

ASSESSMENT OF GROUND WATER QUALITY OF PATHRIA BLOCK OF BILASPUR DISTRICT

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ABSTRACT

The aim of present study is to evaluate the ground water quality of four villages of patharia block of mungeli district of Bilaspur Division, through bore wells using physicochemical parameters. Across the block Patharia of bilaspur division four strategic Villages were selected of ground water analysis over a period of 6 months from march 2018 to august 2018, including pre monsoon and post monsoon season. These villages are **1-peeperlod, 2-Biddida, 3- lohda, 4-kakedi**. Four diagnostic parameters were selected as indictor of ground water quality are conductivity, total hardness, TDS, and pH.

The analysis of results indicates that ground water quality of these villages are very bad and far from standards lay down by various international agencies. The value of hardness, TDS, and conductivity were found to be very high, So ground water from these bore wells sources are not suitable for drinking purpose.

Key words- Conductivity, Hardness, TDS physicochemical parameters.

Introduction

Water quality is the physical, chemical and biological characteristics of water. It is measure of the condition of the water relative to the requirement of one or more biotic species or to any human need or purpose. We are largely depending on ground water for domestic, irrigation an industrial requirements, therefore it should be good quality along with the aesthetic value in the scenic environment water is directly related to human beings.

Ground water contamination is nearly always the result of human activity. In area where population density is high and human use of the land is intensive, ground water is especially vulnerable. Virtually any activity where by chemicals or wastes may be released to the environment either intentionally or accidently has the potential to pollute ground water. When ground water becomes contaminated it is difficult and expensive to clean up. Ground water contamination occurs when products such as gasoline, oil, sewage, domestic and municipal, chemicals get into the ground water and cause it to become unsafe and unfit for human use

Water resources are essential for existence and development of global community. The mineral components present in water are directly related to human health and its parametric value decides its suitability for drinking and irrigation purpose.

Material and Method

In order to ascertain the degree of contamination in the ground water of **Patharia** block of **Mungeli** district due to lack of adequate facilities for safe drinking water and sanitation, a study was conducted in the year 2018 in between MARCH 2018 to AUGUST 2018 so as to Cover both pre-monsoon and post monsoon periods about in the analytical status of ground water quality of a chosen set of sampling station.

Sampling Stations

The following sampling stations were selected.

Village 1(**Kakedi**)- four sampling station.1;2;3;4

Village 2(**Lohada**)- four sampling station.1;2;3;4

Village 3(**Pridbida**)- four sampling station.1;2;3;4

Village 4(**Peeper load**)- four sampling station.1;2;3;4

Analytical parameters

Water samples were analysed for-

1. PH
2. Conductivity
3. Hardness
4. TDS.

Above mentioned 16 sampling stations, covered all the different location of four villages **1.Kakedi 2.Lohda 3.Pridbida 4. Peeper load** of **Patharia** block of **Mungeli** District of **Bilaspur** division.

To Study the physicochemical characteristics of ground water, water samples were collected once in a month (first week of month) from every site regularly. PH, Conductivity, TDS were determined on the spot with the help of Portable kit, for the analysis of Total Hardness, samples were analysed as per Procedure laid down in the NEERI. Results were compared with standards for physical and chemical properties of potable drinking water as recommended by ICMR

Result and Discussion-

1. **Conductivity-** Conductivity is an index of total no of ions in water. Conductivity is the measure of waters ability to conduct electricity depending on the Concentration of dissolved ions in the water. Common ions in water that conduct electricity include Na^{+1} - Mg^{+2} and Ca^{+2} . Conductivity is usually as the indication of presence of dissolve solids and total hardness.

Conductivity increases as salinity increases. Electrical Conductivity at almost all the sampling station exceeds the MPL as prescribed by USPHS i.e. 500 mhos/cm) indicating unsuitability of this water for domestic use and irrigation. E C value at various stations ranged between 1336 mhos/cm. to 3284 mhos/cm. minimum conductivity is observed in village (3BIDBIDA), sampling station-3 during pre-monsoon season. It may be due to the dissolved inorganic solids into water which subsequently percolated to these bore wells polluting the water.

In fact water samples from ground water sources in deep earth have been found to contain high Concentration of Miniral ions.

2. **TDS**

Total dissolve solids-

MPL of TDS is 500 mg/lit

The amount of dissolve solids present in water determine its suitability for domestic use, TDS indicate both dissolved solids and suspended solid that remains as residue after etuaporation TDS refer to any minerals salts, metals cations and anions dissolve in water. TDS compare inorganic salts (Principally Ca^{+2} , Mg^{+2} , K^{+1} , Na^{+1} , HCo3^{-1} , Cl^{-1} , So4^{-2}) and Some small amount of organic matter that are dissolved in water.

