

Studies on the Wilson Dam Reservoir Water quality in relation to fishing, Ahmednagar District, Maharashtra, India

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ABSTRACT

For a duration of Twelve months starting from June 2021 to May, 2022, changes in Temp., pH, dissolved oxygen (DO), hardness, total alkalinity, chloride, magnesium, and calcium have been studied on monthly basis in Wilson Dam reservoir Ahmednagar (MS) India. To determine whether this reservoir was appropriate for fish and fishing methods, they were examined. All of the physicochemical data found showed that the water's Temp., pH, dissolved oxygen (DO), hardness, total alkalinity, chloride, magnesium, and calcium fluctuated within acceptable bounds. In contrast, calcium and magnesium levels were extremely low throughout the study period, whereas chloride levels were higher than ideal during the summer, post-monsoon and low during the monsoon.

Figure : 01

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Table : 01

KEY WORDS : Fishing, Seasonal variation, Water Parameter, Wilson Dam.

Introduction

Numerous physical, chemical, and biological elements influence water quality because they may have a direct or indirect impact on how well it supports the growth and distribution of fish and other aquatic life⁷.

Physico-chemical components are taken into consideration in the limnological study while designing the many ecosystems that influence the trophic dynamics of the water body. Understanding how fish are raised in water bodies require an understanding of the Physicochemical properties of water⁹.

The Ashwi water body of the Pravara River Physicochemical parameters were studied in relation to Fish culture⁸. The physical environment, chemical composition and biological interaction all have an impact on where aquatic organisms are found³. Fish growth and reproduction may be negatively impacted by a variety of Physico-chemical or biological conditions that function

as stresses. Water bodies that have been contaminated lose their tropic status and become unstable for aquaculture⁶. The present work investigates the monthly variation of the Physico-chemical parameters of Wilson Dam and consequently, whether or not they fall inside acceptable bounds for fish and fishing methods.

Materials and Methods

Wilson Dam is located in the western portion of Maharashtra's Ahmednagar district, in the village of Bhandardara. The Pravara River's first reservoir is the Wilson Dam.

The Wilson Dam was the study area situated between 19031'45" N 73045'5" E. The catchment area of the dam was 12200 Sq. km. The Wilson dam's total water capacity was 11,039 TMC and 3 TMC dead water storage. The depth and width of the dam were 270 and 260.10 feet respectively. The principal sources of water in dams are fountains, small rivers, streams, etc. The

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TABLE-1 : Physico-chemical parameters of Wilson Dam. Seasonal mean \pm S. D. are given (Variable range of parameters represented in bracket).

S. No	Water Parameters		Environmental Season			
			Monsoon	Post-monsoon	Winter	Summer
1	Temp. in °C	Water	25.5 \pm 0.57 (25-26)	24.05 \pm 0.63 (23-25)	22.66 \pm 0.57 (22-23)	27.5 \pm 0.5 (27-28)
		Air	27.12 \pm 0.85 (26-28)	25.5 \pm 0.70 (25-27)	23.83 \pm 0.28 (23-24)	29.66 \pm 0.57 (28-31)
2	Dissolved oxygen (ml/l).		6.68 \pm 0.87 (5.75-7.75)	08.1 \pm 0.14 (8.00-8.2)	8.8 \pm 0.1 (8.7-8.9)	6.13 \pm 0.96 (5.4-7.5)
3	pH		7.47 \pm 0.10 (7.3-7.6)	8.15 \pm 0.05 (8.1-8.2)	8.26 \pm 0.04 (8.2-8.3)	8.46 \pm 0.05 (8.4-8.5)
4	Alkalinity (mg/l).		121.25 \pm 34.73 (90-170)	235 \pm 35 (210-260)	213 \pm 20 (190-230)	160 \pm 10 (150-170)
5	Hardness (mg/l).		103 \pm 75 (60-130)	67.5 \pm 2.5 (65-70)	143.33 \pm 15.27 (130-160)	143.33 \pm 20.81 (125-175)
6	Chloride (mg/l).		18.75 \pm 8.53 (10-30)	110 \pm 42 (80-140)	30 \pm 7.05 (20-35)	91 \pm 36.50 (50-120)
7	Calcium (mg/l)		19.23 \pm 6.49 (10-22)	20.5 \pm 2.5 (18-23)	25 \pm 4.08 (20-30)	24.33 \pm 6.64 (15-30)
8	Magnesium (mg/l)		18.45 \pm 5.48 (10-21)	7.5 \pm 2.5 (5-10)	10.33 \pm 3.68 (6-15)	15.05 \pm 1.45 (13-16)

