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ORIGINAL ARTICLE

Study of Algal diversity under changing environment of Narsapur Lake

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ABSTRACT

Present study is about the diversity and the seasonal variation of algal forms of Narsapur Lake. The lake is located in Siddipet town in Telangana state. The investigation was carried out for a period of two years (February 2015 to January 2017). In order to identify the algal groups, samples were collected in monthly intervals. The identified algal forms belonged to two groups-i.e. Chlorophyceae and Cyanophyceae. Chlorophycean members were observed throughout the study period but dense growth was observed during winter season. Cyanophycean members were found to be abundant during summer season. During the present study algal blooms were identified. Lake water showed Eutrophication due to natural and anthropogenic activities. The situation is alarming therefore immediate action is required for lake existence.
Key words: *Algae, Cyanophyceae. Chlorophyceae, Lake water, Narsapur lake*

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INTRODUCTION

Water is an essential entity of life. Fresh water is limited source. Lakes are part of lentic ecosystem. Thousands of people are depending on lakes for life. [1]. Lakes are categorized on the basis of nutrient levels. Oligotrophic lakes are nutrient poor lakes. Mesotrophic lakes have an average level of nutrients and Eutrophic lakes are rich in nutrients [2]. Water quality is directly linked with human health [3]. Population explosion is increasing pressure on water bodies. [4], [5].
Water pollution is a common problem, It is due to discharge of emissions from industrial, domestic and agricultural sectors[6] Direct discharge of effluents in to lake leads to the degradation of water quality [7]. In an ecosystem, analysis of biotic factor is useful to measure the state of particular ecosystem [8]. Most of phytoplankton is microscopic. Periodicity of various taxonomic groups in fresh water ponds of Hyderabad showed variation in relation with the physico- chemical parameters of the Eco system [9]. Cyanophycean diversity has been extensively studied throughout India [10]. Some algal members can be used as bio indicators. [11] [12] [13][14]. Eutrophication leads to formation of algal blooms [15]. Sewage favors the growth of Chlorophyceae [16].
Biodiversity of algae from various lakes has been studied extensively in India. Studies respect to algal biodiversity of Narsapur Lake was not reported earlier. Organic matter enriched water are favorable for Cyanophycean members [17]. Green algae can be used as indicators of highly polluted water. [18]. Study of algal biodiversity is a useful tool as it provides the information about pollution levels of the lake.

OBJECTIVES

➢ Identification of Cyanophyceae members in lake
➢ Identification of Chlorophyceae members in lake
➢ To study the seasonal variation of algae growth in the lakes.
➢ To estimate the pollution levels of the lake.

MATERIALS AND METHODS

Photograph: Narsapur Lake

Study area: Narsapur Lake is situated in city at longitude of 780.511E and latitude of 180.051N. The total catchment area of lake is 144.36 sq.kms. It is a seasonal rainfall dependent watershed. Siddipet is the districts headquarter of Siddipet district of Telangana State with a Population of 113,893 (Census 2011). It is situated in tropical zone which exhibits three seasons. Lake is currently used to dispose sewage.

A total of three sampling stations were identified. The Sampling station I is the location of Sluice, The Sampling station II is the East side location and the Sampling station III is the location of Mattadi in Narsapur Lake. A liter of water samples were collected for phytoplankton study in clean plastic cans at monthly intervals for a period of two years i.e., from February, 2015 to January, 2017. To get uniform quality of water, samples were collected at each location and a mixed water sample prepared and used for analysis. Samples were kept undisturbed after adding 2-3 drops of lugal's solution or 4% Formaldehyde for about 4 weeks for complete settling of the organisms. Finally the samples were concentrated to 100ml.The concentrated material was used for phytoplankton identification. All the preserved samples were examined under research microscope and further identified with the help of standard literature on algae [19][20][21].

Phytoplankton analysis: The qualitative enumeration of the phytoplankton was carried out with the help of a Sedgwick Rafter counting cell. 1ml of concentrated sample was taken in to the Sedgwick Rafter counting cell. Numerical counts of all members of phytoplankton were made using the Whipple micrometer. The organisms thus counted were expressed as units/milliliter (units/ml) of the sample.

