

Status of Ground Water Quality of Residential And Industrial Areas of Lucknow City, Uttar Pradesh

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ABSTRACT:

One of the basic requirements for healthy life of living things is clean water. Although 70% of earth's part is covered with water still there is limited amount of fresh and potable water, and this limited amount of potable water is getting polluted with increase in pollution level of environment. Pollution is increasing in ground water due to ignorance and irresponsible behavior. As potable water gives life, polluted and contaminated water cause diseases.

In this study an attempt is made to evaluate the ground water quality of Lucknow city. The ground water samples collected from the different sites which were divided into industrial and residential areas. The samples were analyzed for the physico-chemical properties such as pH, TDS (total dissolved solid), EC (electrical conductivity), Alkalinity, TH (total hardness) etc. The outcomes were compared with BIS limits. The result revealed that there is variation in physico-chemical properties of ground water from location to location.

KEYWORDS: ground water, Lucknow, physico-chemical quality.

INTRODUCTION:

Total amount of water present on earth can be mainly divided into surface and subsurface (ground water) water. Ground water is principal source of drinking water, although in Lucknow surface water (Gomti River) is also used for many purpose such as drinking. Once it was believed that ground water is safe from pollution as it is not in direct contact with the human being (.D.A.Dhale et.al 2012). The ground water is a part of the active system and its chemical composition differs and varies on changing the sampling sites. (Mamta Goyal 2006).

Lucknow, the capital of Uttar Pradesh is famous place from historic point of view. It is known of city of Nawabs. Lucknow is basically not an industrial area. The climate of Lucknow is subtropical type with three district seasons namely summer, monsoon and winter. The extent of deterioration of water quality is directly proportional to industrialization and urbanization in a modern society. (Annapurna Singh et al 2012). Ground water quality is degrading day by day due to human interface.

According to above aspects in this study attempt is made to investigate ground water samples of different location of Lucknow to know the level of deterioration . In this work water samples of vikas nagar ,Chinhat etc. were grab and analyzed .

MATERIAL AND METHOD:

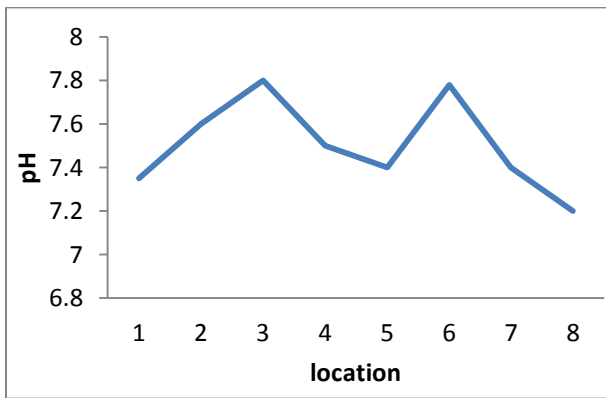
All the samples were collected in month of June-July 2014. The locations selected for investigation were divided into industrial and residential areas. The samples were collected in sterilized and phosphate free bottles. The collected samples were analyzed for various physico-chemical parameters following, "Standard

Methods of Analysis of Water and Waste water”. The chemicals used were of analytical grade. Double distilled water was used for preparation of reagent and solution.

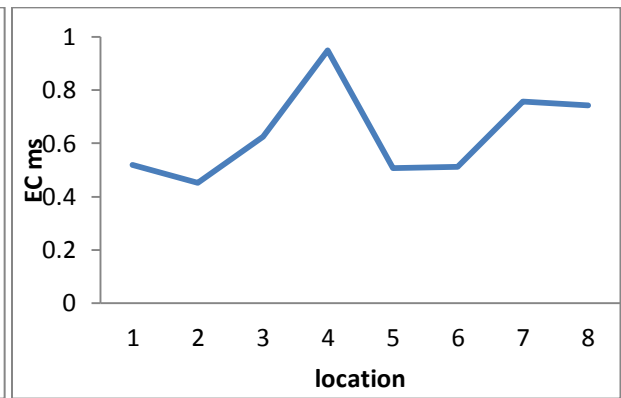
RESULTS AND DISCUSSION:

Table 1. Comparison of Physico-chemical characteristics of ground water of industrial and residential areas of Lucknow.

