

# Assessment of Hydrographical Parameters from Littoral Zone of Bor River Dam, Amravati District (M.S.), India

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**Abstract:** *The present investigation accounts for the status of Bor River Dam, Angoda village, Amravati district, Maharashtra, India with reference to hydrographical properties of water during the September 2023 to June 2024. The purpose of this study is to check the status water quality of Bor River Dam. Water safety is affected by a variety of contaminants, including chemical and microbiological ones. Also to detect and manage pollutants and contaminants, identifying sources of pollution and implementing measures of littoral zone to control and reduce their impact. This study was carried out for monthly water samples from different stations of the Dam. Water quality parameters like pH, temperature, E.C, hardness, chlorides, alkalinity, dissolved oxygen, nitrate, odour, turbidity, colour, T.D.S, phosphate, fluoride, sodium, SAR, Residual Chlorine and magnesium were done. The study indicates some of the reading that exceeds the limit while another are in acceptable range.*

**Keywords:** Bor River Dam, Water quality, Hydrographical parameters, statistical analysis.

## 1. Introduction

Water is one of the world's most important natural resources. All living things, ecological systems, human health, food production, and economic growth depend on it. For one's health, drinking water safety is crucial. Numerous contaminants, including chemical and microbiological ones, have an impact on the safety of drinking water. These pollutants are extremely harmful to one's health. These contaminants lower the quality of drinking water. Human illnesses can occasionally result from drinking water of such poor quality, so it is important to test the water's quality.

The current study focuses on assessing littoral zone water quality through hydrographical parameters and microbiological analysis. This evaluation aims to establish conditions favourable for littoral zone aquatic organisms like

zooplankton and fish within a dam environment. By understanding water quality dynamics, the study informs conservation efforts and sustainable management practices. It addresses issues of biodiversity, species distribution, population abundance, and behavioural patterns crucial to ecosystem health and resilience. Ultimately, this research underscores the critical importance of monitoring and maintaining water quality to safeguard both human health and ecological integrity, ensuring that water resources remain sustainable and resilient against growing environmental pressures and by which governs the diversity, distribution, abundance and behaviour of organisms in the Dam.

## 2. Material and methods

### 2.1 Study Area



Amravati is one of the eleven districts of Vidarbha regions of Maharashtra. It is the second-largest and populous city of Vidarbha region of Maharashtra. It is located at Latitude N 20°32' and 21°46' and Longitude E 76°37' and 78°27'. The total area of the district is 12210 sq.km. The average elevation of Amravati is about 343 m. Bor river dam located in angoda village, Amravati district, Maharashtra, India. It

was constructed on Bor river. The sanction area of dam is 302.5 hector and the length of the dam is 3800 meter. Some geotag photographs are attach here of Bor River Dam, Amravati.

### 2.2. Analysis of Water sample of lake:

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Samples of water were taken every month from September 2023 to June 2024 from littoral zone area. Samples were taken in the early morning, from 7 to 9 in the morning. Samples of surface water were collected in bottle that had been sterilized. The water samples were preserved and transported to the lab for the estimation of various hydrographical parameters in accordance with accepted practices. By using standard method of estimations 17 different parameters of water sample like pH, temperature, Electrical conductivity, hardness, chlorides, alkalinity, dissolved oxygen, nitrate, odour, turbidity, colour, Total Dissolved Solids, phosphate, fluoride, sodium, SAR, Residual Chlorine and magnesium was analysed.

### 3. Result and Discussion

Hydrographical characteristics of littoral zone water were analysed to understand the variation of the various parameters amongst the lake and to understand the Status of Dam water. The results of Bor river dam with reference to hydrographical parameters from September 2023 to June 2024 are listed below.

**pH:** The pH scale had slightly acidic values between 6.68 and 7.1 with the mean value 6.84. The month of June had the highest recorded pH value, and the month of October had the lowest, 6.68. The pH affects the majority of chemical and biochemical reactions.

**Temperature:** water temperature plays an important factor which influences the chemical, bio-chemical characteristic of water body. The maximum temperature of 26°C was recorded in May and minimum of 19°C was recorded in November. The temperature in summer was high due to low water level with mean 21.9°C and all over temperature quite low because we take sample at morning time.

