

**STUDY OF PHYTOPLANKTON BIODIVERSITY IN PANVEL LAKES
(VISHRALE, KRISHNALE AND DEWALE LAKE) AT DIST. – RAIGAD
(MAHARASHTRA) INDIA**

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ABSTRACT

The present study is carried out during the period of February 2010 to January 2011 in order to investigate the seasonal diversity of phytoplankton in Panvel Lakes (Vishrale, Krishnale and Dewale Lake) by analyzing monthly variations. In all the three lakes 16 genera of phytoplankton were recorded. Out of which 7 genera belong to the Chlorophyceae, 04 genera belong to Bacillariophyceae and 05 genera belong to Myxophyceae. Among phytoplankton Chlorophyceae were dominant over others.

KEYWORDS: Biodiversity, Seasonal Variation, Panvel Lakes

INTRODUCTION

Biodiversity refers to variety of plants and animals in a particular ecosystem. Human induced activities pose serious threats to the biodiversity, which ultimately leads to environmental degradation. The knowledge about the biodiversity of lakes along with its present conservation status will help in the wise-use of these lakes, enabling in their sustainable utilization, for the benefit of humankind by maintenance of its natural properties. The most important step to prevent degradation of lake ecosystems is to maintain its biological integrity and health. The aim of the present investigation is to study the fluctuations of the phytoplankton abundance with respect to different seasons.

MATERIAL AND METHODS

The sampling on monthly basis was done for a period of one year, from the three lakes (Vishrale, Krishnale and Dewale) by plankton net (size 25), it was swept through sub surface and then collected organisms were transferred to 1 Lit capacity plastic bottles. Then sample collected was centrifuged to concentrate and made up to 100 ml after removing the surface water in the centrifuge tube and preserved with Lugol's iodine in 10:1 ratio i.e. 10 ml water sample : 1 ml Lugol's iodine (Trivedy and Goel, 1986).

RESULTS AND DISCUSSIONS

Phytoplankton studied in lakes, qualitatively and quantitatively belongs to three (Figure. 1) major groups which are as follows:

Chlorophyceae: Spirogyra spp., Zygnema spp., Ankistrodesmus spp., Pediastrum spp., Scenedesmus spp., Oedogonium spp., and Desmidium spp.

Bacillariophyceae: Nitzschia spp., Navicula spp., Melosira spp., and Diatoma spp.

Myxophyceae: Anabaena spp., Microcystis spp., Merismopedia spp., Spirulina spp., and Nostoc spp.

In all the three lakes 16 genera of phytoplankton were recorded. Out of which 7 genera belong to the Chlorophyceae, 04 genera to Bacillariophyceae and 05 genera to Myxophyceae. Seasonal fluctuation of total phytoplankton in all the three lakes is recorded in table (Table No. 1 & 2 and Figure. 2& Figure 3 a, b & c).

IN VISHRALE LAKE

Pre - Monsoon: Seasonal value is 1842.25 ± 169.62 with variations in groups of phytoplankton during the season were recorded as Chlorophyceae (1129.5 ± 22.36) 61% >Bacillariophyceae (410 ± 89.92) 22% >Myxophyceae (312 ± 78.85) 17%.

Monsoon: Seasonal value is 1589.75 ± 180.23 with variations in groups of phytoplankton during the season were recorded as Chlorophyceae (906.25 ± 166.51) 60% >Bacillariophyceae (344.5 ± 22.69) 23% >Myxophyceae (253 ± 60.52) 17%

Post - Monsoon: Seasonal value is 2401.25 ± 234.72 with variations in groups of phytoplankton during the season were recorded as Chlorophyceae (206.75 ± 169.17) 59% > Bacillariophyceae (493.75 ± 66.53) 21% >Myxophyceae (481 ± 83.87) 20%

IN KRISHNALE LAKE

Pre – Monsoon: Seasonal value is 871 ± 153.46 with variations in groups of phytoplankton during the season recorded as Chlorophyceae (572 ± 36.27) 66% >Bacillariophyceae (166.75 ± 103.41) 19% >Myxophyceae (132.25 ± 77.55) 15%