RESULTS AND DISCUSSION

 In the present investigation algal taxa belonging two groups i.e. Chlorophyceae and Cyanophyceae were identified. It was observed that chlorophycean members grow well throughout the study period.

Cyanophyceae: Cyanophyceae is the dominant group of algal members in summer season [22]. In the present study 6 genera of Cyanophyceae algae were recorded in Narsapur Lake. *Spirulina sp.,Oscillatoria* sp. and *Anabaena* sp. were found to be dominant. *Spirulina* sp. with spiral filament were observed in lake water. *Oscillatoria* forms long filaments of cells with oscillation in its movement. *Anabaena* is identified based on the presence of uniform trichomes and intercalary heterocyst. Other blue green algae recorded in Narsapur Lake were *Nostoc* sp, *Rivularia* sp. and *Microcystis* sp. Temperature has been found to play a very important role in periodicity of this group, as emphasized by many workers [23][24].

Chlorophyceae: The chlorophyceae is a group of algae having their photosynthetic pigments chlorophyll – a, carotene and xanthophyll. 13 genera of chlorophyceae class were recorded throughout the study period in Narsapur Lake. The high frequencies of algae of chlorophyceae class were   recorded minimum units during monsoon season and maximum units were recorded during winter season. Temperature has been found to play an important role in periodicity of this group [25]. The fall in phytoplankton density during rainy season appears to be caused by increase in water volume.

A total of 19 Algal forms were recorded in the Lake during study period. Out of these thirteen belonged to Chlorophyceae (Green algae) and six belonged to Cyanophyceae (Blue green algae). Total phytoplankton count per ml of lake water at different sampling locations. Highest algal density was observed at sampling station-I. Variation in the phytoplankton count may be due the dilution of

lake water due to discharge of water from surrounding area. Algal species belonging to the group Cyanophyceae were observed to be dominant among the phytoplankton community in Narsapur Lake. The frequency of Cyanophyceae was high in summer season where as low in monsoon season. The frequency of Chlorophyceae was high in winter season where as low in summer season.

Algal indicators of water quality: *Oscillatoria* and *Microcystis sp.* is well known indicators of eutrophic lake water. This species were dominated the Narsapur lake water phytoplankton. *Spirulina* sp. was also recorded from highly eutrophic lakes in India [26]. *Oscillatoria* and *Microcystis* are also excellent indicators of eutrophic lakes with high levels of total dissolved solids. The green algae sp. viz. *Anabaena*, *Ankistrodesmus* sp. and *Closterium* sp. are also the indicators of marginal organic pollution in water bodies.

List of algal forms collected from Narsapur lake and population of algal forms is shown in Table:I. Microphotographs of the algal genera identified is shown in Fig-I,

Table : I Population of algal forms recorded from Narsapur Lake

| Algal Group	Algal forms	Algae counting (units/ml)		
		Site-I	Site-II	Site-III
Chlorophyceae	Ankistrodesmus Sp.	54	43	-
	Chlamydomonas sp.	32	48	23
	Closterium sp.	286	124	246
	Cosmarium sp.	24	-	-
	Gonium sp.	-	12	-
	Hydrodictyon sp	34	26	14
	Oocystis sp	-	-	8
	Pyrobotrys sp.	-	-	18
	Scenedesmus sp	56	68	2
	Spirogyra sp.	24	108	66
	Tetraspora sp.	-	-	21
	Volvox Sp.,	12	-	-
	Zygnema sp,	-	-	20
Cyanophyceae	Anabeana sp.	428	123	42
	Microcystis sp.	268	23	-
	Nostoc sp.	43	-	-
	Oscillatoriasp.	238	258	158
	Rivularia. Sp.	22	-	11
	Spirulina sp.	658	34	438
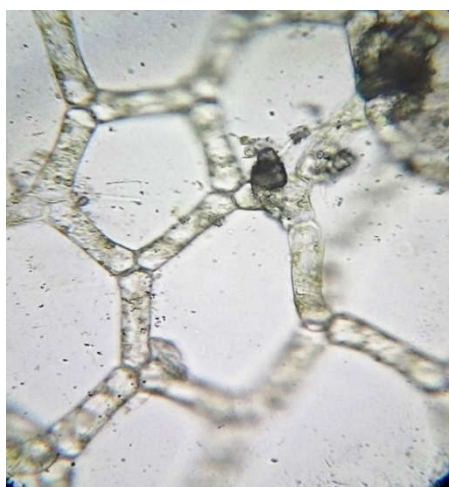
Hydrodictyon sp.
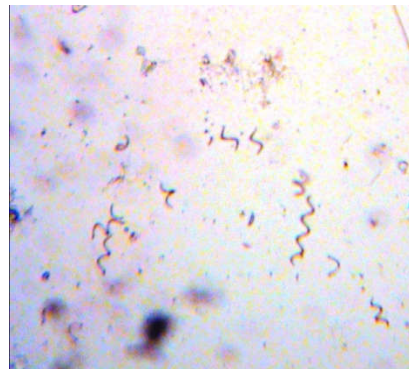

