



DIVERSITY OF PHYTOPLANKTON IN RANI LAKE, IDAR, GUJARAT

Nupur A. Vijayanshi¹, Umerfaruq M. Qureshimatva² and Hitesh solanki³

¹Department of Botany, Bioinformatics and Climate Change Impact Management, University School of Science, Gujarat University, Ahmadabad.

²Department of Botany, Bioinformatics and Climate Change Impact Management, University School of Science, Gujarat University, Ahmadabad.

³Department of Botany, Bioinformatics and Climate Change Impact Management, University School of Science, Gujarat University, Ahmadabad.

Email id: ufmqureshi@yahoo.in

ABSTRACT

Phytoplankton are accumulations of diverse microscopic algal forms whose movement is more or less dependent upon water currents. To know the nature of species composition of phytoplankton and their significance, the present observations were made in the Rani Lake, Idar. The study revealed the occurrence of 65 species belong to 45 genera. Phytoplankton represented by class members of Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae. The algal flora of polluted water bodies showed the dominance of green algae.

Keywords: Phytoplankton, diversity, Rani lake, Idar

INTRODUCTION

Phytoplankton is the basis of trophic chain and the most important biological community in any aquatic system (Monbet, 1992; Sin et al., 1999). Phytoplankton act as primary producers and represent themselves as a direct food source for other aquatic animals. The community composition of phytoplankton is largely influenced by the interaction of several physico-chemical factors. Physico-chemical factors like pH, DO, alkalinity and the dissolved nutrients affect the phytoplanktonic production. Plankton diversity quickly responds to change in the environment of aquatic system, particularly in relation to nutrients. The plankton communities in terms of tolerance, abundance, diversity and dominance in the habitat. Plankton population observation may be used as a reliable tool for biomonitoring studies to measure the pollution status of water (Mathivanan and Jayakumar, 1995). Several phytoplanktonic species have served as bioindicators (Vareethiah and Haniffa, 1998; Bianchi et al. 2003). Phytoplankton are the diagnostic tools in assessing water quality and hydrological status as suggested (Nwankwo, 2004). Phytoplankton fluctuation and diversity are widely used as biological determinates of water quality in freshwater. From phytoplankton density and species composition in tropical lakes, the annual cycle and biological distinctiveness can be established (Palmer, 1977; Shubert, 1984). Variation in phytoplankton community composition depends on the availability of nutrients, temperature, light intensity and on other limnological factors. Phytoplankton follows a recognizable annual cycle of growth, but sometimes the synchrony in their normal annual cycle is disrupted by explosive growth of some species (Vaulot, 2001). Diversity, distribution, and variation in the biotic parameters provide a good indication of energy turnover in aquatic environments (Forsberg, 1982). Phytoplankton sensitivity and fluctuation in species composition are usually a suitable explanation to determine the alteration within an ecosystem. Species diversity responds to changes in environmental gradients and may characterize many interactions that can establish the intricate pattern of community structure (Devassy and Goss, 1988).

MATERIALS AND METHODS

Idar

Idar is a town in Sabarkantha district, Gujarat, India. Idar is located at 23°50'N 73°00'E / 23.83°N 73.0°E on average elevation of 195 m. Idar is at the southern end of the Aravalli hills.

Town is recognized for the production of handmade wooden toys, tiles, its temples and various beautiful architectural monuments on hill. Idar is home to the very scenic and attractive mountains with round shaped grey or red granite rocks. Rani Talav lake has an area of 94 acres and a depth of 17 feet. Its supply water throughout the year for irrigation. The east side of the lake is stacked with masonry steps. In the centre of the lake The Pavapuri Jain temple is built recently. The pavapuri temple is built among the Rani Talav, around 72 feet high, 72 feet long and is built on 72 pillars.



Figure 1: Satellite image of Idar showing study area Rani Lake.

