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Phytoplankton diversity of Sonegaon Lake of Nagpur city, Maharashtra, India

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Abstract
Phytoplankton is the pioneer of an aquatic food chain. The phytoplankton has great significance in the biology of the creek as they provide the food for the organisms, especially for Zooplankton. The productivity of an aquatic environment is directly correlated with the density of plankton. The plankton population in any aquatic system is biological wealth of water for fishes and constitutes a vital link in the food chain. The present study was undertaken to investigate the plankton diversity in Sonegaon lake of water area of Nagpur city having distance approximate 7.5 kms. from zero mile, through this three-season taken for study during the period of February 2018 to January 2019. Four major groups of phytoplankton (*Myxophyceae*, *Bacillariophyceae Chlorophyceae* and *Euglenophyceae*.) were studied for diversity and seasonal abundance. Among the groups of phytoplankton, the population density showed variations due to their ad ptability to seasonal changes in water quality. Some plankton population disappeared at a specified period and reappeared during other period. This disappearance may be due to the fact that some species occur in spores, under favourable conditions spore germinate and appear as plankton. Assessment of lake water bodies with reference to species diversity of flora was done in three different seasons' summer, monsoon and winter. Species diversity of *Myxophyceae*, *Bacillariophyceae Chlorophyceae* and *Euglenophyceae* were recorded. The result indicates the abundance of phytoplankton and high level of primary energy which is subjected to sustainably development of lake utility.

Keywords: phytoplankton, biodiversity, Sonegaon lake, water pollution, abundance, density

Introduction
Phytoplankton are at the base of aquatic food webs and of global importance for ecosystem functioning and services. The dynamics of these photosynthetic organisms are linked to annual fluctuations of temperature, water column mixing, resource availability and consumption. Phytoplanktons are the groups of microscopic plants which are minute and able to spend their whole life floating on water is called planktons. The phytoplankton diversity and density is controlled by water quality and other biotic communities in a water body, (Reid and Wood, 1976) [9]. Phytoplankton's constitute bulk of primary producers and are the base of food chain in every water body, (Belkhode, 2016). Phytoplankton's are the most sensitive floating communities which is being the first target of water pollution, thus any undesirable changes in aquatic ecosystem affects diversity as well as biomass of plankton community, (Summarwar, 2012) [13]. Indian researchers reported the several studies on the phytoplankton distribution with availability of light (Singh & Sharma, 2012) [4], Physical, Chemical and biological qualities (Zafar, 1967, Munawar, 1974) [7] in freshwater lakes. Generally, in Indian Lakes, phytoplankton density peaks found in post monsoon and summer (Gopal & Zutshi, 1998) [2]. Several workers studied phytoplankton diversity in the state and found *Chlorophyceae* is dominant class. In Maharashtra several researchers reported 22 to 65 species of phytoplankton from different Lake. Almost all the workers found maximum diversity of phytoplankton during winter, moderate in summer and minimum in monsoon.

Study area: This lake is situated at distance of 7.5 kms from zero miles of Nagpur city of latitude 20.8048°N and longitude 78.9577°E. The emphasis is laid here that a beautiful design of art and architecture with layout of the city during the King Bhosala was specially planned during the regime of Raghuji Raje Bhosale-2.

Materials & Methods
The present study was carried out for a period of three seasons of a year from February 2018 to January 2019. The water bodies identified for the present study are situated within the municipal boundary of Nagpur city.

Plankton collection: The phytoplankton in the surface water of lake was collected by filtering 50 liters of water through a plankton net made by nylon net of 50 µ mesh size fitted to a metallic frame. Immediately after collection of the samples the plankton were preserved in 4% formaldehyde solution.

Counting of phytoplankton: The counting of phytoplankton was done by 'direct census method' of Jhingran *et al.* (1969) [3], Trivedi, R.K. and Goel, P.K. (1986) [14], Wiley, J. and Sons (2000) [16]. A Sedgewick Rafter type plankton counting cell, divided into 100 equal squares made to hold 1 ml of the sample was used. Phytoplankton present in 10 squares in the vertical row and 10 squares in the horizontal row were counted at random, identified and expressed in nos/l. Percentage of the dominant group and the total number of all the phytoplankton was separately worked out.