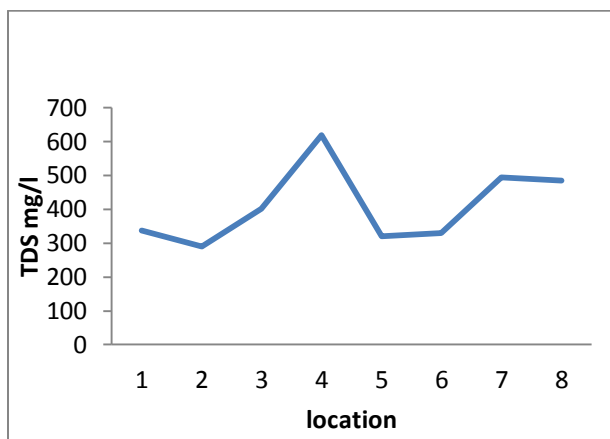
R E S I D E N T I A L	s o .	Location	Tem	pH	EC	TDS	Hard ness	Alka linit y	Cl ⁻	Zn	Cr	cu	NO ₃ ⁻	
			^o C		Ms	mg/l	mg/l	mg/l	mg/l	mg/ l	mg/l	mg/ l	mg/l	
		BIS desirable limit		6.5- 8.5		500 mg/l	300 mg/l	200 mg/l	250 mg/l	5 mg/ l	0.05 mg/l	0.0 5 mg/ l	45 mg/l	
1		Vikas nagar	31.1	7.35	0.520	337	195	162	63.81	0.2 0	0.00 8	0.1	56.8	
2		Indira nagar	30.3	7.60	0.451	289	200	240	54.46	0.4 1	0.01 1	0.1	87	
3		Nishatganj	31.3	7.80	0.625	402	175	220	85.08	0.2 5	0.00 4	>0. 1	65	
4		Hussainganj	29.3	7.5	0.950	618	270	290	85.07	0.6 2	0.01 4	>0. 1	17	
5		Gomti nagar	29.6	7.4	0.506	321	238	178	86.03	0.3 0		>0. 1	19	
6		Sarogni nagar	30.4	7.78	0.511	330	200	266	100	0.4 5	0.00 8	0.1	38.5 5	
7		Chinhat	31.2	7.40	0.758	494	205	186	117.69	0.0 6	0.00 9	>0. 1	79.3	
8		Talkatora	30.6	7.20	0.743	485	265	255	125	0.7 0	0.01 2	0.1	52.4	
		AVERAGE		7.50	0.63	409. 5	218. 5	224. 63	89.64	0.3 7	0.00 9	0.1	51.8 8	
		SD	30.4 8	0.74 4	0.21	0.17	113. 58	34.8 6	45.9 1	24.21	0.2 2	0.00 3	0.1	25.7 9



