Assessment of Physicochemical Parameters in Selected Water Bodies in Rajasthan.

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Abstract: A significant global concern has been the sustainable supply of safe access to drinkable water. In the state of Rajasthan, water samples were taken from Galtaji and Pushkar Lake. This research set out to evaluate the state of these sacred waterways. Activities and tourists in the area were taken into consideration when choosing the sites. In 2023, sampling was place between September and October.
The following physicochemical characteristics were examined: dissolved oxygen (DO), pH, total dissolved solids (TDS), and biochemical oxygen demand (BOD). This study shows that the mismanagement of our waters through unrestrained and unrestricted dumping of contaminants into it has caused these water bodies to have poor quality and should not be used for the purpose of consumption unless properly treated. The presence of aquatic plants that take in some of these pollutants and release oxygen may also help improve quality.

Keywords: Physicochemical parameters, pH, BOD, TDS

INTRODUCTION

India is a country with a rich cultural tradition and a number of festivals. India has a long history of religious involvement in its culture. South Asia is a major player in the global pollution issue because of its deep spiritual ties to the natural world and its vulnerability to the consequences of climate change. Significant Hindu festivals like Diwali, Holi, Durga Puja, and Ganesh Puja, together with traditions like cremations, have led to an increase in air and water pollution in the country, which affects public health and biodiversity (Chakraborty, 2017).

Surface waters from natural sources have a better quality than those from area that have been influenced by human activities (Edokpayi *et al*., 2017). Most surface waters are subject to contamination from point and nonpoint sources through wastewaters from agricultural and industrial activities and runoff from rainfall. The problem is more pronounced in the rustic areas of most emerging countries as there is a weak water supply infrastructure base. The effect of industrialization is the basis of development of societies as it plays a major role in the expansion and advancement of economic growth (Sharma *et al.,* 2011).

Galtaji is a historic Hindu pilgrimage site located in the Indian state of Rajasthan, around 10 km from Jaipur. The location is made up of many temples that have been carved into a little nook in the Jaipur hill range. Pilgrims wash in a succession of holy kunds, or water tanks, that are filled by a natural spring that raises high on the hill and runs downward. Located 12 km northwest of Ajmer, in latitude 26°29'14"N and longitude 74° 33'18"E, lies Pushkar Lake. Due to its legendary significance and popularity as a tourist attraction, this lake is revered. Throughout the year, Pushkar sees a constant stream of pilgrims and visitors due to the Lake's aesthetic significance.

Water pollution occurs when harmful substances often chemicals or microorganisms contaminate a stream, river, lake, ocean, aquifer, or other body of water, degrading water quality and rendering it toxic to humans or the environment. Global environmental change is a serious threat to our existence and requires immediate actions from every dimension. Regular monitoring of such water bodies is essential for physicochemical and microbiological analysis to determine the suitability of the water under use, not only to prevent disease outbreaks and hazards but also to prevent further deterioration of the water (Edori *et al.,* 2018). This is because water is responsible for about 80% of all human diseases, according to WHO. The threat of extinction and the swift deterioration of water supplies are ranked highest among these environmental problems. This process is also being accelerated daily by urbanisation, uncontrolled industrialisation, and population growth.

MATERIALS AND METHODS

Sampling procedure

The basic objectives of sampling are to collect representative water samples for water quality monitoring programme of the study from the lake at different strategic locations. Sampling stations were selected so as to provide the realistic description of existing water quality and to maximize the ease of sampling. The samples were collected in sterile 500 mL vials with dimensions of 43 mm 69 mm 208 mm.

Analysis of lake waters

The analysis of lake waters is most important for ascertaining the water quality of the lake system. The effluents of various Ghat, waste water including sewage were analysed for physico-chemical parameters. The water samples were analyzed for various parameters in the laboratory like pH, Dissolved Oxygen, BOD, Total Hardness, Total Dissolved Solids, COD were monitored of the water samples collected from the Galtaji and Pushkar Lake. The water samples were collected during period of September 2023 to October 2023 mid date of each month.

Table-1 Comparative physiochemical analyses of Galta ji And Pushkar Lake water with acceptable limit. (Study duration From mid September to mid October; Total Sample Collection- 30 Samples).

