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Study of Physicochemical Parameters Assessment of Pimpalgao Malvi Lake District Ahilyanagar, Maharashtra

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Abstract

In this world, fresh water is essential for life on a large scale. This water is used by industries. Fresh water is important for sustaining healthy ecosystems. This quality is affected by environmental factors as well as human beings. In the present study, the water sample was collected from four stations in the Pimpalgao Malvi Lake district of Ahilyanagar, Maharashtra. The water of Pimpalgao Malvi Lake is used for agricultural purposes, washing, and fishery purposes. Agricultural runoff also affects water quality. The aim of the study was to assess physicochemical parameters of water using standardized procedures to determine its quality. A water sample was collected from the monsoon, winter and summer seasons of the 2025. This study was related to analysis of various physicochemical parameters such as water temperature, pH, turbidity, total alkalinity, total hardness which affect as seasonal changes occur result showed that change in physico chemical property affect health of aquatic ecosystem.

Keywords: Physico-chemical parameter, Water quality, seasonal variation, pimpalgao malvi lake.

Introduction

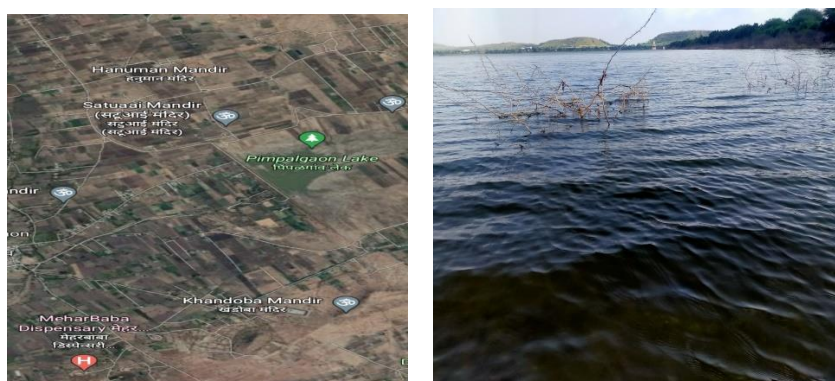
The changes occurring in the environmental water play a conclusive role. The whole ecosystem depends upon water, leaving things present on earth cannot survive without it. Lake water is one of the most important source of fresh water. Fresh Water Lake supports aquatic life ecosystems Whatever drastic changes occur in the aquatic ecosystem, it's mainly due to agriculture, industries and other human activity which contaminate rivers, ponds and lakes. to determine rate of pollution its essential to know physical, chemical and biological characteristics of natural water to identify magnitude and source of any pollution load. This had an adverse effect on the number of birds visiting the lake, and their number is greatly reduced. Many authors have studied various physico-chemical parameters of different lakes of the country to assess their water quality. Many visitor birds visit to pimpalgao lake in winter season some molluscan species also found which are bio indicator this study help in in future study. There was lack research work on its water quality variations and physicochemical factors from Pimpalgao Lake This review summarized the work done by various researchers on physico-chemical parameter which help analysis selected physico-chemical parameters of water (pH, temperature, turbidity, total alkalinity, total hardness, Na, Iron, K) of **pimpalgao malvi lake**. area wise phisico chemical parameter change. In India lake pollution is severe problem due to addition of high amount of pollutants. Thus there is need of continuous monitoring of these water bodies. Recent works on ecological study carried out by Khataavkar. et., al (1989). They have a significant impact on climate regulation, the documentation of environmental changes and the maintenance of ecological balance and biodiversity (Mammides Citation2020). Climate change can influence the temperature of water, the patterns of precipitation which can in turn disrupt the fragile equilibrium of freshwater ecosystems (Ran.j et al. Citation2023) Fresh water has become a scare commodity due to over exploitation and pollution, population growth, rapid urbanization, industrialization, agriculture run off (Ghosh and Basu 1968; Gupta and Shukla 2006). Naik et al. (2012) studied Kunigal Lake, Karnataka for a period of two years (2007–2009) and reported higher amounts of total dissolved salts, high turbidity whereas poor dissolved oxygen was observed". Furthermore, water quality was observed to be deteriorated due to anthropogenic activities, heavy inflow of domestic waste and sewage.