Spirogyra sp.
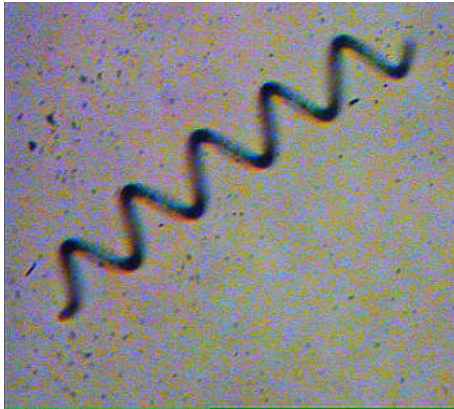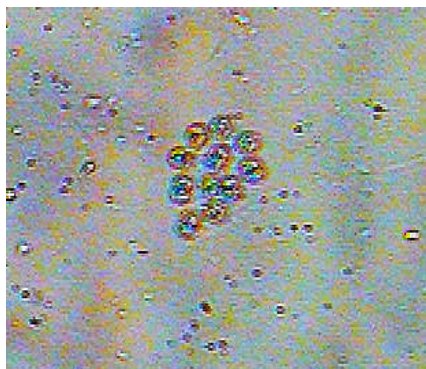
Arthrospira sp.
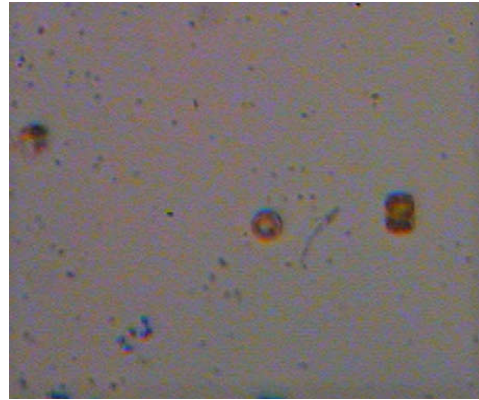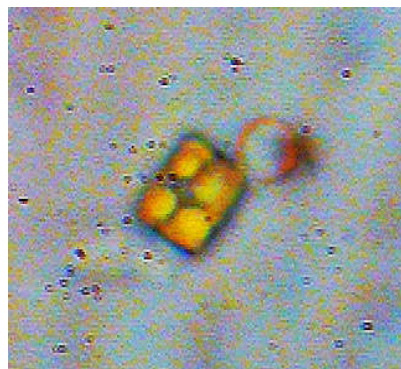

Cosmarium sp.
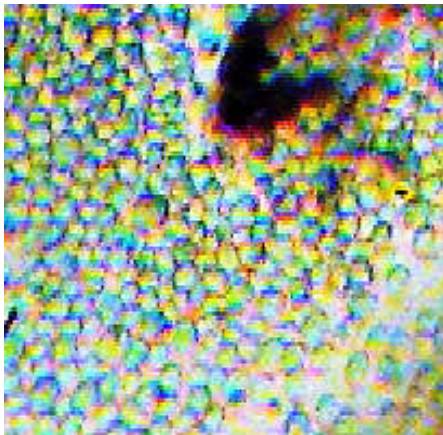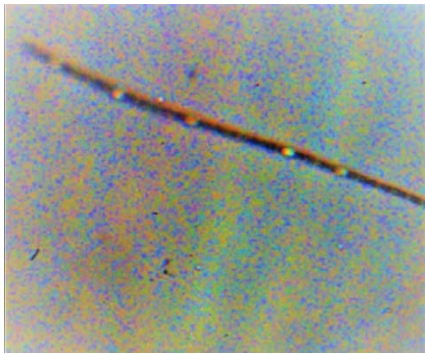

