International Journal of Global Science Research **ISSN: 2348-8344 (Online)**
Vol. 10, Issue. 1, April 2023, pp. 2009-2014 **DOI: 10.26540/ijgsr.v10.i1.2023.234**
***Available Online* at www.ijgsr.com**

Research paper

Comparative Assessment of Kolar Reservoir after a period of 10 years

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Received: 08/03/2023
Revised: 14/03/2023
Accepted: 20/03/2023

Abstract: The present study is aimed at assessing the changes in the water quality parameters of Kolar Reservoir of Bhopal, Madhya Pradesh after a time period of 10 years. The first analysis was conducted in the year 2007-2008. The second analysis was done in the year 2017-2018. The parameters included for study are pH, Turbidity, Biological Oxidation Demand (B.O.D.), Dissolved Oxygen (D.O.), Electrical Conductivity, Total Alkalinity, Total hardness, Nitrate and Phosphate. This comparative study will help in the overall assessment of the present condition of the water body. In the present study the Total Alkalinity and Electrical Conductivity has increased when compared to that of 2007-08. Thus, indicative of the fact that there is a strong relationship between these two parameters and even though all the other water parameters showed improvement after a gap of 10 years but still at some points there is certain amount of solvency of salts mainly due to human activities.

Keywords: Electrical Conductivity, Total Alkalinity, Analysis, Turbidity, Comparative.

Introduction:

India is a land blessed with numerous water bodies, whether big or small. May it be lakes, rivers, reservoirs etc. These water bodies constitute the life line for the major part of the country. Water is absolutely essential not only for survival of human beings and animals but also an integral part of the earth's overall existence. Timely and intermittent assessment of water bodies not only helps us in knowing the present status of the water quality but, it also helps in the well-being of the organisams dependent on these water bodies.

Water quality analysis is the best possible way of identifying and assessing the status of different or same water – bodies over a span of different years. The most traditional water quality indicators are pH, D.O., Nitrate and Phosphate. Other than these indicators, the parameters like Turbidity, Total Alkalinity, Total hardness and B.O.D. also helps in assessing the overall quality of water.

This study aims at finding the present quality of water after a period of 10 years. The water treatment and quality maintenance and the overall impact of

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these steps on water of Kolar Reservoir can be assessed.

Study Area:
Kolar dam was constructed on the river Kolar near Birpur 32 km away from Bhopal on Kolar Road at 23° 01' 08" latitude and 77° 20' 30" longitudes (Fig.1). The Kolar is a tributary of river Narmada and has a catchment area of 508 sq.km. It has a storage capacity of 265 M Cu m. Out of this 56.6 M.Cu.m has been made available to PHED for drinking water supply and rest is for irrigation and other uses. The height of the earthern dam is 45 m. approx, and the length of the dam is 983.5 m. The raw water available from Kolar dam is treated at Kolar water treatment plant for the augmentation of water supply to the city of Bhopal. Kolar reservoir has virgin forest catchment area The water samples were collected from three sites of the Kolar Reservoir i.e. 1. Starting Point of Dam 2. Near Salikhera Village 3. Jhalpipli village. (Fig-1).

