

Post Monsoon Analysis of Physico-Chemical Parameter of Surface and Ground Water Samples In (Arang Block) Raipur Districts, Chhattisgarh, India

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Abstract: The study was carried out to assess surface and ground water quality of the (Arang block) in Raipur districts. The study area is situated between latitude 21.195 and longitude 81.967. Detailed survey by random samples was collected 8 different sites in Arang block and was analyzed for different Physico-Chemical parameters pH, electrical conductivity, alkalinity, hardness and chloride. The results were compared with BIS. By observing the result it can be concluded that the parameters which were taken for study the water quality are below the pollution level for ground as well as surface water which satisfy the requirement for the use of various purposes like domestic, agricultural, industrial etc.

Key words: Post monsoon, Ground water, Surface water, Physico-Chemical parameter, Raipur Districts.

I. Introduction

Natural resources are the important wealth of our country; water is one of them 1. 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 2. Since it is a dynamic system, containing living as well as nonliving 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 natural quality may disturb the equilibrium system and would become unfit for designated uses. The availability water through surface and ground water resources has become critical day by day. Only 1% part is available on land for drinking, agriculture, domestic, power generation, industrial consummation, transportation and waste disposal 3. In India, most of the population is dependent surface water (dame water) as the only source of drinking water supply. The ground water believed to be comparatively much clean and free from pollution then surface water. But prolonged discharge of industrial effluents, domestic sewage and solid waste dump causes the groundwater to become polluted and created health problems 4. The rapid growth of urban areas has further affected groundwater quality due to over exploitation of resources and improper waste disposal practices. Hence, there is always a need for and concern over the protection and management of surface water and ground water quality 5.

The consequence of urbanization and industrialization leads to spoil the water. For agricultural purposes ground water is explored in rural areas especially in those areas where other sources of water like dam and river or the canal is available. During last decade, this is observed that the surface water get polluted drastically because of increased human activities 6 7. The present study was undertaken to investigate the impact of the surface water quality of some river and other bodies of surface water samples. Thus, in this research work an attempt has been made to assess the physical and chemical parameters of surface and ground water like, Temperature (T), pH, electrical conductivity (EC), total dissolved solids (TDS), total alkalinity (TA), total hardness (TH) and chloride. The analyzed data were compared with standard values recommended by BIS and WHO 8.

II. Materials And Method

SAMPLING & PRESERVATION: - The water samples were drawn during post monsoon (Nov-Jan). The ground and surface water were collected from different wards of (Arang Block) in Raipur district C.G. water samples from different location were collected in the sample bottles of 250 ml from well, Bore well, pond and tape water. Sample collected were analyzed in 2 days go no special preservation required. However sample in the bottles were kept in the refrigerator. Standard testing methods are used to analyze metals and different parameter⁹.

The pH of the ground water was estimated by pH meter. The alkalinity of water is generally due to present of carbonate and hydroxide ion. Alkalinity provides an idea of the nature of salts present in the water.

The total alkalinity of ground water was calculated by standard titration method. The total solid (TS) present in 100 ml of sample water was at 103⁰ to 105⁰ c to dryness in drying oven. Cooling it in desiccators and

then weight. The TS in mg/l. $= (A-B) \times 100 / \text{sample volume in liter}$. Where A=weight of (dried residue + dish) & B= weight of dish. The total suspended solid (TSS) was calculated by the following formula: Total suspended solid (mg)/litre = $(A-B) \times 100 / \text{sample vol. in litre}$, where, A=weight of filter + dried residue. B=weight of filter paper. The total dissolved solids (TDS) term is used to describe the inorganic salts and small amount of organic matter present in solution. It was calculated by adding calcium and magnesium hardness derived by EDTA titration method. The chloride was estimated by silver nitrate titration method. Temperature of the samples measure by thermometer.

III. Results & Discussion

Post monsoon analysis of physico-chemical characteristics of surface and ground water of the study area (Arang Block) of Raipur District

Table: 1 Post monsoon analysis of physico-chemical characteristics of Tap water samples in (Arang Block) of District Raipur.

parameter	BIS-standards	Lakholi (1)	Krisaknagar (2)	Chandkhuri (3)	cherikheri (4)	Mandirhasud (5)	Nawagan (6)	Umari (7)	Lakholi (8)	Budeni (9)	Arang (10)
	(mg/l)	TW1	TW2	TW3	TW4	TW5	TW6	TW7	TW8	TW9	TW10
pH	6.5-9.2	7.9	7.5	8	8.8	7.3	8.1	7.3	7.9	7.4	7.9
ALKALINITY	Desirable 200mg/l. permissible 600mg/l	110	260	300	280	270	290	240	300	110	300
HARDNESS	Desirable 300mg/l. permissible 600mg/l	280	240	150	200	100	140	130	110	190	100
TDS	Desirable 500mg/l. permissible 2000mg/	264	660	588	648	492	600	528	576	468	504
CHLORIDE	Desirable 250mg/l. permissible 10000mg/	80	50	40	50	40	70	70	70	90	20
TEMPERATURE		22.3	23.1	23.8	22.2	23	22.6	23.2	23	22.7	22.5

