



# APPRAISAL STUDY OF WATER PARAMETERS QUALITY AND CORRELATION ANALYSIS OF HINGLAJWADI LAKE AT HINGLAJWADI DIST. OSMANABAD, [M.S.] INDIA.

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## Abstract:

The study of various water parameters is very important for understanding metabolic events in the aquatic ecosystem. Parameters influence sediment parameters, the frequency then distribution of flora plus fauna. It is therefore compulsory to analyze at least the important parameters of water when carrying out ecological studies in aquatic ecosystems. Such studies, if carried out from time to time, may indicate favourable or unfavourable changes in the ecosystem. The present study concerns the assessment of the water quality of Lake Hinglajwadi in the Hinglajwadi District. Osmanabad [M.S.] India. The physicochemical properties were examined and analyzed from January 2019 to December 2019. The results showed that the state of this lake showed fluctuations in the physicochemical parameters during various seasons. The correlation coefficient shows a highly significant positive and negative relationship ( $p < 0.01$ ) and also a significant positive and negative relationship ( $p < 0.05$ ) of Lake Hinglajwadi in the Hinglajwadi district. Osmanabad [M.S.] India. Correlation coefficients are used to measure the strength of the association between parameters. The results showed that the conditions of these parameters are correlated with the different seasons.

**Keywords:** Correlation, water parameters, seasonal variations, and Hinglajwadi Lake.

## INTRODUCTION

The quality of surface waters, including lakes and rivers, depends on their physical, chemical, and biological properties. However, the quality of the water is related to the biological and physicochemical properties. The physicochemical properties provide a limited picture of water quality at all times while living organisms act as continuous monitoring of water quality over time. It has increased the relative importance of biological methods for monitoring water quality. We must protect our natural lakes, our reservoirs, our artificial lakes, Ponds, etc. Pollution by domestic wastewater, industrial wastewater, agricultural waste, fertilizers, detergents, toxic metals, cracks, oils, thermal pollution, radioactive substances. The body of water is useful for loading groundwater; Aquaculture, food regulation, moderation, and control, conditioning of the microclimate, conservation of biodiversity, the interaction between flora and fauna, parks, grooves as a source for the neighbour layer, gardening, orchards and common goods of educational and cultural value (Shinde, 2012).

In India variety of weather conditions, summer from February-May, Monsoon from June-September and winter from October-January. In tropical countries, there may be a direct relationship between the duration of sunshine and temperature. The present investigation has been undertaken to assess the water quality of Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India which essential for human use in that vicinity. The water is used for domestic, agricultural, and recreational purposes by the local people.

## MATERIAL AND METHODS

The water samples for Physico-chemical analysis were collected from Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India, in the early morning between 8 am to 11 am in the first week of every month from January 2019 to December 2019. The samples collected in the acid-washed five-liter plastic container up to the depth of 5-10 cms below the surface of the water. Separate samples were collected for Dissolve Oxygen in 250 ml bottles, and Dissolved Oxygen was fixed in the field by adding alkaline iodide-azide solution immediately after collection. The samples were analyzed immediately returned to the laboratory.

The water quality status of the Lake water was determined seasonally viz summer, monsoon, and winter. Physico-chemical characteristics like Air Temperature, Water Temperature, Turbidity, Transparency, pH, Conductivity, Dissolved Oxygen (DO), Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD) were determined seasonally in summer, monsoon, and winter according to standard methods (APHA, 1998; Trivedi and Goel, 1987).

## RESULT AND DISCUSSION

The water parameters were studied and recorded in three seasons, summer, monsoon, and winter, respectively. The seasons Physico-chemical parameters data of Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India has been presented in the table. No.1, and 2. The present study deals with the Physico-chemical characteristics of Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India.

### Physico-Chemical Characteristic

These are considered as the most important values in the identification of the nature, quality, and type of freshwater, brackish water, and saline water in any aquatic ecosystem. Physico-chemical characteristics were observed and recorded as follows.

