

ASSESSMENT OF GROUND WATER QUALITY OF AJARA TAHSIL FROM MAHARASHTRA

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ABSTRACT

The assessment of Borewell water quality for suitability for drinking and domestic purposes was carried out from Ajara Tahsil. The ground water quality was assessed by examining various physico-chemical parameters. Borewell water samples were collected from 51 villages from Ajara Tahsil during April 2011. The physico-chemical parameters like temperature, pH, EC, total alkalinity, total hardness, Ca and Mg hardness, chlorides and dissolved oxygen have been analyzed. The results were compared with WHO and BIS drinking water standards. On the basis of hardness, out of 51 borewell samples, 48 samples were within the permissible limit & safe for drinking purpose.

Keywords: Ajra Tehsil, borewell, WHO, BIS, physic-chemical.

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INTRODUCTION

Quality of groundwater is equally important to its quantity owing to the suitability of water for various purposes. Water quality analysis is an important issue in groundwater studies. Variation of groundwater quality in an area is a function of Physical and chemical parameter which are greatly influenced by geological formations and anthropogenic activities. Among the various sources of water, groundwater is said to be the safest water for drinking and domestic purpose.

Ajara is one of the important tahsil of Kolhapur district located at latitude 16.12°N 74.2°E. It comprises near about 74 villages with population of 1,21,430. Area of this tahsil is about 54,853 hectares. People residing in this tahsil are depends on Borewell water for domestic and agriculture purpose therefore these borewells acts as lifeline for the people. The people who located away from river depend on small ponds, lakes, dug wells, borewells etc. for their domestic needs and drinking purpose. Due to irregular water supply in summer session by Gramsachiwalaya, the villagers depend upon borewell water for drinking & domestic purpose. Therefore the present investigation is undertaken to study the physico -chemical parameters of borewells from different villages of Ajara tahsil

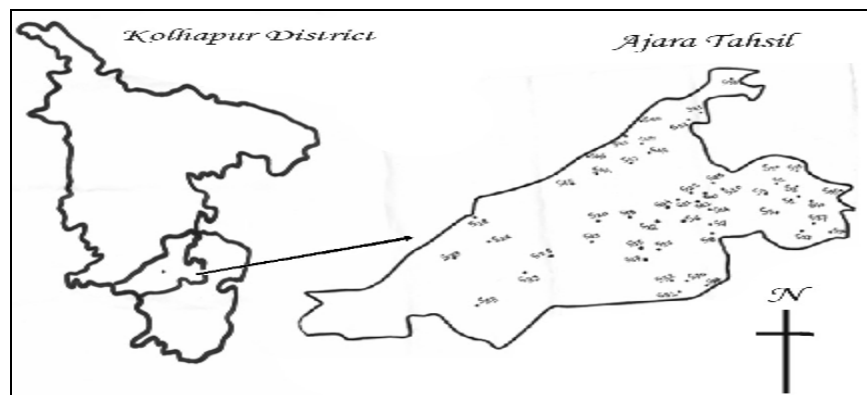


Fig.-1: Study Area

EXPERIMENTAL

Collection of samples

Borewell water samples were collected from 51 villages of Ajara tahsil in April 2011. Samples were collected in plastic container and brought to the laboratory for further analysis.

Analysis of physico-chemical parameters

For the analysis, the standard methods were followed^{1,2}. Some parameters like temperature, pH, EC were analyzed on the sampling site. The samples for D.O. was fixed in the BOD bottle at the site and brought to the laboratory for analysis by wrinkle method. All the physico-chemical parameter was analyzed within 24 hours. These results were compared with WHO³, BIS⁴ and ICMR⁵ drinking water standards.

RESULTS AND DISCUSSION

The results obtained from analysis of water samples of 51 villages of Ajara tahsil are given in Table-1. A comparison of the physico-chemical data of ground water samples has been made with Drinking water standards³⁻⁵ and given in Table- 2. Plate shows the different villages of Ajara from which water samples were collected. All the water samples were collected during the month of April 2011. All the drinking water samples were clear, colorless & odorless. The air temperature ranged from 24° C to 29° C. Water temperature ranged from 19° C to 21° C in all samples.

