

RESEARCH ARTICLE

Diversity and Ecology of Zooplankton in Mumbri creek of South Konkan, Maharashtra, India

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ABSTRACT

The present investigation was carried out in Mumbri Creek of Sindhudurg district (Lat. 16° 21' N. Long. 73° 25' E). The main aim of this work is to find out the productivity of the said creek. The zooplankton plays a very important role in food chain and food web. Most of these are small, microscopic organisms which feed on phytoplankton and ultimately become fish food. The Copepods, Mysids and Chaetognaths are predominantly present throughout the year. Zooplankton provides food for the masses; they get proteins, minerals, vitamins, etc. to the in developing countries. During the non-availability of fish or otherwise the locals depend on zooplankton for food. The work was investigated in Jan. 2015-Jan. 2016.

Keywords: Mumbri Creek, Zooplankton, Diversity.

INTRODUCTION

Mangrove ecosystems have great significance in capture fisheries as well as in aquaculture because the detritus, organic matters, planktonic blooms enter into the initial food chain of various economically important shells and finfishes. Mangrove habitat plays an important role in fishery management. This habitat is rich in food contents and understands area greatly supports the varieties of resource organisms. The planktonic biomass is the major nutritional support to the mangrove habitats. A correlation study on zooplankton distribution, diversity, biomass and seasonal abundance in relation to the environmental factors is necessary for proper assessment of an aquatic ecosystem. The present ecosystem investigation deals with the variation in planktonic biomass during high and low tidal rhythms at Mumbri Creek.

Zooplanktons are small heterotrophic animals inhabiting the oceans at all depths and occupy almost every type of ecological environment. Zooplankton play major role in the food web of an aquatic ecosystem and forms an intermediate link between primary and tertiary production. Study of plankton diversity and their ecology greatly contribute to the understanding of the basic nature and general economy of an aquatic habitat. Zooplanktons are capable of concentrating large quantities of heavy metals from sea water. These metals may be passed on

concentrated at higher trophic levels through the food chain. Thus it is biomagnification of heavy metals or pollutants. The fishery potential is fully related to the presence of zooplankton. In the creeks the blooms of zooplankton recruit along with the tidal flow. In the mangrove habitat once the zooplankton biomass enters, it persists for longer time. Abundance of zooplankton makes the creek rich in food, it helps in survival of juveniles of fish, prawns, and other marine living organisms. Zooplankton attracts different types of birds, migratory, local migratory, vagrant and resident birds. Zooplanktons are the food for these birds, nesting sites of these birds depends upon availability of zooplankton. Juveniles of birds feed on zooplankton. Zooplankton is small heterotrophic animals inhabiting the oceans at all depths and occupy almost every type of ecological environment. Patole V.M. (2009). Zooplankton play major role in the food web of an aquatic ecosystem. Study of plankton diversity and their ecology greatly contribute to the understanding of the basic nature and general economy of an aquatic habitat. Zooplanktons are capable of concentrating large quantities of heavy metals from sea water. These metals may be passed on concentrated at higher trophic levels through the food chain. Thus it is biomagnification of heavy metals or pollutants. The fishery potential is fully related to the presence of zooplankton. In the creeks the blooms of zooplankton recruit along with the tidal flow. In the mangrove habitat once the zooplankton biomass enters, it persists for longer time.

The mangrove ecosystem provide excellent environment for easy settlement and quick attraction by the resource organisms. Thus it is concluded that the occurrence and physiological conditions of zooplankton can be an indicator of the environmental conditions. Zooplanktons are most important in the cycling process of elements in the seas and oceans. Though the heavy metals in zooplankton vary due to many reasons, they do indicate possible environmental characteristics of a particular region. Moreover, being major sources of food of larger animals their role in the transfer of metals to higher trophic levels is of much importance.