Khade (2015) calculated different physico-chemical parameters from Pohara Lake (Malkhed), Chatri Lake and Wadali Lake and observed various parameters to be within permissible range and water quality was found to be good to support fish farming and for human consumption. discovered that the health of aquatic ecosystems depends on maintaining a proper equilibrium of nutrients and the sequential presence of essential nutrients in both water and sediment.

The complex relationship between environmental degradation, climatic factors and the ecological health of freshwater lakes is not yet fully understood. Precisely evaluating the scope and intensity of environmental deterioration is crucial for choosing conservation initiatives and formulating focused mitigation solutions. Freshwater lakes face complex spatial issues, such as uneven pollutant distribution, land-use conflicts and habitat fragmentation, which impact water quality and biodiversity. Hence, assessing the prompt spatio-temporal fluctuations in the ecological environment's quality is crucial for both preserving the environment and promoting sustainable development in the area (Vasistha and Ganguly Citation2020; Xiong et al. Citation2021).

Materials And Methods:

Study Area: Pimpalgao Lake is present in Pimpalgao Malvi Village, Ahilyanagar. with 19.238 latitude and 74.8112 longitude. This water reservoir is the main source for wildlife habitat and agriculture; due to the hardness of the water, it is not used for drinking purposes. The water samples were collected from 4 different sites of the lake in sterilized polythene bottles of capacity one liter for physico-chemical analysis. Samples were monitored in three seasons: monsoon, winter, and summer 2025.. After collection, water samples were brought to the laboratory for the study of physico-chemical parameters of water. The physico-chemical parameters like temperature and pH of water samples were determined on the spot. Other parameters (turbidity, alkalinity,Salinity, Calcium, Magnesium, DO, TDS,) were determined according to standard methods. The methods employed for analysis of water parameter are according to WHO guidelines, APHA (2005), Titrimetric method for alkalinity of water, EDTA titration method for hardness, Na and K by Flame Photometry.



Results and Discussions

Table.1.

Season	Monsoon				winter				summer			
site	1	2	3	4	1	2	3	4	1	2	3	4
water temprature	24.1	23.2	23.8	23.7	20.2	21	20.3	20.4	30.9	29.2	29.2	30.6
Turbidity of wate	8.7	7.6	7.5	7.2	3.8	4.2	4.3	10	9.1	9.4	9.2	9.8
pH	7.9	7.6	7.8.	7.1	7.1	6.8	6.8	6.7	8.2	7.3	7.2	7.1
DO	5.7	5.6	5.8	5.5	9	9	9.6	10	9.2	9.2	8	4.5
TDS	442	374	324	426	282	290	378	480	498	344	624	632
Na	2.15	2	2	2.8	0.84	1.2	0.96	1.02	2.15	2.86	2	2.8
K	1.22	1.32	0.81	1.21	0.85	0.8	0.69	0.6	1.22	1.32	0.81	1.21
Hardness	98	102	108	106	118	128	126	124	146	148	152	156
Iron	0.73	0.72	0.79	0.78	1.21	1.02	1.09	1.29	1.96	1.94	1.96	1.09
Alkalinity	49.4	53.2	53.5	55.8	34.4	36.2	34.8	36.2	58.2	53.7	58.8	55.4
Salinity	2.84	2.34	2.96	2.72	0.75	0.69	0.99	0.48	2.84	2.34	2.96	2.72
Calcium	26.5	26	25	28	21	22	20	19	26.5	26	25	28
Magnesium:	20.4	20.4	20.9	20.8	10.2	11	12	11	77.4	70.4	20.9	20.8

