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ORIGINAL ARTICLE

ECOLOGY OF PHYTOPLANKTON WITH RELATION TO PHYSICO - CHEMICAL PARAMETERS OF BOTHALI (MENDHA) LAKE, GADCHIROLI (M.S.)

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Abstract:

Bothali – Mendha lake is located at 200 - 11' latitude and 800 – 04' longitude situated in rural area. The lake is old "Malgujari" Talav type, having an area of about 39.68 hectares. Seasonal variations in the population of phytoplankton in relation to physico-chemical parameters were studied for a period of two years (November 2003 to October 2005) in lake.

In all 16 genera were recorded of which 06 belongs to Chlorophyceae, 04 to Basillariophyceae, 03 to Cynophyceae (Myxophyceae), and 01 to Euglenophyceae respectively. Among these four families of phytoplankton Chlorophyceae remains dominant throughout the study period. Phytoplankton species and physico-chemical parameters profiles indicate the lake is oligotrophic.

KEYWORDS:

Phytoplankton, Physicochemical, Bothali (Mendha)

INTRODUCTION:

Phytoplankton, being the primary producers in the food chain of fresh water ecosystems, plays a key role in the bio-monitoring and ecological disturbances caused by number of physico-chemical factors, pond morphometry, sewage pollutants and anthropogenic activities. Many investigations carried out study on ecology of phytoplankton and physicochemical studies of water. Extensive work has been carried out in India on ecology of phytoplankton by many workers like Munawar (1974), Trivedi (1983), Patil and Panda (1997) and Sirsat et.ai.(2004). In Maharashra Barhate and Tarar (1981), More and Nandan (2003) and Borse et.al. (2003) made their work on algae. Such studies are focused towards understanding the ecology of phytoplankton and their importance as fish food, indicator of pollution and assess the trophic status of waterbodies. In present work an attempt has been made to investigate seasonal variations in phytoplankton along with the physico-chemical parameters.

Bothali – Mendha lake is located at 200 - 11' latitude and 800 – 04' longitude situated in rural area and away 07 Km. from Gadchiroli on Dhanora road. The lake is old "Malgujari" Talav type, having an area of about 39.68 hectares. The lake water used for mainly irrigation purpose and is polluted due to human activities of the nearby villagers, cattle washing and added domestic sewage. The lake water consisting four families of phytoplankton and aquatic vegetations submerged Hydrilla, Ceratophyllum and emergent Nymphea. The marginal area of lake is surrounding by few Ipomoea sp. and Nemphoide sp.

Materials and Methods: Plankton samples were collected once in a month with the help of nylon plankton net (200 meshes/cm.). 50 liter of water filtered through the net at different sampling sites i.e. S1, S2 and S3 from lake and preserved with 4% formalin. Phytoplankton were observed under microscope and identified with the help of standard literature. The quantitative estimation of phytoplankton was made by Lucky's drop method. Average three counts were made and then mean was calculated. Lastly, total count per liter

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was calculated from the all-mean values of the sites. For physico-chemical parameters, water samples were collected periodically every month during morning period from the selected sites. Temperature (air and surface), Transparency, Conductivity, pH and DO were recorded at the spot while rest parameters analysed in laboratory according to standard methods (APHA, AWWA, 2000).

RESULT AND DISCUSSION:

The phytoplankton was composed of Chlorophyceae, Basillariophyceae, Cynophyceae (Myxophyceae), and Euglenophyceae In all 16 genera were recorded of which 06 belongs to Chlorophyceae, 04 to Basillariophyceae, 03 to Cynophyceae (Myxophyceae), and 01 to Euglenophyceae respectively. Various physicochemical parameters played an important role in periodicity of green algae. The Chlorophyceae remains dominant group among phytoplankton population. The average annual percentage composition of Chlorophyceae was 34.62 and 39.62, found maximum in summer and spring when the pH of water is high (Munawar, 1974). The Myxophyceae was calculated 29.22% and 31.25% during the study period.

Bacillariophyceae were always found to be a significant number in total plankton biomass and the average percentage was 23.38 and 24.31. These are unicellular, sometimes colonial algae found in almost every aquatic habitat as free living photosynthetic symbionts. Diatoms are more common in aquatic conditions and recorded maximum in the months of September and October. It shows positive correlation with the pH of lake water.