Monsoon: Seasonal value is 754.75 ± 200.55 with variations in total phytoplankton group during the season recorded as Chlorophyceae (452.75 ± 56.81) 60% >Bacillariophyceae (150.5 ± 145.30) 24% >Myxophyceae (123.75 ± 13.17) 16%

Post - Monsoon: Seasonal value is 1125 ± 268.66 with variations in total phytoplankton group during the season recorded as Chlorophyceae (725.25 ± 187.19) 64% >Bacillariophyceae (195 ± 56.05) 22% >Myxophyceae (156.25 ± 50.27) 14%

IN DEWALE LAKE

Pre - Monsoon: Seasonal value is 1276.25 ± 122.62 with variations in total phytoplankton group during the season recorded as Chlorophyceae (825.5 ± 74.63) 65% >Bacillariophyceae (221.5 ± 30.57) 18% >Myxophyceae (214 ± 40.10) 17%

Monsoon: Seasonal value is 1186.5 ± 237.39 with variations in total phytoplankton group during the season recorded as Chlorophyceae (739.5 ± 189.99) 62% >Bacillariophyceae (198.75 ± 86.38) 22% >Myxophyceae (187.5 ± 36.5) 16%

Post - Monsoon: Seasonal value is 1609.25 ± 409.35 with variations in total phytoplankton group during the season recorded as Chlorophyceae (1002.75 ± 291.5) 63% >Bacillariophyceae (243.5 ± 45.90) 21% >Myxophyceae (260.5 ± 88.41) 16%.

In all the three lakes Chlorophyceae were dominant in comparison to Bacillariophyceae and Myxophyceae.

In all the three lakes seasonal dominance of phytoplankton is

Pre – Monsoon: Chlorophyceae >Bacillariophyceae >Myxophyceae.

Monsoon: Chlorophyceae >Bacillariophyceae >Myxophyceae.

Post – Monsoon: Chlorophyceae >Bacillariophyceae >Myxophyceae.

DISCUSSIONS

Chlorophyceae dominated over Bacillariophyceae as the second largest group in all the three lakes during the study period. Similar observations were recorded by (Sharma, 2010; Verma and Singh, 2010; Tiwari et al., 2001). Presence of Microcystis, Scenedesmus, Ankistrodesmus, are certain spp. which are pollution tolerant species clearly indicates organic pollution (Hutchinson, 1967; Palmer, 1969; Tiwari and Shukla, 2007; Tiwari and Chauhan, 2006; Fathi et al., 2009; Sharma et al., 2008; Senthilkumar and Sivakumar, 2008; Zafer, 1968).

Quantitatively seasonal fluctuation of total phytoplankton and group density were recorded maximum during post - monsoon season and minimum during monsoon season dominated by Chlorophyceae. Similar observations were made by (Tiwari and Chauhan, 2006; Singh et al., 2010; Dubey and Boswal, 2009; Lokhande and Shembekar, 2009; Jayabhaye, 2010; Kotadiya and Acharya, 2013; Kanagasabapathi and Rajan, 2010; Laskar and Gupta, 2009; Shiddamallayya and Pratima, 2011). Low temperature and low turbidity enhance the growth of green algae; maximum population of Chlorophyceae and Bacillariophyceae during winter may be due to high D.O. and nutrients as well as alkalinity (Tiwari and Chauhan, 2006). Chattopadhyay and Banerjee (2007) reported seasonal diversity is low during monsoon as lakes receive rainfall, resulting in enhanced concentrations of suspended solids, inorganic particles and dissolved organic matter, thereby adversely affecting seasonal abundance and phytoplanktons diversity. Species composition in phytoplankton did not show consistent dominance in all the three lakes.

The data revealed that different species appear at different times of the year and their abundance varies greatly from one another in all the three lakes. Compositions of phytoplanktons are affected by different environmental factors such as pH, light, temperature and nutrients (Ganie, et al., 2010; Buzzi, 2002).