Throughout season the temperature values were changes ranging between 20.2 to 30.9 low during winter it will 20.2 and high during summer 30.9, almost matching the environment temperature. Fluctuation in air and water temperature is due to the changes occurring of season, location and difference in the time of collection. Similar results, were recorded by Muley D.V and Patil I.M (2006). maximum turbidity found in summer season maximum 9.8 in month of April minimum 3.8 in winter month of November. Turbidity show correlation with TDS. The lowest pH value was found during the winter season due to heavy rainfall and dilution effect,and highest ph during summer season similar observation was also made by N. Shiddamallayya and M. Pratima (2008) pH range of 6.5 to

8.5 is normally accepted as per guideline suggested by WHO. In this study pH values were found in the range of 6.8 to 8.2 in the water samples. Trivedi, S and. Kataria H. C (2012) This shows that pH was observed to be slightly alkaline. Higher pH favors the fish production in reservoir. The dissolved oxygen found varied between 5.5 to 9.20 mg/l. Lower values of DO were observed by them in mid winter and higher values summer season. higher value of dissolve oxygen found from site 1 and site 2 in summer season Similarly result observed the monthly variations of mean DO2 concentration at the with lower values in October/November and higher values in March/April. P. A. Araoye, (2009) During present investigation average total hardness was found to be minimum in monsoon i.e., 98 mg/L and maximum in summer i.e., 156 mg/L. maximum hardness show site 4 in summer season. U. G. Meshram et. al., (1996) also recorded maximum value of total hardness in summer, moderate in monsoon and minimum in winter at Study on Physico-Chemical Parameters of Kurhada Lake at Pauni. hardness refer to concentration of calcium and magnesium Temperature increases intensify stream drying and cause a rise in TDS concentration 282 to 632 maximum total dissolve solid was found from site 4 in summer season and minimum from site 3 in winter 282 mg/L. in summer Its concentration was cross exceed the permissible level prescribed by ISI or WHO in summer Salinity measures the mass of dissolved salts in a known mass of solution McCleskey, R.B (2023) During present investigation average total salinity was found to be minimum in monsoon i.e., 0.96 mg/L and maximum in summer i.e., 2.96 mg/L. The maximum Calcium Hardness in pimpalgao Lake was 28 mg/lit in the month of May from site 4 and minimum 19 from site 3 mg/lit in the month of December. In the present investigation, the maximum calcium hardness during summer was due to low water levels and bacterial decomposition of the organic matter in the lake. Ravikumar et al., (2005), The maximum total alkalinity recorded in pimpalgao Lake was 58.3 mg/lit in the month of summer from site 3 and minimum 34.4 mg/lit in the month of winter from site 1. maximum values of total alkalinity were recorded in summer which could be attributed to accelerated rate of photosynthesis leading to greater utilization of carbon dioxide and bicarbonates as source of inorganic carbon by phytoplankton and release carbonates which can cause pH to rise dramatically. U. G. Meshram et al., (2017) Magnesium Hardness in the present study was recorded between 20.9 mg/lit to 10.2 mg/lit. In present study lower value of magnesium were recorded in winter which could be attributed higher sedimentation rate leading to their settlement in the bottom, utilization by plankton organisms and its incorporation into chlorophyll. maximum iron found in summer season 1.96 from site 4 and minimum 0.94 in monsoon season from site 2 maximum acceptable iron level in drinking water 0.3mg/L according to WHO.

Conclusion

It is suggested that the agricultural waste should not be discharged into the Pimpalgao Malvi Lake District of Ahilyanagar. Efforts should be made to bring out greater awareness among people about the importance of good quality drinking water. After studying all physico-chemical factors, it is concluded that the Pimpalgao Malvi lake water has undergone eutrophication. The water quality is good for agriculture and aquaculture, but water should not be used for drinking purposes in a lake and is within the permissible limit. Hence, this lake is good for the flora and fauna of the lake. The study will also help in bringing awareness among the people living near the lakes to keep their environment clean and green. This study may be very helpful for the authorities to protect the lake water resources and keep their impurity level under check so that it can be used during the crisis.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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