Groundwater analysis around Asnoli village,Ambarnath,Maharashtra

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Abstract—**Groundwater is a major source of water all over the world. The physical and chemical properties of groundwater make it a reliable source throughout the world. Groundwater problems took longer time to come forward, but during the past two decades, it has attracted attention from a wide range of disciplines. Issues like groundwater pollution due to man-made activities, depletion of groundwater table etc. focus the attention of researchers on groundwater. Asnoli village located in Ambarnath area of Thane district. After survey of the Asnoli village, four sampling sites were selected. The groundwater quality of Asnoli village was studied from November 2012 to February 2013.Groundwater samples were collected from selected sampling sites during the study period and analysed for different physicochemical parameters like Temperature, pH, Electrical Conductivity, Total Hardness, Turbidity, and Chloride. Obtained results were compared with WHO and BIS standards. All parameters were found within the permissible limits given by BIS and WHO except for turbidity. Turbidity in groundwater samples indicates pollution of groundwater by manmade activities.**

Index Terms—**pollution, groundwater, depletion, physicochemical parameters**

I. INTRODUCTION

Water is a very important resource, which is used for number of uses, like domestic use, agricultural use, industrial use etc. It is very important for sustenance of life. Water is present only on earth. This source, therefore, needs to be protected. Population on earth has been increasing in alarming rate, which demands safe drinking water.

Groundwater resources support many town, rural and distant communities around Australia. It is used as a drinking water source; for irrigation in agriculture, industrial development and indirectly, through ecosystem and stream flow maintenance. About 32% of groundwater is extracted for urban industrial use, 51% for irrigation and 17% for stock watering and rural use but this varies by state [1]

Pollution of groundwater is the natural, physical and chemical change due to human activity, so that water is no longer fit for use; for which it had previously been suited. Groundwater pollution problem now a day has become a severe threat to public health [2]

Asnoli Group Grampanchayat is a group of rural settlements under Ambarnath block of Thane district in the state of Maharashtra. This village is 15 km. away from Badlapur railway station of central railway. This Group Grampanchayat is consists of a group of five settlements namely: Asnoli, Pimploli, Yeve, Pimploli vadi and Barvi dam colony, having population about 3000 according to census of 2011, as reported by Gramsevak and Sarpanch of the village. [3] Groundwater is an important source of water supply in rural area like Asnoli as it is used for different purposes. Therefore, an attempt has been made to find out the ground water quality of Asnoli Group Grampanchayat.

II. METHODOLOGY

Four groundwater samples were collected from selected areas of Asnoli village from November 2012 to February 2013

Table 1-Sampling Sites

Sr.No.	Sampling Site	Station No.
1	Pimploli Wadi Open well	S1
2	Yewa Open well	S2
3	Pimploli village Open Well	S3
4	Pimploli Bore Well	S4

Samples were collected in 2 lit. Capacity of clean polythene bottles. The bottles were rinsed with the groundwater to be taken for analysis. Tightly sealed

after collection and labelled in the field area. Collected samples were analysed for following parameters Temperature, pH, Electrical Conductivity, Total Hardness, Turbidity and Chloride. The temperatures, pH of the water samples were determined on the spot using a Thermometer and Portable pH meter respectively. Conductivity measured by Conductivity meter. Total hardness was measured by EDTA titrimetric method using EBT indicator. Turbidity measured by Turbidometer. Chloride contents by Argentometric method using potassium chromate as an indicator. [4, 5] The quality of groundwater has been assessed by comparing each parameter with the standard desirable limits prescribed by BIS and WHO.

III. RESULTS & DISCUSSION

After analysis obtained results are shown in table no.2 and further it was compared with the BIS and WHO standards from table no.3.

