

INVESTIGATIVE STUDY ON PHYSICO-CHEMICAL PARAMETERS OF FRESHWATER OF MUN DAM OF BULDHANA DISTRICT (M.S.), INDIA

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Abstract

The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. It is necessary to know details about different physico-chemical parameters of water. We studied the physico-chemical parameters of freshwater of Mun dam of Buldhana District (M.S.) for a period of one year from December 2013 to January 2014. We recorded 16 different parameters containing physical and chemical analysis of water are Air temperature, Water temperature, Transparency, pH Electrical Conductivity, Turbidity D. O., B.O.D, T.D.S., Total alkalinity, Total Hardness, Ca⁺⁺, Mg⁺⁺, Chloride, Nitrate, Phosphate etc. The present investigation has revealed that there are significant variations in different seasons in some physico-chemical parameters from different spots of Mun dam.

Key Words: Physico-chemical parameters, Mun dam, Hardness, BOD, Transparency

Introduction

Water is the nature's most wonderful, abundant and most useful chemical compound created by nature with biological, chemical and physical properties and unique characteristics. It is essential for all living things for the survival on this earth planet. Out of total water available on earth's surface only 0.3% to 0.5% issuable therefore, its judicious use is imperative. It is the most abundant and elixir of life and essential chemical, but this vast natural resource has been depleted and turned into scarce commodity with increased usage catering to the needs of ever-expanding population. There is almost a global shortage of water and the world's most important and front rank problem is to supply and maintain cheap and clean drinking water today to everyone.

The problems relates to water attract the attention to the urgency for investigating causes and suggest remedies to prepare future plan of action for maintenance of potable waters and related development issues. The present investigation involves the analysis of water of Mun dam of Buldhana district located in Maharashtra, India.

Materials and methods

Study area

The Mun dam is situated about 65Km east of Buldhana city at a latitude of 20⁰-27'-40''. The Mun dam lies on 76⁰-30'-48''. Longitude. The dam is surrounded by hills from three sides. There water spread in area of 13936 hectares. Total irrigated area under Mun dam is about 314 Sq. Km. Average depth of the reservoir 22 meter. The reservoir is rain fed during monsoon periods. Mun dam is located in Buldhana district of Maharashtra. The dam is located on river Mun, a tributary of Purna River in Tapi basin. The dam comprises of rolled filled earthen dam 1.466 km in length including spillway of 72 meter. The maximum height of the dam is 30.20 meter from the deepest foundation. The spillway is provided with 5 radial gates of 12x8 meter size to pass maximum possible flood discharge of 3623.78 cumec. The main canal is on the left bank and is 22.53 km length with head discharge capacity of 7.8327 cumec. The dam is irrigating an area of 7804 hectare (CCA) with annual irrigation of 9287 hectare. Total 32 villages of Buldhana and Akola district is get benefitted.

Physico-chemical parameters

Monthly collections of water samples were collected from sampling site for one complete year from December 2013 to January 2014. Samples are collected from sampling sites on months first week at 7.00 a.m. to 10.00 a.m. physical parameters are measured on site like pH, air temperature, water temperature, transparency, electrical conductivity. Chemical parameters were analyzed in laboratory by using standard titration methods described by APHA (1998), Paka and Rao (1997)

Result and Discussion

Air temperature is always higher than water temperature it is responsible for rise or decrease in the water temperature and metabolic activities depends on the water and its physico-chemical factors. Air temperature was higher in June i.e. 35.30°C and lower in December i.e. 27.10°C . Water temperature fluctuates when changes the air temperature; it is maintained by differing the rate of environmental temperature. Due to changing environmental temperature water temperature was higher May i.e. 27.20°C and lower in December i.e. 23.70°C . The transparency of water is mainly affected due to suspended particles present in dam and indirectly influenced by the physicochemical parameters. In present investigation, secchi disc transparency was recorded 11.80 cm to 25.60 cm in Mun dam during Feb. 2013 to Jan. 2014. Kedar (2011) reported the values of transparency between 9.22 cm to 28.72 cm in Rishi Lake at Karanja (Lad) Maharashtra. Concentration of hydrogen ion is indicates as a pH and it is considered as an important ecological factors and is the result of the interaction of various substances in solution in the water. In present investigation, the pH was ranges 6.90 to 8.10. According to results of Lokhande R.S. et. al., (2008) ph ranges from 7.1 to 8.8 and higher in winter season of Ulhas River, Thane (M.S.), India. The specific conductivity of water in its capacity to conduct electric current and depends on the nature and concentration of ionized salts. Electrical

