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Hydrology and Correlation status in water parameters of Hinglajwadi Lake At Hinglajwadi Dist. Osmanabad, [M.S.] India.

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Abstract:

Freshwater is one of the most precious and essential prerequisites for maintaining life on earth. First of all, all living things on earth need enough freshwater, directly or indirectly, to stay healthy and functional. Being the most precious gift of natural water is always pure at the source. The pollution of the aquatic environment gradually and negatively influences this purity. Nature protects the environment with all means and mechanisms. 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 2018 to December 2018. 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

Hydrobiology is the science of aquatic life. Modern hydrobiology can be seen as a sub-discipline of ecology, but the field of hydrobiology includes taxonomy, morphology, physiology, etc. They are related to an aquatic organism closely related to limnology and can be divided into the following areas: lotic system ecology

and lenticular system ecology. The hydrobiological properties of water are precious in evaluating water quality and the state of contamination of lakes and rivers. It involves an understanding of the plant and animal communities found in nature, their interactions within themselves, and the environmental conditions in the lake and river. The study of various water parameters is significant for understanding metabolic events in the aquatic ecosystem. Parameters influence each other and sediment parameters, as well as the frequency and distribution of flora and fauna. It is, therefore, compulsory to analyze at least the critical parameters of water when carrying out ecological studies in aquatic ecosystems. If carried out from time to time, such studies may indicate favorable or unfavorable changes in the ecosystem (Shinde et al. 2011).

Different climatic conditions 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 neighborhood. The local population uses the 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 a.m. in Lake Hinglajwadi in the Hinglajwadi district in Osmanabad [MS] India and 11:00 a.m. in the first week of each month from January 2018 to December 2018. The samples were collected in a plastic container washed with 5 liters of acid at a 5 to 10 cm depth below the water surface. Separate samples of dissolved oxygen were collected in 250 ml bottles, and dissolved oxygen was fixed in place by adding an alkaline iodide-azide solution immediately after collection. The samples were directly analyzed and returned to the laboratory.

The state of the lake's water quality was determined seasonally, summer, monsoon, and winter. Physicochemical properties such as Air Temperature, Water Temperature, Total Dissolved 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. The seasons Physico-chemical parameters data of Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India has been presented in the table. 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 the most critical values in identifying 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.

Temperature

Temperature plays an essential role in the aquatic ecosystem as a critical factor. It affects the biochemical reaction, the fluctuations of the population in the water, and the physical and chemical properties of the water. It

directly affects the life activities and metabolic processes of organisms. The water temperature is lower than the air temperature for various reasons, such as gas in the air, humidity, dust, and other colloidal particles. The water in the early morning showed a slightly warmer surface temperature. In ponds, the temperature seems to regulate plankton development;

The high temperature favors the growth of the diatoms. The air temperature was between 22 and 32 ° C. The highest values were recorded in summer at 29.75 ± 3.86 ° C and the lowest values in winter at 22.87 ± 0.62 ° C. The general average was 26.66 ± 1.61 ° C. The water temperature was between 17 and 27 ° C. The highest values were 24.5 ± 3.10 ° C in summer and the lowest in summer in winter, 17.7 ± 0.81 ° C were recorded. The general average was 21.95 ± 1.16 ° C (Table 1). During the January 2018-December 2019 study, air temperature indicated a significant positive correlation with water temperature, total hardness, and chloride, and a significant negative correlation with nitrate. In the study from January 2018 to December 2019, the water temperature shows a significant positive correlation with air temperature and total hardness and a significant negative correlation with nitrate (Table 2).

To summarize air and water temperatures, a general trend 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 2012; Shinde et al. 2010, and 2011).

Total Dissolved Solids (TDS)

These consist of inorganic salts such as calcium, magnesium, potassium, sodium, bicarbonates, chlorides, sulphates, and certain heavy metal compounds; In addition to organic substances in small amounts, the amount of total solids dissolved in water also contributes. TDS in drinking water comes from natural sources, sewers, urban drains, and industrial wastewater. "Dissolved solids" refer to minerals, salts, metals, cations or anions dissolved in water. It includes everything in the water, except for pure water molecules and suspended solids. Suspended matter does not dissolve and does not settle in water.

The total dissolved solids ranged from 539 to 903 mg/L; the highest values were recorded in the monsoon of 841.42 ± 88.53 mg/L, and the lowest in winter of 562.62 ± 44.99 mg/L L. The general mean was 696.62 ± 21.80 mg/L (Table 1). During the study from January 2018 to December 2019, the total dissolved solids showed a significant positive correlation with water temperature, TDS, TSS, total hardness, sulphate, and phosphate, and a negative correlation significant with nitrate (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). The maximum amount of solids dissolved during the summer season may be due to a lower 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.

Total Suspended Solids (TSS)

Total suspended solids are the source of suspended particles in the water body that influence turbidity and transparency.

