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Diversity of Edible and Ornamental Fishes in Kovalam Coast, Southeast India

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KEYWORDS

Fishery resources, Kovalam, Edible fishes, Ornamental fishes, Species composition and density

A B S T R A C T

Total of Seventy three economic importance fish were recorded from Teleosts represented by Thirty Seven families. Among the families, the most dominant family Carangidae recorded with eleven species and followed by second dominant family Leiognathidae recorded with eight species. According to the season wise species composition maximum record of 62 species during post monsoon followed by 41 species at premonsoon, 35 species at monsoon and minimum of 33 species during summer. Over all total species about 13 species of fishes are recorded among all the seasons. Total of twenty two ornamental fish were recorded from Teleosts represented by seventeen families in Kovalam landing centre. Among the thirty seven families of the economic importance fishes, an average of percentage composition of the most dominant one was Carangidae (19.36 %) followed by second and third dominant family Leiognathidae (12.98%) and Sciaenidae (8.62 %).Thirty seven families of the economic importance fishes, an overall density varied among seasons by dominant in no/individuals is as follows 502771 (postmonsoon), 232284 (summer), 123473 (monsoon) and 113497 (premonsoon).The diversity of Economic important fish population varied from minimum of 1.528 (summer)to maximum of 2.391 (postmonsoon). In general, the Kovalam fishery a fairly good fishery potential. During mosoon and postmonsoon (November – February), the biodiversity of fishesin this area indicated a healthy ecosystem.

Introduction

Fisheries is an important sector in India. It provides employment to millions of people and contributes to food security of the country. With a coastline of over 8,000 km, an Exclusive Economic Zone (EEZ) of over 2 million sq km, and with extensive freshwater resources, fisheries play a vital role. Presently, fisheries and aquaculture contribute 1.07 per cent to the national GDP, and 5.30 per cent to agriculture and allied

activities, while the average annual value of output during the Tenth Five Year Plan (2002-2007) was Rs31,682.50 crores. Marine Fisheries contributes to food security and provides direct employment to over 1.5 million fisher people besides others indirectly dependent on the sector. According to the CMFRI Census 2010, there are 3,288 marine fishing villages and 1,511 marine fish landing centers in 9 maritime states and 2 union territories. The total marine fisher folk population was about 4 million comprising in 864,550 families. Any bottom-contact fishing will impact the sea floor to some extent depending on the seabed type and the gear type used. As benthos dwelling in the benthic region In some cases impacts are clear; bottom-trawling can cause immediate and long-lasting damage to deepwater coral, sponge and sea-pen communities. In other cases impacts are not even apparent; beach-seining of shallow sandy habitats has continued for centuries without obvious change. It is only recently that we have begun to appreciate the extent of this variability and initiate research aimed as understanding how disturbance caused by fishing affects ecosystem function, biodiversity, productivity, vulnerability and resilience. Longer term ecosystem and community responses to indirect impacts of fisheries such as discards are hardly understood at all. There is a growing need to develop indicators of ecological status, including seabed integrity and we generally lack predictive models of recovery for most ecosystems. Technical solutions aimed at minimizing seabed impacts are starting to appear, but their efficacy remains to be tested in many ecosystems. Despite of the above researches, no further study has been done for this water area. Some researches on species' composition and distribution of fin and shell fishes have been carried out in some tropical estuaries and mangrove creeks along the Indian coasts, which include the work of Joyothi and Nair (1990), Joseph and Soni (1990), Chandrasekaran and Natarajan (1993, 1994), Mohan *et al.* (1995, 1997), Chandrasekaran (2000) and Kathiresan and Rajendran (2002).

Materials and Methods

Kovalam is a fishing village in Chennai, India. It is away from 40 kilometres in south of chennai. The village of kovalam is famous for its fishing activities. Monthly samples on finfish of ornamental and edible fishes were collected for the period of two years.

Results and Discussion

Species Composition

Total of Seventy three economic importance fish were recorded from Teleosts represented by Thirty Seven families in Kovalam landing centre. The checklist for economic importance fish recorded in Kovalam landing centre were given in the table.1. Among the families, the most dominant family Carangidae recorded with eleven species and followed by second dominant family Leiognathidae recorded with eight species. According to the season wise species composition maximum record of 62 species during postmonsoon followed by 41 species at premonsoon, 35 species at monsoon and minimum of 33 species during summer. Over all total species about 13 species of fishes are recorded among all the seasons. Twenty two ornamental fish were recorded from Teleosts represented by seventeen families in Kovalam landing centre. The checklist for ornamental fish recorded in landing centrewere given in the table.2. Among the families, the most dominant family Serranidae recorded with three species and followed by second

dominant family Pomacanthidae, Haemulidae and Scorpaenidae recorded with two species. According to the season wise species composition maximum record of 20 species during premonsoon followed by 18 species at postmonsoon, 14 species at monsoon and minimum of 10 species during summer. Over all total species about 6 species of fishes are recorded among all the seasons.

