



PHYSICOCHEMICAL AND ALGAL DIVERSITY STUDIES OF FRESHWATER OF KHATKALI RESERVOIR IN BEED

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ABSTRACT

The paper highlights the physico-chemical characteristics and algal diversity of Four sites of khatkali reservoir freshwater of Karjani village, Beed Tehsil of Beed District, Maharashtra during monsoon, winter and summer seasons. Investigations are based on different parameters, like estimation of Turbidity, Alkalinity, Chloride, Nitrate, Total Hardnes, Iron, Fluoride and Total dissolved solids etc. for which no earlier investigations are available on this reservoir. The study revealed significant changes in water quality during all three seasons. pH of water was alkaline; Chloride, Nitrate, Total Hardnes, Iron, Fluoride and Total dissolved solids tend to vary during summer and in winter. The variations in seasons and physico-chemical factors interrelationships between them discussed. The variation in seasonal and environmental conditions affect as the prime determining factors that shape the algal assemblages which includes diverse taxa belonged to major groups like Cyanophyceae, Charophyceae, Chlorophyceae, Bacillariophyceae, and Euglenophyceae.

Introduction

The presence of water on the earth's surface has allowed life to exist, which is a major natural gift for life. Freshwater bodies are the primary source of water for drinking, irrigation, and other household uses as well as helping to recharge groundwater. As a result of population growth, industrialisation, and modern agriculture, freshwater bodies are under tremendous pressure, endangering human health (Bhagde et al., 2020). Because of unscientific waste disposal, poor water management, and environmental neglect, the quality of the water is drastically declining, resulting in a shortage of drinkable water that has an adverse effect on human health (Maasri et al., 2022). Water is the primary internal and exterior medium of creatures, and it is where life first began. Numerous water bodies close to towns and cities are contaminated by different types of pollutants, including waste, wastewater, sewage, and industrial effluents, which alter the water's physico-chemical

properties. Aquatic creatures' survival may be impacted by changes in their physico-chemical traits (Sirsat, 2021).

In Maharashtra's Khatkali reservoir is an essential source of water for home consumption, irrigation, and other human endeavours. A variety of algae species that flourish in the physico-chemical conditions of the environment can be found in the freshwater reservoir of the reservoir. In addition to improving our knowledge of the health of the environment, research on these algae also clarifies their ecological, industrial, and financial value. The study's conclusions will advance our understanding of freshwater algae in India, offer baseline information for next ecological evaluations, and be used as a guide for freshwater ecosystem management and conservation. Additionally, knowing Khatkali reservoir algal flora may help with environmental change monitoring and the creation of long-term plans for managing the area's water resources.

MATERIALS AND METHODS

Study Area

The Khatkali reservoir is constructed on Khatkali river at the Karjani village, Beed Tehsil of Beed District, Maharashtra. The earthfill dam has a 2.279 MMC water storage capacity. The dam is 347 meters long overall and 13.53 meters high at its highest point. The water storage dam is 9.56 meters high. Pali, Aher Wadgaon, and Samnapur are the three villages that make up the 518 hect catchment area. Located in latitude 18 AE 52"45" and longitude 75AE 45" 45", the dam's construction began in 1975 and was finished in 1978. A 7-kilometer canal system on the right side diverts water from the dam to the farmer's land. Nearby villagers and their animals also use the water for drinking. Four sites—S1, S2, S3, and S4—are designated for the study dam.

Collection of algal samples

At monthly intervals, samples of algae were taken from four distinct locations within the Khatkali reservoir. The samples were gathered in sterile 50 ml plastic bottles that had been cleaned and acid washed. They were marked with the sample number; obtained algae samples were brought right away to the lab together with information about the site, habit, and data of collection. For microscopic examination and taxonomic inspection, the algae samples were kept in a 4% formalin solution.

Identification of Algae

The algal samples were classified to species level using monographs such as Smith 1950, Prescott 1951, Desikachary 1959, Randhawa 1959, Ramanathan 1962, Krieger and Gerloff 1965, Philipose 1967, Gonzalves 1981, Inyenger and Desikachary 1981, and Sarode and Kamat 1984. Microphotographs were taken and included in the taxonomic description of algae.