This phytoplankton study was conducted during December 2017 to March 2018. For phytoplankton studies, samples were collected in 1 liter labeled plastic containers by filtering 50 L of water, using a phytoplankton net (20 µm) and immediately preserved with 4% formalin and fixed with 4% formaldehyde for analysis. Enumerations were carried out using an Olympus CH-2 light microscope (10×, 20× or 40×). The planktons were identified through the available literature such as 'The Fresh Water Algae' by Priscott; 'Fresh Water Diatoms of Maharashtra' by

P. T. Sarode (1984); 'Marine & Freshwater Plankton' by Davis (1966) and 'Identification of the most common Freshwater Algae' by Janse Van Vuuren (2005). Identification at species level was attempted and detailed information on phytoplankton.

RESULTS AND DISCUSSION

The phytoplankton diversity in Rani lake was represented by members of Cyanophyceae, Bacillariophyceae, Chlorophyceae and Euglenophyceae shown in Table 1. Phytoplankton identified at Rani lake comprised a total of 65 species belong to 45 genera. Chlorophyceae formed the most dominant taxa and contributed 30 species followed by Bacillariophyceae, 22 species, Cyanophyceae 8 species and Euglenophyceae 6 species. The percentage distribution of Phytoplankton communities in the Rani lake by divisions was as follows: Chlorophyta (46%), Bacillariophyceae (33%), Cyanophyta (12%) and Euglenophyta (9%).

Table 1: Taxonomic composition of phytoplankton

Phytoplankton of the Rani lake, Idar, Sabarkantha			
Sr. No.	Class	Genus	Family
1		<i>Anabaenaspp.</i>	Nostocaceae
2		<i>Lyngbyaspp.</i>	Oscillatoriaceae
3		<i>Merismopediaspp.</i>	Merismopediaceae
4		<i>Oscillatoria curviceps</i>	Oscillatoriaceae



5	Cyanophyceae	<i>Oscillatorialimosa</i>	Oscillatoriaceae
6		<i>Oscillatoriaprinceps</i>	Oscillatoriaceae
7		<i>Scytonemaspp.</i>	Scytonematacae
8		<i>Spirulinaspp.</i>	Spirulinaceae
9		<i>Achnantheidium spp.</i>	Achnanthidiaceae
10		<i>Aulacosierathwaites</i>	Aulacoseriaceae
11		<i>Craticulacuspadata</i>	Stauroneidaceae
12		<i>Cymbella cistula</i>	Cymbellaceae
13		<i>Cymbella tumida</i>	Cymbellaceae
14		<i>Diatomaspp.</i>	Fragilariaceae
15		<i>Fragialariaspp.</i>	Fragilariaceae
16		<i>Gleotaenum crotonensis</i>	Gleotaenaceae
17		<i>Gomphonema gracile</i>	Gomphonemataceae
18		<i>Gomphonema truncatum</i>	Gomphonemataceae
19		<i>Gomphonema turris</i>	Gomphonemataceae
20		<i>Gyrosigaspp.</i>	Pleurosigmataceae
21		<i>Naviculacryptocephala</i>	Naviculaceae
22		<i>Naviculaspp</i>	Naviculaceae
23	Bacillariophyceae	<i>Nitzschiafiliformis</i>	Bacillariaceae
24		<i>Nitzschiasigmoidea</i>	Bacillariaceae
25		<i>Nitzschialineariss</i>	Bacillariaceae
26		<i>Pinnulariaspp.</i>	Pinnulariaceae
27		<i>Pleurosigmaspp.</i>	Pleurosigmataceae
28		<i>Stauronesisanceps</i>	Stauroneidaceae
29		<i>Stauronesisphoenicenteron</i>	Stauroneidaceae
30		<i>Actinotaeniummexiguum</i>	Conjugatophyceae
31		<i>Ankistrodesmusfalcatiss</i>	Selenastraceae
32	Chlorophyceae	<i>Ankistrodesmusfusiformis</i>	Selenastraceae
33		<i>Ankistrodesmusspiralis</i>	Selenastraceae
34		<i>Charaspp.</i>	Characeae
35		<i>Choleochaetespp.</i>	Coleochaetaceae
36		<i>Coelastrumastroideum</i>	Scendesmaceae
37		<i>Coelastrumreticulatum</i>	Scendesmaceae
38		<i>Cosmeriumquadrum</i>	Desmidiaceae
39		<i>Cosmeriumrectangulare</i>	Desmidiaceae
40		<i>Cosmeriumochthodes</i>	Desmidiaceae
41		<i>Elakatothrixspp.</i>	Elakatotrichaceae
42		<i>Hydrodictyonspp.</i>	Hydrodictyaceae
43		<i>Monoraphidium spp.</i>	Selenastraceae
44		<i>Nitellatenuissima</i>	Characeae
45		<i>Oocystis spp</i>	Oocystaceae
46		<i>Pandorinaspp</i>	Volvocaceae
47		<i>Pediastrumangulosum</i>	Hydrodictyaceae
48		<i>Pediastrumtetras</i>	Hydrodictyaceae
49		<i>Pediastrumwillei</i>	Hydrodictyaceae
50		<i>Scendesmusarcuatus</i>	Scendesmaceae
51		<i>Scendesmusellipticus</i>	Scendesmaceae
52		<i>Scendesmusquadricauda</i>	Scendesmaceae
53		<i>Selenastrumbibraianum</i>	Selenastraceae
54		<i>Spirogyra majuscula</i>	Zygnemataceae
55		<i>Staurastrumspp</i>	Desmidiaceae
56		<i>Stegicolonium spp</i>	Chaetophoraceae
57		<i>Tetradesmusacuminatus</i>	Scendesmaceae
58		<i>Ulothrixmoniliformis</i>	Ulothrichaceae
59		<i>Zygnemaspp</i>	Zygnemataceae
60		<i>Euglinadeses</i>	Euglenaceae

