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Karuppasamy K

M.F.Sc Research Scholar,
Department of Fisheries Biology
and Resources Management
Fisheries College and Research
Institute, Tamil Nadu Fisheries
University, Thoothukudi, Tamil
Nadu, India

S David Kingston

Professor and Head,
Department of Fisheries Biology
and Resources Management
Fisheries College and Research
Institute Tamil Nadu Fisheries
University, Thoothukudi,
Tamil Nadu, India.

P Jawahar

Professor, Department of
Fisheries Biology and Resources
Management Fisheries College
and Research Institute Tamil
Nadu Fisheries University
Thoothukudi, Tamil Nadu, India

V Vidhya

M.F.Sc Research Scholar,
Department of Fisheries Biology
and Resources Management
Fisheries College and Research
Institute, Tamil Nadu Fisheries
University, Thoothukudi, Tamil
Nadu, India

Correspondence

Karuppasamy K

M.F.Sc Research Scholar,
Department of Fisheries Biology
and Resources Management
Fisheries College and Research
Institute, Tamil Nadu Fisheries
University, Thoothukudi, Tamil
Nadu, India

Spatio-temporal variation in the diversity of threadfin breams (Family: Nemipteridae) From Wadge Bank, South India

Karuppasamy K, S David Kingston, P Jawahar and V Vidhya

Abstract

The present study was carried out for a period of June 2015 to May 2016 and revealed that the diversity and spatio-temporal variation in catch rates along the Wadge Bank, South India. The fishes of Nemipterids are randomly sampled from three major fish landing centres viz, Chinnamuttom, Colachel and Vizhinjam along the Wadge Bank. A total of 14 species belonging to 3 genera viz, *Nemipterus*, *Scolopsis* and *Parascolopsis* has been recorded. The catch rate was found to be high in Chinnamuttom (76250 Kg/year) followed by Colachel (58000 Kg/year) and Vizhinjam (34000 Kg/year). The highest species diversity was in Colachel (12 species) followed by Chinnamuttom (10 species) and Vizhinjam (9 species) fish landing centres respectively. *Nemipterus japonicus* and *Scolopsis bimaculata* is the dominated species in all landing centres of Wadge Bank. Out of 14 species 6 species are found to be spawners and were recorded in good numbers in all the landing centres during the major fishing season.

Keywords: Spatio-temporal variation, Wadge Bank, Colachel, diversity, *Nemipterus japonicus*, *Scolopsis bimaculata*

Introduction

Biodiversity is simply 'Life on Earth' and it refers to a variety of life forms including plants, animals and microorganisms. The biodiversity is the variability among living organisms from all 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 [6]. 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. The threadfin breams (Nemipteridae) are small to medium-sized marine Perciforms fishes widespread in the tropical and subtropical Indo-West Pacific region, but absent in the eastern Pacific and Atlantic oceans [24]. The largest genus *Nemipterus* in the family Nemipteridae, includes about 26 species which are distributed in the Indo-Western Pacific Ocean [24]. Because of its importance as a food source [2]. The best studied of these taxa and numerous investigations have examined its fisheries, its biology and biochemistry [4, 10, 11, 22, 24].

A total of six species, *Nemipterus japonicus*, *N. mesoprion*, *N. tolu*, *N. delagoae* (= *N. bipunctatus*), *N. luteus* and *N. metopias*, contributed to the fishery along Indian coast. Of these, the first two species contributed to the fishery significantly all along the Indian coast, whereas *N. bipunctatus* form a moderate fishery along the Wadge Bank, South India [18]. Although several studies have been made on the stock estimates of threadfin breams from India [7, 10, 15, 16, 17, 27, 28]. Information on catch, effort, growth parameters and biology of Nemipteridae from Indian waters are available [8, 12, 19]. The area of the south Cape Comorin has been generally known as the 'Wadge Bank' [14]. The area has been defined by the Fishery Survey of India as that part of the sea bed between 76° 30'E to 78° 00 E Long, and 07° 00.00'N to 8° 20' N Lat. The area is about 4000 Sq. miles. It is a fertile fishing ground with rich marine biological diversity occurs. It may also be defined as a place of marine environment, where rich availability of fish food organisms is available. The water depth of this region is normally 15 fathom to 100 fathom. This study was the first attempt in Indian waters, from Wadge Bank, South India.

