Review of ReseaRch
ISSN: 2249-894X
Impact Factor : 5.7631(UIF)
Volume - 12 | Issue - 10 | July - 2023

ASSESSMENT OF GROUND WATER QUALITY IN SATNA -DISTRICT OF MADHYA PRADESH, (INDIA)

Arvind Prasad Dwivedi
Departmentof Chemistry, Govt. Swami Vivekananda P.G. College, Harda, M.P. (India).

ABSTRACT

The district of satna is situated between latitude23 '' 12' north and longitude 80 '' 21' and 81 '' 23 east in mid northern part of rewa commissioners 'division in Madhya Pradesh state of India. Fifteen sampling location were selected for the study from study area. The procedures followed to analyze the physico-chemical parameters were from standard method most of station were found higher value of hardness. The results were compared with standard prescribed by WHO. Temperature, pH, Chloride and sulphate of all the samples were found below the permissible limit set by BIS, 10500 (2012).The quality of ground water is highly related with the local environmental and geological conditions.

The quality of Soil and rock and the water table determines the quality of ground water. The ground water source level change by the regular withdrawal, and hence the quality of ground water may change seasonally as well as annually (Singh R.P. Chauhan, 2000).There are many sources of ground water pollution and, unfortunately, human are to blame for many of them. Poor management of waste, the rapid growth of industry and irresponsible uses of chemical all endanger the ground water people need to survive.

KEYWORDS: *Fifteen sampling location , local environmental and geological conditions.*

INTRODUCTION

Ground water is one of the most Important and basic natural resources. Water is not only of the most essential commodities of our day to day life, but the development of this natural resources also plays a crucial role in economic and social development processes. While the total amount of water available in the world is constant and is generally said to be adequate to meet allthe demands of mankind, its quality and distribution over different regions of the world is uneven and causes problems of scarcity and suitability.1Ground water contamination problem which may potentially affect human health 2-4. However, in the study area, the influence of natural and anthropogenic factors on ground water quality has not been widely available to date. Thus the present study aims (1) to categorize the present influence of natural and anthropogenic process ground water quality through multivariate statistical techniques, (2) to ascertain the physic-chemical characteristics of ground water for drinking use, (3) to use the pollution index of ground water (PIG) to characterize the variation in groundwater quality.

The identification of water quality depends on the intended use of the water which may be consumptive (human consumption) and no consumptive (industries, agriculture, and irrigation account for more than 2/3rd of the total human use), power generation recreation etc.), depending upon the purpose use of water. Certain quality criteria are established and based on these criteria; quality quality standards are specified by health and other regulating agencies to ensure that the water quality in a resource is suitable for the purposed use.Different type of water use requires different levels of water purity. Drinking water requires the highest standards of purity where as water of relatively lower quality is acceptable for other purpose like agriculture, industries fisheries, wildlife, livestock, recreation, hydro electric power, waste disposal etc.

In recent years, the growth of industry technology, population, chemical fertilizers, use of pesticides and some other problems like sewer leakage etc. degraded the ground water quality. The importance of ground water for existence of human society cannot be over emphasized. There are various ways as ground water is contaminated such as use of fertilizers in farming, municipal sewage disposal to nearby water bodies and seepage or disposal of effluent from Industries in general and textile industries, in particular. Most of the industries discharge their effluent without proper treatment in to nearby open pits or pass them through unlined channels, resulting in the contamination of ground water.

MATERIAL METHODS:

Sampling was done in accordance with grab sampling methods in polyethylene bottles on one litter capacity. To avoid leaching of metals and interaction with the surface wall of the container, bottles were first cleaned with detergent and then with1:1 HNO3for 24 hours. Finally bottles were cleaned and rinsed with the distilled water. During sampling bottles were rinsed two to three times with the sample to be examined before finally filling with it. All the Samples were refrigerated at 40C in the laboratory 15-17 and procedures were followed as per standard methods 18-19 and different Physico-chemical Parameter like temperature, pH, Turbidity ,dissolve oxygen, BOD, COD, nitrate, nitrite, chloride, sulphate, phosphate and heavy metals were analyzed. The digested samples were analyzed for heavy metals using Atomic Absorption Spectrophotometer. The location of sampling stations are shown in table

RESULTS DISCUSSION:

Year 2018-19 (Study Periods)

