A STUDY ON CHEMICAL CHARACTERSTICES OF GROUNDWATERS IN PALNADU AREA

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ABSTRACT

Water is a very important natural resource for human needs, which the sources of all living organism's life. One of the most crucial resources we need for day-to-day operations is water. It is a crucial resource for all economic endeavors, from businesses to agriculture. Only a tiny portion of the planet's abundant water is accessible to life as good water. The oceans contain around 97percent of total of it, and it is too salty to be used for irrigation, industry and or domestic. The remaining Three percentage is fresh water. Around Three percentage of it is arrested in ice sheets or glaciers or is concealed so deep that it costs too much time and money to extract. The aim of the present study was carryout on a characteristic of groundwater in five different mandals of palnadu area during pre-monsoon. And the groundwater samples were collected by random sampling method from various five mandals of palnadu, areas of Veldurthi, Durgi, Macharla, Rentachintala, Gurazala mandals and in addition to discover the relative treatment methods to make water for usage.
water quality parameters

Key Words: *Pollution, Pre-monsoon, Palnadu. Mn, Cu, Zn and Groundwater Quality.*

1. INTRODUCTION

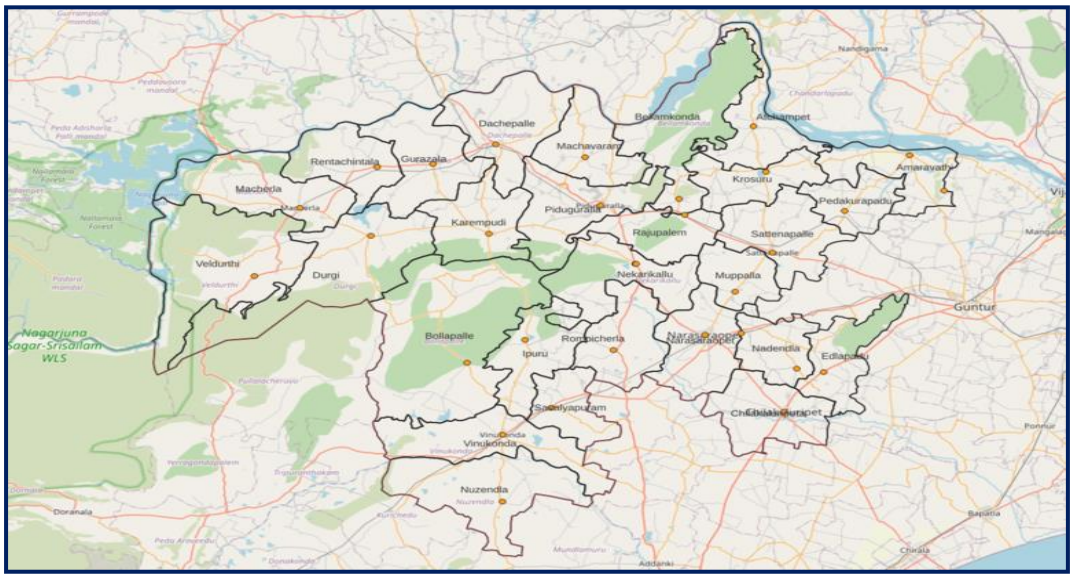
Given their interdependence, surface water and groundwater have frequently been researched and managed as separate resources. Groundwater is generated when surface water seeps into the soil. On the other hand, groundwater can also provide sources of surface water. (Saxena et al., 1978). Depending on where they originated, sources of surface water contamination are typically divided into two types. Alteration in physical, chemical and biological characteristics of these water sources may cause harmful effects on human and aquatic biota.

Water is the prime essence of life. Water is a universal solvent and this characteristic grants it a very important role in all the activities on Earth. Water sustains agriculture, industry, energy and life and it is the key compound in our daily life. India receives 1170mm of rainfall on average per year. A total of 4000 billion cubic meters of rain fall annually across an area of 3290 lakh hectares. Out of the total, 41% of it is lost to evaporation, 40% to runoff, 10% to soil moisture, and 9% is steeped in for ground water recharge. 12% of the stream flow water is used to generate electricity, 8% of it is used for irrigation, 2% for personal use, 4% for industrial, and 40% is used for industry. Only 1122 bcm of the 1869 bcm total available water resources are usable, and this includes 690 bcm of surface water and 432 bcm of ground water. This leaves 1122 bcm as the total available water resources per person at the moment.

