International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Underground Water Quality Assessment around Hadapsar Region in Pune, Maharashtra

M.J.Pawari[1], S. M. Gavande[2]

[1]P. G. Scholar, Department of Civil Engineering, Anantrao Pawar College of Engineering and Research Parvati Pune, Maharashtra, India

[2]Professor, Department of Civil Engineering, Anantrao Pawar College of Engineering and Research Parvati Pune, Maharashtra, India

Abstract: ***Water is one of the vital needs of all living beings. 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. 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 and result shows that water is not suitable for drinking purpose. The hydro chemical analysis has been done by using piper diagram for both the seasons, i.e. pre and post monsoon season. The groundwater quality is tested based on Sodium percent, Sodium Absorption Ratio and Residual Sodium Carbonate & suitability of water for irrigation purpose is examined and it found suitable for irrigation.***

Keywords: Ground water pollution, hadapsar, hydro chemical analysis.

1. 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, its 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 & 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 detoriation of water quality.

2. Methodology

Hadapsar is an eastern suburb of Pune City, Maharashtra, India. Hadapsar is situated at18.4967° 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,

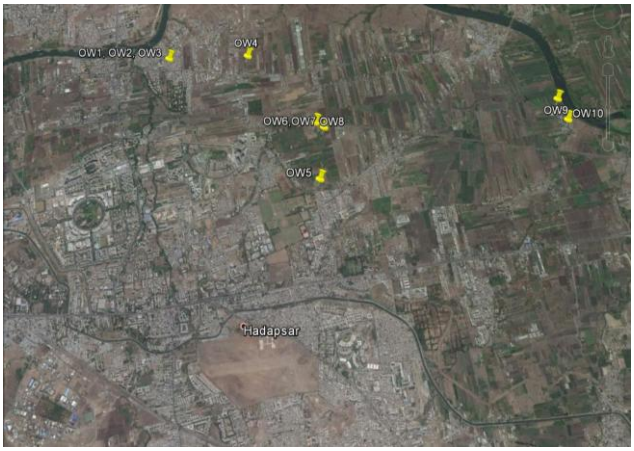

Figure 1: Showing Location of Sample wells

Sodium(Na),Potassium(K),Bicarbonates and Temperature. All the samples were tested as per APHA standards. 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).

3. Results

The Ground water quality parameters analyzed for open wells around Hadapsar region. These samples were analyzed during post monsoon (Nov 2014) and pre monsoon (2015) period for below mentioned water quality Parameters. The results obtained are as fallows.

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	500mg/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	600us/cm	963	1028	1144	1039	779	795	801	561	572
5	Turbidity	5NTU	8	1	1	1	1	1	1	1	1
6	Alkalinity	200mg/l	160	120	100.4	110	101	110	108	80.1	75.3
7	Chlorides	250mg/l	56.3	88.20	108	108	60.30	62.3	70.2	41.4	46
8	Sulphate	200mg/l	19	32	28	21	18	21	22	11	13
9	Calcium	75mg/l	110.4	180	235	168	152	155	153	78	81
10	Magnesium	Mg/l	105	125	180	151	171	178	180	95	98
11	Sodium	300mg/l	110	131	121	126	151	155	152	156	162
12	Potassium	-mg/l	48	41	49	45	31	36	35	36	42
13	Biocarbonate	Mg/l	20	22	18	21	12	14	16	14	19
14	Temperature	$-^0c$	29.30	29	29	29	29	28.9	29.1	29	29
15	Carbonates	mg/l	.100	0.100	0.100	0.200	0.200	.200	.200	0.00	.2

4. 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. 500mg/l. The total hardness was ranging from 250-554 mg/lit. 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 almostinrange. Alkalinity, Chlorides, Sulphates, Ca, Mg, Na, K, Bicarbonates were within the range

Table 2: Table for result of analysis for pre monsoon season

Sr.no.	Parameters	Desired limit	Result(pre monsoon)								
			OW1	OW2	OW3	OW4	OW5	OW6	OW7	OW8	OW9
1	PH	6.5-8.5	7.28	7.14	7.19	7.10	7.5	7.1	7.16	7.22	7.3
2	TDS	500mg/l	1082	1012	597	895	512	526.23	622	486	450
3	T. Hardness	300 mg/l	248.24	352.30	316.72	375.12	375.20	451.2	355.24	258.8	248.3
4	Conductivity	600us/cm	1576	789	896	900	852.1	789.23	944	742	652.3
5	Turbidity	5NTU	9.1	7.5	4.5	6.5	3.1	4.2	0.4	2.1	3.2
6	Alkalinity	200mg/l	681.38	751	303.14	551.46	456.2	426.12	327.6	264.74	250.21
7	Chlorides	250mg/l	111.54	100.23	74.38	95.12	100.2	75.26	66.53	50.88	62.33
8	Sulphate	200mg/l	48.636	35.13	29.35	42.13	45.2	52.3	31.1	24.3	35.6
9	Calcium	75mg/l	96.06	86.15	69.2	72.13	82.3	76.13	87.49	70.33	71.23
10	Magnesium	Mg/l	36.98	45.12	55.28	48.13	56.3	62.3	65.06	45.3	42.3
11	Sodium	300mg/l	10.37	9.15	10.37	8.26	11.3	15.2	10.37	10.37	15.23
12	Potassium	-mg/l	2.0	3.5	2.0	4.6	3.1	2.5	2.0	2.0	2.6
13	Bicarbonates	mg/l	12.56	10.52	8.58	9.12	32.1	29.1	27.64	23.2	32.4
14	Temperature	$-^0c$	4.2	2.3	2.5	1.2	6.3	5.2	2.3	6.3	2.3
15	Carbonates	Mg/l	28	27.2	28	28	27	28	28	28	27.8

