

VOLUME 9

ISSUE 1

2023

ISSN 2454 – 3055



**INTERNATIONAL
JOURNAL OF
ZOOLOGICAL
INVESTIGATIONS**

*Forum for Biological and
Environmental Sciences*

Published by Saran Publications, India



International Journal of Zoological Investigations

Contents available at Journals Home Page: www.ijzi.net

Editor-in-Chief: Prof. Ajai Kumar Srivastav

Published by: Saran Publications, Gorakhpur, India



ISSN: 2454-3055

Fish Assemblages in Nagapattinam Coast, Tamil Nadu, India

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Received: 15th January, 2023; Accepted: 12th March, 2023; Published online: 26th March, 2023

<https://doi.org/10.33745/ijzi.2023.v09i01.057>

Abstract: One of the significant concerns in enabling the sustainable use of natural resources is biodiversity and conservation. The current study was conducted to explore and provide data on the fish assemblages in trawl by catch on the Nagapattinam Coast of India from July 2019 to June 2021. Throughout the research period, 117 species belonging to 16 orders and 56 families were identified. The maximum fish collection was done during June to September and minimum during February to March. Among the collected species, order Perciformes was most dominant followed by Clupeiformes and Pleuronectiformes in all seasons.

Keywords: Nagapattinam Coast, Fish assemblages, Perciformes, Clupeiformes, Pleuronectiformes, Biodiversity

Citation: Karthik M. and Rajakumar R.: Fish assemblages in Nagapattinam Coast, Tamil Nadu, India. Intern. J. Zool. Invest. 9(1): 520-529, 2023.

<https://doi.org/10.33745/ijzi.2023.v09i01.057>



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Introduction

Fishes are the most abundant and yet the least known class of vertebrates. Approximately 20,000 species are now identified, and the ultimate total is probably to show that three out of every five vertebrates are fish. They live in every type of aquatic habitat, and their extensive distribution has resulted in a variety of designs for their unique strategies of survival. The seas encompass more than 71 per cent of the globe and supply up to 99 per cent of the area accessible for life in the ecosystem. However, as compared to the biodiversity recorded from the terrestrial

component, the marine environment is the least investigated. This is mostly owing to the surveyor's logistical challenges during excursions (George *et al.*, 2008). There are 31,362 unique fish species recognized worldwide (William *et al.*, 2010).

Biodiversity is simply 'Life on Earth' and it refers to a variety of life forms including plants, animals and microorganisms, the genes that they contain and ecosystems that they form. De Fontaubert *et al.* (1996) defined that biodiversity is the variability among living organisms from all

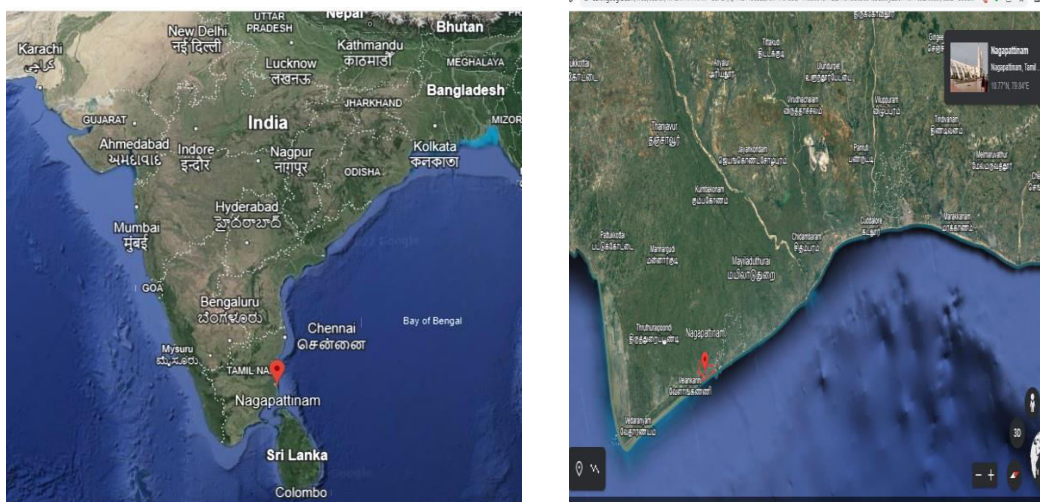


Fig. 1: The map showing the study area.