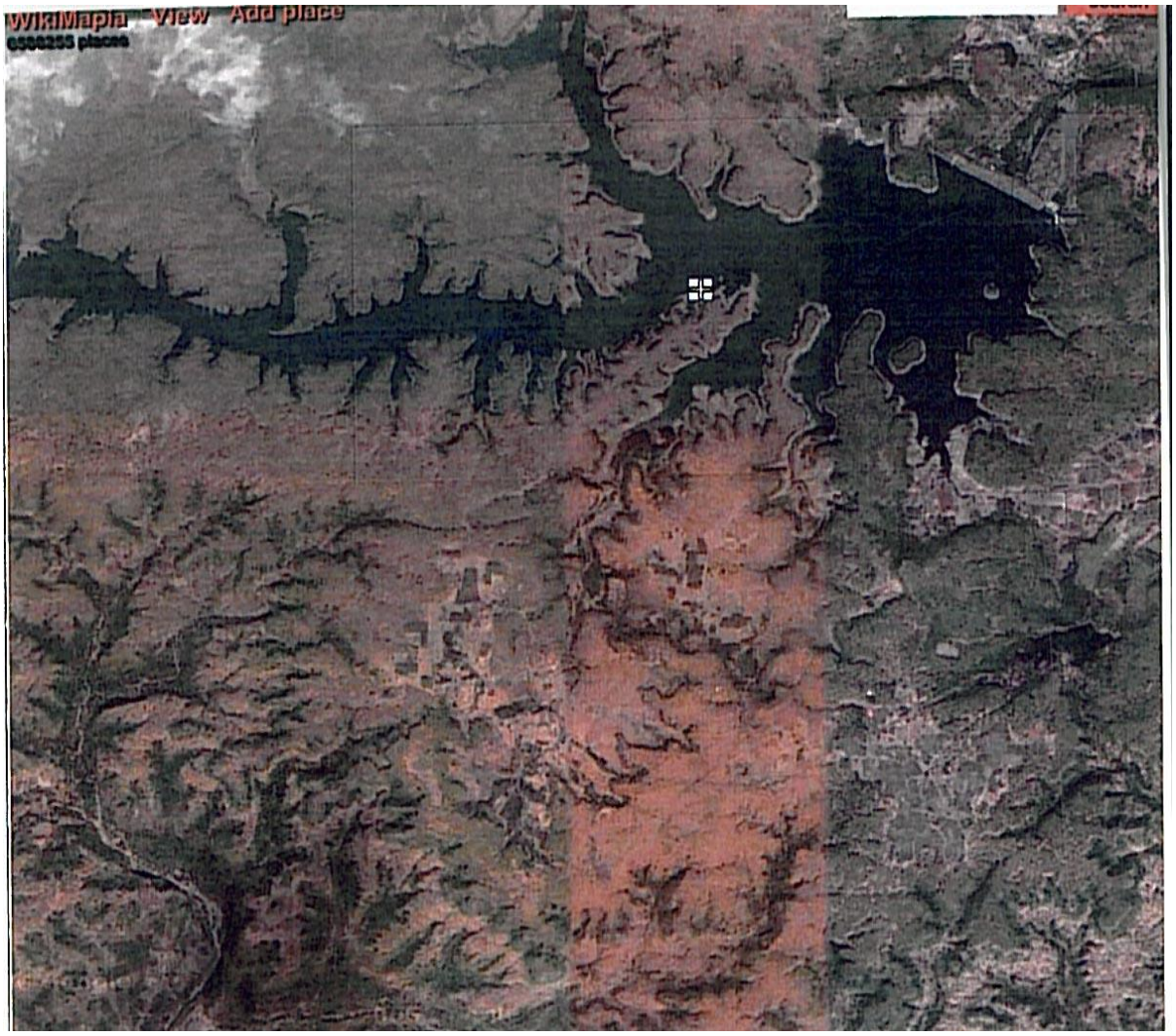

Figure 1. Satellite Imagery of Kolar Reservoir of Bhopal

The digitization of the Kolar River using the satellite imagery was also done (Fig-2).

