



## SPECIES DIVERSITY, DISTRIBUTION AND ABUNDANCE OF FISHES AND MOLLUSCS IN MUTHUPET MANGROVES, SOUTH EAST COAST OF INDIA

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### ABSTRACT

Estuaries are highly complex, but very productive ecosystems with a larger economic, social and environmental significance. They are one of the finest nurseries and breeding grounds for a number of commercially and ecologically important species of fishes, prawns and molluscan etc. In this study the fish and shell species were collected from Muthupet mangroves in Thiruvarur district, Tamilnadu, India. The present investigation showed totally 63 fin fish and 18 shell fish species collected over a 12 months study period from May 2014 to April 2015. Most of the species were commonly available in all the seasons where some species are available in seasonal. The diversity of fish is based on the environmental condition.

**Keywords:** Estuaries, nurseries and breeding grounds.

### INTRODUCTION

Mangrove ecosystem are one of the most productive and biodiversity wetlands on earth. They grow in tropical and subtropical latitudes along the land-sea interface, bays, estuaries, lagoons, backwaters, and in the rivers, reaching upstream up to the point where the water still remains saline [1]. The plant and animal comprising the mangrove ecosystem form the golden asset of coastal marine resources. Mangroves are salt-tolerant plants inhabiting the tropical and subtropical estuarine regions.

They are ranked among the most productive ecosystem of the earth [2]. Mangrove ecosystem provides an ideal nursery and breeding grounds to most of the marine and brackish water fish and shellfish. Mangrove roots, trunks and branches attract rich faunal communities, including fishes, sponges, hydroids, anemones, polychaetes, bryozoans, ascidians, molluscs and crustaceans [3]. India is known for its inland and rich indigenous fishery resources with great biodiversity. Fishes are invariable living components of water bodies. These organisms are important food resources and good indicators of the ecological health of the waters they inhabit. Molluscs are probably the most abundant invertebrate and very adaptive animals which occupy every possible habitat. They act as an important component of biomass, mostly found to be benthic and some are pelagic. [4] They are the primary inhabitants of the intertidal and littoral zones of the oceans that can be found in greater depths [5]. Hence the present study focused on the Species diversity, distribution and seasonal abundance in Muthupet Mangroves, Thiruvarur District, and South East Coast of India.

### MATERIALS AND METHODS

Fishes were collected at monthly intervals from the trawl by catch landed in Muthupet mangroves landing centre (Lat.10°46' N; Long.79°51' E) during the May 2014 to April 2015 (Figure 1). Stratified random sampling



from each of the trawl catch was followed. In the present study, the fish species was collected in the trawl by catch and identified up to species level by using the keys available in FISH BASE [6]. FAO species identification sheets [7] besides standard books [8] also used to identify the fishes. Data were collected fortnightly, pooled seasonally and repeated throughout the period. The data on Mangrove fishes from collection site was combined together for the different seasons.

### Molluscan Collection

The molluscan fauna of gastropods were collected by hand picking methods and the bivalves fauna like mussel and oyster were collected by hand digging and large power dredging methods. The samples were rinsed, adhering debris are removed and sorted out the species, then transferred to 4% formalin and enumerated group wise and preserved the organisms. The species were identified using standard keys provided by Adoni [9]

### Identification of Gastropods

The shell characters such as shape, spire length, mouth opening, opercular shape, umbilicus shape and size, colour and ornamentation of the shell are used mainly for the identification of gastropods.

### Identification of Bivalves

The bivalves were identified mainly based on the shell morphology. The shell comprises of two valves. The outer surface may be striated or ribbed. The two valves

are held together by an elastic ligament, which leaves a scar on the hinge.

### RESULTS

Totally 18 Shell fish (Molluscs) and 63 fin fish species were identified and recorded from the Muthupet mangroves.

#### LIST OF MOLLUSCAN SPECIES IDENTIFIED

11 gastropods and 7 bivalves were identified from the Muthupet mangroves.

#### LIST OF FIN FISHES IDENTIFIED

63 species belongs to 32 families were identified

#### Diversity in Fishes

The species diversity of fishes shown in figure 2 and it, ranged from 1.39 (December-14) to 3.01 (February-15). The species richness fluctuated between 1.01 (October-14) and 3.06 (March-15). As regards species evenness, it varied from 0.71 (December-14) to 0.97 (March-15).

#### Diversity in Molluscs

The species diversity of mollusks shown in figure 3 and it, ranged from 1.12 (December-14) to 2.41 (April-15). The species richness fluctuated between 1.02 (December-14) and 3.29 (May-14). As regards species evenness, it varied from 0.74 (December-14) to 0.96 (May-15).

