



Water quality assessment in rural areas of Bara Tehsil, Allahabad, U.P

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General Note

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ABSTRACT

A study was conducted to evaluate the physico-chemical characters of groundwater quality of selected village of Bara Tehsil, Allahabad, Groundwater samples of different sampling site were analyzed for pH, Temperature, chloride (Cl⁻), Hardness (TH), Turbidity, Sulphate, Total Dissolved Solids (TDS) and Total Alkalinity. All the physico-chemical parameters of ground water quality temp (26-27.33), pH (7.14-7.87), Total Alkalinity (263.67-418.67 mg/l), chloride (45.49-181.78 mg/l), Turbidity (1.00-1.40 NTU), Sulphate (2.53-18.15 mg/l) was found within permissible limit set by BIS (IS: 10500:1991), except total hardness (208-570.42 mg/l) and Total dissolved solids (661.67-1194.00 mg/l).

Key words: Groundwater, water quality, pollution activity

1. INTRODUCTION

Water is one of the plentifully available substances in nature. It forms about 75% of the earth's crust. It is an essential ingredient of animal and plant life. About 22 million-ha-m of ground water are requires for industrial processes. Pollution of land, water and air through water generated as a result of increasing population and urbanization is big a challenge for serious dimensions (Anazawa et al, 2004). Water is a major natural resource, a basic human need and precious natural asset, which should be conserved for future uses in a balanced manner. About 85 % of rural population in India is solely depended on ground water, which is depleting at a faster rate (Gajendran et al, 2014).

Presently the quality and quantity of water is the important alarming environmental problems on at global and national levels. The pressure on water resources are from numerous sources and the impacts can take diverse forms, increase in with rapid urbanization, industrialization and agricultural development has resulted in high impact on quality and quantity of water in our country. Massive uses and inappropriate management of ground water are causing serious threat to the availability and quality of water (Nath et al., 2015). The pollution of water has become a question of considerable public and scientific concern in view of the facts proving their acute toxicity to human health and biological systems.

2. MATERIAL AND METHODS

Present study was focused on analysis of ground water samples which are collected from four different sampling location namely Site 1 (Samera), site 2 (Gauhania), site 3 (Amreha) and site 4 (Jasara) in Bara Tehsil. The experimental values was compared with drinking water quality standard laid by BIS (IS: 10500:1991)

2.1. Study area

The Groundwater (Hand pump) samples were collected from selected villages of Bara tehsil for assessing the water quality for drinking purposes of drinking water sources. The sampling sites are rural places and the samples are the major sources of drinking water from the hand pumps.

2.2. Preparation of water samples

The samples were collected in clean polythene bottles without any air bubbles. Prior to collection, the sample bottles are rinsed thoroughly with the sample water and tightly sealed after collection and labeled in the field. The hand pumps were continuously pumped prior to the sampling, to ensure that ground water to be sampled was representative of ground water and to avoid contamination from the surface.

2.3. Analysis of water samples

Analysis was carried out for various water quality parameters such as pH (Potentiometer/Electrode), Temperature (Thermometer/electrode), Total Dissolved Solids (TDS meter), Chloride (Argentometry), Hardness (EDTA tritrimetric), Alkanity (Tritrimetry), Turbidity (Nephlo-Turbidity), and Sulphate (Turbidimetric) as per Standard Methods of Water Examination, APHA (1989). Sampling was performed every ten days intervals during the period of January and February, 2014.

3. RESULTS AND DISCUSSIONS

The water quality analysis of different ground water samples has been carried out for Temperature, pH, EC, Total Hardness, Total alkalinity, Chloride, Turbidity. The results of the physicochemical analysis were presented in Table 1.

Table 1 Physicochemical characters of groundwater of different areas in Bara Tehsil

S.No	Parameters	Site 1 (Semera)	Site 2 (Gauhania)	Site 3 (Amreha)	Site 4 (Jasara)	Desirable Limit, BIS (IS: 10500:1991)	Permissible Limit, BIS (IS: 10500:1991)
1	Temperature °C	27.00	27.33	27.00	26.00	-	-
2	pH	7.14	7.38	7.70	7.87	6.5-8.5	No relaxation

3	TDS, mg/l	1194.00	661.67	800.00	768.67	500	2000
4	Total Alkalinity, mg/l	418.67	313.00	417.33	263.67	200	600
5	Total Hardness, mg/l	560.67	261.33	208.00	570.42	300	600
6	Chloride, mg/l	181.78	45.67	45.49	61.77	250	1000
7	Turbidity, NTU	1.00	1.00	1.40	1.25	5	10
8	Sulphate, mg/l	18.15	2.53	2.77	4.09	200	400

3.1. Temperature

The average temperature was recorded between 26 °C to 27.3 °C during the study. The variation in the water temperature may be due to different timings of collection and influence of season.

3.2. pH

The mean values of pH fluctuated between 7.14 to 7.87. The prescribed limit of pH for drinking water specified by Bureau of Indian standards (BIS) is 6.5-8.5. The water sample of all sites falls under the permissible limit.

3.3. Total Dissolved Solids

Observed mean values of Total dissolved solids exceed the desirable limit set by BIS at all the sites. The maximum value (1194 mg/l) was observed in site 1. High TDS in ground water may be due to ground water pollution when waste waters from residential are discharged into pits, ponds and enabling the waste migrate down to the water table.

3.4. Total Alkalinity

The mean value of alkalinity ranges between 263.67 mg/l - 418.67 mg/l. The Standard desirable limit of alkalinity in potable water is 200 mg/ l and permissible excessive limit is 600 mg/L. The groundwater sample exceed the desirable limit of alkalinity in all the sampling sites.

3.5. Chloride

Chloride content of the groundwater samples ranged from 45.49 to 181.78 mg/L. The lowest concentration (45.49 mg/l) was recorded in site 3 (Amreha). The desirable limit of chloride in drinking water is 250 mg/L.

3.6. Total Hardness

Total hardness average values were observed between 208 - 570.42 mg/l. Site 1 and 4 exceed the desirable limit of BIS, the permissible limit of total hardness in water samples is 600 mg/L. Water hardness is caused primarily by the presence of cations such as calcium and magnesium and anions such as carbonate, bicarbonate, chloride and sulfate in water.

3.7. Turbidity

Turbidity of ground water samples was varied between 1.0 -1.4 NTU at all the sampling sites. The value of turbidity falls under the BIS permissible and excessive limit.

3.8. Sulphate

Experimental value of sulphate varies from 2.53 to 18.15 mg/l and they are within the permissible limits. The presence of concentration of sulfates can be attributed by the discharge of domestic sewage and littering of organic wastes in study areas.

4. CONCLUSION

On the basis of physicochemical analysis of the studied water sources in four villages of Bara Tehsil, U.P, it has been concluded that the groundwater water quality varied spatially. Temperature, pH, Chloride, values are well within the permissible limits but total alkalinity and dissolved solids above the prescribed limit of BIS in all the sites. This study reveals that groundwater is the only source of drinking in the study area, and the results of the chemical analysis indicate considerable variation in ground water quality and required special attention towards quality management.

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