DIVERSITY OF PHYTOPLANKTONS AND PHYSICO-CHEMICAL PARAMETERS OF BYADARAHALLI LAKE OF MANDYA DISTRICT, KARNATAKA

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Abstract : Phytoplanktons are microscopic and free floating which plays an important role in aquatic ecosystem. They are highly sensitive to environmental conditions. And also act as bio-indicators of pollution and plays role in food chain of Zooplanktons and fishes. The present study was carried out in Byadarahalli lake of Siddapura, Srirangapatna taluk, Mandya District. Water sample was collected during April to June, 2022 at different sites from the same lake. Collected water sample was further analysed for phytoplankton distribution and physico-chemical parameters. Totally 98 species of phytoplanktons were recorded. Among them Bacillariophyceae (44) was dominant followed by Chlorophyceae (22), Cyanophyceae (14), Zygnematophyceae (12), Euglenophyceae (2), Tubulinea (2), Fragilariophycae (1), Coscinodiscophyceae (1). Some of the toxic algae like *Microcystis* Sp., *Planktothrix* Sp. and *Phormidium* Sp. are also present.

***Index Terms* :** Diversity, Phytoplanktons, Byadarahalli Lake, Physico-chemical parameters.

INTRODUCTION

Phytoplankstons are **microscopic algae.** The word phytoplanks which is derived from **Greek** words "**phyto"** means "**plants"** and "**plankton"** means "**wanderer** or **drifter".** Phytoplanktons can be defined as **Autotropic** or **producers** components that they form **foundation of most food webs.** Some of the phytoplanktons are similar to terrestrial plants and they also contain chlorophyll and they require sun light to their growth. They are single-celled, and they are normally microscopic. They also include various factors which can affect or induce the growth and development of phytoplanktons (Anyanwu, E.D., *et al* 2021).

Figure 01 : Byadarahalli Lake.

Growth of the phytoplanktons can be influenced by physical and chemical factors. Based on various factors which can varies in response to nutrient availability, temperature, light intensity other factors such as **lentic and lotic communities** (Ramlee *et al.*, 2022).

MATERIALS AND METHODS : STUDY OF DIVERSITY OF PHYTOPLANKONS

A. **STUDY AREA :** The present area **Siddapura village** located in **Srirangapatna Taluk**, Mandya District Lake is **situated in Siddapura**. Siddapura is a village in the southern state of karnataka. In India total Geographical area of village is **1714.29 Hectares**. The Lake of study area around **7 Hectares**, and **30 feet depth**. Latitude : 27.2046˚ N, Longitude : 77.4977˚ E. Water holding capacity almost dry up, in summer but get filled in monsoon. Soil present in the **lake is Loamy soil**.

B. **WATER SAMPLE :** Water samples were collected every month between **April 15th to June 15th**. Samples are collected in six different spots on same lake and transferred into plastic bottles and taken into laboratory for identification and analysis. **Physico-chemical parameters** are determined in laboratory. Collected water sample upto 100ml through container for further chemical study (Anyanwu *et al*., 2021). By using Six different sampling points they were mixed together and this samples were brought to the laboratory for analysis of chemical parameters (Babu *et al*., 2013).

Analysis of physical and chemical parameters was carried out using the method proposed by **hulyal *et al*., 2009**.

- Colour : **Dark greenish**.
- Odour : **fishy**.
- **Water temperature** at each sampling point was recorded on the spot using centigrade thermometer.
- The **hydrogen ion concentration (P^H)** of lake water sample was measured using **p^H meter** or **stripes**.
- **Carbon dioxide (CO_2)** of lake water sample was estimated by titarting the water sample with 0.041 N Sodium hydroxide by using phenolphthalein indicator.
- **Total alkalinity** of lake water sample was estimated by titrating sample with 0.02 N sulphuric acid by using phenolphthalein and methyl orange as indicator.
- **Chloride** of lake water sample was estimated by Argentometric method, sample was titrated with 0.028 N Silver Nitrate and using potassium chromate as a indicator.
- **Total Hardness** of lake water sample was titarting against with EDTA (0.01 N) and by using Eriochrome Black – T as a indicator. And the all results are expressed in mg/L (**hulyal *et al*., 2008**).