Sr. No.	Parameters	Unit of Measurement	IS 10500 : 2016 Requirement Acceptable Limit	Protocol	Galta ji Lake (Avg. value)	Pushkar Lake (Avg. value)
1	pH	-	6.5-8.5	IS: 3025 (pt-11)-1983, Reaff.2017	7.85	8.19
2	Total Hardness (as $CaCO_3$)	mg/l	200	IS: 3025 (pt-21) Reaff.2019 (EDTA Titrimetric Method)	348.95	386.96
3	Total Dissolved Solids	mg/l	500	IS: 3025 (pt-16)-1984, Reaff.2017	648.26	612.08
4	COD	mg/l	30	IS: 3025 (pt-58)-2006, Reaff. 2017	42.92	45.98
5	Dissolve Oxygen (DO)	mg/l	4.00-6.00	IS: 3025 (pt-38)-1989, Reaff. 2019 (Titrimetric Method)	3.482	3.128
6	BOD	mg/l	5(ICMR)	IS: 3025 (pt-44)-1993, Reaff.2019	6.959	7.128

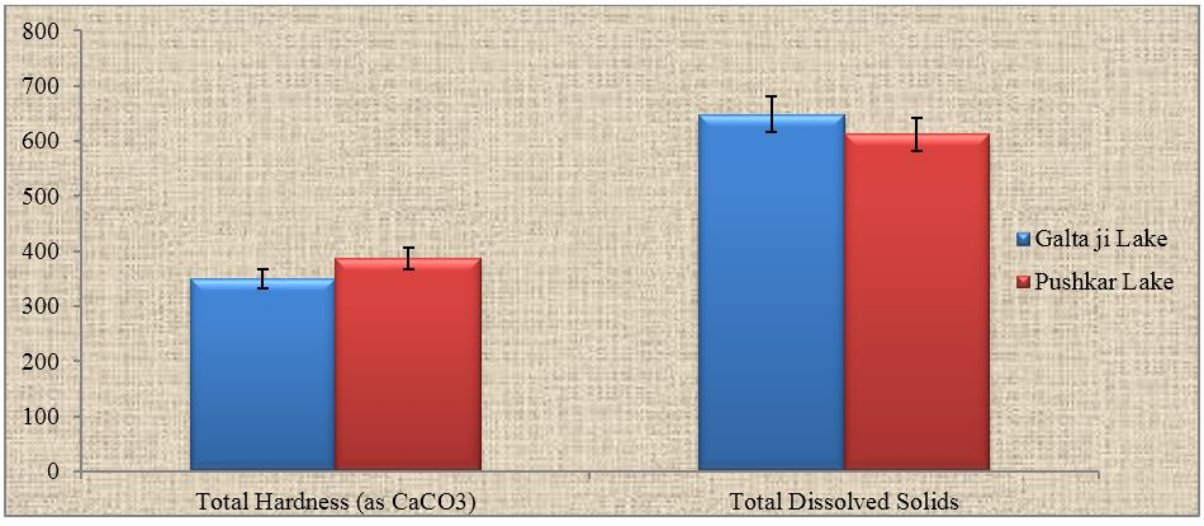

Fig 1 Comparative analysis of Water parameter for Galta ji And Pushkar Lake

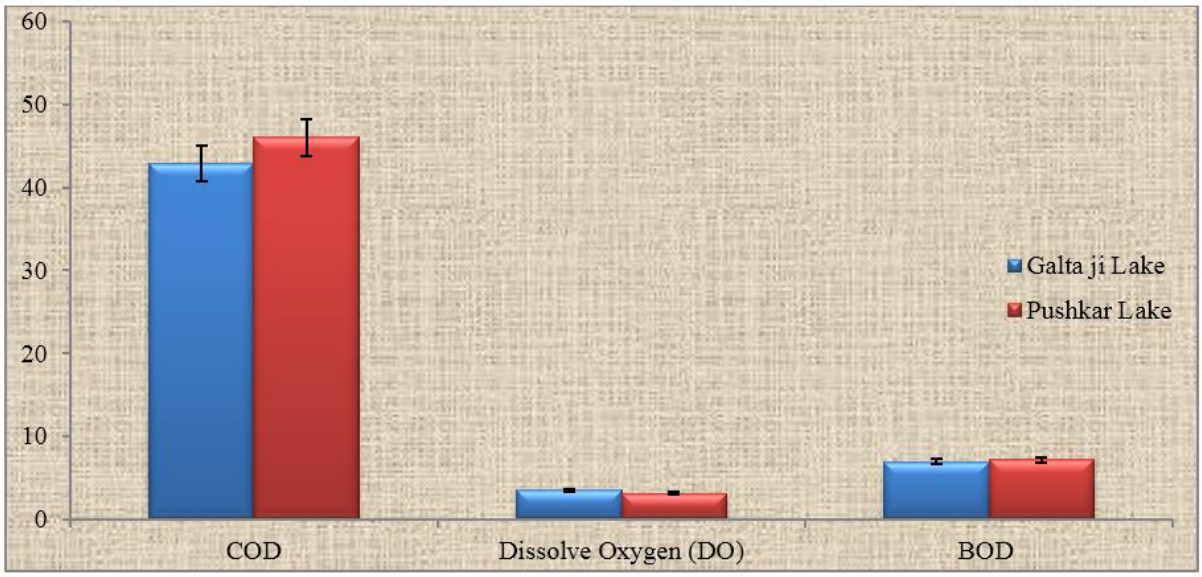

Fig 2 Comparative analysis of Water parameter for Galta ji And Pushkar Lake

3. RESULTS AND DISCUSSIONS

Water physicochemical parameters are indices used in determining water quality. The parameters analyzed in this study were pH, total dissolved solids, biochemical oxygen demand and dissolved oxygen.

