



The Study Of Physico-Chemical Parameters Of Amravati Reservoir Of Malpur, Maharashtra, India.

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Abstract: This study evaluates the physico-chemical characteristics of water from the Amravati Reservoir in Malpur, Maharashtra, India. Given its significance for irrigation, drinking water, and fisheries, assessing the water quality is essential. A analysis was performed from July 2023 to June 2024, examining parameters such as temperature, pH, dissolved oxygen (DO), free CO₂, total dissolved solids (TDS), nitrates, phosphates, and total hardness. The results revealed seasonal fluctuations in these parameters, with distinct differences observed during the pre-monsoon, monsoon, and post-monsoon phases. The water's pH was slightly alkaline, and the DO levels indicated a healthy oxygen supply in the reservoir. These findings can aid in developing guidelines for the sustainable management of the Amravati Reservoir's water resources and bolster conservation initiatives.

Keyword: Malpur, Reservoir, Water Quality.

Introduction:

The physicochemical characteristics of a wetland determine the presence and growth of life, which assembles the intricate interplay of the aquatic ecosystem; hence, many researchers have studied the properties (physical, chemical, and biological) of various water bodies. Aquatic ecosystems include phytoplankton and hydrophytes as primary producers, zooplankton as primary consumers, fish as secondary and tertiary consumers, and other species contributing to aquatic biodiversity. Limnology's history dates back to the late nineteenth and early twentieth centuries when pioneering scholars made significant contributions to the field. Fritsch (1888) created the first transportable biological station to explore lakes, while Forel (1901) provided significant incentives for effective limnological research, earning him the title "father of modern limnology." Reservoirs are valuable resources for a variety of human uses, including irrigation, drinking water supply, fisheries, and biodiversity conservation. Water quality in these reservoirs is influenced by both natural and human activity. As a result, a detailed understanding of these water bodies' physicochemical features is critical for guaranteeing long-term aquatic resource management and protection. The Amravati Reservoir, located in the western portion of the Shindkheda Tahasil (21°19' 31.55N latitude and 74°29' 26.94E longitude) of Dhule District, Maharashtra, is critical to supporting the local community by providing water for agricultural and drinking. Seasonal fluctuations in rainfall, temperature, and other climatic conditions can have a substantial impact on water quality, influencing its suitability for various purposes. This study examines important physicochemical characteristics of the

Amravati Reservoir during a one-year period, from July 2023 to June 2024, to assess water quality and provide insights for long-term water resource management.

Material Method:

The collection of samples from Amravati Reservoir between 9 and 11 a.m. from July 2023 to June 2024, aids in understanding the regional distribution of water quality indicators. This strategy ensures that the data is representative of the entire research region and helps determine the overall health of the aquatic environment. Water samples were collected from the Amravati Reservoir once a month, in the first week. The samples were evaluated for temperature, pH, dissolved oxygen, carbon dioxide, total dissolved solids, total hardness, NO₃, and PO₄ using standard laboratory procedures APHA (1995).

Table 1: Monthly variation of water at Amravati Reservoir of (July 2023 - June 2024)

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Temp	25.5	25.4	26.5	26.2	27	21	24.5	25	26.9	34.5	35.6	33
pH	8.3	8.1	8.2	8.2	8.5	8.6	8.4	8.4	8.3	8.1	7.8	7.9
TDS	349.2	353.4	369.8	335.2	285.3	250.8	229.6	289.6	341.6	399.8	410.5	445.6
CO ₂	2.1	2.2	1.8	1.5	2.5	3.1	2.5	2.6	2.9	3.9	4.3	4.1
Do	5.3	5.4	6.5	7.3	6.9	8.5	8.4	7.5	6.8	5.8	5.6	5.5
TH	89.5	86.5	78.4	82.6	83	95	98.5	102.6	105.5	110.2	112.6	112.5
NO ₃	0.45	0.46	0.53	0.51	0.24	0.22	0.26	0.24	0.31	0.33	0.30	0.39
PO ₄	0.53	0.51	0.6	0.52	0.33	0.40	0.35	0.30	0.41	0.39	0.45	0.55