During the study from January 2019–December 2019, the air temperature was between 23 and 32.5 °C. The highest values were recorded in summer  $30.75 \pm 1.84$  °C and the lowest values in winter  $25.85 \pm 2.18$  °C. The overall average values were  $28.16 \pm 1.26$  °C. The water temperature was between 18 and 27 °C. The highest values were  $25.25 \pm 1.25$  °C in summer, and the lowest in winter,  $21.05 \pm 2.55$  °C were recorded. The general average was  $23.25 \pm 0.79$  °C. The transparency varied from 5.3 to 20 cm the highest values were recorded in summer  $20 \pm 0.30$  cm, and the lowest in monsoon  $6.25 \pm 0.98$  cm the total mean  $13.24 \pm 2.88$  mg/L. The turbidity varied from 107 to 440 NTU the highest values were recorded in monsoon  $365 \pm 65.57$  NTU, and the lowest in summer  $107 \pm 30.84$  NTU the total mean was  $399.99 \pm 7.85$  NTU. The electric conductivity varied from 703.8 to 3468  $\mu\text{mhos/cm}$  the highest values were recorded in monsoon  $1455.75 \pm 769.43$   $\mu\text{mhos/cm}$ , and the lowest in winter  $915.55 \pm 241.18$   $\mu\text{mhos/cm}$  the total mean was  $1392.45 \pm 441.85$   $\mu\text{mhos/cm}$ . The  $\text{P}^{\text{H}}$  varied from 6.48 to 9.3 the highest values were recorded in monsoon  $8.92 \pm 0.43$ , and the lowest in winter  $7.17 \pm 0.67$  the total mean was  $8.09 \pm 0.11$ . The dissolve oxygen varied from 2.9 to 6.5 mg/L the highest values were recorded in winter  $5.6 \pm 1.08$  mg/L, and the lowest in summer  $3.1 \pm 0.18$  mg/L the total mean was  $4.14 \pm 0.45$  mg/L. The Biochemical Oxygen Demand varied from 34.2 to 152 mg/L the highest values were recorded in winter  $135 \pm 11.64$  mg/L, and the lowest in summer  $47.32 \pm 11.14$  mg/L the total mean was  $83.74 \pm 10.30$  mg/L. The Chemical Oxygen Demand varied from 104 to 365 mg/L the highest values were recorded in winter  $322.85 \pm 28.67$  mg/L and the lowest in summer  $125.75 \pm 16.60$  mg/L the total mean was  $214.46 \pm 23.39$  mg/L (Table 1).

During the study from January 2019–December 2019, air temperature indicated a significant positive correlation with water temperature, turbidity, and pH, as well as a significant negative correlation with transparency. Water temperature shows a significant positive correlation with air temperature, turbidity, and pH, as well as a significant negative correlation with transparency, DO, BOD, and COD. Transparency showed a significant positive correlation with BOD, as well as indicated a significant negative correlation with air temperature, water temperature, turbidity, and pH. Turbidity showed a significant positive correlation with air temperature, water temperature, and pH, as well as indicated a significant negative correlation with transparency. Electric conductivity showed a significant no positive correlation and indicated a significant negative correlation with DO, BOD, and COD.  $\text{P}^{\text{H}}$  showed a significant positive correlation with air temperature, water temperature, and turbidity, as well as indicated a significant negative correlation with transparency, DO, BOD, and COD. Dissolve oxygen showed a significant positive correlation with BOD and COD, as well as indicated a significant negative correlation with water temperature, electric conductivity, and pH. Biochemical Oxygen Demand showed a significant positive correlation with DO, transparency, and COD as well as indicated a significant negative correlation with water temperature, electric conductivity, and pH. Chemical Oxygen Demand showed a significant positive correlation

with DO and BOD as well as indicated a significant negative correlation with water temperature, electric conductivity, and pH (Table 2).

To summarize air and water temperatures, a general trend was followed that was higher in summer and relatively low during monsoons and winter. Similar observations have been recorded (Kumar *et al.*, 2006; Ingole *et al.*, 2009; Shinde *et al.*, 2010, and 2011). The water was less transparent during monsoon as compared with winter and summer. Similar observations were made by (Kadam *et al.*, 2007 and Jayabhaye *et al.*, 2008). In the present study, the lowest values of turbidity and the highest values of transparency were recorded in winter and highest values of turbidity and the lowest values of transparency recorded in monsoon. Minimum turbidity and maximum transparency during winter are due to the settlement of total dissolved solids, total suspended solids and total solids as light penetration depend upon the number of suspended particles. Thus it seems that transparency is inversely proportional to turbidity (suspended matter).