61	Euglenophyceae	<i>Euglinasociabilis</i>	Euglenaceae
62		<i>Lepocinclisfusiformis</i>	Euglenaceae
63		<i>Monomorphinapyrum</i>	Euglenaceae
64		<i>Phacuscurvicauda</i>	Euglenaceae
65		<i>Phacuspleuronecetes</i>	Euglenaceae

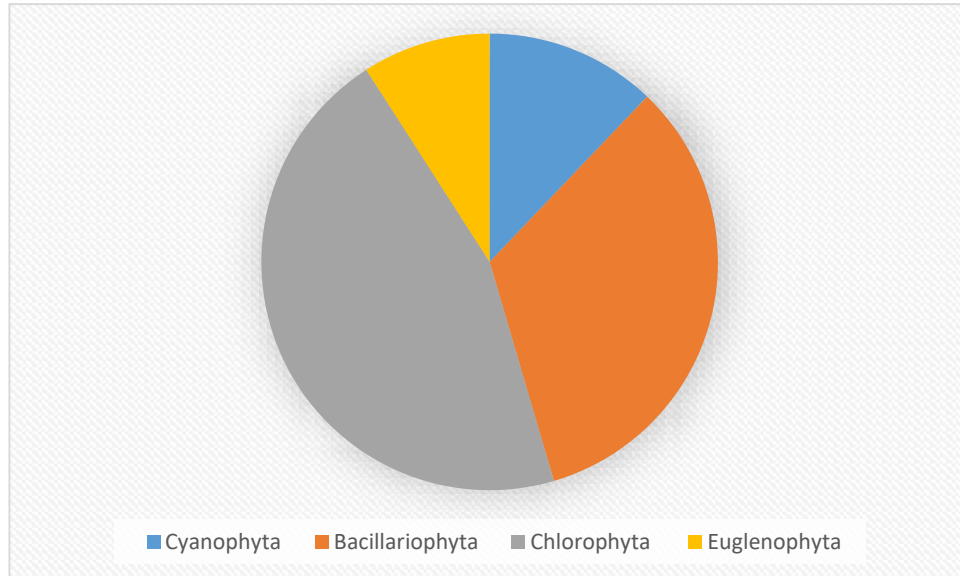


Figure 2: Distribution of phytoplankton in Rani lake.