Results:

Temperature: The temperature of the reservoir water showed a distinct seasonal trend, ranging from 21°C in December to 35.6°C in May. The winter months (December) had the lowest recorded temperatures, while the pre-monsoon period (April–May) had the highest. Similar observation observed by Jadhav and Patil (2023) in Sarangkhedra barrage. Clear skies and sun radiation raised the temperature of the atmosphere during the summer. On the other hand, rain and overcast skies during the monsoon season gradually reduce the temperature of the atmosphere. (Govindswami 2000).

pH: The water stayed somewhat alkaline during the trial, as seen by the pH levels, which varied slightly between 7.8 and 8.6. Good water quality is indicated by an alkaline pH, which was lowest in May (7.8) and greatest in December (8.6). According to WHO recommendations, drinking water should have a pH of 6.5 to 8.5.

Total Dissolved Solids (TDS): TDS concentrations increased near the end of the monsoon and post-monsoon seasons, with values ranging from 229.6 mg/L in January to 445.6 mg/L in June. This shows how evaporation and seasonal runoff affect the mineral composition of the water. Regarding seasonal fluctuations in TDS, similar results have been reported by Garg et al. (2006), Kirubavathy et al. (2005), and Rao et al. (2003).

Dissolved Oxygen (DO): DO levels were between 5.3 mg/L in July and 8.5 mg/L in December. This shows that the reservoir had adequate oxygen levels, which are critical for aquatic life. Hiware (2004) observed maximum DO in winter, and the current findings are consistent with that. Lohar and Patil (1998) found an inverse association between free CO₂ and DO.

Carbon Dioxide (CO₂): CO₂ levels followed a seasonal pattern, with the highest concentration measured in May (4.3 mg/L) and the lowest in October (1.5 mg/L). Mathew (1978) found an inverse association between CO₂ and DO in Gandhinagar Lake. In the summer, when the intensity of light increases, photosynthesis declines, resulting in less CO₂ being used, whilst organic matter dissociates to a greater extent in deeper

depths, increasing CO₂. At higher temperatures, the water absorbs a considerable amount of CO₂ from the atmosphere. During the winter, the procedure is reversed (Mehta 1999; Bhalla 2006).

Total Hardness (TH): Total hardness measurements ranged from 78.4 mg/L in September to 112.6 mg/L in May, demonstrating that calcium and magnesium salt concentrations varied seasonally. Hardness values were found to be high in the summer and low during the monsoon season. Radhika et al. (2004) obtained similar results. Higher values reported in the summer season are attributed to the quick oxidation of organic materials and the drop in water level caused by the high rate of evaporation (Anita 2003).

Nitrates (NO₃): The nitrate concentration varied between 0.22 mg/L in December and 0.53 mg/L in September. These values suggest low nitrate contamination, which is beneficial for preventing eutrophication. These observations are conformity with the work of (Thilaga *et al.* 2005, Deshmukh & Pingle 2007, Mustapha 2008, Verma *et al.* 2012).

Phosphates (PO₄): Phosphate concentrations ranged from 0.30 mg/L in February to 0.60 mg/L in September, indicating moderate nutrient levels which could support algal growth, especially during the monsoon season. Rasal et al. 2019 observed similar pattern about phosphate concentration was 1.8 mg/l (SD = 0.40) in monsoon and 1.7 mg/l (SD = 0.3) during winter.

Conclusion:

The physicochemical parameters of the Amravati Reservoir in Malpur, Maharashtra, show considerable seasonal fluctuations in water quality. Temperature, pH, dissolved oxygen, carbon dioxide, total dissolved solids, nitrates, phosphates, and total hardness all changed significantly during the pre-, monsoon, and post-monsoon phases. The water quality was generally good for agriculture, drinking, and aquatic life, with an alkaline pH and sufficient oxygen levels. Temperature, TDS, and hardness changes, on the other hand, highlight the importance of constant monitoring in ensuring sustainable resource management and preventing long-term damage.

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