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ORIGINAL ARTICLE

MARINE FISH RESOURCES IN NAGAPATTINAM COASTAL WATERS, TAMIL NADU COASTLINE, INDIA

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ABSTRACT

The marine fish communities around Nagapattinam coastal waters are currently under various stresses, both natural and anthropogenic. The annual average landings of marine fishes and fish diversity were studied, collected and analyzed by using software Primer 6.1 Version to study the potential fishery status of the Nagapattinam coastal waters, Southeast Coast of India from May 2015 to March 2016. Highest landing (65.91±17.96 MT) was reported in March 2016 and lowest (59.66±66.00 MT) in August 2015. The diversity indices showed higher values for Shannon-Weinner (4.883), Margalef species richness (15.1) and Evenness (0.993) and the most abundant families were found to be Engraulidae and Clupeidae which shared about 87% of total fishery annually, while Leiognathidae and Lutjanidae which shared about 75% of total fishery annually.The present result demonstrated that higher diversity values might be due to availability of abundant food resources and suitable environmental conditions at Nagapattinam coastal waters, Southeast coast of India, which accessible high species richness with a potential, economical and valuable fishery resource.

Keywords: Engraulidae, Clupeidae, Leiognathidae, Lutjanidae and south east coast.; Minimum inhibitory concentration.

1.INTRODUCTION

Geological change is continuously happening, although much of this change occurs over a period straddling millions of years; and some species depend on periodic disturbances such as fire in order to survive. One of the utmost challenges faced by conservationists is the changing nature and 'shifting baselines' of biological communities. In some cases, change is a natural and often necessary component of a habitat. However, unnatural anthropogenic disturbances have exponentially increased in areas around the world, with negative effects on habitat biodiversity (Short & Wyllie-Echeverria, 1996; Charlson, et al., 1992; Fahrig, 1997). These man-made disturbances can drastically change the composition of both the physical habitat and the organisms living within it, and habitat fragmentation is the primary cause of local and global extinctions and biodiversity loss across all taxonomic groups (Nichols, et al., 2007). The frequency and intensity of extreme weather conditions such as hurricanes, floods, heat waves, draughts, and tropical cyclones has and will continue to increase (IPCC, 2007). In addition, ocean salinity, surface temperature, and pH balance are shifting (IPCC, 2007; Caldeira&Wickett, 2003). In some tropical areas, climate change may lead to the complete submergence of low-laying islands by raising sea level, and thus severe losses in biodiversity in these areas (Pernetta, 1993).In order to develop conservation strategies for the protection of biodiversity in these coastal ecosystems, more research on basic marine biodiversity patterns and community structure should be conducted (Olsgard, et al., 2003).

The assessment of marine fish biodiversity globally, two habitatsidentified where most new marine taxa will likely to be found are the deep-slopes and deep-reefs which are areas so far poorly sampled and studied (Eschmeyer*et al.*, 2010). All these facts make a study on deep sea fishes valuable as it is likely to influence estimation of marine biodiversity as well as options for harvesting of valuable fishery resources by the concerned maritime nation.Hence the present studies take over on marine fish biodiversity studies completed on the Nagapattinam coastal waters, southeast coast of India.

2.MATERIALS AND METHODS

Fishes were collected at monthly intervals from the trawl bycatch landed in Nagapattinam landing centre (Lat 10º45′37.45"N Lon 79º51′09.07"E) during the May 2015 to April 2016 (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 bycatch and identified up to

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species level by using the keys available in FISHBASE (Froese and Pauly, 2007). FAO species identification sheets (Fischer and Bianchi, 1984) besides standard books (Talwar and Kacker, 1984) also used to identify the fishes. Data were collected fortnightly, pooled seasonally and repeated throughout the period. The data on marine fishes from collection site was combined together for the different seasons.

