RESEARCH ARTICLE

Biodiversity and Present Status of Phytoplankton in Mumbri Creek of South Konkan, Maharashtra.

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ABSTRACT

The present investigation was carried out in Mumbri Creek of Sindhudurg district (Lat. 16º 21' N. Long. 73º 25' E). The main aim of this work is to find out the productivity of the said creek. The phytoplanktons are the surface living energy trapping tiny green organisms. They play a significant role in food chain and web. It is believed that 80% of oxygen that we breathe comes from these tiny plant bodies. Bacillariophyceae, cyanobacteria, dinoflagellates, silicoflagellates were predominating. The primary productivity of an ecosystem is directly correlated with the density of phytoplankton. The physico-chemical parameters of the creek are directly correlated with their formation. The present investigation was done in July 2015-16.

Key words: Mumbri Creek, Phytoplankton, Diatoms, Dinoflagellates, Silicoflagellates.

INTRODUCTION

The phytoplankton has great significance in the biology of the creek as they provide the principle source of primary nourishment. The plankton forms the important item of the food of many fishes as well as other organisms. The physio-chemical characteristics are always associated with the density of the plankton. The phytoplankton constitutes 95% of the total marine production Nielsen (1975), so they form the vital source of energy at the first tropic level and also serve as direct source of food to many aquatic animals. Reports on the species composition, diversity, distribution and decomposition of phytoplankton are available from various parts of the world.

In India, studies on marine phytoplankton systematic, species composition, distribution and productivity, community structure in relation to environmental parameters were carried out extensively from both the east and west coasts of India. Gopinathan (1975), Sumitra Vijayaraghavan and Krishnakumari (1989), Yeragi (2003). The present investigation was carried out to focus attention on the species composition and population density of phytoplankton of Mumbri creek areas and various environmental parameters.

The waters of the creek come and go with the tides with an overall gradual and progressive displacement towards sea. This coming and going gives the waters a long residence in the swamp, the duration of which varies with tidal amplitude, and amount of land run-off. During this long period of time and given the usually high temperature, chemical breakdown of nutrients into compounds with smaller molecular weight and dark fixation by micro-organisms becomes important elements of the primary production process.

Phytoplankton study provides a relevant and convenient point of focus for research on the mechanism of eutrophication and its adverse impact on an aquatic ecosystem. The mangroves habitat supports large scale of phytoplankton, which attracts variety of resource organisms. The potentiality of the fishery is directly correlated with the biomass of the phytoplankton. During the study period, it was noticed that when there was low level of phosphate, it indicates a rapid growth of phytoplankton and other primary producers. The phytoplankton production is related to Phosphorus, Nitrogen and Silicates. When there is bloom formation time these nutrients are consumed on large scale, therefore, their values in the water bodies declines rapidly. Phytoplankton population of the creek showed biomodel pattern in post monsoon and pre monsoon. Water quality and other biotic factors in water body control phytoplanktonic diversity and biomass. It is well known that three parameters like light, nutrients and primary production are of importance for determining the biological productivity of an area. Light penetration of the water determines the depth of the euphotic zone. While the nutrients, especially nitrates and phosphates indicate the fertility of water to promote productivity and availability of phytoplankton reveal the production of the primary level. Most of the nutrients have been utilized by the phytoplankton during the post-monsoon period. The silicate-silicon is highly utilized by the diatoms for their cell wall formation. It is observed that the reason for the build-up of phytoplankton biomass may be greatly enhanced by the nutrients supplied by the coastal upwelling of the season (Banse, 1996).

MATERIAL AND METHODS

The surface water was filtered by tea sieve with mesh size 0.0069 mm and by using a half meter bolting Nylon net, No. 2 bolting nylon net. The samples were collected in bottle, adding on the spot Lugol's iodine. The total volume of plankton was determined from an aliquot by displacement method after removing the zooplankton. The relative abundance of different phytoplankton present in net sample was recorded. The total volume of plankton was determined from an aliquot of 1/5 of the sample by the displacement method. After removing zooplankton by means of an organdy cloth. The sample brought to the laboratory were transferred to a 50ml settling chamber and kept for 24 hours adding few drops of formalin. The phytoplanktons present in these 50ml of water were than identified, counted and total cells competed per unit volume.