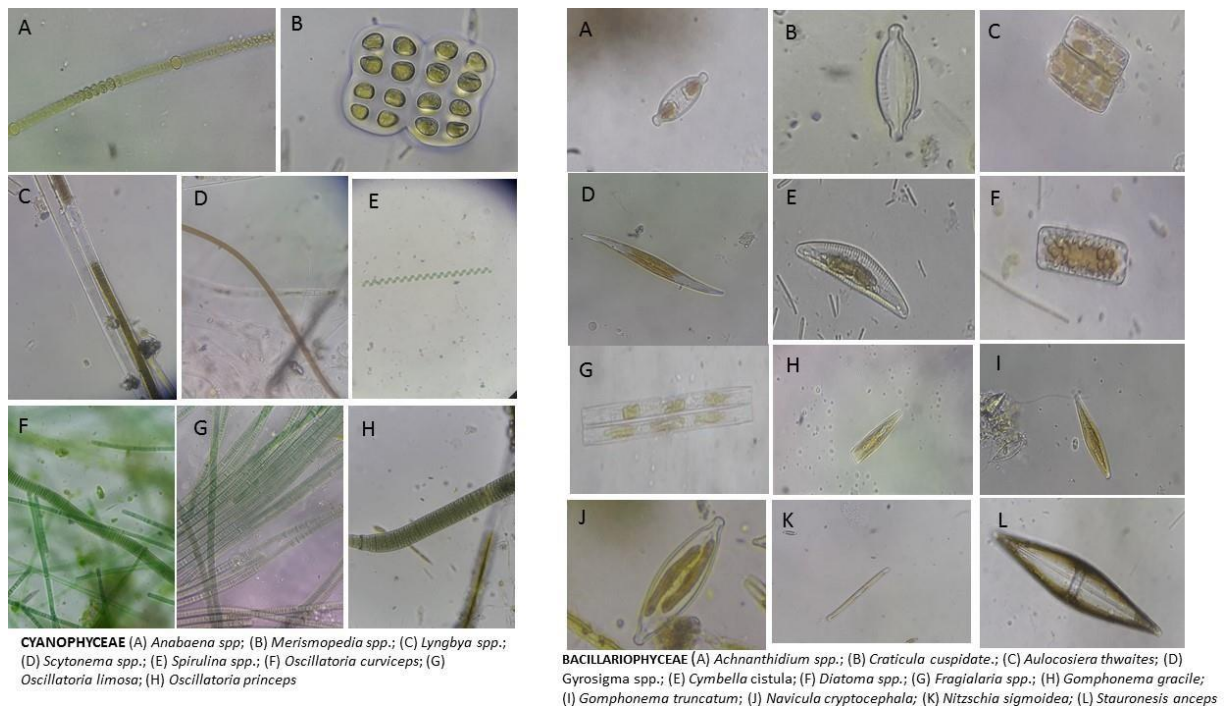
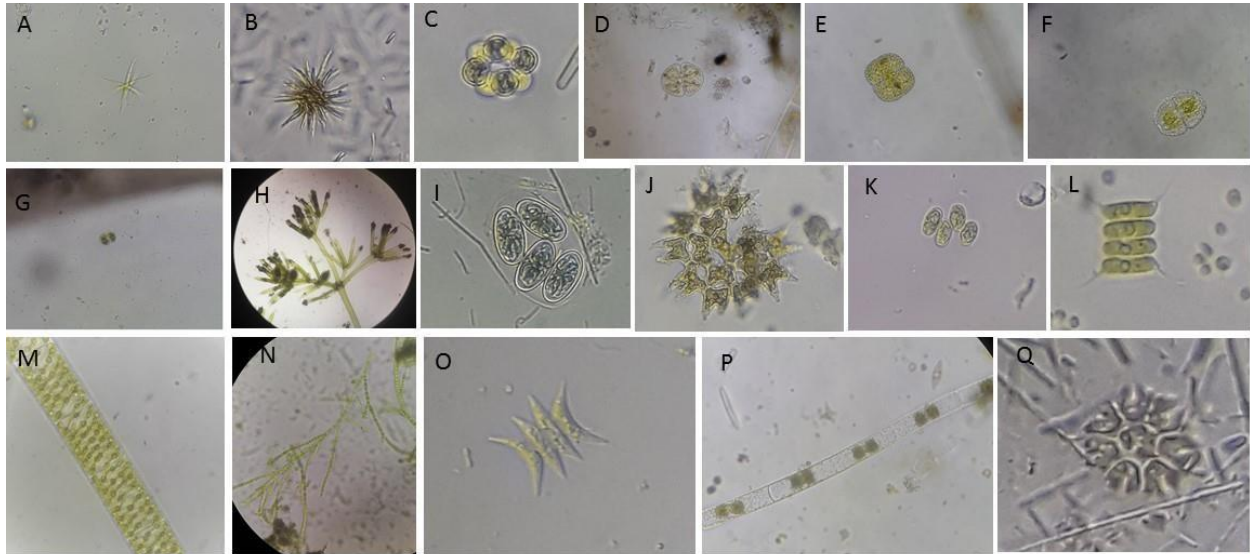
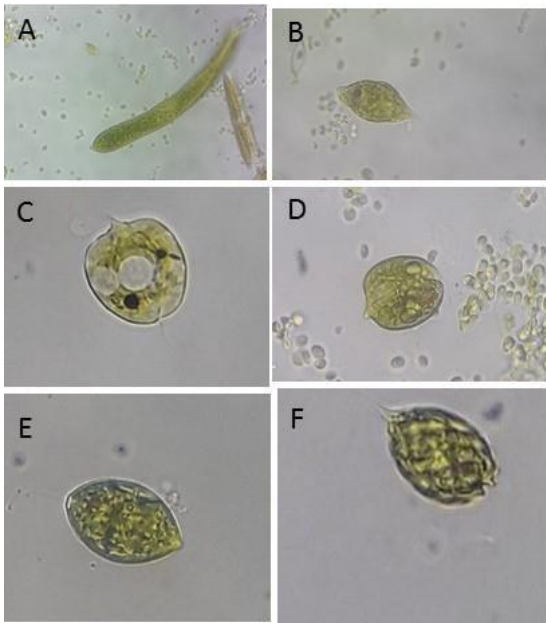


