776)
18.		*Oratonereis*	*Oratonereis* sp
19.		*Onuphis*	*Onuphis* sp
20.	Archiannelid	Oncholaimus	*Oncholaimus* sp
21.	Amphipod	*Raumahara*	*Raumahara dertoo* (J.L. Barnard, 1972)

Table 3. List of macrofauna (cnidaria, arthropoda, mollusca, echinodermata and pisces) in pulicat lake

S. No.	Phylum	Class	Order	Family	Scientific Name
1	Cnidaria	Scyphozoa	Semaeostomeae	Ulmaridae	*Aurelia aurita* (Linnaeus, 1758)
2			Rhizostomeae	Catostylidae	*Crambionella stuhlmanni* (Chun, 1896)
3		Anthozoa	Malacalcyonacea	Paramuriceidae	*Echinomuricea* sp.
4					*Echinogorgia* sp.
5				Gorgoniidae	*Pseudoterogorgia* sp.
6					*Pseudoterogorgia rubrocincta* (Thomson & Henderson, 1905)
7	Arthropoda	Malacostraca	Decapoda	Matutidae	*Ashtoret lunaris (Forskål, 1775)*
8				Portunidae	*Portunus* sp.
9					*Portunus sanguinolentes* (Herbst, 1783)
10					*Portunus pelagicus* (Linnaeus, 1758)
11					*Monomia gladiator* (Fabricius, 1798)
12					*Scylla serrata* (Forskål, 1775)
13					*Charybdis (Charybdis) feriata* (Linnaeus, 1758)
14					*Charybdis natator* (Herbst, 1794)
15				Diogenidae	Clibanarius *longitarsu (*De Haan, 1849)
16				Dromiidae	*Lauridromia dehaani (Rathbun, 1923)*
17				Scyllaridae	*Thenus unimaculatus (Burton & Davie, 2007)*
18					*Thenus orientalis* (Lund, 1793)
19				Epialtidae	*Doclea ovis* (Fabricius, 1787)
20				Ocypodidae	*Ocypode macrocera* (H. Milne Edwards, 1837)
21					*Austruca annulipes*

S. No.	Phylum	Class	Order	Family	Scientific Name
					(H. Milne Edwards, 1837)
22					*Austruca triangularis* (A. Milne-Edwards, 1873)
23				Palinuridae	*Panulirus homarus* (Linnaeus, 1758)
24				Hippidae	*Emerita emeritus* (Linnaeus, 1767)
25				Calappidae	*Calappa guerini* (de Brito Capello, 1870)
26					*Calappa lophos* (Herbst, 1782)
27					*Matuta planipus* (Fabricius, 1798)
28					*Matuta lunaris* (Forskål, 1775)
29				Pandalidae	*Heterocarpus ensifer* (A.Milne-Edwards, 1881)
30				Penaeidae	*Litopenaeus vannamei* (Boone, 1931)
31					*Fenneropenaeus indicus* (H.Milne-Edwards, 1837)
32					*Penaeus indicus* (H. Milne Edwards, 1837)
33					*Penaeus monodon* (Fabricius, 1798)
34			Isopoda	Cirolanidae	*Cirolanidae Dana* (Dana, 1852)
35			Stomatopoda	Squillidae	*Harpiosquilla harpax* (de Haan, 1844)
36		Thecostraca	Balanomorpha	Balanidae	*Balanus amphitrite* (Darwin, 1854)
37					*Amphibalanus reticulatus* (Utinomi, 1967)
38					*Megabalanus tintinnabulum* (Linnaeus, 1758)
39		Hexapoda	Hemiptera	Gerridae	*Gerres erythrourus* (Bloch, 1791)
40	Mollusca	Bivalvia	Cardiida	Cardiidae	*Acrosterigma attenuatum* (G. B. Sowerby II, 1841)
41					*Fulvia laevigata* (Linnaeus, 1758)
42					*Vasticardium assimile* (Reeve, 1844)
43				Donacidae	*Donax scortum* (Dall, 1900)
44					*Donax cuneatus (Linnaeus, 1758)*
45					*Donax faba* (Gmelin, 1791)
46					*Hecuba scortum*

