

# Assessment of some physico-chemical parameters of water sample from Jayakwadi dam, Aurangabad, M.S., India

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## ABSTRACT

The development of a particular ecosystem requires water for sustainability of living organisms. Different organic and inorganic components are dissolved in water, as it is universal solvent. The optimum level of different constituents is responsible to maintain respective quality for the suitable growth and development of plants, animals and micro-organisms. The physico-chemical parameters of water samples collected in the year 2018-2019 from Jayakwadi dam were analysed. To understand these parameters is important, as the Jaykwadi dam water is essential for drinking, irrigation and industrial concern of Marathwada region. Therefore, in this paper different physico-chemical parameters *viz.* Temperature, pH, DO, BOD, Hardness, alkalinity, TDS, turbidity, Chlorides, Phosphates, chlorine, nitrates etc. are studied.

*Key words* : Physicochemical parameters, Climate change, Jaykwadi dam, Ecosystem

## Introduction

Water is an essential solvent for all living organisms for their survival. Various types of organic and inorganic constituents are dissolved in water, these substances may be required for growth of plants, animals and probably all kinds of microorganisms. A suitable environment and water quality is needed for the growth of various microorganisms present in respective water body. The optimum level of different constituents is responsible to maintain respective quality for the suitable growth and development of plants, animals and microorganisms. Overall productivity is depending on the physio-chemical characteristics of water body. Availability, quantity and quality of water with specified organic matter, heavy metal, and factors like temperature, pH af-

fects their enzymatic activities (Inamdar *et al.*, 2022). The entire ecosystem of this particular dam depends on the overall quality of dam region. Nevertheless, water pollution has been increased due to manmade activities, industrialization and use of chemical-fertilizers in agriculture fields (Zhang *et al.*, 2022; Sangawe *et al.*, 2022).

The irrigation demands may be responsible for unforeseen climatic changes with regard to precipitation, temperature, humidity etc. The statistical studies of Sunil *et al.*, (2021), predicted the changes in solar radiations that may effects the wind speed. In near future, the demand of irrigation water was reported a substantial decrease in Kharif crops as there is increase in precipitation prominently from June to September (Sunil, Deepthi, Mirajkar and Adarsh, 2021). The studies of Jiang *et al.*, 2017, re-

ported that, the climatic changes are affecting on the surface water. Majority of crops and drylands are surface water dependent, and decrease in level of surface water can affect the routine activities of farmers (Jiang *et al.*, 2017). The existence of all living organisms are depending upon the quality and quantity of water.

Jayakwadi dam is located in Paithan tehsil of Aurangabad district, Maharashtra, India. Jayakwadi is one of the largest earthen dams in the India. The latitude and longitudinal coordinates of Jayakwadi dam are 19° 29' 28.73" N and 75° 22' 12.3" E. Jayakwadi dam is also called Nathasagar dam, its approximate length and height is around 10 km and 42 m respectively. Jayakwadi dam is also known for bird diversity hence reputedly called as Jayakwadi Bird sanctuary. It's a glory for bird lovers as several resident as well as migratory birds can be spotted in that sanctuary. To irrigate agricultural land of Marathwada region, to provide drinking water as well as usage for the industrial area located in Aurangabad city and nearby towns, is the major purpose behind the construction of Jayk wadi dam. Henceforth approximately 80% of the water of the dam is allocated for irrigation, 7% for drinking water, and the reaming water quota for industrial purposes. Aurangabad is having very rapid growth with regard to economic growth and population. Growing population and industrialization responsible for surface water and their changing related parameters affect the ecology and ecosystem of Jayakwadi Dam. Therefore, water quality check, it is very essential to assess various physico-chemical parameters *viz.* Temperature, pH, DO, BOD, Hardness, alkalinity, TDS, Chlorides, Phosphates, nitrates etc. for preservation of this dam

### Collection of samples

Samples of water were collected in different prewashed water bottles from the Jayakwadi dam at the depth of 0.2 meter at every month of respective year.

### Physico-chemical parameters

Water samples were collected from Jayakwadi dam in clean water bottles for the period of one year from June 2018 to May 2019. the physico-chemical parameters were analysed every month of all three season monsoon winter and summer respectively. Analysis of various parameters including free CO<sub>2</sub>, phosphate, BOD, nitrate, alkalinity, TDS, chloride,

hardness, calcium, sodium, magnesium and pH and temperature was carried out by using the standard methods for water analysis (Rahman, *et al.*, 2021). The parameters like temperature, pH were analysed at study area whereas remaining other parameters are analysed in laboratory.

### Results

The physico-chemical parameters such as temperature, pH, turbidity, alkalinity, dissolved oxygen, total dissolved solid, calcium, magnesium, sodium, chloride, phosphate, biological oxygen demand, nitrate and total hardness of water were analysed in the water samples taken from Jayakwadi Dam, Paithan Aurangabad, Maharashtra, India. Mentioned parameters were taken seasonally at a gate point of the dam. All parameters where report it in graphical presentation.

