

Manuscript ID:  
IJRSEAS-2025-020105



Quick Response Code:



Website: <https://eesrd.us>



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DOI: 10.5281/zenodo.15088571

DOI Link:  
<https://doi.org/10.5281/zenodo.15088571>

Volume: 2

Issue: 1

Pp. 19-22

Month: February

Year: 2025

E-ISSN: 3066-0637

Submitted: 30 Dec-2024

Revised: 19 Jan 2025

Accepted: 25 Feb.2025

Published: 28 Feb.2025

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**How to cite this article:**

Khandagale, D. K., & Pradhan, V. (2025). Study on Harsul Lake Physio-chemical Water Parameters. *International Journal of Research Studies on Environment, Earth, and Allied Sciences*, 2(1), 19–22. <https://doi.org/10.5281/zenodo.15088571>

## Study on Harsul Lake Physio-chemical Water Parameters

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### Abstract

Harsul Lake, found in Chh. Sambhajinagar, Maharashtra, is a valuable ecological and hydrological resource. This investigation evaluates the quality of water of the lake based on various physio-chemical parameters like pH, electrical conductivity (EC), turbidity, temperature, Total Dissolved Solids (TDS), hardness, alkalinity, calcium, magnesium, chemical oxygen demand (COD), biochemical oxygen demand (BOD), and dissolved oxygen (DO). The results demonstrate high levels of pollution, with high organic matter content being among the most startling. High COD and BOD content indicate serious pollution that is a severe menace to the aquatic environment and domestic water use. The research focuses on the adverse effect of bad water quality, which has the potential to kill aquatic life, distort biodiversity, and contribute to health hazards among communities depending on the lake for water supply. Turbidity and TDS are high, and hence indicate pollution, whereas DO levels are low, indicating limited availability of oxygen, which could further deteriorate the ecological balance of the lake. With the urgent levels of pollution, there is a need for urgent action to enhance water quality and safeguard the health of the lake's ecosystem. This study demands the enforcement of stringent pollution control measures, improved waste management, and constant monitoring of water quality. Ongoing research and management are essential to avoid further deterioration of the lake and ensure its long-term sustainability. Addressing these issues is vital for the health of the environment as well as that of the community in question, demonstrating the value in protecting water supplies in highly developed urban cities.

**Keywords:** Physio-chemical parameters, Harsul Lake, Dissolved Oxygen, Chemical oxygen Demand, Water Pollution.

### Introduction

Water is one of the most essential natural resources for sustenance of life gifted to human by nature. The availability of freshwater resources is important to meet the water use demand of rapidly growing population and spreading out of economic activities of any country. India is naturally supported by a large number of freshwater bodies in the form of rivers, lakes and wetland. But, in the present scenario, these fresh water bodies are polluting due to heavy influence of anthropogenic activities, Samrat et al (2012). In the present study an attempt was made to assess degradation of the water of Harsul Lake for checking the pollution status. The basic aim of this Harsul lake is to supply water to nearby locality for domestic use as shown in the work of Deshmukh Pradeep Sudhakar Rao (2020). The Harsul lake is located near Aurangabad city of Maharashtra. It is an important lake constructed on the Kham River in the year 1952. The basic purpose of this lake is to supply water in nearby locality for domestic use, irrigation and pisciculture. A few decades ago, this lake was surrounded by agricultural fields, but due to construction activities now a day this lake is surrounded by many human colonies [6]. The jatwada hill showcases a sequence of layered sandstone that was deposited in the plain of the area. Recent deposits consist of a mixture of sand, slit, and clay, and are suitable for agricultural purposes. The water level underground in the region typically ranges from 30 to 50 meters below the surface. There are no factories or industrial facilities in the vicinity that could potentially contaminate the groundwater sources. The primary source of replenishing the ground water is through precipitation and seepage from streams during rainy seasons, with rainfall being the most significant contributor. The amount of rainfall has a significant impact on the quantity and quality of the crops as found in the work of Dr. Chavan T. P. et al (2021). Effective green revolution has introduced a large variety of chemicals in to the environment these chemicals have been beneficial on one hand but exercise severe strength and environmental problems on other through food chain. The industrial effluent when it enters a terrestrial and aquatic ecosystem it impacts on animal and plant life. These toxic chemical change the quality of water that affects the fish and Effective green revolution has introduced a large variety of chemicals in to the environment, Ganpat B. et al (2017). Aurangabad, a city in Maharashtra now known as Chhatrapati Sambhajinagar, is known for its rich history and is currently recognized as an industrial hub in the state.

It is situated between latitude 19 degrees and 53 minutes north and a longitude 75 degrees and 20 minutes east, Boralkar et al (2012). The urban region is growing rapidly, resulting in the construction of numerous building complexes and an increase in the amount of sewage and other types of waste in the surrounding urban environment Sami Taha Ahmed Aladimy et al (2016). It has been seen that the concentration of different substances in contaminated water rises based on the nature of pollution. Negi et al. (2006) also reported the same findings. The intensive agricultural practices around lentic and lotic systems have a significant influence on COD concentration. The findings of the current study are in accordance with those of earlier research, e.g., Naik et al. (2001).