Percentage Composition

Among the thirty seven families of the economic importance fishes, an average of percentage composition of the most dominant one was Carangidae (19.36 %) followed by second and third dominant family Leiognathidae (12.98%) and Sciaenidae (8.62 %). In post monsoon, the percentage composition economic importance fish varied from 0 (seven families) to 16.13 % (family Carangidae). In summer, the percentage composition economic importance fish varied from 0 (twenty one families) to 24.24 % (family Carangidae).In premonsoon, the percentage composition economic importance fish varied from 0 (fourteen families) to 17.07 % (family Carangidae).In monsoon, the percentage composition economic importance fish varied from 0 (eighteen families) to 20 % (family Carangidae) (figure. 9).Among the seventeen families of the ornamental fishes, an average of percentage composition of the most dominant one was Serranidae (19.38 %) followed by second and third dominant family Scorpaenidae (13.85 %) and Haemulidae (9.56 %). In post monsoon, the percentage composition economic importance fish varied from 0 (two families) to 11.11 % (family Haemulidae, Scorpaenidae and Serranidae). In summer, the percentage composition economic importance fish varied from 0 (ten families) to 30 % (family Serranidae). In premonsoon, the percentage composition economic importance fish varied from 0 (family Mullidae) to 15 % (family Serranidae).In monsoon, the percentage composition economic importance fish varied from 0 (six families) to 21.43 % (family Serranidae) (figure. 10).

Density

Among the thirty seven families of the economic importance fishes, an overall density varied among seasons by dominant in no/individuals is as follows 502771 (postmonsoon), 232284 (summer), 123473 (monsoon) and 113497 (premonsoon). In post monsoon, the density of economic importance fish varied from 0 (seven families) to 83564 no/individuals (family Engraulidae). In summer, the density economic importance fish varied from 0 (twenty one families) to 112392 no/individuals (family Clupeidae).In premonsoon, the density economic importance fish varied from 0 (fourteen families) to 29960 (family Scrombridae).In monsoon, the density economic importance fish varied from 0 (eighteen families) to 35805 (family Scombridae) (figure. 11).Among the seventeen families of the ornamental fishes, an overall density varied among seasons by dominant in no/individuals is as follows 22232 (premonsoon), 14763 (postmonsoon), 4690 (monsoon) and 4256 (summer).

In post monsoon, the density of ornamental fish varied from 0 (two families) to 4200 no/individuals (family Siganidae). In summer, the density ornamental fish varied from 0 (ten families) to 1218 no/individuals (family Serranidae).In premonsoon, the density ornamental fish varied from 0 (family Mullidae) to 10850 (family Siganidae). In monsoon, the density ornamental fish varied from 0 (six families) to 1078 (family Pomacanthidae) (figure. 12)

Diversity Indices

The diversity of Economic important fish population varied from minimum of 1.528 (summer)to maximum of 2.391 (postmonsoon) (Fig 1). The diversity values varied among different seasons such as postmonsson (2.391), summer (1.528), premonsoon (2.259) and monsoon (2.111). The Evenness of Economic important fish population ranged from 0.551 (Summer) to 0.721 (premonsoon) (Fig 2). Evenness among season differentiated from postmonsoon (0.703), summer (0.551), premonsoon (0.721) and monsoon (0.717).The species richness of Economic important fish population rangedbetween1.214 (summer)to 2.209 (postmonsoon) (Fig 3). Species richness deviated among seasons, postmonsoon (2.209), summer (1.214), premonsoon (1.890) and monsoon (1.535).

Table.1

Family	Scientific Name	Postmosoon	Summer	Premonsoon	Monsoon
Ariidae	*Arius thalassinus*	+	-	-	-
Ariommidae	*Ariomma indica*	+	+	-	-
Balistidae	*Sufflamen fraenatus*	-	-	-	+
Belonnidae	*Tylosurus crocodilus*	+		-	-
Bothidae	*Pseudorhombus arsius*	+	-	-	-
Carangidae	*Alectis indicus*	-	-	+	-
	Atule mate	+	+	-	+
	Carangoides chrysophrys	+	+	+	+
	Carangoides malabaricus	+	-	-	+
	Caranx ignobilis	+	+	+	+
	Decapterus russelli	+	+	-	-
	Formio niger	+	+	+	-
	Scomberoides commersonnianus	+	+	+	+
	Scomberoides lysan	+	+	-	-
	Selar crumenophthalmus	+	-	+	+
	Trachinotus bailloni	+	+	+	+
Centropomidae	*Lates calcarifer*	+		+	-
Chirocentridae	*Chirocentrus dorab*	+	-	+	+
	Chirocentrus nudus	-	-	+	+
Clupeidae	*Dussumieria acuta*	+	+	+	-
	Nematalosa nasus	+	-	+	-
	Opisthopterus tardoore	+	-	-	-
	Sardinella gibbosa	+	+	-	+
	Sardinella longiceps	+	+	+	-
Cynoglossidae	*Cynoglossus dubius*	+	-	-	-
Engraulidae	*Coilia dussumieri*	+	-	-	-
	Stolephorus heterolobus	+	+	-	-
	Thryssa setirostris	+	+	-	-
Exocoetidae	*Hirundichthys coromandelensis*	-	-	+	-
Haemulidae	*Pomadasys maculatus*	-	-	-	+
Harpadontidae	*Harpodon nehereus*	-	-	+	+
Lactaridae	*Lactarius lactarius*	+	+	+	+
Leiognathidae	*Gazza minuta*	+	+	-	-
	Leiognathus berbis	+	+	+	+
	Leiognathus dussumieri	+	-	+	+
	Leiognathus equulus	+	+	+	+
	Leiognathus insidator	+	-	-	-

