International Journal of Fisheries and Aquatic Research
www.fishjournals.com
ISSN: 2456-7248
Received: 05-02-2026, Accepted: 08-03-2026, Published: 23-03-2026
Volume 11, Issue 1, 2026, Page No. 95-97

# Studies on physico-chemical parameters of Somthana Dam in district Jalna, Maharashtra

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**Abstract**
The Somthana dam, officially known as the Upper Dudhana dam, is a land filling dam located near the Somthana village in Badnapur Taluka, Jalna district, Maharashtra, India. Built in the Dudhana River, the dam measures approximately 18 meters high and covers approximately 2.46 kilometers long, with a deposit width of approximately 2 kilometers. The main purposes of the dam include irrigation, water supply and local biodiversity support. Understanding the physicochemical parameters of the dam's water is essential to assess its quality and suitability for various uses, such as drinking, agriculture and maintaining aquatic life. These parameters include water temperature, pH, Transparency, Total dissolved solids (TDS), Electrical conductivity (EC), Dissolved oxygen (DO), Oxygen biochemical demand (BOD), Total alkalinity, Hardness, Chloride content and Nutritional concentrations as nitrates and Phosphates. The monitoring of these factors provides information on the ecological health of the deposit and helps in the management of water resources.

**Keywords:** Somthana dam, dudhana river, local biodiversity, physico-chemical parameters, ecological health etc

## Introduction

Freshwater ecosystems are critical for sustaining biodiversity and human livelihoods. The assessment of physico-chemical parameters is essential to determine water quality and ecological balance (Wetzel, 2001) [7]. Reservoirs and dams act as important freshwater resources, particularly in semi-arid regions like Maharashtra, where water scarcity is a recurring issue (Jadhav *et al*., 2019) [4].

Physico-chemical characteristics such as pH, dissolved oxygen, and nutrient concentrations significantly influence aquatic life and productivity (APHA, 2017) [1]. Elevated nutrient levels may lead to eutrophication, affecting biodiversity and water usability (Smith and Schindler, 2009) [5].

The Somthana Dam, constructed on the Dudhana River, serves multiple purposes including irrigation and domestic water supply. However, increasing anthropogenic activities necessitate continuous monitoring of water quality.

The present study aims to:

- Assess seasonal variations in physico-chemical parameters
- Evaluate water suitability for various uses
- Provide baseline data for future ecological studies

## Materials and Methodology

### 1. Study Area

Somthana Dam (Upper Dudhana Dam) is located in Badnapur Taluka, Jalna District, Maharashtra as shown in Fig.1. The region experiences a semi-arid climate with distinct summer, monsoon, and winter seasons.

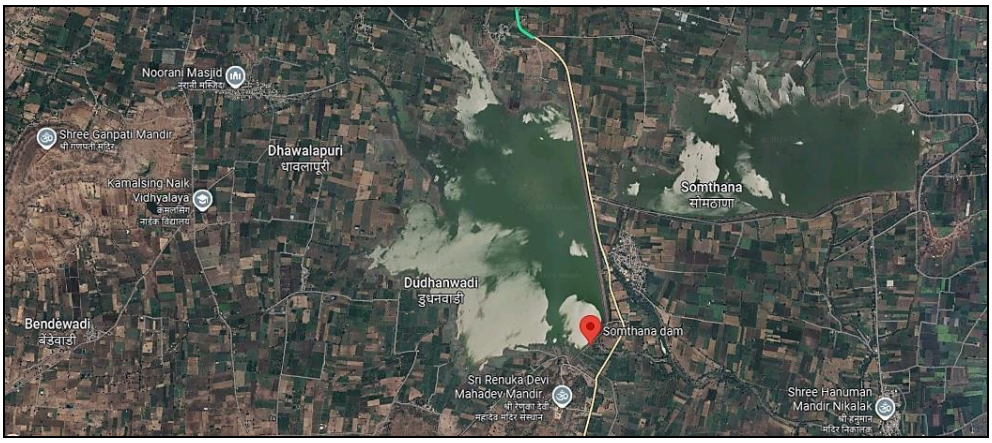



**Fig 1:** Study area Somthana Dam (Upper Dudhana Dam) (Google Maps)

### 2. Sampling Strategy

- Sampling was conducted monthly for one year
- Three sampling stations were selected:
- **Station I:** Near inlet
- **Station II:** Mid-reservoir
- **Station III:** Near outlet

