LIMNOLOGY AND CORRELATION ANALYSIS IN BETWEEN PHYSICO-CHEMICAL PARAMETERS OF HINGLAJWADI LAKE AT HINGLAJWADI DIST. OSMANABAD, [M.S.] INDIA.

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Abstract:

The main objective of limnology is to study the circulation of materials, in particular organic substances in a body of water. Biotic and abiotic phenomena are interrelated, and the concept of equilibrium is an important part of this correlation. Several organizations such as a public health association, hydrologists, water pollution control agencies, etc. are dedicated to water analysis, and trying to improve water quality is of most importance. 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: Hydrology, Correlation, water parameters, seasonal variations, and Hinglajwadi Lake.

INTRODUCTION

In any aquatic system, hydrobiological analysis is a prerequisite for evaluating its possibilities to understand the realities between different water levels and food webs. In this study, taking physical-chemical factors into account helps create specific ecosystems that determine the trophic dynamics of water. Knowledge of the Physico-chemical properties of water is necessary for aquaculture in water. Water productivity depends mainly on the physicochemical and biological properties. These properties depend on the nature of the soil and climatic conditions. It is one of the unique aspects associated with aquatic organisms. The interaction of aquatic organisms with their environment has influenced not only a single species and its environmental relationships but also the communities of organisms in which more than one species participates (Sundaramanickam *et a*l., 2008).

Climatic conditions are different in India, Summer from February to May, monsoon from June to September and winter from October to January. In tropical countries, there may be a direct link between the duration of the sun and the temperature. This survey was conducted to assess the water quality of Lake Hinglajwadi in the Hinglajwadi District. Osmanabad [M.S.] India, which is essential for human use in this neighbourhood. The local population uses water for domestic, agricultural, and recreational purposes.

MATERIAL AND METHODS

Water samples for Physico-Chemical analysis were collected early in the morning between 8:00 to 11:00 a.m. in Lake Hinglajwadi in the Hinglajwadi district in Osmanabad [MS] India.. in the first week of each month from January 2019 to December 2019. The samples were collected in a plastic container washed with 5 liters of acid at a depth of 5 to 10 cm below the water surface. Separate samples of dissolved oxygen were collected in 250 ml vials, and dissolved oxygen was fixed in place by adding an alkaline iodide-azide solution immediately after collection. The samples were immediately analyzed and returned to the laboratory.

The state of the lake water quality was determined seasonally, summer, monsoon, and winter. Physicochemical properties such as air temperature, water temperature, total solids (TDS), total suspended solids (TSS), total hardness (TH), Chloride, nitrate, sulphate, and phosphate were determined seasonally in summer, monsoon, and winter using standard methods(APHA, 2005; 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 to December 2019, Total dissolved solids ranged from 513.5 to 838.1 mg/L the highest values were recorded in the monsoon of 760.47±86.02 mg/L and the lowest in winter of 583.67±112.06 mg/L L. The general mean was 644.15±43.41 mg/L. Total suspended solids ranged from 48.2 to 140.2 mg/L the highest values were recorded during the monsoon with 112±28.23 mg/L and the lowest values in summer with 58.48±14.78 mg/L the general average was 82.91±7.93 mg/L. Total hardness varied from 85.08 to 560.11 mg/L the highest values were recorded in summer 492.75±93.43 mg/L, and the lowest in winter 159.52±92.35 mg/L the total mean was 335.27±40.01 mg/L. Chlorides were between 190 to 440 mg/L the highest values were recorded in monsoon with 354.5±49.16 mg/L and the lowest values in winter with 211.5±18.85 mg/L the total mean was 303±23.80 mg/L. Salinity was between 342.9 to 795 mg/L the highest values were recorded in monsoon with 664.97±70.84 mg/L and the lowest values in winter with 381.72±34.07 mg/L the total mean was 555.33±42.69 mg/L. Nitrates ranged from 10.8 to 21.5 mg/L the

highest values were recorded in summer 19.04±1.70 mg/L, and the lowest during monsoons 16.95±1.83 mg/L the total mean was 17.80±1.95 mg/L. Sulphate was between 18 to 35.71 mg/L the highest values were measured during the summer with 29.81±6.85 mg/L and less in monsoon with 27.9±6.69 mg/L the overall average was 29.02±1.92 mg/L. Phosphate was between 0.27 to 1.03 mg/L the highest values were recorded during the monsoon 0.92±0.10 mg/L, and the lowest during summer 0.43±0.07 mg/L the total mean was 0.61±0.06 mg/L (Table 1).

During the study from January 2019 to December 2019, Total dissolved solids showed a significant positive correlation with TSS, salinity, and phosphate, as well as a negative correlation significant with nitrate and sulphate. Total suspended solids during the study from January 2018 to December 2019, showing a significant positive correlation with TDS, and phosphate, as well as a significant negative correlation with nitrate and sulphate. Total hardness showed a significant positive correlation with Chloride, salinity, and nitrate as well as indicated a significant no negative correlation. Chlorides show a significant positive correlation with total hardness, and salinity as well as a significant no negative correlation. Salinity shows a significant positive correlation with TDS, total hardness, and Chloride as well as a significant no negative correlation. Nitrate shows a significant positive correlation with total hardness and sulphate as well as shows a significant negative correlation with TDS, TSS, and phosphate. Sulphate shows a significant positive correlation with nitrate as well as a significant negative correlation with TDS, TSS, and phosphate. Phosphate showed a significant positive correlation with TDS, and TSS, as well as a significant negative correlation with nitrate, and sulphate (Table 2).