	Leiognathus splendens	+	+	-	+
	Secutor insidiator	+		+	+
	Secutor ruconius	+	-	-	+
Lethrinidae	*Lethrinus lentjan*	+	-	+	+
Lutjanidae	*Lutjanus lutjanus*	+	+	+	-
	Lutjanus russelli	+	-	-	+
Menidae	*Mene maculata*	+	+	-	+
Mugilidae	*Liza macrolepis*	+	+	-	-
	Valmugil buchanani	-	-	+	+
Muraenesocidae	*Congresox talabonoides*	+	-	-	-
Nemipteridae	*Nemipterus japonicus*	+	+	+	+
Plotosidae	*Plotosus lineatus*	+	-	-	-
Polynemidae	*Polynemus heptadactylus*	+	-	+	-
	Polynemus indicus	+	-	-	+
Priacanthidae	*Priacanthus hamrur*	+	+	+	+
Psettodidae	*Psettodes erumei*	+	-	-	-
Scaridae	*Scarus ghobban*	-	-	+	-
Sciaenidae	*Kathala axillaris*	+	+	+	+
	Nibea maculata	+	+	-	+
	Otolithes ruber	+	+	+	-
	Panna microdon	+	+	+	+
Scombridae	*Euthynnus affinis*	+	+	+	+
	Rastrelliger kanagurta	+	+	+	+
	Scomberomorus commerson	+	-	+	-
	Acanthocybium solandri	+	-	+	+
Siganidae	*Siganus lineatus*	+	-	-	-
	Siganus vermiculatus	+	+	+	-
Sillaginidae	*Sillago sihama*	-	-	+	-
	Sillago vincenti	-	-	+	-
Soleidae	*Zebrias quagga*	+	-	-	-
Sparidae	*Rhabdosargus sarba*	+	-	+	-
Sphyraenidae	*Sphyraena forsteri*	+	-	+	+
	Sphyraena obtusata	+	+	-	-
Stromatidae	*Pampus argenteus*	+	+	-	-
Teraponidae	*Terapon jarbua*	-	-	+	-
Trichiuridae	*Trichiurus gangeticus*	+		+	+

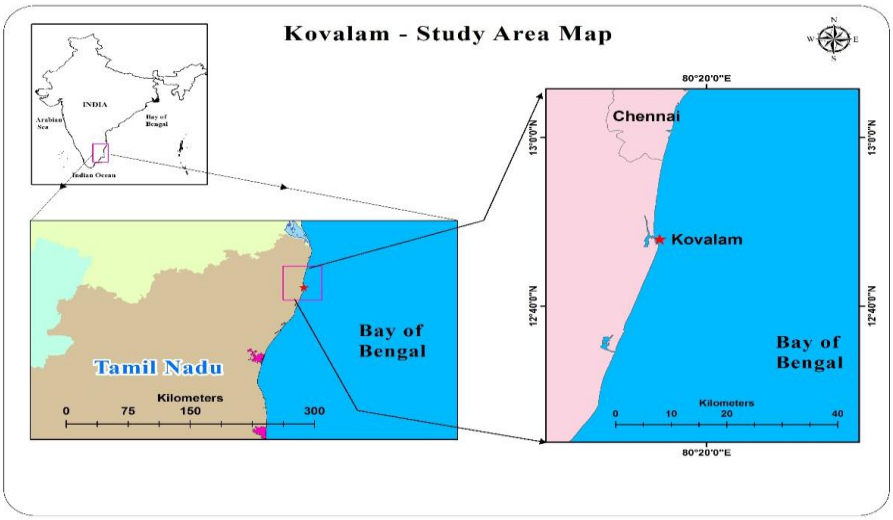
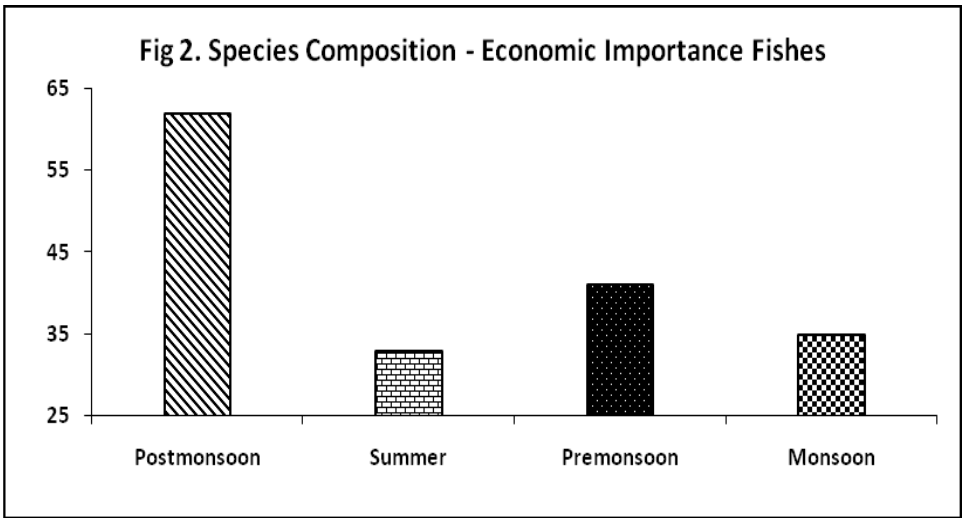


