



## **STUDY OF THE QUALITY OF GROUND WATERS OF SOME VILLAGES AT SAHARSA DISTRICT, BIHAR (INDIA)**

**RAJEEV KUMAR SINGH\* and RANJEEV KUMAR SINGH**

Gangjala - 13, Near Pratap Chowk, SAHARSA - 852 201 (BIHAR) INDIA

### **ABSTRACT**

Water is the most vital resource for all kinds of life and it is adversely affected both qualitatively and quantitatively by all kinds of human activity on land, in air and in water. It is the prime medium in which physical and chemical transformations, particularly those of biological significance, take place. Physico-chemical quality of any water body is the major deciding factor of the pattern of aquatic biota as well as primary and secondary productivity. Water as environment medium maintains the integrity of the entire ecosystem.

The present paper describes the results of survey of the physico-chemical characteristics of ground water of eight villages at Saharsa District, Bihar over a period of one year. It can be concluded from this study that the concentrations of chlorides, fluorides are within the limits as prescribed by WHO. On the other hand, nitrate-nitrogen, alkalinity and hardness are much higher. Entry of pollutants to the ground water is quite complex and several processes affect its movement.

**Key words:** Water Quality, Ground Water.

### **INTRODUCTION**

In continuation of our earlier studies on hand pumps water<sup>1</sup>; here, we report the physico-chemical studies of hand pumps water of some villages at Saharsa District of Bihar. Hand pump water is generally used for drinking and other domestic purpose in this area. The agriculture land in this region is less fertile for the production of different crops and vegetables. For getting higher yields, farmers use different types of insecticides, pesticides and fertilizers. The yield increases but natural composition of land is continuously changing and the harmful ingredients ultimately come into the water as pollutants to create water pollution as well as soil pollution. Hence, it was though

---

\* Author for correspondence; E-mail : [chauhanrajeevkr.singh@yahoo.com](mailto:chauhanrajeevkr.singh@yahoo.com)

interesting to carry out an analysis of physico-chemical parameters<sup>2-4</sup> viz. , temperature of water, pH of water, total alkalinity, total hardness, chlorides calcium, etc. The correlation between physico-chemical parameters and Indian standard specifications for drinking water was evaluated from pollution point of view. After analysis of the physico-chemical parameters, it was observed that according to Indian standard specifications for drinking water, the essential and desirable limits have not been crossed by these water samples.

## **EXPERIMENTAL**

All the reagents used during analysis were of AnalaR grade. Plastic containers were used for sampling samples. Nearly one litre of water samples from hand pumps were collected from eight different villages of Saharsa district for a period of one year from January, 2006 to December, 2006 at 30 days interval. Water samples were analysed as per standard methods (APHA-AWWA-WPCF, 1981)<sup>5</sup>. A mercury thermometer of least count 0.1<sup>o</sup>C was used to measure the temperature of air and water. They were measured at the site itself.

## **RESULTS AND DISCUSSION**

The average concentrations of all the parameters studied are given in Table1. It is apparent from the data for pH that the water is always associated with some kind of alkalinity. High pH is normally associated with a high photosynthetic activity of water.

High values of total alkalinity viz 325 mg/L, were observed in water samples from hand pump at Sri P. N. Singh, Sardiha (Simri Bakhtiyarpur). Such waters may cause excessive encrustation in distribution pipes as these water samples have a positive saturation index. High values associated with water bodies seem apparently polluted. Waters with such high values of alkalinity are not fit for irrigation purposes.

The limits of calcium and magnesium have been prescribed in the range 75-200 mg/L and 50-100 mg/L, respectively<sup>6</sup>. Calcium and magnesium contents in all the samples collected fall within the limits prescribed. Hardness does not have any ill impact on human health though some evidences have been reported to indicate its role in heart diseases.

