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# Seasonal phytoplanktonic diversity of Hirva Lake, Umred Village Nagpur, Maharashtra, India

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**Abstract:**

Data from seasonal investigations of phytoplanktonic diversity in **Hirva Lake, Umred Village, and Nagpur** during the past two years (January 2018 to December 2019) uncovered a total of seventy three different species of algal. only few such have been found Year-round, with the majority occurring mostly in the winter and summer months. Chlorophyceae and Bacillariophyceae were the most common winter plant families. Summers, in contrast, were dominated by Cyanophyceae and Euglenophyceae. *Pandorina morum*, *Gonium sp*.,*Pediastrum tetras*, *Chlorella vulgaris*, *Oedogonium cardiocum*, *Scendesmus quadricauda*, *Synedra ulna*, *Euglena gracilis*and *Oscillatoria agardhii*, have been some of a species recorded throughout the year Polluted water can be detected by Chlorella, Stigeoclonium, Micratinium, Pandorina, Anacystis, Nitzschia, and Cymbella..

**Key words:** Diversification, phytoplankton, Hirva Lake, Nagpur

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## Introduction

Water pollution was amonga majorcritical issues confronting modern person. Algae take part in critical ecological features as well as seems to be frequently utilized while indicators of water pollution due to their common aquatic habitat. Aquatic ecosystems are home to a diverse range of communities that contribute to the ecosystem's characteristics and functioning along with manufacturing as well as the maintenance of the food chain. Phytoplankton have been a firstmanufacturesor form a primaryquantity of the All aquatic organisms are part of the marine food chain. They sotake part in the critical features inside fisheries as well as contribute to pisciculture advancement. Numerous researchers have used phytoplankton density and diversity, as well as their association, as biological indicators for assessing water quality or trophic status (Chaturvedi et al.,1999). Numerous researchers have examined the seasonal variation of phytoplankton in lakes. The current article discusses seasonal variation in phytoplankton abundance in a significant water reservoir in Nagpur, Hirva Lake.

## Methods and Materials

### Area of study:

Nagpur, located at the southern foot of the Satpuda Hills at 20°35' as well as 21°44' north latitudes, as well as 78° 15' but also 79° 40' east longitudes, **is a major city in north-eastern Maharashtra** that gives its name to the plain. It is located in Maharashtra’s mid-west corner. The climate seems to be tropical, includes the hot weather lasting through March - June, the monsoon lasting through July -October, or the froasy weather lasting through November - February. April - May highest degree is among thity five as well as 48 degrees Celsius, while the minimum temperature in December to February is between 7 and 25 degrees Celsius. Hirva Lake is a lake in the Indian state of Maharashtra, near the town of Umrer. It functions like a reservoir. However the pond was drained in

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recent times overrun by aquatic angiosperms, Trapa, particularly Eichornia,Potamogeton, Hydrilla and Ceratophyllum.

Four sites were chosen for this study, each located ina lake other ecological region. Site number one is located in the western section, Site number two is located in the southern section, site number three is located in the northern section, as well as site number four is located in the central section.

**Hirva pond seasonal phytoplanktonic diversity**

Numerous lake water physicochemical parameters have been investigated following APHA recommendations (1995). Collectionsof Algal have been created on a seasonal basis from a variety of locations. Algal samples were preserved in 5% formalin. Quantitative and qualitative analysis of the preserved samples was performed in the laboratory. The plankton count was performed using the Sedgwick-rafter cell method. Desikachary (1959) and Cramer (1961) identified algae (1984).