Statistical analysis

The abundance of algal genera and algae groups were seen to vary seasonally and in quantity. The abundance of algae groups was calculated according to the following formula (Odum 1971).

$$\text{Dominance Index (DI)} = (S / T) \times 100$$

Where,

S = abundance of the dominant species

T = represents the total abundance of all species

COLLECTION AND PHYSICO-CHEMICAL ANALYSIS OF SAMPLE

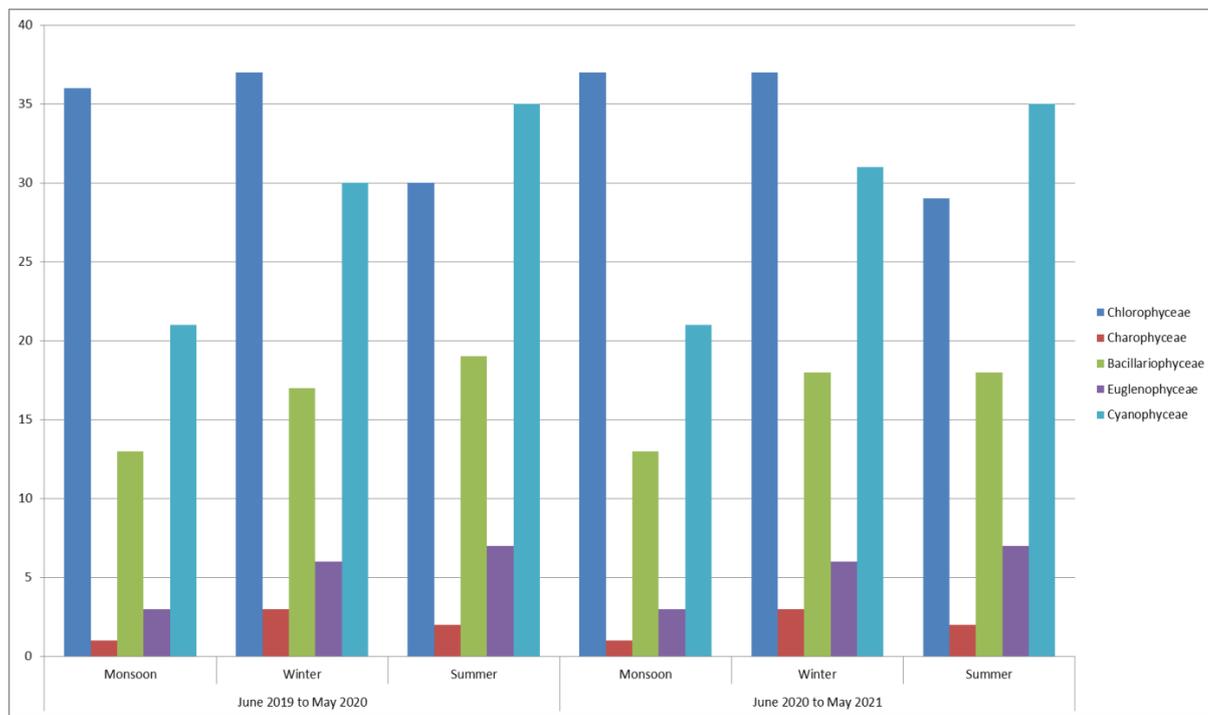
Water samples were taken at approximately one foot depth below the surface from all four sites at seasonal intervals from the Khatkali reservoir in clean, sterile 2 Lit plastic bottles. The collection was done in the morning, between 6:00 and 9:00 a.m. They were labelled with sample numbers, and the date and location of collection were noted. During each sampling, the water temperature was measured using a centigrade mercury thermometer. The bottles were stored in ice bags to keep the temperature stable, and the pH was measured using pH paper. Turbidity, alkalinity, chloride, nitrate, total hardness, iron, fluoride, and total dissolved solids were all determined using the water samples submitted to the laboratory. The physico-chemical analysis of water samples from Khatkali reservoir was carried out by standard methods of Trivedy and Goel (1984) and APHA (2005) prescribed by Bureau of India standard (2010) approved by Ministry of drinking water and sanitation, government of India. APHA, AWWA and WPDF (2012).

RESULTS AND DISCUSSION

The study of freshwater algae in the Khatkali reservoir in Maharashtra revealed a diverse spectrum of algal species, indicating the reservoir's ecological complexity. The identified algal taxa fall into several categories, including Cyanophyceae, Charophyceae, Chlorophyceae, Bacillariophyceae, and Euglenophyceae genera. Diversity of algae at four different sites from June 2019 to May 2020 represents in table 1.

Table 1: - Seasonal Variation of algal taxa.

