

REVIEW OF RESEARCH

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COMPARISON OF PHYSICO-CHEMICAL PARAMETERS OF LAKE WATERS IN NAGOOTHANE; A CASE STUDY IN ROHA TALUKA IN INDIA

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ABSTRACT

Present investigations involved study and comparison of physiochemical parameters of Shrungar and a small Lake near Jogeshwari temple in Nagothane, in Raigad district in Maharashtra. Water parameters like Temperature ($^{\circ}\text{C}$), pH, Sulphates (mg/l) Dissolved oxygen (mg/l), Total Suspended Solids (mg/l), COD (mg/l), and Phosphates (mg/l) helped to determine potability of water. Comparison between the water parameters showed COD ranged from 75.44 mg/L to 56.58 mg/L , Alkalinity observed is 135 mg/l to 139 mg/l respectively for above two lakes. Total Suspended Solids (TSS) values are also 27 mg/l and 38 mg/l . Water from Lake near Jogeshwari Temple is found to be more acidic in nature than Shrungar Lake water. Similarly other parameters are also compared. Though small in size these lakes can be source for water for agriculture if proper methods of purification are suggested and employed.

KEYWORDS – Comparison of physiochemical parameters, Lake water, Potability etc.

INTRODUCTION

Nagothane is located at 18.53°N 73.13°E . in Raigad District in Maharashtra State in India. This village is situated on the bank of river Amba, and is surrounded by hills. There is industrial area with petrochemical industries giving employment opportunities to people. (Google-Nagothane Wikipedia). Nagothane is near to Mumbai just 100 km away and there are chances of developing Railways, bus transport Water from river Amba and lakes around Jogeshwari temple can be the useful for the residents of Nagothane. But Potability of water should be checked before its use. So present investigations involved the study of physiochemical parameters of the Shrungar Lake and Lake near Jogeshwari Temple (named Brahmin Ali Tale), and compared the physicochemical parameters to check its potability. Studies of River water of Amba is already carried out by many researchers like Dr. V.R Jadhavar, Dr D.V. Bhagat and others. Map 1 shows the study area of Lakes of Nagothane village.





Figure1- showing Map of Nagothane area in Raigad district

2. MATERIAL AND METHOD-

The water samples are collected in winter season in month of December of 2018. The collection of samples has been done according to standard methods prescribed by American Public Health Association (1995) and Trivedi and Goel (1986); Kudesia and Kudesia (1998). The various parameters such as Colour, Odour, pH, Sulphate, TSS, COD, DO, Alkalinity, etc can be determined. In the course this is limited study for drinking water purpose. Further seasonal variations, study of variation of the physicochemical parameters for all three seasons. Methods used for analysis are IS:3025(Part -5 8):2006, IS: 3025(Part -16):2002, etc

3. RESULT AND DISCUSSION-

Quality of water is checked with USPH and ISI standards for drinking water to decide the suitability of both lake waters

3.1 pH value:

The pH value of a solution is the negative logarithm of the concentration of hydrogen ions per litre. It shows the chemical nature of water. Observed PH values are 7.61 and 8.20. This indicates that the *Shrungar lake* has more alkaline pH i.e. 8.20 than *Jogeshwari Lake* with pH -7.61. This alkalinity may be due to presence of sufficient quantities of carbonates. Observed parameters are given to follow.

Sr No	Name of the Water Quality Parameter	Observed value of in winter season	Observed value in winter season	USPH standards	Bureau of Indian Standard (IS-10500:1994)	Water Quality Standard
1	pH	7.61	8.20			
2	Electrical conductivity	387	341	6.0-8.5	6.0-9.0	6.0-9.0
3	COD	56	75	300umhom-1		
4	DO	3.03	2.28	4.0ppm	10.0ppm	
5	Alkalinity	135	118.9	4-6ppm	3.0ppm	5.0
				120ppm	-	20

Sulphates(as SO ₄)	10.5	5.26	<0.3mg/l	150	150ppm
Total Suspended solids	27	38	-	-	500ppm
Total organic Carbon	20.9	27.91	-	-	

Table1- observed physico-chemical parameters of Jogeshwari lake and Shrungar Lake water.

Electrical Conductivity (EC):

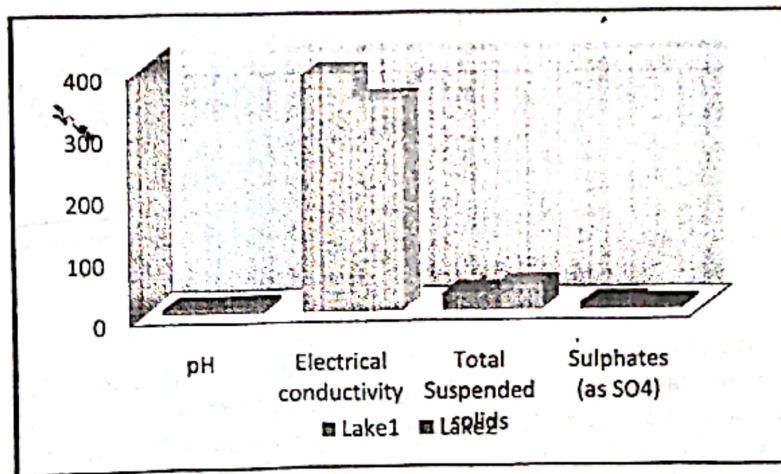
Current carrying capacity of conductor is called as electrical conductivity. By definition conductivity is reciprocal of the resistance. Salts and other chemicals that are dissolved in water are normally responsible for electrical conductivity. Fresh water normally has conductivity between 150 to 500 us/cm. Observed values of conductivities for Jogeshwari Lake waters are more i.e. 387 and 341 μS/cm. It indicates mineral, geological effect and organic pollution in the lake water. Similar results are reported by [1] in 1999 for upper Lake in Bhopal.

