



## HYDROBIOLOGICAL ASSESSMENT OF MANIKDOH DAM, JUNNAR, PUNE DISTRICT, MAHARASHTRA, INDIA

### Zoology

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### ABSTRACT

The present study was conducted to assess the hydrobiological status of Manikdoh Dam, Junnar, District Pune, Maharashtra, India, based on selected physicochemical water quality parameters. Water samples were collected during different months, namely October and December 2023, and February and May 2024, representing different seasonal conditions of the reservoir. The collected samples were analyzed using standard methods to determine important water quality parameters, including water temperature, pH, dissolved oxygen, free carbon dioxide, total alkalinity, total hardness, electrical conductivity, and transparency. The analysis revealed noticeable variations in the physicochemical characteristics of the reservoir water across the sampling periods. These fluctuations were mainly attributed to seasonal changes and environmental factors influencing the aquatic ecosystem. The recorded values of the investigated parameters indicated that the water quality of Manikdoh Dam remained within acceptable ranges and was conducive to maintaining a healthy freshwater environment. The study highlights the importance of periodic monitoring of water quality parameters for understanding the ecological status and sustainable management of reservoir ecosystems.

### KEYWORDS

Hydrobiology, Physicochemical Parameters, Water Quality, Reservoir Ecology, Manikdoh Dam, Seasonal Variation.

### INTRODUCTION

Freshwater ecosystems are essential natural resources that support human life, agriculture, fisheries, industrial activities, and biodiversity. Reservoirs and dams are important components of freshwater systems because they provide water storage, irrigation facilities, flood control, and domestic water supply. The ecological condition of these water bodies depends largely on their physicochemical characteristics, which directly influence water quality and the overall functioning of aquatic ecosystems.

Hydrobiology and limnology are important branches of aquatic science that deal with the study of physical, chemical, and biological properties of inland water bodies. The assessment of water quality through physicochemical parameters provides valuable information regarding the health and productivity of aquatic ecosystems. Parameters such as water temperature, pH, dissolved oxygen, transparency, electrical conductivity, alkalinity, hardness, and free carbon dioxide are commonly used as indicators of reservoir water quality and ecological status.

Seasonal fluctuations play a significant role in determining the hydrobiological characteristics of freshwater reservoirs. Variations in temperature, rainfall, water level, and surrounding environmental conditions can alter the physicochemical properties of water. Continuous monitoring of these parameters is therefore necessary for understanding ecological changes and ensuring the sustainable utilization of freshwater resources.

Analysis of quality of water is important to preserve and protect the natural ecosystem. To assess the quality of water, analysis of physicochemical parameters of water is essential for the best usage like irrigation, drinking, bathing, industrial processing and fishing and so on. Water quality deals with the physical chemical and biological characteristics in relation to all other hydrological properties, (Shinde et al., 2010). Natural and anthropogenic activities influence the quality of water including local climate, geology and irrigation practices, water regulates the earth's temperature (Ahamed, and Krishnamurthy, 1990).

Manikdoh Dam, located in Junnar Taluka of Pune District, Maharashtra, is an important freshwater reservoir that serves irrigation and other domestic purposes in the region. The reservoir also supports local aquatic biodiversity and contributes significantly to the surrounding ecosystem. Despite its ecological importance, detailed information regarding its hydrobiological characteristics remains limited. Therefore, the present study was undertaken to evaluate selected physicochemical parameters of Manikdoh Dam during different sampling periods, namely October and December 2023 and

February and May 2024.

The investigation aims to provide baseline information on the water quality status of the reservoir and contribute to future ecological monitoring, conservation planning, and sustainable management of freshwater resources in the region.

### MATERIAL AND METHODS

A hydrobiological study of Manikdoh Dam, Junnar, District Pune (M.S.), India, was carried out during October and December 2023 and February and May 2024. For the physico-chemical analysis, water samples were collected from selected sampling stations during the morning hours (between 8:00 and 10:00 a.m.). Water samples were collected in clean 5-liter plastic containers, transported to the laboratory, and analysed for various physicochemical parameters following standard procedures. Water temperature, transparency, pH, electrical conductivity, total alkalinity, total hardness, free carbon dioxide, and dissolved oxygen were determined using standard analytical methods. For the estimation of dissolved oxygen, water samples were collected in 300 ml capacity BOD bottles and fixed immediately at the sampling site. The obtained data were analysed and interpreted using standard formulas and procedures described by APHA (1985), NEERI (1986), and Kodarkar (1992).