S. No.	Phylum	Class	Order	Family	Scientific Name
					(Linnaeus, 1758)
47				Tellinidae	*Alaona ala* (Hanley, 1845)
48					*Tellina angulata* (Chemnitz, 1782)
49					*Indentina scalpellum* (Hanley, 1844)
50					*Phylloda foliacea* (Linnaeus, 1758)
51			Carditida	Carditidae	*Cardites bicolor* (Lamarck, 1819)
52			Pectinida	Pectinidae	*Volachlamys tranquebaria* (Gmelin, 1791)
53					*Mimachlamys crassicostata (G. B. Sowerby II, 1842)*
54					*Mimachlamys sanguinea* (Linnaeus, 1758)
55				Spondylidae	*Spondylus imperiallis* (Chenu, 1844)
56				Placunidae	*Placuna placenta* (Linnaeus, 1758)
57			Venerida	Veneridae	*Paratapes textillis* (Gmelin 1791)
58					*Protapes gallus* (Gmelin 1791)
59					*Paphia rotundata* (Linnaeus 1758)
60					*Sunetta scripta (Linnaeus, 1758)*
61					*Meretrix meretrix (Linnaeus, 1758)*
62					*Meretrix casta* (Gmelin, 1791)
63					*Catelysia opima* (Gmelin, 1791)
64					*Gafrarium pectinatum* (Linnaeus, 1758)
65				Mactridae	*Mactra cuneata (Gmelin, 1791)*
66					*Mactra species*
67			Arcida	Arcidae	*Anadara indica* (Gmelin, 1791)
68					*Anadara inaequivalvis* (Bruguière, 1789)
69					*Tegillarca rhombea (*Born, 1778)
70					*Arca (Scapharca) enequivalvis* (Bruguiere, 1789)
71					*Tegillarca granosa* (Linnaeus, 1758)
72					*Cucullaea labiata* ([Lightfoot], 1786)
73			Ostreida	Ostreidae	*Magallana bilineata* (Röding, 1798)

S. No.	Phylum	Class	Order	Family	Scientific Name
74				Pinnidae	*Atrina vexillum* (Born, 1778)
75					*Pinna atropurpurea* (G. B. Sowerby I, 1825)
76					*Pinna bicolor* (Linnaeus, 1758)
77				Pteriidae	*Pinctada margaritifera* (Linnaeus, 1758)
78					*Saccostrea cucullata* (Born, 1778)
79			Adapedonta	Solenidae	*Solen kempi* (Preston, 1915)
80					*Solen vagina* (Linnaeus, 1758)
81			Mytilida	Mytilidae	*Perna virids* (Linnaeus, 1758)
82					*Modiolus metcalfei* (Hanley, 1843)
83			Adapedonta	Cultellidae	*Siliqua radiata* (Linnaeus, 1758)
84		Gastropoda	Neogastropda	Babyloniidae	*Babylonia spirata* (Linnaeus, 1758)
85					*Babylonia zeylanica* (Bruguière, 1789)
86				Olividae	*Olividae oliva* (Linnaeus, 1758)
87					*Oliva vidua* (Roding, 1798)
88					*Olivancillaria gibbosa* (Born, 1778)
89					*Agaronia gibbosa* (Born, 1778)
90				Muricidae	*Chicoreus virgineus* (Röding, 1798)
91					*Murex Tribulus* (Linnaeus, 1758)
92					*Murex trapa* (Roding, 1798)
93					*Murex tenuirostrum tenuirostrum* (Lamarck, 1832)
94					*Murex ternispina* (Lamarck, 1822)
					Chicoreus virgineus (Röding, 1798)
96					*Muricanthus virgineus* (Roding, 1798)
97					*Thais bufo* (Lamarck, 1822)
98					*Thais rudolphi* (Lamarck)
99					*Rapana rapiformis* (Born, 1778)
100				Turridae	*Unedogemmula indica* (Röding, 1798)
101				Harpidae	*Harpa major* (Röding, 1798)

