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Spectrophotometric evaluation of some trace elements from Sudha reservoir of Bhokar in relation to Biotic Community

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ABSTRACT

Water is essential resources for sustainable life and environment which we have always thorough to be available in abundance and free gift of nature. Trace elements were found in rarer form in surface water. The present study was undertaken to determine the trace elements from sudha reservoir. The total concentrations of a sample site of trace elements (Zn and Fe) were determined using UV spectroscopic method. The concentration of selected trace elements was evaluated from two sampling sites named S_1 and S_2 . The study was carried out during entire year of 2009. The observed values showed the variations especially doing the research work.

Keywords: Trace elements, Surface Water, UV spectrometric, zinc, Iron.

INTRODUCTION

Water quality is affected in many ways. It changes with the seasons and geographic areas, even when there is no pollution present; therefore we pay close attention to water quality by monitoring and testing. Water quality monitoring is a scientifically designed system of long-term, standardized measurement, systematic observation, evaluation and reporting of water quality in order to define status and trends. Biologists consider pollution as change in aquatic environment which brings about a reduction in the diversity of aquatic life and eventually destroy the balance of life in a stream and biological indicators of community diversity are therefore, the direct evidence of pollution.

The sources of pollutions with trace elements of the environment can be natural and anthropogenic. The natural sources include mother rocks and minerals of the metals. From the main anthropogenic sources are agriculture, black and coloured metallurgy and transport [8, 15]. The dust associated with toxic metals remain in air for longer duration and therefore it causes health problems to urban population [19].

Organic compounds are known to play an important role in various geochemical processes, such as solubility, mobility, concentration and accumulation of metals [20]. Much of the till health effects in under development countries is mainly due to lack of safe drinking water. Through the water supply schemes were implemented in some villages water quality and quantity problems are still there [3]. The various sources of water pollution include domestic, urban, industrial, agricultural, natural sources, coal mines, oil spills, thermal power plants etc.

Bioavailability of a trace metal for aquatic organisms and metal and toxicity are dependent on the physical and chemical forms of the metal [2, 17]. High concentration of Zn is found in acidified lake water, as the solubility of these metal increases at decreasing pH [9, 10].

Through some of the metals like Fe, Zn is essential as macronutrients for life processes in plants and microorganisms [7,14]. According to the toxicity for the human and animals the metals are divided into the groups, in which today beside heavy metals are included also other metals, which have toxic influence to the living organisms, from heavy metals in this list are included Cd, Cu, Ni, Hg, Pb, Zn, Cr and from other toxic metals Al . [25].

Heavy Element, presents in chemical compounds as positive ions, or in the form of cat-ions (+ ions) in solution. Metals with a density over 5 kg/dm^3 are known as heavy metals. Metals may be found in various chemical and physical forms. These form, or "species", can be particles or simple organic compounds, organic complexes or colloids. The dominating form is determined to a large extent by the chemical composition of the water, the matrix and particular the pH. The major features of iron bearing water which normally make it objectionable for beneficial use are the staining of plumbing fixtures, cloths, teeth, nails and interference in culinary uses [22].

