Special Issue

ISSN:- 2321-9777

THE RESARCH VIEW: A MULTIDISCIPLINARY JOURNAL
PART A: SCIENCE AND TECHNOLOGY
Recent Trends in Pure and Applied Sciences (RTPAS-2021)
Dr. Patangrao Kadam Mahavidyalaya, Sangli

WATER QUALITY ANALYSIS OF FOUR LAKES IN KADEGAON TEHSIL, MAHARASHTRA, INDIA

***Vikas S. Salunkhe[1], Hemant S. Joshi[1], Anuja H. Joshi[1]**

[1]Department of Botany
Bharati Vidyapeeth's
Matoshri Bayabai Shripatrao Kadam Kanya Mahavidyalaya, Kadegaon
Email ID- drvikassalunkhe@rediffmail.com

Abstract

It is believed that life started with water on earth in form of unicellular micro-organisms. More than 75 % of area of earth is covered by water and the rest by land mass. Even a healthy human body consists of more 70% of water by mass. Humans use water for domestic as well as industrial purposes. Hence the water quality parameters are at most important. The present communication is about the water quality parameters such as alkalinity, BOD, hardness, chlorine, etc from lakes in and around Kadegaon tehsil. Three samples of four water bodies from Kadegaon tehsil viz., Kerli lake, Hingangaon lake, Shivajinagar lake and Tadsar lake were test for water quality parameters such as pH, electric conductance, temperature, total alkalinity, BOD, total hardness, residual chlorine and total dissolved solids. The results show the water quality is good in the tehsil. But still proper care and maintenance should be taken of these water bodies.

Keywords: Water quality, parameters, alkalinity, chlorine, hardness, BOD

1. Introduction

It is believed that life started with water on earth in form of unicellular micro- organisms. Also oxygen which is necessary for survival of living organisms is formed by photolysis of water. Hence, water plays are very important role in survival and evolution of living organisms on earth. More than 75 % of area of earth is covered by water and the restby land mass. Even a healthy human body consists of more 70% of water by mass (4).

Humans use water for domestic as well as industrial purposes. Hence, it must be said that human welfare is direct depended on water. Hence the water quality parameters are at most important. These parameters will help to decide the usage of water. About 30 % of

urban and 70 % of rural population in India do not have access to safe drinking water as per the WHO (5). Water quality has become a major global concern due to increasing human developmental activities. The present communication is about the water quality parameters such as alkalinity, BOD, hardness, chlorine, etc from lakes in and around Kadegaon tehsil.

Kadegaon is a tehsil in Sangli district of Maharashtra state, India. Four lakes were selected for the analysis. Soyabean, Jowar, Maize, Pigeon pea, sugarcane and grapes are the important crop plants here. The pesticides, fertilizers and insecticides used for farming ultimately lead to the water pollution this area. Also few industries present in the study area are responsible for water pollution here. Kadegaon tehsil has the total population of 1, 43,019 according to Census 2011. Out of the total population, children account for 11%. So the the water sources in this area need to evaluated for the health concerns of children population. Also 86.2% of the 69,793 working population are permanent employed either in industries or farming (2). Such a large

population is depended directly or indirectly through agriculture or industries on water bodies. Hence, the authors have investigated the some water bodies in Kadegaon tehsil for their quality.

2. Material and Methods

The water samples were collected from four different lakes in Kadegaon tehsil viz., Kerli, Shivajinagar, Hingangaon and Tadsar. The locations of these water bodies are given in the **Table No. 1.** The collections were made in the month of February 2020. Three samples from each water body were collected in sterile glass bottles with rubber corks. The water samples were immediately brought into the laboratories for further analysis.

Sr. No	Location	Coordinates
1	Nerli Lake	17°17'12.1"N 74°18'55.5"E
2	Shivajinagar Lake	17°18'49.7"N 74°17'50.1"E
3	Hingangaon Lake	17°24'08.8"N 74°20'38.8"E
4	Tadsar Lake	17°15'07.0"N 74°19'49.1"E

Table 1 Locations of sample collectionPhysicochemical analysis of water

1. pH- The pH of the water sample were determined by using digital pH meter.