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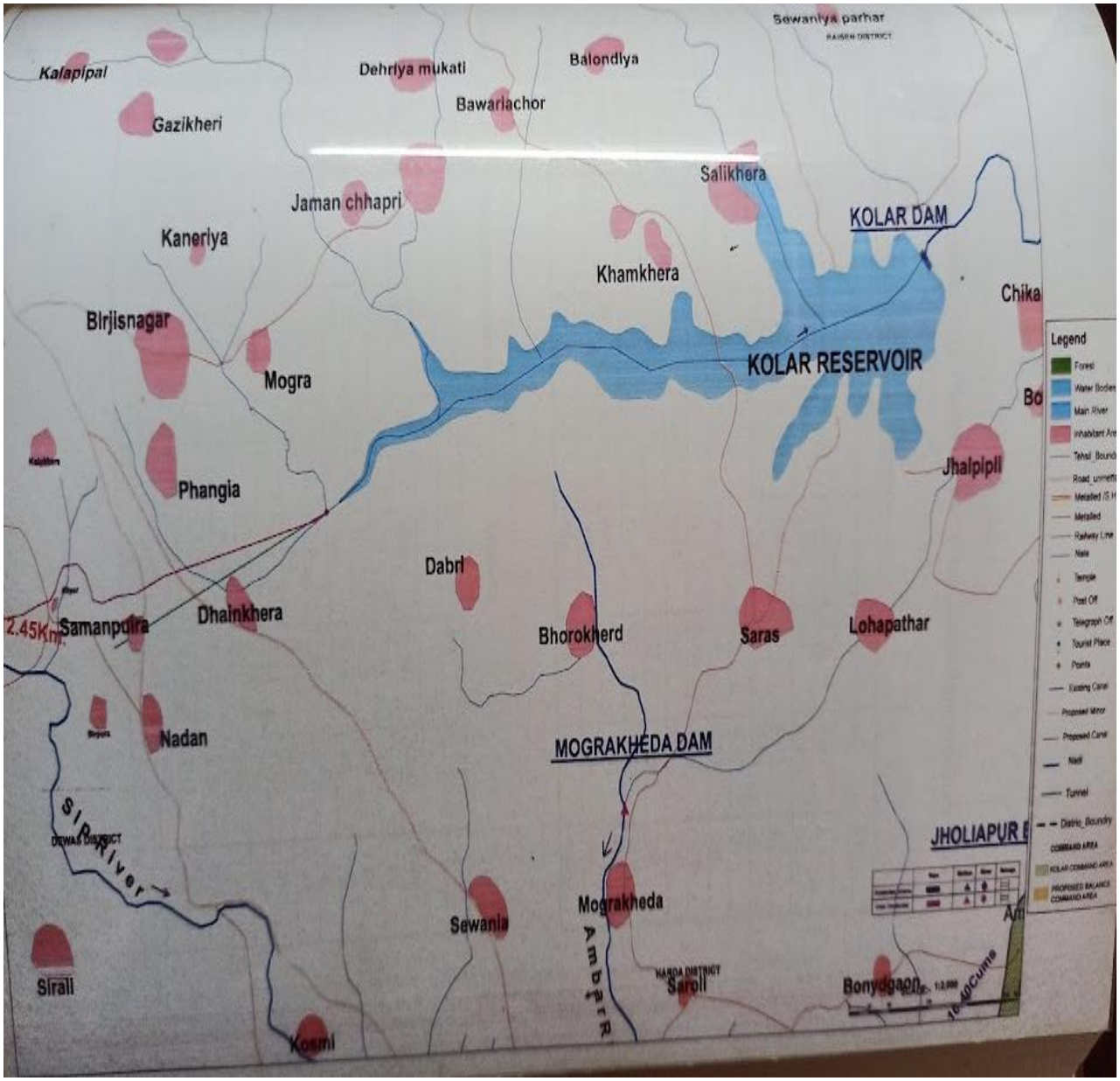

Figure 2. Digitised Map of Kolar Reservoir.

Methodology:

The methodology followed were as per the Workbook on Limnology by Adoni (1985) and according to APHA (1988) (Standard Methods). The investigation has four parts. The samples are collected from four stations in replicates of three. The samples are analysed for various parameters on monthly basis for 12 months.

Physico-chemical analysis of water –

The water samples were analysed at monthly intervals in three parts for 12 months from 3 stations. On comparison with latest data obtained from M.P. Pollution Control Board with the earlier research data of the year 2007-08 for the study of 9 different parameters were taken into consideration. They are pH, Total Hardness, Total Alkalinity, Phosphate, Nitrate, Dissolved Oxygen (D.O.), Electrical Conductivity, Turbidity, Biochemical Oxygen Demand (B.O.D.). The parameters were then compared with the readings of the year 2017-2018 to

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identify the variations in the water quality parameters.

Result:

The result of the mean annual variation of Kolar Reservoir in the year 2007-08 and 2017-18 is presented in Fig-3.