conductivity is measured in present investigation was 270.00 $\mu\text{mhos/cm}$ in June and lower rate of conductivity is 201.00 $\mu\text{mhos/cm}$ in September. Narayana et. al., (2005) reported the range of conductivity between 121.35 $\mu\text{mhos/cm}$ to 381.25 $\mu\text{mhos/cm}$ in Anajanapuram reservoir near Shikaripura, District Shimoga, Karnataka. The maximum value of turbidity was recorded from present investigation during August i.e. 274 and minimum during January i.e. 36

Dissolved oxygen is a parameter to participate for improvement in water quality and physical and biological processes. In the present study, the maximum concentration of dissolved oxygen was observed maximum during November was 8.33mg/L and minimum during October was 6.30mg/L. Living organisms are dependent on aquatic ecosystem requires the amount of oxygen present in water it is termed as biological oxygen demand (BOD). It is a very important indicator of the pollution status of a water body. The values of BOD was higher during November and lower during October i.e. 3.4mg/L and 2.5mg/L. The residue remaining in a weighed dish after the sample has been passed through a standard fiber glass filter and dried to constant mass. Many dissolved substances are undesirable in water like minerals, gases and organic constituents are the total dissolved solvents also termed as TDS. The rate of TDS is higher in present study was during June is 183.5 mg/L and lower in November 168.6mg/L. Total alkalinity is dependent on total hardness and it is responsible for the alkaline nature of water. During present investigation rate of total alkalinity was maximum in June 113.40mg/L and minimum in February was 86.00mg/L.

The hardness of dam water increases due to deposition of calcium and magnesium salts. Calcium and magnesium salts are comes from different areas around the dam. Total hardness is positively related with rainfall of all sites. Total hardness in present investigation was higher in June i.e. 118.30mg/L and found lower in October 98.90mg/L. Calcium is essential for all organisms and regulates

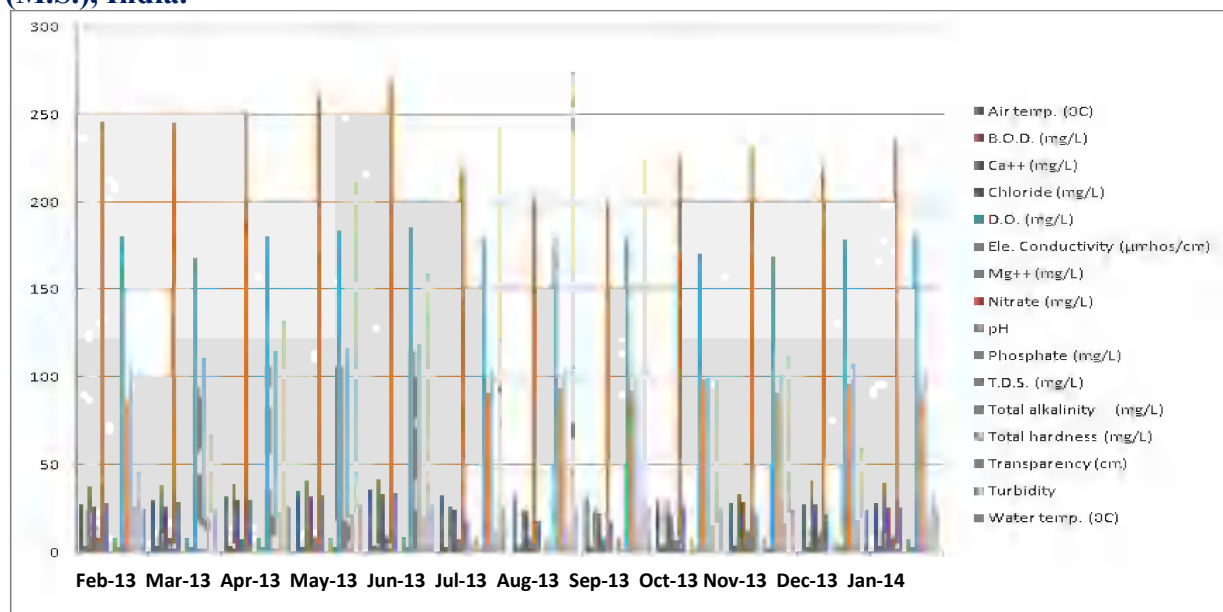
various physiological functions. The calcium ions contribute to the total hardness of water. In present study maximum value of calcium was observed in June is 41.30mg/L and minimal value was 24.10mg/L in September. Magnesium ion is also essential for all organisms and for regulation of physiological function. In present study magnesium was observed in higher rate in June 33.20mg/L and lower rate in September was 17.40mg/L. chloride is one of the important indicators of pollution. Chloride is found in sewage, effluents and farm drainage. In present study value of chloride was highest in June i.e.