Results & Discussion
A list of phytoplankton collected from the study area is

presented in Table 1. The total number of phytoplankton listed from site and varied considerably. The phytoplankton consisted of 24 taxa belonging to *Myxophyceae* (5), *Bacillariophyceae* (6), *Chlorophyceae* (11), and *Euglenophyceae* (2). The highest number of taxa was recorded at winter season,

The average phytoplankton density was recorded during 2018-2019, i.e. (362) /lit. Seasonally phytoplankton was dominant during winter season, i.e. (185.0) /lit and during summer i.e. (125.0) /lit and (52) ind/lit, least density found during monsoon season. The result was similar with others research indicating that *Chlorophyceae* as the dominant genera on water sample S. C. Chunne, P. N. Nasare (2018) [10]. *Chlorophyceae* (11)> *Bacillariophyceae* (6)> *Myxophyceae* (5)> *Euglenophyceae* (2). Similar results were reported by various researchers Khanna & Singh (2000) [4], Sakhare & Joshi (2002) [11], Shaikh *et al*. (2012) [12], Chauhan & Lanjewar (2016), Mahajan & Harney (2016) [5], Belkhode & Sitre (2016). Phytoplankton diversity of the Sonegaon lake of Nagpur city are listed below (Table-1). The density and diversity of phytoplankton was represented in following fig. 1 & 2.

Table 1: Seasonal Variations of Phytoplankton in water of Sonegaon lake during 2018-19

Year		2018 - 2019		
S. No.	**Phytoplankton**	**Sum**	**Mon**	**Win**
A) *Myxophyceae*				
1	*Microcystis*	4	2	6
2	*Spirulina*	7	3	10
3	*Nostoc*	7	2	9
4	*Anabaena*	4	1	7
5	*Oscillatoria*	6	2	10
B) *Bacillariophyceae*				
1	*Fragilaria*	2	1	5
2	*Diatoma*	7	5	12
3	*Navicula*	6	3	8
5	*Pinnularia*	3	1	4
6	*Nitzchia*	2	1	3
C) *Chlorophyceae*				
1	*Vaucheria*	3	2	5
2	*Oedogonium*	5	2	9
3	*Ulothrix*	7	2	9
4	*Volvox*	8	3	11
5	*Chlorella*	10	5	13
6	*Cladophora*	7	2	9
7	*Spirogyra*	6	2	9
8	*Closterium*	9	3	11
9	*Pandorina*	4	3	6
10	*Microspora*	4	2	7
11	*Vorticella*	7	2	9
D) *Eugknophyceae*				
1	*Phacus*	3	1	6
2	*Euglena*	4	2	7

Total phytoplankton diversity: 125 52 185

The status of phytoplankton in Sonegaon lake are as follows

Chlorophyceae (11)> *Bacillariophyceae* (6)> *Myxophyceae* (5)> *Euglenophyceae* (2)