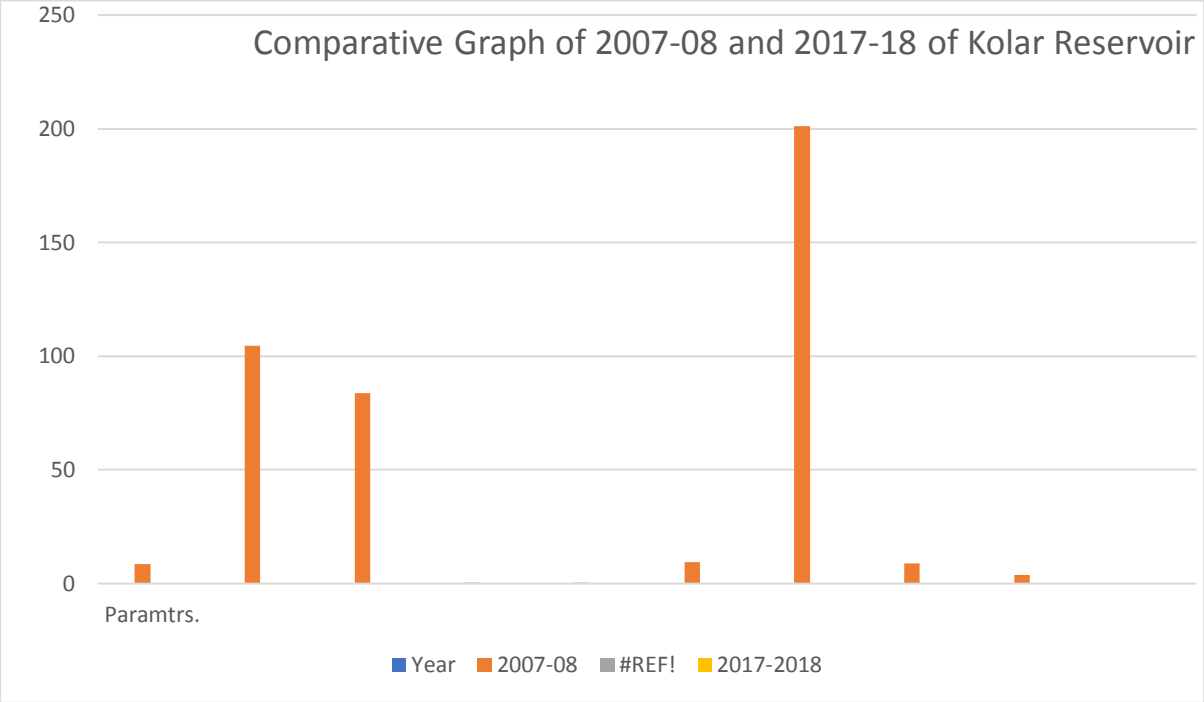

Figure 3. Graph showing the comparison of water parameters during 2007-08 and 2017-18.

A comparative graph of different parameters studied during the year 2007-08 is created (Fig-4).

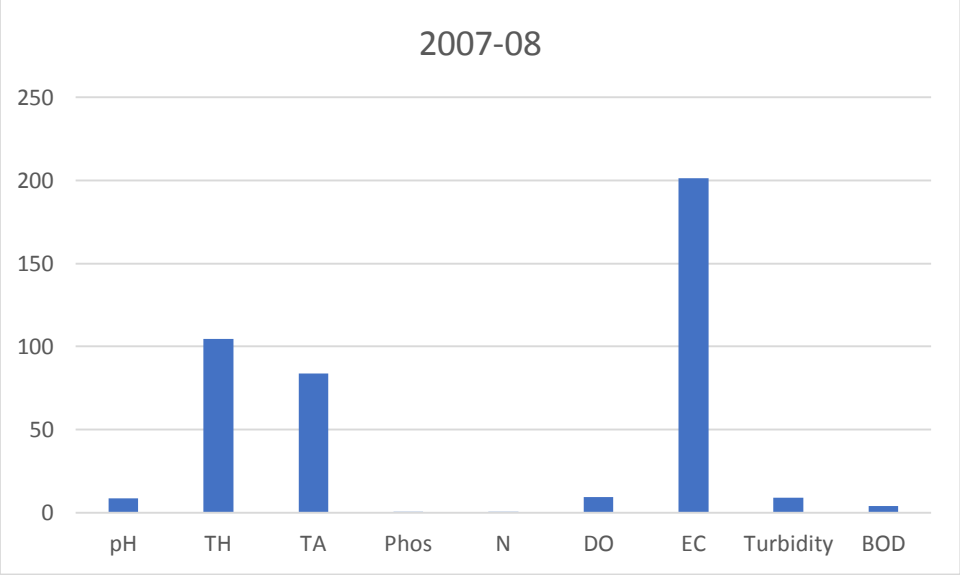

Figure 4. Graph showing the water parameters in 2007-08

As per the comparative study of the 9 different parameters of Kolar Reservoir for the time period 2007-08 and 2017-18 (Fig-5), indicated a significant decrease in the

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values of pH, Total hardness, Phosphate, Nitrate, Dissolved Oxygen, Turbidity and Biochemical Oxidation Demand (B.O.D.) which is a very good indication of the water quality.