The present inventory work was carried out in **,** for the period of 3 months during **April 15 to June 15.** A total genera are includes species were recorded belonging to **8 different classes**, namely Bacillariophyceae, followed by Chlorophyceae, Cyanophyceae, Zygnematophyceae, Euglenoideaceae, Tubulinea member, Fragilariaceae and Coscinodiscophyceae, **27 Families** are given in **Table 01**. Out of **98 species** maximum number of species which are belongs to **Bacillariophyceae (44)**, followed by **Chlorophyceae (22)**, **Cyanophyceae (14)**, **Zygnematophyceae (12)**, **Euglenaceae (2)**, **Tabellariaceae (2)**, **Fragilariaceae (1)** and **Coscinodiscophyceae (1)** species are recorded.

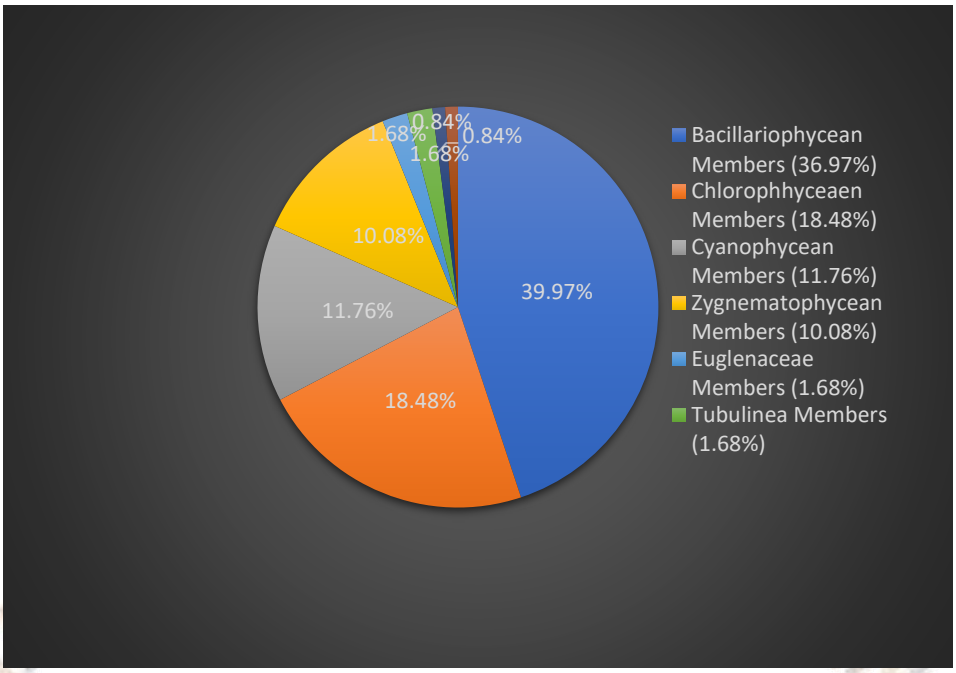

Figure 02 : Percentage of Phytoplanktons

Table 01 : Scientific Classification of Identified Plankton [Followed by, F. E. Fritsch Classification]

Sl.No	Class	Order	Family	Scientific Name
01	Bacillariophyceae	Naviculales	Naviculaceae	*Navicula clavata*
02				*Navicula* Sp.
03				*Navicula* Sp.
04				*Navicula* Sp.
05				*Navicula* Sp.
06				*Navicula* Sp.
07				*Navicula* Sp.
08				*Navicula* Sp.
09				*Navicula* Sp.
10				*Navicula subtilissima*
11		Fragilariales	Fragilariaceae	*Fragilaria* Sp.
12				*Fragilaria* Sp.
13				*Fragilaria* Sp.
14				*Fragilaria* Sp.
15				*Fragilaria* Sp.
16				*Fragilaria* Sp.
17		Pennales	Naviculoideae	*Pinnularia* Sp.
18		Cymbellales	Cymbellaceae	*Cymbella* Sp.
19				*Cymbella* Sp.
20				*Cymbella* Sp.
21				*Cymbella* Sp.
22				*Cymbella* Sp.
23				*Nitzchia* Sp.