Table-1: Physico – chemical parameters of Borewell water of Ajara

Village Name	Sample No.	Ph	EC	Alkalinity	Hardness			Chloride	D.O.
					Total	Ca	Mg		
Sarambalwadi	S ₁	7.1	0.57	50	182	16.84	40.31	93.72	3
Kanoli	S ₂	6.9	0.28	32	124	26.46	23.70	39.76	6
Hasur	S ₃	7.6	0.26	30	116	20.05	23.31	34.08	7
Dabewadi	S ₄	6.7	0.47	26	132	24.06	26.22	42.6	3
Maligre	S ₅	6.5	0.27	30	126	16.80	26.53	31.24	5
Hattiwade	S ₆	6.6	0.25	20	98	12.03	20.89	36.92	6
Honewadi	S ₇	6.6	0.35	32	132	14.40	28.56	45.44	3
Mendhali	S ₈	6.8	0.41	34	182	14.43	40.57	59.64	6
Ainapur	S ₉	7.2	0.34	40	144	40.1	25.24	42.6	5
Kowade	S ₁₀	6.6	0.33	36	150	39.29	26.90	34.08	4
Pedrewadi	S ₁₁	6.8	0.37	40	170	48.12	29.80	36.92	5
Hajgoli	S ₁₂	6.8	0.19	20	90	16.04	17.72	34.08	3
Sohale	S ₁₃	6.5	0.12	20	40	12.83	6.16	28.40	6
Munguswadi	S ₁₄	6.5	0.17	26	80	20.05	14.56	34.08	3
Ajara	S ₁₅	6.5	0.21	36	100	31.27	16.70	36.92	5
Bhatwadi	S ₁₆	6.6	0.27	36	50	22.45	6.69	34.08	6
Parewadi	S ₁₇	7.9	0.46	40	170	8.02	39.36	39.76	4
Dewarde	S ₁₈	6.5	0.46	46	100	20.05	19.42	73.84	3
Velvatti	S ₁₉	7.5	0.28	46	100	18.44	19.81	36.92	3
Sulegaon	S ₂₂	6.5	0.15	30	200	20.05	43.72	36.92	7
Khade	S ₂₁	6.6	0.14	46	230	70.64	51.60	65.32	5
Bhadawan	S ₂₂	7	0.16	44	180	8.02	41.79	116.44	6
Khoratwadi	S ₂₃	8.1	0.45	64	120	12.03	26.23	56.08	7
Godsewadi	S ₂₄	7.1	0.57	54	260	8.02	61.23	71	3
Gajargaon	S ₂₅	6.8	0.53	44	130	8.02	29.64	56.8	4
Dabbil	S ₂₆	8.4	0.22	25	160	24.06	33.03	34.08	6