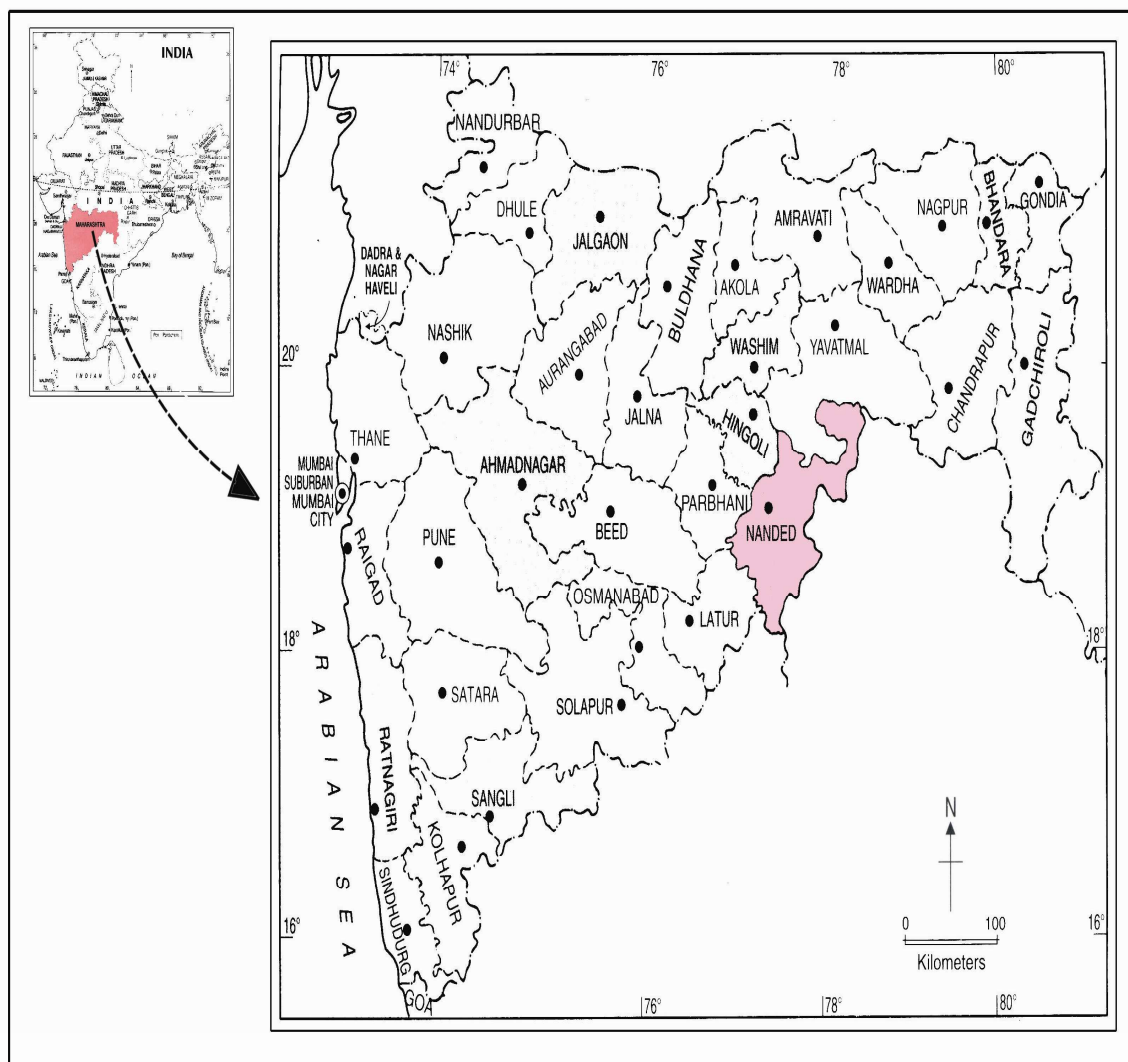
The toxicity of metals is dependent on their solubility and this in turn, depends heavily on pH and on the presence of different types of anions and other cations. Iron is an abundant element in the earths crust, but exists generally in minor concentration in natural water systems. Surface water in a normal pH range of 6 to 9 rarely carries more than 1 mg of dissolved iron per liter.

The formation of hydrated ferric oxide makes iron-laden waters objectionable. This ferric perception imarets an orange stain to any setting including, laundry articles, cooking and eating utensils and plumbing fixtures. Additionally, iron imparts a yellowish colour and bitter taste to water. This coloration along with associated taste and odors can make the water undesirable for domestic use. Even so, the levels of these metals are well below toxic levels for plant growth or animal health concern.

STUDY AREA

Bhoker 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 Bhoker towards eastern. The reservoir is situated $19^{\circ} 15'$ latitude $73^{\circ} 43'$ longitude. The catchments area of the reservoir is about 105.67 sq.kms.