**Table 1. Distribution of gastropods Molluscan fauna at Muthupet mangroves**

S.No.	Name of the Gastropods
1.	<i>Babylonia zeylonica</i>
2.	<i>Cerithidea cingulata</i>
3.	<i>Chicorens ramosus</i>
4.	<i>Hemifuses pugilinus</i>
5.	<i>Murex tenuirostrum</i>
6.	<i>Nautica didyma</i>
7.	<i>Oliva oliva</i>
8.	<i>Thias bufo</i>
9.	<i>Tonna galea</i>
10.	<i>Turbinalla pyrum</i>
11.	<i>Turricula javana</i>

**Table 2. Distribution of bivalves Molluscan fauna at Muthupet mangroves**

S.No.	Name of the Bivalves
1.	<i>Anadara inequivalvis</i>
2.	<i>Circe scripta</i>
3.	<i>Paphia textile</i>
4.	<i>Placenta placenta</i>
5.	<i>Sunetta maroe</i>
6.	<i>Sunetta scripta</i>
7.	<i>Trachycardium cascaticum</i>



**Table 3. Checklist of fish species identified and recorded from Muthupet mangroves**

S. No.	Family	Fish species	Authenticator	Abundant
1.	Ambassidae	1. <i>Ambassis commersoni</i>	(Cuvier, 1828)	Premonsoon
		2. <i>Pseudoambassis ranga</i>	(Hamilton, 1822)	Throughout
2.	Anguillidae	3. <i>Anguilla bicolor</i>	(Mc Clelland, 1844)	Summer
3.	Ariidae	4. <i>Arius arius</i>	(Hamilton, 1822)	Postmonsoon
		5. <i>Arius maculatus</i>	(Thunberg, 1792)	
4.	Bagridae	6. <i>Mystus gulio</i>	(Hamilton, 1822)	Throughout
5.	Belonidae	7. <i>Strongylura strongylura</i>	(Van Hasselt, 1824)	
6.	Carangidae	8. <i>Caranx ignobilis</i>	(Forsskal, 1775)	Postmonsoon
		9. <i>Caranx carangus</i>	(Bloch, 1793)	
7.	Chanidae	10. <i>Chanos chanos</i>	(Forsskal, 1775)	Throughout
8.	Cichlidae	11. <i>Etroplus maculatus</i>	(Bloch, 1795)	Premonsoon
		12. <i>Etroplus suratensis</i>	(Bloch, 1790)	Monsoon
		13. <i>Oreochromis mossambicus</i>	(Peters, 1852)	Postmonsoon
9.	Clupeidae	14. <i>Escualosa thoracata</i>	(Valenciennes, 1847)	Throughout
		15. <i>Hilsa keele</i>	(Cuvier, 1829)	
		16. <i>Hilsa ilisha</i>	(Hamilton, 1822)	
		17. <i>Ilisha melastoma</i>	(Schneider, 1801)	
		18. <i>Nematolosa nasus</i>	(Bloch, 1795)	
		19. <i>Sardinella gibbosa</i>	(Bleeker, 1849)	
10.	Cynoglossidae	20. <i>Cynoglossus puncticeps</i>	(Richardson, 1846)	Postmonsoon
11.	Engraulidae	21. <i>Coilia dussumieri</i>	(Valenciennes, 1848)	
		22. <i>Coilia neglecta</i>	(Whitehead, 1967)	
		23. <i>Stolephorus indicus</i>	(Van Hassert, 1823)	
		24. <i>Stolephorus commersonii</i>	(Lacepede, 1803)	
		25. <i>Stolephorus baganensis</i>	(Hardenberg, 1933)	
		26. <i>Thryssa malabarica</i>	(Bloch, 1795)	
27. <i>Thryssa mystax</i>	(Bloch and Schneider, 1801)			
12.	Elopidae	28. <i>Elops machnata</i>	(Forsskal, 1775)	Monsoon
13.	Gerreidae	29. <i>Gerres abbreviatus</i>	(Bleeker, 1850)	Postmonsoon
		30. <i>Gerres filamentosus</i>	(Cuvier, 1829)	
14.	Gobiidae	31. <i>Boleophthalmus boddarti</i>	(Pallas, 1770)	Monsoon
		32. <i>Glossogobius giuris</i>	(Hamilton, 1822)	
15.	Haemulidae	33. <i>Pomadasys kaakan</i>	(Cuvier, 1830)	Premonsoon
		34. <i>Plectorhichus gibbosus</i>	(Lacepede, 1802)	
16.	Hemiramphidae	35. <i>Hemiramphus far</i>	(Forsskal, 1775)	
17.	Latidae	36. <i>Hyporhamphus xanthopterus</i>	(Valenciennes, 1847)	Premonsoon
18.	Leiognathidae	37. <i>Lates calcarifer</i>	(Bloch, 1790)	
18.	Leiognathidae	38. <i>Leiognathus equulus</i>	(Forsskal, 1775)	Premonsoon
		39. <i>Leiognathus brevirostris</i>	(Valenciennes, 1835)	
19.	Mugilidae	40. <i>Mugil cephalus</i>	(Linnaeus, 1758)	Throughout
		41. <i>Liza parsia</i>	(Hamilton, 1822)	
		42. <i>Liza vaigiensis</i>	(Quoy and Gaimard, 1825)	
		43. <i>Valamugil seheli</i>	(Forsskal, 1775)	
		44. <i>Upeneus sulphureus</i>	(Cuvier, 1829)	
20.	Muraenesocidae	45. <i>Muraenesox bagio</i>	(Hamilton, 1822)	Premonsoon
21.	Platycephalidae	46. <i>Platycephalus indicus</i>	(Linnaeus, 1758)	Monsoon
22.	Polynemidae	<i>Eleutheronema tetradactylum</i>	(Shaw, 1804)	Premonsoon
23.	Plotosidae	48. <i>Plotosus canius</i>	(Hamilton, 1822)	Monsoon
24.	Serranidae	49. <i>Epinephelus tauvina</i>	(Forsskal, 1775)	
25.	Sillaginidae	50. <i>Sillago sihama</i>	(Forsskal, 1775)	
		51. <i>Sillaginodes punctatus</i>	(Cuvier, 1829)	



