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HYDROCHEMICAL ANALYSIS OF GROUND WATER QUALITY IN BODH GAYA BLOCK, GAYA DISTRICT, BIHAR (INDIA)

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ABSTRACT

The present investigation deals with Hydrochemical analysis of ground water quality of five different site of Bodh gaya block and its adjoing area i.e. Bakraur (S1), Mahuain (S2), Silaunja (S3),Bataspur (S4) and Bara (S5). The groundwater parameters such as, pH, temrature, alkalinity, calcium, magnesium, phosphate, total hardness, dissolved oxygen, biochemical oxygen demand, sulphate, iron, chloride and Floride were estimated in the samples to evaluate their quality. The data of physico chemical parameters are compared with WHO (1992) and IS: 10500 standards for drinking water. Our result revealed that concentration of DO, BOD, Total hardness, Calcium, magnesium, sulphate, turbidity, alkalinity, phosphate, iron and chloride are within permissible limits and Iron, phosphate are negligible in comparison to permissible limits whereas the concentration of nitrate is higher at sampling areas S2,S3 and S5. The proper treatment necessary before the use for drinking purposes and irrigation purposes.

KEYWORDS: Groundwater, Dissolved oxygen, Water quality.

INTRODUCTION:

Bodhgaya is a Block in Gaya District of Bihar State, India. Bodhgaya Block Head Quarters is Bodhgaya town. It is located 11 KM towards South from District headquarters Gaya. Water is one of the most important and basic natural resources and forms about 75% of the matter of the earth crust and present in the form of marine water (Ocean and Sea) and fresh water (River, Lake, ponds, Streams and Ground water etc.). Water is the prime requirement for life and used for drinking, bathing, recreation, irrigation, sheries, navigation and power generation purposes etc. India receives 1800-1900 mm of rainfall annually. According to an estimate made by Indian central water commission (ICWC) for pollution control the total utilizable water from surface water sources is 690 cubic kms and ground water sources is about 452 cubic kms (Sud., 1997). The management for waste water discharges from habitat centers, industries, agricultural activities etc to maintain the quality for various purposes. India required 60% water for irrigation and 85% for drinking purposes which depends upon groundwater; India is the largest user of ground water in using over 25% of the total global use of ground water. (Gautam and Kumar, 2010) India has more than 20 million bore wells in comparison to 0.2 million in USA. The increasing human population has tremendously increased the demand of fresh water. The rapid growth of urban areas has affected the ground water quality due to over exploitation of resources and improper waste disposal practices. The present study and investigation has been designed to understand the chemical characteristics of ground water of this region.

OBJECTIVE:

The objective of the present investigation has been made to understand the chemical characteristics of ground water quality of bodh gaya block.

STUDY AREA:

In the present investigation, there are five water samples from different areas of bodh Gaya block were collected in the month of December 2015 to estimate quality of ground water. These water were extensively used for drinking purposes. The sampling stations are Bakraur (S1), Mahuain (S2), Silaunja (S3),Bataspur (S4) and Bara (S5).

MATERIALS AND METHODS:

The analysis of pH, Alkalinity, Ammonium, Fluoride, chloride, Calcium Hardness, Phosphate, Iron, Nitrate, Nitrite etc. were carried out by water testing kits which are supplied by Nice Chemicals (P) Ltd. Cochin, Kerala. The temperature of water samples were measured by thermometer (Celsius). The water analysis observed data were compared with the standard data provided by WHO for drinking purposes.

RESULTS AND DISCUSSION:

The ground water are quality parameters given in Table-1 and data are comparing with WHO (2011) and IS: 10500 standards for drinking water.

Temperature: Temperature of water plays important role for living beings. Quality of water is also maintained by temperature. The temperature of different sampling station ranges from 27^{o}C to 28^{o}C

pH: The pH of ground water ranges from 6 to 7which is within the range of drinking water proposed by ISI 1991 is 6.5 to 7.0

Alkalinity: Generally ground water associated with dissolved carbon dioxide, bicarbonates and hydroxides which occurs due to dissolution of minerals in the soil. The values of alkalinity ranges from 200 to 300 mg/l. Iron: The concentration of iron varies from 0.2mg/L to 3.0 mg/L whereas permissible limit for iron is 0.3 to 1.0 mg/L. Only the sample S3 have higher value of iron (3mg/l).

Calcium Hardness: The value of calcium hardness varies from 100mg/l to 400mg/l.

Nitrate: The biochemical oxidations of nitrogenous substances coming from domestic wastes are main source of nitrate in Ground Water. The concentration of nitrate in present study varies from 10 mg/l to 15 mg/L which is higher the permissible limit of WHO health based guide line values. The concentrations of nitrate above 40mg/L cause Blue diseases in infants (Sharma, 1997).