Table.2

Family	Scientific Name	Postmosoon	Summer	Premonsoon	Monsoon
Carangidae	*Gnathanodon speciosus*	+	-	+	+
Chaetodontidae	*Chaetodon vagabundus*	+	-	+	-
Ephippidae	*Platax orbicularis*	+	-	+	+
Haemulidae	*Diagramma pictum*	+	-	+	-
	Plectorhinchus lineatus	+	+	+	+
Holocentridae	*Myripristis adusta*	-	-	+	+
Labridae	*Xyrichthys novacula*	-	-	+	+
Lutjanidae	*Lutjanus bengalensis*	+		+	
Mullidae	*Parupeneus cyclostomus*	+			+
Nemipteridae	*Scolopsis vosmeri*	+		+	
Pomacanthidae	*Apolemichthys xanthurus*	+	+	-	+
	Pomacanthus annularis	-	-	+	-
Pomacentridae	*Abudefduf saxatilis*	+	-	+	+
Scaridae	*Scarus russelii*	+	+	+	-
Scatophagidae	*Scatophagus argus*	+	+	+	+
Scorpaenidae	*Dentrochirus zebra*	+	+	+	+
	Pterois russelii	+	+	+	+
Serranidae	*Cephalopholis formosa*	-	+	+	+
	Epinephelus areolatus	+	+	+	+
	Diploprion bifaciatum	+	+	+	+
Siganidae	*Siganus javus*	+	-	+	-
Zanclidae	*Zanclus cornatus*	+	+	+	-



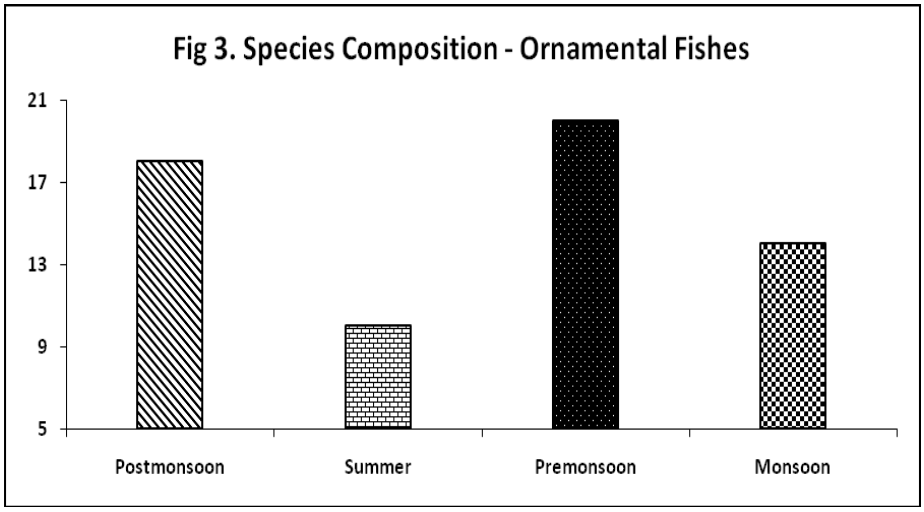


Fig 3. Species Composition - Ornamental Fishes
21
17
13
9
5
Postmonsoon
Summer
Premonsoon
Monsoon