Microcystis sp
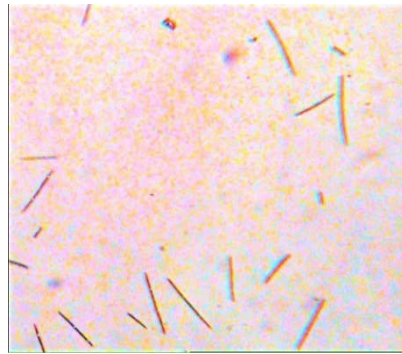

Oscillatoria sp.

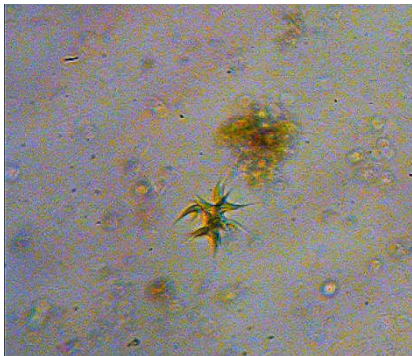*Chlamydomonas sp.*

Spirulina sp
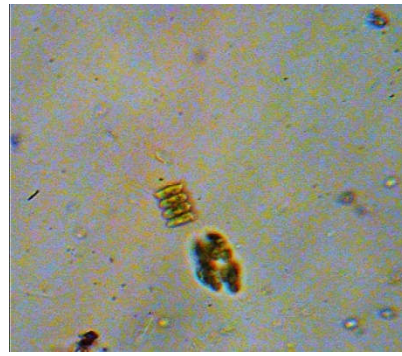

Gonium sp.

Tetraspora sp.

Anabaena sp.

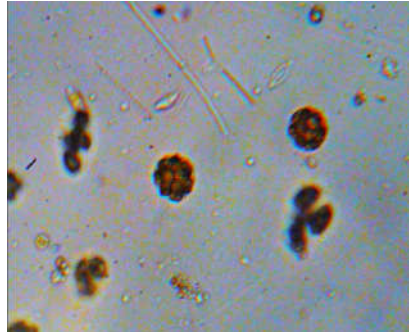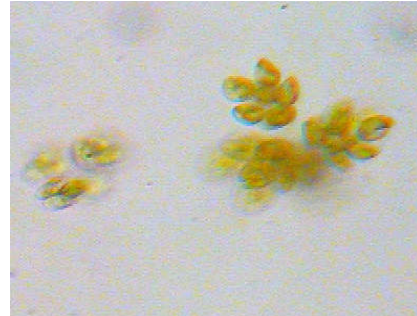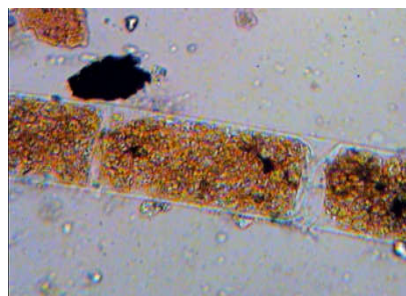*Anabaena sp.*

Ankistrodesmus sp.

Scenedesmus sp

Pyrobotrys sp.

Oocystis sp

Zygnema sp.

Closterium acerosum

CONCLUSION

Algal analysis in studied lake showed seasonal changes throughout the study period. Lake water analysis revealed that frequency and density of Cyanophycean members are high in summer season. The presence of some algae in high density indicates that the Lake water was polluted and the quality

of water was no longer good to support life. The present study of lake water showed Eutrophication due to activities such dumping of sewage directly into lake. The condition is alarming therefore immediate action is required for lake existence. So there is an urgent need to protect this lake.

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