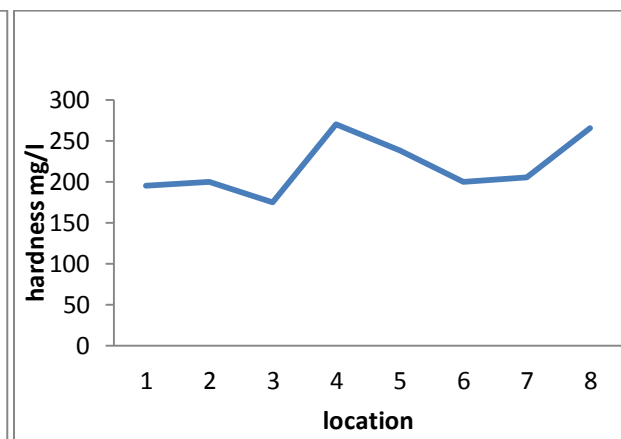
Variation in pH value



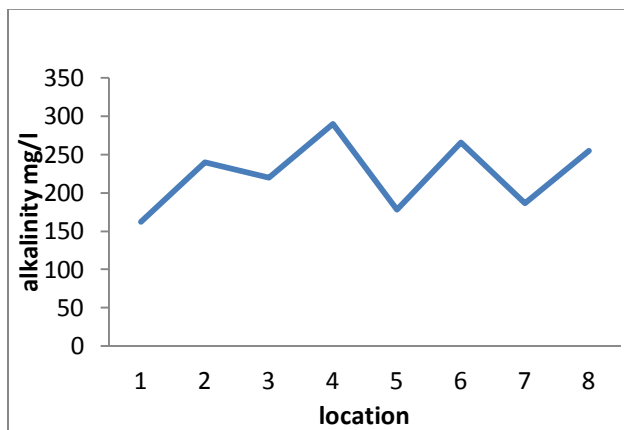
Variation in EC value



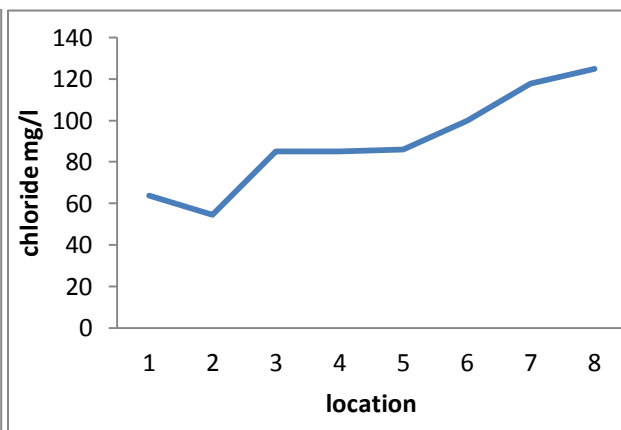
Variation in TDS value



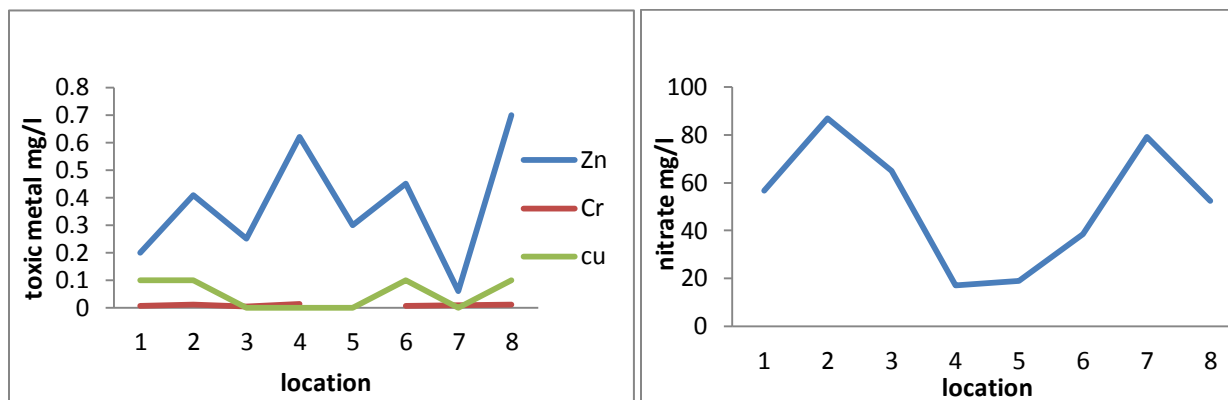
Variation in hardness



Variation in alkalinity



Variation in chloride concentration



Variation in toxic metal concentration

Variation in nitrate concentration

pH- The term pH refers to the measure of hydrogen ion concentration in a solution and define as negative log of H⁺ ion concentration in water. Lower value of pH below 4 will give sour taste and value above 8 will give bitter taste.(APHA). Value of pH recorded between 7.20-7.80. all the values were with in the desirable limit set by BIS which is 6.5-8.5

EC- conductivity of water is linked to the ions present in water (APHA).value of conductivity recorded between 0.950-0.506 ms. The highest value was of Hussainganj and value was recorded in Gomti nagar.

TDS- TDS referes to the amount of substance which is dissolved in water(APHA) .Highest value is recorded is of Hussainganj 618 mg/l and lowest value is of Gomti nagar 321 mg/l. TDS of Hussainganj is above desirable limit and TDS value of Chinhat and Talkatora near desirable value.

HARDNESS:

water with high mineral content is known as hard water. (APHA) .Hussainganj has highest value i.e. 270 mg/l, whereas lower value is recorded in Nishatganj i.e. 175 mg/l. hardness of Hussainganj and Talkatora were near desirable limit.

ALKALINITY:

large amount of alkalinity cause bitter taste in water (APHA). Hussainganj has highest value of alkalinity i.e 290 mg/l. whereas vikas nagar has recorded minimum value i.e.162 mg/l. value of Indira nagar,Nishatganj, Hussainganj, Sarogni nagar, chinhat, Talkatora were above desirable limit .Alkalinity of Gomti nagar is near desirable limit.

CHLORIDE CONCENTRATION:

Chlorides are present in water usually as NaCl, MgCl₂ and CaCl₂. Cholide concentrations over 250 ppm impart a peculiar taste to the water thus rendering the water unacceptable for drinking purposes. Highest value of chloride was recorded in Talkatora, and lowest value was recorded in Indira nagar.

