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Ground water quality in some rural areas of Khathumar Tehsil at Alwar District Rajasthan, India

Ajit Kumar Sharma[1], Ravi Sharma[2] and Nidhi Sharma[3]
[1] Department of Botany, S. S. Jain Subodh Girls Collage, Sanganer Jaipur (Raj.)
[2] Principal, ESS. Collage of Education Dayalbagh Agra (U.P.)
[3] Department of Chemistry K. R. (P. G.) Collage, Mathura (U.P.)
E-mail Id: ajit2612@gmail.com

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Abstract

Water is a resource, basic amenity and universal solvent shared by population. The physico-chemical study of water quality of 5 hand pumps of 5 villages of some rural areas in Khathumer Tehsil of Alwar district, Rajasthan was conducted. The water samples were analyzed with respect to their portability. The study revealed that most ground water samples meet criteria for drinking water with the exception of few samples having higher values for fluoride, calcium, total hardness and total alkalinity. The quality of ground water assessed in the study area is discussed in detail.

Key Words: Ground water, Fluoride, Calcium, Total alkalinity, Total Hardness.

Introduction

Water being a universal solvent has been and is being utilized by mankind time and now. Of the total amount of global water only 2.4% is distributed on the main-land of which only a small portion can be utilized as fresh water. The available fresh water to man is hardly 0.3-0.5% of the total water available on the earth and therefore its judicious use is imperative (Ganesh *et al.* 1995). The fresh water is a finite and limited resource (Bouwer 2000). The quality of ground water is deteriorating at a faster pace due to pollution ranging from septic tanks (Olaniya & Saxena 1977, Gillision & Patmount 1983), land fill leachates domestic sewage (Eison & Anderson 1980, Sharma & Kaur 1995, Rao & Rao 1995), agriculture runoff / agricultural fields (Banerji 1983, Hand 1986, Somashekar *et al.* 2000, Chandra *et al.* 1991, Dutta & Gupta. 1996) and industrial waste (Todd 1995, Rangraj *et al.* 1996, Indra 2000). This is a feature common not only in developed countries but also in developing countries like India. The change in quality of ground water in response to variations in physical, chemical and biological environment through which it passes is immense (Singh 1982). The primary inorganic nitrate and ammonium nitrates both of which are widely used as fertilizers cause water quality deterioration to large extent. Thus, characterization of ground water qualities is of considerable importance to safeguard health and hygiene of residents. In this communications we are reporting ground water qualities from rural areas of Khathumer Tehsil at Alwar district, Rajasthan (India).

Materials and Methods

The ground water samples were collected in clean sterile containers from hand pumps at different location. These were transported and were analyzed immediately. Their pH values were measured by pH meter standardized with buffers. Total dissolved solids, Alkalinity. Total hardness, Iron and Sulphate were analyzed using standard methods (APHA 1989).

Result and Discussion

The pH value ranging between neutral alkaline (pH 6.8-8.50) was within the acceptable limit (B I S 1991).

The total dissolved solids (TDS) in the study area varied from 247-1120 mg/l (Table 1) while its permissible limits are 500 mg/l. TDS signifies the inorganic pollution load of any water body (Loganayagi *et al.* 2008). The Alkalinity ranged between 20- 650 mg/l (Table 1) indicates high alkaline nature of water in the area and some samples were found exceeding the acceptable limits (BIS 1991). The chloride varied widely ranged from 28-298 mg/l (Table1). All the values are within the permissible limits as prescribed (BIS 1991). It is harm less up to 1000 mg/l but produces salty taste above 250 mg/l. Calcium and Total hardness in the water are interrelated. In the present study values of calcium 28-298 mg/l and Total Hardness 105-470 mg/l varied greatly (Table 1).

The study reveled that the ground water of the Khtaumer Tehsil of Alwar district is some what hard. Fluoride content in the study area varied from 1.50 to 5.10 mg/l (Table 1) samples were found exceeding the acceptable limits of (BIS 1991) standards. Fluoride sample which exceeded the acceptable limits are not recommended for consumptions without treatment. Fluoride is considered as an essential element through health problems may arise from either deficiency or excess amount. Much of the fluoride entering the human body is obtained from drinking water (Kumari & Rao 1993). Fluoride concentration of 0.4 ppm in drinking water caused mild type of dental fluorosis (Dinesh 1991, Gupta *et al.* 1993, Yadav & Lata 2004).

The nitrate concentration in the study area ranged from 16-92 mg/l (Table 1) which indicates that the ground water has not been affected by nitrate. Human and animal wastes, industrial effluents. Application of fertilizer and chemicals, seepage and silage through drainage system are the main sources of nitrates contamination of ground water (Agrawal *et al.* 1999). The high concentration of Nitrates in drinking water caused methenoglobinemia in infants, a disease characterized by blood changes.

Table 1 Physico-chemical analysis of ground water in some village of Khathumar Tehsil

Sampling site	pH	(TDS)	Alkalinity	Chloride	Total Hardness (TH)	Fluoride	Nitrate
Nagla Madhupur	7.50	1060	650	180	470	5.10	92
Badhangarhi	7.80	980	480	220	450	4.80	90
Shokher	8.10	1100	545	265	440	4.60	89
Bhanokhar	8.50	1120	620	298	380	4.30	76
Galakheda	6.8	247	20	28	105	1.50	16

*All Parameters value is mg/ liter.

Conclusions

Present study revealed that almost all water quality parameters were within permissible limits (BIS 1991) with the exception of few water samples having higher values for Total alkalinity, Total Hardness, calcium and fluoride. Such hand pumps are not fit for human consumption through these may be used in other house hold activities so public should be made aware of the water quality importance and hygienic conditions before use. Also it is necessary to implement certain remedial measures.

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