### Background of Harsul Lake:

Harsul Lake serves as a crucial water source for irrigation and domestic use in the region. However, increasing urbanization and agricultural runoff have raised concerns about water quality. Understanding the physiochemical parameters of the lake is essential for evaluating its ecological status and implementing effective management strategies.

### Achieving the Goals of Our Research:

The primary targets of this observe are:

- Evaluation of current physiochemical parameters of Harsul Lake water.
- To identify potential sources of pollution affecting water quality.
- To provide baseline data for future monitoring and management efforts.

### Material and Methods:

#### Study Area

Harsul Lake is situated in Chh. Sambhajinagar, Maharashtra, and is characterized by its diverse aquatic ecosystem. The lake's geographical coordinates are approximately 20.05°N and 75.25°E.

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Fig 1: Showing Study Area Map (Harsul Lake)



### Sampling:

Water samples were collected using grab sample method using a plastic water bottle 1 litre of sample was used for analysis. The sample was analysed on 23<sup>rd</sup> August 2023, with the following parameters measured.

### Physio-chemical Parameters Analysis:

The following parameters were analysed according to standard methods:

Parameter	Result	Unit	Method of Analysis
pH	8.56	pH	IS 3025 (Part 11)
Electrical Conductivity (EC)	0.63	mS/cm	IS 3025 (Part 14)
Turbidity	2.1	NTU	IS 3025 (Part 10) [2]
Temperature	27	°C	IS 3025 (Part 9) [2]
Total Dissolved Solids (TDS)	465.72	mg/L	IS 3025 (Part 16) [2]
Total Hardness (as CaCO <sub>3</sub> )	220.00	mg/L	IS 3025 (Part 21) [2]
Total Alkalinity (as CaCO <sub>3</sub> )	166.85	mg/L	IS 3025 (Part 23) [2]
Calcium (as Ca)	76.88	mg/L	IS 3025 (Part 40) [2]
Magnesium (as Mg)	16.29	mg/L	IS 3025 (Part 46) [2]
Chemical Oxygen Demand (COD)	360	mg/L	APHA 5220B [1]
Biochemical Oxygen Demand (BOD)	134	mg/L	IS 3025 (Part 44) [2]
Dissolved Oxygen (DO)	1.5	mg/L	IS 3025 (Part 38) [2]

### **Data Analysis:**

Data were analysed to determine mean values and assess compliance with water quality standards. The results were compared to established guidelines for freshwater bodies.

### **Results:**

#### **pH and Temperature:**

The pH of 8.56 is slightly alkaline, which is typically a good condition for aquatic organisms. The temperature of 27°C is normal for tropical freshwater, conducive to a wide variety of organisms.

#### **Electrical Conductivity and TDS:**

The electrical conductivity of 0.63 mS/cm and TDS of 465.72 mg/L indicate moderate mineral concentration in the water, which impacts aquatic ecosystems and usability of water.

#### **Turbidity:**

A turbidity of 2.1 NTU represents fairly clear water, which is good for photosynthesis by aquatic plants. Increased turbidity, however, can result in less penetration of light and impacts aquatic life.

#### **Hardness and Alkalinity:**

220 mg/L total hardness and 166.85 mg/L alkalinity indicate the water has moderate buffering capacity to resist pH change, which is important for ensuring stable aquatic habitats.

#### **Nutrient Levels and Organic Pollution:**

The COD of 360 mg/L and BOD of 134 mg/L are high, showing extensive organic pollution, and the lake is apparently receiving large quantities of biodegradable material, probably from agricultural runoff and municipal waste. The low DO of 1.5 mg/L is alarming since it points to possible hypoxic conditions that are detrimental to aquatic life.

### **Discussion:**

The analysis reveals that Harsul Lake is experiencing moderate to high levels of organic pollution, which can lead to eutrophication and negatively impact water quality. The low levels of dissolved oxygen are particularly alarming, as they threaten the survival of fish and other aquatic organisms. To improve water quality in Harsul Lake, the following measures are recommended: Implementing pollution control measures to reduce runoff from agricultural and urban sources. Establishing regular monitoring programs to track changes in water quality over time. Engaging local communities in conservation efforts to promote sustainable practices.

### **Conclusion:**

The study of Harsul Lake's physiochemical parameters highlights significant challenges regarding water quality and ecological health. Immediate action is necessary to address pollution sources and protect this vital resource for future generations.

### **Acknowledgment**

I am Dnyanraj Khandagale thankful to Dr. Maqdoom Farooqui, Principal and Prof. Vidya Pradhan HOD, Department of Zoology, Dr. Rafiq Zakaria College for Women Chhatrapati Sambhajinagar for granting permission to carry out this research work.

### **Financial Support and Sponsorship**

Nil.

### **Conflicts of Interest**

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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