The total number of suspended solids ranged from 37 to 173.6 mg/L; the highest values were recorded during the monsoon with 151.5 ± 20.55 mg/L and the lowest values in winter with 68.37 ± 21, 77 mg/L the general average was 102.63 ± 10.14 mg/L (Table 1). Total suspended solids during the study from January 2018 to December 2019 showed a significant positive correlation with TDS, TSS, total hardness, sulphate, phosphate, and a significant negative correlation with nitrate (Table 2).

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

(Kumar 2006).

Total Hardness (TH)

Water hardness is generally defined as the sum of the multivalent cations dissolved in water. The most common cations are calcium and magnesium; Although iron and manganese can help.

The total hardness varied from 184.34 to 553.2 mg/L; the highest values were recorded in summer 427.17 ± 151.66 mg/L and the lowest in winter 349.21 ± 156.84 mg/L the total mean was 399.99 ± 7.85 mg/L (Table 1). During the study from January 2018 to December 2019, total hardness showed a significant positive correlation with air and water temperature, TDS, TSS, and a significant negative correlation with nitrate (Table 2).

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).

Chlorides:-

Chlorides are found in all drinking water, usually in the form of a metallic salt in wastewater. The presence of chloride in natural water can be attributed to salt deposits, chemical sewage discharges, sewage discharges, irrigation drainage, leachate contamination from shelters, and leaching. Seawater infiltration in coastal areas. Any of these sources can lead to local contamination of surface and groundwater.

Chlorides were between 190 and 500 mg/L; the highest values were recorded in summer with 325 ± 116.76 mg/L and the lowest values in monsoons with 247.5 ± 55.33 mg/L the total mean was 276.66 ± 46.65 mg/L (Table 1). During the study from January 2018 to December 2019, chlorides show a significant positive correlation with air temperature and a significant negative correlation with sulphate (Table 2).

In the present study, high chloride levels were recorded in the summer and minimum values in the winter. These results could be related to the high temperature, which favors evaporation, reduces the volume of water, and leads to salts' concentration. Similar observations have been reported by

(Pagare 2002 and Salve 2005).

Nitrate

Nitrogen is less soluble in water than oxygen. However, since it makes up 78% of the atmosphere, it still represents 65% of the dissolved gases in equilibrium. Nitrogen is essential because it is a necessary element in proteins, chlorophyll, RNA and DNA, etc. All living organisms necessarily require it as it is an essential part of biochemistry.

The nitrates ranged from 8.33 to 20.18 mg/L; the highest values were recorded in winter 18.22 ± 2.84 mg/L and the lowest during monsoons 11.62 ± 4 78 mg/L the total mean was 14.96 ± 1.24 mg/L (Table 1). During the study from January 2018 to December 2019, nitrate shows a significant positive correlation with TDS and TSS and shows a significant negative correlation with chloride, sulphate, and phosphate (Table 2).

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).

Sulphate

The most common form of sulphate is the sulphate anion (So_{4-2}). Sulphate is ecologically vital for plant growth, and its scarce availability can inhibit the development of plankton. Sulfur is also essential in protein metabolism. There are sulfur-colored photosynthetic bacteria that oxidize hydrogen sulfide in water and use hydrogen sulfide as an oxygen acceptor in photosynthesis.

The sulphate was between 20 and 40.71 mg/L; the highest values were measured during the monsoon with 36.55 ± 3.79 mg/L and less in summer with 27.55 ± 9.69 mg/L the overall average was 31.00 ± 3.34 mg/L (table) one). In the study from January 2018 to December 2019, sulphate shows a significant positive correlation with TDS, TSS, and phosphate and a significant negative correlation with chloride and nitrate (Table 2).

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).

Phosphate

In water, phosphate occurs both in its inorganic and organic form, since organic phosphorus and orthophosphate play a dynamic role by limiting the presence of phosphate nutrients in water analysis and wastewater.

Phosphate was between 0.25 and 40.71 mg/L; the highest values were recorded during the monsoon 0.79 ± 0.05 mg/L and the lowest during winter 0.40 ± 0.17 mg/L, the total mean was 0.54 ± 0.06 mg/L (Table 1). During the study from January 2018 to December 2019, phosphate showed a significant positive correlation with TDS, TSS, and sulphate, and a significant negative correlation with nitrate (Table 2).

During the investigation period, the maximum values for phosphate during the monsoon season and the minimum values in winter were recorded as seasonal values. Due to the inflow of rainwater, which concluded that phosphorus is the essential factor for eutrophication and algae growth and that the increase in phosphate is due to water pollution carried. Urban waters 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. The summer, monsoon, and winter seasons show different seasonal fluctuations with Air Temperature, Water Temperature, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Total Hardness (TH), Chloride, Nitrate, Sulphate, and Phosphate. The present study performs 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. Correlation coefficients are used to measure the strength of the association between parameters. The degree of contamination of the lake has varied during the study of various sources, such as municipal waste, agricultural waste, household waste, etc. 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. These studies show that lake water is not used for drinking purposes. Today's lake water is useful for irrigation and fish farming. Water quality is improved; pollution levels must be continuously monitored to maintain favorable fish survival and reproduction conditions in Lake Hinglajwadi in the Hinglajwadi district. Osmanabad [M.S.] India.

