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ASSESSMENT OF GROUND WATER QUALITY OF SEONI CITY, (M.P.)

Dr. Sandeep Kumar Shukla
Department of Zoology Govt. P.G. College Seoni (M.P.)

ABSTRACT :- Water is essential for human survival hence termed as water is life. Ground water is one of the most useful water sources. It has become scarce due to frequent drought situations and increased human activity leading to water pollution. The use of fertilizers, pesticides and insecticides in rural areas and lime, bleaching powder, refuse dumps etc. in urban areas are the main source of soil and underground water pollution. In the present study, we have collected groundwater samples from different place of Seoni city. These samples have been analysed on the basis of various qualitative parameters namely, temperature, PH, total alkalinity, total hardness, total dissolving solid, dissolved oxygen, turbidity, sulphate, nitrate, chloride, fluoride. This study was aimed to assess the suitability of the ground water for the drinking and domestic purposes.

KEYWORDS:- Physico-chemical Properties, Groundwater Quality, Seoni City.

INTRODUCTION:-

Water is a wonder of the nature. "No life without water'' is a common saying depending upon the fact that water is the one of the naturally occurring essential requirement of all life supporting activities. It is a dynamic system, containing living as well as non-living, organic, inorganic, soluble as well as insoluble substances. So its quality is likely to change day by day and from source to source. Any change in the natural quality may disturb the equilibrium system and would become unfit for designated uses. The availability of water through surface and groundwater resources has become critical day to day (Makwana et. al. (2012); J. Dharmaraja et.al. (2012) and S. Julie et.al. 2010). Our Present Study area Seoni city is located in seoni district Madhya Pradesh state in India. This area is a part of Mahakoshal region. The ground water is generally used for drinking, domestic and agricultural purposes in this area. Ground water crisis is not the result of natural factors. It has been caused by human actions (A.Kumar ; 2004). The use of fertilizers and pesticides, manure, lime, bleaching powder, septic tank, and industrial effluents, domestic and agricultural wastes etc. is the main sources of ground water pollution (B.Chouhan; 2011). Fluorosis due to drinking water has been reported in thousands of villages in Andra Pradesh, Western M.P., Rajasthan, Uttar Pradesh and Gujarat. Fluorosisis effect on dental and skeleton tissues of animals and human beings. Its characterized by back pain in lumber and cervical region, rigidity and stiffeners of spine and chest limitation of movement of joints with the alkalosis of spine, hips and knees, crotalaria genugenu valgum and wind swept deformities of leg, inability to walk and crippling (S.P.S. Teotia et.al.; 1998).It is evident that many parts of the industrial area in India are colonized in very close vicinity of the industries and using groundwater for drinking, cleaning and bathing purposes (S. Prajapati et.al.; 2006).

AIM OF THE STUDY-

Present study deals with the suitability of ground water for human uses and aware to people about side effects of polluted water on animals and human beings.

EXPERIMENTAL SAMPLE COLLECTION AREA

The ground water samples were collected from ten different areas located around Seoni district during March to June 2023.

Sample Collection

The ground water samples were collected in brown glass bottles with necessary precautions (E. Brown; 1974) from tube well sand deep hand pumps located around Seoni region. Nearly two liter of each water sample was collected early in morning. The bottles were thoroughly cleaned with Hydrochloric acid and then washed with tape water rendered free of acid and then washed with distilled water twice and again rinsed with the water sample to be collected and then filled up the bottle with the sample leaving only a small air gap at the top, stopper and sealed the bottle with paraffin wax. Some samples which were turbid or containing suspended

matter were filtered at the time of collection. All the glassware, casserole and other pipettes were first cleaned with tape water thoroughly and finally with de-ionized distilled water. The pipettes and burette were rinsed with solution before final use. It was ensured that the concentrations of various water quality parameters do not changes in time that elapses between drawing of samples and the analysis in the laboratory. Samples were analysed immediately for parameters, which need to be determined instantly and rest of samples were refrigerated at to be analysed later. The results of samples vary with different collecting places because of the different nature of soil contamination (A.I. Vogal ; 1978).

METHOD OF PHYSICO-CHEMICALANALYSIS:-

1. The collected samples were analysed for physic-chemical parameters. Temperature and PH were measured at the time of sampling itself.
2. Total hardness of water was measured by complex metric titration methods. Chloride contents were measured by silver nitrate titrimetric method using potassium chromate indicator.
3. Sulphate contents were measured by volumetric method.
4. Total alkalinity was determined by visual titration method using methyl orange and phenolphthalein as indicator.
5. The Winkler test is used to determine the concentration of dissolved oxygen samples. Dissolved oxygen (DO) is widely used in water quality studies and routine operation of water reclamation facilities.
6. Total dissolve solid (TDS) was determined by evaporation method in an oven maintained at 200^{o}C for 2hrs.
7. Fluoride values were measured by spectrophotometer method and nitrate determined by Brucine method.

