**study OF SOME Physicochemical Parameters of Paliwal park lake water at agra, uttar pradesh**

**ABSTRACT**

Physicochemical analysis of Paliwal Park lake water at Agra, Uttar Pradesh, India carried out for period of eight months (July 2024 to February 2025) on the basis of monthly sampling. Various physicochemical parameters, such as water temperature, air temperature, pH, humidity, electric conductivity (EC), total dissolved solid (TDS), dissolved oxygen (DO), total hardness (TH) and turbidity were taken for study. The results revealed that significant variations were found in monthly water samples. The aim of this study was to analyze the monthly variations in Physicochemical Parameters of Paliwal Park lake water at Agra, Uttar Pradesh.

**Keywords - :** Physicochemical Analysis, pH, Lake, total dissolved solid, dissolved oxygen, total hardness.

**1. INTRODUCTION**

Water, the one of a very important factor of nature has assumed the vital role in the development of life from bio molecules to man. Every Ancient civilization developed on the banks of Rivers. The water assets are utilized to satisfy the interest for horticultural, mechanical and human settlement. Human wellbeing and strength of biological community is specifically related with quality and availability of water. The aquatic flora and fauna are depleted and the water quality is deteriorating due to rapid industrialization and recurrent consumption of fertilizers and pesticide in agriculture leads to pollution of aquatic environment. This contaminated water affects the surrounding of lakes which are unique assets and are very important ecosystems in the nature and society [1].

Water is considered as base of life, for all the living organisms the water is basic and unavoidable requirement. Due to more and more economic development in last few centuries the population grows as well and requirement of fresh water also goes high. Water is one of the most peculiar of our natural resources for life; next to air it is likely to become a critical scarce resource in the coming decades. Most of our demands for water are fulfilled by rainwater that gets deposited in surface and groundwater sources [2, 3].

Agra is one of the most populous cities in Uttar Pradesh, and the 23th most populous in India. Agra is a major tourist destination because of its many Mughal-era buildings, like the Tāj Mahal, Agra Fort and Fatehpur Sikri, all three of which are UNESCO World Heritage Sites. K. D. Paliwal Park also known as Hewitt Park is located in the heart of Agra, India. It is spread over an area of around 70 acres (280,000 m2). KD Paliwal Park, one of the top attractions in Agra. It attracts a lot of tourists every day because it is situated in the centre of the city. The park is home to a wide variety of plants and animals as well as a beautiful lake that is surrounded by abundant vegetation. The park was originally known as Hewitt Park when it was constructed during the British era, but it was later renamed in honour of Shri Krishna Dutta Paliwal, the first finance minister of Uttar Pradesh, when Shri Govind Ballabh Pant was the Chief Minister of U.P State. Tourists can enjoy boating on the lake, which is really adorable [4, 5].

Groundwater includes water of rivers, lakes and ponds etc. Groundwater is a precious and the most widely distributed resource of the earth. Groundwater is one of the largest sources of fresh water on our planet excluding the polar ice caps and glaciers. The quality of water can be assessed by various parameters such as pH, BOD, COD, electrical conductivity, nitrate, phosphorus, potassium; total dissolved solid, dissolved oxygen, total hardness and turbidity etc [6, 7]. The study of variations in Physico-chemical properties of ground water is very important to know the quality of water. The aim of this study was to evaluate the monthly variations in Physicochemical Parameters of Paliwal Park lake water at Agra, Uttar Pradesh, India.

**2. MATERIALS AND METHODS**

**Sample Collection**

Water samples from Paliwal Park Lake at Agra, Uttar Pradesh were collected for period of eight months (July 2024 to February 2025) on the basis of monthly sampling. The samples were collected from the surface water of the selected site in pre-cleaned polyethylene bottles of one litres capacity.

**Physico-Chemical Analysis**

The collected samples were analyzed for major physical and chemical water quality parameter like Water temperature, Air temperature, Humidity, pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Hardness (TH), Dissolved oxygen (DO) and Turbidity. Water temperature, Air temperature, Humidity, pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), and Turbidity were analyzed with electronic digital meters. Total Hardness (TH) was noted with volumetric method by titrating with a standard solution of ethylene diamine tetra acetic acid (EDTA). Dissolved oxygen (DO) was determined by Winkler method or iodometric method which was a titration-based method [8, 9, 10].