TSS are solids in water that can be trapped by filter. TDS are the total amount of mobile charged ions, including minerals, salts or metals dissolved in a given volume of water expressed in mg/lit. water with TDS value higher than 500 mg/lit effect kidney of human.

Mineral water should have TDS 150mg/lit. Some time R O water treatment removes some important minerals which are very essential for our body like Ca, K, Mg, and Na. Water with TDS value less than 50 gm/lit is also bad for our health. Water with high TDS generally of inferior potability. High TDS of ground water are due to vegetable decay, disposal of effluents and weathering of Rocks.

In present study TDS ranged between 812 to 2034

Maximum value of TDS observed in village 4-PEEPER LOAD; sampling station 1; during post monsoon season in month **August 2018**

Minimum value of TDS 812 observed in village -3;**BiDBIDA**-sampling station -1 during pre monsoon season in month **April** and **March 2018**..

3. Hardness

Hardness in ground water is due to the presence of metal ions primarily Mg^{2+} , Ca^{2+} and to a lesser extent Fe^{2+} iron in the water.

Hardness Category	Equivalent Concentration of $CaCO_3$
Soft	- 60mg/lit
Medium Hard	-60mg/L to <120mg/L
Hard	- 120mg/l to <180mg/L
Very Hard	- 180mg/L to <or greater

Water with hardness greater than 200mg/L is considered poor in most region of province and water with hardness greater than 500mg/lit is normally Considered unacceptable for domestic purpose. Ground water tend to be harder than surface water and can range to greater than 1000mg/L.

Water hardness in most ground water is naturally occurring from weathering of live stone, sedimentary rocks and calcium bearing minerals. Hardness can also occur locally in ground water from chemical and mining industry effluent or excessive application of lime to the soil in agricultural areas.

Hard water is mainly an aesthetic Concern because of the unpleasant taste that a high concentration of calcium and other ion gives to water, It also reduce the ability of soap to produce a lather, and causes scale formation in pipes and on plumbing fixture. Soft water can cause pipe corrosion and may increase solubility of heavy metals such as Cu, Zn, Pb and Cd in water. In some agricultural areas where lime and fertilizers are applied to the land excessive hardness may indicate the presence of other chemical such as nitrate.

Hardness ranges between 630 mg/lit to 1220mg/lit. Minimum value of hardness is observed in the village **BIDBIDA** in sampling station 3. During pre-monsoon season of the month **may 2018**.

Maximum value 1220 observed in village-1 (**KAKEDI**), sampling station-2 during post monsoon season in the month **august 2018**.

PH- PH value of water is an index to denote the extent of pollution by acidic and alkaline wastes. PH value is good indicator of whether the water is hard or soft. PH value of natural water is an important factor as it effects its taste and plays an important role in corrosivity; efficiency of chlorination and other treatment processes. The normal range of Ph for ground water system lie between 6 to 8.5. In general water with PH > 6.5 would be acidic soft and corrosive. Acidic water could contain metal ions such as iron, manganese, copper, lead and zinc. In other words acidic water contains elevated levels of toxic metals.

In present study PH ranges between 6.7 to 7.5. Minimum value of PH is observed in village-2 (LOHDA) from sampling side (3) and (1) during post monsoon season Of month august 2018. Maximum value of PH 7.5 is observed in village-(4) (PEEPARLOAD) from sampling side 3 during pre-monsoon season of the month may 2018.

PRE-MANSON SEASON-2018

Village1 (Kakedi)	March 2018				April 2018				May 2018			
	Hardne ss	Con d.	TD S	P H	Hardne ss	Con d.	TD S	P H	Hardne ss	Con d.	TD S	P H
Sampling station1	864	1652	106 4	7. 3	806	1602	100 4	7. 4	808	1520	936	7. 2
2	1062	1876	125 4	7. 4	1022	1884	113 4	7. 2	1108	1882	116 0	7. 3
3	1080	2084	119 6	7. 3	1050	1878	113 0	7. 4	1018	1914	120 2	7. 4
4	984	1986	119 2	7. 3	938	1882	111 2	7. 3	904	1926	113 4	7. 3
Village2(Lohda)												
Sampling station1	806	1544	101 2	7. 4	784	1576	972	7. 4	758	1756	106 4	7. 2
2	882	1612	101 6	7. 3	818	1636	101 2	7. 3	782	1848	112 4	7. 3
3	948	1824	105 6	7. 4	920	1780	108 6	7. 3	870	1758	110 4	7. 2
4	944	1850	112 6	7. 2	938	1836	111 6	7. 3	9101	1776	110 2	7. 3
Village3(Bidbi da)												