RESULTS AND DISCUSSION

Environmental condition is the main controller of the formation of the phytoplankton. All the ecological factors as well as nutrients are directly correlated with the multiplication of the phytoplankton.

Table.1 Checklist of phytoplankton in one litre of surface water sample

Bacillariophyceae (Diatoms)	11) *Fragilaria oceanica*	***Cyanophyceae***
1) Melosira sulcata	12) *Thalassionema spp.*	22) *Oscillatoria spp.*
2) *Skeletonema costatum*	13) *Pleurosigma normanni*	23) *Tricodesmium spp.*
3) *Coscinodiscus spp.*	14) *Pleurosigma elongatum*	
4) *Planktonella spp.*	15) *Pleurosigma directum*	***Dinophyceae***
5) *Chetoceros lorianus*	16) *Navicula spp.*	24) *Dinophysia caudate*
6) *Hyalodiscus subtilis*	17) *Hemidiscus hardmannianus*	25) *Noctiluca miliaris*
7) *Chaetoceros affinis*	18) *Nitzschia longissima*	26) *Peridinium depressum*
8) *Rhizosolenia spp.*		27) *Peridinium pentagonum*
9) *Triceratium favus*	***Silicoflagellates***	28) *Ceratium furca*
10) *Biddulphia sinensis*	19) *Dictyota fibula*	29) *Ceratium fuscus*
	20) *Coccolithophora spp.*	30) *Ceratium triops*
	21) *Cocclithus spp..*	

Table 2: Showing the phytoplankton present in Mumbri Creek between 2015-16.

Zones	Bacillariophyceae (Diatoms)	Silicoflagellates	Dinophyceae	Cyanophyceae
East	80.57%	1.85%	7.24%	10.34%
North	82.95%	2.22%	6.36%	8.47%
West	75.41%	2.25%	10.44%	11.90%