During monsoon, the process of photosynthesis was mostly inhibited. Similar findings have been observed by Kumar *et al.*, (2006). The high value in monsoon could be due to inflow of high quantum of domestic sewage in the rainy season and low values in summer might be due to higher temperature, and stabilization of water due to sedimentation and increased concentration of slats because of discharged domestic sewage and organic matter in the river join Lake. During the present investigation, the range observed was higher than the permissible limits given by ISI, which indicates that the water of the said lake is not suitable for drinking purposes. The pH values varied from 7.2 to 8.7 are suitable for the aquatic organism (Rajshekhar *et al.*, 2007). In summer, high pH might be due to a reduced level of water in the dam, and the low pH value was observed during the winter due to heavy water into the water body. The maximum DO in winter might be due to low atmospheric temperature and intensive photosynthetic activity, and minimum DO was recorded in summer months might be due to the high metabolic rate of organisms. Similar results have been reported by (Hazelwood and Parker, 1961 and Manawar, 1961). The BOD values were higher in monsoon as compared with the summer and winter season. It might be because of the presence of various types of pollutants mixed with rainwater. The COD was high in the rainy season while in the winter season, the COD value was minimum as the organic pollution was minimum (Shinde *et al.*, 2010 and 2011).

## CONCLUSIONS

The present study shows a detailed study regarding the quality of water in Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India.

- 1) The summer, monsoon, and winter seasons show different seasonal fluctuations in Air Temperature, Water Temperature, Turbidity, Transparency, pH, Conductivity, Dissolved Oxygen (DO), Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD).
- 2) During the present investigation, the range observed conductivity and turbidity were higher than the permissible limits given by ISI, which indicates that the water of the said lake is not suitable for drinking purposes.



- 3) The water of the present lake is useful for irrigation as well as fish culture.
- 4) Manmade activates are the main source of water pollution. There is no industrial pollution in this area.
- 5) In the present study, it performs that the significant positive and significant negative correlation present in Physico-Chemical parameters. We can conclude that all the parameters are more or less correlated with each other.
- 6) Correlation coefficients are used to measure the strength of the association between parameters.
- 7) The water quality improves, there should be continuous monitoring of pollution level to maintain the favourable conditions of fish survival growth and reproduction in Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India.

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**Table-1. Seasonal variations in physico-chemical parameters of Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India (During January 2019 - December 2019).**

Parameters	Range	Summer	Monsoon	Winter	Annual
<b>Air Temperature</b>	23-32.5	30.75±1.84	27.9±4.18	25.85±2.18	28.16±1.26
<b>Water Temperature</b>	18-27	25.25±1.25	23.475±2.70	21.05±2.55	23.25±0.79
<b>Transparency (cm)</b>	5.3-20	20±0.30	6.25±0.98	13.475±5.41	13.24±2.88
<b>Turbidity (NTU)</b>	107-440	107±30.84	365±65.57	191.75±96.91	221.25±49.45
<b>Conductivity (µmhos /cm)</b>	703.8-3468	1455.75±769.43	1806.07±1118.83	915.55±241.18	1392.45±441.85
<b>pH</b>	6.48-9.3	8.18±0.55	8.92±0.43	7.17±0.67	8.09±0.11
<b>DO (mg/l)</b>	2.9-6.5	3.1±0.18	3.72±0.75	5.6±1.08	4.14±0.45
<b>BOD (mg/l)</b>	34.2-152	47.32±11.14	68.9±29.24	135±11.64	83.74±10.30
<b>COD (mg/l)</b>	104-365	125.75±16.60	194.8±61.79	322.85±28.67	214.46±23.39

**Table 2: - Values of correlation coefficient among Physico-Chemical parameters, of Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India (During January 2019 - December 2019).**

Parameters	Air Temp	Wat. Temp.	Tran.	Turb.	Cond.	pH	DO	BOD	COD
<b>Air Temp</b>	1	<b>0.98**</b>	<b>-0.99**</b>	<b>0.99**</b>	0.52	<b>0.98**</b>	-0.65	-0.65	-0.56
<b>Wat. Temp.</b>		1	<b>-0.99**</b>	<b>0.95**</b>	0.67	<b>0.98**</b>	<b>-0.77*</b>	<b>-0.78*</b>	<b>-0.70*</b>
<b>Transparency</b>			1	<b>-0.98**</b>	-0.57	<b>-0.99**</b>	0.69	<b>0.70*</b>	0.61
<b>Turbidity</b>				1	0.43	<b>0.95**</b>	-0.57	-0.57	-0.47
<b>Conductivity</b>					1	0.67	<b>-0.98**</b>	<b>-0.98**</b>	<b>-0.99**</b>
<b>pH</b>						1	<b>-0.77*</b>	<b>-0.78*</b>	<b>-0.70*</b>
<b>DO</b>							1	<b>0.99**</b>	<b>0.99**</b>
<b>BOD</b>								1	<b>0.99**</b>
<b>COD</b>									1

\*\*significant at  $p < 0.01$ , \*significant at  $p < 0.05$