

# STUDIES ON PHYSICO-CHEMICAL PARAMETERS ASSESSMENT OF MULA DAM WATER FROM AHMEDNAGAR DISTRICT OF MAHARASHTRA, INDIA.

\*Ms. R. S. Thorat / \*\*R. R. Dandawate

Department of Zoology,

Arts, commerce and Science College, Sonai, Ahmednagar.

(Affiliated to Savitribai Phule Pune University, Pune)

## ABSTRACT:

In the present investigation, the water sample was collected from Mula Dam, in Ahmednagar district of Maharashtra and subjected to physicochemical assessment using standardised procedures to determine its quality. Water sample was collected in February, June and October months of 2021. This study concerns the analysis of various physicochemical parameters such as water temperature, pH, turbidity, total alkalinity, total hardness, Bicarbonates, Chlorides, Sulphates, Phosphates and residual Sodium Carbonates.

**Key Words:** Physico-chemical assessment, Water quality, Investigation, Parameters.

## INTRODUCTION:

The quality of water is as important as its Quantity because it directly impacts human health and existence. Dams are said to be the most significant water source. They provide a wide range of environmental and economic benefits which includes wildlife habitat, recreation and power generation also. Hence water stored in this reservoir should be of certain physico-chemical standards to avoid environmental problems.

Water is the most essential asset of biological lives. About 71% of the earth's surface is covered by water of which 97% is salty water and approximately 3% constitutes the fresh water of planet (Arangale et al., 2018). Water quality deteriorate by some natural and anthropogenic factors (Albaggar A. A., 2021) Which leads to water pollution. Physico-chemical and biological characteristics collectively states the water quality, which influence its intended use. Water can completely dissolves some minerals from rock where it is stored hence physico-chemical parameters are changed according to the particular area (Kalwale and Padmakar ,2012). This research work was therefore envisage with the intent of determining selected physico-chemical parameters (pH, temperature, turbidity, , total alkalinity, total hardness, bicarbonates, chlorides, sulphates, phosphates and residual sodium carbonates) of Mula Dam water.

The research work was instituted to dictate the water quality of Mula Dam. The study area of Mula Dam located 19° 19' 45.51"N latitude to 74° 31' 46.4" E longitude.

## MATERIALS AND METHODS :

**Study Area:** The dam was artificially constructed in 1971 across the Mula river at south of Baregaon Nandur, taluka Rahuri, district-Ahmednagar (Arangale et al., 2018) . Mula dam encompasses total surface area of 53,600 km<sup>2</sup> with gross storage capacity of 7,36,320,00 km<sup>3</sup> and water capacity is 26 TMC. The height of Mula dam is 48.17 m (158.0 ft) above lowest foundation while the length is 2856 m (9370 ft) and the volume content of the dam is 7594 km<sup>3</sup>.

**Sample Collection:** The water samples were collected in sterilized polythene bottles of capacity one litre for physico-chemical analysis. Samples were monitored in February, June and October of 2021. Samples were labelled after collection and transported to the laboratory for physico-chemical evaluation.

**Physico-chemical Analysis:** The physico-chemical parameters like temperature and pH of water samples were assessed on the spot with the help of thermometer and gun(pen), pH meter respectively. Other parameters (turbidity, total alkalinity, total hardness, bicarbonates, chlorides, sulphates, phosphates and residual sodium carbonates) were determined according to standard methods. The methods employed for analysis of water parameter are according to IS, WHO guidelines, APHA, Titrimetric method for alkalinity of water, EDTA titration method for hardness (Kalbage and Chandanshive, 2021), Argentometric titration for chlorides.

The methods employed to assess physico-chemical parameters and standard limits of those water parameters prescribed by WHO and IS shown in Table.1.

**Table. 1. Water parameters prescribed by WHO and IS and methods employed for that.**

PARAMETERS	METHODS APPLIED	WHO	IS
pH	Electrometric method	6.5-8.5	6.5- 8.5
Temperature C	Thermometry	-	-
Alkalinity(mg/L)	Titrimetric method	120	200
Hardness (mg/L)	EDTA titrimetric method	500	300
Chlorides (mg/L)	Argentometric titration	500	250
SO <sub>4</sub> (mg/L)	Gravimetric method	250	150
PO <sub>4</sub> (mg/L)	Spectrophotometer	-	-
Turbidity (NTU)	Turbidity meter	5	10

**TABLE. 2. RSC VALUES FOR WATER**

RSC VALUE OF WATER	SUITABILITY OF WATER
<1.25 me/L	Good quality
1.25-2.5 me/L	Fair quality
>2.5 me/L	Poor quality

**RESULT AND DISCUSSION:**

Physico-chemical parameters of water sampled from Mula dam were evaluated in the month of October 2021. Some physico-chemical parameters like temperature, pH, alkalinity, chlorides, hardness of water sample were determined within few hours of collection. The parameters variation of samples are given in Table . 3.

**Table. 3. Reported values of variation in physic-chemical parameters of Mula dam water samples.**

PARAMETERS	MONTHS		
	FEBRUARY	JUNE	OCTOBER
WT (C)	27.50	27.68	25.68
pH	7.76	7.90	7.80
TURB (NTU)	7.77	6.57	8.40
TA (mg/L)	98.54	89.11	87.60
TH (mg/L)	81.89	89.56	109.72
BC (mg/L)	99.37	88.76	87.17
Cl (mg/L)	15.21	16.78	15.54
SO <sub>4</sub> (mg/L)	9.14	13.19	14.51
PO <sub>4</sub> (mg/L)	1.38	1.91	1.01
RSC (meq/L)	-3.97	-4.09	-4.01

**Abbreviations:** WT- Water temperature; TURB- Turbidity; TA- Total alkalinity; TH- Total hardness; BC- Bicarbonate; Cl- Chloride; SO<sub>4</sub>- Sulphate; PO<sub>4</sub>- Phosphate; RSC- Residual sodium carbonate

**Temperature:** Water temperature plays major Role in regulating aquatic ecosystems. Water temperature elevates due to some factors like solar radiation (Kalbage and Chandanshive, 2021), turbidity and atmospheric heat transfer leads to changes in physico-chemical parameters of water. The temperature confined in this study was ranged between 25.68 C in October to 27.68 C in June.

