

Appraisal of Available Groundwater in Rural Area of Sinnar Tehsil (Nashik District, Maharashtra, India) for Drinking Purpose

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ABSTRACT

In the present investigation, the suitability of available groundwater for drinking application is assessed using parameters like pH, total dissolved solids (TDS), Fluoride, Iron and Nitrate. Fifteen samples collected from different villages in Sinnar tehsil area are analysed using standard water analysis protocol. Iron concentration oscillated from 0.09 to 1.35 mg/L and Nitrate concentration ranged from 01 to 124 mg/L, and the average is 51.86 mg/L in the study area. The Fluoride concentration in the study area is averaged to 0.18 mg/L. Only five of fifteen samples are found potable.

Keywords : Groundwater Quality, Iron, Nitrate

I. INTRODUCTION

Due to the growing of modernization, mechanization and agricultural activities the groundwater sources are becomes highly polluted. Drinking water is very essential for all kind of livestock but very few of groundwater sources are found to be potable. The quality of drinking water is disturb day by day in rural as well as in urban areas. In the present investigation, the suitability of available groundwater for drinking application was assessed using parameters like pH, total dissolved solids (TDS), Fluoride, Iron and Nitrate. Fifteen samples collected from different villages in Sinnar tehsil area are analysed using standard water analysis protocol.

II. METHODS AND MATERIAL

1. Sampling

Total fifteen samples (S_1 to S_{15}) are collected for analysis in cleaned polythene bottles. Out of fifteen

samples, 01 is from Dug well, 10 are from Hand pumps, and 04 are from power pumps.

2. Experimental Methods

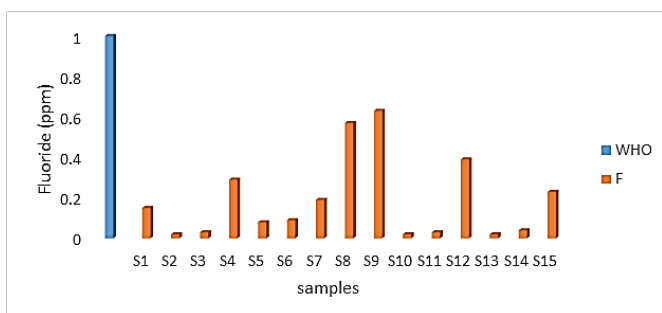
The standard methods of APHA are used for the complete analysis. Fluoride is analyzed by SPANDS method at 570 nm. Iron is estimated by UV Visible spectrophotometer at 480 nm (Chemito UV 2100). The nitrate concentration is measured by phenol disulphonic acid method at 410 nm using UV Visible spectrophotometer (Chemito UV 2100).

III. RESULTS AND DISCUSSION

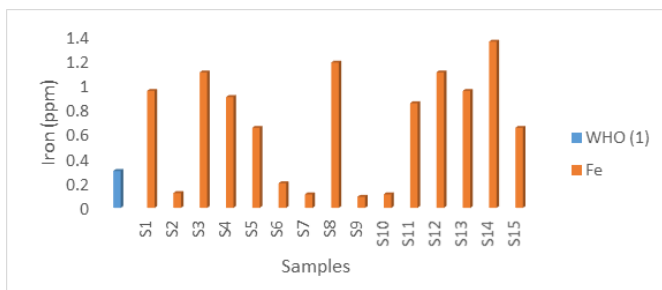
The investigated results are depicted in Table 1 along with permissible range as declared by WHO and BIS. The variation of parameters like Fluoride, Iron and Nitrate is shown graphically through Graph 1, Graph 2 and Graph 3 respectively.

Parameters of drinking water	WHO (1993)	BIS		Analyzed samples range
		Acceptable limit	Maximum Permissible Limit	
pH	Not mentioned	6.5-8.5	No relaxation	7.28-7.93
TDS (ppm)	No guidelines	500	2000	132-804
Fluoride(ppm)	1.5	1.0	1.5	0.02-0.63
Iron (ppm)	0.3	0.3	1.0	0.09-1.35
Nitrate(ppm)	45	45	45	1-124

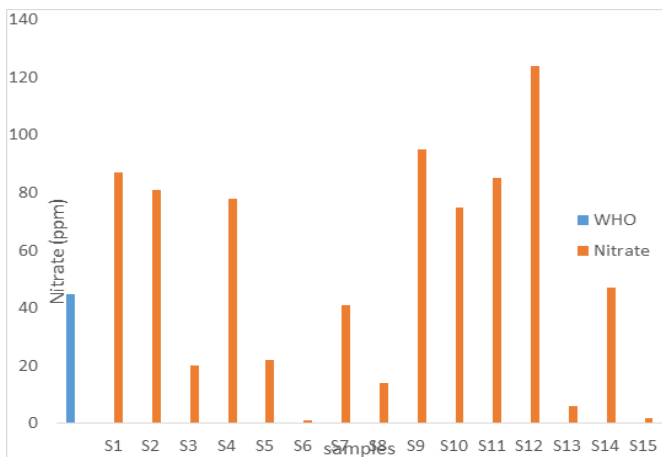
Graphical Representation



Graph 1. Variation of Fluoride in water samples



Graph 2. Variation of Iron in water samples



Graph 3. Variation of Nitrate in water samples

pH is an ecological factor of major importance in controlling the activities and distribution of aquatic Flora and Fauna^{1, 2} and it is clear that all fifteen samples are within the pH range given in WHO recommendations for drinking water.

Generally the TDS contains the inorganic salts, with the small amount of organic matter. TDS in drinking water originates from natural sources, sewage, urban runoff and industrial wastewater³. The analyzed samples exhibited the TDS values from 132-804 ppm. Out of fifteen, 09 are within the permissible limit given by WHO.

Fluoride ions have dual significance in water supplies. High concentration of Fluoride ion causes dental fluorosis at the same time a less concentration results in dental caries^{4,5}. The concentration of fluoride in analyzed samples are ranging from 0.02-0.63 ppm. All have fluoride content within the permissible limit declared by WHO.

The easily water soluble Iron (III) plays a very important role for human and organism in transportation of oxygen through the bloodstream. Less amount of Iron is essential for human nutrition and high concentration causes the hemochromatosis in tissues⁴. The Iron concentration oscillated from

0.09 to 1.35 mg/L in the studied area. Five samples lie within the permissible limit of Iron in drinking water.

The Nitrate ion is involved in Nitrogen Cycle. The sources of Nitrate in surface and groundwater is originated from agricultural activity, wastewater disposal and oxidation of nitrogenous waste products in human and animal excreta³. Nitrate concentration ranged from 1 to 124 mg/L. Seven samples qualify for the permissible limit given by WHO.

IV. CONCLUSION

Parameter	S ₂	S ₅	S ₆	S ₇	S ₈	S ₁₃	S ₁₅
pH	√	√	√	√	√	√	√
TDS (ppm)	×	√	√	√	√	×	√
Fluoride(ppm)	√	√	√	√	×	√	√
Iron (ppm)	√	×	√	√	×	×	×
Nitrate(ppm)	×	√	√	√	√	√	√

From the above findings, it is concluded that only two water sources (S₆ & S₇) qualify to be potable water sources. For rest of the above sources, one has to make compromise for one or two parameters.

V. Acknowledgment

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