sources including terrestrial, marine and other aquatic inter alia ecosystems and the ecological complexes, of which they are part which includes diversity within species, between species and of ecosystems.

India is one among the 17 mega Biodiversity countries of the world, with only 2.5% of the land area which accounts about 7.8% of the total recorded species of the world (Anon, 2012). The understanding marine diversity is important for number of reasons. Nature to adopt to the changing climate. People to adopt to their food source and different environmental conditions and People to discover and gain new benefits from biodiversity. Considering the above, the present study focused on the fish assemblages in Nagapattinam Coast, Tamil Nadu, India.

Materials and Methods

Nagapattinam is a coastal district of Tamil Nadu (Lat 10°45'37.45"N Lon 79°51'09.07"E). Nagapattinam the district headquarter lie 326 km, south of the state capital Chennai. The district spreads over an area of 2,715.83 sq. km. From July-2019 (Pre-monsoon) to June - 2021 (Summer) samples with the help of local fishermen using a variety of gears including cast nets, drag net, scoop nets and traps were collected once a month from trawls operating in the Nagapattinam coast (Fig. 1). The fish samples were taken visually and then preserved in 5.8%

formalin. Using standard references Fish Base (Froese and Pauly, 2007), the morphological characteristics of the species were investigated (Day, 1878; Talwar and Jhingran, 1991; Jayaram, 2013) and each species was identified up to the species level. In addition to standard books, FAO species identification sheets (Fischer and Bianchi, 1984) are used to identify the fishes.

Results

Species composition:

In the present study, total 117 species were recorded belonging to 16 order and 56 families. The number of species recorded for different families varies in numbers. More number of species was recorded from family Engraulidae, Hemiramphidae and Clupeidae. Limited number of species were recorded from family Ophichthidae, Mugilidae, Acanthuridae, Carangidae, Gobiidae, Haemulidae, Lutjanidae, Ctenidae, Serranidae, Cynoglossidae and Soleidae. Family-wise composition of fish species in the study area are illustrated in the Table 1 and Figure 2.

Percentage composition:

When the percentage composition of fish assemblages in orders of the fish species was examined, order Perciformes topped with 42%. The percentage composition of fish of other orders are -- Clupeiformes 17%, Pleuronecti-

Table 1: Family-wise composition of fish Species in the study area

Family	Number of Species
Carcharhinidae	1
Triakidae	1
Dasyatidae	2
Gymnuridae	1
Albulidae	1
Anguillidae	2
Muraenesocidae	2
Ophichthidae	3
Synodontidae	2
Atherinidae	2
Belonidae	1
Exocoetidae	2
Hemiramphidae	4
Chirocentridae	1
Clupeidae	4
Dussumieriidae	1
Engraulidae	12
Pristigasteridae	2
Elopidae	1
Megalopidae	1
Mugilidae	3
Acanthuridae	3
Ambassidae	2
Apogonidae	1
Carangidae	3
Cepolidae	1
Drepanidae	1
Gerreidae	2
Gobiidae	3
Haemulidae	3
Kyphosidae	1
Latidae	2
Leiognathidae	2
Lethrinidae	2
Lutjanidae	3
Mullidae	2
Nemipteridae	2
Polynemidae	2
Sciaenidae	3
Scombridae	2
Serranidae	3
Siganidae	2
Sparidae	2