**Electrical conductivity:** Conductivity measures the capacity of water to conduct electric current. It determines the amount of dissolved solids present in the water to conduct electricity. In our study case, we analysed that the electrical conductivity of Bor river dam varies from 0.27 to 0.41. The mean value of E.C is 0.32. The maximum electrical conductivity was found in the November and minimum electrical conductivity found in March.

**Hardness:** The hardness varies between 6.0 and 22.5 mg/lit. May had the highest recorded value of 22.5 mg/lit, while December had the lowest value of 6.0 mg/lit. Hardness has mean value of 15.28. Summertime high hardness values are caused by a drop in water level and an increase in water evaporation rate.

**Turbidity:** The turbidity of water fluctuates from 9.2 NTU to 15 NTU with mean 11.32. The highest value of 15 NTU was recorded in June; this could be attributed to human activity and the presence of suspended particulate matter. The lowest value of 9.2 NTU was recorded in February.

**Colour:** The water samples are generally colourless, indicating that they are clear and free from any noticeable impurities or contaminants. However, there are occasional instances where the water appears slightly greenish. This

greenish tint could be due to the presence of microscopic algae, dissolved minerals, or other organic materials. The varying coloration might suggest changes in environmental conditions, water source, or the presence of specific substances at different times.

**Odour:** water sample is odourless; it means that it does not have any detectable smell. This characteristic is important in several contexts, such as in drinking water quality assessments, environmental monitoring, and industrial applications.

**Chlorides:** Higher levels of organic waste from sources related to animals are known to cause higher concentrations of chloride, whereas lower levels of chlorides indicate lower levels of contamination. Chloride concentrations vary from 5.0 mg/l to 12.5 mg/l. The month of October recorded the lowest value (5.0 mg/l) and the month of January the maximum value (12.5 mg/l).

**Alkalinity:** The ability of water to neutralize strong acids is known as alkalinity, and it is primarily determined by the content of carbonate, bicarbonate, and hydroxide minerals that are created when carbon dioxide dissolves in water. There is a range of 12.2 to 20.0 mg/lit for total alkalinity. October recorded the maximum value of 20.0 mg/lit, while February recorded the minimum value of 12.20 mg/lit. The average alkalinity value is 14.42. Because of the increased bicarbonate content in the water, the alkalinity reached its peak in October and its lowest point in the winter because of the high rate of photosynthesis.

**Dissolved oxygen:** A variety of variables, including the season, riparian vegetation, suspended solids, amount of nutrients in the water, and organic wastes, all has an impact on the dissolved oxygen. Dissolved oxygen varies in value from 6.1 mg/l to 8.2 mg/l. The lowest values were 6.1 mg/l in November and the highest values were 8.2 mg/l in April. The mean of dissolved oxygen found to be 7.06. Summer time's long days and bright light seem to speed up phytoplankton's use of CO<sub>2</sub> and release of oxygen during photosynthesis.

**Nitrate:** Nitrates are essential plant nutrients, but in excess amounts they can cause significant water quality problems. High level of nitrate makes water unstable as drinking water and in our study area we were got slightly increases in results. The values of nitrate range found 10.0 ppm to 45.0 ppm with the mean 28.24. The maximum value 45.0 ppm was observed in the month of October and minimum value 10.9 ppm in the March and May.

**Total Dissolved Solids (T.D.S):** The total dissolved solid fluctuates from 210 mg/l to 135 mg/l. The minimum value 135 mg/l was recorded in the month of March and maximum 135 mg/l value in the month May with the mean value 173.41.

**Phosphate:** The levels of phosphate range from 36.6 mg/l to 57.87 mg/l with mean 49.16. The months of March and December had the highest and lowest recorded values 57.87 mg/l and 6.6 mg/l, respectively. Rain, surface water runoff, and agricultural runoff are the main causes of the high

phosphate value; washer man activity may also have contributed to the inorganic phosphate contents.

**Fluoride:** If fluoride is consumed in moderation, it can be beneficial to human health. Fluoride levels in drinking water should not exceed 1.0 mg/l. fluoride having mean value 0.31ppm. The fluoride content of the current dam is between 0.5 and 0.17. In January, the highest value of 0.17 ppm was recorded, and in October, the lowest value of 0.5 ppm.