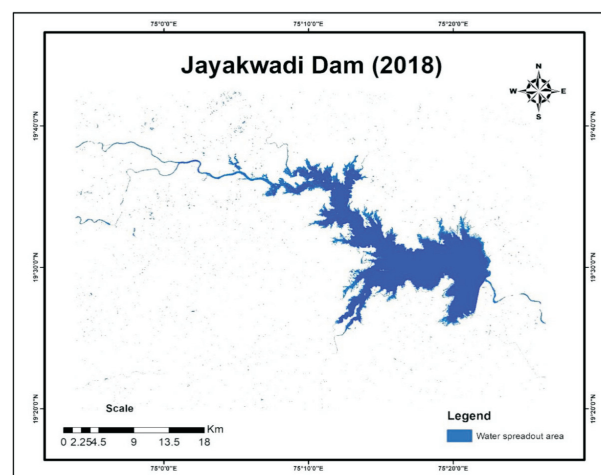


Fig. 1. Image courtesy (Kandekar *et al.*, 2021)

### Nitrate

As shown in Figure 2, the highest amount of nitrate was recorded during month of June- July that is 8.8 mg/l, whereas the lowest amount of nitrate was recorded is 7.6 mg/l in month of May. The rise in nitrate may be because of water pollution and in summer season its lower value indicates its utilization by the zooplanktons, phytoplankton's, animals and fishes present in the dam or may be because of their metabolic activities.

### Phosphate

The highest amount of phosphates reported is 2.0

mg/l in August and in October while 0.46 mg/l was recorded as lowest value in month of February, as shown in Figure 2.

**Biochemical oxygen demand (BOD)**

The highest biochemical oxygen demand was recorded is 2.9 mg/l in February and March whereas Lower value estimated in month of August that is 2.3 mg/l as shown in Figure 2.

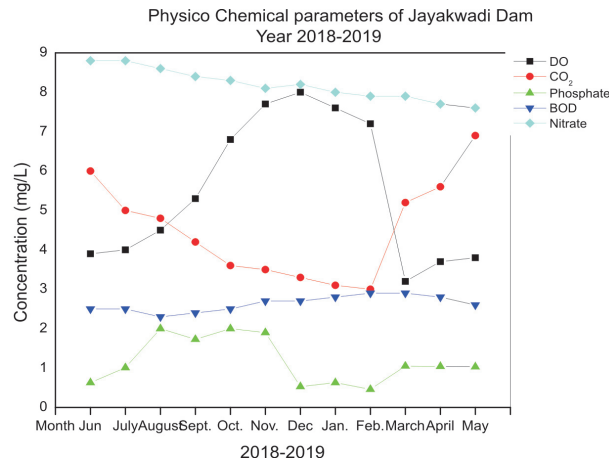


Fig. 2.

**Dissolved oxygen**

As Shown in Figure 2 the highest amount of dissolved oxygen recorded during the month of December as it is 8 mg/l while lowest amount estimated in month of March 3.2 mg/l, which can be related to the increased temperature and reduced water level may responsible for drastically reduced the dissolved oxygen.

**Calcium**

In freshwater calcium plays a crucial role in exoskeleton as well as in endoskeleton formation as it is part of shell and bone construction (Jhingran, 1975). The highest amount of calcium content in water was recorded during November as 42 mg/l whereas the lowest amount of calcium was 33.4 mg/l recorded in May, as shown in Figure 3.

**Magnesium**

The highest amount of magnesium was 32.7 mg/l consecutively in month of June and July, same value estimated in January also. The lowermost value was recorded in month of May 30.8 mg/l, as shown in Figure 3. In photosynthesis magnesium is one of the

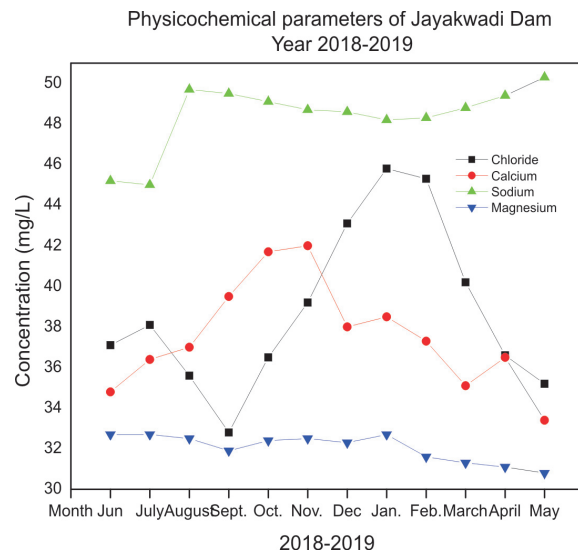


Fig. 3

essential element as it is integral part of chlorophyll pigment. Hence, it may affect the rate of photosynthesis in aquatic vegetation as well as in phytoplankton.

**Chloride**

As shown in Figure 3, the highest chloride concentration of 45.8 mg/l was estimated in January. The lowest value of chloride was found in September that is 32.8 mg/l. The presence of organic matter in dam, responsible for chloride ion increment especially due to animal activities.

