

BIODIVERSITY OF ALGAE IN MAVATHURU LAKE, Bangalore rural Karnataka

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Abstract

The planktons constitute the basic bulk of food cycle of all aquatic animals and so their role in fisheries is important. Enough literature is available on limnological studies of fresh water lakes and ponds of India (Chacko and Krishna murthy 1954, Phillipose 1959, Sumantra 1971, Pandey 1987 and Adoniet al., 1987). However the studies on the fresh water ecosystem of Mavathuru lake of Kanakapura Town have not yet been made in detail. The present investigation is preliminary work carried to understand the occurrence and distribution of algae and certain physiochemical factors of Mavathuru lake. It is a small perennial, shallow and has a saucer shaped basin with slopes in the margin of late it has been renovated for recreation purposes.

In the present study 56 species belonging to Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae are recorded. Some of the important genera are Gloeocapsa, Alphanocapsa, Microcystis, Chroococcus, Nostoc, Anabaena, Lyngbya, Spirulina, Oscillatoria, Phormidium, Chlorella, Closterium, Oedogonium, Scendesmus, Gomphonema, Navicula, Nitzschia, Synandra, Cymbella, Euglena, Lipocinclis and Phacus.

Keywords : Biodiversity, Algae, Mavathuru lake.

Introduction :

Information on Biodiversity is important for the study of primary productivity, to understand the factors influencing rise, fall and change in algal population, interaction of algae with other organisms and study the effect of anthropogenic pressure upon aquatic habits (Round, 1981; Kumar, 1990). Some algal forms can be useful as indicators on which major water management practices, pollution studies and water quality analysis can be keyed (Palmer, 1969; Schubert, 1984). The importances of algal dynamics, particularly their response to environmental changes and nutrient fluctuation have been suggested in several studies (Frempong, 1984; Sudhakar et al, 1991). Present study was conducted in a freshwater reservoir, the Mavathuru Kanakapura, Karnataka state, Increasing input of organic and inorganic wastes in the lake has become a source of major concern. Studies conducted on the ecology of certain tropical lakes in India (Singh and Swaroop, 1979; Parvatheesam, et al, 1991) have indicated changes in water, quality and related effects on phytoplankton community. The object of our present study the algal flora and correlating the algal periodicity with observed physico-chemical characters of Mavathuru Lake water.

Material and Methods:

Mavathuru Lake is located in North of Kanakapura town, Karnataka state, India. The lake is surrounded by residential complexes on two sides and bound by road. It is more or less rectangular in shape with a maximum depth of 4.8 meters and is connected by drainage line. The climate is tropical with three distinct seasons, a hot and dry summer (March to June), Wet rainy season (July to October) and cool, dry winter (November to February) with annual average temperature of 24°C, 45% relative humidity and 980 mm precipitation.

Sampling was done at monthly intervals from April 2008 to March 2009. Subsurface water samples were collected in pre sterilized bottles between 8:00 and 10:00 A.M. Samples of phytoplankton were collected using a phytoplankton net. Samples were examined fresh and preserved in 4 to formalize for water quality analysis, standard methods were followed (APHA, 1985). Identification of algal taxa was done following keys given by Prescott (1951), Desikachary (1959) Randhawa (1967), Phillipose (1967) and Anand (1989).

The results of physico-chemical analysis of water are presented in table 1. Average temperature ranges from 17 to 34°C. Dissolved oxygen ranged from 8.00 to 7.80 mg/L and free carbon dioxide was maximum at 31.96 during monsoon and minimum of 21.85 during winter.

A total of 56 species belonging to Cyanophyceae, Bacillariophyceae, Chlorophyceae, and Euglenophyceae were recorded (Table 2). At community level, Cyanophyceae was the dominant group represented by 25 species, followed by Chlorophyceae (20) Bacillariophyceae (8) and Euglenophyceae (3). Table 2 further indicated that *Ghlorococcum lunicola*, *Ulothrix variabilis* of Chlorophyceae, *Gomphonema* sp. *Navicula simplex* of Bacillariophyceae *Lipocinalia* sp. Of Euglenophyceae and *Arthrospira* Sp. *Chroococcus minor*, *C. minutus*, *C. dispersus* and *Spirulina laxa* of Cyanophyceae were absent during Monsoon. Similarly, *Spondylosium* and *Oocystis* (Chlorophyceae), *Anacystis* sp. and *Plectonema* sp. (Cyanophyceae) and *Cymbella ventricosa* (Bacillariophyceae) were absent during winter and summer.

Discussion:

The observation of physico-chemical characteristics of lake water is in general are consistent with results of studies on other tropical lakes of India (Singh and Swaroop, 1979; Srivastava et al 1993) concentration N and P were found high enough to support algal growth.

Excessive growth of certain algal species such as *Anabaena*, *Aphanizomenon*, *Microcystis*, *Oscillatoria*, *Scenedesmus* and *Pediastrum* is known to indicate nutrient enrichment of aquatic bodies (Palmer, 1969; Bush and Welch, 1972; Kumar, 1990). It is observed that some species

showed prolific growth while some are restricted to certain seasons. Seasonal variations indicated a low concentration of N and P coincided with excessive algal blooms during summer. It could be that a greater proportion of these nutrients were utilized by rapidly growing species making the ambient water nutrient poor. Studies have also indicated that the time of peak concentration of N and P did not coincide with the period of abundant algal growth (Lund, 1966). Relatively high N: P ratio during monsoon could be due to additional N input due to land drainage.