### Parameters Analyzed

The following physico-chemical parameters were analyzed:

- Temperature

- pH
- Transparency
- Total Dissolved Solids (TDS)
- Electrical Conductivity (EC)
- Dissolved Oxygen (DO)
- Biochemical Oxygen Demand (BOD)
- Total Alkalinity
- Total Hardness
- Chloride
- Nitrate
- Phosphate

**Observation Table**

**3. Methods Used**

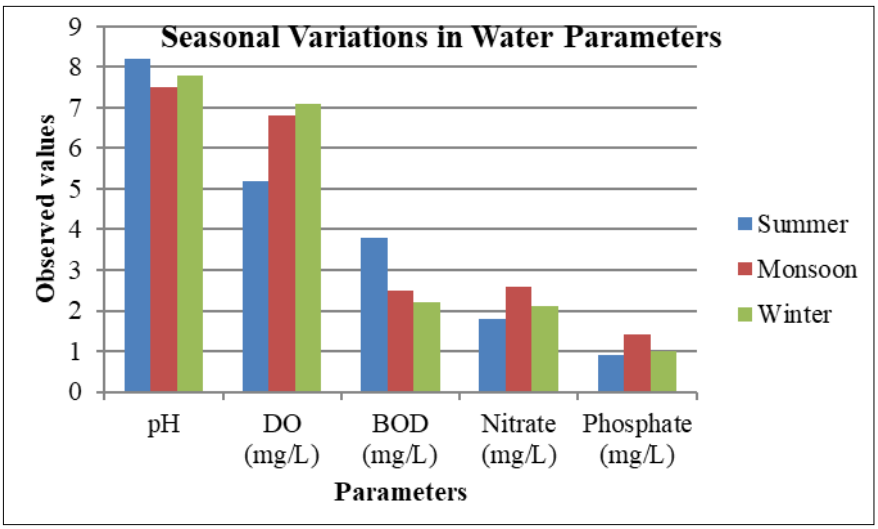
- Standard methods prescribed by APHA (2017) [1] were followed
- DO measured by Winkler's method
- BOD determined after 5-day incubation
- Nutrients analyzed using spectrophotometric methods

**4. Statistical Analysis**

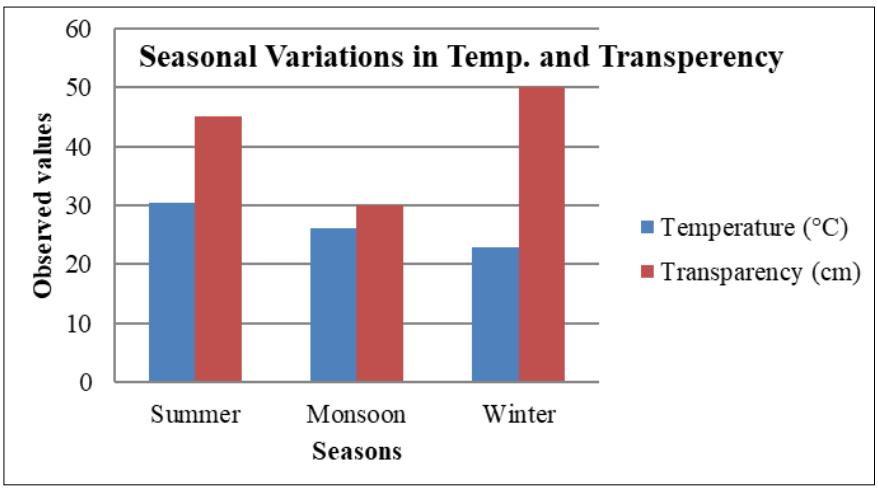
- Mean and standard deviation calculated
- Seasonal comparisons performed