S. No.	Phylum	Class	Order	Family	Scientific Name
102				Melongenidae	*Volegalea cochlidium* (Linnaeus, 1758)
103					*Pugilina (Hemifuses) cochidium* (Roding, 1798)
104				Fasciolariidae	*Fusinus forceps (Perry, 1811)*
105				Nassariidae	Bullia *vittata* (Linnaeus, 1767)
106				Pisaniidae	*Cantharus tranquebaricus* (Gmelin, 1791)
107			Littorinimorpha	Naticidae	*Natica* Sp
108				Bursidae	*Bufonaria crumena* (Lamarck 1816)
109					Bufonaria *echinate* (Link, 1807)
110					*Bursa spinosa* (Lamarck, 1822) = *Bursa (Bufornaria) echinata* (Link, 1807)
111					*Bursa (Bufornaria) rana* (Linnaeus, 1758)
112				Cassidae	*Phalium glaucum* (Linnaeus, 1758)
113				Littorinidae	*Littoraria (Littoraria) undulate* (Gray, 1839)
114					*Littorina (Littorinopsis) scabra scabra* (Linnaeus, 1758)
115					*Nodilittorina (Nodilittorina) vidua* (Gould, 1859)
116					*Nodilittorina (Nodilittorina) trochoides* (Gray, 1839)
117				Cypraeidae	*Cypraea (Mauritia) arabica* (Linnaeus, 1758)
118					*Cypraea (Cypraea) tigris* (Linnaeus, 1758)
119					*Cypraea (Erronea) caurica* (Linnaeus, 1758)
120				Ficidae	*Ficus gracilis* (Sowerby, 1825)
121				Naticidae	*Sinum neritoideum* (Linnaeus, 1758)
122				Tonnidae	*Tonna dolium* (Linnaeus, 1758)
123			Heterostropha	Architectonicidae	*Architectonica perspectiva* (Linnaeus, 1758)
124				Potamididae	*Pirenella cingulata* (Gmelin, 1791)

S. No.	Phylum	Class	Order	Family	Scientific Name
125				Cerithiidae	*Rhinocleavis sp.*
126					*Rhinoclavis vertagus* (Linnaeus 1767)
127					*Cerithium coralium* (Kiener, 1841)
128					*Cerithium tenllum,* (Sowerby, 1855)
129					*Cerithum scabridum* (Philippi, 1848)
130					*Pirenella cingulata* (Gmelin, 1791)
131				Turritellidae	*Turritella attenuate* (Reeve, 1849)
132					*Turritella sp*
133					*Turritella columnaris* (Kiener, 1840)
134					*Turritella acutangula* (Linnaeus, 1758)
135				Potamididae	*Telescopium telescopium* (Linnaeus, 1758)
136					*Cerithidea alata* (Philippi, 1847)
137			Trochida	Trochidae	*Umbonium vestarium* (Linnaeus, 1758)
138		Cephalopoda	Sepiida	Sepiidae	*Sepia aculeata* (Orbigny, 1848)
139					*Sepia pharaonis* (Eherenberg, 1831)
140			Octopoda	Octopodidae	*Octopus fusiformis* (Brock, 1887)
141	Echinodermata	Echinoidea	Camarodonta	Temnopleuridae	*Salmacis virgulata* (L. Agassiz & Desor, 1846)
142					*Salmacis bicolor* (L. Agassiz & Desor, 1846)
143					Temnopleurus alaxandri (Bell, 1884)
144					Microcyphus ceylonicus (Marlensen, 1942)
145			Clypeasteroida	Clypeasteridae	*Clypeaster humilis* (Leske, 1778)
146			Echinolampadacea	Astriclypeidae	*Sculpsitechinus auritus* (Leske, 1778)
147		Asteroidea	Valvatida	Goniasteridae	*Stellaster equestris* (Bruzelius, 1805)
148					*Coelotrochus viridis* (Gmelin, 1791)
149				Oreasteridae	*Pentaceraster regulus* (Muller and Troscher, 1842)
150			Paxillosida	Astropectinidae	*Astropecten indicus* (Döderlein, 1888)
151	Pisces	Actinopteri	Eupercaria incertae sedis	Lutjanidae	*Lutjanus kasmira* (Forsskål, 1775
152			Tetraodontiformes	Tetraodontidae	*Chelonodontops patoca* (Hamilton, 1822
153				Triacanthidae	*Tripodichthys*