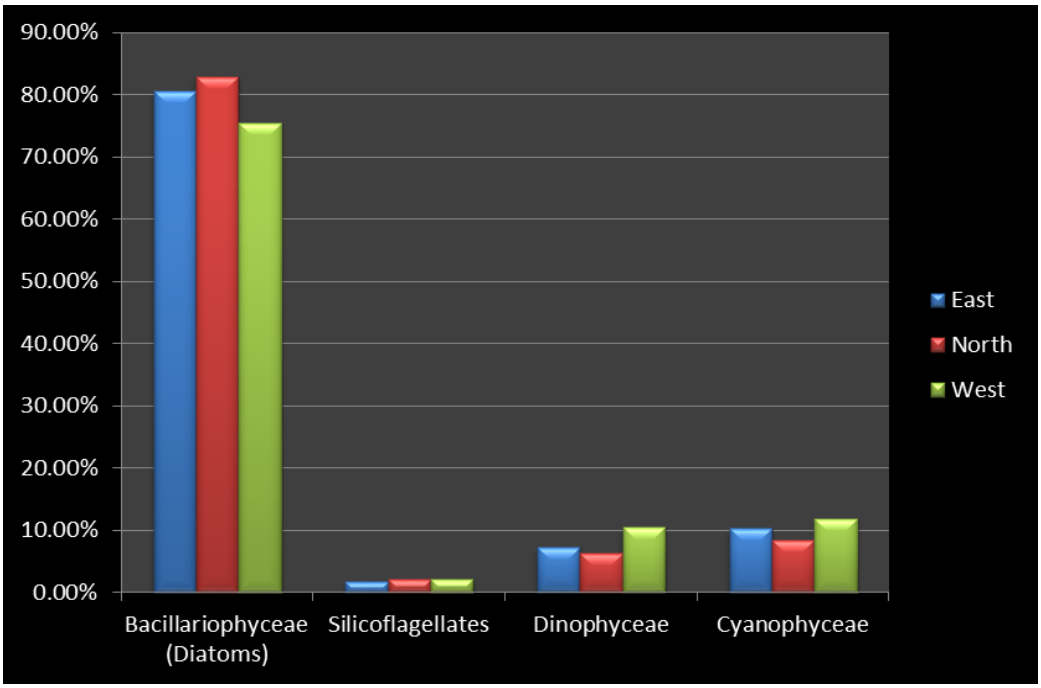

Fig. 1: Graph showing the phytoplankton present in Mumbri Creek between 2015-16.

Phytoplankton quickly absorbs nitrates and phosphates available in the water. During monsoon, due to upwelling these elements are peaked up at the surface by which accelerates the standing crop of phytoplankton.

Species composition of phytoplankton revealed a total number of 30 species from all the three stations. A checklist of phytoplankton recorded from the sites during the investigation time is given in Table 1. The checklist clearly focused that the Bacillariophyceae (Diatoms) occupied first rank followed by Cyanobacteria and Dinoflagellates. The parameters like temperature, alkalinity, oxygen, nitrate, silicate, phosphate, total suspended solid and salinity plays a significant role in qualitative and quantitative spectrum of planktonic population(s). Yeragi,SG (1997). These are both significant positive and negative correlation with planktonic loads of various species with water quality parameters. It is due to different niche requirement of individual species. During post monsoon, *Biddulphia sinensis*, *Thalassionema spp.*, increased in number, while in pre monsoon zooplankton increased in number like Herpacticoid copepod. *Ceratium fuscus*, *C. triops*, *Rhizosolenia spp.*, etc. Yeragi (1995).

The fluctuation in phytoplankton population density was wide in different months of the study period. The peak density was noticed in monsoon and lowest in pre monsoon season.

The planktonic volume showed gradually increasing trend from June onwards, reaching its maximum in the month of July-August. It is mainly due to high abundance of dinoflagellates, *Noctiluca miliaris*. Afterwards the volume goes on decreasing and recorded lowest in February, there was a rise in volume of plankton through the succeeding months.

DISCUSSION:

The phytoplankton biomass both qualitatively and quantitatively was high in monsoon and post monsoon season. It is also noticed that the relation between oxygen and phytoplankton were directly correlated at all the stations. Jhingran (1985) recorded a direct relationship between hardness and planktonic production, hard water enhances productivity as compared to soft water. In the present investigations positive correlations between phytoplankton and total hardness was noticed.

The mangroves habitat supports large scale of phytoplankton, which attracts variety of resource organisms. The potentiality of the fishery is directly correlated with the biomass of the phytoplankton. During the study period, it was noticed that when there was low level of phosphate, it indicates a rapid growth of phytoplankton and other primary producers. The phytoplankton production is related to phosphorus, nitrogen and silicates. When there is bloom formation time these nutrients are consumed on large scale, therefore, their values in the water bodies declines rapidly. Phytoplankton population of the creek showed biomodel pattern in post monsoon and pre monsoon. Yeragi (1997).

CONCLUSION

The biomass of phytoplankton is totally correlated with the surrounding factors. The maximum biomass was recorded in monsoon due to availability of nutrient. The formation of phytoplankton was least in monsoon Chandran (1985) and post monsoon because of high temperatures. The phytoplankton shows the negative correlation with temperature. The qualitative and quantitative values were high during monsoon only. It is also noticed that the productivity is directly correlated with dissolved oxygen. During monsoon the nitrate concentration was high due to which accelerate the luxuriant growth of phytoplankton. Temperature is an abiotic factor, which helps in controlling the growth of phytoplankton. Thakur (2011) Chandran (1982), the cause of rapid decline of phytoplankton during post monsoon and pre monsoon was due to grazing by zooplankton.

Conflicts of interest: The authors stated that no conflicts of interest.

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