Figure 1: Map showing the collection site (Nagapattinam)

3.RESULTS AND DISCUSSION

The coastal area is dependent upon fishing, related activities and their economies have been badly damaged by the overfishing of fishery resources at an ever increasing rate over the past decade. Fishery resources are finite but renewable. The present scrutiny was document the distribution of marine fishes along the Nagapattinam coastal waters and totally 137 different species were identified belonging to 56 family and 55genera from collection site, southeast coast of India (Figure 1). At the same time as 95 species are documented among the Nagapattinam coastal waters (Ramu*et al*., 2015) There were also indications that the familydominated {Engraulidae (18 species), Clupeidae (14 species), Leiognathidae (6 species) and Lutjanidae (4 species)} over the year as compared to other family. From monthly abundance value it was clear that value increased from October to March which specified the availability of more number of individuals during these months. This might be related to reproduction, feeding and migration (Somvanshi, 2001). Similar fluctuations of species diversity and abundance had been reported from the shallow waters of the west coast of India (Vivekanandan et al., 2003).The lower number of species must be due to differences in sampling gear and habitat characteristics which ultimately affect species abundance (Dorairaj, 1998).

Month wise different species diversity indices were calculated (Table 1) which showed that the pooled Shannon-weinner index (H) value was of 4.26 whereas pooled value for Margalef species richness of 14.96 and evenness index of 0.99. Highest (H) value (4.884) was observed in May-2015 and lowest value (4.851) for Shannon index (H) was found in Jul-2015. Highest evenness value (0.993) was calculated in May-2015 and lowest (0.986) in Augest-2015. The table 2 showed the diversity indices of family Engraulidae which showed that the pooled Shannon-weinnerindes valve was of 3.86 while pooled valve of Margalef species richness of 8.28 and Pielou's evenness of 0.98. The abundance and diversity of marine fish species might be associated with feeding, nursing and reproductive habits (Nabi et al., 2011). The increase in number of individuals of each species during winter months viz. October, November and December might be due to post spawning period resulted in more numbers of juveniles and adults (Islam et al., 1993)

High diversity value was attributed to availability of food resources and suitable environmental conditions of the coast which was also demonstrated by (Dorairaj, 1998). High diversity and species richness is a characteristic feature of sub tropical and tropical waters (Nair et al., 1989; Jayaprakash et al., 2006). Higher Shannon-Weinner index specified presence of a large number of species which used the bay as their habitat. The coast indicated higher abundance of finfishes of commercial value. The present study, however did not suggest the abundance and dominance of one or two species and cluster analysis of most dominant 52 species showed similarity between them to a large extent. This corroborates earlier findings from west coast of India (Jayaprakash et al., 2006).

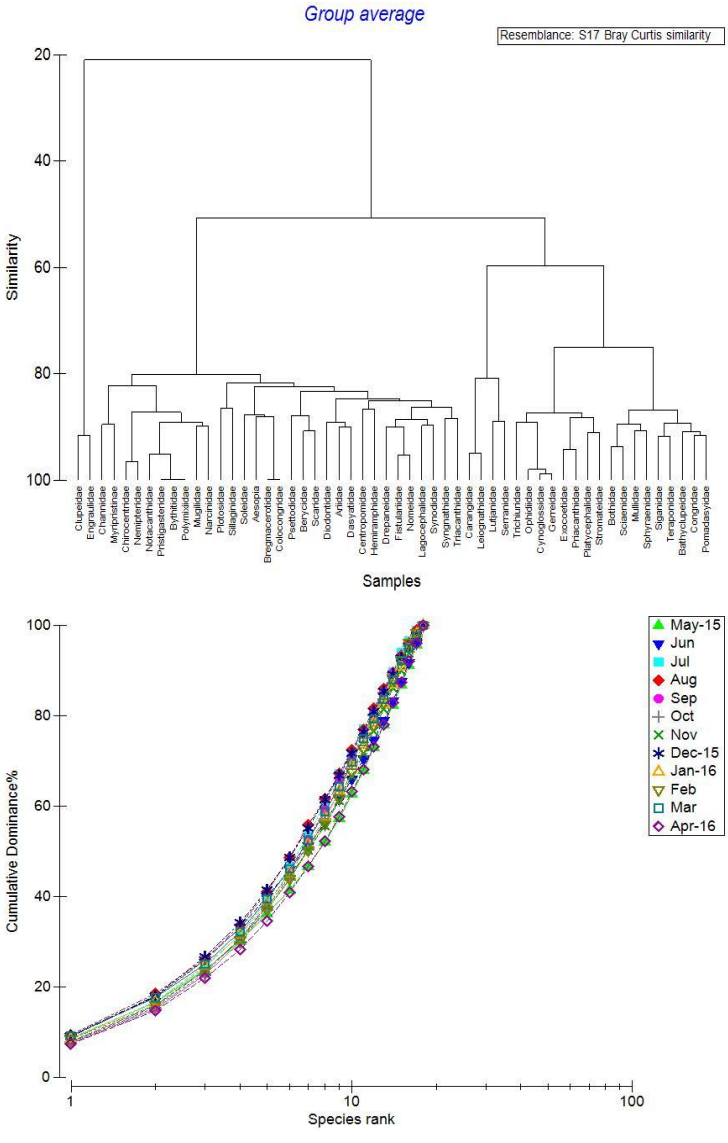
Table 1: Diversity indices of marine fishes in Nagapattinam coastal