S. No.	Phylum	Class	Order	Family	Scientific Name
					angustifrons (Hollard, 1854)
154			Cichliformes	Cichlidae	*Oreochromis mossambicus* (Peters, 1852)
155			Centrarchiformes	Terapontidae	*Terapon jarbua* (Forsskål, 1775)
156			Beloniformes	Hemiramphidae	*Hemiramphus brasiliensis* (Linnaeus, 1758)
157					*Hyporhamphus dussumieri* (Valenciennes, 1847)
158			Clupeiformes	Clupeidae	*Sardinella albella* (Valenciennes, 1847)
159					*Nematalosa nasus* (Bloch, 1758)
160			Mugiliformes	Mugilidae	*Mugil cephalus* (Linnaeus, 1758)
161			Eupercaria incertae sedis	Sillaginidae	*Sillago parvisquamis (*Gill, 1861)
162			Siluriformes	Ariidae	*Bagre marinus* (Mitchill, 1815)
163		Elasmobranchii	Myliobatiformes	Dasyatidae	*Brevitrygon imbricata* (Bloch & Schneider, 1801)

Table 4. Check list of avifauna in pulicat lake

S.No	Order	Family	Scientific Name	Common Name
1.	Pelicaniformes	Pelecanidae	*Pelecanus philippensis* Gmelin, 1789	Spot-Billed Pelican
2.		Phalacrocoracidae	*Phalacrocorax niger* (Vieillot, 1817)	Little Cormorant
3.		Threskiornithidae	*Threskiornis melanocephalus*	Black-headed Ibis
4.	Ciconiformes	Ardeidae	*Egretta garzetta* (Linnaeus, 1766)	Little Egret
5.			*Egretta gularis* (Bosc, 1792)	Western Reef Egret
6.			*Ardea cinerea* Linnaeus, 1758	Grey Heron
7.			*Ardea purpurea* Linnaeus, 1766	Purple Heron
8.			*Casmerodius albus* (Linnaeus, 1758)	Large Egret
9.			*Mesophoyx intermedia* (Wagler, 1829)	Median Egret
10.			*Bubulcus ibis* (Linnaeus, 1758)	Cattle Egret
11.			*Ardeola grayii* (Sykes, 1832)	Indian Pond Heron
12.			*Butorides striatus* (Linnaeus, 1758)	Little Green Heron
13.			*Nycticorax nycticorax* (Linnaeus, 1758)	Black-Crowned Night Heron
14.			*Botaurus stellaris* (Linnaeus, 1758)	Eurasian Bittern
15.			*Butorides striata* (Linnaeus, 1758)	Striated Heron
16.			*Ixobrychus cinnamomeus* (Gmelin, JF 1789)	Chestnut Bittern
17.			*Ixobrychus sinensis* (J.F. Gmelin, 1789)	Yellow Bittern
18.			*Dupetor flavicollis* (Latham, 1790)	Black Bittern
19.			*Egretta alba* (Linnaeus, 1758)	Great Egret
20.			*Egretta gularis* (Bosc, 1792)	Western Reef-Heron
21.			*Egretta intermedia* (Wagler, 1829)	Intermediate Egret
22.		Ciconiidae	*Mycteria leucocephala* (Pennant, 1769)	Painted Stork