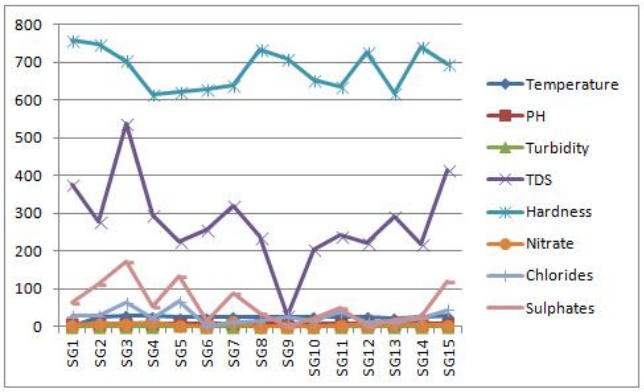
Parameters		Sampling Locations									
		SG1	SG2	SG3	SG4	SG5	SG6	SG7	SG8	SG9	SG10
Temperature (C^0)	Monsoon	29.0	26.0	30	28.0	27.0	26.0	29.0	28.0	30.0	25.0
	Winter	24.0	21.0	23.0	22.0	20.0	19.0	23.0	22.0	18.0	21.0
	Summer	33.0	35.0	34.0	36.0	27.0	29.0	28.0	31.0	30.0	31.0
pH	Monsoon	7.9	8.0	7.5	8.2	7.4	7.8	6.7	6.9	6.5	8.4
	Winter	7.8	7.9	7.3	8.0	7.3	7.5	6.4	6.2	6.3	7.9
	Summer	8.0	8.2	7.8	8.5	7.8	8.0	7.6	6.9	7.6	8.5
Turbidity (NTU)	Monsoon	2.2	2.0	1.3	2.0	2.0	0.8	2.5	1.8	1.4	0.5
	Winter	1.4	2.1	1.2	2.0	1.7	0.6	2.0	2.0	1.6	0.3
	Summer	2.0	2.4	1.6	2.3	3.2	0.8	2.1	1.6	1.7	0.3
TDS	Monsoon	368	273	534	322	227	257	312	238	285	198
	Winter	371	275	528	228	217	253	318	235	280	205
	Summer	388	284	549	342	230	263	327	241	292	215
Hardness	Monsoon	756	753	742	616	624	635	641	732	750	653

	Winter	745	741	722	613	612	613	626	728	623	651
	Summer	762	755	649	615	628	639	647	738	754	652
Nitrate	Monsoon	4.85	9.6	7.13	9.5	3.2	0.59	13.5	1.19	0.59	0.68
	Winter	4.92	8.3	8.12	10.0	4.5	0.52	12.7	1.16	0.52	0.54
	Summer	4.96	10.5	9.68	11.5	4.0	0.74	13.5	1.27	0.74	0.69
Chlorides	Monsoon	56.8	28.6	84.7	24.2	68.6	22.4	14.8	17.4	27.6	15.5
	Winter	54.2	26.0	83.1	21.5	65.3	21.2	14.6	15.2	26.4	15.2
	Summer	59.5	28.4	85.2	23.4	67.8	24.5	16.3	17.8	27.8	16.4
Sulphates	Monsoon	87.2	112	169	52.3	135	13.0	89.0	35.0	0.64	21.0
	Winter	80.5	115	174	51.1	132	12.8	87.3	34.8	0.62	19.4
	Summer	29.6	117	178	54.2	138	16.4	90.5	36.5	0.75	21.7

Table – 1 Continues.....

Parameters		Sampling Locations				
		SG11	SG12	SG13	SG14	SG15
Temperature (C^0)	Monsoon	29.0	27	25	30.0	29.0
	Winter	23.0	22.0	19.0	23.0	24.0
	Summer	30.0	29.0	27.0	28.0	31.0
pH	Monsoon	7.8	8.0	6.8	6.4	6.3
	Winter	7.6	8.2	7.4	6.6	6.8
	Summer	7.9	8.3	7.6	7.9	8.0
Turbidity (NTU)	Monsoon	1.8	ND	1.0	0.5	1.8
	Winter	1.6	ND	0.7	0.3	1.4
	Summer	2.0	ND	1.3	0.3	2.2
TDS	Monsoon	227	225	290	219	415
	Winter	217	228	287	216	412
	Summer	284	235	296	225	419
Hardness	Monsoon	637	725	617	741	695
	Winter	632	723	615	733	692
	Summer	642	732	622	746	698
Nitrate	Monsoon	4.6	2.98	8.0	2.86	3.67
	Winter	4.3	2.89	7.9	2.75	3.58
	Summer	4.8	2.90	8.6	3.49	3.78
Chlorides	Monsoon	38.3	10.6	11.6	23.6	43.7
	Winter	36.5	9.5	10.4	23.2	41.5
	Summer	40.6	12.4	12.8	24.8	48.2
Sulphates	Monsoon	47.0	0.71	18.0	24.2	121
	Winter	49.3	0.69	17.6	23.4	119
	Summer	56.0	0.78	21.4	27.5	124