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RESULT AND DISCUSSION:-

Temperature

Temperature is an important biologically significant factor, which plays an important role in the metabolic activities of the organism. In present study temperature ranged from 14.5°C to 20.5°C. Lowest water temperature was observed in the siteS4 was 14.5°C and highest temperature site S10 20.5^{0}C.The temperature of water generally depends on the atmospheric condition.

pH -

pH is a measure of the hydrogen ion concentration in water and indicates whether the water is acidic or alkaline. The measurement of alkalinity and acidity of pH is required to determine the corrosiveness of the water. The limit of PH value for drinking water is specified as 6.5 to 8.5 by (WHO; 2009). In different samples pH ranged from 6.70 to 8.35. In the present study the pH shows within range.

Total Hardness-

Hardness is the property of water which prevents the lather formation with soap and increases the boiling points of water10. In present study total hardness of water varied from 200 to 285 mg/l in all ground water samples. The total hardness values in maximum sample are exceeded than permissible limit. Water hardness is generally because of the geochemical formulations of water (Patil st. al.; 2010) and due to presence of various salts of calcium and magnesium (bicarbonates, carbonates, sulphates, chlorides etc.). Inadequate intakes of calcium have been associated with increased risks of osteoporosis, nephrolithiasis (kidney stones), colorectal cancer, hypertension and stroke, coronary artery disease, insulin resistance and obesity. Increased intake of magnesium salts may cause a temporary adaptable change in bowel habits (diarrhoea) and is the cause of hyper magnesia in which human and animals are unable to excrete magnesium from body (WHO; 2009). Temporary hardness of water can be reduced by boiling and permanent hardness can be treated by various methods (Gupta et. al 2009).

Total Dissolved Solid

Hardness although have no health effects it can make water unsuitable for domestic and industrial use. TDS of all ground water samples ranged 450 to 665 mg/l. Some samples contain TDS out of maximum permissible limit suggested by WHO & Indian standards (Gazette; 1991).

Dissolved Oxygen

Dissolved oxygen is oxygen that is dissolved in water. Its levels fluctuate seasonally and over a 24-hour period. They vary with water temperature and altitude. Cold

water holds more oxygen than warm water and water hold less oxygen at higher altitudes. In present study dissolved oxygen ranged from 2.10 to 5.95 mg/l.

Chloride

Chloride a major anion in potable and industrial water has no adverse effect on health, but imparts bad taste to drinking water. The chloride concentration serves as an indicator of pollution by sewage. People accustomed to higher chloride in water are subjected to laxative effects (Fried et.al. 1971). The Chloride content in samples is in between 240 to 355 mg/L.

Sulphate

Sulphate is found in small quantities in ground water. Sulphate may come into ground water by industrial or anthropogenic additions in the form of Sulphate fertilizers. The sulphate was found in ranged from 11 to 26 mg/L. This is in prescribed limit (J.E. Mehee;1998).

Total Alkalinity

Alkalinity in streams is influenced by rocks and soils, salts, certain plant activities, and certain industrial wastewater discharges. Measuring alkalinity is important in determining a stream's ability to neutralize acidic pollution from rainfall or wastewater. It's one of the best measures of the sensitivity of the stream to acid inputs. Alkaline compounds in the water such as bicarbonates (baking soda is one type), carbonates and hydroxides remove H+ ions and lower the acidity of the water (which means increased pH). They usually do this by combining with the H+ ions to make new compounds. Without this acid-neutralizing capacity, any acid added to a stream would cause an immediate change in the pH. The total alkalinity ranged from 200 to 350 mg/L. Alkalinity can be removed by reverse osmosis, along with other total dissolved solids.