23077 hectares area is irrigated under the Wilson dam.

Monthly water samples were collected. Polythene bottles were used for the collection of samples. Some parameters were recorded in fields like Temperature, and other parameters in the laboratory. The temperature was recorded by Thermometer, pH by using a pH meter, and Winkler's method was used for the estimation of dissolved oxygen from the water sample. Total alkalinity, Chloride, Water hardness magnesium, and Calcium were estimated by titration¹.

Collection sites

For the investigation following four sites were selected—

Site-A- Spil-way (Overflow Gate).

Site-B - Near Amruteshwar Temple, Ratanwadi Village.

Site-C- Shaleachiwadi – Panjare (Backside of the dam).

Site-D- Z. P. Guest house.

The monthly fluctuation of studied water parameters (Table-1). All twelve months are divided into four seasons, that are June to September- Monsoon; October to November- Post-Monsoon; December to February- Winter, and March to May-Summer.

Result and Discussion

In the Wilson Dam reservoir, the Dissolved oxygen range was 5.4 (May) to 8.9 (December). The overall dissolved oxygen level was high during the winter season

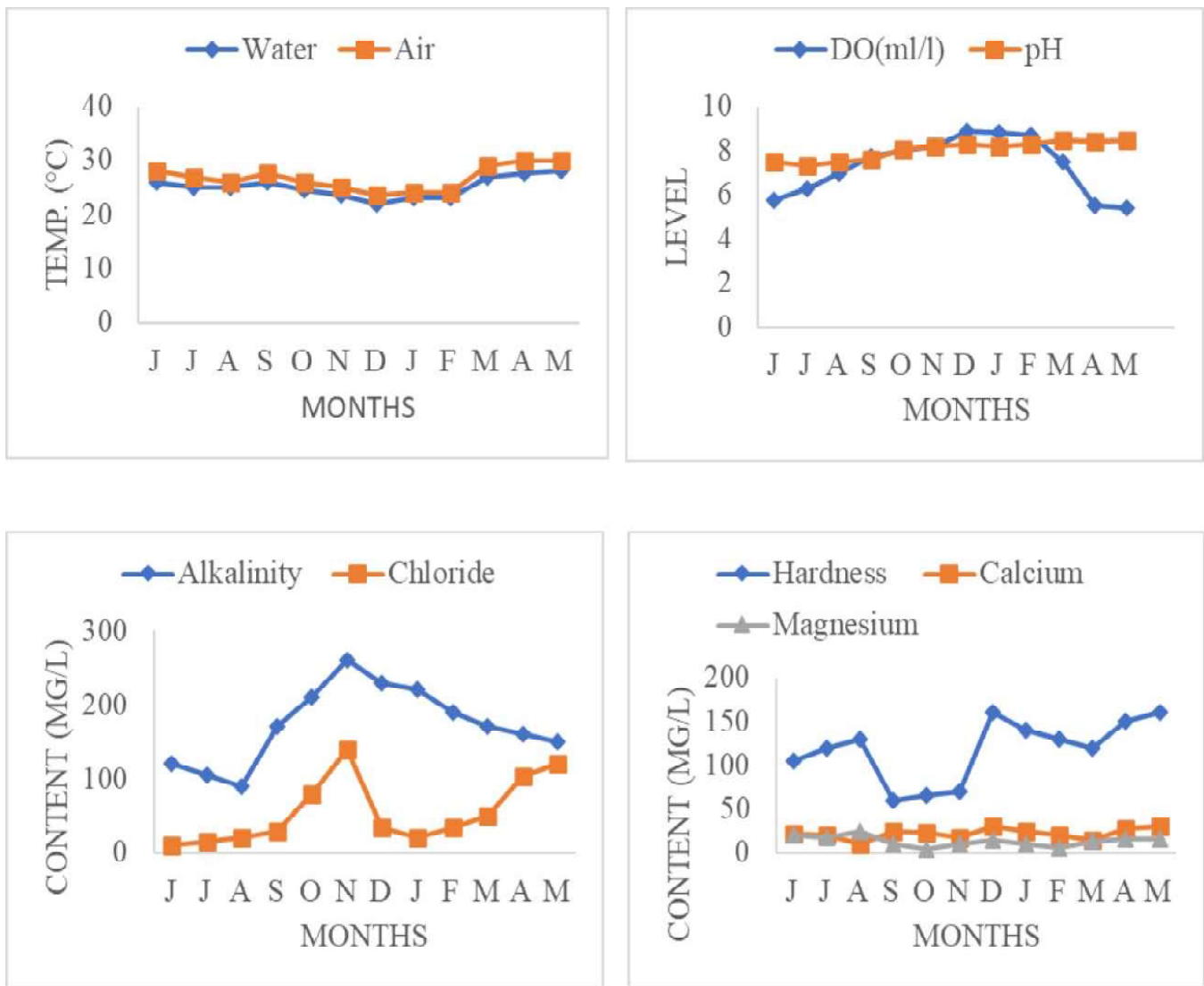


Fig. 1 : Monthly Changes in the Physico-chemical parameters of Wilson Dam from June 2021 to May 2022.

and the overall dissolved oxygen level was low during the summer season. Dissolved oxygen level was above the minimum level (>5 ppm)², so, Wilson dam supports the good fishery.

The minimum range of pH (7.3-7.5) was recorded during the monsoon due to heavy rainfall in the catchment area of the dam and the maximum range (8.4-8.5) was observed during the summer season and the water level of the dam was also low. The overall pH range of the Dam was 7.3 to 8.5. The pH range of the dam is suitable for will fish growth (6.4 to 8.5 optimum pH range for good fish growth⁴). Fish have blood pH levels that are slightly different from their usual blood pH of 7.4, which is middle of 7.0 to 8.5, which is good and beneficial to fish keep alive. Fish become metabolically stressed in water with a pH between 4.0 to 6.5 and 9.0 to 11.0, and Mortality increases practically at a pH of less than 4.0 or greater than 11.0. A pH of 7 to