S.No	Order	Family	Scientific Name	Common Name
23.			*Anastomus oscitans* (Boddaert, 1783)	Asian Openbill-Stork
24.		Threskiornithidae	*Plegadis falcinellus* (Linnaeus, 1766)	Glossy Ibis
25.			*Threskiornis melanocephalus* (Latham, 1790)	Oriental White Ibis
26.			*Pseudibis papillosa* (Temminck, 1824)	Black Ibis
27.			*Platalea leucorodia* (Linnaeus, 1758)	Eurasian Spoonbill
28.	Phoenicopteriformes	Phoenicopteridae	*Phoenicopterus rubber* (Linnaeus, 1758)	Greater Flamingo
29.	Anserifiormes	Anatidae	*Anas streperai* (Linnaeus, 1758)	Gadwall
30.			*Anas penelope* (Linnaeus, 1758)	Eurasian Wigeon
31.			*Anas poecilorhyncha* (J.R. Forester, 1781)	Spotbilled Duck
32.			*Anas clypeata* (Linnaeus, 1758)	Northern Shoveller
33.			*Anas acuta* (Linnaeus, 1758)	Northern Pintail
34.			*Anas querquedula* (Linnaeus, 1758)	Garganey
35.			*Anas clypeata* (Linnaeus, 1758)	Common Teal
36.			*Anser indicus* (Latham, 1790)	Bar-headed Goose
37.			*Aythya ferina* (Linnaeus, 1758)	Common Pochard
38.			*Aythya fuligula* (Linnaeus, 1758)	Tufted Pochard
39.			*Nettapus coromandelianus* (Gmelin, 1789*)*	Cotton Teal
40.			*Sarkidiornis melanotos* (Pennant, 1769)	Comb Duck
41.			*Tadorna ferruginea* (Pallas, 1764*)*	Ruddy Shelduck
42.			*Rhodonessa rufina*	Red-crested Pochard
43.			*Dendrocygna javanica* (Horsfield, 1821)	Lesser Whistling-Duck
44.	Falconiformes	Accipitridae	*Milvus migrans* (Boddaert, 1783)	Black Kite
45.			*Haliastur indus* (Boddaert, 1783)	Brahminy Kite
46.			*Haliaeetus leucogaster* (Gmelin. 1788)	White-Bellied Sea Eagle
47.	Charadriiformes	Charadriidae	*Pluvialis squatarola* (Linnaeus, 1758)	Grey Plover
48.			*Charadrius hiaticula* (Linnaeus, 1758)	Common Ringed Plover
49.			*Charadrius dubius* (Scopoli, 1786)	Little Ringed Plover
50.			*Charadrius alexandrinus* (Linnaeus, 1758)	Kentish Plover
51.			Charadrius mongolus (Pallas, 1776)	Lesser Sand Plover
52.			*Charadrius leschenaultia (*Lesson, 1826)	Greater Sand Plover
53.			*Vanellus indicus* (Lesson, 1826)	Red-wattled Lapwing
54.			*Charadrius melanops* (Vieillot, 1818)	Black-fronted Plover
55.			*Pluvialis fulva* (Gmelin, 1789*)*	Pacific Golden-Plover
56.			*Vanellus malabaricus* (Boddaert, 1783)	Yellow-wattled Lapwing
57.		Scolopacidae	*Gallinago gallinago* (Linnaeus, 1758)	Common Snipe
58.			*Limosa limosa* (Linnaeus, 1758)	Black-Tailed Godwit