24	**Bacillariophyceae**	Bacillariales	Bacillariaceae	*Nitzchia* Sp.
25				*Nitzchia* Sp.
26				*Nitzchia* Sp.
27				*Nitzchia* Sp.
28				*Nitzchia* Sp.
29		Fragilariales	Fragilariaceae	*Synedra* pinnate diatom Sp.
30				*Synedra* pinnate diatom Sp.
31				*Synedra* pinnate diatom Sp.
32				*Synedra* pinnate diatom Sp.
33				*Synedra* pinnate diatom Sp.
34		Rhopalodiales	Rhopalodiaceae	*Rhopalodia gibba*
35				*Rhopalodia* Sp.
36		Rhopalodiales	Rhopalodiaceae	*Rhopalodia* Sp.
37				*Rhopalodia* Sp.
38				*Rhopalodia* Sp.
39				*Rhopalodia* Sp.
40				*Rhopalodia* Sp.
41				*Rhopalodia* Sp.
42		Naviculales	Pleurosigmataceae	*Pleurosigma* Sp.
43			Amphipleuraceae	*Amphipleura pelludica*
44		Melosirales	Melosiraceae	*Melosira* Sp.
45		Sphaeropleales	Hydrodityaceae	*Pediastrum tetras*
46			Scenedesmaceae	*Scenedesmus acuminatus*
47				*Scendesmus acunae*
48				*Scendesmus ornatus*

49	**Chlorophyceae**	Chlamydomonadales	Volvocaceae	*Pondorina* Sp.
50				*Pondorina* Sp.
51		Chaetophorales	Chaetophoraraceae	*Pleurococcus alchentron*
52		Chlamydomonadales	Haematococcaceae	*Haematococcus pluvialis*
53		Chlorellales	Chloroellaceae	*Chlorella* Sp.
54				*Chlorella vulgaris*
55		Sphaeropleales	Neochloridaceae	*Golenkinia* Sp.
56		Conjugales	Desmidiaceae	*Closterium lunula*
57	**Chlorophyceae**			*Closterium leibleinii*
58		Zygnematales	Zygnemataceae	*Spirogyra ellipsospora*
59		Sphaeropleales	Selenastraceae	*Kirchneriella* Sp.
60		Chlamydomonadales	Scenedesmaceae	*Coelstraum pseudomicroporum*
61			Volvocaceae	*Volvox* Sp.
62			Tetrasporaceae	*Tetraspora* Sp.
63		Sphaeropleales	Selenastraceae	*Monoraphidium arcuuatum*
64				*Monoraphidium griffithi*
65				*Monoraphidium minutum*
66				*Ankistrodesmus falcatus*
67	**Cyanophyceae**	Oscillatoriales	Oscillatoriaceae	*Oscilltoria meslinii*
68				*Oscilltoria juergensii*
69		Chrococcales	Chrococcaceae	*Microcystis aeruginosa*
70				*Microcystis* Sp.
71				*Microcystis* Sp.
72				*Microcystis* Sp.
73		Synechococcales	Merismopediaceae	*Merismopedia* Sp.

