

## Study of Physicochemical condition of Choral river with Emphasis on Diatoms, District Indore (M.P.) India

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### Abstract

The present study was conducted to understand the diversity and distribution pattern of micro-algae in freshwater system found in Choral river. A variety of phytoplanktons were identified belonging to various groups of Algae during July 2019 to June 2020. Among the identified phytoplankton species 12 belonged to Bacillariophyceae. The fluctuations in the physico-chemical parameters like pH, temperature, turbidity, dissolved oxygen, chloride, nitrate, & sulphate were also monitored. The result provides a primary documentation of the phytoplankton community and its diversity and basic understanding of hydrological variables in the river ecosystem.

### INTRODUCTION

Limnology is the study of inland waters. It is often regarded as a division of ecology or environmental science. It covers the biological, chemical, physical, geological, and other attributes of all inland waters (running and standing waters, both fresh and saline, natural or man-made). This includes the study of lakes and ponds, rivers, springs, streams and wetlands (Cole, 1994).

Algae are very important as a source of food and serve as an early step in the food chain of larger aquatic animals, especially fish. They are also of great use to human beings being the source of food especially rich in vitamins A and E. Many are important sources of iodine, potassium and other minerals. The blue-green algae play a great role in enriching the soil fertility by fixing atmospheric nitrogen. In short, except for the chemosynthetic bacteria, all organisms are directly or indirectly benefited from algae (Krishnamurthy, 2000). Studies on Phycology has its long history in India, Iyengar (1925) was the pioneer in this field. Later on these studies were enriched by the works of Randhawa (1938-1959), he worked on

Zygnemaceae, *Oedogonials* and *Vauchariaceae* of Punjab and U.P. He contributed a number of papers recording 70 species of Zygnemaceae which include one new species of *Debarya*, two of *Mougeotia*, two of *Zygogonium* and 11 of *Spirogyra*. His monograph on the Zygnemaceae is monumental. During the 70 years interesting contribution on morphology and taxonomy of various algal groups are credited to Desikachary (1958), Singh (1942), Venkataraman (1961) and Kant and Gupta (1998). The contribution to the north Indian chlorophycean flora have been made by Kant and Anand (1978). Zarina et al (2005 and 2006), Taxonomy of 15 species of the class Ulvophyceae has been described and worked on genera algal and made large collection from various districts of Punjab. Zarina et al (2009) described 22 genera and 127 species of green algae from Punjab and neighboring areas of Pakistan.

Studies on the seasonal changes and correlation of phytoplankton diversity in relation with physico-chemical parameters in Bathypool were studied by Begum *et al.*, 2010. Kesharwani *et al.* (2011) studied Bacillariophycean population

dynamics in relation to water quality, and reported that these species are indicator of polluted water. Present study was undertaken to find out the diversity of algae in river.

**MATERIALS AND METHODS**

**Study area:** Choral river is the tributary of Narmada river, the life line of Madhya Pradesh and Gujarat. Choral river emerges from highly dance hilly area of Surrounding hills and flows through the surrounding hills. The global position of Choral river is 22.4684° N and 75.8924° E to 22.2532° N and 76.0408° E in Mhow tehsil Indore District MP to Narmada river near tehsil Barwaha district Khargone. Choral river is the main sampling station of the research work. Samples were collected in

plastic bottle from all possible habitats like plant, stones and running water. Further stone sample scrub by toothbrush and diatom suspension put in to plastic bottle. Collected sample were preserved in 4% formaldehyde.

The sample was filtered through phytoplankton net. The filtrate thus obtained was analyzed in Botany lab and slides were prepared and observed under microscope. Identification was carried out on the basis of available literature. Microscopic photography have also been carried out with the help of sony cybershot camera. The magnification was kept as 45x × 10x throughout the study period. For Physico-chemical parameters standard techniques were employed.



Fig: 1 Choral river

**RESULTS AND DISCUSSION**

Temperature of the water sample from river have been represented in Table No.1. maximum Temperature was recorded during the month of June (28.4°C) & minimum temperature for the month of Sept. (20.3°C). These sites do not show much variation in temperature.

