

EVALUATION OF POLLUTION IN THE LAKE MASUNDA, THANE (MAHARASHTRA)

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ABSTRACT

Phytoplankton of lake Masunda, Thane, were studied from April 1999 to June 2000. *Pediastrum* sp was the most dominant phytoplankton. Different biological indices were employed. Arceivalas' scheme indicated eutrophication in 20% samples. Lower values of Odum's index revealed higher pollution. Eleven pollution tolerant genera mentioned in Plamer's index were recorded. Nygaard's trophic state indices could not be applied effectively.

Key words: Eutrophication, Phytoplankton, Biological indices.

INTRODUCTION

Lake Masunda is an ancient lake, situated in Thane city. Its area is about 37670 sq.m. and is influenced by anthropogenic activities like idol immersion, vegetable washing, boating and aquaculture. Stress due to anthropogenic activities results in cultural eutrophication. The effect of organic pollution is reflected into total number of algal species (Patil & Nadan 1998). Recent approach for assessment of pollution tends to use algal communities as indices. Phytoplankton data if subjected by different biological indices, can reveal the trophic status of the waterbody under observation. With this approach, the data was analysed to study the extent of pollution of lake Masunda.

MATERIALS AND METHODS

Water samples were collected from lake Masunda from April 1999 to June 2000. The Monthly collection was carried out at early morning hours. Samples for phytoplankton (500 ml) were fixed with Lugol's Iodine and concentrated later for qualitative and quantitative estimations.

Identification upto genera level, was carried out using standard keys. Bellinger (1992), Fritsch (1979) and Sarode and kamat (1984) for quantitative estimation, Haemocytometer method was applied. Palmer's algal genus index (Palmer 1969), Nygaard's trophic indices (Nygaard 1949), Arceivala's scheme (Arceivala 1980) and Odum's index (Odum 1960) were employed to analyse monthly phytoplankton data.

RESULTS AND DISCUSSION

Chlorophyceae was observed to be the most dominant phytoplankton class, during the study period. It contributed to 67.3% of total phytoplankton. Mason (1981) stated association of *Pediastrum* sp. with entrophic lakes. This genus was the most dominant in almost all the samples.

Arceivala's Scheme (1981) proposes trophic status on the basis of algal cell density: The scheme indicated 6.7% samples having oligotrophic nature, 73.3% samples with mesotrophic status and 20% samples with eutrophic nature.

Odum's Index (Odum *et al* 1960) considers variations of species in comparison in the samples. Except for June 1999 and March 2000, the lake always exhibited lower values of this index, indicating higher pollution status. (Table 1).

Table 1 Unit values for different algal indices applied to phytoplankton data of Masunda lake

Index	Nygaards indices	Algal groups				Palmer's index	Odum's index
		Compound	Mmyxophycean	Chlorophycean	Diatom		
Apr 99	8	4	2	-	0.34	22	0.137
May	2	0.66	1	-	0.25	18	0.09
Jun	4	1	2	-	0.34	12	0.145
Jul	6	2	3	-	0.2	19	0.056
Aug	-	1	-	1	0.5	16	0.098
Sep	6	3	2	0.33	-	15	0.132
Oct	6	1	3	-	0.5	23	0.171
Nov	8	4	3	-	0.14	22	0.065
Dec	-	-	-	0.5	0.23	26	0.057
Jan 00	-	-	-	-	0.2	19	0.082
Feb	1.66	0.33	1	-	0.25	13	0.032
Mar	5	1	3	-	-	12	0.438
Apr	-	-	-	-	-	3	0.156
May	9	4	4	1	-	-	0.064
Jun	-	-	-	-	0.4	21	0.084

Palmer's Algal; Genus Index (Palmer 1969) denotes 20 % pollution tolerant genera, Lake Masunda showed presence of 11 genera, at one time or other, Nearly 60% samples showed high organic pollution or probable high organic pollution. 23 genera, with reference to Palmer's list of 60, most pollution tolerant genera were denoted in the present study.

Nygaard's trophic state indices: Out of 5 different quotients suggested by Nygaard, only the compound index has been found to be useful and applicable to waters over a wide geographical range (Hutchinson 1967). Many researchers extensively used these indices to understand the quality criteria of the water (Ragothaman & Jaiswal 1995). In the present study, the indices could not be calculated every month, as 3 indices are based on desmids which were absent from the sample for certain months. (August, Dec., Jan., April & June). Myxophycean index could be calculated for 11 months. Out of which 10 samples indicated eutrophic nature. Chlorophycean index could be calculated for 10 months, all showing eutrophic status. Diatom index could be evaluated only 4 times, due to frequent absence of centric diatoms (Table 1). Euglenophycean index as well as compound index indicated eutrophic nature.

To evaluate trophic status of a lake, it is important to employ the biological indices considering qualitative as well as quantitative approach. If only one type of index employed, it may indicate inappropriate results. Any one index which can be applied satisfactorily to phytoplankton data of one particular water body, may not be proved significant for other lakes. Mishra *et al* (2004), have successfully employed Nygaard's indices to comment on trophic status of Bhoj wetland. However the index was not sufficient to conclude about trophic status of lake Masunda. The index showed eutrophic nature of this lake; however, the index is solely dependent upon presence of either desmid or centric and pinnate diatoms. As these species were not found consistently in every collection the application of this index might be depicting a confusing picture. Palmer's index indicated on an average, the status of probable high organic pollution, whereas Areceivala's scheme indicated mesotrophic nature of this lake. Odum index pointed higher pollution status.

To conclude, every index mentioned above, has significant approach and if all are employed may give a better or correct picture. Similarly if applied to monthly phytoplankton data, can as well cover the changes due to seasonal variations. Scums of cyanobacterial blooms, considered as peculiarity of eutrophic conditions, were never observed during the study period. The overall picture showed mesotrophic status of lake Masunda, tending towards increasing pollution.

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