S.No	Order	Family	Scientific Name	Common Name
59.			*Numenius phaeopus* (Linnaeus, 1758)	Whimbrel
60.			*Numenius arquata* (Linnaeus, 1758)	Eurasian Curlew
61.			*Tringa erythropus* (Pallas, 1764)	Spotted Redshank
62.			*Tringa totanus* (Linnaeus, 1758).	Common Redshank
63.			*Tringa Stagnatilis* (Bechstein, 1803)	Marsh Sandpiper
64.			*Tringa nebularia* (Gunner, 1767)	Common Greenshank
65.			*Tringa Ochropus (*Linnaeus, 1758)	Green Sandpiper
66.			*Tringa glareola* (Linnaeus, 1758)	Wood Sandpiper
67.			*Xenus cinereus* (Guldenstandr, 1774)	Terek Sandpiper
68.			*Actitis hypoleucos* (Linnaeus, 1758)	Common Sandpiper
69.			*Arenaria interpres* (Linnaeus, 1758)	Ruddy Turnstone
70.			*Limnodromus semipalmatus* (Blyth, 1848)	Asian Dowitcher
71.			*Calidris tenuirostris* (Horsfield, 1821)	Great Knot
72.			*Calidris canuta* (Linnaeus, 1758)	Red Knot
73.			*Calidris minuta* (Leisler, 1812)	Little Stint
74.			*Calidris temminckii* (Leisler, 1812)	Temminck's Stint
75.			*Calidris alphina* (Linnaeus, 1758)	Dunlin
76.			*Calidris ferruginea* (Pontoppidan, 1813)	Curlew Sandpiper
77.			*Limicola falcinellus* (Pontoppidan, 1763)	Broad-Billed Sandpiper
78.			*Calidris subminuta* (Middendorff, 1853)	Long-toed Stint
79.			*Lymnocryptes minimus* (Brunnich, 1764)	Jack Snipe
80.			*Gallinago stenura* (Bonaparte, 1831)	Pintail Snipe
81.		Recurvirostridae	*Himantopus himantopus* (Linnaeus, 1758)	Black-winged stilt
82.		Phalaropidae	*Phalaropus lobatus* (Linnaeus, 1758)	Rednecked Phalarope
83.		Laridae	*Larus brunnicephalus* (Jerdon, 1840)	Brown-headed Gull
84.			*Larus ridibundus* (Linnaeus, 1766)	Black-headed Gull
85.			*Gelochelidon nilotica* (Gmelin, 1789)	Gull-Billed Tern
86.			*Sterna caspia* (Pallas, 1770)	Caspian Tern
87.			*Sterna hirundo* (Linnaeus, 1758)	Common Tern
88.			*Sterna albifrons* (Pallas, 1764)	Little Tern
89.			*Chlidonias hybridus* (Pallas, 1811)	Whiskered Tern
90.			*Chlidonias leucopterus* (Temminck, 1815)	White-winged Tern
91.			*Chlidonias niger* (Linnaeus, 1758)	Black Tern
92.			*Larus heuglini* (Bree, 1876)	Heuglin's Gull
93.			*Larus ichthyaetus* (Pallas, 1811)	Great Black-headed Gull
94.			*Larus ridibundus* (Linnaeus, 1758)	Common Black-headed Gull
95.			*Sterna acuticauda* (J.E.Gray, 1831)	Black-bellied Tern
96.		Glareolidae	*Glareola lacteal* (Temminck, 1820)	Small Pratincole