Teraponidae	1
Trichiuridae	1
Cynoglossidae	3
Paralichthyidae	2
Psettodidae	1
Soleidae	3
Cottidae	2
Ariidae	2
Fistulariidae	1
Syngnathidae	2
Balistidae	1
Triacanthidae	1
Tetraodontidae	1
TOTAL	117

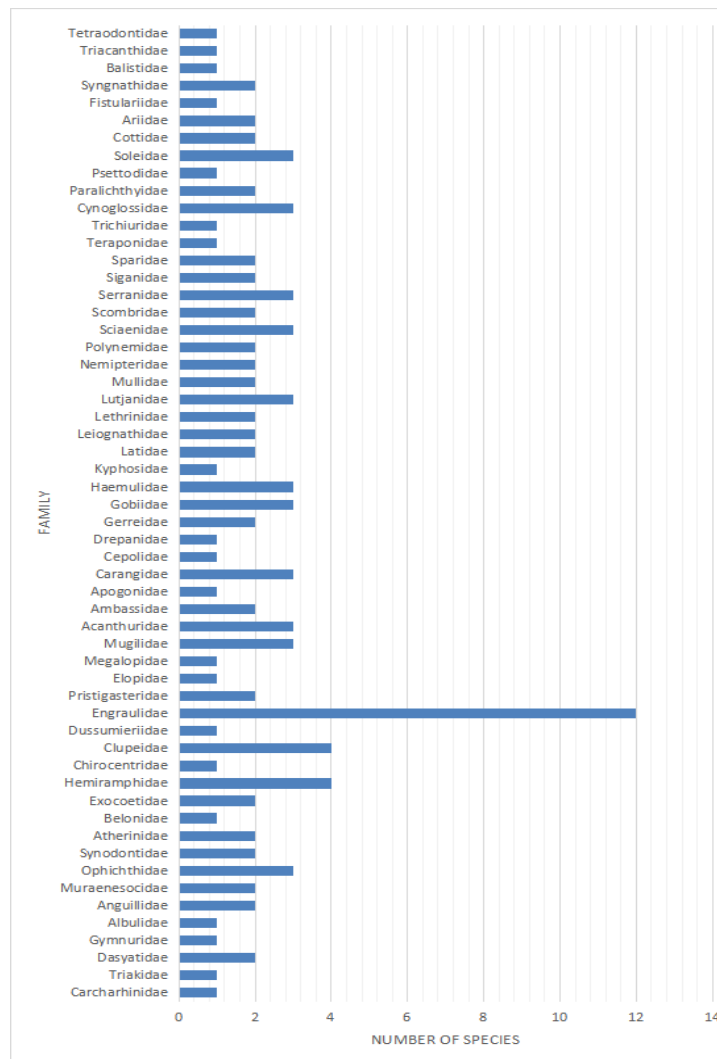


Fig. 2: Family-wise composition of fish species in the study area.

Table 2: Order-wise percentage composition of fishes in study area

Order	Percentage of composition in species %
Carcharhiniformes	2
Myliobatiformes	2
Albuliformes	1
Anguilliformes	6
Aulopiformes	2
Atheriniformes	2
Beloniformes	6
Clupeiformes	17
Elopiformes	2
Mugiliformes	2
Perciformes	42
Pleuronectiformes	8
Scorpaeniformes	2
Siluriformes	2
Syngnathiformes	2
Tetraodontiformes	2
Total	100 %

