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RESEARCH ARTICLE **OPEN ACCESS**

Status of Phytoplankton in relation to Physico-Chemical characteristic of Siregaon lake, Dist.Gondia (Maharashtra), India.

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ABSTRACT

Limnological parameter and plankton diversity are an important criterion. Siregaon Lake has greatest importance for humankind and aquatic life. The specific status of limnological characteristic and diversity of plankton in Siregaon Lake have been studied for the period of one year 2017 – 2018. Siregaon Lake is located near to Navegaon national park, Ta.Arjuni/ mor. Distt. Gondia It is perennial lake receives water from rain. The water level remains more of less constant except the level decreases slightly in the summer season. In this lake, the Phytoplanktons are abundant. The water spread area is 18 hect. And water is used not only for the agriculture activity but also for fishery activities. In the present study, the species composition of Phytoplankton revealed total number of 43 species from two sites. Site II showed less abundance of species class Bacillariophyceae (10 Sp.), Chlorophyceae (18Sp.), Cyanophyceae (7 sp.) & Myxophyceae (8 Sp.). It was concluded that the dominant species are spirogyra, Eugleno polymorpha, Anabena and Spirulina.

Keywords: ***Abundant, Phytoplankton, Bacillariophyceae, Chlorophyceae, Cyanophyceae, Myxophyceae***

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INTRODUCTION

Biological production in any aquatic body gives direct correlation with its physico-chemical status which can be used as trophic status and fisheries resources potential [1]. Life in aquatic environment is largely governed by physico-chemical characteristics and their stability. These characteristics have enabled biota to develop many adaptations that improve sustained productivity and regulate lake metabolism. Studies on limnology of udaipur lakes have been made covering different aspect [2-5].

The distribution and variability of the principle plant nutrients in lake, largely determine the biomass and productivity of Phytoplankton. They are natural inhabitants of water and serve as the basis of food chain within the ecosystem. They are also involved in the water pollution in a number of significant ways [6]. Water is a vital resource used for various activities such as drinking, irrigation, fish production, industrial cooling, power generation and many others.[7]

The most characteristic criterion to assess the trophic structure of a lake remains to be primary productivity studies. The food chain in Lake Ecosystem is very simple comprising phytoplankton and aquatic vegetation as primary producers, zooplankton as primary consumers, small fishes as secondary consumers and large fishes as tertiary consumers. Plankton is the most sensitive floating community which is being the first target of water pollution, thus any undesirable change in aquatic ecosystem affects diversity as well as biomass of this community. The measurement of plankton's productivity helps to understand conservation ratio at various trophic level and resources as an essential input for proper management of lake. Phytoplankton and Zooplankton diversity have been made by Rao and Choubey,[8]; Deorari,[9]; Mishra et al.,[10]; and Joseph and Yamakanamardi,[11]).

Fresh water is perhaps the most vulnerable habitats and is more likely to be changed by the activities of man. This essential resource is becoming increasingly scarce in many parts of the world due to severe impairment of water quality. [12]. The increasing anthropogenic influences in recent years in and around aquatic systems and their catchment areas have contributed to a large extent to a large extent to deterioration of water quality and dwindling of water bodies leading to their accelerated eutrophication.

The planktonic study is a very useful tool for assessment of water quality in any type of water body and also contributes to understanding of the basic nature and general economy of the lake. [13] Unplanned urbanization rapid industrialization and indiscriminate use of artificial chemicals in agriculture are causing heavy varied pollution in aquatic environments leading deterioration of water quality and depletion of aquatic biota.[14] Siregaon Lake are the shallow bodies of standing waters with silght wave action and may be naturally created of manmade. Siregaon Lake was chosen for the study where several Phytoplankton species occur and fishing also carried out regularly.

For present investigation two sites were selected, viz sites. I (Agriculture site) and site II (Embankment Site). These are opposite to each other. The production of Phytoplankton is directly correlated with phosphate, silicates as well as nitrogen.[15] These three elements are essential for the bloom of Phytoplankton. The Phytoplankton and zooplankton are always inversely proportional in an aquatic environment because the zooplankton feed on the phytoplankton. Thus density of phytoplankton is directly correlated with fishery potentiality of an aquatic ecosystem. In the present study main focus has been on the species composition of phytoplankton of Siregaon Lake of Gondia District.

METHODOLOGY

For Plankton study, samples were collected from surface water, littoral region and bottom mud. For qualitative analysis, Collection of Phytoplankton samples were made by using a half meter bottling nylon net 21, mesh size 0.069 mm from two sites (I and II). Water samples were collected at seasonal interval during 2017-18, using clean 1L-polyethylene bottle for analysis of water variables in the laboratory from preselected station of the Lake. The biotic factors such as pH, free carbon dioxide, dissolved oxygen, total alkalinity and chlorides were analyzed following standard methods.[16] The samples were allowed to

settle by adding Lugol's iodine, centrifuged and the concentrate was made up to 20ml with 4% formalin for quantitative estimation of Phytoplankton.