**3. RESULTS AND DISCUSSION**

The selected physico-chemical parameters such as air temperature, water temperature, humidity, pH, electric conductivity, turbidity, dissolved oxygen, total dissolved solid and total hardness of water from selected sites were analyzed for eight months (July 2024 – February 2025). The Monthly Variation in Physico-chemical Parameters of Paliwal park lake water at Agra were presented in table 1. All parameters were reported in mean value of the data with standard deviations.

**Table 1: Average Results of the Physicochemical Parameters of Paliwal Park lake water at Agra for July 2024 – February 2025**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Month | Air temp.In 0C | Humidity in % | Water temp. in 0C | pH | TDS in ppm | ECµs/cm | DO in mg/l | Hardness in mg/l | Turbidity in NTU |
| July | 35.7 | 67 | 34.8 | 8.9 | 1750 | 3500 | 8.8 | 364 | 3 |
| Aug | 31.0 | 74 | 30.8 | 8.5 | 1314 | 2968 | 9.0 | 490 | 2 |
| Sept | 32.7 | 66 | 32.6 | 8.4 | 1912 | 1956 | 9.2 | 408 | 5 |
| Oct | 31.2 | 55 | 31.4 | 8.1 | 1262 | 2466 | 10.2 | 320 | 2 |
| Nov | 25.1 | 53 | 30.2 | 7.4 | 1020 | 2556 | 9.6 | 364 | 2 |
| Dec | 18.1 | 51 | 28.1 | 7.2 | 1008 | 2473 | 9.3 | 402 | 2 |
| Jan | 20.3 | 58 | 20.3 | 8.3 | 1588 | 3362 | 9.2 | 406 | 3 |
| Feb | 20.4 | 53 | 20.5 | 7.9 | 1681 | 3366 | 7.7 | 340 | 2 |
| Range | 18.1-35.7 | 51-74 | 20.3-34.8 | 7.2-8.9 | 1008-1912 | 1956-3500 | 7.7-10.2 | 320-490 | 2-5 |
| Mean | 26.81 | 59.62 | 28.58 | 8.08 | 1441.87 | 2830.8 | 9.12 | 386.75 | 2.62 |
| SD | 6.68 | 8.38 | 5.40 | 0.56 | 340.04 | 552.54 | 0.71 | 52.63 | 1.06 |

In study period during sampling, range of air temperature, humidity, and water temperature were noticed as 18.1-35.7 0C, 51-74 % and 20.3-34.8 0C, respectively. Mean TDS of Paliwal park lake water was 1441.87 ± 340.04 ppm while WHO standard was less than 250ppm. Mean hardness of Paliwal park lake water was 386.75 ± 52.63 mg/L while WHO standard was less than 200 mg/L for drinking water. Mean turbidity of Paliwal park lake water was 2.62 ± 1.06 NTU while WHO standard was less than 5 NTU for drinking water. Mean electric conductivity of Paliwal park lake water was 2830.8 ± 552.54 µs/cm while WHO standard was less than 500 µs/cm for drinking water in term of EC [11, 12, 13, 14, 15].

Gupta S., et al., (2023), studied some physicochemical parameters of Paliwal Park Lake water at Agra, and showed there were significant monthly variations in selected physicochemical parameters of water samples. In that study it was also concluded that these water samples did not meet the drinking water standards as prescribed by WHO [16].

 **4. CONCLUSION**

Due to use of contaminated water, humans suffer in many aspects such as water born disease, health hazards and environmental hazards etc. it is therefore to check water quality at regular time interval is essential. The result of present study revealed that there were significant monthly variations in selected physicochemical parameters of water samples from Paliwal Park Lake at Agra, Uttar Pradesh.

**CONSENT**

It is not applicable.

**ETHICAL APPROVAL**

It is not applicable.

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