S.No	Order	Family	Scientific Name	Common Name
97.			*Glareola maldivarum* (J.R.Forster, 1795)	Oriental Pratincole
98.		Rostratulidae	*Rostratula benghalensis* (Linnaeus, 1758)	Greater Painted-Snipe
99.		Recurvirostridae	*Recurvirostra avosetta* (Linnaeus, 1758)	Pied Avocet
100.		Burhinidae	*Burhinus oedicnemus* (Linnaeus, 1758)	Indian Stone-Curlew
101.		Jacanidae	*Hydrophasianus chirurgus* (Scopoli, 1786)	Pheasant-tailed Jacana
102.	Gruiformes	Rallidae	*Fulica atra* (Linnaeus, 1758)	Eurasian Coot
103.			*Gallinula chloropus* (Linnaeus, 1758)	Common Moorhen
104.			*Porzana fusca* (Linnaeus, 1758)	Ruddy-breasted Crake
105.			*Porphyrio porphyrio* (Linnaeus, 1758)	Purple Swampher
106.			*Rallus striatus* (Linnaeus, 1758)	Slaty-breasted Rail
107.			*Rallus aquaticus* (Linnaeus, 1758)	European Water Rail
108.			*Amaurornis phoenicurus* (Pennant, 1769)	White-breasted Waterhen
109.	Suliformes	Fregatidae	*Fregata ariel.* (G.R.Gray, 1845)	Lesser Frigatebird
110.		Phalacrocoracidae	*Phalacrocorax carbo* (Linnaeus, 1758)	Great Cormorant
111.			*Phalacrocorax fuscicollis* (Stephens, 1826)	Indian Shag
112.		Anhingidae	*Anhinga melanogaster* (Pennant, 1769)	Oriental Darter
113.	Strigiformes	Strigidae	*Ketupa zeylonensis* (J.F.Gmelin, 1788)	Brown Fish-Owl
114.	Passeriformes	Motacillidae	*Motacilla citreola* (Pallas, 1811)	Grey Wagtail
115.			*Motacilla flava.* (Linnaeus, 1758)	Yellow Wagtail
116.			*Motacilla maderaspatensis* (Gmelin, 1789)	White-browed Wagtail
117.	Phoenicopteriformes	Phoenicopteridae	*Phoeniconaias minor* (É.Geoffroy Saint-Hilaire, 1798)	Lesser Flamingo
118.	Podicipediformes	Podicipedidae	*Tachybaptus ruficollis* (Pallas, 1811)	Little Grebe
119.	Coraciiformes	Alcedinidae	*Alcedo atthis* (Linnaeus, 1758)	Common Kingfisher
120.			*Halcyon pileata* (Boddaert, 1783)	Black-capped Kingfisher
121.			*Halcyon smyrnensis* (Linnaeus, 1758)	White-throated Kingfisher
122.			*Ceryle rudis* (Linnaeus, 1758)	Lesser-Pied Kingfisher
123.	Ciconiiformes	Ciconiidae	*Ciconia ciconia* (Linnaeus, 1758)	White Stork
124.			*Ciconia episcopus* (Boddaert, 1783)	Woolly-necked Stork
125.	Accipitriformes	Accipitridae	*Circus aeruginosus* (Linnaeus, 1758)	Western Marsh-Harrier
126.		Pandionidae	*Pandion haliaetus* (Linnaeus, 1758)	Osprey

Portunus sanguinolentus (Herbst, 1783) | *Monomia gladiator (Fabricius, 1798)* | *Calappa guerini (de Brito Capello, 1870)*

Charybdis natator (Herbst, 1794) | *Lauridromia dehaani (Rathbun, 1923)* | *Portunus pelagicus (Linnaeus, 1758)*

Clibanarius longitarsus (De Haan, 1849) | *Thenus unimaculatus (Burton _ Davie, 2007)* | *Harpiosquilla harpax (de Haan, 1844)*

Litopenaeus vannamei (Boone, 1931) | *Heterocarpus ensifer (A.Milne-Edwards, 1881)* | *Fenneropenaeus indicus (H.Milne-Edwards, 1837)*

Fig. 2. Arthropoda

Oliva vidua (Röding, 1798) | *Agaronia gibbosa (Born, 1778)* | *Anadara inaequivalvis (Bruguière, 1789)*

Chicoreus virgineus (Röding, 1798)

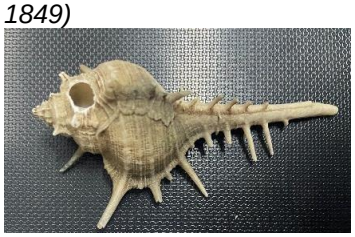
Volegalea cochlidium (Linnaeus, 1758)