The total solids dissolved was found to be monsoon maxima, followed by summer and winter minima. The maximum total amount of solids dissolved in the monsoon can be due to surface runoff, the release of rotting material from the aquatic vegetation (Verma *et al*., 1978, Shinde *et al*., 2010 and 2011). The maximum total amount of solids dissolved during the summer season may be due to a lower amount of rotting dead flora. The minimum values of the total solids dissolved were recorded during the winter season. In the present study, total solids showed a positive correlation with the amount of water. The maximum number of suspended solids recorded during the monsoon could be due to the penetration of exogenous particles suspended by surface runoff and the agitation of soil sediments. The maximum total suspended solids found in summer can be attributed to less water. During the present study, the total hardness was highest in summer, and the lowest values were recorded in winter. Similar trends in the results for the associated total hardness (Kumar *et al.*, 2006 and Shinde, 2012). In the present study, high levels of Chloride were recorded in the summer and minimum values in the winter. These results could be related to the high temperature, which favours evaporation, reduces the volume of water, and, therefore, leads to the concentration of salts. Similar observations have been reported by (Pagare, 2002 and Salve, 2005). In the present study, salinity was higher in summer and lowered in the winter season. Pejaver *et al*., (2002) has reported similar results. The salinity between 50 to 500 mg/l is of little significance to animal life but could much consequential for plants. Salts present in excess or without proper antagonistic salts or ions are toxic to the animal world. The higher values

of salinity recorded in summer Maybe due to temperature effect and rapid reduction in water mass (Pejaver *et al.,* 2002). Elevated nitrate levels have been reported due to lake runoff, soil drainage, and fertilizer inputs from adjacent fields and agriculture, as well as ammonia oxidation, similar results (Ansari and Prakash, 2002). Maximum sulphate levels were recorded in monsoons and minimum levels during the winter season, as evidenced by seasonal values. Similar results have been reported (Kaushik *et al*., 2002, and Kumar *et. al.*, 2006). During the investigation period, the maximum values for phosphate during the monsoon season and the minimum values in winter were recorded as evidence of the seasonal values. It is due to the inflow of rainwater, which concluded that phosphorus is the most important factor for eutrophication and algae growth and that the increase in phosphate is due to water pollution carried. Urban waters that can be contaminated by domestic wastewater have a high phosphate content and show all signs of eutrophication. (Kumar *et. al.*, 2006).

CONCLUSIONS

The present study shows detailed information on the water quality of Lake Hinglajwadi in the Hinglajwadi District. Osmanabad [M.S.] India.

1. The summer, monsoon, and winter seasons show different seasonal fluctuations with air temperature, water temperature, total solids (TDS), total suspended solids (TSS), total hardness (TH), Chloride, nitrate, sulphate, and phosphate.
2. Humanmade activates are the main source of water pollution. There is no industrial pollution in this area.
3. 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.
4. Correlation coefficients are used to quantify the strength of the association between parameters.
5. The degree of contamination of the lake has varied during the study of various sources, such as municipal waste, agricultural waste, household waste, etc.
6. The data showed that, based on the Physico-chemical parameters of the lake water, the TDS, total hardness, and chlorides were above the permitted limit values prescribed by the ISI and the WHO for drinking water.
7. These studies show that lake water is not used for drinking purposes, but lake water is useful for irrigation and fish farming.
8. Water quality improves, pollution levels must be constantly monitored to maintain favourable conditions for fish survival and reproduction in Lake Hinglajwadi in the Hinglajwadi district. 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
Total Dissolved Solids (mg/l)	513.5-838.1	588.29±27.31	760.47±86.02	583.67±112.06	644.15±43.41
Total Suspended Solids (mg/l)	48.2-140.2	58.48±14.78	112±28.23	78.26±28.81	82.91±7.93
Total hardness (mg/l)	85.08-560.11	492.75±93.43	353.54±162.19	159.52±92.35	335.27±40.01
Chloride (mg/l)	190-440	343±65.81	354.5±49.16	211.5±18.85	303±23.80
Salinity (mg/l)	342.9-795	619.3±119.20	664.97±70.84	381.72±34.07	555.33±42.69
Nitrate (mg/l)	10.8-21.5	19.04±1.70	16.95±1.83	17.42±5.14	17.80±1.95
Sulphate (mg/l)	18-35.71	29.81±6.85	27.9±6.69	29.35±3.44	29.02±1.92
Phosphate (mg/l)	0.27-1.03	0.43±0.07	0.92±0.10	0.48±0.19	0.61±0.06

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	TDS	TSS	TH	Chloride	Salinity	Nitrate	Sulphate	Phosphate
Total Dissolved Solids	1	**0.92****	0.11	0.58	**0.64***	**-0.65***	**-0.96****	**0.99****
Total Suspended Solids		1	-0.27	0.22	0.29	**-0.89****	**-0.99****	**0.96****
Total hardness			1	**0.87****	**0.83****	**0.67***	0.13	0.01
Chloride				1	**0.99****	0.23	-0.35	0.48
Salinity					1	0.15	-0.42	0.54
Nitrate						1	**0.82****	**-0.73***
Sulphate							1	**-0.99****
Phosphate								1

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