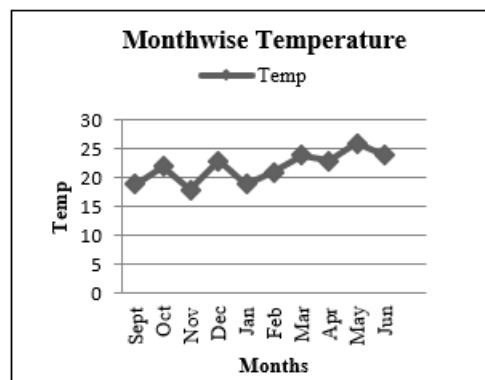
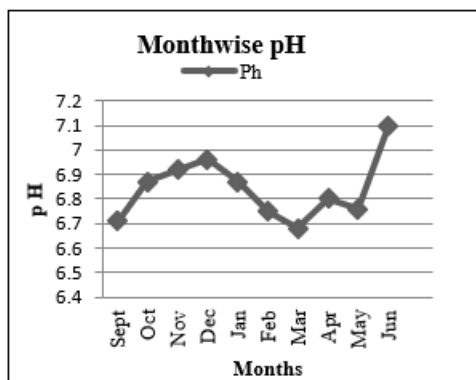
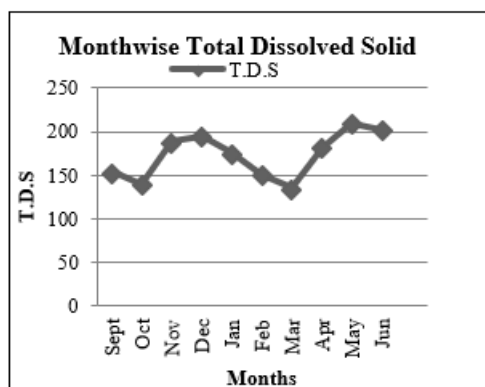
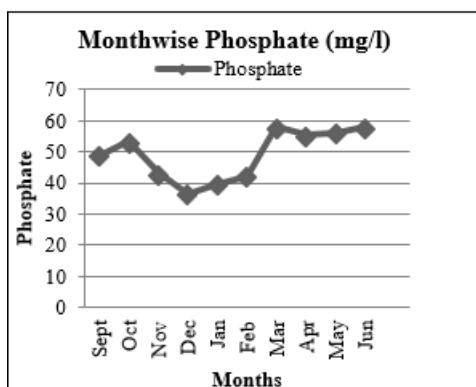
**Sodium:** if dam water contain high range of sodium and it use as drinking water it can produce an increase in blood pressure as a person ages. The normal range found in water sample is 0.45ppm to 0.79ppm with mean value 0.63. The month of April recorded the lowest value (0.45ppm) and the month of September the maximum value (0.79 ppm).