Nitrate

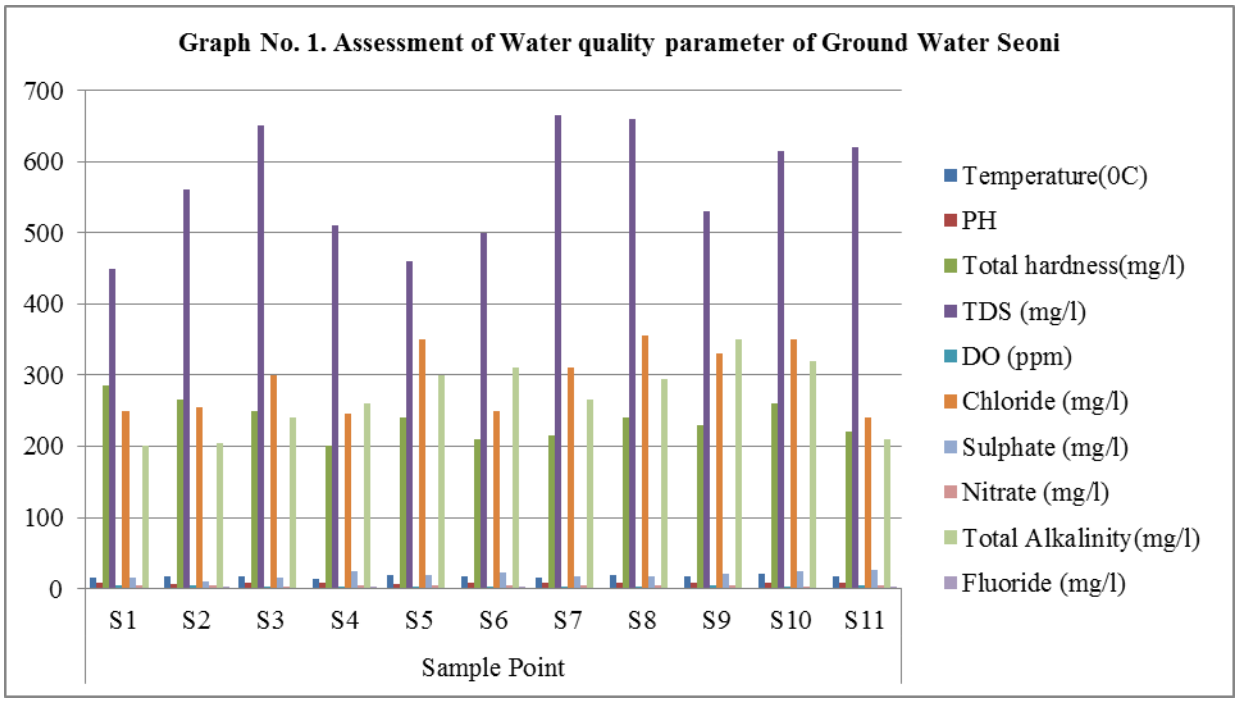
The high nitrogen content is an indicator of organic pollution. It results from the added nitrogenous fertilizers, decay of dead plants and animals, animal urines faces, etc. Nitrate in high concentration has been observed in ground water (Kugal et.al. 2013). Moreover, the increased nitrate level in drinking water may adversely affect the central nervous system18. Nitrate ranged in all samples was from 3.00 to 5.50 mg/L. This is in the prescribed values (D.G. Miller; 2014).

Fluoride

Probable source of high fluoride in Indian waters seems to be that during weathering and circulation of water in rocks and soils, fluorine is leached out and dissolved in ground water (Chandne ; 2014). Maximum permissible limit is 1.0 ppm (WHO; 1993). Small concentration of fluoride in drinking water has beneficial effect on human body but higher concentration beyond 1.5 ppm caused dental and skeletal fluorosis. In the present analysis, fluoride concentration was found in all samples sites. It is found 1.0 mg/l to 2.6 mg/l throughout the sites.

Table-1: Assessment of Ground Water quality parameters of Samples Collected from Seoni Area

Sr. No	Parameter	Sample Point										
		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
1	Temperature(^{0}C)	15.5	16.5	18.0	14.5	18.5	17.6	15.8	19.5	16.5	20.5	17.3
2	PH	7.44	6.95	7.86	8.10	6.70	7.91	7.62	8.35	8.25	7.95	7.5
3	Total hardness(mg/l)	285	265	250	200	240	210	215	240	230	260	220
4	TDS (mg/l)	450	560	650	510	460	500	665	660	530	615	620
5	DO (ppm)	5.2	5.10	2.58	2.95	2.55	2.65	2.10	2.05	4.60	3.20	5.0
6	Chloride (mg/l)	250	255	300	245	350	250	310	355	330	350	240
7	Sulphate (mg/l)	16	11	15	25	20	22	18	17	21	24	26
8	Nitrate (mg/l)	5.0	4.5	3.0	4.0	4.2	4.4	4.5	5.5	4.5	3.5	4.0
9	Total Alkalinity(mg/l)	200	205	240	260	300	310	265	295	350	320	210
10	Fluoride (mg/l)	1.00	2.5	1.55	2.3	1.2	2.6	1.4	2.0	1.7	1.22	2.4



CONCLUSION:-

The ground water of the studies area Seoni has been found to be unfit for drinking because in maximum samples fluoride has been detected in high value than maximum permissible limit. Excess fluoride may lead to tooth decay and kidney disease. These sample water are not suitable for drinking. It is suggested that the people in this area should drink only treated water. Minor filtration, reverse osmosis and deionization methods are suggested for further purification of water.

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