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## RESEARCH ARTICLE

### ASSESSMENT OF UNDERGROUND WATER QUALITY AROUND HADAPSAR REGION IN PUNE, MAHARASHTRA

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#### ABSTRACT

Water is one of the vital needs of all living beings. Humans need water in many daily activities like drinking, washing, bathing, cooking etc. If the quality of water is not good then it becomes unfit for drinking and other activities. Present work is analysis of ground water pollution in hadapsar region. This area has got many open wells which are connected by ground water table of surrounding area. As the water is used for drinking and irrigation purposes, it becomes essential to find the suitability of these open wells for drinking and irrigation purpose. In current work Open wells from study area were Selected and tested for various parameters. The hydro chemical analysis has been done by using piper diagram for both the seasons, i.e. pre and post monsoon. The groundwater quality is tested based on Sodium percent, Sodium Absorption Ratio and Residual Sodium Carbonate & suitability of water for irrigation purpose is examined. Thus from the overall analysis some suggestions & remedial measures are provided in the paper for the same.

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#### INTRODUCTION

The chemistry of water is very vibrant, mostly controlled by its medium of contact. In view of the fact that the chemistry of water directly hints the quality of water for various purposes, it's monitoring and evaluation gained considerable importance in the present century. A terrific raise in the population increased the stress on surface water and the groundwater. From the ancient times the ground water is used mostly for drinking because of the filtering effect of aquifers. Though, in at present one cannot drink the water directly from the source without treatment. Various chemical, physical and biological processes alter the original quality of water when it moves through the hydrological cycle; the reactions of soil, rock, organic matter, Natural processes and human activities are causes behind changes in groundwater quality. So this study examines the quality of ground water throughout the hadapsar region and it is seen that the ground water quality at some places is not fulfilling the desired parameters. The ground water quality may affect due to industrial activities in surrounding area, human activities, unlimited use of chemical fertilizers etc. such factors lead to decrease in water qualities in wells & bores in the area. Water from such wells & bores is currently used by the people in the area for drinking, domestic & agricultural purpose which might affect the health of people.

Therefore it is necessary to assess the ground water quality status of the areas around hadapsar region during the pre monsoon and post monsoon period to frame the policy and management plan for the protecting it from the contamination and further deterioration of water quality.

#### MATERIALS AND METHODS

Hadapsar is an eastern suburb of Pune City, Maharashtra, India. Hadapsar is situated at 18.4967° N, 73.9417° E. Groundwater samples are randomly collected from rural areas like Keshavnagar, Ghulewasti and Bhapkar mala. All the three areas are surrounded by agricultural land and residential area. The 4 open well samples from Keshavnagar, 4 open well samples from ghule wasti and 2 open well samples from bhapkar mala were collected. All the samples were collected by grab sampling method in plastic bottle from all the sampling stations. The collected samples were analyzed for various parameters like pH, Total Dissolved Solids, Hardness, Conductivity, Turbidity, Alkalinity, Chlorides, Sulphates, Calcium, Magnesium. The parameters are selected on the basis of two steps. First one is the cations and anions that required for plotting of piper diagram which indicates the concentration of ions in water. Second one is to check the suitability of water for irrigation purpose on the basis of Residual sodium carbonate (RSC), Sodium Hazard and Sodium adsorption ratio (SAR).

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## RESULTS

The Ground water quality parameters analyzed for open wells around Hadapsar region. These samples were analyzed during post monsoon (Nov 2014) period for below mentioned water quality Parameters. The results are as below:

## DISCUSSION

From the above result it can be seen that the PH was within the range. The TDS was ranging from 283-569 mg/lit. It can be seen that many of the samples were above desirable limits i.e. 500 mg/l. The total hardness was ranging from 250-554 mg/lit.



Figure 1. Location of Sample wells Sodium, Potassium, Bicarbonates and Temperature. All the samples were tested as per APHA standards

Table 1. Table for Result of Analysis for Post Monsoon Season

S.No.	Parameters	Desired limit	Result (post monsoon)								
			OW1	OW2	OW3	OW4	OW5	OW6	OW7	OW8	OW9
1	PH	6.5-8.5	6.48	6.76	6.46	6.64	6.83	6.73	6.74	6.78	6.82
2	TDS	500 mg/l	490	515	569	519	393	405	410	283	295
3	Total Hardness	300 mg/l	316	470	554	400	380	398	401	250	262
4	Conductivity	600 $\mu$ s/cm	963	1028	1144	1039	779	795	801	561	572
5	Turbidity	5 NTV	8	1	1	1	1	1	1	1	1
6	Alkalinity	200 mg/l	160	120	100.4	110	101	110	108	80.1	75.3
7	Chlorides	250 mg/l	56.3	88.20	108	108	60.30	62.3	70.2	41.4	46
8	Sulphate	200 mg/l	19	32	28	21	18	21	22	11	13
9	Calcium	75 mg/l	110.4	180	235	168	152	155	153	78	81
10	Magnesium	-	105	125	180	151	171	178	180	95	98
11	Sodium	300 mg/l	110	131	121	126	151	155	152	156	162
12	Potassium	-	48	41	49	45	31	36	35	36	42
13	Biocarbonate	Desired limit	20	22	18	21	12	14	16	14	19
14	Temperature	- $^{\circ}$ C	29.30	29	29	29	29	28.9	29.1	29	29

All the water samples except one were above the normal range. Thus it can be seen that the open well water for all sampling points is hard. Conductivity and Turbidity were almost in range. Alkalinity, Chlorides, Sulphates, Calcium, Magnesium, Sodium, Potassium, Bicarbonates were within the range.

### Conclusion

Even if many of the parameters were within range, but the parameter hardness needs attention. Water hardness has no known adverse effects; however, some evidence indicates its role in heart diseases and hardness of 150-300 mg/l and above may cause kidney problems and kidney stone formation, as it causes unpleasant taste and reduce ability of soap to produce lather. Hard water is unsuitable for domestic use.

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