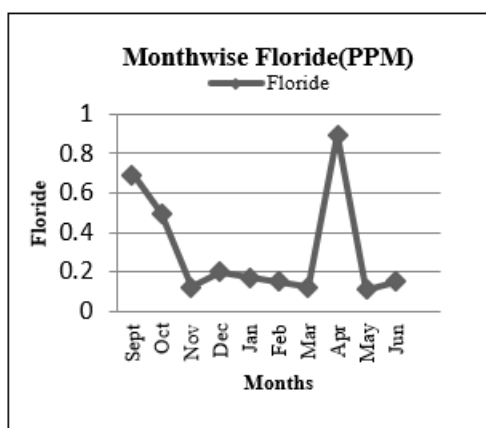
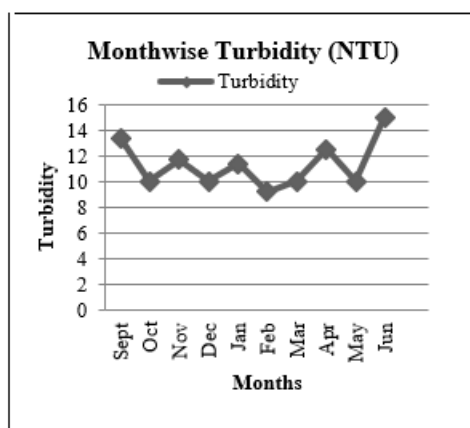
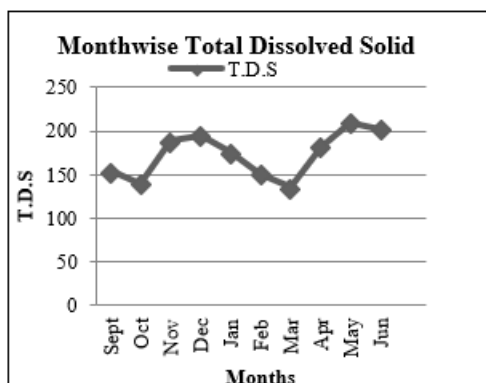
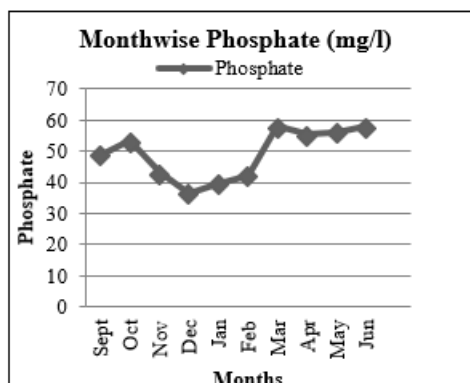
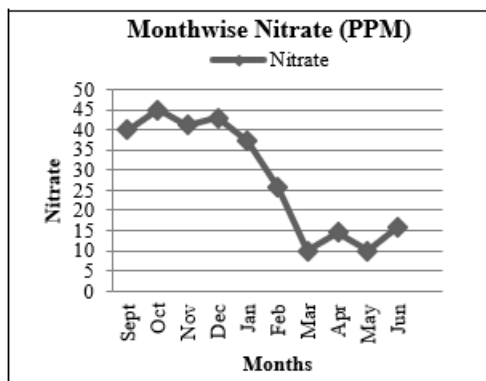
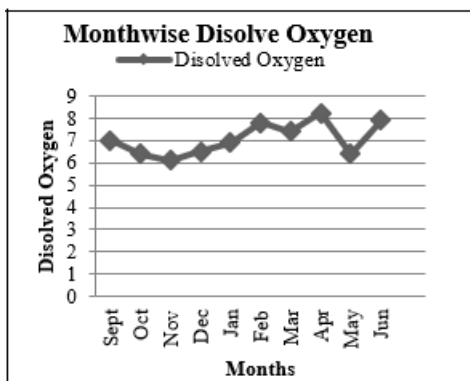
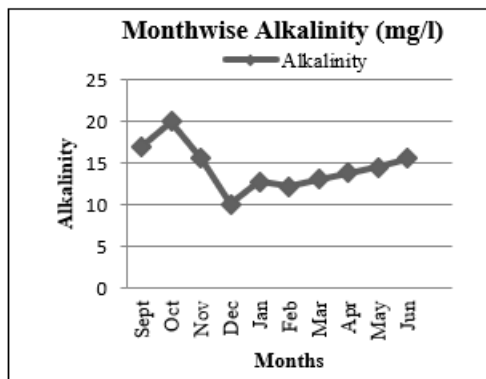
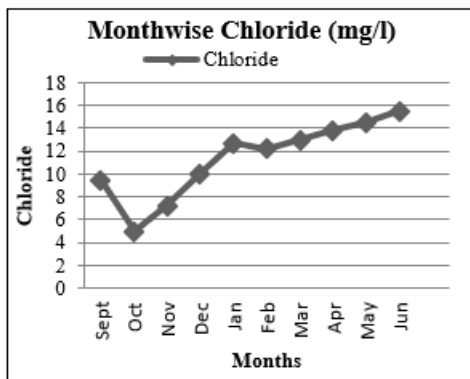
**Sodium Adsorption Ratio (SAR):** Sodium Adsorption Ratio which indicates a possible sodium hazard. It relates the amount of sodium relative to calcium and magnesium in water. When the SAR is >3, the water is sodic, and can increase the exchangeable sodium percentage (ESP) of the soil. In Bor river dam water sodium adsorption ratio is 4.16 to 4.58. The average SAR is 4.4.