**Conclusions and Discussion**

Tables 1 and 2 present informationas ofa physicochemical features as well as Hirva Lake Umrer liquid phytoplankton population. The lake's algal community seventy three genera same, on that thirty-four are Chlorophyceae, twenty one are Cyanophyceae, 14 are Bacillariophyceae, as well as four are Euglenophyceae (Table 2). The phytoplankton population experienced two peaks during the study period: winter (November-March) and summer (April- June). Chlorophyceae populations peaked during the winter season. Between December and early March, filamentous algae dominated all other algal forms (Table 2). This could be because of a nutrients higher concentration (4.1 to9.0 mg. l-1), a higher concentration of oxygen dissolved (6.1 to 7.0 mg. l-1), a magnesium less concentration (6.9 to 12.6 mg.l-1), calcium (7.5 to 10.5 mg.l-1), carbon dioxide (30.0 to 32.4 mg.l-1), as well asThroughout that time frame, there is a slow current of water. (Table 1). The winter population was dominated by *Chlamydomonasconferata*, *Cladophorafracta*, *Pandorina morum*, *Drapernaldia sp.*, *Oedogonium cardiocum*, *Stigeoclonium tenue*, *Zygnema sp.*, *S. condensata*,

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*Spirogyra longata*, *Ulothrixzonata*, Nitella and Chara, (Table 2). According to Saha (1985), Conjugalean members favour lush growth while the wintertime, as well as Chara and Nitella organismsthrived during this time period, particularly from December to February.

**Table 1:Seasonal variation in water physicochemical parameters at HirvaTalab from January 2018 to December 2019.**

| | Ranges | | |
|---|---|---|---|
| Parameters | Summer | Rainy | Winter |
| Temperature (ºC) | 28.5 – 34.5 ºC | 24.0 – 31.5 ºC | 17.0 – 18.5 ºC |
| pH | 8.2 –8.4 | 7.0 –7.5 | 8.3 – 8.6 |
| Turbidity | 83 – 320 | 90 – 450 | 70 – 205 |
| Colour | Green | Dark brown | Light brown |
| Dissolved oxygen | 1.0 – 4.9 | 1.3 – 6.3 | 4.5 – 7.0 |
| Total alkalinity | 135 –550 | 130 – 450 | 125 – 309 |
| Chloride | 70 – 247 | 65 – 170 | 70 – 220 |
| Sulphate | 15 – 60 | 10 – 40 | 10 – 45 |
| Phosphate | 2.8 – 5.6 | 1.5 – 2.4 | 2.0 – 4.0 |
| Magnesium | 7.5 – 17.5 | 8.5 – 23.5 | 6.9 – 12.6 |
| Free $CO_2$ | 40 – 55.5 | 38.2 – 40.0 | 30.0 – 32.4 |
| Calcium | 11.7 – 27.5 | 12.5 – 20.8 | 7.5 – 10.5 |
| Nitrate | 1.6 – 3.3 | 2.0 – 3.9 | 4.1 – 9.0 |

| | | | |
|---|---|---|---|
| Ammonia | 5.2 – 10.2 | 4.5 – 7.0 | 2.5 – 5.0 |
| Overall abrasion | 60 – 210 | 220 – 350 | 240 – 310 |

Except for the temperature, pH and colour of the water, only those morals seem to be in mgl-l. In the eastern part of the lake, temperature is the primary factor affecting species richness and diversity4. (Various lake water physicochemical parameters have been investigated following APHA recommendations) (1995). Collections of Algal have beencreated on a seasonal basis from a variety of locations. Algal samples were preserved in 5% formalin. Quantitative and qualitative analysis of the preserved samples was performed in the laboratory. The plankton count was performed using the Sedgwick-rafter cell method. Desikachary (1959) and Cramer (1961) identified algae (1984)

However, Chlorococcalean forms were abundant during the summer and rainy season (April–September) and were scarce during the winter. They preferred large temperature (28.5 to 34.5 $^{o}C$) and large $CO_2$ (40.0 to 55.5 mg.l-1). July and August see an increase in the water level, which becomes quite turbid. Increased magnesium (7.5–23.5 mg.l-1) as well as calcium (11.7–27.5 mg.l-1) concentrations in liquidwereviewed to promote a Chlorococcalean algaegrowth (Table 1). *Pediastrum tetras*, *Pediastrum simplex*, *Pediastrum duplex*, *Chlorococcumhumicola*,*Ankistrodesmus falcatus*, *Actinastrum sp*., *Elactrothrix gelatinosa*, *Kirchneriellaobesa*, Scendesmus and *Micratinium pusillum*, were present on all peaks (Table 2). Sharma and Senger (1986) discovered which increased nitrate, phosphate and calcium, concentrations insideliquid promote a chlorococcalean algae growth.

