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Studies on the Biodiversity and Proximate Composition of Cephalopods in Thoothukudi, Gulf of Mannar, Tamilnadu

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Abstract- **The cephalopods (squids, cuttlefish and octopi) are exclusively marine molluscs. Though globally is considered as delicious seafood. These are commercially important and are fished in large quantities in several countries. In the present study were investigated the distribution and availability of cephalopods was collected from three fish landing centres via Thuravaikulam, Vellapatti and Mottakopuram at Thoothukudi district were recorded from September 2017 to March 2018. At each centre, by-catch trash from crab net, trawl net, thallumadi and karaivalai of fishing vessels was collected every fortnight. Also analysis the proximate composition like protein, carbohydrate and lipid concentrations of cephalopods and analysis the marine physicochemical parameters. In addition, reviews in the methods of exploitation of squid, fishing methods and conservation strategy. The present study revealed that the diversity indices of cephalopods and biochemical composition of squid and physicochemical parameters.**

KEYWARDS: Cephalopods, Biodiversity, Proximate Composition, Physicochemical etc.

INTRODUCTION

The Gulf of Mannar Biosphere Reserve is located on the south eastern tip of India and is near srilanka. Gulf of Mannar has declared as World Biosphere Reserve under UNESCO's Man and Biosphere Program in 1989. The Gulf of Mannar falls in the Indo-Pacific region and constitutes one of world's richest marine biological resources. This biosphere reserve extends from Rameswaram to Tuticorin lies between 78°5'E-79°30'E and 8°45'N-9°25'N and extends to a distance of 140 km. It is one of the world's richest forms of marine biodiversity aspect and the first Marine Biosphere Reserve in Southeast Asia (Ajmal Khan,S, 2005). The Biosphere Reserve comprises 21 islands with estuaries, mudflats, beaches, forests of the near shore environment, including 22 marine components like algal communities, sea grasses, coral reefs, salt marshes and mangroves etc. The Exclusive Economic Zone (EEZ) of GoM is about 15,000 km out of which the Gulf of Mannar biosphere reserve has an area of about 10,500 km2 and the commercial fishing is carried out in about 5,500 km2 (Arnold John M.,2017). The entire coastline of Gulf of Mannar from Thoothukudi to Dhanuskodi is protected from the fury of wind and waves by the continuance of a chain of islands or sand cays. The Island system and coral reefs spread over this region offer shelter for a variety of marine fauna and flora. Both mechanized trawlers and non-mechanized vessels carry out the fishing throughout the year (Arnold John M.,2001). When the Gulf of Mannar covering its southern portion becomes rough during April to September. Squids belong to the order Teuthoidea (Decapoda) which includes the majority of cephalopods, possessing a stream-lined soft body with a pair of fins varying in shape, size and disposition (Gonzalez, A.F.,2010). The distinct head in front is with ten circumoral arms provided with toothed suckers or claws or both. An internal shell known as pen or gladius, when present is imbedded in the dorsal mantle skin. The gladius of squids is almost transparent, thin and chitinous in nature. It varies in shape in different species.

REVIEW OF LITERATURE:

Cephalopods are a marine fishery resource of increasing importance and many species are exploited as by-catch by trawlers from throughout the Indian coast. Although they form only 4-5% of the total marine fish landings, cephalopod stocks are under heavy fishing pressure because of their high value as an exportable commodity. The CMFRI has initiated studies on cephalopod stock from Indian waters during the seventies. The initial results of this programme on the taxonomy, biology, fishery and stock assessment of cephalopod stocks pertaining to the seventies were published as a bulletin. Subsequently a major exercise on the stock assessment of Indian cephalopod stocks with data of 1979-

89 was made by CMFRI. These studies indicated that squids were exploited at optimum level on both coasts and cuttlefishes were optimally exploited along east coast and under exploited along west coast (Muhammad.,1998). The Gulf of Mannar is has a hugely marine ecosystem, which includes coral reefs, salt marshes, algae communities, mangroves ,and sea grasses, among many others. The reserve includes twenty-one islands where beaches and estuaries are predominant. Forests of dry broadleaves can also be found throughout the buffer zones. The climate of the region is that of a tropical one, consisting of relatively high temperatures from January to May, and heavy rainfall due to monsoons. From October to December rainfall is usually at its maximum due to the Northeast monsoon. The south west monsoon contributes, but plays a much smaller role in overall rain fall. Cephalopods in the most important supplier countries like Argentina, Chile, Peru, Mauritania and China. Cephalopods are caught in seas around India in fair quantities, but largely incidentally in nets that are operated for other commercial fishes, almost all through the year (M.M. Meiyappan.,1993).

MATERIALS AND METHODS:

In the present study were investigated the distribution and by-catch availability of cephalopods was collected from three fish landing centers via Thuravaikulam, Vellapatti and Mottakopuram at Thoothukudi district were recorded from September 2017 to March 2018. At each centre, specimens were collected and identified done monthly two times in the above landing centers. The data collected were station-wise for calculation of various biodiversity indices. Various biodiversity indices were estimated using Paleontological Statistics (PAST) software. The smaller specimens were also identified in the landing centre itself. But the specimens that were difficult to identify in the field were collected and fixed in formalin. Fishes preserved in the field was washed and sorted into taxonomic groups and identified in the Zoology laboratory of V.O.C. College, Thoothukudi. Also analysis the proximate composition like protein, carbohydrate and lipid concentrations of cephalopods and marine physicochemical parameters such as Temperature, Salinity, pH for seven months.