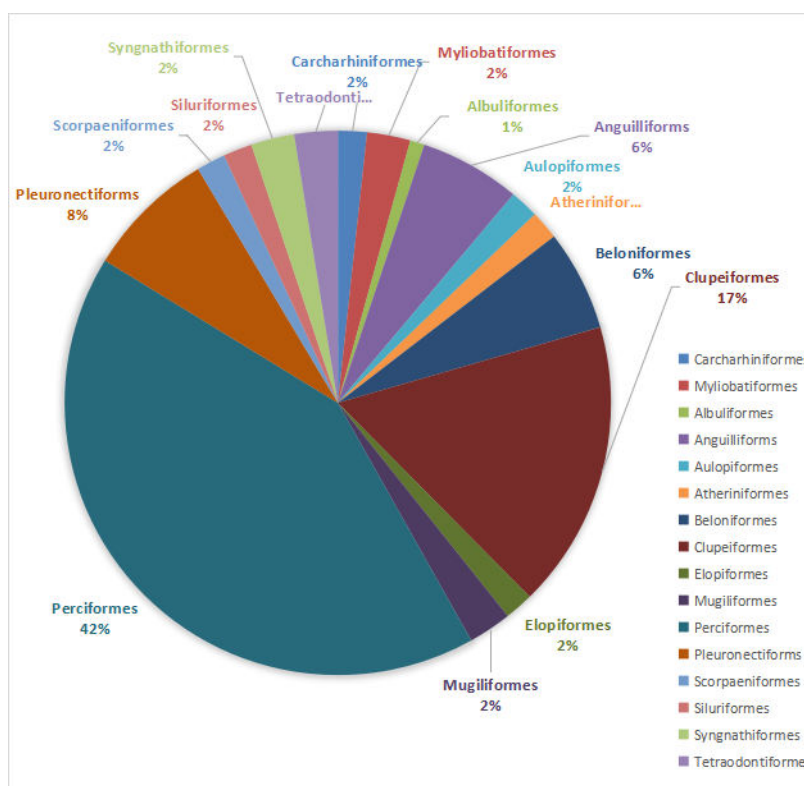


Fig. 3: Order-wise percentage composition of fish in Nagapattinam coast.

Table 3: Checklist of fish species identified and recorded from Nagapattinam Coast

S. No.	Order	Family	Fish Species	Authenticator
1.	Carcharhiniformes	1. Carcharhinidae	<i>Scoliodon laticaudus</i>	(Muller and Henle, 1838)
		2. Triakidae	<i>Mustelus canis</i>	(Mitchill, 1815)
2.	Myliobatiformes	3. Dasyatidae	<i>Himantura uarnak</i>	(Gmelin, 1789)
			<i>Pastinachus sephen</i>	(Forsskal, 1775)
		4. Gymnuridae	<i>Gymnura poecilura</i>	(Shaw, 1804)
3.	Albuliformes	5. Albulidae	<i>Albula vulpes</i>	(Linnaeus, 1758)
4.	Anguilliforms	6. Anguillidae	<i>Anguilla bengalensis</i>	(Gray, 1831)
			<i>Anguilla bicolor</i>	(McClelland, 1844)
		7. Muraenesocidae	<i>Congresox talabon</i>	(Cuvier, 1829)
			<i>Muraenesox bagio</i>	(Hamilton, 1822)
		8. Ophichthidae	<i>Bascanichthys deraniyagalai</i>	(Menon, 1961)
			<i>Lamnostoma orientalis</i>	(McClelland, 1844)
			<i>Pisodonophis boro</i>	(Hamilton, 1822)
5.	Aulopiformes	9. Synodontidae	<i>Saurida tumbil</i>	(Bloch, 1795)
			<i>Synodus sageneus</i>	Waite, 1905
6.	Atheriniformes	10. Atherinidae	<i>Atherinomorus duodecimalis</i>	(Valenciennes, 1835)
			<i>Atherinomorus forskalii</i>	(Rüppell 1838)
7.	Beloniformes	11. Belonidae	<i>Tylosurus crocodilus</i>	(Peron and Lesueur, 1821)
		12. Exocoetidae	<i>Cheilopogon cyanopterus</i>	(Valenciennes, 1847)
			<i>Cypselurus poecilopterus</i>	(Valenciennes, 1847)
		13. Hemiramphidae	<i>Hemiramphus far</i>	(Forsskal, 1775)
			<i>Hemiramphus lutkei</i>	(Valenciennes, 1847)
			<i>Hyporhamphus quoyi</i>	(Valenciennes, 1847)
			<i>Hyporhamphus xanthopterus</i>	(Valenciennes, 1847)
8.	Clupeiformes	14. Chirocentridae	<i>Chirocentrus nudus</i>	(Swainson, 1839)
		15. Clupeidae	<i>Anodontostoma chacunda</i>	(Hamilton, 1822)
			<i>Escualosa thoracata</i>	(Valenciennes, 1847)
			<i>Sardinella gibbosa</i>	(Bleeker, 1849)
			<i>Sardinella longiceps</i>	(Valenciennes, 1847)
		16. Dussumieriidae	<i>Dussumieria acuta</i>	(Valenciennes, 1847)
		17. Engraulidae	<i>Setipinna taty</i>	(Valenciennes, 1848)
			<i>Stolephorus commersonii</i>	(Lacepède, 1803)
			<i>Stolephorus indicus</i>	(van Hasselt, 1823)
			<i>Stolephorus tri</i>	(Bleeker, 1852)
			<i>Thryssa dussumieri</i>	(Valenciennes, 1848)
			<i>Thryssa gautamiensis</i>	(Babu Rao, 1971)
			<i>Thryssa hamiltonii</i>	(Gray, 1835)
			<i>Thryssa kammalensis</i>	(Bleeker, 1849)
			<i>Thryssa malabarica</i>	(Bloch, 1795)
			<i>Thryssa mystax</i>	(Bloch and Schneider, 1801)
			<i>Thryssa purava</i>	(Hamilton, 1822)
			<i>Thryssa vitirostris</i>	(Gilchrist and Thompson, 1908)
		18. Pristigasteridae	<i>Ilisha melastoma</i>	(Bloch and Schneider, 1801)
			<i>Opisthopterus tardoore</i>	(Cuvier, 1829)