The mangrove habitats are rich in organic matter, detritus are associated with detritus feeders, bottom feeders like herbivorous and carnivorous, prawn larvae ride the incoming tide and cling to some support on the bottom of the creeks during which

enables them to proceed upstream to the desired level of feed and grow several cms. in length. Anadromous fish spawn in the mangroves while some adults feed on the mangroves and migrate elsewhere to spawn. Phoronidea, Enteropneusta, Rotifera, Mollusca and Crustacean eggs and larvae are mainly brought in by the incoming sea water on which fish fingerling feed. Some mysids, cladoceran, barnacle larvae and fish larvae as well as fingerlings also feed on zooplankton. *Noctiluca miliaris* often bursts into bloom and brightens the estuaries and major creeks with its phosphorescence, coelenterates specially some ctenophora and hydromedusae are carnivorous and always present in dense swarms (Divakaran *et. al.* 1982). The abundance pattern of Protozoa, Zoa and Nauplius in general, indicates the existence of two peak periods of crustacean breeding. The fishery potential is directly correlated to planktonic availability in the estuaries. The fluctuation in fishery is mainly due to variation, diversification of plankton both qualitatively and quantitatively. Thus the importance of plankton studies is to understand the productivity of the mumbri creek is very popular for the varieties of fishery throughout the year. So far this creek is away from pollution and hence there is no alarm to take any serious precaution.

MATERIALS AND METHODS

Zooplankton samples were collected with the help of plankton net made up of bolting silk no. 20 (mesh 75 μ m). The filtered residue was preserved in 5% buffered formalin in seawater. The counting was done under Uter Mohl microscope and the counts were expressed in no/m³. The displacement method was used for finding the total volume. Wet weight of the samples were estimated by absorbing all fluids with absorbent paper and then measured directly with electronic balance. The dry weight was determined by drying in an oven at 60-65^oC. The weights were expressed in mg/100m³. The sample was split into two equal aliquots. After this the aliquot was made upto 100 ml from which 1-5 ml with stempal pipette was utilized to record the number of smaller organisms.

RESULTS AND DISCUSSION

Environmental conditions play a major role in appearance of zooplankton. The seven types of