In the present investigation, diatoms did not form a major part of the plankton. The green algae and blue green algae found to be more in the phytoplankton population (Patil et.al., 1997). This may be due to preferential feeding on these algae by the fishes present in the waterbody. Temperature does not seem to be important factors for seasonal periodicity of phytoplankton (Chari, 1985). The blooms of green algae were found associated with the low phosphates thereby utilizing this nutrient, which is essential for the growth of green algae. Diatoms were observed when the phosphate, nitrates and silica are rich in water. The diatoms have great sensitivity to chemical and physical conditions of water. The important factor, which controls the seasonal variations of diatoms, is the silica concentration. Munawar (1974) reported the inverse relationship between silica concentration and diatoms population in fresh ware body. In the present investigation diatom, population was poor due to fewer amounts of silicates in water.

The pH of water during both years was in range of 7.1 to 8.3. The total phytoplankton was high when the pH was high (Jana, 1973). CO2 does not play any role in controlling phytoplankton production and most of the algae utilize CO2 from bicarbonate. D.O. contents in water were found to be 6.2 to 8.5, and show positive correlation with the population of phytoplankton.

The average percentage of Euglenophyceae was 1.92 and 2.15 and showed tolerance to organic pollution and species belonging to this group could be used as biological indication of organic pollution. Euglenophyceae are in greater number in organically polluted water bodies. The blue green algae and euglenoid flagellates were mostly associated with organically rich effluents. The present phytoplankton species and physico-chemical parameters profiles indicate that the lake is oligotrophic.

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REFERENCES:

APHA, AWWA, 2000: Standards of methods for examination of water and waste water 18th Ed., American Public Health Association, Washington, D.C.

Chari, M.S., 1985: Aquatic pollution and its effects on the fauna and flora of a freshwater pond at Aligarh, India, Proc. Nat. Sympos. Evaue. Sup. Vol. Geobios, 49-65.

Jana, B.B.,1973: Seasonal periodicity of plankton in a freshwater pond in West Bengal, India. Hydrobiologia, 58, 127 -143.

Patil, S.G. and Panda, P.,1997: Phytoplankton ecology of a freshwater fish tank, Bibinagar, Hyderabad, A.P., Rec. Zool. Surv. India, 96 (1-4), 221-228.

Munawar, M.,1974:Limnological studies on fresh water ponds of Hyderabad., Hydrobiologia, 44 : 13 - 27.