The initial nutrient demand of merging blooms at the onset of dry season is probably met from the nutrient enriched due to reduction in water volume and death and decay of less adapted organisms. Further, continued cyanobacterial growth up to the onset of monsoon indicated continued supply of nutrients through the sewage inflow. Unlike Cyanophyceae, members of Chlorophyceae grow better in water with low organic matters and high dissolved O₂ (Goldman and Home, 1983). Some of the diatoms like *Melosira* and *Fragillaria* grow well in a polluted water (Palmer, 1969). Physical factors such as temperature and light intensity also regulate seasonal appearance of algal forms. Also, algal forms also regulate seasonal appearance of algal form (Goldman and Home, 1983). It may be argued that although, one factor may have importance over the other in regulating phytoplankton periodicity, a number of physical, chemical and complex manner. Therefore to assess the relative importance of different variables regulating algal periodicity, detailed quantitative data are needed. The present study provides evidence of increased nutrient accumulation in Mavathuru Lake. Increased inflow of nutrients which is expected to increase in future and consequently algal growth is bound to deteriorate the water quality. It is therefore imperative to take preventive measures before the lake gets converted into an eutrophic system. Further work is in progress.

TABLE-1**PHYSICO CHEMICAL AND PLANKTON PARAMETERS OF MAVATHURU LAKE**

Sl.No.	PARAMETERS	SUMMER	RAINY	WINTER
1)	Temp-Atm	34.00	31.00	21.00
2)	Water	33.00	29.00	19.00
3)	Colour	Muddy	Clear	Clear
4)	Turbidity	Turbid	Turbid	No Turbidity
5)	PH	8.20	8.77	9.12
6)	Conductivity	523.32	429.87	782.04
7)	D.O.	6.00	6.67	7.80
8)	CO ₂	26.30	31.95	21.85
9)	Total Alkalinity	180.00	140.00	180.00
10)	Hardness	126.00	132.00	106.00
11)	Calcium	28.85	30.46	19.23
12)	Nitrates	0.24	0.032	0.017
13)	Nitrites	0.25	0.06	0.01
14)	Phosphates	0.20	0.29	0.08
15)	COD	35.00	37.00	33.00
16)	BOD	2.43	4.45	5.27
17)	Chlorides	36.92	34.08	45.44
18)	Mg ⁺⁺	21.60	13.64	14.13

TABLE-2

SEASONAL VARIATION IN DISTRIBUTION OF ALAE OF MAVATHURU LAKE

Sl.No.	Name of Species	Winters	Summer	Monsoon
	Cyanophyceae			
1)	Anabaena constricta	P	P	P
2)	Anacystis Sp.	AB	AB	P
3)	Aphanocapsa rivularis	P	P	P
4)	Aphanozomenon flos-aquae	P	P	P
5)	Arthospira Sp.	P	P	AB
6)	Arthospira Sp.	P	P	P
7)	C.dispersus	P	P	AB
8)	C.minor	P	P	AB
9)	C.minutus	P	P	AB
10)	Chroococcus varius	P	P	P
11)	Gloeocapsa sp.	P	P	P
12)	Lyngbya birgei	P	P	P
13)	Lyngbya epiphytica	P	P	P
14)	Merismopodia glance	P	P	P
15)	Microcystis aeruginosa	P	P	P
16)	Microcystis aeruginosa	P	P	P
17)	Nostoc calcicola	P	P	P
18)	Oscillatoria Formosa	P	P	P
19)	Oscillatoria limosa	P	P	P
20)	Oscillatoria tunuis	P	P	P
21)	Phormidium ambigium	P	P	P
22)	Plectonema sp.	AB	AB	AB
23)	Scytonema sp.	P	P	P
24)	Spirulina laxa	P	P	P
25)	Spirulina major	P	P	P

SEASONAL VARIATION IN DISTRIBUTION OF ALAE OF MAVATHURU LAKE

Sl.No.	Name of Species	Winters	Summer	Monsoon
	Cyanophyceae			
1)	Chlamydomonas epiphytica	P	P	P
2)	Chlorella sp.	P	P	P
3)	Chlorella vulgaris	P	P	P
4)	Chlorococcum lunicola	P	P	AB
5)	Closterium glomerata	P	P	P
6)	Closterium lunula	P	P	P
7)	Coelastrum microsporum	P	P	P
8)	Cosmerium corda	P	P	P
9)	Oedogonium capillarea	P	P	P
10)	Oedogonium sp.	P	P	P
11)	Oocystis sp.	AB	PAB	P
12)	Pediastrum duples	P	P	P
13)	S.bijugatus	P	P	P
14)	S.dimorphus	P	P	P
15)	Scenedesmus sp.	P	P	P
16)	Selnastrum gracile	P	P	P
17)	Spirogyra Sp.	P	P	P
18)	Spondylosium	AB	AB	P
19)	Ulothrix variables	P	P	AB
20)	Zygnema sp.	P	P	P

	Bacillariophyceae	Winters	Summer	Monsoon
1)	Chlamydomonas epiphytica	AB	AB	P
2)	Fragillaria sp.	P	P	P
3)	Gomphonema Sp.	P	P	AB
4)	Melosira sp.	P	P	P
5)	Navicula rhombiodes	P	P	P
6)	Navicula simplex	P	P	AB
7)	Nitzschia palea	P	P	P
8)	Synandra acus	P	P	P
		P	P	P
	Euglenophyceae	Winters	Summer	Monsoon
1)	Eugena Limmophyllia	P	P	P
2)	Lipocynalis sp.	P	P	AB
3)	Phacus curvicaude	P	P	P

P=Present: AB=Absent

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