**pH:** pH is determined by the concentration of the Hydrogen ion [H<sup>+</sup>] activity in a solution. The pH values of water samples were between 7.76 to 7.90 which are within permissible limits. The average minimum pH was observed in February while average maximum pH was in June. These values indicates that the pH of Mula Dam water is acceptable.

**Turbidity :** Various factors like slit, minerals, clay, organic matter/ phytoplankton bacteria are responsible for the turbidity of water. Water turbidity was recorded between 6.57 to 8.40 NTU. The water quality and aquatic life may hamper by high turbidity value (Kalbage and Chandanshive, 2021).

**Alkalinity:** Alkalinity is measure of water capacity to neutralise strong acid (Kalbage and Chandanshive, 2021). Alkalinity of water sample depends on the presence of salts of strong bases or weak acids, bicarbonates, carbonates and hydroxides. The alkalinity of water sample was ranged between 87.60 mg/L to 98.54 mg/L.

**Hardness:** Amount of dissolved minerals, largely Calcium and Magnesium in the water states its hardness. Hardness is measure of the capacity of water to precipitate soap. Hardness of water sample of Mula Dam was ranged between 81.89 mg/L to 109.72 mg/L which indicates that this dam water is moderately soft.

**Bicarbonates:** Bicarbonates in water is dominant form of dissolved inorganic carbon. The minimum Bicarbonate amount was recorded in October which is 87.17 mg/L while maximum amount was recorded 99.37 mg/L in February.

**Chlorides:** Combination of Chlorine gas with metal results into the inorganic compound that is Chlorides. For normal functioning of animal and plant cell small amount of Chlorides are required. Pollution is indicated by high amount of Chloride in Water (Kalbage and Chandanshive, 2021). The value of Chloride concentration ranged Within 15.21 to 16.78 mg/L observed in Mula dam.

**Sulphates:** Sulphates occur naturally in some minerals like Borite(BaSO<sub>4</sub>), Epsomite(MgSO<sub>4</sub>.7H<sub>2</sub>O) and Gypsum(CaSO<sub>4</sub>.2H<sub>2</sub>O) (Greenwood and Arnshaw 1984). The observed sulphate concentration of water sample ranged between 9.14 mg/L to 14.51 mg/L. the maximum value of Sulphate concentration was noted in October month.

**Phosphate:** Phosphate plays important role in life of microorganisms, phytoplanktons and plants. The minimum phosphate quantity in water sample was reported as 1.01 mg/L in October and the maximum quantity was reported as 1.91 mg/L in June which are below WHO standard.

**Residual sodium carbonate:** Residual Sodium Carbonate is used to find the suitability of water for irrigation purpose. The water with high RSC value has high pH which results in infertile land irrigated by such water (Dhembare, 2012). The RSC value of water sample was ranged between -3.97 meq/L to -4.09 meq/L. The negative values of RSC indicates that there is no complete precipitation of Calcium and Magnesium (Dhembare, 2012). Suitability of water according to its RSC values Is given in Table. 2.

## CONCLUSION:

The main objective of the study was the assessment of Mula dam water quality by studying its physico-chemical parameters. Variations in parameters were found in this one year study and they were compared with IS and WHO standard limits. This study shows that the assessed physico-chemical parameters were within prescribed limit of IS and WHO. Therefore this investigation reveals that the water of Mula dam is suitable in order to protect aquatic life. Also for irrigation and drinking purpose.

## AKNOWLEDGEMENT:

The authors are grateful of Department of Zoology, Arts, Commerce and Science College, Sonai, Ahmednagar, Maharashtra. for providing research Facilities and also those who have contributed to The completion of this paper.

## REFERENCES:

1. Albaggar. A. A. (2021) Saudi Journal Of Biological Sciences. 28: 4605.
2. Arangale, K. B., Raut, V. R., Gavit, M. G., Shinde Y. P. (2018) IJBAT. 6(2):7.
3. Gulumbe B. H., Aliyu B. and Manga. S. S. (2016) IJISSET 2(4): 30.
4. Zahid. B , Gondal M. A. and Batool A. (2019) J Biores Manag 6(2): 5.
5. Dhembare, A. J., (2011) Euro. J. Exp. Bio. 1(4):98.
6. Ilechukwu. I, Olusina T. B and Echeta O. C. (2020) Ovidius University Annals of Chemistry 31(2): 80
7. Jadhav S. D, Jadhav M. S. (2020) International Journal of Lakes And Rivers 13(1): 95.
8. Kalbage B. T, Chandanshive N. E (2021) IJBAT 3(9):21.
9. Kalwale A. M and Savale P. A. (2012) Adv. Appl. Sci. Res., 3(1): 273.
10. Elahcene.O, Hoda. A. E and Aziou Aidoud. (2019) Egyptian Journal of Aquatic Biology and Fishries 23(3): 423.
11. Ouma SO', Ngeranwa JN, Juma KK and Mburu DN (2016) Journal of Environmental Analytical Chemistry 3(1):3.