

PHYSICO-CHEMICAL WATER ANALYSIS OF SELECTED BOREHOLES FROM VILLAGES OF BARSHITAKLI TAHSIL, DISTRICT AKOLA, MAHARASHTRA STATE, INDIA

A.B. Vairale

Dept. of Zoology, Ghulam Nabi Azad Arts, Commerce & Science College, Barshitakli, District Akola.(M.S.)
vairaleamit1@gmail.com

Abstract

The physicochemical parameters of water from 25 Boreholes from 6 different villages in Barshitakli block of Akola District, Maharashtra State, India were determined within the period of six months from July 2021 to December 2021 to investigate its quality. Analysis were done on water samples for pH, Turbidity, Total dissolved solids (TDS), Alkalinity, Total hardness, Nitrate, Fluoride and Iron using standard methods and evaluated with the World Health Organization standards. All physicochemical parameters analyzed in borehole water samples were within recommended standards except the following: alkalinity ranged from 204.0 to 500.0mg/l with a mean value of 334.80 ± 81.99 mg/l, Total Hardness 256-772 mg/l (452.36 ± 148.91 mg/l mean), Total Dissolved Solids (TSS) 375.0-1325.0 mg/l (742.40 ± 213.91 mg/l mean) all generally above Indian standard limit. But as per the IS 10500, if other source is not available these limits are permissible. Thus apart from some cases the overall results shows, that water from the boreholes in the studied area are acceptable quality for drinking and household utilization.

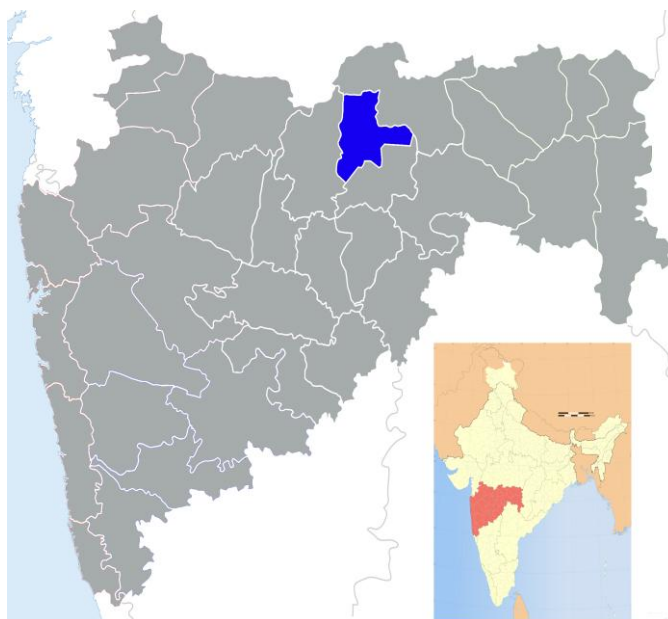
Keywords: Borehole, Physico-chemical property, Water quality.

