Plantae Scientia – An International Research Journal in Botany Publishing Bimonthly Open Access Journal

Plantae Scientia : Volume 04, Issue 03, May 2021

ISSN 2581-589X

RESEARCH ARTICLE

Physicochemical Assessment of Khelna Reservoir Water from Aurangabad District of Maharashtra

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Manuscript Details

Manuscript Submitted : 03/01/2021
Manuscript Revised : 13/03/2021
Manuscript Accepted : 14/03/2021
Manuscript Published : 22/03/2021

Available On

https://plantaescientia.com/ojs

Cite This Article As

Sawdekar J H & M J Jadhav (2021). Physicochemical Assessment of Khelna Reservoir Water from Aurangabad District of Maharashtra. *Pla. Sci.* 2021; Vol. 04 Iss. 03:174-177.

Indexed In

CrossRef, Scientific Indexing Services (SIS), Google Scholar, Index Copernicus International (ICI), Directory of Research Journal Indexing (DRJI), CiteFactor, Scientific Journal Impact Factor (SJIF), General Impact Factor, Journal Factor, Cosmos Impact Factor, PKP Index, AJIFACTOR Indexing, etc.

ABSTRACT

Present study deals with the physicochemical assessment of Khelna reservoir water. Life in water depends upon the physicochemical conditions prevailing in that water. A total of 20 parameters were analyzed at seasonal intervals. Results of present study reveals that all selected physicochemical parameters were found in normal range as per the guidelines of WHO. The water is potable and safe for drinking and irrigation purpose. In order to maintain better quality of water, regular monitoring of quality of water and protection and conservation of water bodies is required. A proper awareness among society has to be created about protection and conservation of water resources.

Keywords: Physicochemical parameters, Khelna reservoir, Water quality.

A view of Khelna reservoir.

INTRODUCTION

Water is one of the most important natural resources of earth. It is the only inorganic compound exists in liquid, solid and gaseous physical state under natural conditions. It serves as a medium for the transformation of highly complex organic molecules that form the base for life process. Water is very important in the sustenance of life on earth. All living organisms need water for their survival and growth. The quality of water usually described according to its physical, chemical and biological characteristics. Streams, rivers and lakes are the most important freshwater resources for man. Unfortunately, these are being polluted by sewage, industrial waste and agricultural surface run off. Increased human population, rapid industrialization, use of chemical fertilizers and pesticides in agriculture and man-made activities are causing heavy and varied pollution. Therefore, it is necessary to check the quality of water at regular interval of time. Due to the use of contaminated drinking water human population suffers from water borne diseases. It is therefore regular monitoring of quality of ground and surface water is essential.

Present study deals with the assessment of water quality in relation to physicochemical parameters of Khelna reservoir situated in Aurangabad district of Maharashtra. The reservoir is source of drinking water for Sillod town and 11 villages of Sillod tehsil area. About 6000 acres land is under irrigation. This reservoir is an important source for drinking and irrigation purpose. Fishing activity is also observed in reservoir. Khelna reservoir is located in Sillod tehsil area of Aurangabad district in Maharashtra.

MATERIALS AND METHODS

Water samples were collected at seasonal intervals from four sampling sites during October 2017 to September 2018. Samples were collected at about one feet depth below surface from all four sampling sites. The collection was made during morning hours i.e., 8.00 to 10.00 am in acid washed plastic cans of 5 litre capacity. Air temperature and water temperature were recorded by using centigrade thermometer at the time of sampling. For the estimation of dissolved oxygen, separate samples were collected in 250 ml BOD glass bottles. The samples were fixed with chemicals on the spot. The bottles were stored in ice-bags to maintain temperature. Collected water samples were brought to the laboratory for the estimation of selected physicochemical parameters such as pH, electrical conductivity, dissolved oxygen, free carbon dioxide, carbonate, bicarbonate, calcium, magnesium, sodium, chloride, silica, nitrate, total phosphorus, potassium, BOD, COD, total dissolved solids and total hardness. The physico-chemical analysis of water samples was carried out by following the standard methods of APHA (1992) and Trivedy and Goel (1984).

RESULTS AND DISCUSSION

Data pertaining to physicochemical parameters of Khelna reservoir has been given in the Table 1. Physicochemical characteristics of Khelna reservoir were influenced due to the agricultural discharges. Air temperature ranges from 24.95°C to 26.22°C. Air temperature is one of the important factors in aquatic environment since it regulates physicochemical as well as biological activities (Kumar et.al 1996). Water temperature influences chemistry of water and biological reactions of organisms in water. The water temperature ranged from 23.55°C to 24.50°C. Water temperature was minimum in rainy season and maximum in summer season. In present study it clearly found that water temperature being consistently lower than air temperature. Similar results were obtained by Munawar (1970), Sharma et.al (2007) and Khan et.al. (2012).The pH values range from 8.15 to 8.50. The best pH level for drinking water is 6.5 to 8.5. Nasar and Munshi (1974) stated that fresh waters are generally alkaline. In present study electrical conductivity was ranged from 332 to 340.50 umhos/cm. The results agree with Kumar (1995) and Khan et.al. (2012). The dissolved oxygen ranges from 6.15 to 6.55 mg/l. It is in conformity with Jaysree (2002), Jaker and Rawat (2003) and Khan et.al. (2012). Dissolved oxygen is essential to maintain higher forms of biological life. Free carbon dioxide was totally absent in Khelna reservoir. Similar results were obtained by Munawar (1970) Nasar and Munshi (1974), Gupta and Sharma (1994) and Khan et.al. (2012).