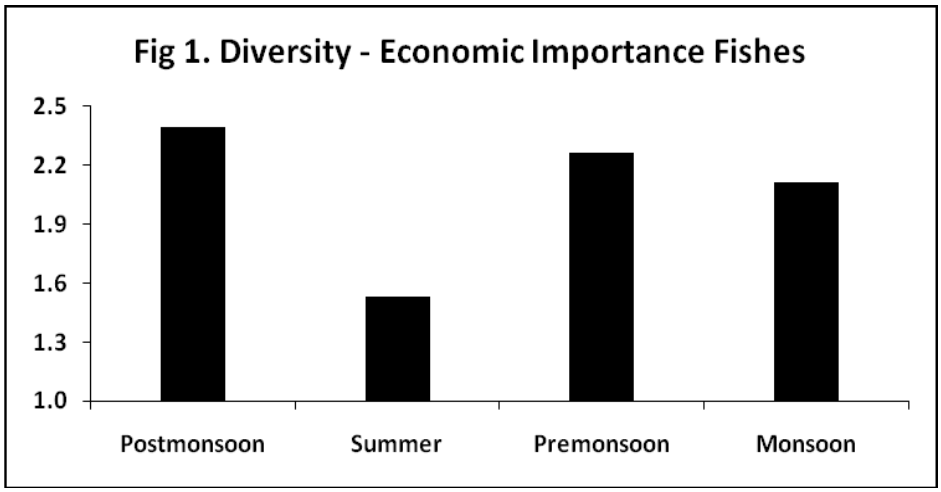


Fig 1. Diversity - Economic Importance Fishes
2.5
2.2
1.9
1.6
1.3
1.0
Postmonsoon
Summer
Premonsoon
Monsoon

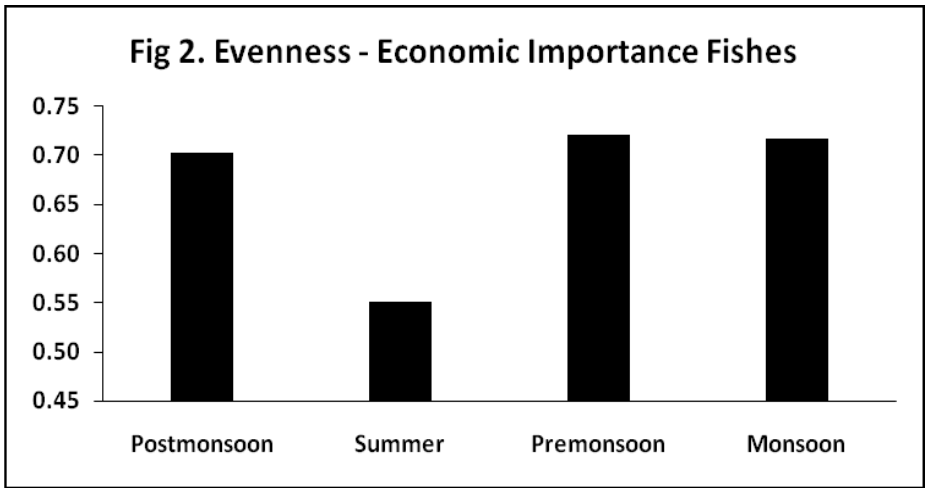


Fig 2. Evenness - Economic Importance Fishes
0.75
0.70
0.65
0.60
0.55
0.50
0.45
Postmonsoon
Summer
Premonsoon
Monsoon

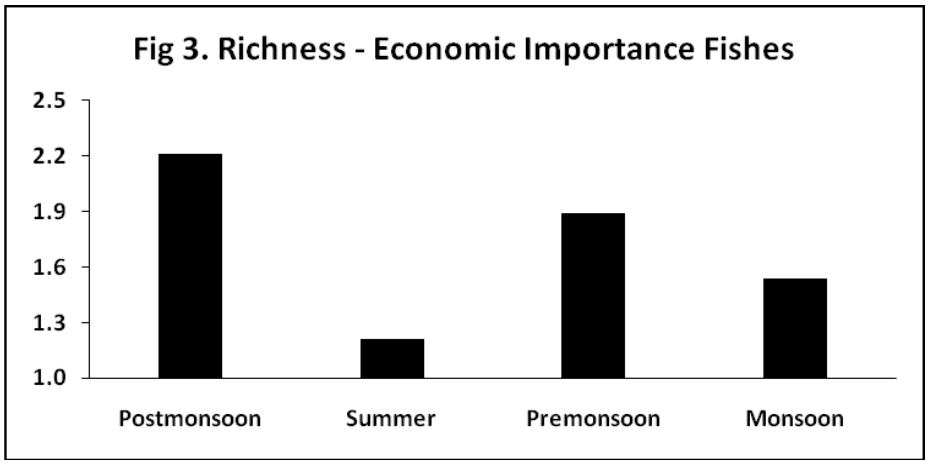


Fig 3. Richness - Economic Importance Fishes
2.5
2.2
1.9
1.6
1.3
1.0
Postmonsoon
Summer
Premonsoon
Monsoon