2. DISCRIPTION OF THE STUDY AREA:

The northernmost part of the Indian state of Andhra Pradesh is called Palnadu. The regional capital of Palnadu is Gurazala. And it holds a significant position in Telugu history. The name Palnadu still refers to this region in honour of the Pallava dynasty. The Palnadu-Guntur district experiences an average annual precipitation of 864 mille metres. The Fig.1 The area of Palnadu

Fig.1: Study Area Map i.e. Palnadu Area



3. OBJECTIVES OF THE STUDY

- The present study's goals are to determine the levels of harmful metals such as Cu, Fe, Zn, Cd, Cr, Ni, Ar and Mn in groundwater samples and to offer solutions for the safe use of groundwater for diverse applications.

4. METHODOLOGY

Groundwater samples have been collected from hand pumps, namely mandalas of Veldurthi, Durgi, Macharla, Rentachintala, Gurazala of palnadu area for Chemical analysis, which will be has been carried out, in the Chemistry Laboratory, Department of Chemistry, VFSTR, deemed to be University, Guntur, A.P., India.

The Chemical parameters evaluated through standard test procedures which include Cu, Fe, Zn, Cd, Cr, Ni, Ar and Mn. The study aims in evaluating groundwater quality status in the study area and its portability during pre-monsoon time. As per UNESCO document procedures water samples were collected. The collected samples were carefully labelled with the precise location of sample collection at the study area. Standard procedures are used to analyze samples that are brought to the lab in bottles (APHA 1998). Methods used for water analysis shown in Table 1.

Table 1. Methods used for water analysis

Name of Test Conducted	Units	Principle of the method
Cu - Copper	ppm	AAS (Atomic Absorption Spectrophotometer)
Fe - Iron	ppm	
Zn - Zinc	ppm	
Cr - Chromium	ppm	
Ni – Nickel	ppm	
Cd – Cadmium	ppm	
Ar - Arsenic	ppm	
Mn - Manganese	ppm	

5. RESULTS AND DISCUSSIONS

To assess the suitability of the water for different uses, samples of groundwater were examined for the presence of toxic metals like Copper, Iron, Zinc, Cadmium, Chromium, Nickel, Arsenic and Manganese. In the groundwater samples collected at different mandals during the pre-monsoon season, toxic metal concentrations of Cu, Fe, Zn, Cd, Cr, Ni, Ar and Mn are detected. These concentrations are presented in Table 2. Figures 2 and 3 provide graphical representation of this information of twenty-five groundwater sample sites were identified in five mandals in the Palnadu region.

Table 2. Metals Concentrations of Groundwater samples at study area

S. No.	Sample Code	Mn (ppm)	Cu (ppm)	Zn (ppm)	Cd (mg/l)	Fe (ppm)	Cr (ppm)	Ar (ppm)	Ni (ppm)
1	S1 : Veldurthi	0.003	0.005	0.012	BL	0.08	BL	BL	BL
2	S2: Veldurthi	0.002	0.006	0.014	BL	0.09	BL	BL	BL
3	S3: Veldurthi	0.002	0.005	0.020	BL	0.08	BL	BL	BL
4	S4: Veldurthi	0.003	0.005	0.022	BL	0.07	BL	BL	BL
5	S5: Veldurthi	0.002	0.006	0.010	BL	0.08	BL	BL	BL
6	S6: Durgi	0.008	0.005	0.012	BL	0.03	BL	BL	BL
7	S7: Durgi	0.008	0.005	0.014	BL	0.03	BL	BL	BL
8	S8: Durgi	0.009	0.004	0.012	BL	0.02	BL	BL	BL
9	S9: Durgi	0.008	0.003	0.010	BL	0.03	BL	BL	BL
10	S10: Durgi	0.008	0.004	0.012	BL	0.02	BL	BL	BL
11	S11: Macherla	0.202	0.030	0.004	BL	0.02	BL	BL	BL
12	S12: Macherla	0.220	0.020	0.003	BL	0.01	BL	BL	BL
13	S13: Macherla	0.210	0.030	0.003	BL	0.02	BL	BL	BL
14	S14: Macherla	0.210	0.020	0.004	BL	0.02	BL	BL	BL
15	S15: Macherla	0.220	0.020	0.004	BL	0.02	BL	BL	BL
16	S16: Rentachintala	0.204	0.024	0.003	BL	0.01	BL	BL	BL
17	S17: Rentachintala	0.182	0.020	0.004	BL	0.02	BL	BL	BL
18	S18: Rentachintala	0.194	0.020	0.003	BL	0.02	BL	BL	BL
19	S19: Rentachintala	0.190	0.022	0.004	BL	0.01	BL	BL	BL
20	S20: Rentachintala	0.205	0.024	0.003	BL	0.02	BL	BL	BL
21	S15: Gurazala	0.001	0.004	0.001	BL	0.01	BL	BL	BL
22	S15: Gurazala	0.001	0.003	0.000	BL	0.01	BL	BL	BL
23	S15: Gurazala	0.000	0.003	0.000	BL	0.01	BL	BL	BL
24	S15: Gurazala	0.001	0.004	0.001	BL	0.01	BL	BL	BL
25	S15: Gurazala	0.001	0.004	0.000	BL	0.01	BL	BL	BL

