JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

ANALYSIS AND ASSESSMENT OF GROUND WATER QUALITYOF SHERGHATI BLOCK AT GAYA DISTRICT, (BIHAR)

[1] SUDESH KUMAR/ [2]DR ARUN KUMAR RAJAK/ [3]Dr.SANJAY KUMAR VERMA
1. RESEARCH SCHOLAR 2.PRINCIPAL 3.PRINCIPAL.
1. P.G DEPARTMENT OF BOTANY, MAGADH UNIVERSITY, BODH- GAYA, INDIA

Abstract: In present investigation an attempt has been made to investigate the quality of ground water around **Sherghati Block area in Gaya district Bihar.** We have selected six different villages of Sherghati block in Gaya district, Bihar, i.e. **Chanpi (S1), Srirampur (S2), Kachoudi (S3), Dhab Chiraiya (S4), Gopalpur (S5) and Bela (S6).**The parameters are **pH, Alkalinity, EC,TH, TDS, Calcium, Magnesium, chloride, Iron, Sulphate, Nitrate, Phosphate, Fluoride, BOD, DO, COD, Temperature, Turbidity and Arsenic** 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 concentrations of estimated parameters are within permissible limits. The Ground water can be used as drinking and irrigation purposes. Finally it can be suggested that an intensive study may be carried out on other living organisms to avoid the hazardous impact of the other chemical substances if these are present in the ground water of study area, further study may be carried out before the large domestic consumption.

Index Terms- **GROUNDWATER, WATER QUALITY, DISSOLVED OXYGEN, physico-chemical parameters**

I. *INTRODUCTION*

The **Sherghati block** is situated at *Lat. 24.5000°N-24.6930°N, Long. 84.7290° E-84. 8990°E* in southern part of Gaya District Bihar (formally Magadha), India. The Sherghati Block is surrounded by Guraru block in the North, Amas block in the North-west, Bankebazar in the West,Dobhi block in the East and one State boundary, Jharkhand in the South. There are total 9 Panchayat and 84 Villages are present in the Sherghati Block. Geomorphologically

the Sherghati block is covered by flat/gentle slope, which is made up of unconsolidated sediment. The groundwater regime of the Sherghati block has been monitored from the existing network monitoring wells and inventoried observation wells. Observation wells are dug wells and piezometer of minor irrigation department, Government of Bihar. The average depth of dug wells is 0-15 mbgl. Piezometers are on an average 55 m bgl depth. The pre monsoon water level in dug well zone 5-6 m bgl and in post monsoon water level varies from 1-2 m bgl. Comparatively deeper water level 7.73-8.84 m bgl is reported from the deep tube wells of PHED.

Ground water is about 20% of the world resource of fresh water and widely used by industry, irrigation and domestic purposes. Only about 1% of all of fresh water available from rivers, ponds and lakes, out of 0.03% water require for survival and growth of many forms of animal and plant life on the earth surface. In town and villages people completely depend on ground water for domestic as well as for agriculture purpose, hence quality of ground water is very important. Ground water is also polluted by acid rain, fertilizers, industrial waste, garbage and domestic waste. Groundwater is a highly useful and often abundant resource, however over use or overdraft can cause major problems to human beings and to the environment. About 70% of the fresh water (River,Lake,Ponds,Streams and Ground water) on the planet is blocked up in ice at the pole, and most of the remainder is retained as soil moisture or deposited in deep underground aquifers. In the final tally less than 0.5% of all the fresh water on the earth is technologically and economically accessible for human uses. India is an integral part of the global water crisis. The National Water Policy 1987 underscores water as a prime natural resource to meet the basic human need and so it is a precious national asset.

A study was conducted by the Central Pollution Control Board (CPCB) with regard to the projected status of water consumption in 453 cities and towns in the country (CPCB, 2010). According to the study the water supply in these cities and towns of India, is being provided at a rate of 135 liters per person per day (CPCB, 2010); which has been restated in recent work by (Kumar, 2014).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 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.