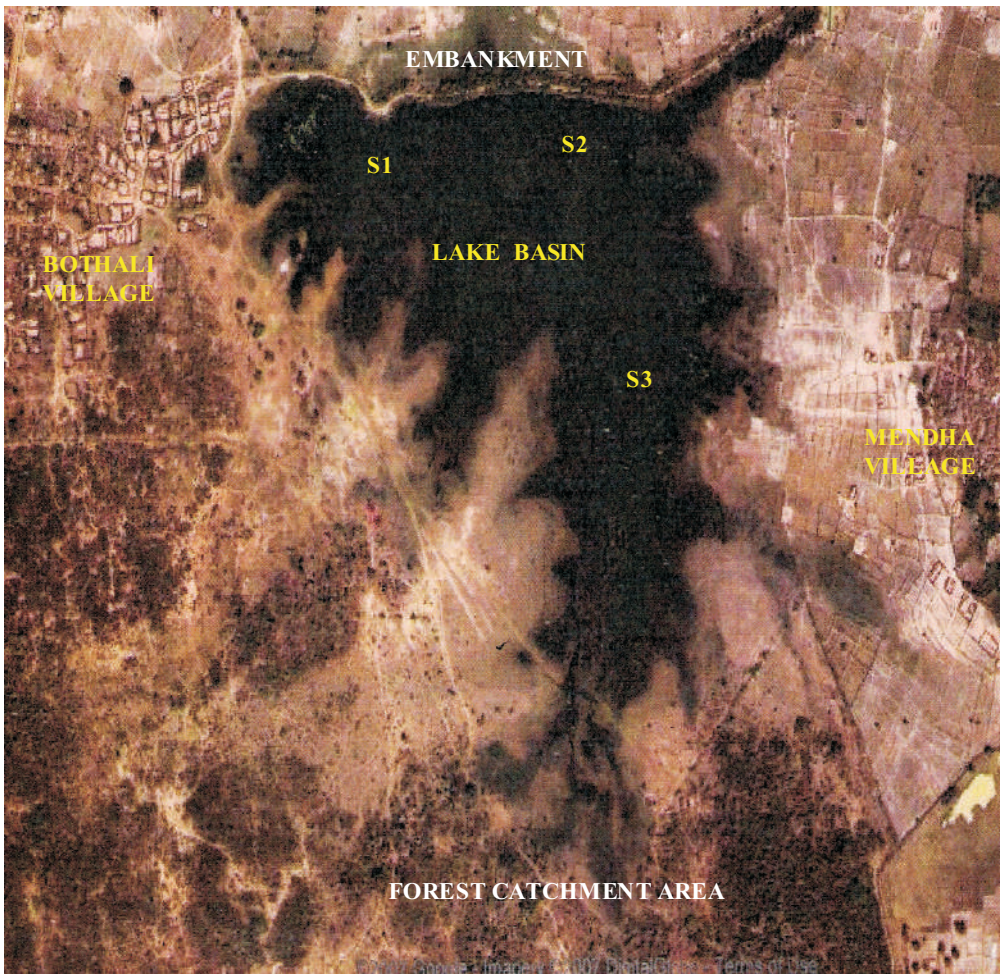
Barhate, V.S. and Tarar, J.L., 1981: The algal flora of Tapi river, Bhusaval, Maharashtra Phycos, 20 : 75 - 78.
Borse, S.K., Lohar P.S. and Bhave, P.V., 2003:Hydrobiological study of algae of Aner river, Jalgaon, Maharashtra. J. Aqua. Bio. 18 (1): 15 - 18.
More, Y.S., and Nandan, S.N., 2003:Hydrobiological study of algae of Panzara Dam, Maharashtra. Eco. Env. Conserv, 9 (3) : 367 - 369.
Sirsat, D.B., Ambhore N.E. and Pulle, J.S., 2004: Study of phytoplankton of freshwater pond at Dharmapuri in Beed district (M.S.), J. Aqua. Bio.19 (2) : 7 – 10.
Trivedi, R.K., Goel P.K. and Guard G.M., 1983: Limnology of five lakes in Kolhapur (Maharashtra) with reference to human activity. Envir. & Eco. 1 (1) : 41-43.

Average annual range of various physicochemical parameters.

Table – 1

S. No.	Parameter	2003 - 04		2004 - 05	
		Min.	Max.	Min.	Max.
1	Temperature Arial (^{0}C)	28.3	38.5	25	39
2	Temperature Water (^{0}C)	24.5	34.0	22	31
3	pH	7.1	7.9	7.4	8.3
4	Conductivity (uMoh).	50.8	75.8	56.9	112
5	S.D.Transparency (cm.)	48.5	71.5	46.5	71.0
6	Turbidity (NTU)	02	48	03	51
7	Total Solids (Mg/lit)	125	367	145	455
8	Total Dis. Solids (Mg/lit)	102	280	105	361
9	D.O. (Mg/lit)	6.2	8.3	7.0	8.5
10	CO_2 (Mg/lit)	2.0	14.0	1.0	13.5
11	Total Hardness (Mg/lit)	35.0	59.5	22	47
12	Ca - Hardness (Mg/lit)	2.15	3.47	1.47	3.78
13	Mg - Hardness (Mg/lit)	8.0	13.4	5.0	10.6
14	Calcium (Mg/lit)	8.6	13.8	6.23	13.47
15	Phe. Alkalinity (Mg/lit)	00	00	00	00
16	Total Alkalinity (Mg/lit)	74	126	51	87
17	Chloride (Mg/lit)	35.4	85.1	42.7	86.1
18	Salinity (Mg/lit)	64.0	153.5	76.8	155.4
19	Phosphate (Mg/lit)	0.73	1.14	0.85	2.58
20	Nitrate (Mg/lit)	0.32	0.77	0.52	0.87
21	Sulphate (Mg/lit)	2.4	8.5	3.6	10.1
22	Silicate (Mg/lit)	0.30	1.15	0.42	1.70