Turbidity of the water samples from river have been represented in Table no.1. maximum turbidity, was recorded during the month of Aug. (20 NTU ) & minimum Turbidity for the month of Jan. (1.6 NTU ). Turbidity declines after the end of the rainy season.

Table: 1. Monthly recorded of Physico-chemical parameters of Choral river in year 2019-2020

Month	Temperature	Turbidity	pH	Dissolved Oxigen	Chloride	Nitrate	Sulphate
July	25.1	18.0	7.6	4.8	58.7	2.3	8.9
Aug.	22.8	20.0	7.1	5.1	63.5	2.2	8.7
Sept.	20.3	13.2	7.3	5.1	69.8	2.1	9.1
Oct.	21.4	8.4	7.3	4.9	71.3	1.8	9.8
Nov.	21.1	8.1	7.4	5.9	64.6	1.3	10.5
Dec.	23.2	6.6	7.8	6.1	70.1	1.7	11.0
Jan.	21.2	1.6	7.6	6.3	40.3	2.7	12.9
Feb.	21.7	1.8	8.1	6.0	42.6	2.8	10.7
March	26.1	2.4	7.9	5.7	51.2	3.0	9.6
April	26.4	4.3	7.7	6.1	65.4	3.1	9.9
May	27.6	3.8	8.5	5.9	58.7	3.0	8.6
June	28.2	4.1	8.2	6.3	64.3	2.8	8.8

pH of the water sample from river have been represented in table no.1. High value for these reading have also been calculated Maximum pH (8.5) was recorded in the month of May and the minimum value of pH is river (7.1) was recorded in the month of Aug. & October. pH is the measure of the intensity of the acidity and alkalinity. Most of the pH values are alkaline.

Dissolved oxygen of the water samples from river have been represented in Table-1. maximum dissolved oxygen was recorded in the month of June & Dec. (6.3 mg/l) and the minimum (4.8mg/l) in the month of July.

Chloride of the water sample from river have been represented in Table-1. maximum chloride

was recorded in the month of Oct. (73.1) and the minimum in the month of Jan (40.3mg/l).

Nitrate of the water sample from river have been represented in Table-1. Nitrate content of water has been represented in terms of mg/l. it was maximum in March (3.0 mg/l.) and minimum in Nov. (1.3 mg/l).

Sulphate of the water sample from river have been represented in table -1. High values for these were reading have also calculated. Maximum value of Sulphate was recorded during the month of January (12.9 mg/l) and minimum in the month of May (8.6 mg/l).

Present study was undertaken to find out the natural algal flora and physical and chemical characteristics of Choral river.









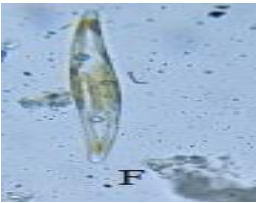
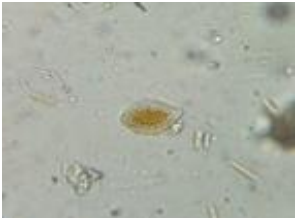


 <p><i>Navicula sp.</i></p>	 <p><i>Pinnularia sp.</i></p>	 <p><i>Cymbella Sp.</i></p>	 <p><i>Gomphonema sp.</i></p>
 <p><i>Amphora sp.</i></p>	 <p><i>Rhopalodia sp.</i></p>	 <p><i>Nitzschia sp.</i></p>	 <p><i>Achnathes sp.</i></p>
 <p><i>Pleurosigma sp.</i></p>	 <p><i>Cocconeis sp.</i></p>	 <p><i>Surirella sp.</i></p>	 <p><i>Encyonema sp.</i></p>

Table: 2. Monthly variation of Algal flora (Diatom) in year 2019-2020. [(+ Abundance, ++ More Abundance, - Absent )].