Figure 3: Microphotographic images of Cyanophyceae and Bacillariophyceae



CHLOROPHYCEAE (A) *Ankistrodesmus falcatus*; (B) *Ankistrodesmus spiralis*; (C) *Coelastrum reticulatum*; (D) *Cosmarium ralfsii*; (E) *Cosmarium quadrum*; (F) *Cosmarium ochthodes*; (G) *Cosmarium* spp.; (H) *Nitella tenuissima*; (I) *Oocystis* spp.; (J) *Pediastrum angulosum*; (K) *Scendesmus arcuatus*; (L) *Scendesmus quadricauda*; (M) *Spirogyra majuscula*; (N) *Stegiocolonium* spp.; (O) *Tetrademus acuminatus*; (P) *Zygnima* spp.; (Q) *Pediastrum tetras*

Figure 4: Microphotographic images of Chlorophyceae.



EUGLENOPHYCEAE

(A) *Euglina deses*; (B) *Euglina sociabilis*; (C) *Phacus curvicauda*; (D) *Phacus pleuronectes*; (E) *Lepocinclis fusiformis*; (F) *Monomorphina pyriformis*

Figure 5: Microphotographic images of Euglenophyceae

CONCLUSION

Knowledge about phytoplankton provide valuable insights into water quality, indicating concerns such as pollution of waterways, reduction in water flow, or a health and safety risk, as some algal species are highly toxic to humans and livestock. The present study was aimed to list the diversity of phytoplankton in Rani lake, Idar. This is the pioneer work on freshwater phytoplankton in Rani lake. Phytoplankton identified at Rani lake comprised a total of 65 species belong to 45 genera. Chlorophyceae formed the most dominant class.



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