Sample	Margalef index species richness	Pielou's evenness	Shannon-Weiner diversity
May-15	15.04	0.993	4.884
Jun	15.06	0.988	4.861
Jul	14.96	0.986	4.851
Aug	15.1	0.984	4.841
Sep	15.02	0.986	4.844
Oct	14.94	0.991	4.874
Nov	15.05	0.992	4.882
Dec-15	15.03	0.986	4.854
Jan-16	14.98	0.990	4.869
Feb	14.94	0.991	4.875
Mar	14.93	0.992	4.881
Apr-16	14.97	0.991	4.883

Table 2: Diversity indices of family Engraulidae in Nagapattinam coastal waters

Sample	Margalef index species richness	Pielou's evenness	Shannon-Weiner diversity
May-15	8.282	0.975	3.888
Jun	8.282	0.976	3.894
Jul	8.244	0.976	3.892
Aug	8.302	0.974	3.887
Sep	8.287	0.972	3.877
Oct	8.243	0.974	3.887
Nov	8.288	0.973	3.883
Dec-15	8.287	0.971	3.875
Jan-16	8.261	0.974	3.886
Feb	8.238	0.975	3.89
Mar	8.233	0.975	3.889
Apr-16	8.241	0.976	3.896

Fig 2 exemplified the dendrogram of the hierarchical grouping of species (family wise) those were mostly abundant during whole study period at Nagapattinam coastal waters. The largest cluster consisted of three families such as Pristigasteridae, Bythitiidae and Polymixiidae. These species were more abundant in monsoon and post monsoon. These clustering confirmed the co-occurrence of species as well as family at study area.The K-dominance plot drawn clearly demonstrated the diversity pattern of the Marine fishes at Nagapattinam coastal waters. Conforming to the trend observed in diversity indices**,** curves of month April, 2016 and June, 2015 lies on the lower side extends further and rises slowly due to the presence of higher number of species. As the percentage contribution of each species is added, the cure extends horizontally (species number is evident in X axis) before reaching the cumulative 100%. The plot also adequately proved the rich diversity in the April, 2016 and June, 2015 (Fig 3). The abundance and distribution of fishes is dependent on several distinct factors such as recruitment, habitat structure, food availability, and environmental factors (Williams, 1991). Roberts and Ormond (1987) stated that most of the coral reef fishes tend to increase in both abundance and number of species with increasing depth on fringing reefs.



4.CONCLUSION

The present findings contributed additional knowledge of coastal fish diversity than qualitative and quantitative aspects and the Nagapattinam coastal waters, southeast coast of India offered high species richness with a rich biodiversity. The conclusions were drawn to predict the diversity however based on the data of one year only. Thus further study is required.

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