II.OBJECTIVE

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

III.STUDY AREA

In order to assess the ground water chemistry, ground water samples were collected from 6 different villages of Sherghati block in the month of **August 2023** to estimate quality of ground water. The samples were collected from wells, which are being extensively used for agriculture; drinking and other domestic purposes. The sampling stations are **Chanpi (S1), Srirampur (S2), Kachoudi (S3), Dhab Chiraiya (S4), Gopalpur (S5) and Bela (S6).**

IV.MATERIALS AND METHODS

The analysis of **pH, Turbidity, Temperature, Alkalinity, TDS, Calcium, TH, Magnesium, Iron, Nitrate, Phosphate, Fluoride, Sulphate, EC, Chloride, Arsenic, BOD, COD, DO** were carried out in P. G. Department of Botany, Magadh University, Bodh-Gaya by water testing kits which are supplied by Nice Chemicals (P)Ltd. Cochin, Kerala The Temperature of water samples were measured by Thermometer (Celsius).Method of Water analysis followed by APHA (American Public Health Association) 23rd Edition 2017 and observed data were compared with the standard data provided by WHO for drinking purposes.

V.RESULTS AND DISCUSSION

The ground water quality parameters have given in **Table-1.** And data has been comparing withWHO (2011) and IS: 10500 standards for drinking water.

Temperature: Temperature of water plays an important role for living beings. Quality of water is also maintained by temperature. The temperature of different sampling points ranges from **26ºC to 28ºC.**

pH: The pH of ground water ranges from **7.13 to 7.58** which is within the range of drinkingpurposes, proposed by ISI 1991 is **6.5 to 8.5.**

Alkalinity*:* Generally ground water associated with dissolved carbon dioxide, bicarbonates and hydroxides which occur due to dissolution of minerals in the soil. The values of alkalinity ranges from **314 to 446** mg/l, where as BIS limit is **200mg/l** to **600mg/l.**

TH: (Temporary hardness) it is only due to dissolved of Calcium and Magnesium bicarbonate salt in water, whereas permanent hardness is due to presence of chlorides of Calcium and Magnesium salt in water. The value of total hardness ranges **266 mg/l** to **430 mg/l.** The BIS Limit is **200 mg/l** to **600 mg/l**

TDS (Total Dissolve Solid): All the samples are analyzed to have TDS values in the range of **366** mg/l to **592** mg/l, which were well within the BIS Limit between **500 mg/l** to **2000 mg/l.**

Calcium: The value of calcium hardness varied from **80.7 mg/l to124.9 mg/l.**

Magnesium: The value of Magnesium of all water samples ranged between **18.4 mg/l to 21.7 mg/l.** The BISLimit is **30 mg/l to 100 mg/l**.

Turbidity: Turbidity of water samples ranged between the values of 1**.0 NTU to 2.0 NTU**. Which are all well below the maximum permissible limit.

TABLE 1: SHOWING DIFFERENT PARAMETERS OF GROUND WATER OF SHERGHATI BLOCK

Sl. No.	Parameters	Experimental Area Location					
		S1	S2	S3	S4	S5	S6
1	Temperature(ºC)	28	27	28	28	27	26
2	PH	7.56	7.58	7.43	7.58	7.13	7.54

3	Alkalinity (mg/l)	369	446	341	394	314	374
4	Phosphate (mg/l)	0.0	0.0	0.0	0.0	0.0	0.0
5	Iron (mg/l)	0.19	0.20	0.15	0.18	0.25	0.23
6	Calcium(mg/l)	93.7	124.9	119.8	89.8	80.7	109.2
7	Nitrate (mg/l)	1.3	2.6	1.8	1.1	2.2	1.9
8	TDS(mg/l)	484	430	476	415	366	592
9	Magnesium(mg/l)	20	21.3	21.7	18.4	18.7	21
10	Fluoride (mg/l)	0.96	0.86	0.82	0.74	0.88	0.88
11	Chloride (mg/l)	147	130	126	108	137	157
12	Turbidity(mg/l)	1.0	1.0	1.0	1.0	1.0	1.0
13	Arsenic (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL
14	Total Hardness(mg/l)	343	430	395	300	266	359
15	COD(mg/l)	5.6	4.9	5.8	5.7	5.9	5.0
16	Sulphate (mg/l)	18.7	18.5	22.3	22.1	20.8	26
17	Electrical Conductivity (mg/l)	658	886	751	659	799	767
18	DO(mg/l)	4.1	3.9	3.5	3.2	2.7	3.8
19	BOD(mg/l)	2.4	2.3	2.2	2.4	2.2	2.1

Nitrate: The biochemical oxidations of nitrogenous substances coming from domestic wastes are main source of nitrate in Ground Water concentration of nitrate. In the present study its value varies from **1.1 mg/l to 2.6 mg/l** which is under permissible limit of WHO health based guide line values.