S. No.	Family	Fish species	Autenticator	Abundant
26.	Sparidae	52. <i>Acanthopagrus berda</i>	(Forsskal, 1773)	Throughout
27.	Sciaenidae	53. <i>Dendrophysarussele</i>	(Cuvier, 1829)	
		54. <i>Johnius belangerii</i>	(Cuvier, 1830)	Postmonsoon
28.	Scatophagidae	55. <i>Scatophagus argus</i>	(Bloch, 1788)	Monsoon
29.	Sigamidae	56. <i>Siganus canaliculatus</i>	(Park, 1797)	Summer
		57. <i>Siganus javus</i>	(Linnaeus, 1766)	Throughout
30.	Soleidae	58. <i>Brachirus orientalis</i>	(Bloch and Schneider, 1801)	Summer
31.	Teraponidae	59. <i>Terapon jarbua</i>	(Forsskal, 1775)	
		60. <i>Terapon puta</i>	(Cuvier, 1829)	
32.	Triacanthidae	61. <i>Triacanthus brevisrostris</i>	(Temminck and Schlegel, 1850)	
		62. <i>Pseudapocryptes lanceolatus</i>	(Bloch and Schneider, 1801)	
		63. <i>Triacanthus biaculeatus</i>	(Bloch, 1786)	