I. BOTHALI LAKE
(SATELLITE VIEW)



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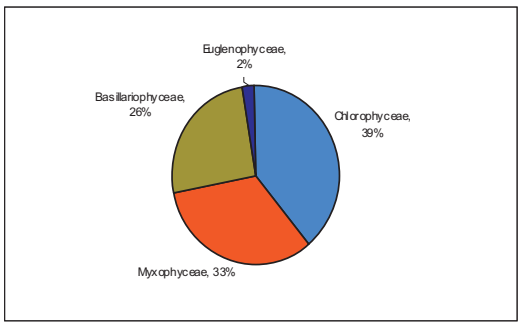
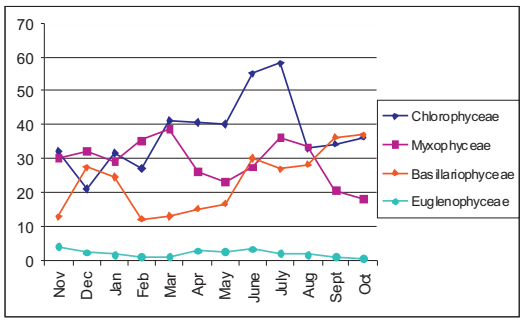
Observation:
2003 – 2004

S. No.	Family	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total	Avar. %
1.	Chlorophyceae	32.17	21.09	31.50	27.10	41.20	40.60	40.15	55.10	58.15	32.80	34.42	36.20	450.48	34.62
2.	Myxophyceae	30.15	32.20	29.10	35.30	38.60	26.12	23.20	27.52	36.30	33.50	20.46	18.20	350.71	29.22
3.	Basillariophyceae	12.80	27.40	24.70	12.30	13.10	15.10	16.53	30.15	26.70	28.30	36.38	37.20	280.67	23.38
4.	Euglenophyceae	3.76	2.30	1.59	1.19	0.85	2.70	2.50	3.21	2.01	1.57	0.96	0.45	23.09	1.92



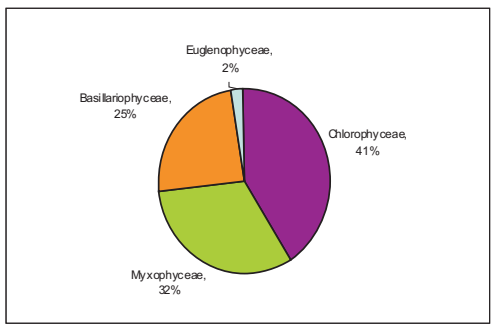
Total % of phytoplankton during the year 2003 -04



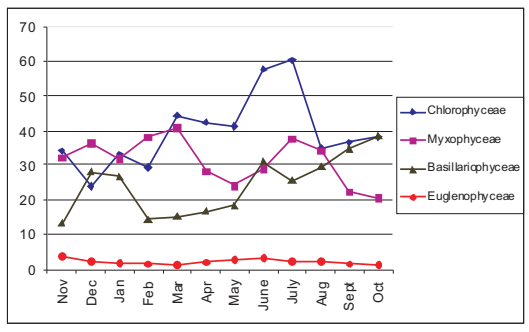
Graphical status of phytoplankton present in months (2003-04)

2004 – 2005

S. No.	Family	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total	Avarage %
1.	Chlorophyceae	34.25	23.85	33.13	29.22	44.29	42.14	41.27	57.63	60.13	34.76	36.66	38.20	475.53	39.62
2.	Myxophyceae	32.15	36.40	31.80	38.10	40.56	28.21	24.25	29.12	37.46	34.13	22.34	20.56	375.08	31.25
3.	Basillariophyceae	13.25	28.10	26.85	14.45	15.11	16.70	18.22	30.85	25.40	29.65	34.84	38.32	291.74	24.31
4.	Euglenophyceae	3.85	2.30	1.68	1.45	1.21	1.95	2.76	3.40	2.23	2.20	1.56	1.21	25.80	2.15



Total % of phytoplankton during the year 2004 -05



Graphical status of phytoplankton present in months(2004-05)