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REFERENCES

Ansari KK and Prakash S. (2000) Limnological studies on Tulsidas talav of tarai region of belrampur in relation to fisheries.Poll.Res .19[4]:651-655.]

APHA. (2005) Standard methods for the examination of water and waste waters, 21st Edn., Washington, DC. U.S.A.

Ingole SB, Pawale RG and Wade PN. (2009) Water quality studies on Majalgaon Dam, Dist.Beed, and Maharashatra: J.of Aqua. Biol vol.24 (1): 71-76.

Kaushik A, Kumar K, Kanchan, Taruna and Sharma HR. (2002) Water quality index and suitability of urban ground water of Hisar and paripat in Haryana J. Environ. B Niol. 23(3), 325-333 (2002).

Kumar AT, Qureshi A, Alka parashar and Patiyal RS. (2006) The Academy of Environmental Biology. occup. Hit. India.

Pagare SS. (2002) "Hydrobiological Studies of Garkheda dam". Thesis submitted to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad Dec.2002.

Salve BS. (2005) Ecological Studies of Wan prakalpa, Nagapur near Parli-V. Marathwada Region the submitted to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad for the award of degree of ph. D.

Shinde SE, Pathan TS, Raut KS, More PR and Sonawane D L (2010) Seasonal variationss in physico-chemical characteristics of Harsool-Savangi Dam, district Aurangabad, India. The Ecoscan 4 (1): 37-44.

Shinde SE, Pathan TS, Raut KS and Sonawane DL. (2011) Studies on the Physico-chemical Parameters and Correlation Coefficient of Harsool-savangi Dam, District Aurangabad, India. Middle-East Journal of Scientific Research 8 (3): 544-554.

Shinde SE. (2012) Hydrobiological study of Harsool-Savangi Dam in relation to polluation, Ph.D. thesis, Dr. B. A. M. University, Aurangabad.

Trivedi RK and Goel PK. (1987) Chemical and biological methods for water pollution studies. Environmental publications Karad, India.

Verma SR, Tyagi AK and Dalela RC. (1978) Pollution studies of a few rivers of western utter pradesh with reference to the biological indices proc. Ind. Acad. Sci. B. 87(6) 13: 123-131.

Table-1. Seasonal variations in Physico-chemical parameters of Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India (During January 2018 - December 2018).

Parameters	Range	Summer	Monsoon	Winter	Annual
Air Temperature	22-32	29.75±3.86	27.37±2.15	22.87±0.62	26.66±1.61
Water Temperature	17-27	24.5±3.10	23.65±2.25	17.7±0.81	21.95±1.16
Total Dissolved Solids	539.2-903.9	685.82±64.63	841.42±88.53	562.62±44.99	696.62±21.80
Total Suspended Solids	37-173.6	88.015±3.62	151.5±20.55	68.37±21.77	102.63±10.14
Total hardness	184.34-553.2	427.17±151.66	423.59±141.41	349.21±156.84	399.99±7.85
Chloride	190-500	325±116.76	247.5±55.33	257.5±25.21	276.66±46.65
Nitrate	8.33-20.18	15.05±5.15	11.62±4.78	18.22±2.84	14.96±1.24
Sulphate	20-40.71	27.55±9.69	36.55±3.79	28.9±4.01	31.00±3.34
Phosphate	0.25-0.861	0.43±0.12	0.79±0.05	0.40±0.17	0.54±0.06

Table 2: - Values of correlation coefficient among Physico-Chemical parameters of Hinglajwadi Lake at Hinglajwadi Dist. Osmanabad [M.S] India (During January 2018 - December 2018).

Parameters	Air Temp.	Wat. Temp.	TDS	TS	TH	Chloride	Nitrate	Sulphate	Phosphate
Air Temp	1	**0.97****	0.59	0.39	**0.95****	**0.68***	**-0.62***	0.03	0.26
Wat. Temp.		1	**0.76****	0.59	**0.99****	0.49	**-0.78****	0.26	0.47
TDS			1	**0.97****	**0.80****	-0.18	**-0.99****	**0.82****	**0.93****
TS				1	**0.65***	-0.40	**-0.96****	**0.93****	**0.99****
TH					1	0.43	**-0.83****	0.33	0.54
Chloride						1	0.14	**-0.70****	-0.52
Nitrate							1	**-0.80****	**-0.91****
Sulphate								1	**0.97****
Phosphate									1

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