Materials and Methods

a) Study area

The area covers between Kanyakumari and Vizhinjam approximately 4000 sq. Miles. This area is basically called as Wadge Bank off of India (76°. 30'E to 78°.00 E Long, and 07°.00,M to 8°. 20' N Lat). It comprises both Southeast and Southwest Coast of India. Mainly this area comprises with three landing centres namely Chinnamuttom, Colachal and Vizhinjam. This study area (Fig.1) covers the near shore and off shore fishing grounds located between 76°. 30'E to 78°.00 E Long, and 07°.00,N to 8°.20' N Lat off Wadge Bank. For clarity and unambiguity purpose, the fishing areas are divided into northern Kanyakumari and southern Kanyakumari of which the trawler boats of southern area navigate off Chinnamuttom in Kanyakumari district in sharp contrast to those of the northern side, which cover off Vizhinjam in Trivandrum district, Kerala. This study was conducted for a period of 12 months from June 2015 to May 2016.

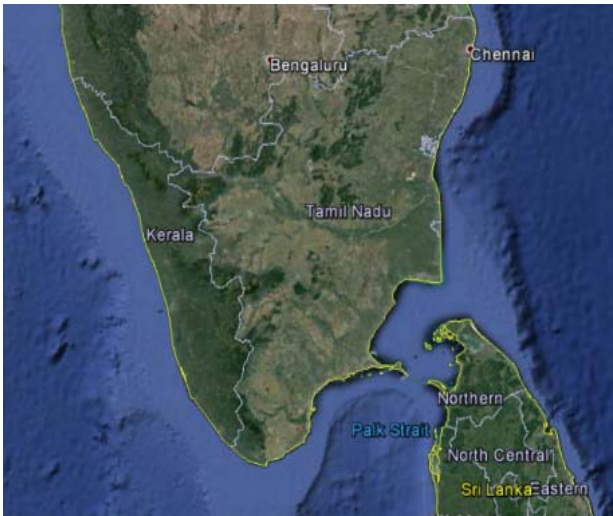


Fig 1 A. Map showing important fishing grounds of India



Fig 1.B: Map showing important fishing grounds of Wadge Bank, South India

b) Gear and Crafts Specification

Information on crafts and gears specifications (head rope length, type of otter board and cod end mesh size), fishing

operation details (depth of operation, trawling hour, towing and hauling speed) and accessories, species diversity from the major trawling and artisanal landing centres of Chinnamuttom, Colachal and Vizhinjam Fishing Harbour were studied (Wadge Bank).

C) Sampling Methodology

Samples of fishes were collected from the commercial shrimp trawler and FRP boats operating in the coastal waters off at a depth ranging between 10 - 60 m during June 2015 to May 2016. The diversity and community structure of the marine species was assessed based on 12 months of faunistic surveys along the coastal waters of Wadge Bank, South India (South-west-east coast of India). The sampling was carried out fortnightly from three landing centers. A total of seventy two (N = 72) sampling effort was sampled. Geographical position of each sampling station was recorded with Global Positioning System (GPS). The trawl catch obtained was first spilled over the deck and then subject to close examination by the trained crew observers for then total catch, target catch and catch composition of fishes and the same was recorded. Subsequently, total length and weight of the fishes were taken for stock assessment studies. Similarly, the subsamples were taken back to the laboratory for detailed identification and examined for species composition. In the laboratory, fishes from each subsample were identified to the lowest taxonomic level which was species level for most.

D) Species Identification

In the laboratory, fishes from each subsample were identified to the lowest taxonomic level which was species level for most. Preserved sample placed in Museum of Fisheries College and Research Institute, Thoothukudi. Identification of fishes was done up to species level with the help of standard keys, book and standard taxonomic references. The above identification was aided by published taxonomic literature for the respective faunal groups like fin fish^[1,5].

