



WATER QUALITY ASSESSMENT IN RAHURI TEHSIL, OF AHMEDNAGAR, MAHARASHTRA

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Abstract

Water quality assessment of Rahuri tehsil in Ahmednagar district of has done in Maharashtra State, India. This paper aims to study the physical and chemical properties of water of Rahuri and its surrounding area. The physical parameters included: Temperature, Total dissolved solids and electrical conductivity. The chemical parameters included: pH, total hardness, calcium hardness, magnesium hardness, Phenolphthalein alkalinity, total alkalinity. Ionic parameters like chloride, phosphate, sulphate, calcium, magnesium, sodium, potassium, iron, chromium and manganese. Also, the biological parameters studied standard plate count and most probable number.

Keywords: Physico-Chemical Parameters, Permissible Limit, Chemical standards of drinking water, Rahuri.

Introduction

Water is the world's most precious resource because the life of animals and plants depends on it. Most industries also require water for various applications, so the global economy depends on it as well. Springs are the places where ground water is discharged at specific locations on the earth and they vary dramatically as to the type of water they discharge. Many of the springs are the result of long cracks or joints in sedimentary rock. (Young, 2007) Hot springs are defined as springs where the temperature of water lies significantly above the mean of annual air temperature of that region. (Thompson, 2003 and Young, 2007) Hot ground water can be used to drive turbines and generate electricity, or it can be used directly to heat homes and other buildings. Energy extracted from the Earth's heat is called geothermal energy. (Thompson and Turk, 2005) Water is one of the abundantly available substances in nature. It is essential constituent of all animal and plants material and forms about 75% of matter of earth crust. It has been argued previously that geochemical energy-yields may be a key determinant of microbial community structure and diversity in thermal environments (Amend and Shock, 2001) Rainfall, an important and largest source of water, other sources are surface water and sub-surface water or ground water. (Sharma B.K., 2001) Water is mostly important for industrial and municipal purposes. In addition to the direct consumption of water at homes and farms, there are many indirect ways in which water affects our daily life.

The physical, chemical and biological composition of water is influenced to a great extent by different factors including climate, geomorphology and geology. Also the physical

variables which include temperature and turbidity; chemical variables in that non-toxic variables such as pH, total dissolved salts, salinity, conductivity, ions, nutrients, organic matter and dissolved gases and toxic variables like biocides and trace metals. The objectives of the present work are to analysis and discuss the suitability of water for drinking and sanitation.

Material and Methods

Study Area

The Rahuri Tehsil in Ahmednagar district of Maharashtra has been selected for the present investigation work. The tehsil comprises of 95 villages and two urban centers spread over an area of 1, 00,898 hectares. The geographical extension of the study area is form 19°15' N to 19°34' North latitude and 74°23' E to 74°50' East Longitude. The Rahuri tehsil lies in the rain shadow zone of the Western Ghats in Mula and Pravara basin.

Sampling Methods

The water quality parameters estimated by the standard methods given by APHA (1998). For the present investigation groundwater samples were collected every month during the study year from June 2013 to May 2014 from 32 different sampling stations of Rahuri tehsil. The water samples collected from the Rahuri tehsil and taken in pre-cleaned polyethylene bottle. Water temperature recorded immediately on the site by mercury thermometer. TDS of water samples measured using gravimetric method. Dissolved oxygen was estimated by the method of Winkler method. EC values of the water sample under investigation were measured using Digital Conductivity meter. The pH value of water sample measured by using Digital pH meter.

The total hardness of the water sample was determined by complex metric titration with EDTA using Erichrome black T as an indicator. The calcium hardness and calcium of the water sample were determined by complex metric

titration with EDTA using Murexide as an indicator. Phenolphthalein and Total alkalinities of the water samples were determined by titrating with H₂SO₄ using phenolphthalein and methyl orange as indicators.