### RESULTS AND DISCUSSION

**Table No. 1:- The physico-chemical parameters of water samples from Manikdoh Dam**

| Month and year              | October-23 | December-23 | February-24 | May-24 |
|-----------------------------|------------|-------------|-------------|--------|
| Temperature (0C)            | 28         | 26          | 27          | 31     |
| pH at 25 0C                 | 7.56       | 8.06        | 7.38        | 8.36   |
| Turbidity (NTU)             | < 1.0      | 0.21        | < 1.0       | < 1.0  |
| TDS at 180 0C (mg/l)        | 107        | 86          | 120         | 96     |
| Total alkalinity (mg/l)     | 50         | 46.46       | 42.4        | 44     |
| Total hardness (mg/l)       | 53.50      | 50.01       | 60.04       | 52.04  |
| Chloride (mg/l)             | 6.40       | 5.91        | 6.35        | 6.84   |
| BOD (mg/l)                  | < 2.0      | < 2.0       | < 2.0       | < 2.0  |
| Fluoride (mg/l)             | < 0.10     | < 0.10      | < 0.10      | < 0.10 |
| Dissolved oxygen (DO)(mg/l) | 4.1        | 5.9         | 5.6         | 4.6    |

The physicochemical characteristics of water from Manikdoh Dam were analysed during October 2023, December 2023, February 2024, and May 2024. The observed variations in the water quality parameters are presented in Table 1.

Water temperature exhibited seasonal variation, ranging from 26°C in December 2023 to 31°C in May 2024. The increase in temperature

during May may be attributed to higher atmospheric temperatures and increased solar radiation during the summer season, whereas the lower temperature recorded in December reflects winter conditions. Temperature is an important factor influencing the chemical and biological processes in aquatic ecosystems.

The pH of water varied from 7.38 to 8.36, indicating slightly alkaline conditions throughout the study period. The lowest pH value was recorded in February 2024 (7.38), while the highest value was observed in May 2024 (8.36). The alkaline nature of the reservoir may be associated with the presence of bicarbonates and carbonates in the water. The recorded pH values were within the desirable limits for freshwater ecosystems.

Turbidity values remained very low throughout the study period, ranging from less than 1.0 NTU to 0.21 NTU. The lowest turbidity was observed in December 2023, indicating clear water conditions and minimal suspended particulate matter. Low turbidity generally favours light penetration and primary productivity in aquatic environments.

Total Dissolved Solids (TDS) ranged from 86 mg/l in December 2023 to 120 mg/l in February 2024. The observed values indicate a low concentration of dissolved salts and suggest good water quality. The increase in TDS during February may be related to concentration effects resulting from reduced water inflow and evaporation.

Total alkalinity varied between 42.4 mg/l and 50 mg/l. The maximum value was recorded in October 2023, whereas the minimum value was observed in February 2024. The moderate alkalinity values indicate adequate buffering capacity of the reservoir water, helping to maintain stable pH conditions.

Total hardness ranged from 50.01 mg/l to 60.04 mg/l, with the highest value recorded in February 2024. The relatively low hardness values suggest that the reservoir water can be classified as soft to moderately hard. Hardness is mainly influenced by the concentration of calcium and magnesium salts in water.

Chloride concentration showed minor fluctuations during the study period, varying from 5.91 mg/l in December 2023 to 6.84 mg/l in May 2024. The low chloride content indicates the absence of significant organic pollution and reflects the freshwater nature of the reservoir.

Biochemical Oxygen Demand (BOD) remained below 2.0 mg/l throughout the study period. Low BOD values indicate minimal organic pollution and suggest that the reservoir possesses good water quality with limited biodegradable organic matter.

Fluoride concentration remained below 0.10 mg/l in all sampling months. The low fluoride levels indicate that the water is free from fluoride-related contamination and remains within permissible limits. Dissolved Oxygen (DO) values ranged from 4.1 mg/l to 5.9 mg/l. The highest concentration was recorded in December 2023, while the lowest value was observed in October 2023. Higher dissolved oxygen levels during winter may be associated with lower water temperatures, which enhance oxygen solubility. The recorded DO concentrations indicate that the reservoir water is capable of supporting aquatic life.

Overall, the physicochemical parameters recorded during the study period revealed that the water quality of Manikdoh Dam remained within acceptable limits. Seasonal fluctuations were evident; however, the reservoir exhibited favourable hydrobiological conditions with low turbidity, low BOD, moderate alkalinity and hardness, and adequate dissolved oxygen levels. These findings suggest that Manikdoh Dam maintains a healthy freshwater environment suitable for sustaining aquatic organisms and supporting various water-use activities.

## CONCLUSION

The present hydrobiological investigation of Manikdoh Dam, Junnar, Pune District, Maharashtra, was carried out by analysing selected physicochemical parameters during October and December 2023 and February and May 2024. The study revealed noticeable seasonal variations in water quality parameters such as temperature, pH, total dissolved solids, alkalinity, hardness, chloride, biochemical oxygen demand, and dissolved oxygen.

The recorded values of all analysed parameters were found to be within acceptable limits, indicating good water quality and a healthy aquatic environment. Low turbidity, low BOD values, moderate alkalinity and

hardness, low chloride concentration, and adequate dissolved oxygen levels suggest the absence of significant pollution in the reservoir. The slightly alkaline nature of the water and the observed seasonal fluctuations are characteristic of freshwater reservoir ecosystems.

Overall, the findings indicate that Manikdoh Dam maintains satisfactory hydrobiological conditions and possesses good water quality suitable for supporting aquatic life and various beneficial uses. The study provides baseline information that can be useful for future monitoring, conservation, and sustainable management of the reservoir ecosystem.

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