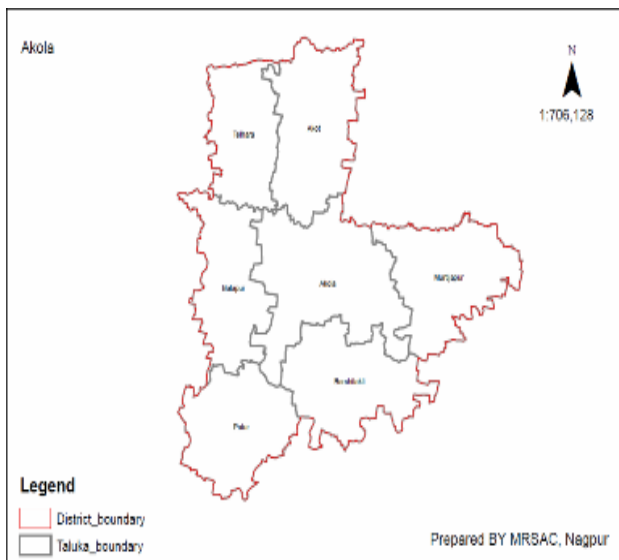
Introduction

Groundwater is used for domestic and industrial water supply and irrigation all over the world. In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization C. R. Ramkrishnaiah et. al. (2008). As water is one of the most important compounds of the ecosystem, but due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to pollute water quality and depletion of aquatic biota. It is therefore necessary that the quality of drinking water should be checked at regular time of interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases Basavaraja Simpi et.al. (2011). The water used for drinking purpose should be free from toxic elements, living and non-living organisms and excessive amount of minerals that may be harmful to health B. Rajappa et. al. (2011). Pollution of groundwater due to industrial effluents and municipal waste in water bodies is another major concern in many cities and industrial clusters in India. Groundwater is very difficult to remediate, except in small defined areas and therefore the emphasis has to be on prevention M. R. Mahananda et. al. (2010). The present work attempts to measure the water quality of various boreholes of three villages of Barshitakli Taluka, district Akola, Maharashtra State, India.

Materials and Methods

Study area: Three villages are selected from Barshitakli Taluka, District Akola. The following figure shows the location on map.



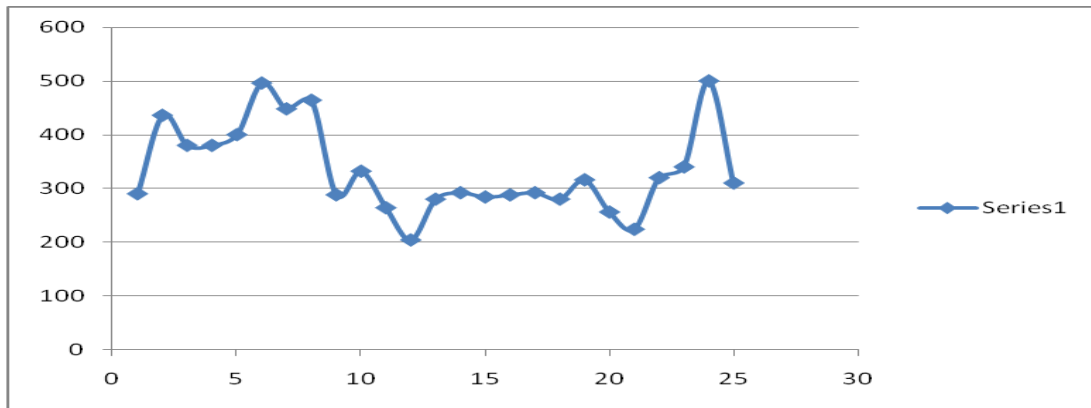


I have survey the water for investigate its quality during the period of six months from July 2021 to December 2021. The Water Samples from 6 villages were collected in the morning hours between 9 am to 11 am in Polythene bottle. The Water samples were immediately brought in to laboratory for the estimation of various parameters. Distilled water was used as a Control Sample Rathore D.S. (2014). Standard Procedures Titration method- Atomic Absorption Spectrophotometer (AAS) were performed as per APHA.