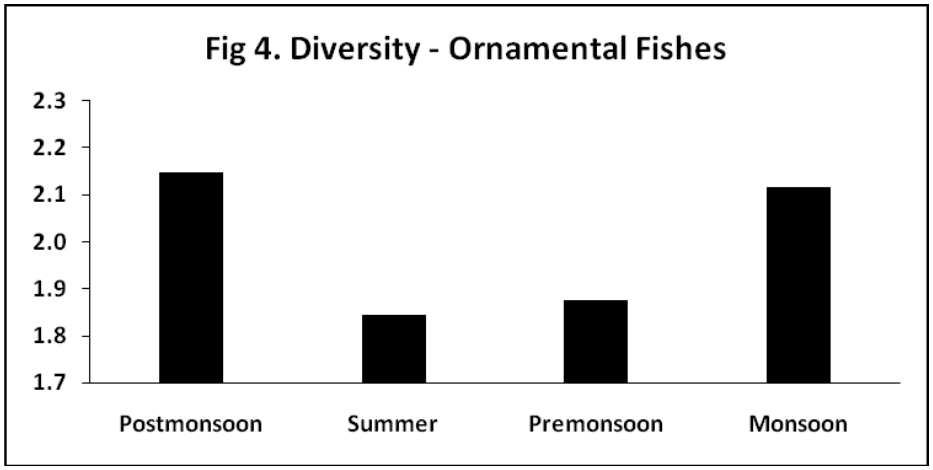


Fig 4. Diversity - Ornamental Fishes
2.3
2.2
2.1
2.0
1.9
1.8
1.7
Postmonsoon
Summer
Premonsoon
Monsoon

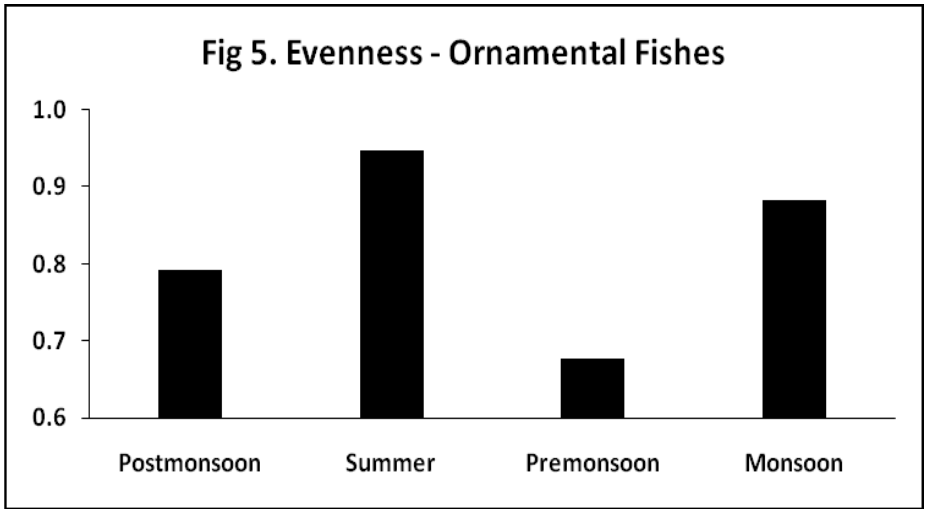


Fig 5. Evenness - Ornamental Fishes
1.0
0.9
0.8
0.7
0.6
Postmonsoon
Summer
Premonsoon
Monsoon

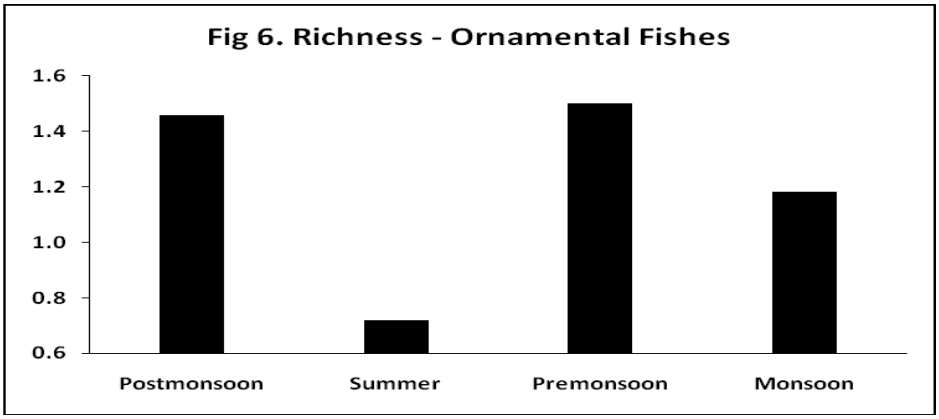


Fig 6. Richness - Ornamental Fishes
1.6
1.4
1.2
1.0
0.8
0.6
Postmonsoon
Summer
Premonsoon
Monsoon