Table 1. Analysis results of the samples collected during January, 2006 to Decemebr, 2006

Sample Station	pH	Total hardness (mg/L)	Turbidity (NTU)	Colour (HU)	Conductivity ( $\mu$ mhos/cm)	Total alkalinity (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	Fluoride (mg/L)	Iron (mg/L)	Sulphate (mg/L)	TDS (mg/L)	Arsenic
P.N. Singh, Sardiha, Simari Bakhtiyarpur	7.64	113	12	10	285	325	61.24	17.24	34.56	Nil	0.87	0.41	24	400	Nil
Primary School, Jhitki, Mahishi	6.80	192	15	10	305	202	38.00	13.86	36.00	10	1.00	2.00	22	220	Nil
Block H.Q., Sour Bazar	7.10	250	6	5	550	260	48.00	17.28	56.00	Nil	1.20	1.50	32	330	Nil
Primary School, Sahpur, Siterkataya	6.85	180	6	5	330	200	38.00	12.96	60.00	Nil	1.50	2.0	16	250	Nil
Md. S. Nawaj, Kash Nagar, Sohbarsa Raj	6.90	150	6	5	266	160	26.00	9.35	27.00	Nil	0.70	1.5	24	250	Nil
J.S. Singh, Bisanpur, Patarghar	7.40	104	6	5	160	114	20.00	7.20	16.00	10	0.90	2.0	21	200	Nil
A. Mukhiya, Kashimpurm Salkhua	6.90	193	14	10	333	204	34.00	12.13	32.00	Nil	1.50	3.50	12	100	Nil
Yadav, Bajinatpur, Sour Bazar	6.80	200	12	10	416	210	40.00	14.40	40.00	10	0.80	1.50	16	200	Nil

Hand pump water samples have fluoride contents below 1.0 mg/L whereas hand pump water at Bishanpur (Pataghat) village have fluoride content 1.5mg/L.

It is reported that dental fluorosis may occur in those cases where water contains fluoride more than 1.0 mg/L.

The chloride content in the samples is in between 56 to 16 mg/L. Natural water contains low chloride. The findings indicate that all the samples have chloride below the permissible limits viz 250 - 1000 mg/L of chloride in drinking water, prescribed by Indian Standard Index (I.S. 10500/1983)<sup>8</sup>.

The highest values of nitrate viz 10 mg/L was noted in hand pump water at P. School, Jhitki (Mahishi), Kashnagar (Sonbarsa) and Bishanpur (Patarghat) and nil nitrate was recorded in hand pump water of other villages.

Nitrates generally owe their origin mainly to anthropogenic sources and as such high values are not expected. The higher values of nitrates in few water samples may be attributed to the garbage in the vicinity of water source and excessive use of nitrogenous fertilizer. Nitrate toxicity in human beings were reported and diagnosed as methaemoglobinamly, This illness is generally confined to infants.

## REFERENCES

1. R. K. Singh and Anamika, Monitoring of Wetlands Water of Madhubani District, *Asian J. Chem.*, (2007) (In Press).
2. S. E. Manahan, *Environmental Chemistry*, 3rd Edn, . Willard Grant Press, Boston (1983).
3. M. C. Rand, A. E. Greenberg and M. J. Trane; *Standard methods for the Examination of Water and Waste Water*, 14th Edn, American Public Health Association, Washington, D. C. (USA) (1976).
4. A. I. Vogel, *Text Book of Quantitative Inorganic Analysis*, 4th Edn. ELBS, London (1978).
5. *Standards Methods for Examination of Water and Waste Water*, 16th Edn., APHA. AWWA and WPCF, Inc., New York (1981).

6. A. J. Dhembare, G. M. Pondhe and C. R. Singh;, *Poll. Research*, **17**, 87 (1998)
7. N. K. Singh and D. S. Kadam, A Study of Fluoride in Ground Water of Nawar Block (Shivpuri, M. P. ), *Int. J. Chem. Sci.* **5 (2)**, 592 (2007)
8. The Gazette of India; Extraordinary Part - II, 3, 11 (1991).

*Accepted : 17.06.2008*