Water Quality Assessment of Lake Water Using Physico-Chemical Parameters: A Case Study of Tilyar Lake, Rohtak (Haryana), India

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***Abstract*—Freshwater lakes play an important role in maintaining ecological balance and supporting biodiversity. The present study focuses on the analysis of water samples collected from Tilyar Lake in Rohtak district of Haryana. Various physicochemical parameters such as temperature, pH, dissolved oxygen (DO), biological oxygen demand (BOD), total dissolved solids (TDS), alkalinity, and nutrients were evaluated to assess the water quality of the lake ecosystem. Water samples were collected from different sites of the lake and analyzed using standard laboratory procedures. The results indicated moderate variation in water quality parameters due to seasonal changes and anthropogenic influences. Some parameters such as dissolved oxygen and nutrient concentration showed fluctuations that may influence aquatic biodiversity. Continuous monitoring and proper management strategies are essential to maintain ecological health and sustainability of the lake ecosystem.**

***Index Terms*—Water quality, Physico-chemical parameters, Tilyar Lake, Rohtak, freshwater ecosystem**

I. Introduction

Water is one of the most essential natural resources for sustaining life on earth. Freshwater lakes are important components of aquatic ecosystems and provide water for domestic, agricultural and recreational purposes. However, increasing urbanization, tourism activities and agricultural runoff have significantly affected the quality of freshwater bodies.

Tilyar Lake located in Rohtak district of Haryana is a major recreational and ecological site. The lake receives water mainly through canal supply and supports several aquatic organisms.

Assessment of water quality is necessary to understand the ecological condition of the lake and its suitability for aquatic life.

Physico-chemical analysis of water samples helps in identifying pollution levels and environmental changes occurring in aquatic ecosystems.

II. Objectives

The present study was conducted with the following objectives:

- To analyze the physicochemical parameters of lake water samples from Tilyar Lake.
- To evaluate seasonal variation in water quality.
- To assess the ecological condition of the lake ecosystem.

- To suggest management strategies for sustainable conservation of the lake.

III. Hypothesis

H_0: There is no significant variation in the physicochemical parameters of water samples collected from Tilyar Lake.

H_1: Physicochemical parameters show significant variation due to environmental and anthropogenic influences.

IV. Study Area

Tilyar Lake is located in Rohtak district of Haryana, India. The lake is situated near the Delhi-Fazilka highway and is surrounded by recreational facilities and a zoological park. The lake covers an area of approximately 132 acres and serves as an important ecological and tourism site.

The lake ecosystem supports aquatic flora and fauna and attracts visitors throughout the year.

V. Methodology

5.1 Sample Collection

Water samples were collected from three different sites of the lake representing different ecological zones such as:

- Inlet zone
- Middle zone
- Outlet zone
- Samples were collected in clean sterilized bottles during morning hours.

5.2 Physico-Chemical Analysis

The following parameters were analyzed:

- Temperature
- pH
- Dissolved Oxygen (DO)
- Biological Oxygen Demand (BOD)
- Total Dissolved Solids (TDS)
- Total Hardness
- Alkalinity
- Nitrate
- Phosphate

- Standard methods recommended by APHA were used for laboratory analysis.

VI. Results and Discussion

The physicochemical analysis revealed variations in different water quality parameters.

Temperature: Water temperature ranged between 22°C–30°C depending on seasonal conditions.

pH: The pH values remained slightly alkaline which is typical for freshwater lakes.

Dissolved Oxygen: DO levels varied across sampling stations, indicating fluctuations in oxygen availability for aquatic organisms.

Nutrients: Nutrient concentrations such as nitrate and phosphate influence phytoplankton growth and primary productivity.

Previous studies on Tilyar Lake also reported variations in physicochemical parameters and phytoplankton productivity due to nutrient concentration and environmental conditions.

Low dissolved oxygen levels in some cases may disturb ecological balance and affect aquatic biodiversity.

These results suggest that anthropogenic activities and seasonal changes can significantly influence the water quality of the lake.

VII. Conclusion

The present study highlights the importance of regular monitoring of lake water quality. Physicochemical parameters showed moderate variations indicating that the lake ecosystem is under environmental pressure but still capable of supporting aquatic life.

Proper conservation measures such as pollution control, management of nutrient inflow and public awareness programs are required to maintain the ecological health of Tilyar Lake.

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