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APPENDICES

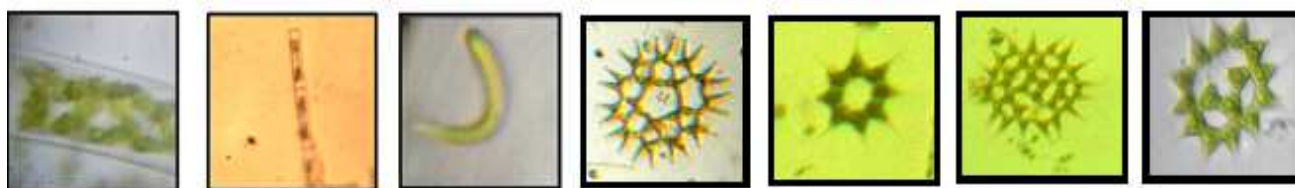
Table 1: Seasonal Variation of Phytoplankton in the Three Lakes during 2010-2011

Lakes	Pre-Monsoon	Monsoon	Post-Monsoon
Vishrale Lake	1842.25± 169.62	1589.75±180.23	2401.25±234.72
Krishnale Lake	871±153.46	754.75±200.55	1125±268.66
Dewale Lake	1276.25±122.62	1186.5±237.39	1600.25±409.35

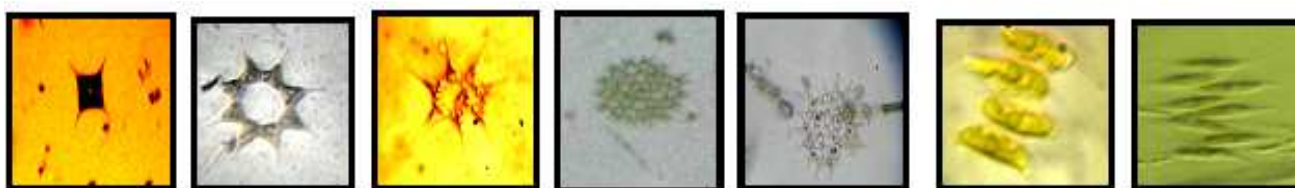
Table 2: Seasonal Variation in Phytoplanktons Group in Three Lakes during 2010-2011

Seasons	Pre - Monsoon			Monsoon			Post - Monsoon		
	Chlorophyceae	Bacillariophyceae	Mvxophyceae	Chlorophyceae	Bacillariophyceae	Mvxophyceae	Chlorophyceae	Bacillariophyceae	Mvxophyceae
Vishrale lake	1129.25±22.36	401=89.92	312=78.85	906.25±166.51	348.5±22.69	253=60.52	1426.5±169.17	493.75±66.53	481=83.87
Krishnale lake	572=36.26	166.75=103.40	132.25=77.54	452.75=56.81	150.5=145.30	123.75=13.17	725.25=187.19	195=36.05	156.25=50.27
Dewale lake	825.5=74.63	221.25=30.57	214=40.10	739.5=189.99	198.75=86.38	187.75=36.5	1002.75=291.50	243.5=45.90	260.5=88.41

CHLOROPHYCEAE



Spirogyra Spp. Zygnema Spp. Ankistrodesmus Pediastrum Boryanum Pediastrum Simplex Pediastrum Simplex Pediastrum Simplex



Pediastrum Simplex1 Pediastrum Spp. Pediastrum Simplex Pediastrum Spp. Pediastrum Spp. Scenedesmus Spp. Scenedesmus Acutus



Scenedesmus Spp. Scenedesmus Acutus f. Scenedesmus Dimorphus Scenedesmus Ovalternus Scenedesmus Spp. Scenedesmus Spp. Costulatus var. Graevenitzii Quadricauda