Sr. No.	Name of Class	June 2019 to May 2020			June 2020 to May 2021		
		Monsoon	Winter	Summer	Monsoon	Winter	Summer
01	Chlorophyceae	36	37	30	37	37	29
02	Charophyceae	1	3	2	1	3	2
03	Bacillariophyceae	13	17	19	13	18	18
04	Euglenophyceae	3	6	7	3	6	7
05	Cyanophyceae	21	30	35	21	31	35
Total		73	92	92	74	94	90

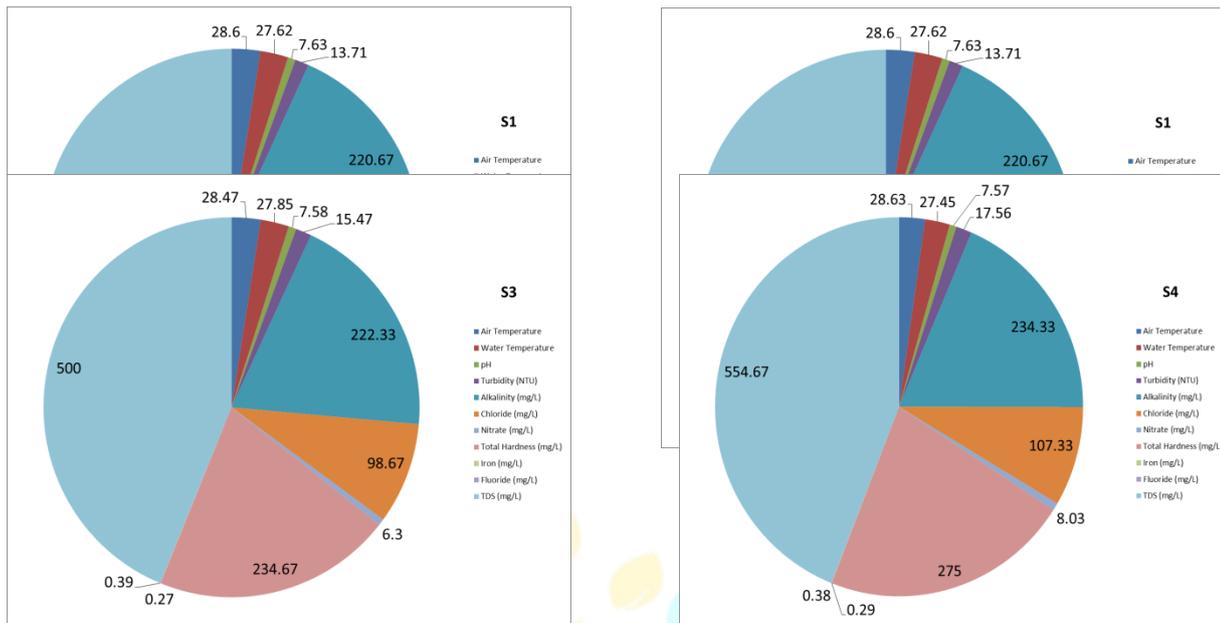
Graph 1: - Seasonal Variation of algal taxa.

The variations of physicochemical characteristics of water quality at all four sites in katkali reservoir for two years have summarized in the table 2 and graph 1,2,3 and 4. It was observed that average air temperature at all four site is same 28⁰C. while other character water temperature, pH, turbidity, Alkalinity, Chloride, Nitrate, Total hardness, Iron, Fluoride and TDS also shows similar average values. The temperature of water was recorded with the help of thermometer. The temperature of water is the most significant ecological factor which strongly affects various properties of the water body. The average temperature of reservoir water was 27⁰C, while it shows very minor variations. This slight variation in temperature may be depending on collection timing and season (Jayaraman et al. 2003). The pH of water of khatkali reservoir ranges from 7.63, 7.58, 7.58, 7.57 at S1, S2, S3, and S4 respectively. This variation pH values indicate the imbalance in carbonate and bicarbonate equilibrium of water (Karanth, 1987).

Table 2:- Average values of Physico-chemical Parameters in

Sr. No.	Parameters (Unit)	S ₁	S ₂	S ₃	S ₄
01	Air Temperature (°C)	28.60	28.33	28.47	28.63
02	Water Temperature (°C)	27.62	27.33	27.85	27.45
03	pH	7.63	7.58	7.58	7.57
04	Turbidity (NTU)	13.71	14.52	15.47	17.56
05	Alkalinity (mg/L)	220.67	253.33	222.33	234.33
06	Chloride (mg/L)	102.00	112.67	98.67	107.33
07	Nitrate (mg/L)	6.38	15.00	6.30	8.03
08	Total Hardness (mg/L)	237.00	311.00	234.67	275.00
09	Iron (mg/L)	0.29	0.29	0.27	0.29
10	Fluoride (mg/L)	0.36	0.38	0.39	0.38
11	TDS (mg/L)	510.67	567.67	500.00	554.67

Graph 2:- Average values of Physico-chemical Parameters in



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