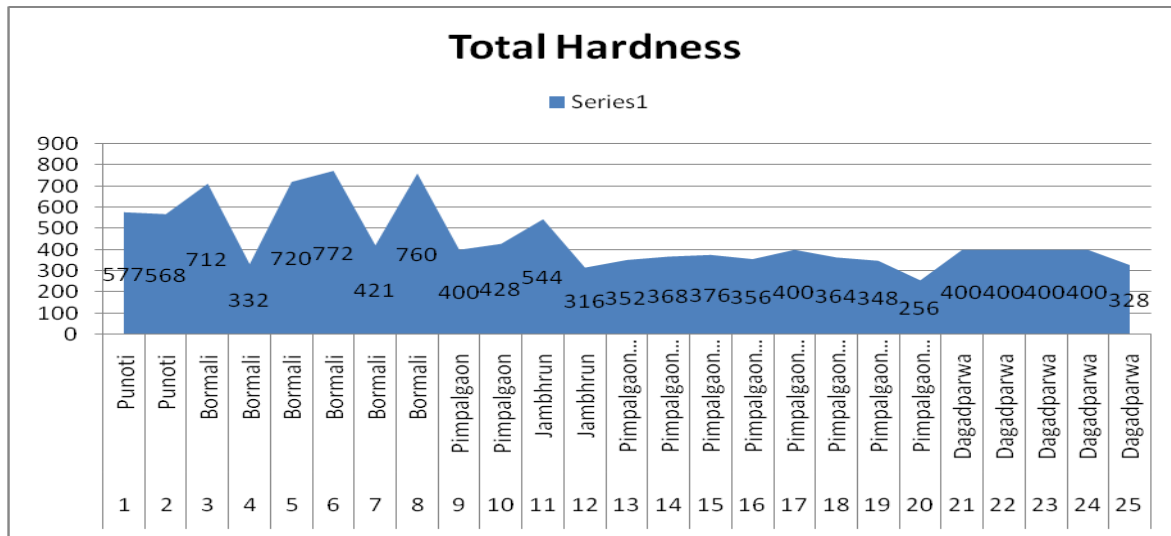
Results and Discussion

Sr. No	Location	Physical appearance	Odour	Turbidity NTU	pH	Alkalinity	Total hardness as CaCo ₃	Total Dissolved Solids	Fluoride as F	Chloride as Cl	Nitrate as NO ₃	Iron as Fe
1	Punoti	Clear	Odourless	1.65	7.24	290	577	950	0.256	128	39.18	ND
2	Punoti	Clear	Odourless	0.53	7.41	436	568	661	0.336	34	24.77	0.02
3	Bormali	Clear	Odourless	1.81	7.6	380	712	890	0.404	28	20.2	0.15
4	Bormali	Clear	Odourless	0.9	7.56	380	332	858	0.382	124	43.88	0.22
5	Bormali	Clear	Odourless	0.73	7.4	400	720	1077	0.433	200	44.85	0.04
6	Bormali	Clear	Odourless	0.7	7.31	496	772	1325	0.347	144	74.104	ND
7	Bormali	Clear	Odourless	0.5	7.48	448	421	597	0.587	58	31.214	0.07
8	Bormali	Clear	Odourless	1.34	7.21	464	760	1096	0.536	200	67.656	0.32
9	Pimpalgaon	Clear	Odourless	0.98	7.55	288	400	778	0.387	120	42.18	0.241
10	Pimpalgaon	Clear	Odourless	0.91	7.59	332	428	677	0.735	60	41.402	0.03
11	Jambhrun	Clear	Odourless	0.61	7.82	264	544	696	Nil	84	63.988	0.135
12	Jambhrun	Clear	Odourless	0.63	7.56	204	316	375	Nil	22	8.634	0.01
13	Pimpalgaon chambher	Clear	Odourless	1.07	7.59	280	352	743	0.422	196	30.89	0.04
14	Pimpalgaon chambher	Clear	Odourless	0.36	7.67	292	368	760	0.308	126	34.74	0.25
15	Pimpalgaon chambher	Clear	Odourless	0.67	7.63	284	376	763	0.29	130	35.13	0.05
16	Pimpalgaon chambher	Clear	Odourless	0.69	7.66	288	356	763	0.821	140	30.57	0.01
17	Pimpalgaon chambher	Clear	Odourless	0.77	7.73	292	400	746	0.365	220	42.96	0.04
18	Pimpalgaon chambher	Clear	Odourless	0.93	7.65	280	364	750	0.239	128	38.54	0.09
19	Pimpalgaon chambher	Clear	Odourless	0.94	7.67	316	348	763	0.33	124	44.79	0.07
20	Pimpalgaon chambher	Clear	Odourless	0.96	7.66	256	256	756	0.615	40	32.1	0.02
21	Dagadparwa	Clear	Odourless	1.04	7.97	224	400	590	0.519	140	16.47	0.005
22	Dagadparwa	Clear	Odourless	0.83	7.88	320	400	416	0.179	78	0.425	1.1
23	Dagadparwa	Clear	Odourless	1.09	7.82	340	400	524	Nil	40	1.018	0.375
24	Dagadparwa	Clear	Odourless	1.25	7.97	500	400	566	0.104	46	12.33	0.05
25	Dagadparwa	Clear	Odourless	0.91	8.1	310	328	470	0.442	129	60.1	0.06

