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MONITORING OF DRINKING WATER QUALITY OF SAHARSA CITY (PART II), BIHAR, INDIA DURING ONE YEAR (2006-2007)

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ABSTRACT

Saharsa city is a divisional headquarter of Koshi Division. It is situated 95 Km away from the Koshi river, which is called "Bihar Ka Shok" (Sorrow of Bihar). So water pollution has been created due to lack of knowledge, negligence and illiteracy. It is observed that the study of the water quality is of enormous educational value. Hence, it was thought interesting to study the physico-chemical parameters of water. The suitability of water for drinking and other domestic purpose has been studied by collecting samples from hand pumps situated in various zones of Saharsa city, Bihar. The parameters were analyzed and compared with the standards values prescribed by American Public Health Association (APHA), World Health Organization (WHO), Bureau of Indian Standards (BIS) and Indian Council of Medical Research (ICMR).

Key Words: Monitoring, Drinking water quality, Alkalinity, Hardness, Saharsa

INTRODUCTION

Water is a natural resource for drinking, domestic, industrial and irrigation purposes. It also has a vital role in all the development activities. With the advent of development, there is an exponential increase in the demand for water. The main source to fulfill this demand for irrigation, industrial and drinking purposes is ground water. About 95% of the total available water all over the world is in the form of ground water. Thus, the quality of ground water is of vital concern for mankind, since it is directly linked with human welfare[1]. In Saharsa, the main source of drinking water is ground water available in the form of hand pumps.

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EXPERIMENTAL

Water samples were collected in the July 2006 to September, 2007 from various places. The sampling sites were: hand-pump water of Bus Stand (S_1), house of Sri Pradyuman Narayan Singh (S_2). Saharsa Basti (S_3). Sant Nagar (S_4), Koshi Project (S_5) and Naya Bazar (S_6). The samples were collected in pasteurized bottles for analysis purpose. The samples were analyzed in accordance with standard methods[2,3].

RESULTS AND DISCUSSION

The chemical examination of water samples were carried out for the temperature, pH, turbidity, total alkalinity, total hardness, chloride, TDS, calcium, fluoride, iron, magnesium, nitrate and sulphate. The analytical results of various hand-pumps have been shown in Table 1.

Table 1: Physico-chemical analysis of hand-pump water for drinking purpose of Saharsa during 2006-2007

S. No.	Parameters	Unit	Samples					
			S_1	S_2	S_3	S_4	S_5	S_6
1	Turbidity	NTU	8	17	10	15	6	6
2	pH		6.53	6.83	6.61	6.86	6.78	6.83
3	Conductance	μmhos/cm	270	330	250	660	300	333
4	Total alkalinity	mg/L	90	200	120	190	180	210
5	Total hardness	mg/L	95	180	110	170	200	180
6	Calcium	mg/L	22.12	40.00	42.00	20.00	38.00	18.8
7	Magnesium	mg/L	15.12	9.22	10.94	13.94	8.06	7.19
8	Chloride	mg/L	50	60	40	30	50	38

Cont…

S. No.	Parameters	Unit	Samples					
			S_1	S_2	S_3	S_4	S_5	S_6
9	Fluoride	mg/L	0.8	0.6	0.9	0.6	0.8	0.9
10	Iron	mg/L	2.0	1.5	7.8	9.6	10.6	12.2
11	TDS	mg/L	180	200	350	400	200	120
12	Nitrate	mg/L	Nil	Nil	10	20	Nil	20
13	Sulphate	mg/L	16	/ 12	8	18	14	19

The results *of the* samples vary with different collecting places because of the different nature of soil contamination[4]. All metabolic and physiological activities and life process of aquatic organisms are generally influenced by water temperature. In the present study, temperature ranged from 292 -304 K[5].

The pH of drinking water is an important index of acidity or alkalinity and it results due to the acidic-basic interaction of a number of its mineral and organic components. A pH range of 6.5 to 8.5 is normally accepted as per guide line by WHO. The pH below 6.5 starts corrosion in pipes, resulting in release of toxic metals. In the present study, pH ranged from 6.53 to 6.86 and samples S_1 and S_2 show lower pH than that prescribed by APHA[2].

Desirable limit of total dissolved solids (TDS) is 500 mg/L for drinking water. In present study, TDS ranged from 120 mg/L to 350 mg/L. TDS is an important parameter for drinking water.

The chloride content of water samples except some points arc within the permissible limit in drinking water prescribed (The Gazette of India, 1991)[6] by Indian Standard Index. The higher chloride is trouble some in irrigation water and harmful for aquatic life.

For drinking water, the maximum permissible limits for fluoride is 1.5 mg/L. If concentration of fluoride exceed 2 mg/L and water is used continuously for drinking over years, it causes fluorosis with resultant skeletal damage in man and cattle. However, presence of less than 0.8 mg/L fluoride in water causes dental carries in children. The value of fluoride in these water samples were varied from 0.6 mg/L to 0.9 mg/L.

The desirable limits for hardness in drinking water according to IS-10500 is 300 mg/L. Total hardness of all the samples except some were found to be within the limit.

The desirable limit for total alkalinity is 200 mg/L. The value of water samples varied from 90 mg/L to 210 mg/L.

The evaluated value of iron contamination in drinking ground water is much higher than the prescribed value[7] i.e. 0.3 ppm (I. S. Code). Except some visible characteristics of iron contamination in water e. g. colouring of utensils, floors, clothes and laundary, and yellowish brown colouring associated with change of taste of water, tea, coffee and other beverages, the water of two sample site (S_1 and S_2) may be said to be potable and not hazardous to health.

In the present study, sulphate ranged from 8.00 to 19.00 mg/L. The high concentration of sulphate may induce dioarrhea[8].

Nitrate nitrogen is one of the major constituents of organisms along with carbon and hydrogen as amino acid, protein and organic compounds. The prescribed values of nitrate is 45 to 100 mg/L[9]. In the present study, nitrate ranged upto 20 mg/L.

CONCLUSION

The water quality of Saharsa is very poor due to high iron concentration and the bacteriological quality of water is also doubtful due to low water level. The drinking water of Saharsa is fit for consumption and does not pose any serious threat to human health. But peoples of Saharsa are suffering from gastroenteritis, dioarrhea, constipation, blood dysentery. The water samples S_6, should not be used for drinking purposes. Hence, it is necessary to develop a suitable technique to protect water resources from contamination.

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