	Month	July 2019-20	Aug. 2019-20	Sept. 2019-20	Oct. 2019-20	Nov. 2019-20	Dec. 2019-20	January 2019-20	February 2019-20	March 2019-20	Aprile 2019-20	May 2019-20	June 2019-20
1	<i>Navicula spp</i>	+	+	++	++	++	++	++	++	++	++	++	++
2	<i>Pinnularia spp.</i>	++	+	++	++	++	++	++	++	++	+	++	++
3	<i>Cymbella spp.</i>	+	+	++	++	+	+	++	++	++	+	+	+
4	<i>Gomphonema spp.</i>	-	-	+	+	+	+	+	++	+	++	+	+
5	<i>Amphora spp.</i>	-	-	+	+	++	+	+	+	+	+	+	-
6	<i>Rhopalodia spp.</i>	-	-	++	+	+	++	++	++	++	++	-	+
7	<i>Nitzschia spp.</i>	+	++	++	++	++	++	++	++	++	+	++	+
8	<i>Achnanthes spp.</i>	-	+	+	++	+	+	+	++	+	+	+	-
9	<i>Pleurosigma spp.</i>	-	-	+	+	++	++	+	+	+	+	-	-
10	<i>Cocconeis spp.</i>	-	-	+	+	++		+	+	+	+	+	-
11	<i>Surirella spp.</i>	+	+	+	++	++	++	++	++	+	+	+	+
12	<i>Encyonema spp</i>	-	-	+	++	+	++	+	++	++	+	+	+

The most common physical assessment of quality is the measurement of temperature. Temperature impacts both the chemical and biological characteristics of surface water. Temperature of the Choral river is ranged between 20.3°C to 28.2°C throughout the sampling period. The number of diatoms decreases with increase in temperature. Temperature has negative effect on diatoms growth, the highest temperature is month of June 28.2°C these range of temperature downs the average occurrence of diatoms. Turbidity is a measure of water clarity. Suspended solids include things such as mud, algae detritus, and facial materials. Factor contributing to water turbidity include soil erosion, elevated nutrient inputs that stimulated algal blooms, wastes discharge, and abundance of bottom feeders that stir up sediments. As water become more turbid, less sunlight penetrates its surface, therefore the amount of photosynthesis decrease. The present study recorded higher value month of Aug. in the 20 NTU, high amount of turbidity is decreases growth of diatoms because photosynthesis rate is decrease, diatoms do not absorb proper sunlight. The high level of turbidity has negative relationship of dissolved oxygen. pH is the most important parameter of the water analysis. It is indicator of alkalinity and acidity. The high amount of pH has negative relationship of dissolved oxygen and nitrate. The pH has less affect of diatomic flora in water body. Dissolved oxygen refers to the level of free non compound oxygen present in water other liquids. It is an importance parameter. In assessing water quality because of its influence on the organism living within a body of water. In present study the amount of Dissolved

oxygen were recorded to be low ranged during the month of July 4.5mg/l and high ranged of dissolved oxygen is recorded month of Jan & June 6.3 mg/l. It is positive relation with Bacillaiophycean members and other aquatic algal flora. Chloride is the important ions of all natural water body. Their concentration varies considerably according to the mineral content of the earth in any given area. In small amount they are not significant. In large concentrations they posed problems. Usually chloride concentration are in low to moderate concentration of chloride ions add palatability to water in fact they are desirable for this reason. During this study, the chloride ions were reported to be at higher range in river 73.1 and 40.3 is minimum range. Chloride ions is negative relation of diatoms. Common sources of nitrate in water include plant and waste, household septic system, and fertilizers. Because it dissolves readily in water, nitrate from these sources is usually present at least in low concentration in drinking water supplies regardless of the water source. The diatoms is not show much variation in this present study. Sulphate is second to bicarbonate as the major anion in hard water reservoirs. Sulphates can be naturally occurring or the result of municipal or industrial discharges. In present study of choral river is higher ranged in month Jan. and low of month May. Sulphate is not show much variation in the study period. Study of Bacillariophycean member i.e. *Navicula*, *Pinnularia*, *Cymbella*, *Gomphonema*, *Amphora*, *Rhopalodia*, *Nizschia*, *Achnanthes*, *Pleurosigma*, *Cocconeis*, *Surirella*, *Encyonema*, 12 Orders are present.

The *Navicula* and *Gomphonema* is the more abundance in the other member of diatoms. The Choral river is ideal sites growth of Bacillariophycean and other members algae.

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