Table No.2 – Mean value of parameter for winter season (November 2012 to February 2013)

Station no.	Temperature (^{0}C)	pH	Electrical Conductivity (μS/cm)	Total Hardness (mg/l)	Turbidity (NTU)	Chloride (mg/l)
S1	21	6.5	192.4	246	8.6	675.6
S2	23	6.6	189.7	186	8.2	692.5
S3	22	6.8	212.4	198	10.4	721.2
S4	22	6.5	112.6	214	8	494.2

Table No.3: Drinking water standards

Sr. No.	Parameters	BIS (IS 10500-91)		WHO
		Desirable Limit	Max. permissible Limits in the absence of alternate source	
1	Temperature (^{0}C)	-	-	-
2	pH	6.5 to8.5	No relaxation	6.5 – 8.5
3	Electrical Conductivity (μS/cm)	-	300	-
4	Total hardness as $CaCO_3$(mg/l)	200	600	500
5	Turbidity (NTU)	-	5	5
6	Chloride in (mg/l)	250	1000	250

Temperature-Temperature ranges from 21^{0}C to 23^{0}C during study period. Highest temperature was observed at station no. S2. Temperature of water changes seasonally with air temperature [6].

pH- pH ranges from 6.5 to 6.8 during study period. All the samples were found within the desirable limit given by BIS and WHO. At station no. S3 highest pH were observed. All the samples were found within the desirable limit given by BIS and WHO. pH of water is influenced by geology of catchments area and buffering capacity of water. [7]

Conductance-Conductance was ranged from 112.6 to 212.4 μS/cm during study period. Highest conductance was observed at station no. S1 and lowest conductance was observed at station no. S2. All samples were found within the permissible limits given by BIS.

The Electrical conductance of distilled water was found between 1 to 5 μ mho but presence of salts and contamination with waste water increases the conductivity of the water. A sudden increase in conductivity in the water is an indication of addition of some pollutants to it.[5]

Total Hardness- Total hardness ranges from 186 to 246 mg/l during study period. At station no. S1, highest hardness observed in study period. S1 found above the desirable limit given by BIS, i.e.200mg/l, but all the samples were found within the permissible limit given by BIS and WHO i.e.600 and 500 respectively. Hardness is a measure of the abundance of cations,

mainly Calcium and Magnesium which react with soap to form insoluble compounds or precipitate from heated water to form encrustations [8] Hardness is the result of geological formations of the water sources [9] Turbidity- Turbidity in study area ranges from 8 to 10.4 NTU during study period. All samples were found above the permissible limit given by BIS and WHO i.e.5 NTU. Highest turbidity was observed at station no. S3. Open well water shows more turbidity compared to bore well water. Turbidity in water may be due to suspended particles, as well as rainy season also contributes high amount of soil and silt material in water, which imparts Turbidity to water, means water samples are susceptible to the changes in seasons (monsoon, winter and summer) as well as sites from where the water samples were collected. Turbidity in water may be due to large variety of suspended materials, which range in size from colloidal to coarse dispersions, depending upon the degree of turbulence [10]

Chloride- Chloride in study area ranges from 494.2 to721.2 mg/l., highest chloride was observed at station no. S3 during study period. All the samples were found above the desirable limit given by BIS and WHO i.e. 200 mg/l, but all samples were found within the permissible limit given by BIS i.e.1000 mg/l. Chloride present in all types of natural water. The high concentration of Chloride in water is considered as a sign of contamination due to high organic waste of animal origin [11,12]

IV. CONCLUSION

All ground water samples collected from Asnoli village were found within the permissible limit given by BIS and WHO for different parameters, except the turbidity. Slight site wise variations observed during study period.

Turbidity was detected above the permissible limit given by BIS and WHO. The probable reasons behind the turbidity of water are: lack of maintenance around open wells; negligence of existing groundwater resources, discharge of solid waste material in open wells due to manmade activities like throwing of solid waste material around and inside open wells; and mixing of soil and silt particles in open well during rainy season. Turbidity is an indication of contamination of groundwater to a certain extent. Other parameters were found within the permissible

limit. These groundwater sources are possible to use for different purposes, not suitable for drinking purpose, for other uses filtration is necessary, as well as use of alum for removing turbidity prior to use of water is preferable.

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