74	**Cyanophyceae**	Chrococcales	Chrococcaceae	*Chrococcus prescotti*
75		Spirulinales	Spirulinaceae	*Spirulina* Sp.
76				*Spirulina* Sp.
77		Oscillatoriales	Microcoleaceae	*Arthrospria* Sp.
78				*Planktothrix rubescens*
79		Nostocales	Nostocaceae	*Anabaena* Sp.
80		Oscillatoriales	Oscillatoriaceae	*Phormidium* Sp.
81	**Zygnematophyceae**	Desmidiales	Desmidiaceae	*Cosmarium* Sp.
82				*Cosmarium trachypleurum*
83				*Cosmarium obsoletum*
84				*Cosmarium* Sp.
85				*Cosmarium botrytis*
86		Zygnematales	Zygnemataceace	*Zygnema* Sp.
87				*Mougeotia* Sp.
88				*Mougeotia* Sp.
89				*Mougeotia* Sp.
90		Desmidiales	Desmidiaceae	*Pleurotaenium trabecula*
91				*Desmidium bengalicum*
92				*Spondylossium* Sp.
93	**Euglenoidea**	Euglenodiales	Euglenaceae	*Euglena* Sp.
94				*Euglena* Sp.
95	**Tubulinea**	Arcellida	Arcellidae	*Arcella vulgaris*
96				*Arcella* Sp.
97	**Fragilariophyceae**	Tabellariales	Tubulinea	*Tabellaria diatom gridle – view*
98	**Coscinodiscophyce**	Thalassiosirales	Thalassiosiraceae	*Thalassiosira eccentrica*

Analysis of Physico – Chemical Parameters in the Byadarahalli Lake Water Sample

The sample was collected during summer season (April 15, 2022) and at all the sampling sites the water sample was collected for chemical parameters. Physical parameters are test at sampling sites. All Parameters mean values of the data was calculated as shown in the table 02.

Table 02 : Different analytical water quality parameters with their analytical technique.

SI. No	Parameters	Technique Used	Inference
A. Physical Parameters			
1.	Temperature	Thermometer	29˚C - 33˚C.
2.	Colour	Visual	Greenish dark.
3.	Odour	Physiological sense	Fishy odour.
B. Chemical Parameters			
1.	P^H	P^H Stripes	10 (alkaline water)
2.	Chloride	Argentometric titration	7.59 mg/L.
3.	Carbon dioxide	Titration	180.4 mg/L.
4.	Total hardness	Complexometeric titartion	154.6 mg/L.
5.	Alkalinity	Acid – Base titration	7.74 mg /L.

SUMMARY : **Phytoplanktons** is one of the important components of aquatic ecosystem. Phytoplanktons are primary food for other aquatic micro – organisms which depends food and other nutrients for their survival. Which they contain chlorophyll contains and they require sunlight for order to live and grow. Most of the phytoplanktons are buoyant due to presence of flagella which can floats on the surface of the water. Common phytoplanktons include **Bacillariophyceae**, followed by **Chlorophyceae**, **Cyanophyceae**, **Zygnematophyceae**, **Euglenaceae**, **Tubulinea member**, **Fragilariaceae** and **Coscinodiscophyceae**. Phytoplanktons uses **sunlight**, **nutrients**, **carbon – dioxide** and water in order to **produce oxygen** and **nutrients** for other organisms. The lake is located in the human dominating areas are facing a threat due to various factors like **anthropogeinc activities**, which leads to loss of diversity of planktons diversity, and also loss of aquatic biodiversity. In this present study area due to high temperature and less rainfall as well as also high in anthropogenic activities which leads to high diversity of phytoplanktons. We conducted field survey of the totally **98 species**, recorded in study area belonging to **8 classes**, and **27 families**. In this study area rich in species diversity and also tested physico-chemical parameters in lake water. The aim to conduct this study for knowing the species diversity and to check the water quality in the lake water. By detecting the data of this lake we come to know the water quality and which helps to create the awareness to society about the lake water not to pollute and not to use for human activities and to feed for domestic animals. Some of the phytoplanktons which are not harmful to other organisms, but ***Microcystis*** **Sp.** containing toxic elements which can destroy the other organisms, birds, domestic animals, humans and also zooplanktons. Like this we can create the awareness to governament as well as local people like disease which can be infections, respiratory disease, and throught infections etc., so that not to drink and use this lake water.

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