2. Temperature- The temperature of the water sample was measured by using thermometer.

3. Electric conductivity- For measurement of conductivity, EC meter was used.

4. Total dissolved solids- Total dissolved solids denote mainly the various kinds of mineral present in water. These can be determined as the residue left after evaporation of the filtered sample.

5. Total alkalinity- It is determined by titrating the sample against Sulphuric acid using bromcresol green as indicator.

6. BOD- It was estimated by Wrinkler's method.

7. Total hardness- Hardness was determined by titrating against EDTA using Erichrome Black-T indicator.

8. Residual Chlorine – It was estimated by iodometric titration method.

The present study involves the analysis of water quality in terms of physicochemical parameters (1). Water Quality Index (WQI) was calculated for collecting water samples. Water Quality Index was calculated based on physicochemical parameters and the standards of drinking water quality by the World Health Organization (WHO) is given in **Table No. 2**. The calculated WQI values of the samples are classified according to the five types, which are given in the following **Table No. 2**.

Sr. No.	Water Quality	WQI Value
1	Water Unsuitable for drinking	>300
2	Very poor water	200-300
3	Poor water	100-200
4	Good water	50-100
5	Excellent	<50

Table 2 Classification water quality index based on WQI value

3. Result and Discussion

Three samples of four water bodies from Kadegaon tehsil viz., Kerli lake, Hingangaon lake, Shivajinagar lake and Tadsar lake were test for water quality parameters such as pH, electric conductance, temperature, total alkalinity, BOD, total hardness, residual chlorine and total dissolved solids. The results show the water quality is good in the tehsil (3,6).

Fig. nos. **1, 2, 3, 4, 5, 6, 7 and 8** show the results of the water sample and **Table no. 3** shows the comprehensive results of water samples. From the results, pH, conductivity, temperature, hardness, residual chlorine and total dissolved solids are within the limits of IS and WHO while, total alkalinity and

BOD are above the optimum levels. BOD is a measure of the amount of oxygen required to remove waste organic matter from water in the process of decomposition by aerobic bacteria. The higher values of BOD indicate organic pollution in these water bodies. Also the higher temperatures are responsible for increase on BOD values as at higher temperature the planktonic population increases. Higher alkalinity suggests industrial or agricultural discharges in the water bodies.

Parameters	Kerli Lake	Hingang aonLake	Shivajinagar Lake	Tadsar Lake	IS and WHO water quality parameters
1. Total alkalinity (mg/lit)	245 ± 0.41	198 ± 0.55	212 ± 0.32	210 ± 0.98	200
2. pH	7.0	7.2	7.3	7.1	6.5-8.5
3. Electric conductivity ($mhos.cm^{-1}$)	0.413 x 10^{-3}	0.458 x 10^{-3}	0.502 x 10^{-3}	0.462 x 10^{-3}	0.75 x 10^{-3}
4. BOD (mg/lit)	1365 ± 0.85	1402 ± 0.78	1524 ± 0.68	1204 ±0.89	350
5. Temperature (^{O}C)	29.68 ± 0.35	28.98 ± 0.68	28.10 ± 0.45	30.01 ± 0.12	-
6. Total Hardness (mg/lit)	152 ± 0.98	132 ± 0.47	102 ± 0.67	120 ± 0.49	300
7. Residual chlorine (mg/lit)	0.2 ± 0.11	0.1 ± 0.09	0.1 ± 0.07	0.1 ± 0.07	0.2
8. Total dissolved solids (ppm)	424 ± 0.21	325 ±0.78	365 ± 0.49	226 ± 0.77	500

Table 3 Results of Water Quality Value

Table No. 4 and **Fig. no. 9** show the Water quality index of the water bodies ranging from 52-89 which indicates good water. But the WQI of the Kerli lake (89.04858195) was onthe higher side which is the matter of concern **(Table No. 2)**.

Location	WQI Value	Water Quality
Kerli Lake	89.04858195	Good water
Hingangaon Lake	52.88729455	Good water
Shivajinagar Lake	54.48578061	Good water
Tadsar Lake	52.76628362	Good water

Table 4 Water Quality Index

4. Conclusion

The results of four water samples from the four lakes indicate good quality of water according to IS and WHO standards. But still proper care and maintenance should be taken ofthese water bodies. Care such as chlorination of water, reduction of use of inorganic chemicals in agriculture, no discharge of industrial effluents in the water bodies can prolong and enhance the use and quality of water. It shall help in improving health of the people.