9.	Elopiiformes	19. Elopidae	<i>Elops machnata</i>	(Forsskal, 1775)
		20. Megalopidae	<i>Megalops cyprinoides</i>	(Broussonet, 1782)
10.	Mugiliformes	21. Mugilidae	<i>Chelon parsia</i>	(Hamilton, 1822)
			<i>Moolgarda speigleri</i>	(Bleeker 1858)
			<i>Mugil cephalus</i>	(Linnaeus, 1758)
11.	Perciformes	22. Acanthuridae	<i>Acanthurus xanthopterus</i>	(Valenciennes, 1835)
			<i>Ctenochaetus striatus</i>	(Quoy and Gaimard, 1825)
			<i>Acanthurus mata</i>	(Cuvier, 1829)
		23. Ambassidae	<i>Chanda nama</i>	(Hamilton, 1822)
			<i>Parambassis ranga</i>	(Hamilton, 1822)
		24. Apogonidae	<i>Apogonichthyoides niger</i>	(Doderlein, 1883)
		25. Carangidae	<i>Alectis ciliaris</i>	(Bloch, 1787)
			<i>Trachurus novaezelandiae</i>	(Richardson, 1843)
			<i>Uraspis helvola</i>	(Forster, 1801)
		26. Cepolidae	<i>Acanthocephala abbreviata</i>	(Valenciennes, 1835)
		27. Drepanidae	<i>Drepane punctata</i>	(Linnaeus, 1758)
		28. Gerreidae	<i>Gerres erythrourus</i>	(Bloch, 1791)
			<i>Gerres setifer</i>	(Hamilton, 1822)
		29. Gobiidae	<i>Acentrogobius audax</i>	(Smith, 1959)
			<i>Acentrogobius cyanomos</i>	(Bleeker, 1849)
			<i>Yongeichthys criniger</i>	(Valenciennes, 1837)
		30. Haemulidae	<i>Diagramma pictum</i>	(Thunberg 1792)
			<i>Pomadasys commersonii</i>	(Lacepede, 1801)
			<i>Pomadasys guoraca</i>	(Cuvier, 1829)
		31. Kyphosidae	<i>Kyphosus waigiensis</i>	(Quoy and Gaimard 1825)
		32. Latidae	<i>Lates calcarifer</i>	(Bloch, 1790)
			<i>Psammoperca waigiensis</i>	(Cuvier, 1828)
		33. Leiognathidae	<i>Eubleekeria jonesi</i>	(James, 1971)
			<i>Eubleekeria splendens</i>	(Cuvier, 1829)
		34. Lethrinidae	<i>Lethrinus lentjan</i>	(Lacepede, 1802)
			<i>Lethrinus nebulosus</i>	(Forsskal, 1775)
		35 . Lutjanidae	<i>Aphareus rutilans</i>	(Cuvier, 1830)
			<i>Lutjanus sanguineus</i>	(Cuvier, 1828)
			<i>Pinjalo pinjalo</i>	(Bleeker, 1850)
		36. Mullidae	<i>Upeneus moluccensis</i>	(Bleeker, 1855)
			<i>Upeneus sulphureus</i>	(Cuvier, 1829)
		37. Nemipteridae	<i>Nemipterus bipunctatus</i>	(Valenciennes, 1830)
			<i>Nemipterus zysron</i>	(Bleeker, 1856)
		38. Polynemidae	<i>Leptomelanosoma indicum</i>	(Shaw, 1804)
			<i>Polydactylus plebeius</i>	(Broussonet, 1782)
		39. Sciaenidae	<i>Daysciaena albida</i>	(Cuvier, 1830)
			<i>Kathala axillaris</i>	(Cuvier, 1830)
			<i>Nibeas soldado</i>	(Lacepède, 1802)
		40. Scombridae	<i>Euthynnus affinis</i>	(Cantor, 1849)
			<i>Scomberomorus commerson</i>	(Lacepède, 1800)
		41 . Serranidae	<i>Epinephelus bleekeri</i>	(Vaillant, 1878)
			<i>Epinephelus retouti</i>	(Bleeker, 1868)
			<i>Epinephelus tauvina</i>	(Forsskal, 1775)
		42. Siganidae	<i>Siganus lineatus</i>	(Valenciennes, 1835)
			<i>Siganus spinus</i>	(Linnaeus, 1758)
		43. Sparidae	<i>Crenidens crenidens</i>	(Forsskal, 1775)