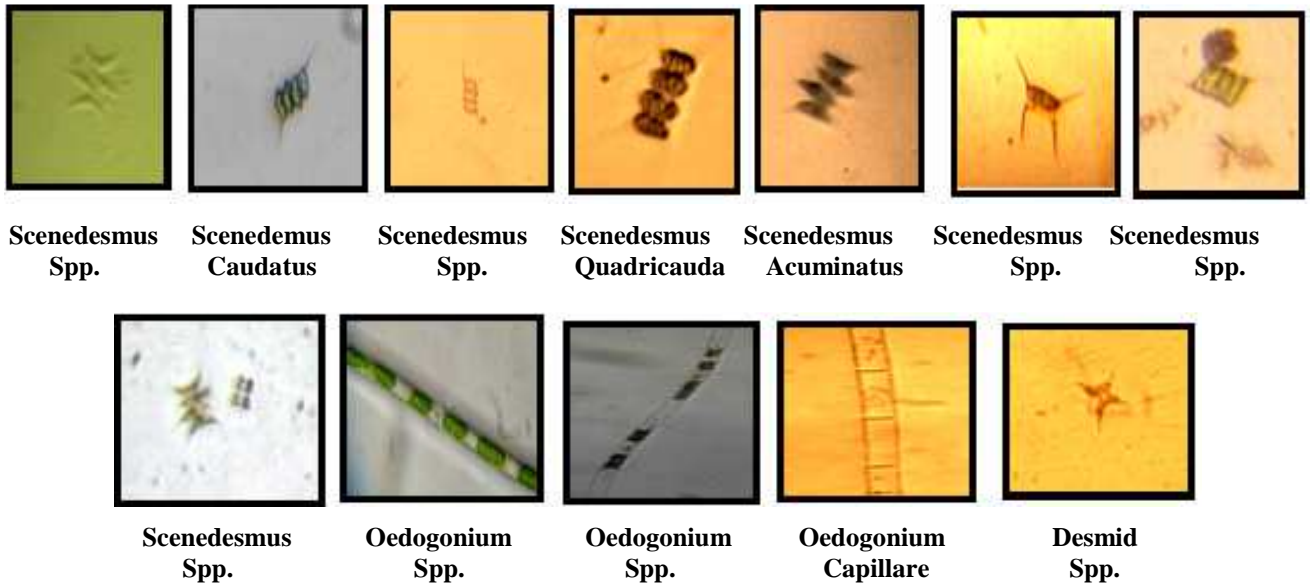
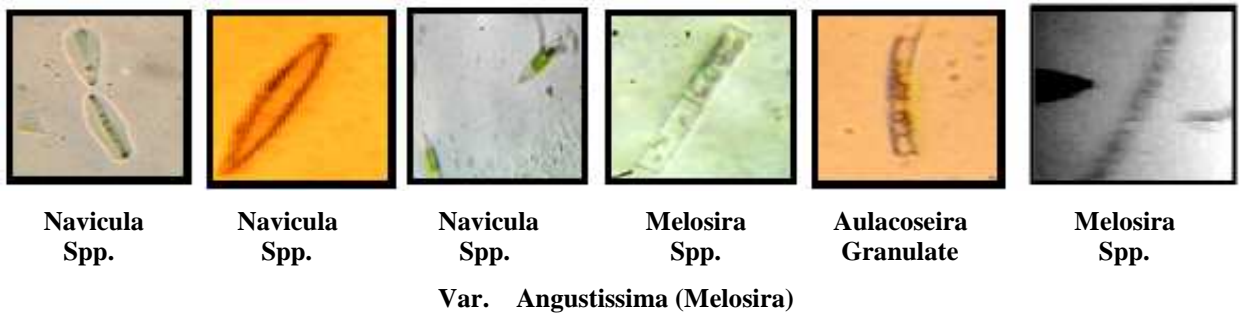