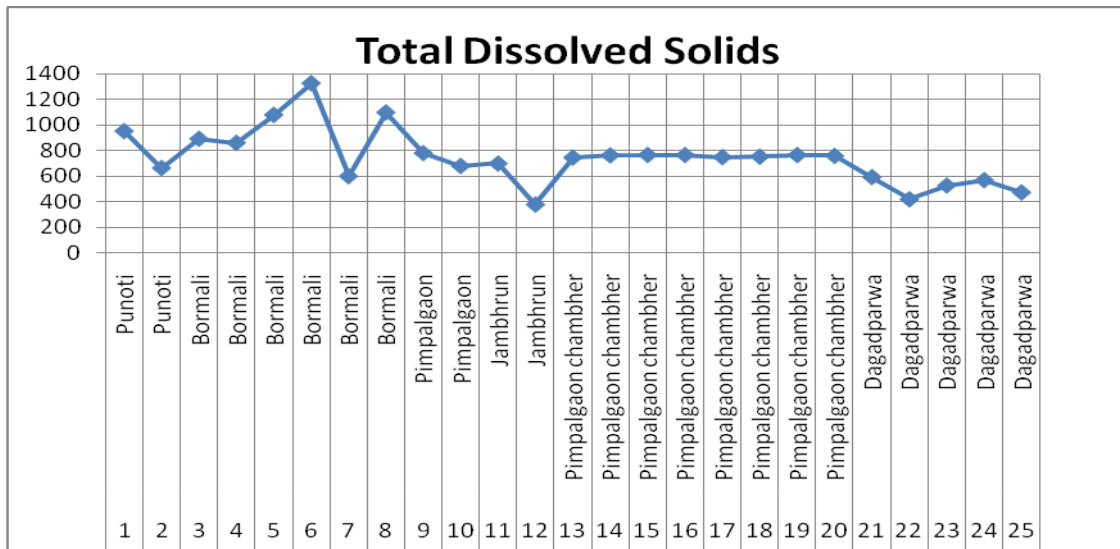
Table: 1. Physico-chemical Water Parameter from various places of Barshitakli Tahsil.



Graph: 1. Graphical Representation of Alkalinity from various places in Barshitakli.



Graph: 2. Graphical Representation of Total Hardness from various places in Barshitakli.



Graph: 3. Graphical Representation of Total Dissolved Solids from various places in

Barshitakli

The results of the physicochemical analysis performed have been recorded in Tables 1. The water samples had acceptable levels of pH in the range of 7.18-8.10. In the case of turbidity, none of

the sample exceeds the limits of 5 NTU. Hardness and alkalinity of drinking water are said to be acceptable at 300mg/L and 200mg/L respective according to the WHO. Alkalinity of 500.00 mg/L (In the case of Dagadparwa) is however also acceptable by the IS 10500 if other source does not

available. The total hardness of four samples of Bormali far exceeds the level of 300 mg/l and reaches to 700+ values, which is a cause of concern. The range of Total Dissolved Solids is large, with a minimum value of 375.00 mg/l to 1325.00 mg/l ($375.00-1325.00 \pm 213.91$ mg/L). Fluoride shows all the results within limits. Very few locations shows more chloride and nitrate concentration than the standard values. Iron concentration is within limits for all the studied location. The graphical representation of alkalinity, Total Hardness and Total Dissolved solids are shown separately.

Conclusion

There is more variation in the concentration of Alkalinity and total hardness. Total Dissolved Solids (TSS) 375.00-1325.0 mg/l (742.40 ± 213.91 mg/l mean) are generally above Indian standard limit. But as per the IS 10500, if other source is not available these limits are permissible. Thus apart from some cases the general results shows that water from the boreholes in the studied area are of acceptable quality for drinking and household utilization. However the four samples from Bormali shows higher concentration of Total Hardness, which is a cause of concern.

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