Figure 1. Map showing the study area



Figure 2. Diversity indices calculated for the fishes

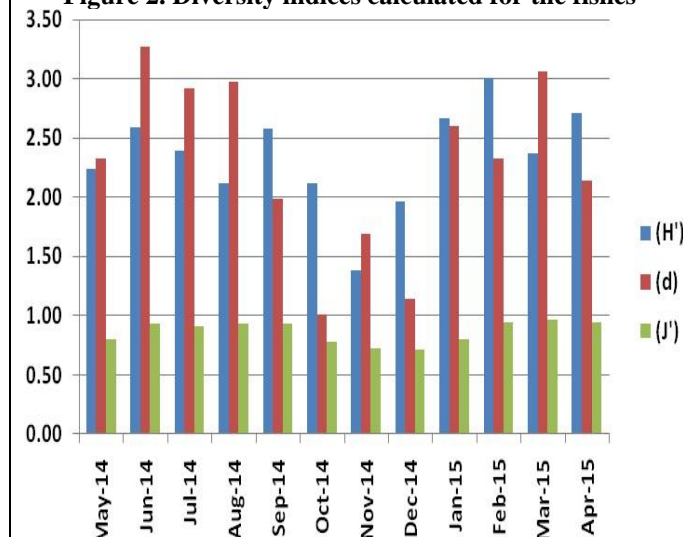
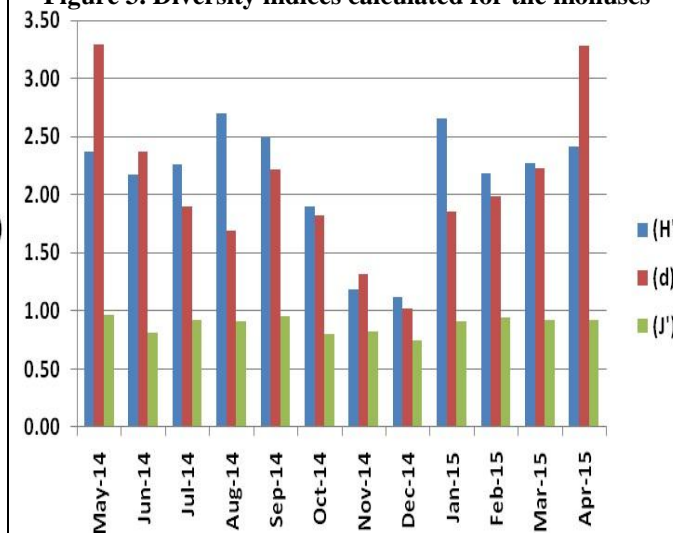


Figure 3. Diversity indices calculated for the molluscs



## DISCUSSION

Mangroves are typical wetland ecosystems found in coastal deposits of mud and silt throughout the tropics and some distance into the subtropical latitude. The best suitable area for their growth is the sea-land interface, where the saline water mixes with fresh water [10]. Mangroves are providing rich faunal resources from macro faunal communities to microbial diversity. Biodiversity and community structures are now recognized to be important determinants of ecosystem functioning. Monitoring of species diversity is a useful technique for assessing damage to the system and maintenance of good species diversity is a positive management objective. [11]

The Central Inland Capture Fisheries Institute (CIFRI), Barrackpore has collected data from selected stretches of rivers Ganga, Brahmaputra, Narmada, Tapi, Godavari and Krishna. These rivers harbour a rich and varied fish fauna, of which the Gangetic system alone has 265 species, followed by the Brahmaputra system with 126 species and the peninsular rivers harbouring 76 species. [12]. Deiva Oswin [13] reported that 73 species of finfishes have been recorded from Muthupet lagoon. The dominant and abundant ones are *Mugil spp.*, *Chanos chanos*, *Sillago sihama* and *Lates calcarifer*. Murugesan [14] collected 46 species in Parangipettai and 51 in Cuddalore coastal waters as well as Varadharajan [15] identified 66 species in Mallipattinam coastal waters, Southeast coast of India. Ramu [16] reported that different family fishes were identified totally in which 95 different species were identified belonging to 42 family and 59 genera from collection site, southeast coast of India. In the present study totally 63 species were recorded belonging to 49 genera and 32 families. The diversity of fish is based on the environmental condition.

Molluscan are considered to be the most diverse and dominant benthic fauna, both from lentic and lotic region which are mainly represented by the two major classes namely Gastropods and Pelecypods. [17] Molluscs

can reach high biomass in mangrove ecosystem because of high primary production within the food web, as predators, herbivores, detritivores and filter feeders [18]. The numerical abundance and biomass of molluscs can be equally impressive [19]. Gastropods are typically one of the dominant and most conspicuous macrofauna in mangrove systems and occupy a wide range of ecological niches. Amitkumar and Roy (2009) have observed 18 Gastropod species and 7 Pelecypod species from north Bihar region of India. The authors emphasise about conservation and management of faunal diversity of the molluscan species [20]. Rajan and Murugan (2001) while studying the diversity of molluscan fauna from Shivakasi, Tamilnadu observed 4 species of molluscan at less polluted site, 2 species at high polluted site and 5 species at non polluted site of Arjuna river [21]. T. Anandaraj *et al.* 2012 have observed 20 species of bivalves and 20 species of gastropod from Adirampattinam and Vedaranyam coastal area [22]. In the present study 11 gastropods and 7 bivalves were identified from the Muthupet mangroves. The present findings totally 18 Shell fish (Molluscs) and 63 fin fish species were identified and recorded from the Muthupet mangroves.

In the present study, a marked seasonal variation in the species diversity was noticed with minimum diversity value recorded during monsoon season and maximum during summer. Similar range of diversity values was also recorded earlier by Murugesan [23] in Vellar estuary, Kundu [24] in the shelf waters of southeast coast of India.

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