BL = Below Detectable Level

Fig 2. Graphical representation of Cu, Zn and Fe

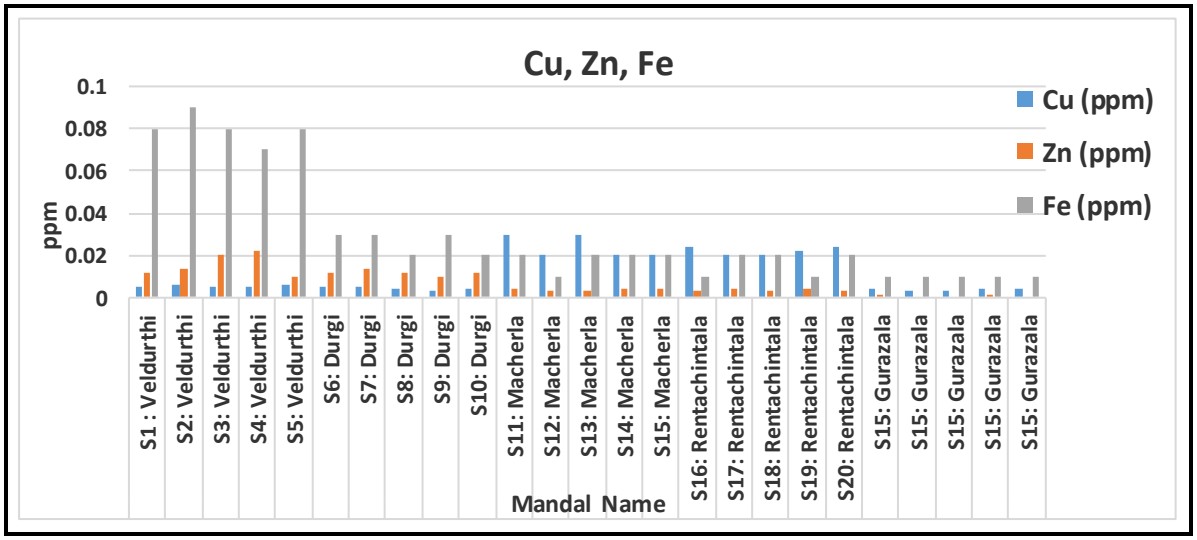
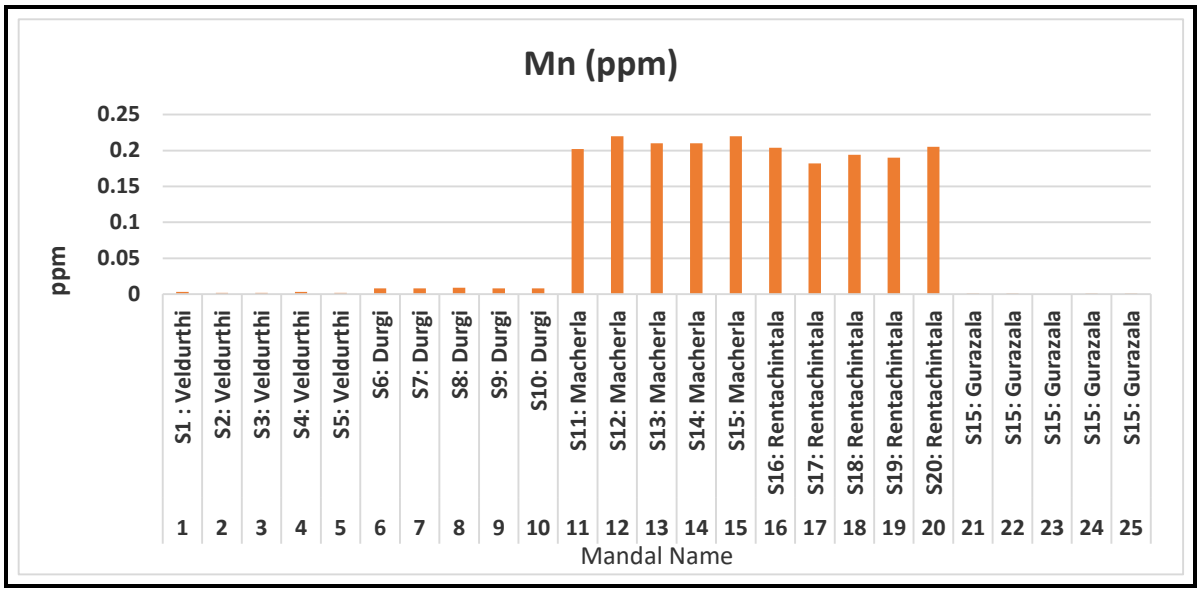