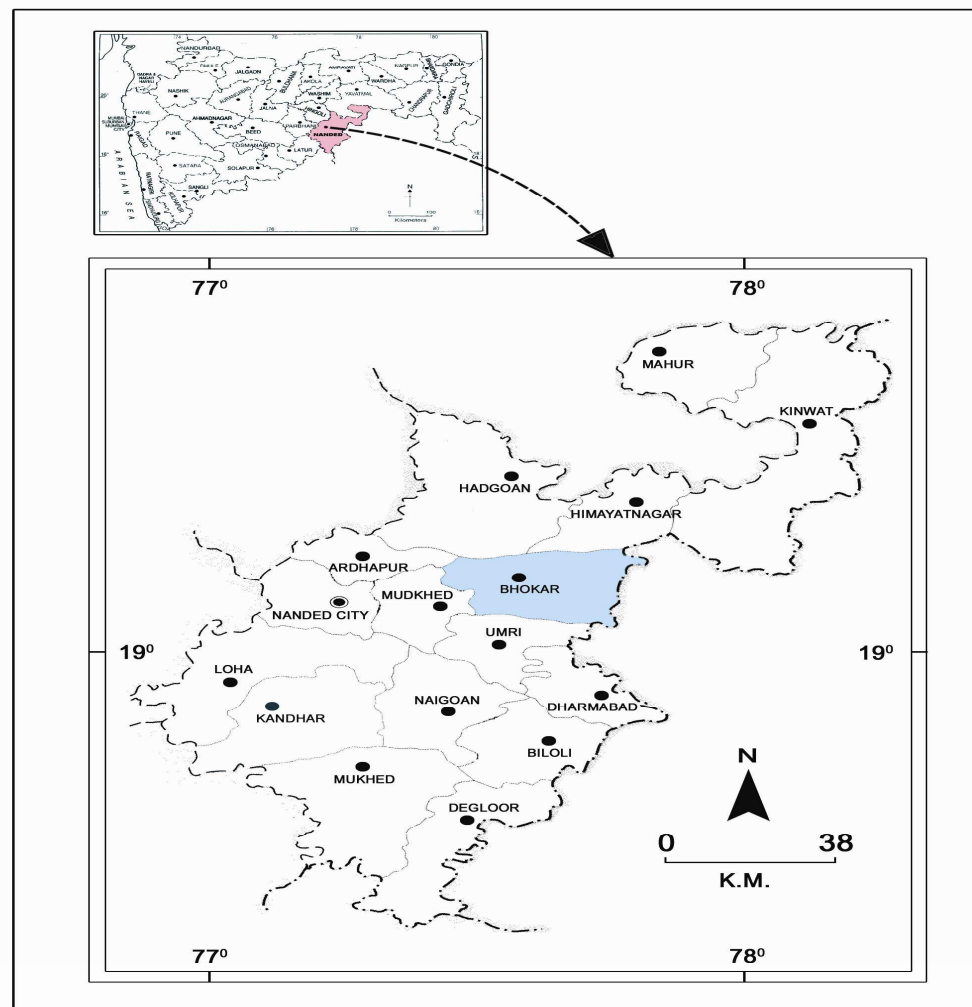
Sudha river is emerging from Sitakhandi near Bhoker of Nanded highways. The flow of water is from west to east in the direction. The area covered by this project is about 175.385 hectares. This project is highly benefited by several villages along with entire city of Bhoker. Several villages are benefited by this dam in lot of sectors.