Stigeoclonium, Scendesmus, Chlorococcum,Micratinium, Pandorina, Cladophora and Chlorella were used as indicators of the organic pollution in this study because they were all taken from extremely polluted water. The above results corroborate with the many previously published by Chaturvedi et al., (1999). Those who gathered a similar organisms throughout Jaipur, Sanganer, through 6 dye

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Vol-10 Issue-2 No.01 February 2020

sewage water treatment plants.. This is worth noting that the pH and chloride content of Sanganer dye domestic sewage are comparable via that of contaminated Lake liquid.

Between April and June, the number of blue-green algae peaked and then decreased. *Oscillatoria chalybea*, *Oscillatoria limosa*, *Anabaena iyengarii*,*Oscillatoria platensis*, Phormedium, *Oscillatoria tenuis*, *Oscillatoria principes*, Nostoc, *Scytonemacoactile*, Nodularia,*Microcystiselebans*, *Synechosystis aquaLyngbyabirgei*, This can only be explained by elevated $CO_2$ (40 – 55.5 mg. l-1), pH (8.2- 8.4), and turbidity (83-320 mg. l-1) levels, all of which favour growth of Cyanobacterial. In contrast, *O. agardhi*and *Oscillatoria formosa*established the population majority while the monsoon, or Merismopedia had a very low density. Water blooms were also observed during the summer months of April and May, when oxygen levels were extremely low. These tolerant Cyanobacteria species may be utilisedwhile 'Marker species' but also water pollution indicators.

Bodhke and Tarar (2002) and Sarojini (1996) hypothesised which high turbidity, bicarbonate, pH, orthophosphate, chloride and, alkalinity can all contribute to Cyanophyceae growth and bloom. Kumar and Saini (1998) discovered that CO2 and pH have an inverse relationship. According to Jarousha (2002), blue-green algae increased diversitycan be a result of large nitrate levels whilea monsoon. According to this research, fourteen diatom organismhave been identified. *Pinnularia major*, *Naviculaconfervacea*,*Synedra ulna*, *Gomphonemamontanum*, *Nitzschiacommunis*, *Cymbelladeliculata*and *Frustulia sp*., were the most abundant diatoms. *Gomphonemaparvulum*, *Cymbellahustedii*, *Nitzschiaacicularis* and *Gomphonemamontanum*, all demonstrated a few intriguing outcomes in terms of dominance during this investigation. Those were accurate measures of contaminant contamination in the water. We reach their peak improvement while the wintertimes. Diatoms have been very abundant inside the winter after wardswithin the summer, as well as were absent during the rainy season. Diatom species thrive in conditions of high pH, large organic matter,nitrate, low temperature and low phosphate. Winter months, Accordingly Bodhke and Tarar (2002) and Nautiyal et al. (1996), the conditions for diatom multiplying were even more

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Vol-10 Issue-2 No.01 February 2020

favourable. Nevertheless, Kaur et al (2001)observed a limit diatom community at modest temperatures. In comparison in comparison to certain other algae classes, the euglenoidhad the fewest members. Winters were used to locate *Euglenaviridis's* and *Phacus triquater* highest peaks and *Euglena oxyuris* and *Euglena gracillis*, in contrast.

Thus, the current authors' observations indicate a certain winter weather seem to be better for a Bacillariophyceae and Chlorophyceae. In contrast, Cyanophyceae are abundant during the summer. Certain species, for example, *Chlorella vulgaris*, *Scendesmus dimorphous*, *Pandorina morum*, *Stigeocloniumtennue*, *Pediastrum tetras*, *Chlorococcum humicola*, *Micratinium pusillum*, *Anacystis sp*., *Oscillatoria agardhi*, *Arthrospira sp*., Cymbell, *Euglena oxyuriss.*

ISSN: 2278-4632
Vol-10 Issue-2 No.01 February 2020

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