

ANALYSIS OF SEASONAL PHYSICO CHEMICAL WATER QUALITY OF SUDHA RIVER IN BHOKAR, MAHARASHTRA, INDIA

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Abstract

The seasonal water quality analysis of Sudha river Bhokar in Nanded district (19° 15 'N, 73° 43' E) were investigated between January to December 2011 using standard methodology of APHA. The Physico chemical detected in the water were pH, Electrical conductivity, Temperature, Total Dissolved Solids, Alkalinity, Total Hardness, Calcium Hardness, Magnesium Hardness, Sulphate, Phosphate, Chloride, Calcium, Magnesium, Dissolved Oxygen, Fluoride, Iron, Manganese, Salinity, Sodium, Potassium and Nitrate. Seasonally and average concentrations values of Physico chemical parameters within the permissible limits of WHO.

Keywords: Seasonal, Water quality, Sudha river, Physico Chemical Parameters, Bhokar, Nanded.

Introduction

Water is essential for social-economic development and for maintaining healthy ecosystems. Properly managed water resources are a critical component of growth, poverty reduction and equity. The livelihoods of the poorest are critically associated with access to water services. Throughout history, the quality of drinking water has been a factor in determining human welfare. They have been widely utilized by mankind over the centuries to the extent that very few, if any, are now in a nature. One of the most significant manmade changes has been occur due to the addition of chemicals, containing a lot of heavy metals, to the waters. Such inputs to water can be derived from a verity of sources, some of them obvious, and others less so.

They can be varied so that the concentrations of chemicals in water are rarely constant. Pollution and water quality degradation interfere with vital and legitimate water uses at any scale, i.e. local, regional or international³.

One of the greatest challenges of the twenty-first century is to provide an adequate supply of safe water for household consumption to everyone. But, the demand for water is constantly on the rise. On the other hand, the quality of the water resources, which are unevenly distributed over the earth's surface, is deteriorating due to the anthropogenic activities. Water plays an important role in the world economy, as it functions as a solvent for a wide variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70% of the fresh water used by humans goes to agriculture².

It is primarily climatic, geomorphologic and geochemical conditions existing in a specific water basin that affect the physicochemical properties of each individual fresh water ecosystem⁴. Metals are defined as any element that has a silvery luster and is a good conductor of heat and electricity⁵.

Trace elements present in natural waters (ground and surface) and their sources are associated with either natural processes or man's activities. Most trace elements, especially heavy metals, do not exist in soluble forms for a long time in waters. They are present mainly as suspended colloids or are fixed by organic and mineral substances⁶.

Study Area:

Sudha river at Renapur village in the Bhokar taluka district Nanded of Maharashtra state has been selected for carrying out this research work. It is situated at northern part of Marathwada region. Bhokar is the Tehsil place in Nanded district of Maharashtra, the Sudha reservoir was constructed earlier and it is on the way to Kinwat road and at Bhokar towards eastern. The reservoir is situated 19⁰ 15' latitude 73⁰ 43' longitude. The catchments area of the reservoir is about 105.67 Km².

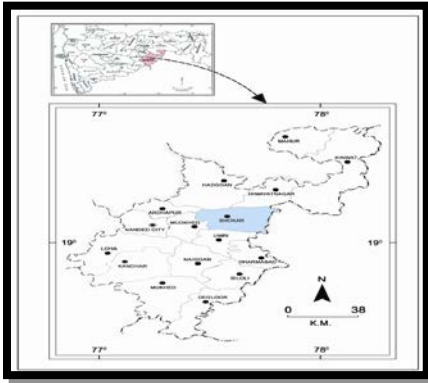


Fig. 1: Location of Bhokar Taluka in Nanded District



Fig. 2.: Location of Water Sampling Station of Sudha dam

MATERIALS AND METHODS

Sampling Methods

Three water samples were collected from four sampling site of Sudha river in 1liter pit bottles and carried to the laboratory. The physical and chemical parameters were analyzed as per Standard Methods for the Examination of Water and Waste Water¹.

Sampling was done three times in the year at morning in January to December 2011. The pH, temperature were determined on the spot rest of the parameters were analyzed in the laboratory by standard methods.