**Sodium**

The highest amount of sodium was recorded during

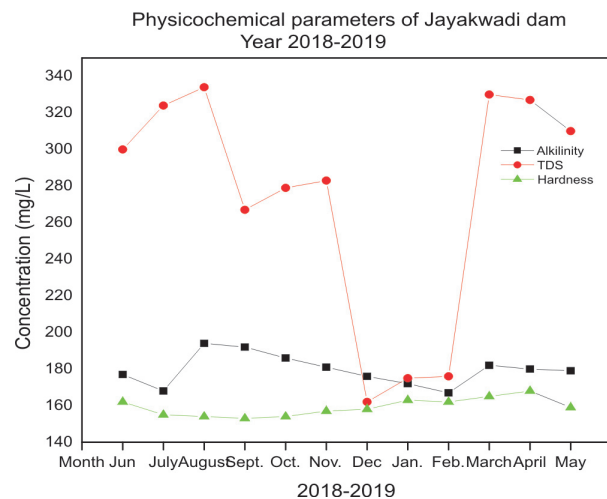


Fig. 4.

the month of August 50.3 mg/l while the lowest value was reported in July is 45 mg/l, as shown in Figure 3.

### Alkalinity

The highest value of alkalinity was reported 194 mg/L in the month of August due to the deposition of various organic material as because of deterioration of aquatic plants, animals, various biological activities of microorganisms etc. present in water body. The lowest alkalinity of 167 mg/l in February month, as shown in Figure 4.

### Total dissolved solids (TDS)

The highest total dissolved solids (TDS) in month of August was observed as 334 mg/l due to the precipitation, incoming water flow from origin side of river, addition of various organic and other substances contributed. The decreased TDS values 162 mg/l are found in the month of December, as shown in figure 4. The incorporation of industrial effluent,

domestic waste related water pollution, garbage etc. may be responsible for increased level of TDS [ (Umerfaruq, 2015).

### Total hardness

The highest quantity of total hardness in the water was recorded in April as 168 mg/l whereas the lowest amount of total hardness was recorded in September as 153 mg/l as shown in Figure 4.

### Temperature

All kind of aquatic ecosystem are very much concerned with the temperature. The temperature plays crucial role and can act as limiting factor for many biological activities. As shown in Figure 5 the utmost temperature in a month of May and was recorded 33 °C as because of solar irradiation, dry and clean atmosphere and low water level as compared to other seasons. In the month of December lowest temperature at 18 °C was reported, may be due to limited light as because of short day duration and the cold as it recorded in winter season (Umerfaruq, 2015).

### pH

As shown in Figure 6, the low pH 7.00 was recorded in the month of October while the highest pH was found 8.2 in the April. Studies of Chaudhary (2020) show that, the increased decomposition of certain biotic and abiotic component is associated with increased pH.

### Conclusion

The data of physicochemical investigation of Jaykwadi dam, clearly indicate concentration of various inorganic and organic components present in water are significantly changed as, the climate changes. The substantial changes occurred in such water dynamics affects all living kinds present in Jaykwadi dam and disrupts local ecosystem. Surface water present in Jaykwadi dam is important for the rural- urban drinking water, industries and for irrigation, consequently it is very essential to monitor such changes in the water body.

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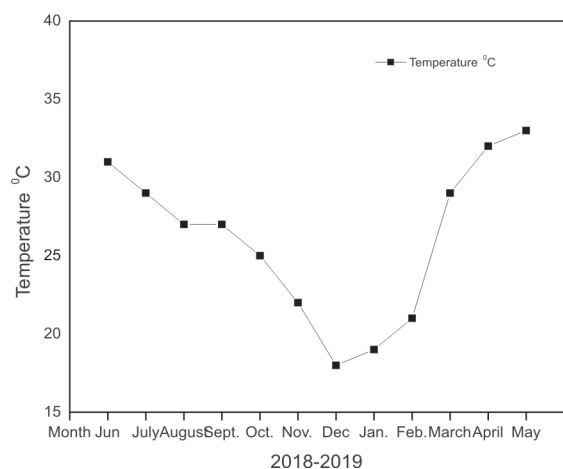


Fig. 5

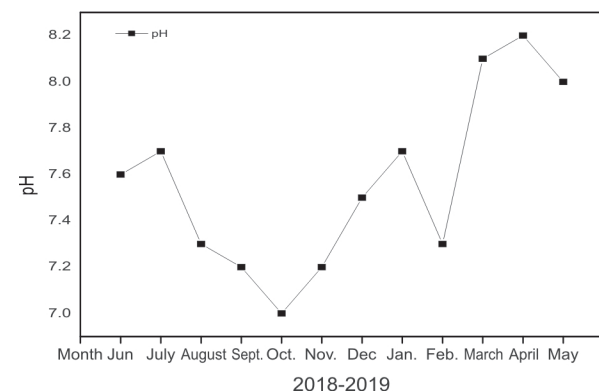


Fig. 6

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