Phosphate and Arsenic: The values of Phosphate and Arsenic are negligible.

Chloride: The chloride values range from **108 mg/l to 157 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, (Patil et al., 2002)

***Iron*:** The concentration of iron varies from **0.15mg/l to 0.25 mg/l** whereas permissible limitfor iron is **1.0 mg/l.**

***Sulphate*:** The concentration of Sulphate varies from **18.5 mg/l to 26 mg/l.**

The values of ***BOD*** (**2.1mg/l to 2.4 mg)/l, *COD* (4.9 mg/l to 5.9 mg/l),** and ***DO*** **(2.7 mg/l to 4.1 mg/l)** level was well within the limits.

Fluoride: As per BIS the permissible limits of fluoride concentration in drinking water is **1.0 to 1.5 ppm** with a rider lesser the fluoride is better, as fluoride is injurious to health. All the water samples were value between **0.74 to 0.96 mg/l.**

VI. CONCLUSION

1. The water samples were analyzed for physic-chemical characteristics. The Results of this water analysis indicate levels of all the parameters are within the limit of WHO health based guide line values.
2. The observed values of pH, COD, BOD, DO, TDS, Nitrates, Turbidity are within the Permissible limits as per WHO guide lines for drinking water. The values of Phosphate and Arsenic are observed negligible.
3. The values of Iron and Fluoride are less than the BIS Limits (> 1.0 NR mg/l and >1.0 to 1.5 mg/l) respectively.
4. The Ground water can be used as drinking and irrigation purposes.

VII. RECOMMENDATION

1. It can be suggested that an intensive study may be carried out on other living Organisms to avoid the hazardous impact of the other chemical substances if these are present in the ground water of the study area.

REFERENCES

1. American Public Health Association and American Water Works Association 1999 Standard Methods for the Examination of Water and Wastewater.20th Ed, Washington, D.C., USA
2. Brown R. M., McClelland N. I., Deininger R. A., Tozer R. G.1970 A water quality index- do we dare? Water and Sewage Works, October 1970,339-343
3. Bureau of Indian Standards 2012 Indian Standard Drinking Water Specification (Second Revision)
4. Deshpande L. undated Water Quality Analysis: Laboratory Methods. National Environmental Engineering Research Institute (NEERI), Nagpur, Council of Scientific & Industrial Research, New Delhi, Govt. of India
5. Kori R., Parashar S., Basu, D.D. undated Guide Manual: Water and Waste water Analysis. Central Pollution Control Board, Ministry of Environment and Forest, India
6. Metcalf E., Eddy H. 2003 Waste water Engineering: Treatment and Reuse. Tata McGraw-Hill Publishing Co Ltd, India.

7. Roy R. 2018 An Approach to Develop an Alternative Water Quality Index Using FLDM. In: Majumder M. (eds) Application of Geographical Information Systems and Soft Computation Techniques in Water and Water Based Renewable Energy Problems. Water Resources Development and Management. Springer, Singapore, 51-68
8. Roy R., Majumder M. 2017 Comparison of surface water quality to land use: a case study from Tripura, India. Desalination and Water Treatment, 85, 147-153
9. Roy R., Majumder M. 2018 A Quick Prediction of Hardness from Water Quality Parameters by Artificial Neural Network. International Journal of Environment and Sustainable Development, 17(2/3), 247-257
10. Tyagi S., Sharma B., Singh P., Dobhal R. 2013; Water Quality Assessment in Terms of Water Quality Index. American Journal of Water Resources, 1(3),34-38
11. World Health Organization 2004 Guidelines for Drinking-Water Quality (3rd edition)
12. Changmai, M., Pasawan, M., and Purkait, M. (2018). A hybrid method for the Removal of fluoride from drinking water: Parametric study and cost estimation. Sep. Purify Technol. 206, 140–148.dio 10.1016/j.seppur.2018.05.061
13. Boretti, A., and Rosa, L. (2019). Reassessing the projections of the world Water development report. NPJ Clean Water 2, 1–6. doi:10.1038/s41545- 019-0039-9
14. CGWA (2016). Estimation of Water Requirement for Drinking and domestic use. National Building Code, 2016. Bureau of Indian Standards India.
15. Jain, S. K. (2012). Sustainable water management in India considering Likely climate and other changes. Curr. Sci. 2012, 177–188.