RESULTS AND DISCUSSION

In this study total 3 water samples; in pre-monsoon, 3 in monsoon, and 3 in post-monsoon ware analyzed from Sudha river. The number of physicochemical parameters like pH, EC, temperature, total dissolved solids, alkalinity, dissolved oxygen, chloride, salinity, total hardness, calcium hardness, magnesium hardness, sulphate, phosphate, calcium, magnesium, fluoride, iron, manganese, sodium, potassium and nitrate were performed. In the present study the data revealed that there were considerable variations in the quality with respect to their physicochemical characteristics. Physicochemical analysis of Sudha river water was studied in different seasons. The average value of various water quality parameters had been mentioned in Table and represented in different graphs.

The pH of Sudha river water varies from 6.3 to 8.25, temperature 24 °C to 26 °C and electrical conductivity 214 to 331. The total dissolved solid is in the range of 618 to 913 and dissolved oxygen recorded in the range 1.21 to 1.63 mg/liter.

Alkalinity of Sudha river water varies from 3310 to 3690 mg/L, total hardness 122 to 143 mg/L, calcium hardness 23 to 44 mg/L, and magnesium hardness 70 to 110 mg/L. The sulphate is in the range of 184 to 210 mg/L, phosphate 0.736 to 1.490 mg/L, chloride 2010 to 3137 mg/L, calcium 11.75 to 17.21 mg/L, and magnesium 18.94 to 24.24 mg/L and dissolved oxygen 1.11 to 1.63 mg/L.

Fluoride concentration was found in the range is 0.27 to 0.49 mg/L, iron 5 to 11 mg/L, manganese 0.2 to 0.7 mg/L, salinity 389.9 to 909.47 mg/L, sodium 297.1 to 735.7 mg/L, Potassium 8 to 12.1 mg/L and nitrate is not found in the Sudha river water samples. Also the all physico chemical parameters represent in the average form in the table no.1 and also represent through the graphically fig.1 to fig. 9 respectively.

Sr. No.	Parameters	Post monsoon Sample	Pre monsoon Sample	Monsoon Sample	Average
1	pH	6.33	7.1	8.25	7.22
2	Electrical conductivity	214	310	331	285
3	Temperature	24 ° C	26 ° C	25 ° C	25 ° C
4	Total Dissolved Solids(mg/L)	618	710	913	747
5	Alkalinity(mg/L)	3310	3530	3690	3510
6	Total Hardness(mg/L)	122	131	143	132
7	Calcium Hardness(mg/L)	38	23	44	35
8	Magnesium Hardness(mg/L)	70	110	90	90
9	Sulphate(mg/L)	210	184	200	198
10	Phosphate(mg/L)	0.847	0.736	1.490	1.024
11	Chloride(mg/L)	2010	3137	2045	2397.3
12	Calcium(mg/L)	17.21	13.45	11.75	14.136

13	Magnesium(mg/L)	18.94	22.19	24.24	21.79
14	Dissolved Oxygen(mg/L)	1.21	1.11	1.63	1.31
15	Fluoride(mg/L)	0.27	0.39	0.49	0.383
16	Iron(mg/L)	05	11	10	8.66
17	Manganese(mg/L)	0.2	0.7	0.4	0.43
18	Salinity(mg/L)	514.61	909.47	389.9	604.56
19	Sodium(mg/L)	719.2	735.7	297.1	584
20	Potassium(mg/L)	8	12.7	10.1	10.26
21	Nitrate (mg/L)	N.D.	N.D.	N.D.	N.D.

Table 1: Physic-chemical parameters of Sudha river water samples

They observed the pH of a water body is very important in determination of water quality since it affects other chemical reactions such as solubility and metal toxicity⁹. The pH of the water under study in the year is within the permissible limit (WHO standard of 6.50-8.50) [10]. He found the river water exhibited a slightly alkaline pH apparently increased along the downstream due to the tidal effect of Bay of Bengal¹¹.

The maximum iron concentration 2578 mg/L and 5.70 mg/L in the Godavari bed and suspended sediments¹². He believed in more concentration of iron in the aquatic system an indication of oxygen depletion by low oxidation state¹³. The investigated water quality from different region of Mahendergarh, Haryana. During study they recorded fluoride concentration ranged between 0.238 to 1.995 mg L⁻¹. In some villages high fluoride content water cause serious health hazards to people¹⁴. The high concentration of chloride gives an undesirable taste to water and beverages. Taste thresholds for the chloride anion depends on the associated cations and are in the range of 200-300 mg/l for sodium, potassium, and calcium chlorides¹⁵.