A.) Hydrogen Ion Concentration (pH):

In determining the quality of water, pH is a significant consideration as it has an impact on a variety of biological and chemical processes in watercourses. It is a method of determining acidity or alkalinity, as well as the sum of hydrogen ions in water. The existence of some pollutants can lead to varying pH values, like oxides of sulphur and nitrogen which are converted to nitric and sulphuric acids, especially when calculated and documented continuously, together with the electrical conductivity of a water body. Minor changes in pH may result in protracted consequences; the solubility of phosphorus and other nutrients can be improved by changing the pH of water. The more the nutrients, the more aquatic plants and algae thrive thereby causing an increase in the demand for dissolved oxygen (Abdulrazzak *et al.*, 2020).

Present study also shows pH is alkaline in most of samples and it value for Galta Ji 7.85 whereas for Pushkar lake water it is 8.19. The pH value of different studied in different samples is within highest desirable limit (HDL) prescribed by WHO which is 6.5 to 8.

B.) Total Hardness:

Hardness is an important parameter in decreasing the toxic effect of poisonous element. In our investigation, range of hardness value of Galta Ji pond water is 348.95 mg/l, whereas for Pushkar lake water it is 38.96 mg/l. These high value may be due to the concentration of carbonate and bicarbonate salt of calcium and magnesium.

C.) Total Dissolved Solids:

Total dissolved solids (TDS) is a measure of the combined dissolved content of all inorganic and organic substances present in water - molecular, ionized, or micro-granular suspended form. Natural sources, wastewater, municipal and agriculture run-off and industrial effluents are all sources of TDS in bodies of water.

Total dissolved solids consists majorly all of the inorganic and organic substances in the water body that are generally found in the suspended form. In our investigation, range of TDS contents of Galta Ji pond water is 648.26 mg/l, whereas for Pushkar pond water is 612.08 mg/l. The prescribed limit of TDS by WHO is 500 mg/L.

D.) COD

Further chemical oxygen demand is the measure of oxygen equivalent of that portion of the organic matter in a sample that is susceptible to oxidation by strong chemical oxidant. It is important rapidly measured parameters for industrial waste water and control of waste treatments. COD test is used to measure the load of organic pollutants in industrial waste water (Moisès *et al.,* 2020). It was observed

that in all the effluents are very much higher than 30.0 mg/l which have maximum permissible limit according references.

According to our investigation, the COD value of the water at Galta Ji Pond is 42.92 mg/l, whereas for Pushkar pond water COD value is 45.980 mg/l.

E.) Dissolve Oxygen (DO)

All types of life, including species responsible for self-purification mechanisms in aquatic ecosystems, require oxygen. Apart from temperature and organic matter, DO levels in water reflects the physical and biological reactions that endure in water and is usually influenced by aquatic plants and plankton concentration. Temperature, salinity, turbulence, algae and plant photosynthetic action, and atmospheric conditions all affect oxygen levels. The dissolved oxygen amount in waste water sample is very less, due to high amount of BOD and COD. In our investigation, DO value of Galta Ji pond water is 3.482 mg/l, whereas average DO value for Pushkar pond water is 3.128 mg/l.

F.) BOD

Biochemical oxygen demand (BOD) is the amount of dissolved oxygen that is needed for stabilization of organic matter that are biodegradable through the action of aerobic microorganisms and the oxidation of certain inorganic materials over a 5-day period. It refers to the amount of oxygen required to decompose organic materials in water (Ivandini et al., 2015).

Increases in BOD can be due to mix of unwanted religious offerings in pond water. According to our research, the BOD for the water in the Galta Ji pond is 6.959 mg/l, whereas BOD value for Pushkar pond water is 7.128 mg/l

From this study it can be deduced that the mismanagement of our waters through unrestrained and unrestricted dumping of contaminants into it has caused these water bodies to have poor quality and should not be used for the purpose of consumption unless properly treated. In-spite of these issues, the water bodies have managed to sustain the ecosystem and most aquatic life. The presence of aquatic plants that take in some of these pollutants and release oxygen may also help improve quality (Navarro-Ortega *et al.,* 2015).

Finally concluded that ongoing study duration is a holy month Kartika of Hindi calendar, during this month many of people attend to bath in holy lake as Galta ji and Pushkar ji. In comparisons Pushkar Lake is more polluted as compare to Galta ji. The results of the present investigation point out that the water is not good for human consumption and also struggling for their existence. All of the physicochemical characteristics had high values in the pond sample when compared to the standard. According to this study, devout, religious, and traditional activities at the location have caused the water quality to deteriorate.

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