Cantharus tranquebaricus (Gmelin, 1791)

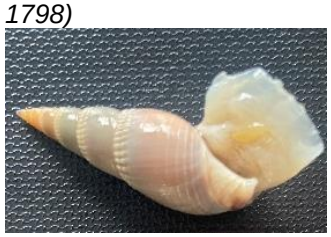
Turritella attenuata (Reeve, 1849)

Unedogemmula indica (Röding, 1798)

Fusinus forceps (Perry, 1811)



Murex trapa (Röding, 1798)



Bullia vittata (Linnaeus, 1767)

Harpa major (Röding, 1798)

Bufonaria echinata (Link, 1807)

Tonna dolium (Linnaeus, 1758)

Babylonia zeylanica(Bruguière, 1789)

Fig. 3. Mollucsa

Astropecten indicus Doderlein

Pentaceraster regulus

Anthenea tuberculosa Gray, 1847

Fig. 4. Ecinodermata

Terapon jarbua (Forsskål, 1775)

Hemiramphus brasiliensis (Linnaeus, 1758)

Bagre marinus (Mitchill, 1815)

Sillago parvisquamis (Gill, 1861)

Lutjanus kasmira (Forsskål, 1775)

Tripodichthys angustifrons (Hollard, 1854)

Oreochromis mossambicus (Peters, 1852)

Mugil cephalus (Linnaeus, 1758)

Fig. 5. Pisces

Greater Flamingo

Brown-headed Gull

Common sandpiper

Curlew

Painted Stork

Little ringed Plover

Fig. 6. Aves

6. DISCUSSION

The lake is subject to pollution from various sources, including sewage, agricultural runoff (fertilizers and pesticides), industrial effluents, and waste from fish processing facilities. These pollutants can have detrimental effects on water quality and aquatic life. The Arani and Kalangi rivers are identified as pathways for agricultural runoff to enter the lake. Managing and reducing the introduction of pollutants from these rivers should be a priority. Automated boats pose a risk due to potential oil spills. Strategies to prevent and respond to such spills should be in place to minimize their impact on the ecosystem. The presence of crustacean larvae throughout the season suggests that Pulicat Lake has a productive ecosystem with valuable fisheries resources. This productivity is important for the local economy and biodiversity. To counter habitat loss and changes, management strategies like removing silt deposition, maintaining river mouths, preventing soil erosion, and regulating freshwater discharge should be implemented. These actions can help restore the lake's natural habitat. It is crucial to manage, conserve, and propagate Pulicat Lagoon effectively. Sustainable management practices are essential to ensure that the lake continues to support fisheries and other ecological functions while minimizing the negative impacts of pollution and habitat degradation. Raising public awareness about the importance of Pulicat Lake's ecosystem and the need for conservation is crucial. Engaging local communities in conservation efforts can lead to more sustainable practices. In conclusion, the challenges facing Pulicat Lake are complex, but with concerted efforts in pollution control, habitat restoration, and sustainable management, it is possible to protect and conserve this valuable ecosystem for future generations. Collaboration among various stakeholders and ongoing research will be key in achieving these goals.

7. CONCLUSION

The present study conducted a thorough investigation and identified a diverse range of species from six different phyla. This study reported a total of 354 species belongs to six phyla. Among them 44 species of microfauna (Phytoplankton, and Zooplankton), 21 species of meio-fauna and 289 species of macrofauna (Mollusca (101), Arthropoda (33), Echinodermata (10), Cnidaria (06), Pisces (13) and Birds (126) were identified during the study period. This study's findings highlight the richness and diversity of life within the studied area, showcasing a wide range of species across different size categories and phyla. Such comprehensive studies are essential for understanding and conserving aquatic ecosystems and their inhabitants.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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