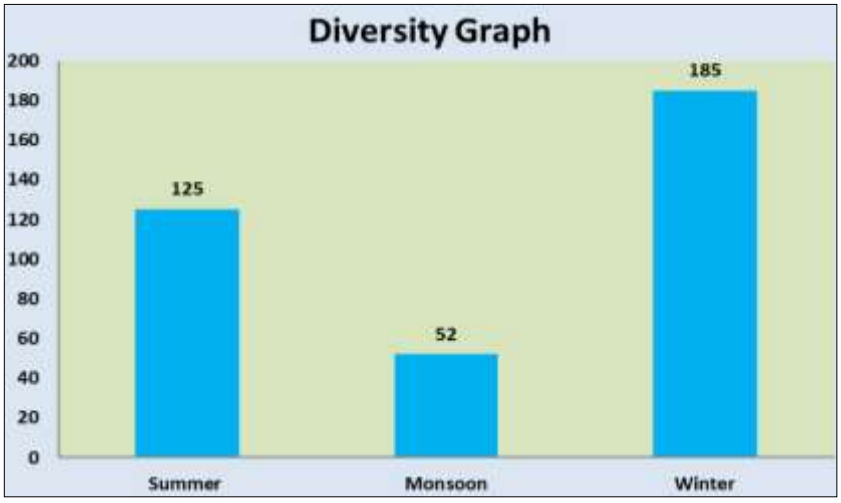

Fig 1

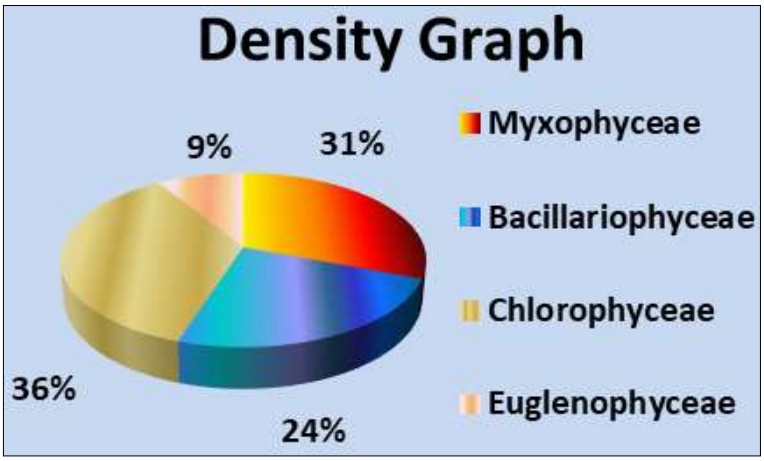

Fig 2

Conclusion

Phytoplankton communities may be used as an indicator of ecological status. In Sonegaon lake, phytoplankton community is still considered to normal status. *Chlorophyceae* is the most diverse and high abundance class because it possesses a wide range of environmental variables. Diversity index of phytoplankton varied from moderate to stable. Diversity and abundance of phytoplankton communities is essentially reflecting the resource supply into the ecosystem.

References

1. Chavhan RN, Lanjekar S. Observations and Studies on Floral Diversity in Lake Mendki, Bramhapuri, District Chandrapur, M.S. India. Gurukul International Multidisciplinary Research Interdisciplinary Research Journal. 2016; 4(5):43-46.
2. Gopal B, Zutshi DP. Fifty years of Hydrobiologia Resarch in India. Hydrobiologia. 1968; 324:267-290.
3. Jhingran VG, Natarajan AV, Banerjea SM, David A. Methodology of reservoir fisheries investigation in India. Bull. Cent. Inland Fish. Res. Inst. Barrackpore, India, 1969, 12:109.
4. Khanna DR, Singh RK. Seasonal fluctuation in the planktons of Suswa River at Raiwala, Dehradun. Journal Environment Conservation. 2000; (1):89-92.
5. Mahajan VS, Harney NV. International Journal of Scientific Research. 2016; 5(3):366-338.
6. Manual for phytoplankton sampling and analysis, 2010.
7. Munawar M. Limnological studies on fresh water ponds of Hyderabad, India, Biocenase Ibid. 1974; (45):1-32.
8. Nasare PN, Wadhve NS, Harney NV, Sitre SR. Phytoplankton diversity of Khadki Lake, Bengali Camp, Bhadrawati, District Chandrapur, M.S. India. Bioinfolet. 2009; 6(3):232-234.
9. Reid GK, Wood RD. Ecology of Inland water and estuaries D. Van Norstand Co. New York, 1976, 485.
10. Chunne SC, Nasare PN. Phytoplankton diversity of Nandgaon and Arwat lakes of Chandrapur district Maharashtra, India. IJCESR. 2018; 5(1):187-191.
11. Sakhare VB, Joshi PK. Plankton diversity in Yeldari Reservoir, Maharashtra Fishing Chimes. 2006; 25(12):23-25.
12. Shaikh PR, Bhosle AB. Plankton biodiversity of Siddheshwar Dam in Hingoli, Maharashtra, India. Journal of Environmental Research and Development. 2012; 7(2A):905-916.
13. Summarwar S. Studies on plankton diversity in Bisalpur Reservoir. International Journal of Life Sciences Biotechnology and Pharma Research. 2012; 1(4):65-72.
14. Trivedi RK, Goel PK. Chemical and Biological Methods for Water Pollution Studies, Environmental Publications, Karad, India, 1986.
15. Welling DE, Webb WB. Suspended load in gravel bed river U.K. John Wiley and sons, Chichester, U.K, 1994, 691-732.
16. Wiley J, Sons. Hydrological and Limnological Aspect of Lake monitoring, 2000, 4-5.