Table No.2 Post monsoon analysis of physico-chemical characteristics of Bore-well water samples in (Arang Block) of District Raipur

parameter	BIS-standards	Lakholi (1)	Krisaknagar (2)	Chandkhuri (3)	cherikheri (4)	Mandirhasud (5)	Nawagan (6)	Umari (7)	Lakholi (8)	Budeni (9)	Arang (10)
	(mg/l)	BW1	BW2	BW3	BW4	BW5	BW6	BW7	BW8	BW9	BW10
pH	6.5-9.2	8.2	7.5	7.7	7.3	7.6	7.4	7.3	7.1	7.2	7.1
ALKALINITY	Desirable 200mg/l. permissible 600mg/l	250	140	140	80	110	160	140	130	210	150
HARDNESS	Desirable 300mg/l. permissible 600mg/l	80	220	100	130	140	280	250	200	100	120
TDS	Desirable 500mg/l. permissible 2000mg/	492	528	336	382	348	576	612	528	444	372
CHLORIDE	Desirable 250mg/l. permissible 10000mg/	80	80	40	110	40	30	120	110	60	40
TEMPERATURE		22.3	23	23	22.1	23.4	23.1	22.6	22.1	22.3	23.1

Table: 3 Post monsoon analysis of physico-chemical characteristics of well water samples in (Arang Block) of District Raipur

parameter	BIS-standards	Lakholi (1)	Krisaknagar (2)	Chandkhuri (3)	cherikheri (4)	Man dir hasud (5)	Nawag oan (6)	Umari a (7)	Lakholi (8)	Budeni (9)	Arang (10)
	(mg/l)	WW1	WW2	WW3	WW4	WW5	WW6	WW7	WW8	WW9	WW10
pH	6.5-9.2	7.5	7.8	7.9	7.8	7.2	7.3	7.5	7.8	7.9	8
ALKALINITY	Desirable 200mg/l. permissible 600mg/l	60	100	80	90	200	160	100	100	110	140
HARDNESS	Desirable 300mg/l. permissible 600mg/l	120	100	80	90	110	80	110	80	100	90
TDS	Desirable 500mg/l. permissible 2000mg/l	276	336	264	312	420	372	312	280	444	504
CHLORIDE	Desirable 250mg/l. permissible 10000mg/l	50	80	60	80	40	70	50	70	50	40
TEMPERATURE		23	22.1	22.1	23	22.1	23	23.1	23.1	22	23.1

Table: 4 Post monsoon analysis of physico-chemical characteristics of pond water samples in (Arang Block) of District Raipur

parameter	BIS-standards	Lakholi (1)	Krisaknagar (2)	Chandkhuri (3)	cherikheri (4)	Man dir hasud (5)	Nawag oan (6)	Umaria (7)	Lakholi (8)	Budeni (9)	Arang (10)
	(mg/l)	PW1	PW2	PW3	PW4	PW5	PW6	PW7	PW8	PW9	PW10
pH	6.5-9.2	8.1	8	7.8	8.5	8.5	8.8	8.8	8.2	7.9	7.2
ALKALINITY	Desirable 200mg/l. permissible 600mg/l	150	140	100	140	120	120	150	100	140	140
HARDNESS	Desirable 300mg/l. permissible 600mg/l	180	130	170	150	180	170	190	150	120	180
TDS	Desirable 500mg/l. permissible 2000mg/l	372	420	348	336	290	264	300	240	244	280
CHLORIDE	Desirable 250mg/l. permissible 10000mg/l	80	80	70	20	50	90	30	10	30	40
TEMPERATURE		23.1	22.8	22.5	24	23.5	23.5	23	23.9	23.5	22.8

Temperature

The temperature of tap water ranged from a minimum of $22^{\circ}\text{C} \pm .5^{\circ}\text{C}$ to a maximum of $23.5^{\circ}\text{C} \pm .5^{\circ}\text{C}$ in ward no 4, 1, 10, 9 and 5,2,7,6, and 3 respectively (Table-1). Similarly the variation in temperature of a bore well water ranged from a minimum $22^{\circ}\text{C} \pm .5^{\circ}\text{C}$ to a maximum $23 \pm .5^{\circ}\text{C}$ in ward no. 8,4,9,1,7 and 2,3,10,6,5 respectively (Table-2). The temperature of well water ranged minimum of $22^{\circ}\text{C} \pm .2^{\circ}\text{C}$ and maximum $23^{\circ}\text{C} \pm .1^{\circ}\text{C}$ in ward no. 9,5,2,3, 7 and 1,6,4,7,8 respectively (Table-3). The temperature of pond water ranged minimum of $22.5^{\circ}\text{C} \pm .4^{\circ}\text{C}$ and maximum $23.5^{\circ}\text{C} \pm .5^{\circ}\text{C}$ in ward no.3,10,2, and 4,8,6,5,7 and 1 respectively (Table-4).