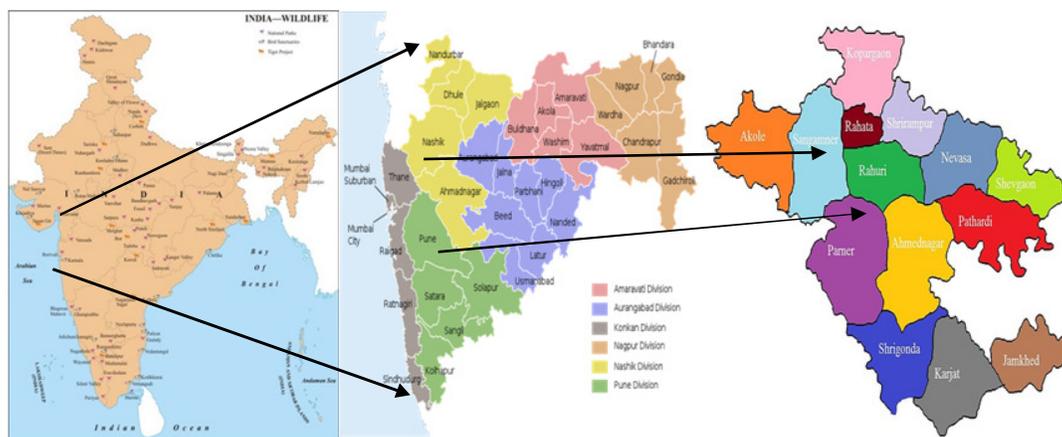


Figure: 1.1 showing map of the study area

Result and Discussion

A total of 32 samples were collected from 32 villages of Rahuri tehsil of Ahmednagar. Among these villages, 4% drinking water samples from two locations contain 1 mg/l of fluoride, 96% of the samples contain fluoride 0.5 mg/l. The results indicate that the fluoride content in all the sampling stations was found within the permissible levels as per WHO standards.

Hydrogen Ion Concentration (pH)

The average of pH noted from 32 villages of Rahuri tehsil. Water sample is 8.77 as maximum and minimum 5.1 was observed.

Electrical conductivity (EC)

The average of Electrical conductivity recorded from 32 villages of Rahuri tehsil. Of it water sample is 4.53 uS/cm as maximum and 0.16 uS/cm as minimum recorded.

Total Dissolved Solids (TDS)

The average total dissolved solids observed from 32 villages of Rahuri tehsil. From water sample are 690 mg/L as maximum in pre-monsoon and 110 mg/L as minimum in post monsoon. Total dissolved solids are above the permissible limiting 500 mg/L recommended by WHO.

Asrari et al. (2008) measured the TDS minimum 50mg/L and maximum 3575 mg/L from Kor River, Iran. The amount of TDS related with increasing dissolved ions.

Temperature

The water temperature noted from 32 villages of Rahuri tehsil, it 28.5°C in pre-monsoon as maximum and 27°C in post-monsoon season.

Jayabhaye et al. (2008), reported water temperature ranged from 22.5-32.5°C from Kayadhu river, near Hingoli during January-December 2004.

Dissolved Oxygen

The average dissolved oxygen obtained from 32 villages of Rahuri tehsil of water sample is 0.9 mg/L maximum and 0.2 mg/L minimum with the mean value of 0.49 mg/L.

Yannawar VB and Bhosle AB (2013), achieved value of dissolved oxygen varied from 2.0, 1.12, 1.8 and 1.64 in S1, S2, S3 and S4 respectively from the selected sites. The lower dissolved oxygen due to organic contamination near sources to water.

Hardness

The average hardness obtained from 32 villages of Rahuri tehsil of water sample is 310 mg/L maximum and 80 mg/L minimum with the mean value of 80 mg/L.

Singh et al. (2005), found hardness level as 243 mg/L, 180 mg/L and 149 mg/L during June 1999 from the wells, springs and the rivers respectively in Udhampur, Jammu and Kashmir. Also they found hardness 194 mg/L, 179 mg/L and 146 mg/L in October 1999 from same water sampling sites.

Calcium

The value of calcium observed from 32 villages of Rahuri tehsil of water samples are 198 mg/L maximum and 5.6 mg/L minimum in pre and post-monsoon respectively. The mean calcium hardness was 33.1 mg/L.

Vijayakumara et al. (2005), observed calcium ranged from 8.60 – 94.10 mg/L 75.25 – 124

mg/L in surface and sub-surface water of Bhadra River respectively.

Phenolphthalein Alkalinity (PA)

The phenolphthalein alkalinity of 32 villages of Rahuri tehsil of water sample is below detectable limit in pre-monsoon and 1885 mg/L maximum and minimum 267 mg/L. Average value of phenolphthalein alkalinity 596.9 mg/L.

Approximately of the aquatic characteristics stay lower the accepted edge in the post-monsoon period and some are upstairs the acceptable limits in pre-monsoon season. This might be due to dilution of water by raining. Simmular remarks are observed by Yannawar et al. (2013).

Conclusion

On the basis of above discussion, it is concluded that the water quality assessment of Rahuri Tehsil in Ahmednagar district in Maharashtra. It reveals that although the situation is not worst but it has to be maintained. Some of the water characteristics are below the permissible limit in the post-monsoon season and some are above the permissible limits in pre-monsoon season. This may be due to dilution of water by raining. Complete study showed that the water is more polluted in pre-monsoon as compared to post-monsoon.

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