5. Conclusion

From the above observation, it may concluded that almost all the parameters like pH, sodium, potassium, carbonate, bicarbonate, chloride are within the permissible limits prescribed by APHA but calcium, magnesium and nitrate values were exceeding the limits. The piper diagram shows that alkaline earth(Ca2++ Mg2+) exceed over alkaline (Na++ K+) where in anion strong acids (SO42-+ Cl-) were predominated. On the other hand most of the sampling station considered suitable for irrigation uses according to EC, SAR, %Na and RSC values.

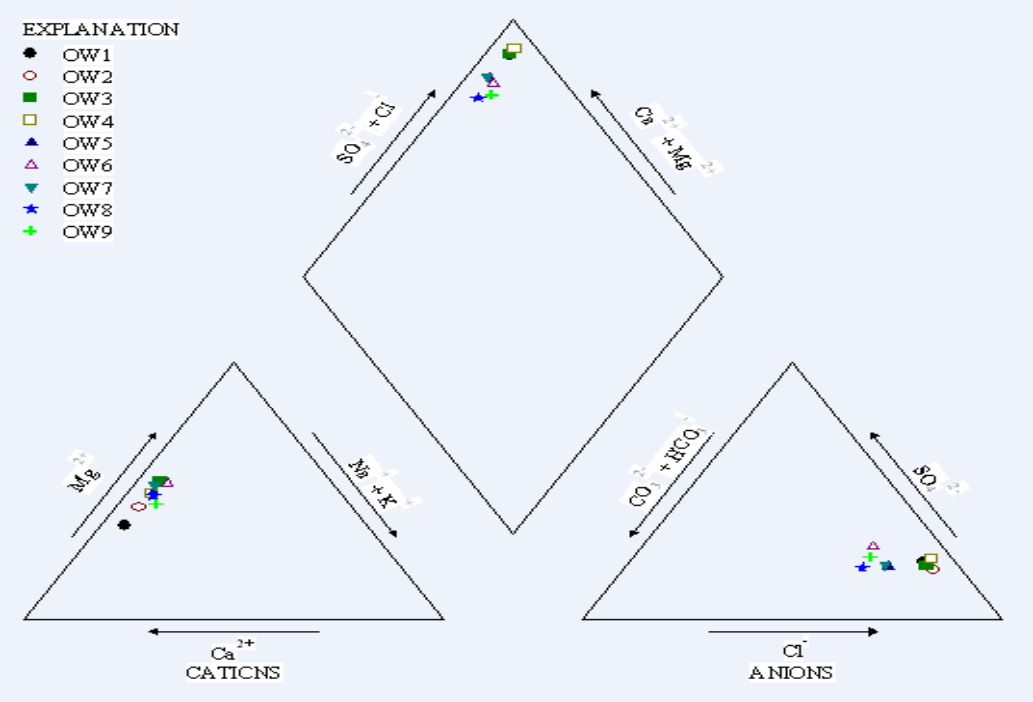

Figure 2: shows piper diagram for Pre Monsoon season

References

[1] Priti Singh1, I.A. Khan2,1- Institute of Environment Education and Research, BhartiVidyapeeth,Pune411043, Maharashtra, India.2-Department of Geology Nowrosjee WadiaCollege, Pune- 411001,Maharashtra, India

[2] Sarala C, Ravi Babu P, " Assessment of Groundwater Quality Parameters in and around Jawaharnagar, Hyderabad, International Journal of Scientific and Research Publications, Volume 2, Issue 10, 2012, pp.1-6.

[3] ShimaaM.Ghoraba&A.D.Khan,"hydrochemistry and groundwater quality assessment in balochistan province, Pakistan", IJRRAS 17 (2) November 2013, 185-199

[4] Vikas Tomar, Kamra S.K, Kumar S, Kumar Ajay and Vishal Khajuria, "Hydro-chemical analysis and evaluation of groundwater quality for irrigation in Karnal district of Haryana state, India", International Journal of Environmental Sciences, Volume 3, No 2, 2012, pp.756-766.