Figure 1: Phytoplanktons Found in the Lakes

BACILLARIOPHYCEAE



MYXOPHYCEAE

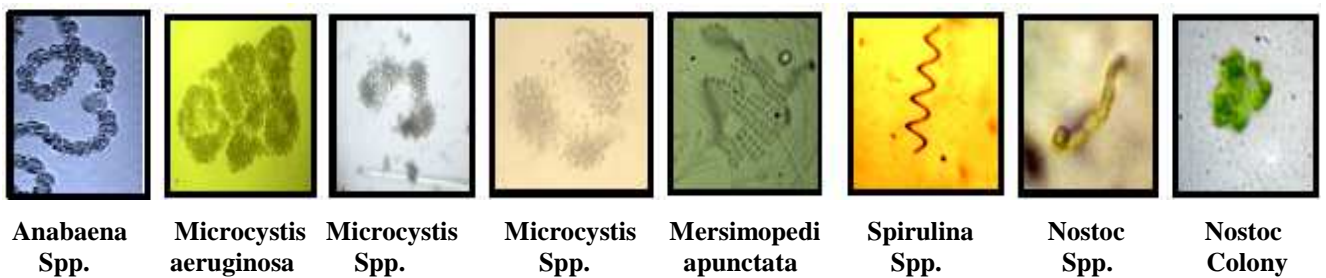
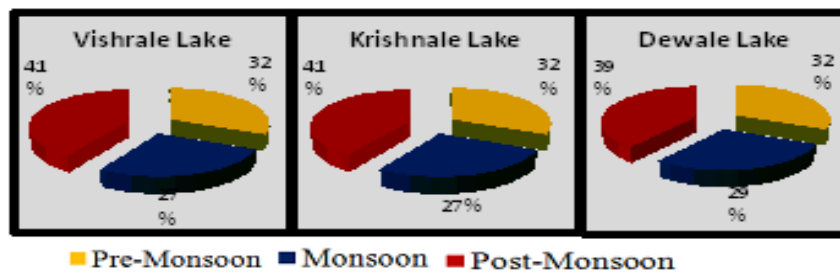
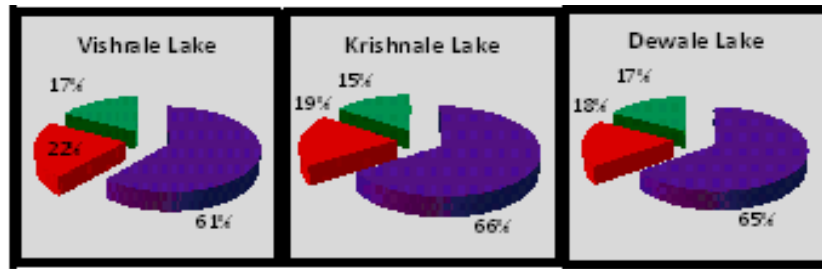


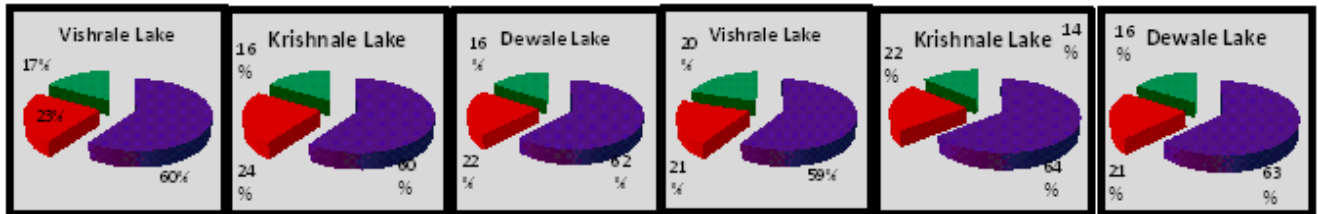
Figure 2: Seasonal Variation of Total Phytoplankton in the Three Lakes during 2010 – 2011



(a) Pre - Monsoon



(b) Monsoon



■ Chlorophyceae ■ Bacillariophyceae ■ Myxophyceae

(c) Post-Monsoon

Figure 3: Seasonal Variation Phytoplankton Diversity in Three Lakes during 2010-2011