Nitrite: It varies from 0.0 to 3.0 mg/l in the samples.

Ammonium: It varies from 0.3 to 1.0 mg/l

Chloride: The chloride values ranges from 150 mg/L to 500 mg/L in the present sample. The permissible limit of chloride in drinking water is 250mg/L as suggested by WHO and ISI. The higher concentration of chloride may affect heart and kidney disease affected person (Patil et al., 2002)

Total Hardness: The temporary hardness of water is only due to dissolved of Calcium and Magnesium bicarbonate in water, where as permanent hardness is due to presence of chlorides of Calcium and Magnesium in water. The value of total hardness ranges 150 to1500mg/L.

Table 1: Showing different Parameters of ground water of Bodh Gaya block.

Sl No.	Parameters	Experimental Area Location				
		S1	S2	S3	S4	S5
1	Temperature (ºC)	28	28	28	27	28
2	PH	7	6.5	6.5	6.5	7
3	Alkalinity (mg/l)	230	240	250	200	300
4	Phosphate (mg/l)	0.0	0.0	0.0	0.0	0.0
5	Iron (mg/l)	0.3	0.3	0.3	0.2	0.3
6	Calcium Hardness (mg/l)	225	300	300	100	400
7	Nitrate (mg/l)	15	10	15	10	15
8	Nitrite (mg/l)	2.0	3.0	3.0	2.0	3.0
9	Ammonium (mg/l)	0.5	1.0	1.0	0.3	0.4
10	Fluoride (mg/l)	0.0	0.0	0.0	0.0	0.0
11	Chloride (mg/l)	300	320	220	150	500
12	Total Hardness (mg/l)	350	400	150	600	350
13	DO (mg/l)	3.2	3.5	2.3	2.1	4.0
14	BOD (mg/l)	2.0	2.2	2.8	2.4	2.4

CONCLUSION:

1. It was observed that the concentration of all parameter of ground water werethe permissible limit of WHO health based guide line values.

2. The higher concentration of nitrate needs proper treatment before the use for drinking purposes.

3. The observed values of sulphate, sodium, potassium, DO, Nitrate, BOD are within the permissible limits as per WHO guide lines for drinking water. The values of phosphate, uoride, residual chlorine and arsenic are observed negligible.

SUGGESTION:

The detail investigation may be carried out on other living organisms to avoid the hazardous/ injurious impact of the nitrate contamination.

REFERENCES:

1. APHA 1992, Standard methods for the examination of water and waste water. 16th ed. American Public Health Association, New York.
2. APHA. Standard methods for the Examination of water and wastewater, 17thEdition.American Public Health Association, New York.
3. A Kumar and V K Prabhat (2017) ANALYSIS AND ASSESSMENT OF GROUND WATER QUALITY OF BARACHATTI BLOCK , GAYA DISTRICT, BIHAR (INDIA), G J R A ,volume -6,page 179- 180.
4. Analysis of Dye contaminated river water. Ind. J. Environ. Hlth.40: 7-14 (1998). Gitanjali G, and kumaresan a (2006) poll res.25 (3), 583 ICMR. Manual of Standards of Quality of Drinking Water Supplies. Indian Council of Medical Research, New Delhi.

5. BIS. Indian Standard specication for Drinking Water, IS: 10500, Bureau of Indian Standards, New Delhi (1998).
6. Dyaneshwari P and Meena D. Seasonal variation ion DO and BOD of some lentic water bodies of Kolhapur city.
7. Sinha D K and Saxena R, Indian J. Environ. Protect. 2006, 26, 163.
8. Veera Bhadram K, Ravichandra M and Prashanthi M, Nature Environ. Pollut. Tech. 2004, 3, 65.
9. ISI. Drinking water specication, Indian standard Institute, New Delhi (1991). Kudesia V P. Water Pollution, Pragati Prakashan, Meeret (1985). Neeraj Verma. Studies on the drinking water and irrigation water resources of Industries state, Ph.D Thesis
10. Barkatullah University, Bhopal (1994). Nice Chemicals (p) Ltd. Cochin, Kerala. Patil P R; Patil S K and Dhandae A D. Studies on drinking water quality in Bhuswal corporation water supply (2002).
11. Sharma B K and Kaur H. Environmental Chemistry Third edition. Krishana Prakashan Media (P) Ltd, Meeret. Page11. No. Env. 30-32, Water 67-76 (1996-97). • Sud, Surender. Beware: Water is Fast Becoming Scarce Yojana 41 (8): 47- 48 (1997).
12. Sallae, A.J. Water borne diseases in Fundamental Principals of Bacteriology, 7 th Edition, Tata McGraw Hill
13. Publishing Company Ltd., New Delhi. (1975). Senthilkumar RD; Narayansamy, R and Ramkrishan K. Pollution studies on sugar mill effluent physic-chemicals