[5] C. Sadashivaia1, C. R. Ramakrishnaiah and G. Ranganna, "Hydrochemical Analysis and Evaluation of Groundwater Quality in Tumkur Taluk, Karnataka State, India, International Journal of Environmental Research and Public Health, 2008, 5(3) 158-164. N Shaheda Niloufer, A.V. V. S. Swamy and M K. Syamala Devi, "Impact of Municipal Solid Waste on the Ground Water Quality in Vijayawada City, Andhra Pradesh", Indian Jo urnal of Applied research, Volume 3, April 2013, pp.62-642.

[6] Chidanand Patil, Shreekant Narayanakar and ArjunVirupakshi, "Assessment of Groundwater Quality Around Solid Waste Landfill Area - A Case Study, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 2, Issue 7, July 2013, pp. 3131-3136.

[7] E.O. Longe and M.R.Balogun, "Groundwater Quality Assessment near a Municipal Landfill, Lagos, Nigeria", Research Journal of Applied Sciences, Engineering and Technology , Vol2(1), 2010, pp.39-44.

[8] M. R. G. Sayyed1, G. S. Wagh2, A. Supekar3, "Assessment of impact on the ground water quality due to urbanization by hydro geochemical facies analysis in SE part of Pune city, India", Proceedings of the International Academy of Ecology and Environmental Sciences, 2013, 3(2): 148-15.

[9] Adetunde L.A, Glover R.L.K &Oguntola G.O, "assessment of the ground water quality in ogbomoso township of oyo state of nigeria", IJRRAS8 (1) july 2011, 115-122.

[10] Dinesh kumar tank and c. p. Singh chandel, "Analysis of the major ion constituents in groundwater of Jaipur city", Nature and Science, 2010;8(10), 1-7

[11] Mane T.T. and HinganeHemalata N."Existing Situationof Solid Waste Management in Pune City, India", Research Journal of Recent Sciences.

[12] P.I. Agber, A. Ali and N. A. Tsaku, "Assessment of Ground Water Quality, Soil Propertiesand Nutrient Content of Soil in Areas Close to MunicipalRefuse Dump Sites in Makurdi, Nigeria", J. Biol. Chem. Research. Vol. 30, No. 1, 2013, pp.88-97.

[13] Sarala C, Ravi Babu P, " Assessment of Groundwater Quality Parameters in and around Jawaharnagar, Hyderabad, International Journal of Scientific and Research Publications, Volume 2, Issue 10, 2012, pp.1-6.

[14] N Shaheda Niloufer, A.V. V. S. Swamy and M K. Syamala Devi, "Impact of Municipal Solid Waste on the Ground Water Quality in Vijayawada City, Andhra Pradesh", Indian Journal of Applied research, Volume 3, April 2013, pp.62-642.

[15] Chidanand Patil, Shreekant Narayanakar and ArjunVirupakshi, "Assessment of Groundwater Quality

Around Solid Waste Landfill Area - A Case Study, International Journal of Innovative Research in Science,
[16] Mohammed Saidu, "Effect of refuse dumps on ground water quality", Advances in Applied Science Research, 2011, Vol.2 (6) pp.595-599.
[17] AderemiAdeolu O., Oriaku Ada V. AdewumiGbenga A. and Otitoloju Adebayo A, "Assessment of groundwater contamination by leachate near a municipal solid waste landfill", African Journal of Environmental Science and Technology Vol. 5(11), November 2011, pp. 933-940.
[18] N.Rajkumar,T.Subramani,L.Elango,"Groundwater Contamination Due to Municipal Solid Waste Disposal – A GIS Based Study in Erode City, International Journal of Environmental Sciences Volume 1, No1,2010, pp. 39-55.
[19] Butt, Ibtisam and Ghaffar, Abdul, "Ground water quality assessment near Mehmood Botilandfill, Lahore, Pakistan," Asian Journal of Social Sciences &Humanities, Vol. 1. No. 2. May 2012, pp.13-24.
[20] N.Raman*andD.Sathiyanarayanan,Research Department of Chemistry VHNSN college V irudhunagar-626 001, India.
[21] LI Peiyue, WU Jianhua, QIAN HuiSchool of Environmental Science and Engineering, Chang'an University, No. 126 Yanta Road, Xi'an, Shaanxi, 710054, China.
[22] M Senthilkumar1 and L Elango2,∗1Central Ground Water Board, Chennai 600 090, India.2Department of Geology, Anna University, Chennai 600 025, India.
[23] Priti Singh1, I.A. Khan2,1- Institute of Environment Education and Research, BhartiVidyapeeth, Pune – 411 043,Maharashtra, India.2-Departmentof Geology NowrosjeeWadia College, Pune- 411 001, Maharashtra, India
[24] S.Nassem.Department of Geology University of Karachi,Karachi 7527o,Pakistan.
[25] Priyanka Pandeya,Pushpendra Singh Bundelaa, AnjanaSharmab, Akhilesh Kumar Pandeyc, and Abhishek Kumar Awasthia. a- Regional Office, Madhya Pradesh Pollution Control Board, Vijay Nagar, Jabalpur, India

Engineering and Technology, Vol. 2, Issue 7 July 2013, pp. 3131-3136.