Village Name	Sample No.	pH	EC	Alkalinity	Hardness		Chloride	D.O.	
					Total	Mg			
Kine	S ₂₇	6.71	0.32	28	140	26.48	27.59	48.28	3
Madhyal	S ₂₈	6.98	0.44	38	184	40.10	34.46	39.76	4
Medhewadi	S ₂₉	7.74	0.28	44	66	14.43	12.33	25.56	7
Chafewadi	S ₃₀	6.5	0.15	10	88	15.23	17.68	39.76	6
Hude	S ₃₁	6.52	0.13	12	72	10.40	14.96	36.92	7
Waisegi	S ₃₂	6.59	0.37	20	158	21.65	33.13	82.36	7
Sursaange	S ₃₃	7.41	0.20	44	98	20.02	18.94	39.76	5
Morewadi	S ₃₄	7.30	0.52	60	152	27.26	33.31	48.28	8
Lakudwadi	S ₃₅	7.16	0.80	50	338	9.65	79.78	99.4	7
Postsotwadi	S ₃₆	6.89	0.25	44	120	25.66	22.92	28.4	6
Kolindre	S ₃₇	7.02	0.51	48	176	9.62	40.43	73.84	6
Handewadi	S ₃₈	7.10	0.50	60	162	8.02	37.41	45.44	6
Gavse	S ₃₉	7.12	0.25	28	48	11.22	8.93	51.12	5
Sule	S ₄₀	6.98	0.85	92	260	36.09	54.41	102.24	4
Mumewadi	S ₄₁	6.80	0.61	50	260	64.15	47.58	59.64	5
Chimane	S ₄₂	7.58	0.46	24	140	32.08	26.22	56.80	3
Honyali	S ₄₃	7.36	0.61	20	60	12.03	11.65	159.04	4
Vazare	S ₄₄	7.01	0.17	20	100	17.64	20.01	56.80	3
Ghagarwadi	S ₄₅	6.66	0.25	28	100	24.06	18.45	42.60	3
Mahagond	S ₄₆	7.25	1.22	60	480	124.3	86.42	178.92	4
Vadakshiwale	S ₄₇	7.86	0.47	40	140	42.51	23.69	56.8	5
Halewadi	S ₄₈	7.92	0.58	50	180	48.12	32.04	75.0	5
Bhadawanwadi	S ₄₉	7.35	0.87	70	160	52.13	26.21	127.8	6
Chavhanwadi	S ₅₀	8.13	0.45	34	100	28.07	78.47	56.8	6
Uttur	S ₅₁	6.95	0.80	50	300	22.18	55.36	99.4	7

The pH values ranged from 6.5 to 8.4 All samples are within the permissible limit. pH value of about 10 are exceptional and may reflect contamination by strong bases such as NaOH and Ca(OH)₂⁶.

Table-2: Drinking water samples of WHO (1961) , BIS (1991) & ICMR

Parameters	WHO	BIS	ICMR
pH	6.5-8.5	7 to 8	7-8.5
E.C.	300	300	300
Total Hardness	500	500	300
Calcium	75	75	75
Magnesium	50	50	50
Chloride	200	200	250-1000
Alkanility	75	-----	-----
D.O.	4 to 6(ppm)	4 to 6(ppm)	4 to 6(ppm)

Electrical conductance values ranged from 0.12 to 1.22 mmhos and indicate the presence of some ionic matters in water. All the values are within the permissible limit.

Most of the groundwater content substantial amounts of dissolved carbon dioxide, bicarbonates and hydroxides. These constituents are the results of dissolution of minerals in the soil and atmosphere⁷. In the present study, total alkalinity of water samples ranged from 10 to 92 mg/l which was within the permissible limit.

The total hardness is due to the presence of divalent cations of which Ca and Mg are the most abundant in ground water. The water of the study area are classified according to hardness as suggested

by Hen⁸. In the present study the total hardness of water sample ranged from 40 to 480mg/l. This indicates that out of 51 samples, 3 samples (S₃₅, S₄₆ and S₅₁) are fall under very hard category above 300 mg/l. Calcium hardness values ranged from 8.02 to 72.18mg/l. These values are close resembling to Borah *et al*⁹. All samples were within the permissible limit. Magnesium hardness values ranged from 6.16 to 86.42 mg/l and were within the permissible limit of 50 to 150 mg/l (WHO). Jain *et al*¹⁰ reported that high concentration of hardness (150 to 300 mg/l and above) may cause kidney problems. Chloride occurs in all natural waters in widely varying concentration. Excessive Chloride in potable water is not particularly harmful and the criteria set for this ion are based primarily on palatability and its potentially high corrosiveness¹¹. Chloride in excess (>250 mg/l) impart a salty taste to water and people who are not accustomed to high chlorides may be subjected to laxative effects. Chloride values ranged from 25.56 to 178.92 mg/l. all the samples are within the permissible limit.

Dissolved oxygen is very important parameter; low dissolved oxygen gives bad odor to water due to anaerobic decomposition of organic waste¹². In the present study dissolved oxygen values of water samples ranged from 3 to 7. Out of 51 samples, 43 samples were within the permissible limit by WHO (3-6) while 8 samples were exceeds the permissible limit.

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