Sampling station1	708	1384	824	7.4	702	1358	832	7.4	688	1352	836	7.4
2	726	1424	914	7.3	714	1374	836	7.2	700	1724	1026	7.3
3	688	1378	812	7.2	650	1268	812	7.3	630	1336	780	7.4
4	804	1588	992	7.4	782	1412	860	7.4	740	1612	1068	7.3
Village 4(Peeper load)												
Sampling station1	1706	3286	1950	7.2	1680	2876	1702	7.3	1650	2180	1924	7.4
2	1622	3184	1858	7.3	1602	2568	1552	7.4	1550	2108	1856	7.3
3	1730	3312	1948	7.3	1700	2914	1748	7.3	1620	2274	1922	7.5
4	1410	2748	1650	7.4	1402	2686	1616	7.2	1350	2874	1534	7.4



POST MANSOON SEASON-2018

Village	June 2018				July 2018				August 2018			
Village1(Kakedi)	Hardness	Con d.	TD S	P H	hardness	Con d.	TD S	P H	hardness	Con d.	TD S	P H
Sampling station1	908	1782	1080	7.3	1106	2112	1314	7.0	1208	2312	1392	7.0
2	1088	1924	1162	7.4	1158	2234	1382	6.9	1220	2394	1422	6.9
3	1116	1936	1164	7.4	1180	2084	1256	6.9	1188	2286	1366	6.9
4	1024	1884	1150	7.3	1108	2080	1250	7.0	1150	2326	1384	6.8
Village2(Lohda)												
Smpling station1	856	1684	1002	7.2	920	1724	1044	7.1	968	1864	1126	6.7
2	904	1732	1050	7.1	950	1776	1038	7.0	986	1896	1142	6.8
3	980	1874	1112	7.2	1010	1892	1142	7.2	1030	1924	1162	6.7
4	986	1922	1154	7.3	1020	1924	1162	7.1	1050	2080	1224	6.9
Village3(pridbi da)												
Sampling station1	728	1424	872	7.2	748	1522	930	7.0	768	1474	904	6.8
2	752	1512	934	7.3	786	1612	962	6.9	804	1568	962	6.9
3	706	1338	842	7.4	752	1574	934	6.8	780	1584	964	6.8
4	822	1596	970	7.3	820	1622	982	6.9	850	1682	986	7.0
Village4(Peeper load)												
Sampling station1	1630	3168	1902	7.4	1750	3312	1968	6.8	1808	3474	2034	7.1
2	1630	3168	1902	7.4	1662	3262	1942	6.9	1716	3256	1968	7.2
3	1700	3274	1926	7.3	1730	3256	1942	6.8	1782	3284	1956	7.1
4	1438	2874	1732	7.4	1450	2754	1662	6.9	1484	2774	1646	7.0

Conclusion-

The present study was aimed to assess the water quality of various ground water samples through Borewells of some localities of **Patharia** block of **Mungeli** district of **Bilaspur** division.

The Contamination of the ground water is due to the percolation of untreated sewage, san sanitation facilities and Industrial and agricultural run of.

The result of present study, reveal that -

1. The PH of the water samples from all the sampling station are not with in the permissible limit. Perusal of table indicates that PH values of water samples varies during monsoon season.
2. The Electrical conductivity records for water samples from these sampling stations were much above as per WHO standards. These high conductivity indicates presence of very high concentration of cations and Anions making these water samples unsuitable for drinking and irrigation purpose, it may be due to the dissolved inorganic solids into water which subsequently percolated to these bore wells polluing the water.
3. The recommending limit for the TDS present in water is 500mg/lit perusal of table indicated higher value of TDS in ground water and varies sampling stations. It indicates pollution of water by extraneous resources. However water with higher TDS contains may also be used for human consumption without harmful physiological effects
4. Perusal of table indicates; total Hardness of water is much higher in all sampling stations in all month during the assessment year of 2018. Higher value of hardness in ground water samples are due to weathering and sedimentation of rocks or due to excessive application of lime to the soil in agricultural areas.

Suggetions

1. Adequate and Routine analysis of water samples is inevitable to avoid the occurrence of contamination in the drinking water.
2. Field water taste kids can serve this purpose effectively is proper training is being imparted to rural mass including gram Panchayats etc.
3. Local youth groups may be trained to canny on such test kids at village level itself.
4. Active community awareness campaigns need to be launched by NGO as to sensitize the communities with importance of water conservation and adaptation of best hygiene practices.

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