SG1 = Satna, Birla cement Plant
SG2 = Prism Cement Plant
SG3 = Maiher Cement Plant
SG4 = KJS Cement Plant
SG5 = Near MadhogarhFortmSatna
SG6 = Near H.S.S. Saiganjpur, Satna
SG7 = Krishnanage, Satna
SG8 = Near Railways Station Maiher
SG9 = ChhibausmodNarsinghpur
SG10 = Near Jabainath Temple Goriya
SG11 = Babupur, Satna
SG12 = Gumchihaai, Satna
SG13 = Wnchechara, Near Railway station
SG14 = Near JhagharmodeKarmial
SG15 = Near H.S.S. Rampur Baghelan.



REFERENCE:

1. Arvind Prasad Dwivedi, ArunDwivedi, Ashwani Kumar Awasthi and Indra Prasad Tripathi,Quality of Ground Water used for Drinking in ORAI, District-Jalaun,InternationalJournal of Information Research and Review, Vol.03, Issue02 PP1915-1920, February,2016.
2. Sabhapati, Pranab and Mishra Abanikar, Physico-chemical Characteristics of ground and surface water in Ghopur Sub-Division Sonipur District, Assam (India), Journal of Environ. Science and Engg. 53(1), 89-96 (2011).
3. Indra Prasad Tripathi., Arvind Prasad Dwivedi; M. Suresh Kumar; S.S. Gautam; Physico-Chemical Parameters and Correlation Coefficient of Ground Water of Shahdol District., Asian Academic Research Journal of Multidisplinary (AARJMD) volume1, Issue-2 (june-2014)
4. Indra Prasad Tripathi and Arvind Prasad Dwivedi; Analysis of Physicochemical Parameters and correlation coefficient of Ground Water Samples in Residential Area of East Zone of Central India., International Journal of Information Research and Review Vol.03, Issue,03.pp-2078-2086 March.2016.
5. Central Ground Water Board (CGWB, 2009 Ground Water Quality in Shallow Aquifers of India, Faridabad, Ministry of water Resources, Govt. of India.
6. Patil P.N. Sawant. Desmukh D.V., R.N. 2012, Physico-chemical Parameters for Testing of Water –A review, IJERs, 3(3):1194-1207.
7. Hasan M.Z., Panday S., Pathak B.N., Bulusu, K.P. Project No.1428, NEERI Nagpur, (1981).
8. ICMR Manual of Standards of Quality for drinking water, ICMR Delhi 2nded, (1975).
9. NEERI Manual on Water and waste water analysis, Nagpur (1988).
10. WHO, Guidelines for drinking Water Quality, (1994).
11. Standard Method for the Examination of Water and Waste Water, APHA AWWA and WEF, 18th ed. (1992).
12. Sharma V.K., Environmental Chemistry, Goel Publishing House, Meerut,(2000).
13. P. Thamilarasu and R. Sharma, Physico-chemical Characteristics of Ground Water Analysis in Namakkal District of Tamil Nadu State. Rasayan J. Chem. Vol.8 No.1 pp-92-97 January-March-2015.

14. Krishna Kumar Yadav, Neha Gupta, Vinit Kumar, SandeepArya and Deepak Singh, Physico-Chemical Analysiis of Selected Ground Water Samples of Agra City, India., Recent Research in Science and Technology, 2012, 4(11):51-54.
15. Davd N. Lerner, Diffuse Pollution of Ground Water in Urban areas , BHS10th National Hydrology Symposium, Exeter,2008
16. K. Srinivasan P. Prem Kumar and K. Poongodi, Examination of Ground Water for Drinking and Irrigation use in Rasipuram area of Namakkal District, Tamil Nadu, IJEP,33(9) 754-760,2013.
17. SadhanaChaurasia and Rajkaran, Pollution Sources and water Quality of River Mandakini at Chitrakoot, IJEP, 33 (12) 969-977 (2013).
18. A.P. Dwivedi. I.P. Tripathi and M. Suresh Kumar, Assessment of Soil and Ground Water Quality in Rewa District of Vindhya Plateau (India), Journal Environ. Sciences &Engg. Vol.55. No.1pp-51-64, January, 2013.
19. Indra Prasad Tripathiand Arvin Prasad Dwivedi, Multivariate Analysis of Soil and Ground water Quality in Sidhi district of Vindhya Plateau., Journal of Applicable Chemistry, 2015,4(1):178-203.
20. Sharma Shraddha, Dixit Savita and Praveen Jain, 2011. Evaluation of Water Quality of Narmada River with Reference to Phsico-chemical Parameters Hoshangabadcity,MP,India, Res.J. Chem. Sci,1.