8.5 is excellent for Aquatic production⁵.

Alkalinity of water was low during the monsoon due to water dilution. The optimum range of alkalinity was 50-300 mg/l, which is for good fish rearing¹⁰. The Wilson dam reservoir alkalinity means the value was 121.25 in monsoon; 235 in post-monsoon; 213 in winter and 160 in summer. All values of alkalinity are suitable for fish growth.

A high content of chloride in water represents water pollution. In this study post-monsoon had a high range of chloride than other seasons because in the monsoon season all polluted substances were collected in water bodies. In Wilson dam, the value of chloride was high in post-monsoon (140 mg/l in November) but that is not beyond the optimum range.

The hardness of water was maximum during December (160 mg/l) and minimum in September (90 mg/l). The hardness standard range of 30-180 mg/l was

better for fishery¹⁰. Calcium and magnesium are also key parameters of water bodies. The level of calcium and magnesium also affects the growth of fish. In the present study the values of calcium and magnesium fluctuated throughout the year. The calcium Mean value of all seasons was between 19.23 to 25 mg/l and the magnesium Mean value of all seasons was between 7.5 to 18.45 mg/l.

Conclusion

All parameters of a water body were within a standard limit. In order to Wilson dam reservoir used for a fishery it is recommended that fish larvae of some culturable fish, such as *Catla catla*, *Cirrhinus mrigala*, *Labeo rohita*, etc., be introduced at the start of the monsoon season and allowed to grow up to completion growth, but not harvested before a reproductive stage.

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