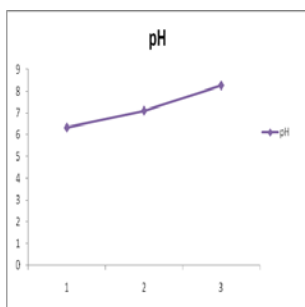


Fig.1: Observed pH of water samples

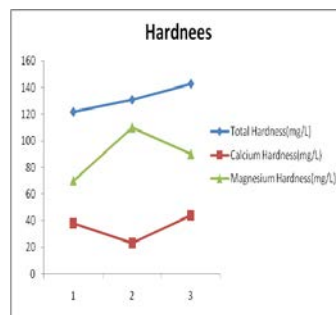


Fig.2: Cons. of Calcium, Magnesium &

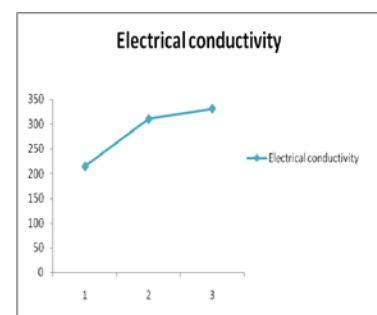


Fig.3: Observed Electrical conductivity

Total Hardness in different water samples

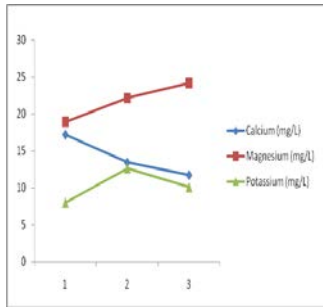


Fig.4: Cons of Magnesium, Calcium & Potassium in observed water samples.

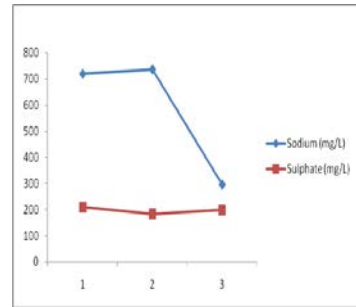


Fig.5: Observed Sodium & Sulphate of samples

of water sample

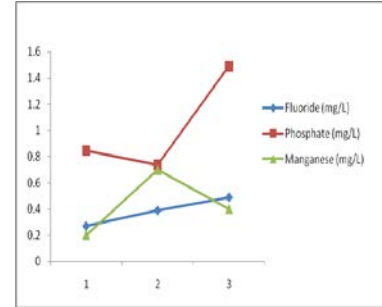


Fig.6: Cons of Phosphate, Fluoride & Manganese

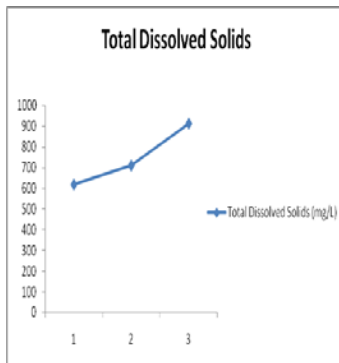


Fig.7: Observed Total dissolved Solid of water sample

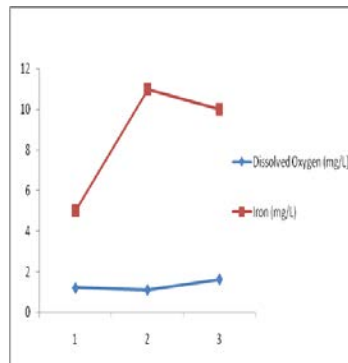


Fig.8: Variation of Iron & D.O water samples

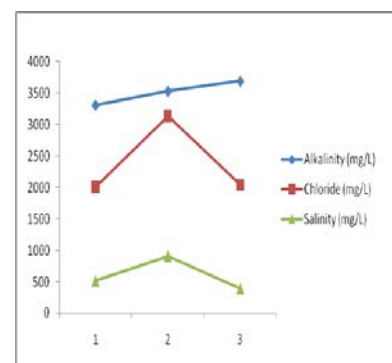


Fig.9: Variation in Alkalinity, Chloride, & Salinity of water sample

Conclusion

Here, I find that the variations in the concentration of selected physico-chemical water quality from Sudha dam water were investigated. The cultural eutrophication of this river is taking place due to some of the untreated domestic sewage and garbage coming out from Sudha river town that reaches into the river. Inside the crater, some farmers are doing farming and hence the use of inorganic fertilizers, insecticides and pesticides like toxic compounds enters in river. Simultaneously, Hygienic activities are carried out by the local people in the fresh water springs and used waste water enters in river at last.

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