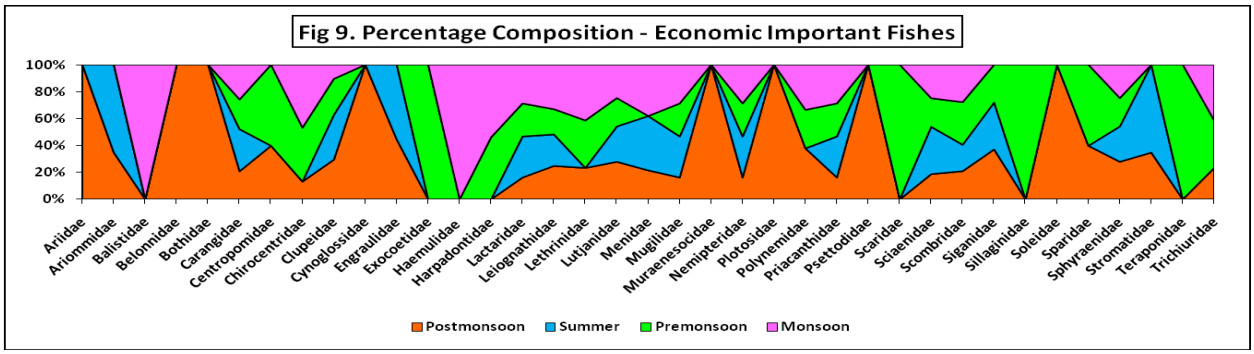


Fig 9. Percentage Composition - Economic Important Fishes
100%
80%
60%
40%
20%
0%
Ariidae
Ariommidae
Balistidae
Belonnidae
Bothidae
Carangidae
Centropomidae
Chirocentridae
Clupeidae
Cynoglossidae
Engraulidae
Exocoetidae
Haemulidae
Harpadontidae
Lactaridae
Leiognathidae
Lethrinidae
Lutjanidae
Menidae
Mugilidae
Muraenesocidae
Nemipteridae
Plotosidae
Polynemidae
Priacanthidae
Psettodidae
Scaridae
Sciaenidae
Scombridae
Siganidae
Sillaginidae
Soleidae
Sparidae
Sphyraenidae
Stromatidae
Teraponidae
Trichiuridae
Postmonsoon
Summer
Premonsoon
Monsoon

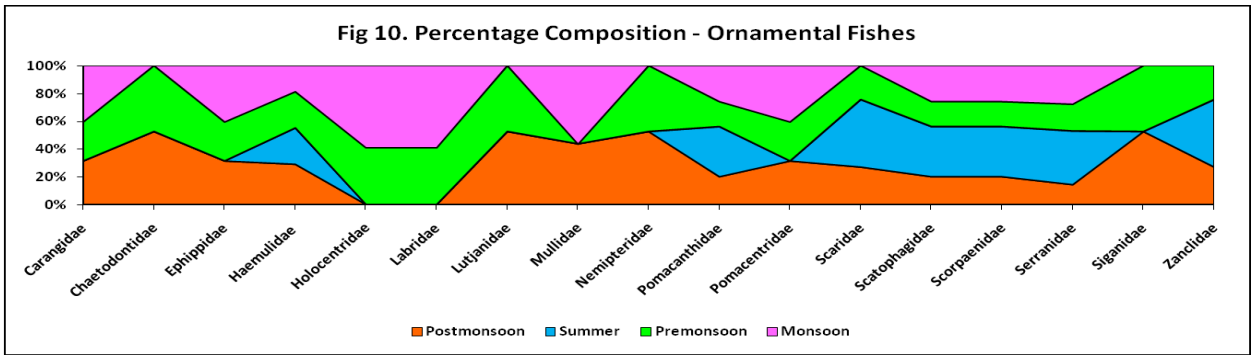


Fig 10. Percentage Composition - Ornamental Fishes
100%
80%
60%
40%
20%
0%
Carangidae
Chaetodontidae
Ephippidae
Haemulidae
Holocentridae
Labridae
Lutjanidae
Mullidae
Nemipteridae
Pomacanthidae
Pomacentridae
Scaridae
Scatophagidae
Scorpaenidae
Serranidae
Siganidae
Zanclidae
Postmonsoon
Summer
Premonsoon
Monsoon