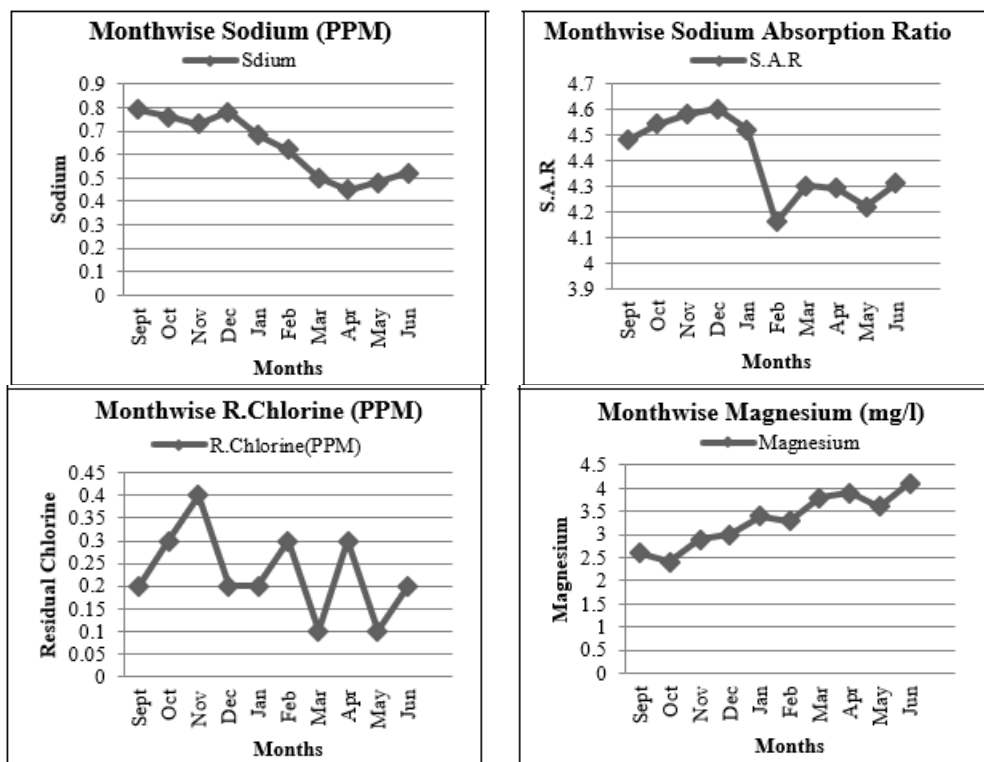
**Residual Chlorine:** Residual chlorine is the low level amount of chlorine remaining in the water after a certain period or contact time after its initial application. It constitutes an important safeguard against the risk of subsequent microbial contamination after treatment. The Residual chlorine of the current dam is between 0.1 and 0.5. Minimum in the month of March and maximum in the month of November. A mean of 0.2 is found for Residual Chlorine.

**Magnesium:** Magnesium is a slow-reacting element in general, but as oxygen levels rise, so does its reactivity. Magnesium can also form magnesium hydroxide and hydrogen gas when it reacts with water vapour. In the present dam water the values of magnesium is in the range of 2.4 to 4.1 with mean value 13.3. Higher value of magnesium in June and lower in October.

**5. Statistical representation of monthly observed hydrographical parameters of littoral zone of Bor River Dam, Amravati.**







#### 4. Conclusion

All living things depend on the aquatic ecosystems good water quality to survive. Numerous contaminants in water lower the oxygen content of aquatic environments, degrading the water and making it harder for aquatic life to survive. The aquatic environment is made up of many interdependent and related components, and changes to one would have an impact on the others.

The result indicates that there is marked variation in Hydrographical parameters of littoral zone dam water. The observed values of various Hydrographical parameters from of littoral zone Dam water samples have been compared values recommended by World Health Organization. The hydrography of Bor River indicated that the Hydrographical parameters vary during the months. Except for a small number of readings that exceed the limit and are indicated by statistical analysis, all parameter values are within the acceptable range. The environmentally friendly improvement of water sources will benefit from this study.

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## **Author Profile**

**Wadekar Shubham** graduated from Shri Shivaji Science College in Amravati with a B.Sc. in biotechnology and an M.Sc. in Zoology from Sant Gadge Baba Amravati University in Amravati, with a specialization on immunology and molecular biology. Bachelors of education also completed from Sant Gadge Baba Amravati University in Amravati. At Shri. Dr. R. G. Rathod Arts & Science College, Murtizapur, they began working as research fellows while pursuing a Ph.D.

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