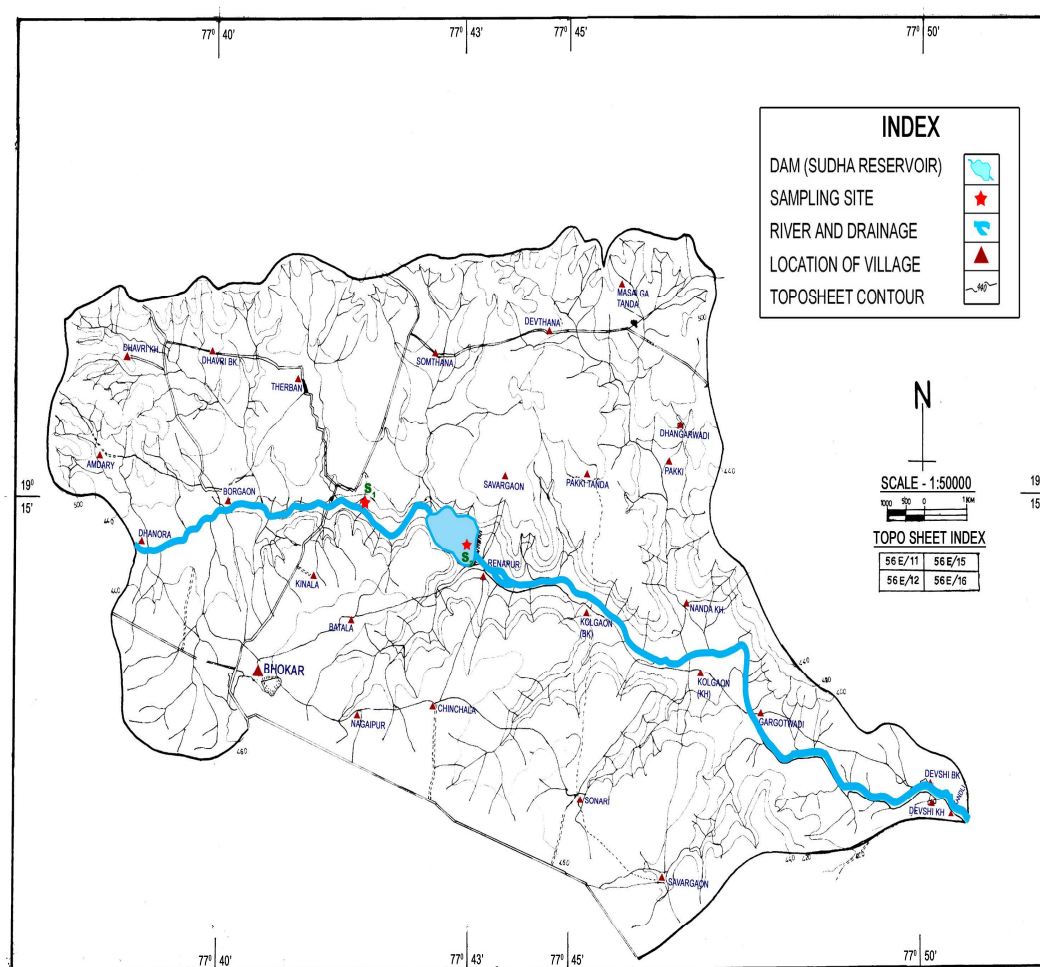
Map-1: Location of Maharashtra state in India and Show to Nanded city in Maharashtra state

Aims and objectives of the present study are to analyze, through investigation of water quality in all means. Earlier the water quality evaluation was not under taken for the research purpose especially for elemental analysis. The density of vegetation around the dam is thick and the soil is black, slightly rocky and occasionally red.

Water from the dam is mainly used for the purpose of agriculture, irrigation, drinking and domestic application. The water supplies to Bhoker and several villages, more than 75,000 peoples get benefited from this dam.



Map-2a: Location of Sampling Show in Nanded city



Map-2b: Location of Sampling Station Show in Bhoker

MATERIAL AND METHODS

Water sample

Two surface water samples were collected from Sudha reservoir station situated in Tal. Bhoker, Dist. Nanded from January to December 2009. Water sample were placed in polyethylene bottles, which were previously acid-washed and rinsed with portions of distilled water and water sample. The water samples were filtered immediately using filter paper and filtrates acidification to pH 2 in order to keep the metals in solution. All samples were in a dark and cool room tempter.

Experimental

The metal analysis was performed according to standard method [1], and using U.V. Double Beem Spectroscopy. All solution were prepare with deionized water. Stock solutions of all the metals, containing 1000 mg were used form the preparation of the standards for the calibration curve. The analysis has been used in the past to identify these metals.

The temperature was measured by using mercury thermometer on the spots. And also the pH was measured by pH meter was calibration for 4.0 and 9.2 buffer solution.

RESULT AND DISCUSSION

Occurrence of Zn and Fe metals in surface water has drawn world wide attention due to its considerable impact on human physiology. In this view, metals contamination study of zinc and Iron along with other physical parameter like pH as well as temperature has been carried out to determine the status of drinking water from Sudha dam, Bhoker Taluka of Nanded Dist. Maharashtra State.