**Table 1:** Seasonal Variation of Physico-Chemical Parameters of Somthana Dam

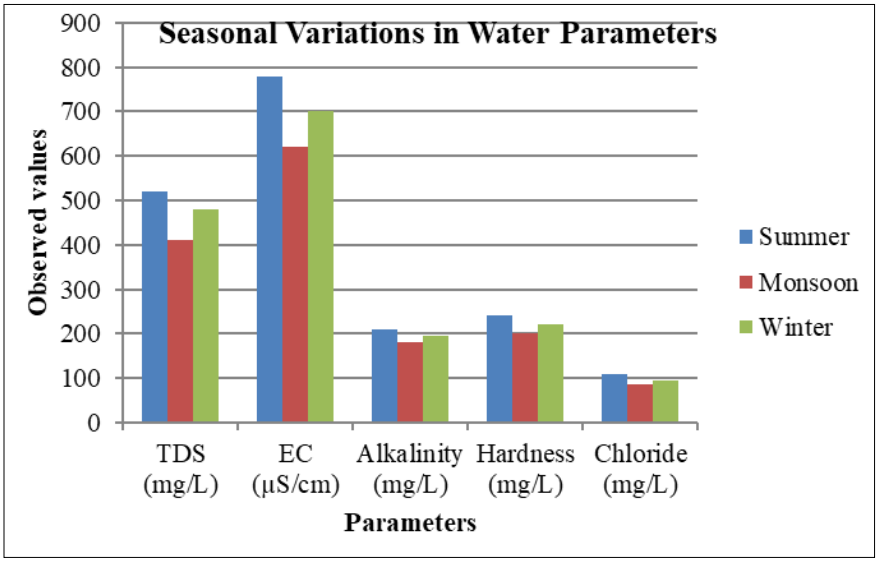
| Parameter | Summer | Monsoon | Winter |
|---|---|---|---|
| Temperature (°C) | 30.5 | 26.2 | 22.8 |
| pH | 8.2 | 7.5 | 7.8 |
| Transparency (cm) | 45 | 30 | 50 |
| TDS (mg/L) | 520 | 410 | 480 |
| EC (µS/cm) | 780 | 620 | 700 |
| DO (mg/L) | 5.2 | 6.8 | 7.1 |
| BOD (mg/L) | 3.8 | 2.5 | 2.2 |
| Alkalinity (mg/L) | 210 | 180 | 195 |
| Hardness (mg/L) | 240 | 200 | 220 |
| Chloride (mg/L) | 110 | 85 | 95 |
| Nitrate (mg/L) | 1.8 | 2.6 | 2.1 |
| Phosphate (mg/L) | 0.9 | 1.4 | 1.0 |




**Graph 1:** Seasonal Variation of Physico-Chemical Parameters pH, DO, Nitrate and Phosphate




**Graph 2:** Seasonal Variation in Temperature and Transperency




**Graph 3:** Seasonal Variation of Physico-Chemical Parameters

**Results and Discussion**

The study revealed significant seasonal variations in water quality parameters.

**Temperature**

Temperature was highest in summer due to intense solar radiation, affecting metabolic rates of aquatic organisms as shown in Table 1 and Graph 2, (Wetzel, 2001) [7].

**pH**

Water remained slightly alkaline, indicating buffering capacity suitable for aquatic life as shown in Table 1 and Graph 1 (Trivedi and Goel, 1986) [6].

**Transparency**

Lower transparency during monsoon was due to suspended particles and runoff as shown in Table 1 and Graph 2.

**Dissolved Oxygen (DO)**

Higher DO in winter indicates better oxygen solubility at lower temperatures (Boyd, 2015) [2]. Lower DO in summer may stress aquatic organisms as shown in Table 1 and Graph 1.

**Biochemical Oxygen Demand (BOD)**

Higher BOD in summer suggests increased organic load and microbial activity as shown in Table 1 and Graph 1.

**Nutrients (Nitrate and Phosphate)**

Elevated nutrients during monsoon indicate agricultural runoff, which may lead to eutrophication if unchecked as shown in Table 1 and Graph 1 (Smith and Schindler, 2009) [5].

**Overall Assessment**

- Water is moderately polluted
- Suitable for irrigation and fisheries
- Requires treatment for drinking purposes

**Conclusion**

The present study highlights that Somthana Dam exhibits seasonal variations in physico-chemical parameters. While most parameters fall within permissible limits for irrigation, nutrient enrichment and organic load indicate the need for regular monitoring.

**Recommendations**

- Periodic water quality monitoring
- Control of agricultural runoff
- Awareness programs for local communities

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