Results & Discussion

Details of fishing grounds

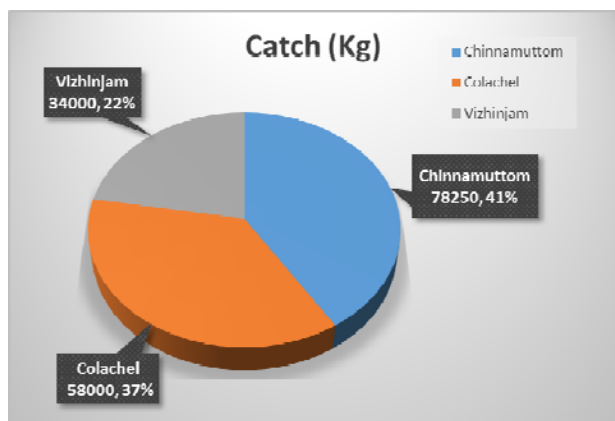
The Wadge Bank area is partly to the west coast and partly to the east coast of India. The present investigation was carried out for 12 months (June 2015 to May 2016) to assess the marine ichthyofaunal diversity of Wadge Bank, southern coast of India. A total of 2,575 fish specimens were collected during the study period and 14 number of species were identified from landing centres of Chinnamuttom, Colachel and Vizhinjam of Wadge Bank, Southern India.

Distribution, diversity and taxonomy of Nemipteridae fishes

The survey was made on the quantitative assessment of threadfin breams fish distribution and diversity in Wadge Bank, South India. In the present survey, a total of 14 species belong to three genera were recorded viz., Nemipterus (7 species), Scolopsis (3 species) and Parasclopsis (4 species) (Table.1). The taxonomical position and distinctive characters of the Threadfin breams fishes reported were presented below.

Table 1: Checklist of Nemipteridae in Wadge Bank, South India

Sl. No	Species	Chinnamuttom	Colachel	Vizhinjam
1.	<i>Nemipterus bipunctatus</i>	+	+	+
2.	<i>Nemipterus japonicas</i>	+	+	+
3	<i>Nemipterus mesoprion</i>	+	+	+
4	<i>Nemipterus nematophorus</i>	+	+	+
5	<i>Nemipterus peronei</i>		+	+
6	<i>Nemipterus randalli</i>		+	+
7	<i>Nemipterus zysron</i>	+		
8	<i>Parascolopsis aspinosa</i>		+	
9	<i>Parascolopsis baranesi</i>	+	+	
10	<i>Parascolopsis eriomma</i>		+	
11	<i>Parascolopsis inermis</i>	+	+	
12	<i>Scolopsis bimaculata</i>	+	+	+
13	<i>Scolopsis vosmeri</i>	+	+	+
14	<i>Scolopsis igcarensis</i>		+	+

**Fig 2:** Catch rates of Nemipteridae fishes in Wadge Bank, South India

Check list of marine finfish diversity

Colachel

Colachel landing centre has the mechanized sector and comes under South West Coast of India. It contributes 58000 Kg/year of Nemipteridae fishes (Figure. C). Species richness at Colachel was found to be highest with 12 species represented by 3 genera. Among the threadfin breams the genus *Nemipterus* contributes 6 species (*Nemipterus bipunctatus*, *Nemipterus japonicas*, *Nemipterus mesoprion*, *Nemipterus nematophorus*, *Nemipterus peronei* and *Nemipterus randalli*) followed by *Scolopsis* 3 species (*Scolopsis bimaculata*, *Scolopsis vosmeri* and *Scolopsis igcarensis*) and *Parascolopsis* genus contributed 5 species (*Parascolopsis aspinosa*, *Parascolopsis baranesi*, *Parascolopsis eriomma* and *Parascolopsis inermis*). Among the Nemipteridae family the *Nemipterus japonicus* dominated species followed by *Nemipterus mesoprion* and *Scolopsis vosmeri* other species landed very limited along this landing centre. A total of 895 fishing boats are operated at Colachel fishing harbour. Mostly steel trawlers are used for multiday fishing and wooden trawlers were carried out in depth of 40-65 nautical mile. It includes 325 mechanized (trawlers), 450 motorized (FRP boats), and 120 non-motorized fishing vessels. Normally they are operating 100-200 m depth zone. The multiday-fish and shrimp trawlers were used to capture fish along 300 m depth along the Wadge Bank zone.