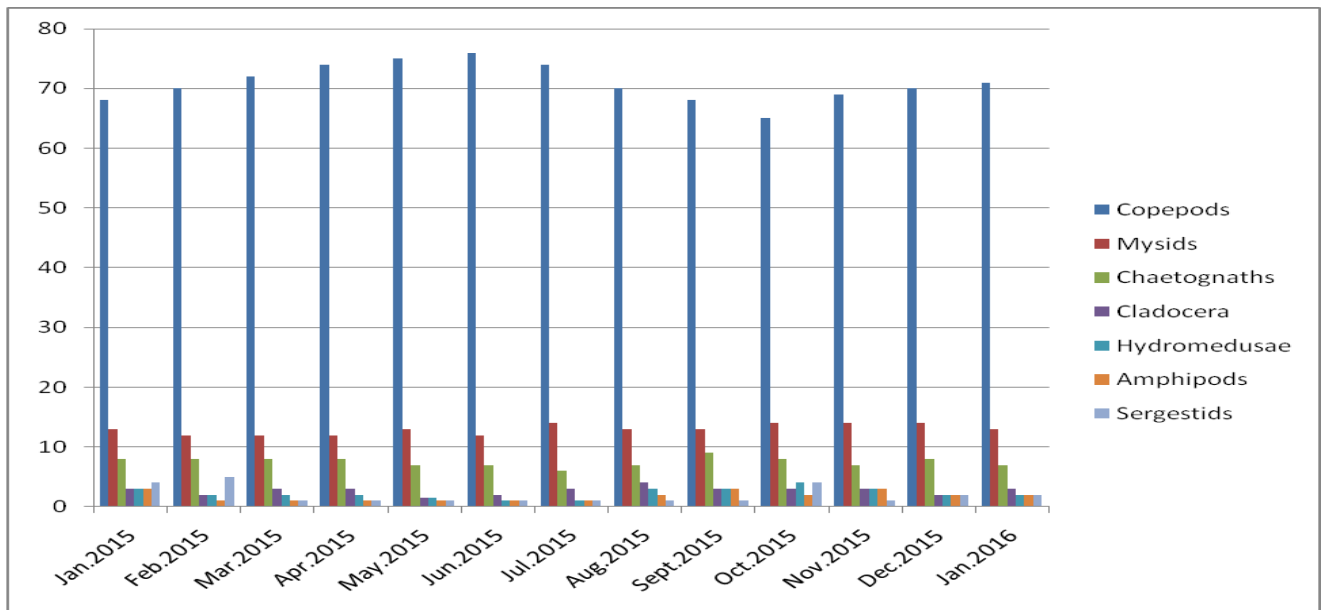


Fig. 1 Graph showing distribution of zooplankton in all regions of Mumbri Creek from Jan. 2015-16

zooplanktons were under study. The creek was divided into 3 regions. The seven types of zooplanktons are as follows: Copepods, Mysids, Chaetognaths, Cladocera, Hydromedusae, Amphipods and Sergestids.

In all the regions the Copepods were the maximum; Next to Copepods comes Mysids and Chaetognaths. While in first region Amphipods were lowest, in second region Cladocera, Hydromedusae, Amphipods were found to be low, in third region Hydromedusae was lowest.

Copepods are present throughout the year in the Creek region; Similarly, Mysids and Chaetognaths are present throughout the year. But, Cladocera, Hydromedusae, Amphipods and Sergestids were periodically present.

The biomass of zooplankton was highest in the month of February, because of highly saline waters. While in the months of September-October the zooplanktons were lowest due to decrease in the salinity. But in premonsoon period the population of zooplankton increased considerably.

The biochemical compounds of zooplankton showed higher level of proteins, carbohydrate and lipids. Estimation of biochemical constitutions of zooplankton is important in understanding their physiological functions, metabolism, nutritive value, its energy transfer and secondary production which are

relevant to the marine ecosystem. The zooplanktons are nutritionally equal to any other food fish and they could be exploited successfully for feed and for preparing byproducts similar to fish and prawn. Nowadays due to oil pollution in the oceanic region the biomass of plankton is in decline position. The plankton is very much sensitive to hydrological parameters. The upwelling is also decreasing in the sea hence there is a great effect on sea productivity. The estuarine ecosystems which is also under a dangerous condition. The planktons are the first organisms which are going to suffer fast and going to affect the entire ecosystem.

CONCLUSION

The richness of any ecosystem will depend on the total number of species present in that ecosystem. Whereas the number of individuals of a species in relation to the total number of individuals of all the species will indicate the dominance of that species. Both of them are the important aspects of the ecosystem structure.

The richness and the dominance of any such ecosystem structure at one time could be called as diversity indices. The diversity index gives a measure of the way in which individuals in an ecological community are distributed among species. It was found in present study, the values of zooplanktonic diversity indices were low during monsoon and high

during summer. The copepod distribution and dominance in the zooplankton sample of various estuaries and backwaters have been reported by various authors like (Subbaraju and Krishnamurthy, 1972; Nair *et. al.* 1987 a). From this it could be concluded that the hydrological parameters like temperature and salinity influence the zooplankton distribution. (Mukundan, 1967), in Calicut observed the August-November period was the peak period for the zooplankton while February-July was period registered moderate value and in the month of December and January the zooplankton biomass was poor. In June-July large number of fishes, especially *Mugil spp.*, *Gerres spp.*, *Penaeus spp.* and prawns migrate in the creek, enter in the lagoon and easily lay their eggs. The larvae grow faster in low salinity hence mangrove swamp contains high density of crustacean as well as *Lates and Mugil spp.* Thus hyposaline condition was reported to increase the growth of juveniles (Gunter, 1950). Lowering of temperature and enrichment of plant nutrients appear to be responsible for the peak production of phytoplankton in the month of September. (Aruga, 1973) had also reported the same results.

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