RESULTS:

A total of seven species of cephalopods from 3 families and 5 orders were identified in the study period (Table.1). The Shannon-Wiener diversity index (H'(log2) was calculated to be ranges for Thoothukudi. The index was in the ranges of 1.115-1.868 for Tharuvaikulam. The index was in the ranges of 1.74-1.847 for Vellapati and 1.27 -1.926 for Mottakopuram. The Spatial variations in Simpson's diversity index (D) was calculated to be ranges of 0.5393-0.8304 for Tharuvaikulam. The index was in the ranges of 0.6512-1.847 for vellapatti and 0.661 – 0.8515 for Mottakopuram. The Spatial variations in brillouin index (HB) was estimated to be ranges of Thoothukudi. The index was in the ranges of 1.48-1.745 for Tharuvaikulam. The index was in the ranges of 1.12-1.723 for Vellapatti. The index was in the ranges 0.98-1.802 for Mottakopuram. The Fisher's alpha diversity index (α) was calculated to be ranges of Thoothukudi. The index was in the ranges of 1.72-1.714 for Tharuvaikulam (Plate.1). The index was in the ranges of 1.221-1.774 for Vellapatti. The index was in the ranges 0.8742-1.709 for Mottakopuram. The Spatial variations in Margalef Species richness (d) was calculated to be ranges Thoothukudi. The index was in the ranges of 1.07-1.306 for Tharuvaikulam. The index was in the ranges of 1.064-1.148 for Vellapatti. The index was in the ranges 0.6771-1.295 for Mottakopuram.

The pre monsoon protein value less than the monsoon and post monsoon value (17.44 ± 0.52, 26.7 ± 0.43, 18.79 ± 0.61) the highest value are post monsoon value (24.2 ± 3.80, 26.37 ± 1.04, 19.7 ± 1.23) the species are loligo Vulgaris, Loligo duvauceli, Dryreuthis sibaue protein value are high. The cuttle fish species are low in the species are sepia ramani, sepia Pharaunis, Sepia Prabahari. The lipid value high in the cuttle fish species in pre monsoon (1.76 ± 0.12, 1 ± 0.08, 0.7 ± 0.08) the high value in the post monsoon value in the (1.77 ± 0.12, 2.51 ± 0.08, 2.01 ± 0.08).

Physico- chemical parameters were determined along the tharuvaikulam, Vellapatti, Mottakopuram coastal waters are temperature 27.40c to 29.50c, pH varied from 7.9 to 8.5 salinity varied from 33-36 %, dissolved oxygen content was varied from 3.96 to 4.98mg/l . The concentrations of nitrates 2.48-2.82, nitrites 2.80-1.08, silicate 4.23-45.9 and phosphate 2.36-2.66. The dissolved oxygen minimum in September 3.96 and maximum in a 4.98 March. Nitrates concentration ranged from 2.48 -2.82 mg/l and minimum Nitrate was observed during September 2017 and maximum during March 2018. The minimum inorganic phosphate concentration 2.36 kg at/l was recorded during September 2017 station and the maximum concentration 2.66 Kg at /l during the march 2018. The reactive silicate concentration ranged from 42.3 kg at /l with higher value during March 2018 45.9 Kg at /l. The minimum pH was observed during September 2017 in 7.9 and maximum pH values are high 8.5 in a march 2018.

Table.1 NUMBER OF CEPHALPODS SPECIES DOMINANCE IN GULF OF MANNAR

Scientific Name	Tharuvaikulam	Vellapatti	Mottakopuram
Loligo Vulgaris	240	173	272
Loligo Duvauceli	126	114	170
Doryteuthis Sibogae	113	143	57
Sepia Ramani	85	89	104
Sepia Pharaonis	52	64	61
Sepia Prabahari	81	98	83
Octopurs Vurgaris	25	12	36
Total No of Individuals	**722**	**693**	**783**

Sepia ramani

Doryteuthis sibogae

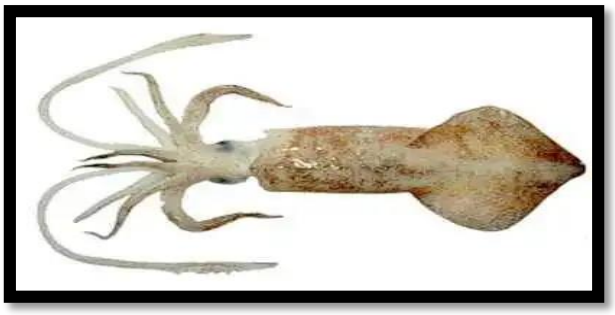
Palate - 1

Sepia Pharaonis

Loligo Vulgaris

Sepia Prabahari

Octopus Vulgaris



Loligo duvauceli

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