			<i>Rhabdosargus sarba</i>	(Forsskål, 1775)
		44. Teraponidae	<i>Pelates quadrilineatus</i>	(Bloch, 1790)
		45. Trichiuridae	<i>Lepturacanthus savala</i>	(Cuvier, 1829)
12.	Pleuronectiformes	46. Cynoglossidae	<i>Cynoglossus arel</i>	(Bloch and Schneider, 1801)
			<i>Cynoglossus lida</i>	(Bleeker, 1851)
			<i>Cynoglossus macrostomus</i>	(Norman, 1928)
		47. Paralichthyidae	<i>Pseudorhombus elevatus</i>	(Ogilby, 1912)
			<i>Paralichthys oblongus</i>	(Mitchill 1815)
		48. Psettodidae	<i>Psettodes erumei</i>	(Bloch and Schneider, 1801)
		49. Soleidae	<i>Dagetichthys albomaculatus</i>	(Kaup 1858)
			<i>Dagetichthys commersonii</i>	(Lacepède 1802)
			<i>Zebrias quagga</i>	(Kaup, 1858)
13.	Scorpaeniformes	50. Cottidae	<i>Myoxocephalus octodecemspinosus</i>	(Mitchill, 1814)
			<i>Platycephalus indicus</i>	(Linnaeus, 1758)
14.	Siluriformes	51. Ariidae	<i>Arius arius</i>	(Hamilton, 1822)
			<i>Arius jella</i>	(Day, 1877)
15.	Syngnathiformes	52. Fistulariidae	<i>Fistularia petimba</i>	(Lacepède, 1803)
		53. Syngnathidae	<i>Syngnathoides biaculeatus</i>	(Bloch, 1785)
			<i>Trachyrhamphus serratus</i>	(Temminck and Schlegel, 1850)
16.	Tetraodontiformes	54. Balistidae	<i>Melichthys niger</i>	(Bloch, 1786)
		55. Triacanthidae	<i>Triacanthus biaculeatus</i>	(Bloch, 1786)
		56. Tetraodontidae	<i>Arothron reticularis</i>	(Bloch and Schneider, 1801)