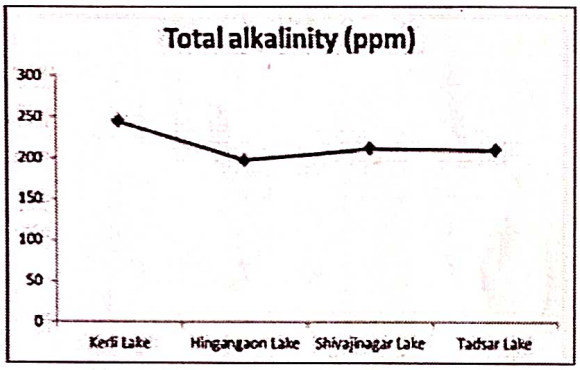

Fig No. 5 Total alkalinity

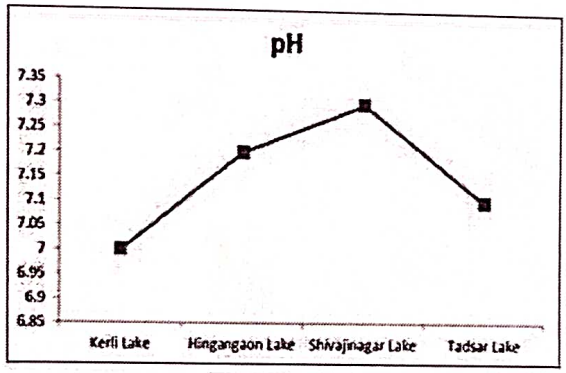

Fig No. 6 pH

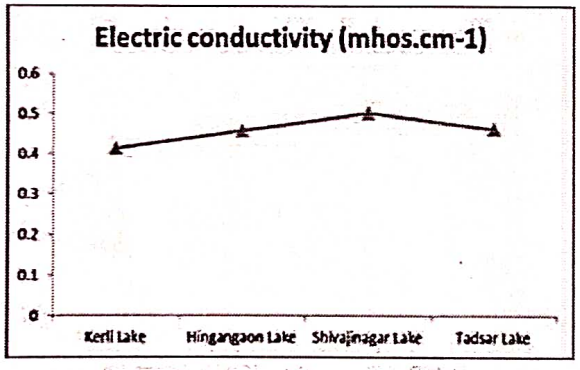

Fig No. 7 Electric conductivity

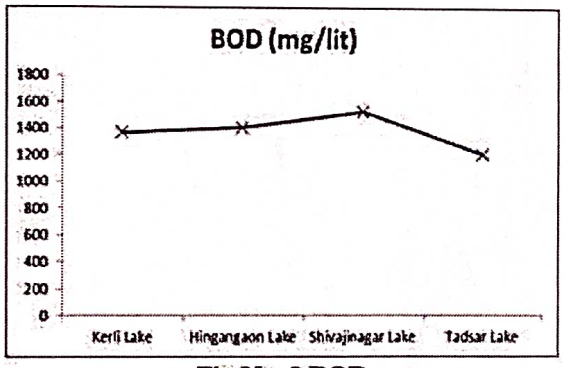

Fig No. 8 BOD

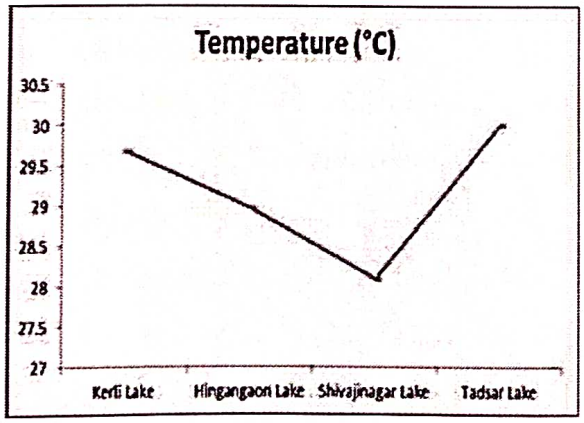

Fig No. 9 Temperature

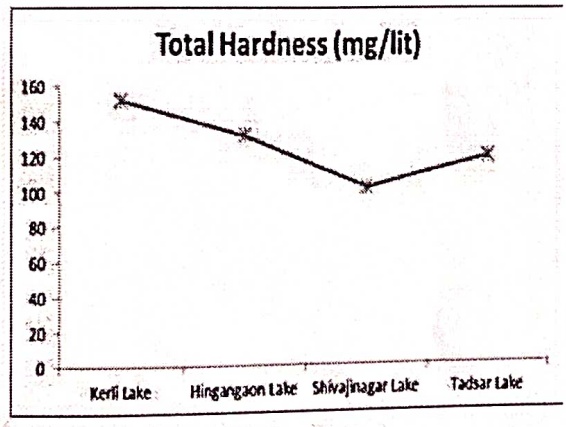

Fig No. 10 Total Hardness

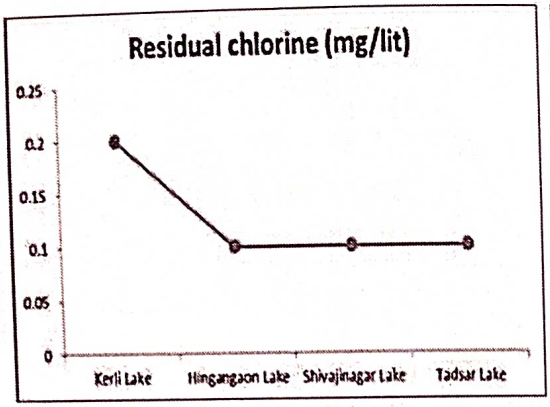

Fig No. 11 Residual chlorine

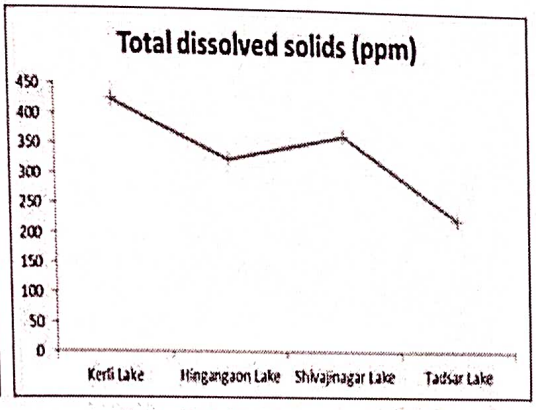

Fig No. 12 Total Dissolved Solids

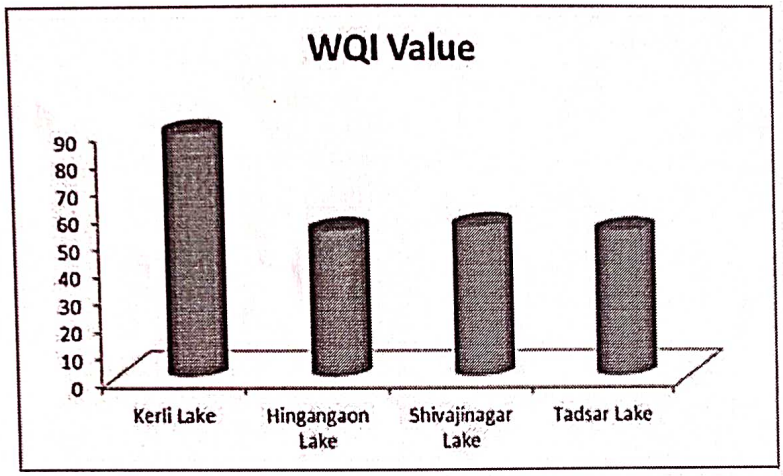

Fig No. 13 Water Quality Index Values

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This Journal is a quarterly or otherwise, without published by Jaysingpur College Jaysingpur, Shirol-Wadi Road, Jaysingpur - 416 101 (India)

Edited and Published by Prin. Dr. R. R. Kumbhar on behalf of The Research Wing of Jaysingpur College
At post - Jaysingpur - 416 101. Dist - Kolhapur - Maharashtra State, India.
Published from Jaysingpur College - 416 101, India and
Printed at Anekant Printing & Publishing House, Jaysingpur College, Jaysingpur
Created by Anekant Printing & Publishing House, Jaysingpur College, Jaysingpur