In continuation of our work trace elements, here we are mainly focus on trace elements such as iron and zinc in surface water of sudha reservoir. The data of the trace elements are given in the tabulated form (Table-1). From our result and discussion we notice that in the month of January to December the concentration of zinc is highly increases in the range of 4.35-6.12 mg/L and iron concentration is also increases in the range of 0.50-1.82 mg/L of pH 7.1-7.6 and temp 22°-26°C Sudha dam in sampling station (S1 and S2). Particularly in the month of June we found the highest concentration of zinc 6.15-6.02 mg/L of pH 7.5 and temp 27°C and the lowest concentration month of January 4.35-4.1 of pH 7.1 and temp. 22°C in sampling station (S1 and S2).

On other hand in the month of February we found the highest concentration of trace elements of iron in the sudha dam 2.13-2.61 mg/L of pH 7.3 and temp 22°C. and the month of July lowest concentration is 0.50-0.81 mg/L of pH 7.5 and temp. 26°C of the sampling station (S1 and S2).

Table 1: Various concentrations of trace metals found in sample-1 and sample-2.

Months	pH		Temp.°C		Fe		Zn	
	S ₁	S ₂	S ₁	S ₂	S ₁	S ₂	S ₁	S ₂
January	7.1	7.1	22	22	1.45	1.61	4.35	4.1
February	7.3	7.3	23	23	2.31	2.61	4.48	4.23
March	7.4	7.3	25	25	1.31	1.11	5.18	4.58
April	7.5	7.4	27	27	1.57	1.43	5.71	4.87
May	7.3	7.4	26	25	0.99	0.76	5.47	5.83
June	7.5	7.5	27	27	0.93	0.93	6.02	6.15
July	7.5	7.5	26	26	0.50	0.81	5.52	5.52
August	7.4	7.4	25	25	1.19	1.23	5.27	5.41
September	7.5	7.5	24	24	1.82	1.76	5.18	5.10
October	7.6	7.5	23	23	1.57	1.67	5.62	5.33
November	7.5	7.4	22	22	1.63	1.50	5.40	5.31
December	7.2	7.3	22	22	1.71	1.34	6.0	5.91

All the values are in mg/L except.

The metal-toxicant passed to the water basin or the river is dispensed the components of the water ecosystem, but high concentration of the metal cause disbalance of the ecosystem [8]. Reservoirs are relatively still and closed ecosystem and comparison to flowing system [12]. Dam systems are strongly influenced by inputs of nutrients from the terristal watershed in which they lie. The nutrients in dam system originate from biological, geological and metrological pathways [14]. The lowest pH value was always observed in monsoon at all the four locations which may be due to the dilution effect of rain water [13]).

He believed that pH would prove to be an ecological factor of major importance in controlling the activities and distribution of aquatic flora and fauna [26]. The alteration in PH of water is accompanied by changes in other physicochemical aspects of the medium. The pH of environment had little or no importance [24]. The metals like zinc, iron are essential for the proper functioning of biological system, their deficiency or excessive consumption may results in heath hazards.

The level of metals at river Godavari. He reported the concentration of metals low at downstream and high at upstream the amount is more because of the waste discharge with some industrial effluents [4] .Similar trends of results were also observed [14].

He believed in more concentration of iron in the aquatic system an indication of oxygen depletion by low oxidation state [23]. The maximum iron concentration 2578 mg/L and 5.70mg/L in the Godavari bed and suspended sediments [6].

The amount of zinc showed highest in premonsoon and low in post-monsoon because of the seasonal changes will founded [18]. The highest concentration of most of the heavy metals (Fe, Zn) at Palta may be due to the discharge of heavy metal loaded industrial waste water [21].

The seasonal fluctuation of iron content at upstream, midstream and downstream of river Godavari from different sampling station may be due to the rate of flushing by rain water and springs, also increasing the concentration in times of drought and diluting monsoon [5].

CONCLUSION

The variations in the concentration of selected heavy metals from Sudha dam water were investigated. The major source of pollution is domestic and agricultural runoff.

The study was carried out at two sampling sites from this dam. The release heavy metals the dam is important mainly where the dam water is utilized as a source for drinking water. A comparison with earlier investigation and as a result of the increasing economic growth, population and the living standards suggest that the concentration of important water quality constituents are not raising.

The dam started changes in aquatic environment which may brings about a reduction in the diversity of aquatic life possibly it may destroy the balance of life in the reservoir.

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