Chinnamuttom

Chinnamuttom landing centre also one of the major landing centre in Kanyakumari district. Chinnamuttom (78250 Kg/year) has the dominant landing centre among the Wadge

Bank, South India (Figure.2). It comes under the South East Coast of India the number of species recorded was 10. The genus *Nemipterus* were represented by 5 species (*Nemipterus bipunctatus*, *Nemipterus japonicas*, *Nemipterus mesoprion*, *Nemipterus nematophorus* and *Nemipterus zysron*) followed by genus *Parascolopsis* 3 species were recorded (*Parascolopsis baranesi*, *Parascolopsis aspinosa* and *Parascolopsis inermis*). In *Scolopsis* genus 2 species (*Scolopsis bimaculata* and *Scolopsis vosmeri*) were recorded. Among the threadfin bream diversity *Nemipterus japonicas* followed by *Scolopsis vosmeri* and *N. mesoprion* was the dominant species. In Chinnamuttom landing centre they used only two types of boats based on the type of material used for construction, viz., wood and steel. The majority of the boats built by using wood and nowadays steel vessels are used for fishing. In this landing centre there are 320 mechanized, 90 motorized and 20 non-motorized fishing vessels were recorded. Normally they are operating 100-200 m depths zone, because they are permitted to capture single day fishing only.

Vizhinjam

Vizhinjam landing centre is completely different from the other two landing centre and it has full of artisanal fishing in Vizhinjam (3400 Kg/year) in (Figure.2). In Vizhinjam landing center, the species diversity was observed to be higher in the genus *Nemipterus* with 6 species (*Nemipterus bipunctatus*, *Nemipterus japonicas*, *Nemipterus mesoprion*, *Nemipterus nematophorus*, *Nemipterus peronei* and *Nemipterus randalli*) and followed by 3 species of *Scolopsis* (*Scolopsis bimaculata*, *Scolopsis vosmeri* and *Scolopsis igcarensis*). Vizhinjam landing centre was the completely specified for motorised sector like vallam and FRP boats. This fishing ground was in natural and it has artificial rocky habitat, hard and soft corals along the shore. This fishing ground was not suitable for trawling and only suitable for specialized gears like line and gillnets fishing. The depth of the operation was about 60-120 m. The electronic equipment used for fishing was radiotelephone, mobile phone and GPS. They are mainly used for fishing in Wadge Bank marine zone of South-west coast of India.

Seasonal wise fish diversity

The result of dominance with total month and season-wise shows that highest density of fish species during September and post-monsoon season. It shows that the number of species (richness) was more in this season compared to other months. In Colachel and Chinnamuttom, the diversity was the highest during post-monsoon and summer seasons. In Vizhinjam, the

diversity was the highest in post-monsoon followed by summer and monsoon. During the present study, the numbers of species collected were invariably higher during month of the September-2015 and seasons-wise higher during post-monsoon period. From this study there are about 14 species of threadfin bream recorded in Wadge Bank, South India. Earlier a total of 184 species from 41 families were recorded in Wadge Bank areas of Vizhinjam and Colachel, South India [25]. As per their report, they recorded family Serranidae -20, followed by the Acanthuridae -18, Labridae -18, and Pomacentridae -16. From this study, A total of only 2 species were recorded under the family Nemipteridae. During this study, the numbers of species collected were invariably higher during month of the September-2015 and seasons-wise higher during post-monsoon period. Similar results were reported by various researchers [3, 9, 21]. This may be due to aggregation of fish in coastal waters as these waters are more productive because of upwelling noticed in this region during South-West monsoon [21]. In Colachel and Chinnamuttom, the diversity was the highest during Post-monsoon and summer seasons. In Vizhinjam, the diversity was the highest in post-monsoon followed by summer and monsoon. Variation in fish diversity indicate the differences between areas that possibly due to habitat type [13]. Relatively less number of species were observed during the pre-monsoon and monsoon periods which might be due to fluctuation in salinity and temperature [23].

Conclusion

Wadge Bank is endowed with rich Nemipterids diversity and catches. Available data indicated the lack of scientific studies on this region for fish diversity. Hence research need to be conducted on fish identification and patterns of distribution status in Wadge Bank for planning appropriate conservation strategies.

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