RESULTS AND DISCUSSION

Distribution of Phytoplankton and their variation at different zones of a water body is known to be influenced by the physico – chemical parameters of water [17]. Regular sampling of water was made from the different regions of this pond. The physic – chemical parameters like pH, temperature, dissolved oxygen, free CO_2, alkalinity hardness, chlorides. TDS were recorded. Temperature varied from 27^0-35^0 maximum temperature was recorded during summer at both sizes. pH shows neutral to alkaline nature (7.0 – 8.3). Do was varied from 6.4 to 14.2 mg/L., it was maximum during summer season at both stations. Free CO_2 varied from (6.50 – 18 mg/L.) it was maximum during winter. The hardness varied from (250 – 380) mg/L and chlorides varied from (16 - 80) mg. /L control Phytoplankton diversity and density.

In the present study, the species composition of Phytoplankton revealed total number of 43 species (Table. 2) from two sites site II showed less abundance of species class Bacillariophyceae (10 Sp.) Chlorophyceae (18Sp.). Cyanophyceae (7 sp.) & Myxophyceae (8 Sp.). Blue green show dominance at site I during summer.

Table 1: Physico-Chemical Parameters from two sites of Siregaon Lake during 2017-18.

Parameter /season	Site 'I'			Site 'II'		
	Summer	**Monsoon**	**Winter**	**Summer**	**Monsoon**	**Winter**
Temp.	33 – 35^0	29 – 31^0	27 – 28^0	33 – 35^0	29 – 31^0	27 – 28^0
pH	7.5 – 8.3	7.1 – 8	7.5 – 8.2	7.5 – 8.3	7 – 8	7.4 – 8.2
DO	6.4	2.2	14.2	6.4	2.1	14.2
CO_2	6.50– 6.55	9.24	17.62	6.50	9.80	18
Alkalinity	212 – 214	120 – 125	170 – 175	212 – 214	121 – 124	170 – 175
Hardness	370 – 380	250 – 255	295	380	250-255	295
Chlorides	80 - 75	16 – 20	20 – 30	80 – 75	16 – 21	20 – 31
Nitrites	80 – 90	20 – 25	70 - 75	81 – 95	20 – 25	70 – 76
TDS	2000 – 2050	900 – 910	1420 – 1450	2100 – 2200	900 – 970	1420 - 1450

Table 2: Phytoplankton diversity and abundance

No.	Taxa	Site-I	Site-II
	I.BACILLARIOPHYCEAE		
1.	Coscinodiscus SPS	++	++
2.	R. setigera	++	++
3.	Fragillaria Capurnia	++	+
4.	Navicula gracilis	+	+
5.	Navicula radiosa	+	+
6.	Fragilaria rumpens	+	+
7.	Cymbella marathwadensis	++	++
8.	Navicula delicatula	++	+
9.	Pinnularia sp.	++	++
10.	Nitzschia sp.	++	+
	II CHLOROPHYCEAE		
11.	Ankistrodesmus falcatus	+	+
12.	Chlamydomonas conferta	++	+
13.	Chlorella congla – merata	+	+

14.	Chlorella valgoris	+	+
15.	Chladophora	+	+
16.	Closterium linneticum	+	+
17.	Cosmarium contractum	+	+
18.	Oedogonium patulum	++	++
19.	Pediastrum Duplex	+	+
20.	Pediastrum simplex	++	++
21.	Scendesmus armadas	+	+
22.	Spirogyra	++	++
23.	Zyqnema species	++	+
24.	Spirogyra	++	++
25.	Chara	++	++
26.	Asterococcus sp.	++	++
27.	Nephrocytium sp.	++	+
28.	Pleodorina sp.	++	++
III CYANOPHYEAE			
29.	Anabaena constrica	++	++
30.	Nostoc	++	++
31.	Oscillatoria tenuis	+	+
32.	Lyngbya	+	-
33.	Merismopedia minima	+	+
34.	Phormidium dimorphum	+	+
35.	Phormidium tennve spirulina	+	+
IV MYXOPHYCEAE			
36.	Microcystis sp.	+	+
37.	Anabaena sp.	++	+
38.	Oscillatoria sp.	++	++
39.	Nostoc sp	+	+
40.	Spirulina sp.	+	+
41.	Coccochlaris sp.	++	++
42.	Gomphosphaeria sp.	++	+
43.	Agmenellum sp.	+	+

+ + More abundant
+ Abudant
- Rare

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