Total Suspended Solids-

Total suspended salts (TSS) means total amount of particles that suspended in a water sample measured by term TSS. In present case, observed values for TSS are 27 and 38 ppm. Observed values are below the permissible limit of WHO Standard of drinking water. Total dissolved solids can be produced due to soil erosion, improper sewage system, and unauthorized disposal of waste material.

Dissolved Oxygen-

Dissolved oxygen is important parameter, which affects flora and fauna of the Lake. Dissolved oxygen is required for physiological and biological processes of living beings. In the present study, observed DO values are 3.03 and 2.02 in winter season. If DO levels are below 5 then aquatic life is in stress. DO levels below 3 ppm are not good for aquatic organism. Dissolved oxygen levels below 3 ppm are stressful to most aquatic organisms. Low value of DO shows no chance for fresh vegetation. Low DO indicates organic pollution due to addition of waste. Variation in physicochemical parameters like PH, Electrical Conductivity, Total suspended solids, Sulphates can be shown in figure-2.



2. Variation in Physicochemical parameters like pH, Electrical conductivity, Total suspended solids, Sulphates etc.

3.5 Total alkalinity-

Salts of carbonates, bicarbonates, silicates and phosphates along with hydroxyl ions impart alkalinity to water sample. Observed values for total alkalinity are 135.5 ppm to 118.9 ppm. Ideal range is 150-200 ppm. But Permissible Range is 200 mg/l. The lower value of alkalinity in water provides an idea about the amount of salts present in water. Minerals dissolved from soil also cause alkalinity.

3.6 Chemical Oxygen Demand-

The term Chemical Oxygen Demand (COD) is used to indicate the amount of oxygen required to oxidize organic matter present in water sample. It indicates the pollution strength of water. Observed values of COD i.e. 56 and 75 mg/L indicate organic contamination. Geographical positions of Lake Nagothane, improper sewage system, Cleaning practices of villagers, agricultural run offs may increase the COD expressed in terms of mg/L.

Similarly variations in parameters like alkalinity, COD, DO, Total Organic Carbon can be observed. Figure-3 and Figure-4 shows overall trend of variation of physiochemical parameters for both lake waters.

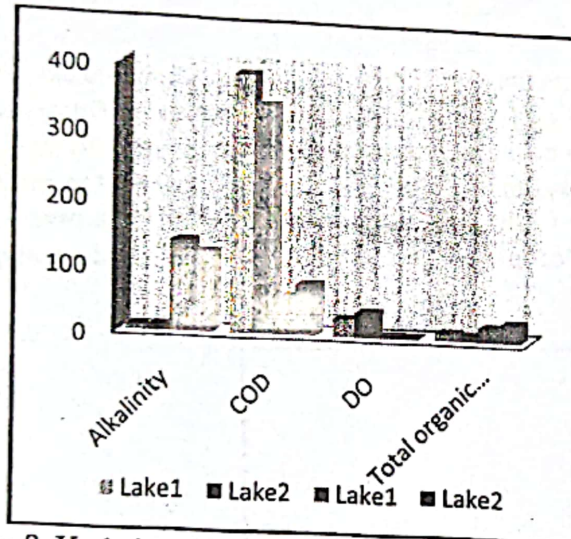


Figure-3 Variation in physiochemical parameters for both Lake waters

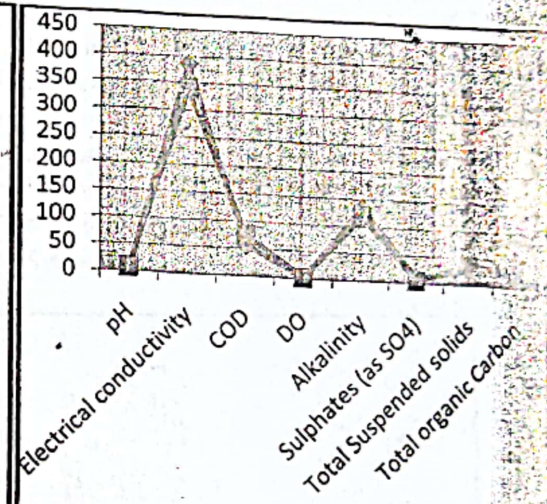


Figure-4 Overall trend of variation of physiochemical parameters for both lake waters

3.7 Sulphate:

Sulphate in water is due to leaching of gypsum and other minerals (Ranjana et al, 2015). The values of the present study lie below the standard limit. The minimum value recorded is 10.52 and 5.26 mg/l in lake waters. The BIS permissible limit of 150 mg/lit. Sulphates in water are utilized by aquatic plants and get diluted. Lake waters are used for domestic purpose like washing clothes, vehicles, animals etc. High values increase sulphates. Minimum values of sulphate in winter probably due to biodegradation and low temperature level.

Probable reasons for contamination are-

- 1) Industrialization and urbanisation
- 2) silting of Lake
- 3) Waste and domestic effluents
- 4) Dumping of waste
- 5) Destruction of catchment area
- 6) Immersion of Ganapati idol. (Jadhavar et al, 2014)

CONCLUSION-

According to WHO 80% diseases are caused by impure water. So Potability must be checked. These diseases are though smaller in sizes they can be a source of water for irrigation for villagers. Slightly acidic nature of water, high COD, Low DO makes water unfit for drinking purposes. Of course heavy metal analysis should also be done. Though Lake Size is small it has importance in life of villagers of the area. The water is slightly alkaline but within permissible limit. Total suspended solids and Sulphates are low. Hence proper purification system should be employed.

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