32.80mg/L and lowest in September 22.10mg/L.

Nitrate concentration depends on the activity of nitrifying bacteria which in turn get influence by presence of dissolved oxygen. In present study the values of nitrate ranged from 0.36mg/L to 0.21mg/L. Ashok K. Agrawal (2010) reported on nitrate range between 0.08 to 0.97mg/L from summer to early monsoon months. The phosphate is an important constituent not only for the aquatic vascular plants but also for the growth of phytoplankton. In present investigation phosphate ranges from 2.69mg/L to 0.90mg/L

Table No.-1 Physico-chemical parameters observed from Mun dam of Buldhana District (M.S.), India.

Parameters	Feb 2013	Mar 2013	Apr 2013	May 2013	Jun 2013	Jul 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013	Jan 2014
Air temp. (°C)	27.20	29.30	31.30	34.50	35.30	32.50	31.30	31.50	29.10	27.50	27.10	27.50
Water temp. (°C)	24.50	24.70	26.20	27.20	27.10	25.90	25.80	25.80	24.80	23.90	23.70	24.00
Transparency (cm)	25.60	20.10	22.30	21.30	20.20	11.80	12.50	13.00	15.00	16.40	18.30	20.20
pH	7.50	7.70	7.80	7.80	8.10	7.90	7.95	7.90	6.90	7.20	7.40	7.10
Ele. Conductivity (µmhos/cm)	246.00	245.00	252.00	260.00	270.00	220.00	203.00	201.00	226.00	232.00	220.00	236.00
Turbidity	48	67	132	211	159	243	274	224	98	112	59	36
D.O. (mg/L)	7.70	7.80	7.20	7.10	7.00	7.00	7.05	7.00	6.30	8.33	6.90	7.40
B.O.D. (mg/L)	3.2	3.2	2.9	2.8	3.1	2.8	2.8	2.7	2.5	3.4	2.7	2.9
T.D.S. (mg/L)	180.30	168.30	180.10	183.30	185.30	180.40	180.30	180.40	170.40	168.60	178.20	181.90
Total alkalinity (mg/L)	86.00	98.30	110.20	112.60	113.40	90.90	93.40	91.80	98.70	90.50	95.80	89.70
Total hardness (mg/L)	107.00	110.50	114.30	116.40	118.30	102.30	102.10	100.70	98.90	101.30	107.50	102.80
Ca ⁺⁺ (mg/L)	37.40	38.10	38.80	40.40	41.30	25.80	24.40	24.10	28.90	32.60	40.40	39.30
Mg ⁺⁺ (mg/L)	27.80	28.30	29.70	32.30	33.20	17.90	17.50	17.40	27.10	23.50	21.70	25.30
Chloride (mg/L)	25.60	25.80	29.30	31.70	32.80	23.70	22.90	22.10	21.50	28.20	26.90	24.90
Nitrate (mg/L)	0.28	0.21	0.32	0.36	0.35	0.31	0.28	0.27	0.30	0.26	0.29	0.27
Phosphate (mg/L)	2.30	2.35	2.52	2.57	2.69	1.01	0.95	0.90	1.67	1.90	2.37	2.45

Figure No.-1 Physico-chemical parameters observed from Mun dam of Buldhana District (M.S.), India.

Conclusion

The present study has been focused on physico-chemical parameters of Mun dam water with specific environmental associations. Our results will help for assessing the potable nature of dam water. This investigation also focuses on reducing the water pollution due to human activity and helps in improve social and cultural importance of dam and its scenario.

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