TOXIC METAL:

metal such as Cu, Zn, Cr, were analysed in ground water samples. Concentration of metal were within desirable limit set by BIS in all samples.

NITRATE CONCENTRATION:

Nitrate and Nitrite pollution is one of groundwater's most commonly identified contaminants, an indicator of serious pollution as they are associated with septic waste and agricultural endeavours, leads to numerous health problems to human beings and animals(Anjali Verma 2014). highest value of nitrate concentration was recorded in Indira nagar 87 mg/l, whereas lowest value was recorded in Hussainganj 17 mg/l. nitrate concentration of Vikas nagar , Indira nagar, Nishatganj, Chinhat, Talkatora were above desirable limit, value of Gomti nagar was near desirable limit.

CONCLUSION:

From the above discussion it can be concluded that values of most of water samples are acceptable according to BIS guideline .Except few parameter like nitrate concentration, TDS, alkalinity shows marginal increase from desirable limit of BIS. Overall Hussainganj of residential area is more polluted. Whereas industrial areas are near deterioration limit.

REFERENCE:

1. Baskaram Sundaram and Jane Coram, Groundwater Quality in Australia and New Zealand: a literature review, dec 2009, prepared by Geoscience Australia.
2. Verma Anjali, Rawat Amit K.,and Nandkishore, Extent of Nitrate and Nitrite Pollution in Ground Water of Rural Areas of Lucknow , U.P., India ,2014, v9(1),pp 114-122
3. Das .N.C., Physico-Chemical Characteristics of Selected Ground Water Samples Of Ballarpur City Of Chandrapur District , Maharashtra, India, 2013 ,IRJES,V-2(11)pp96-100
4. Dhawale VP, Aher SK And Kukarni SD, Ground Water Quality Assessment Of Drought Prone Area - A Case Study, IJBPA, November, 2013, 2(11): 2157-2168
5. Er. Rajvir Singh Jurel, Er. Raj Bahadur Singh, Dr. Sunit Kumar Jurel, Dr.Raghuwar D.Singh , Infiltration Galleries:-A Solution To Drinking Water Supply For Urban Areas Near Rivers, Journal of Mechanical and Civil Engineering, Volume 5, Issue 3 (Jan. - Feb. 2013), PP 29-33
6. Tripathi A K, Pandey S N, Water Pollution ,2009 p 3-4
7. Sharma B.K., Environmental Chemistry,2012,ISBN 81-8283-119-9,p 36
8. Chandra Sameer, Rawat.S.K., Garg Sanjay K. and Singh Rana P. , Nitrate, Nitrite, Ammonium and Phosphate in Drinking Water and Surface Water Sources of Uttar Pradesh And Madhya Pradesh, India, 2012, IJPAES,V 2,ISSUE 3,pp 237-240
9. Verma Anjali, Rawat Amit K.,and Nandkishore, Extent of Nitrate and Nitrite Pollution in Ground Water of Rural Areas of Lucknow , U.P., India ,2014, v9(1),pp 114-122
10. Singh Annapurna, singh Jaspal and Shikha, Status of Ground Water and Municipal Water Supply of Lucknow Region – U.P.,2012, IJPAES,v-2,issue-4,pp 139-142
11. Hemant Wakode,Urbanisation and Water April 21, 2011, Vulnerability of Groundwater in India, Department of Engineering Geology and Hydrogeology of the RWTH Aachen University
12. BIS “Specifications for drinking water”, Bureau of Indian standards, New Delhi:1992;15:10500
13. Mamta Goyal AND Durga Nath Dhar, Status Of Iron And Fluoride Pollution In Some Parts Of District Unnao, U.P., India, Jr. of Industrial Pollution Control 22 (2)(2006) pp 277-284
14. D.A. Dhale and G.L. Pachkore , Assessment Of Physico-Chemical Status Of Ground Water Samples Of Parabhani District (M.S., INDIA), IJPSR, 2012; Vol. 3(5): 1367-1370
15. Anjali Verma, Amit Kumar Rawat and Nandkishor More, Extent of Nitrate and Nitrite Pollution in Ground Water of Rural Areas of Lucknow, U.P., India, Current World Environment, Vol. 9(1), 114-122 (2014)
16. American Public Health Association (APHA), Study Standard Methods for the Examination of Water and Wastewater 20 Edition. Washington D C, 1998.