formes 8%, Anguilliformes 6%, Beloniformes 6%, and Carcharhiniformes, Myliobatiformes, Aulopiformes, Atheriniformes, Elopiformes, Mugiliformes, Scorpaeniformes, Siluriformes, Syngnathiformes and Tetraodontiformes with 2% each, whereas Albuliformes with 1% (Table 2, Fig. 3). Table 3 illustrates the checklist of fish species identified and recorded from Nagapattinam Coast.

Discussion

The importance of biodiversity and community forms in ecosystem functioning is now well documented. Additionally, the fishery is essential to the country's socioeconomic growth. Fish are part of the environment that determine the distribution and abundance of other creatures in the ecosystems they represent, and they are good indicators of the ecosystem's water quality and health.

The Mandapam Central Marine Fisheries Research Institute documented 569 finfish species from India's southeast coast. Apart from its

economic value, fish have the highest species diversity of any vertebrate taxon in terms of biodiversity. It is estimated that out of 61,259 vertebrate species known worldwide, 32,300 are fish species, of which 15,170 are fresh water and 16,764 are marine (CMFRI, 1969)

An examination of the current literature on Coastal and Marine Biodiversity revealed that in comparison to other species, only fish have been properly recorded across the Indian Ocean regions. The fish species in the various parts of estuaries and swamps were well suited to the natural flow regime. Fish assemblages had evolved to a high degree of year-to-year variability (Welcomme and Halls, 2001; Welcomme and Marmulla, 2006). Hiddink *et al.* (2008) discussed the significance of fish diversity management in the fisheries environment.

Varadharajan *et al.* (2012) identified 66 species in Mallipattinam coastal waters, Southeast coast of India. Almost similar result was reported by Sirajudheen and Biju Kumar (2014), they

recorded 138 species belonging to 14 orders, 67 families and 108 genera in trawl catch of the Neendakara fishing harbour of Kerala.

High diversity value was attributed to availability of food resources and suitable environmental conditions of the coast Gulf of Mannar Biosphere Reserve (Dorairaj, 1998) The richness and number of species have been documented from the shallow seas along India's west coast (Vivekanandan *et al.*, 2003). High diversity and species richness is a characteristic feature of sub tropical and tropical waters (Nair *et al.*, 1989; Jayaprakash *et al.*, 2006)

Ramu *et al.* (2015) recorded 95 species belonging to 42 families and 59 genera along the coastal line of Nagapattinam. The present investigation recorded 117 species belonging to 16 order and 56 families and percentage composition of fish assemblages in fish species and order Perciformes topped with 42% where the diversity of fish is determined by environmental factors.

Conclusion

This investigation indicated the accumulation of many fish species along the Nagapattinam coast. The present study revealed that Nagapattinam coast has rich assemblages of fishes and most of the species are abundant. Due to its abundant coastal environment, the Nagapattinam coast offers good fishing potential.

Acknowledgements

The authors are grateful to Mr. T. Krishnasamy Vandayar, President, and Mr. A. Balasubramaniya Vandayar, Secretary and Correspondent, and the Principal of A.V.V.M. Sri Pushpam College (Autonomous), Poondi 613503, Thanjavur (Dt.) for providing the excellent infrastructure and necessary facilities to carry out this research work successfully.

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