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Study of Groundwater Quality of Asnoli Village of Ambarnath, Maharashtra, India

Dr. Gangotri Nirbhavane*
Assistant Professor, Environmental Studies Dept. Dr. Ambedkar College of Commerce and Economics, Wadala, Mumbai, India

Original Research Article

***Corresponding author**
Dr. Gangotri Nirbhavane

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Abstract: Asnoli village of Ambarnath area was selected for study purpose. Ground water quality of Asnoli village was studied in winter season during November 2011 to February 2012.Groundwater samples were collected from 4 sampling sites during study period and analyzed for different physicochemical parameters like Temperature, pH, Electrical Conductivity, Total Hardness, Turbidity and Chloride. Obtained results were compared with WHO and BIS standards. Except turbidity all parameters were found within the permissible limits given by BIS and WHO. Turbidity in groundwater sample indicates contamination of water by outside sources.
Keyword: Contamination, Groundwater, Physicochemical, Permissible limits.

INTRODUCTION

Groundwater is a major source of water all over the world. Its physical and chemical properties make it a reliable source throughout the world. Groundwater plays a variety of roles in day today's life, which makes it important resource for human being.

India is the largest user of ground water source. Presently about 65 percent of the irrigation and about 90 percent of the domestic and industrial water requirements are met through private ground water resources. It has been estimated that India, Nepal, Bangladesh, Pakistan and China use over 300 billion m^3 of ground water annually, which is mostly in agriculture. Use of ground water is becoming unsustainable day by day. The fall in ground water level and deterioration in quality give rise to drinking water shortages [1].

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[2,3].

Groundwater is an important source of water supply in rural area; as it is used for different purposes in day-to-day's life [2].Therefore an attempt has been made to find out the ground water quality of Asnoli village.

METHODOLOGY

4 groundwater samples were collected from selected areas of Asnoli Group Grampanchayat in the month of November 2011 to February 2012.

Table-1: Sampling Sites

Sampling Site	Station No.
Pimploli Wadi Open well	S1
Yewa Open well	S2
Pimploli village Open Well	S3
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 labeled in the field area. Collected samples were analyzed 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.

RESULTS AND 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-2: Mean value of parameter for winter season (November 2011 to February 2012)

Station No.	Temp. (^{0}C)	pH	E.C. (µS/cm)	Total Hardness (mg/l)	Turbidity (NTU)	Chloride (mg/l)
S1	22	6.7	190.6	228	8.2	698.4
S2	23	6.8	184.5	192	8.4	645.7
S3	23	6.8	202.8	198	10.2	700.4
S4	22	6.5	106.2	146	6	352.2

Table-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 22 ^{0}C to 23^{0}C during study period. Temperature of water changes seasonally with air temperature[6]. Highest temperature was observed at station no.S2 and S3.lowest temperature found at S1 and S4.

pH

pH ranges from 6.5 to 6.8 during study period . In general, lower the value of pH, higher is the level of corrosion. Increase in the amount of organic carbon, total carbonate by the use of sewage leads to decrease in pH level. It is positively correlated with electrical conductance and total Alkalinity[7]. All the samples were found within the desirable limit given by BIS and WHO. At station no.S2 and S3 highest pH were observed. All the samples were found within the desirable limit given by BIS and WHO.

Conductance

Conductance was ranged from 106.2 to 202.8 µS/cm. Highest conductance was observed at station no. S3 and lowest conductance was observed at station no. S4. Groundwater tends to have high Electrical Conductivity due to the presence of high amount of dissolved salts [8]. All samples were found within the permissible limits given by BIS.

Total Hardness

Total hardness ranges from 146 to 228 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 the result of geological formations of the water sources [9].

Turbidity

Turbidity in study area ranges from 6 to 10.2 NTU. All samples were found above the permissible limit given by BIS and WHO i.e.5 NTU. Open wells are, open in atmosphere, so having more chances of contamination. Bore well shows less turbidity compared to open well, as it gets less affected by outside disturbances. Highest turbidity was observed at station no.S3.Open well water shows more turbidity compared to bore well water. The Turbidity has a negative impact on user's acceptability of water as cloudiness is visible in water. It is not a risk to health but it is a sign of the possible occurrence of contaminants. When such water is not treated appropriately before use, it has concern for health [10].

Chloride

Chloride in study area ranges from 352.2 to 700.4 mg/l., highest chloride was observed at station no.S3. 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]. 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.

CONCLUSION

All ground water samples collected from Asnoli village were found within the permissible limit given by BIS and WHO for different parameter, except the turbidity. Turbidity was found above permissible limit given by BIS and WHO. The probable reason behind turbidity of water is lack of maintenance around open well, which causes mixing of soil and silt particles in open well areas. Turbidity is an indication of contamination of groundwater up to certain extent. Other parameters were found within permissible limit, therefore groundwater sources possible to use for different purposes but filtration of water and use of alum for removing turbidity is necessary.

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