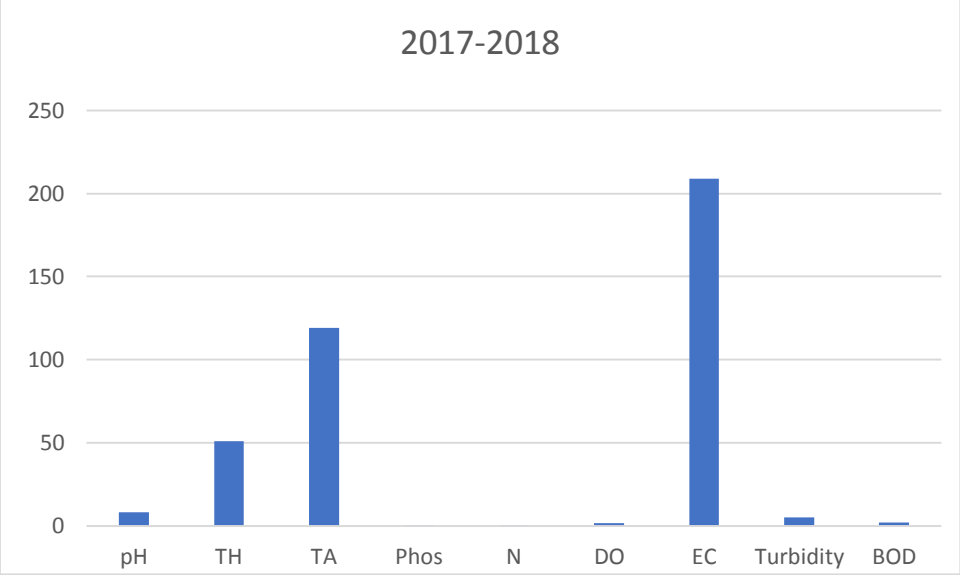

Figure 5. Graph showing the water parameters in 2017-18

The pH values are suitable for irrigation as per the study of Ayers and Westcot (1976). The pH values reduced from 8.9 to 7.7. The pH values represent that there is higher chloride, carbonate content indicating the alkalinity of the water.

The higher conductivity levels depend on the concentration and degree of dissociation of ions. Also, the conductivity levels depend on the temperature levels of the water. The electrical conductivity even though it reduced compared to that of 2007-08. The average values of 135.7 were a little higher. This figure is well within the standard level of electrical conductivity of most natural waters.

The water of Kolar Reservoir which through earlier studies was indicative of eutrophication having set in. After a period of 10 years the factors which were indicative of pollution have shown a considerable decline. Electrical Conductivity and Total Alkalinity are the 2 parameters which have shown an increase compared to the readings of 10 years back. The relationship between alkalinity and conductivity helps us in knowing the fact that there are still very much point and non-point sources entrance of salts like Chloride and Sodium salts. This is true as per the study of Bodo, (1993), and Kilgour et.al. (2002) where, the sites which receive anthropogenically derived inputs of organic chemicals have unusually high conductivity.

Discussion:

The studies conducted by Williams et.al (2000) indicated that diurnal variations occur in streams which are dominated by macrophytes, resulting in pollution events in the water bodies which also causes low Dissolved Oxygen (D.O.) levels. Proper maintenance including filtration, timely scrutinization of water quality levels have helped to bring down the pollution levels where, the higher concentration of dissolved chemicals in the water helps in greater electrical current to be conducted. Conductivity is measured in (µ/cm). micro or millisiemens per centimeter. Also, reported in milli mhos or micro mhos/centimeter (µmhos/cm or mmhos/cm). Suggested measures like total

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ban on activities causing pollution alongside the measures which are in sync with the atmospheric and ecological pollution policies need to be followed as indicated by Proulx et.al (2018).

Conclusion:

Conductivity and alkalinity values are commonly used in study of water bodies. The study of these 2 specific parameters is bound to have a very good potential if, these studies are applied widely. The status of Kolar Reservoir has not deteriorated much as indicated by this comparative study. Even though there are possibilities of improvement in the water quality parameters. If, the monitoring and maintenance are done at a more stringent level such as regulating inflow of fertilizers or any other pollutants as well as regulations are implemented on human activities in the reservoir water along, the sides where there are villages or settlements.

Acknowledgement: The authors are thankful to the Madhya Pradesh Pollution Control Board for providing with the relevant and updated water quality parameters' data.

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