During the present investigation, there was no great difference between the temperature of the tap water, bore well, well and pond water.

pH

The pH of tap water from a minimum of $7.5 \pm .5$ and maximum of $8.3 \pm .5$ of ward no. 7,5,9,2,1,8,9 and 6,3 respectively (Table-1). Similarly the variation of pH of bore- well water ranged from a minimum $7 \pm .5$ and maximum $8 \pm .3$ of ward no. 8,10,4,7,6,5,2 and 3,1 respectively (Table-2). Similarly the variation of pH of well water ranged from a minimum $7.2 \pm .5$ and maximum $7.5 \pm .5$ in ward no. 5,6,7,1,4,2,8 and 3,9 (Table-3).

The pH of pond water ranged from a minimum $7.3 \pm .5$ and maximum $8.2 \pm .5$ of ward no. 9,3 and

6,7,4,5,8 1 respectively (Table-4). The results show that water quality of Arang block shows no remarkable variation from the BIS recommended value of pH.

Alkalinity

(Table-1) represent the variation in total alkalinity of tape water ranged from a minimum of 110mg/l. and maximum of 300 mg/l. in ward no.1,9, and 3,8,10 . Similarly the variation in total alkalinity of bore well water ranged from minimum 80 mg/l. and maximum 250mg/l. in a ward no. 4 and 1 respectively (Table-2). The alkalinity of well water ranged from minimum of 60mg/l. and maximum 200 mg/l. in a ward no. 1 and 5 respectively (Table-3). Similarly the alkalinity ranged from pond water was minimum 100 mg/l. and maximum 150 mg/l. in a ward no. 3,8 and 1,7 respectively (Table-4). The alkalinity of some places was above and some places were below the BIS desirable level 200 mg/l. in all the samples of ground and surface water but was less than the maximum permissible limit.

Hardness

The Hardness of tape water ranged from a minimum 100 mg/l. and maximum of 280 mg/l. in ward no. 5,10, and 1 respectively (Table-1). Similarly the variation in hardness of bore well water ranged from a minimum 80 mg/l. and maximum of 280 mg/l. in ward no. 1 and 6 respectively (Table-2). The hardness of well water ranged from a minimum 80 mg/l. and maximum of 120mg/l. in ward no. 3 and 1 respectively (Table-3).

Similarly the hardness ranged of pond water from a minimum 120 mg/l. and maximum 180 in ward no. 9 and 10 respectively (Table-4). In present investigation the total hardness to be equal the BIS desirable level of 300 mg/l.

Total Dissolved Solid (Tds)

The total dissolved solid of tape water ranged from a minimum 264 mg/l. and maximum 660 mg/l. in ward no. 1 and 2 respectively (Table-1). Similarly the variation of total dissolved solid of bore well water ranged from a minimum 336 mg/l. and maximum 612 mg/l. respectively (Table-2). The total dissolved solid of well water ranged from a minimum 262 mg/l. and maximum 504mg/l. in ward no. 3 and 10 respectively (Table-3). Similarly the total dissolved solid of pond water ranged from a minimum 240 mg/l. and maximum 420 mg/l. in ward no. 8 and 2 respectively (Table-4). The water samples of all the wards contains higher amounts of TDS than the desirable limits. The maximum TDS was detected in Krisak nagar 660 mg/l. in Arang block.

CHLORIDE

(Table-1) represent the variation in total chloride of tape water ranged from a minimum of 20 mg/l. and maximum of 90 mg/l. in ward no. 10 and 9 . Similarly the chloride of bore well water ranged from minimum 30 mg/l. and maximum 120 mg/l. in a ward no. 6 and 7 respectively (Table-2). The chloride of well water ranged from minimum of 40 mg/l. and maximum 80 mg/l. in a ward no. 5,10, and 2,3 (Table-3). Similarly the variation of chloride ranged from pond water ranged from minimum 20 mg/l. and maximum 90 in a ward no. 4 and 6 respectively (Table-4). In present investigation the chloride content of Arang block less then the BIS desirable level 250 mg/l.

IV. Conclusion

The study assessed the evolution of water quality in ground water and surface water of Arang Block in Raipur District. A comparative study of both type of ground water and surface water was carried out by taking certain important parameters like temperature, PH, total dissolved solid, alkalinity, hardness and chloride .

The water samples of all the Arang block contain higher amount of TDS than the desirable limits. No sample crossed the maximum permissible limit for TDS Alkalinity, hardness chloride and PH.

In this present investigation it was found that the maximum parameters were not at the level of pollution. So both type of ground water satisfy the requirement for the use in various purposes.

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