There is no significant difference in average values of carbonate, it ranges from 0.27 to 0.28 mg/l. The values of biocarbonate ranged from 147.90 to 155.15 mg/l. Pandey and Soni (1993) and Jain (2002) showed direct correlation of carbonate and biocarbonate with pH and dissolved oxygen. Calcium is common element found in most natural water. Calcium contributes to the hardness and taste of water. It ranged from 50.50 to 55.50 mg/l. Magnesium concentration of Khelna reservoir varies in the range of 19.50 to 25.50 mg/l. The range of sodium was 26.35 to 27.50 mg/l. It favours of growth of phytoplankton with nitrate and chloride (Pandey and Soni, 1993). Chloride occurs naturally in all types of waters. The values of chloride ranged between 38 to 44 mg/l during present study. The amount of chloride content of any water gives an idea about the nature and extent of pollution (Singh and Singh, 1990). Silica also occurs in natural water. During present study the range of silica was 5.99 to 8.30 mg/l.

Nitrate is an important nutrient for the growth of phytoplankton and helps in eutrophication. During present

study nitrate concentration varies in the range of 2.90 to 3.79 mg/l. Pearsall (1932) reported that nitrate was the main factor controlling the phytoplankton periodicity. In natural fresh water phosphorus is in low concentration. The higher concentration of phosphorus is indicative of pollution. In present study, the range of phosphorus was recorded 1.65 to 2.22 mg/l. Potassium also found in considerable amount in natural water. In present study potassium concentration varies in the range of 7.05 to 7.15 mg/l. BOD is the amount of oxygen utilized by microorganism in stabilizing the organic matter. BOD gives a complete picture of the nature and extent of pollution and also about water quality. Concentration of BOD ranged between 10.50 to 13.50 mg/l in the present study. Srivastav (2018) recorded BOD value of lake from 0.4 to 4 mg/l. He observed that highest BOD value was in winter. Increased temperature and sedimentation load reduces BOD.

The chemical oxygen demand ranges from 22.50 to 40.50 mg/l. The high concentration of COD is one of the factors inhibit phytoplankton growth. (Agarwal et.al. 1976 and More 1997). Total dissolved solids indicate presence of various kinds of minerals in water. Concentration of TDS is an important parameter in drinking water and for irrigation water. As recommended by WHO (2006) the permissible amount of TDS for potable water has been considered to be 500 to 1000 mg/l. During present study TDS concentration ranged from 347 to 363 mg/l. Beetor (1965) classified the lakes on the basis of concentration of TDS. Total hardness in water is the sum of concentration of alkaline earth metal cation such as Ca^{++} and Mg^{++}. The range of total hardness during present study was 218 to 232 mg/l. The permissible limit as per WHO is 500 mg/l. Mishra and Saxena (1992) reported total hardness in Ganga River 295 mg/l. Overall results reveals that during present study all physicochemical parameters were found in normal range as per the guidelines of WHO for drinking water. The water of Khelna reservoir is potable and safe for drinking and irrigation purpose.

CONCLUSION

It is concluded that, physicochemical parameters of Khelna reservoir water are in normal range and indicates better quality of water. The water is potable and safe for drinking and irrigation purpose. In order to maintain better quality of water regular physicochemical assesment is essential. The society should also make aware about protection and conservation of water bodies. Regular monitoring of quality of water, protection and conservation of water resources is significant for availability of potable and safe water for human being.

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Table 1: Average values of Physicochemical parameters of selected sites of Khelna reservoir from October 2017 to September 2018.

Sr. No.	Parameters	S1	S2	S3	S4	Unit
1	Air Temperature	24.95	25.25	25.66	26.22	^{O}C
2	Water Temperature	23.65	23.55	23.55	24.50	^{O}C
3	pH	8.50	8.20	8.15	8.20	-
4	Electrical Conductivity	326	334.50	232	340.50	umhos/cm
5	Disoolved Oxygen	6.55	6.15	6.15	6.15	mg/l
6	Free Carbon Dioxide	00	00	00	00	mg/l
7	Carbonate	0.27	0.28	0.27	0.27	mg/l
8	Bicarbonate	152.05	155.15	147.90	148.95	mg/l
9	Calcium	55.50	50.50	54.00	50.50	mg/l
10	Magnesium	19.50	22.00	22.00	25.50	mg/l
11	Sodium	26.90	26.35	27.05	27.50	mg/l
12	Chloride	44	40	38	42	mg/l
13	Silica	8.30	7.37	7.01	5.99	mg/l
14	Nitrate	3.61	3.79	3.36	2.90	mg/l
15	Total Phosphorus	1.83	2.22	1.65	1.95	mg/l
16	Potassium	7.15	7.05	7.20	7.10	mg/l
17	BOD	13.50	10.50	10.50	12.50	mg/l
18	COD	40.50	35.50	22.50	24.50	mg/l
19	Total Dissolved Solids(TDS)	363	359	347	351	mg/l
20	Total Hardness	220	218	228	232	mg/l