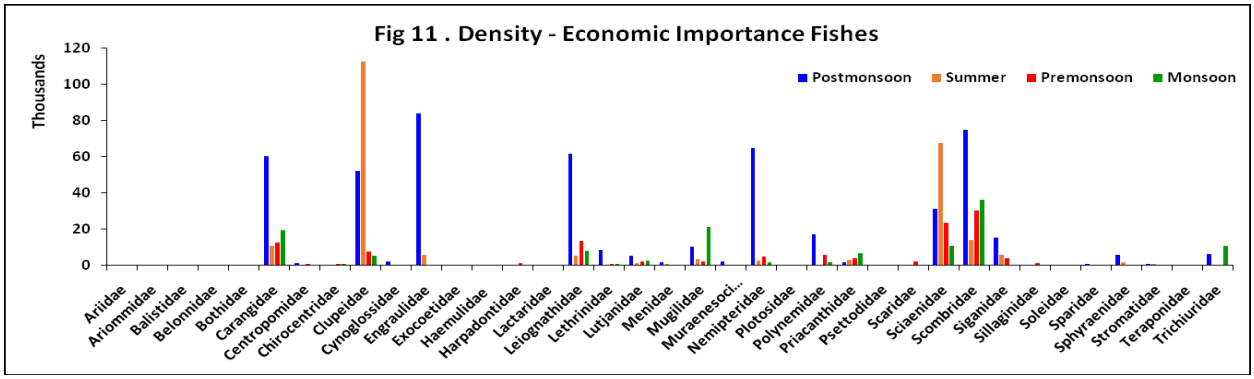
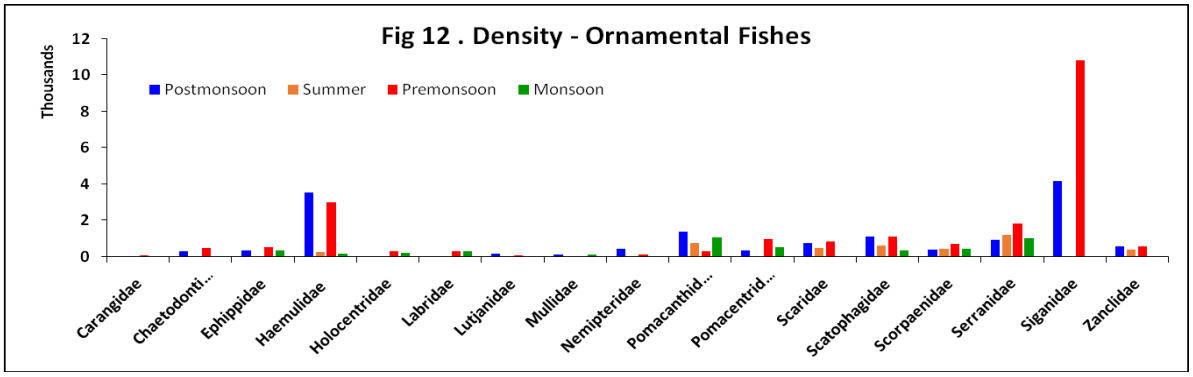


Fig 11 . Density - Economic Importance Fishes
Thousands
120
100
80
60
40
20
0
Postmonsoon
Summer
Premonsoon
Monsoon
Ariidae
Ariommidae
Balistidae
Belonnidae
Bothidae
Carangidae
Centropomidae
Chirocentridae
Clupeidae
Cynoglossidae
Engraulidae
Exocoetidae
Haemulidae
Harpadontidae
Lactaridae
Leiognathidae
Lethrinidae
Lutjanidae
Menidae
Mugilidae
Muraenesoci...
Nemipteridae
Plotosidae
Polynemidae
Priacanthidae
Psettodidae
Scaridae
Sciaenidae
Scombridae
Siganidae
Sillaginidae
Soleidae
Sparidae
Sphyraenidae
Stromatidae
Teraponidae
Trichiuridae



Total of Seventy three economic importance fish were recorded from Teleosts represented by Thirty Seven families. Among the families, the most dominant family Carangidae recorded with eleven species and followed by second dominant family Leiognathidae recorded with eight species. According to the season wise species composition maximum record of 62 species during postmonsoon followed by 41 species at premonsoon, 35 species at monsoon and minimum of 33 species during summer. Over all total species about 13 species of fishes are recorded among all the seasons. Similarly, several investigations made in other areas also found that the mangroves supported a rich fish fauna ranging from 26 to 197 species with fish densities varying from 0.3 to 161 fish m-2, and the biomass estimates were mostly in the range of 7−29 g m-2(Robertson and Blabber, 1992; Vance *et al*., 1996). Total of twenty two ornamental fish were recorded from Teleosts represented by seventeen families in Kovalam landing centre. Among the thirty seven families of the economic importance fishes, an average of percentage composition of the most dominant one was Carangidae (19.36 %) followed by second and third dominant family Leiognathidae (12.98%) and Sciaenidae (8.62 %).Thirty seven families of the economic importance fishes, an overall density varied among seasons by dominant in no/individuals is as follows 502771 (postmonsoon), 232284 (summer), 123473 (monsoon) and 113497 (premonsoon).The diversity of Economic important fish population varied from minimum of 1.528 (summer)to maximum of 2.391 (postmonsoon). In addition, low diversity values were also due to the preponderance of two or three species, which was clear in the present observation and a similar pattern in North Florida salt marshes (Subramanyan and Drake, 1975). It is widely accepted that diversity increases with an increase of the environment stability in aquatic biotopes (Rajendran and Kathiresan 1998, 1999a, b; Kathiresan and Bingham, 2001). The high diversity values recorded during monsoon in the present study indicated very well that more stable environmental conditions prevailed in this period, whereas the low values recorded during monsoon might be due to the sharp decrease in salinity and other physico-chemical changes in the marine environment, which was affected by inundation and influx of freshwater in the system. Similar observations were reported in other three mangrove areas by Kathiresan and Rajendran (2002). Similar to diversity values, evenness values were also low during monsoon and high during winter. In general, the Kovalam fishery a fairly good fishery potential. During mosoon and postmonsoon (November – February), the biodiversity of fishesin this area indicated a healthy ecosystem.

Conclusion

From the present study on edible and ornamental fish density and diversity, it is quite clear that benthic food contributed healthy pelagic ecosystem with a pristine nature. Therefore, the present baseline information of the edible and ornamental fish resources and abundance would form a useful tool for further ecological assessment and monitoring of these coastal ecosystems in Chennai coast.

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