Fig 3. Graphical representation of Mn



6. CONSLUCTION

The objective of the current research is to evaluate the quality of groundwater in 5 mandals in the Palnadu region, namely Veldurthi, Durgi, Macharla, Rentachintala, and Gurazala, by taking groundwater samples from 25 bore wells/pumps. Additionally, it was meant to evaluate how suitable the harmful metals water quality was for different uses. Groundwater samples from 25 sampling stations were employed to assess the important toxic metals such as Copper, Iron, Zinc, Cadmium, Chromium, Nickel, Arsenic, and Manganese. It was found in the study area, that the Mn concentrations are 0.220 ppm maximum and 0.01 minimum, Cu concentrations are 0.030 maximum and 0.003 minimum, Zn concentrations are 0.022 maximum and 0.001minimum, Fe concentration are 0.09 maximum and 0.01 minimum, where ae other elements of Cd, Cr, Ni, Ar are found below detectable limits. And the concentration except few, many of the metals concentrations are safe in permissible limits and whereas from concentration are slightly higher than the permissible limits. A suitable road map must be made in order to periodically examine the conditions of the water quality in

order to understand how they have been changing over time and to give the public with the necessary awareness.

7. REFERENCES

[1] APHA, AWWA, WPCF, Standard Methods for the Examination of Water and Wastewater. (20th Edition). American Public Health Association, Washington DC, New York. 1998.

[2] Bureau of Indian Standards IS: 10500: 1991, Edition 2.1, (2003) Indian Standard Drinking Water — Specification (First Revision) Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002.

[3] https://des.ap.gov.in/.

[4] Handbook of Statistics (2018). Guntur District, Government of Andhra Pradesh (GoAP).

[5] Jain C.K and Sharma M.K, 1997 Relationship among water quality Parameters of groundwater of Jammu District, Pollution Research 16 (4): 241-246.

[6] Kumar, M.S., Raju, M.V., Palivela, H., Venu Ratna Kumari, G. 2017., Water quality scenario of urban polluted lakes - A model study, International Journal of Civil Engineering and Technology 8(5), pp. 297-302.

[7] Madhuri, T.U. A study on assessment of groundwater quality and its suitability for drinking in Madhurawada, Visakhapatnam, Indian Journal of Environmental Protection, Volume 35, Issue 2, February 2015, Pages 138-143.

[8] Rohit Shrivastav and Bindu Choudhary, 1997 Drinking water quality in an average Indian city a case study of Agra, (U.P.). Pollution Research 16 (1): 63-65.

[9] Raju, M.V., Satish Kumar, M., Venu Ratna Kumari, G., Ramesh Babu, S.R. 2018, An investigative study on water quality distribution in the zones of municipal corporation using remote sensing and gis applications, International Journal of Civil Engineering and Technology, 9(6), pp. 1182-1190.

[10] Satish Kumar, M. V Raju, G.Venu Ratna kumari and S.Ramesh babu , Mapping and modeling of groundwater pattern using geo spatial technology, International Journal of Civil Engineering and Technology, Volume No: 9, Issue No: 09, 2017, pp 110 – 115, ISSN: 0976-6316.

[11] Sanjay Sharma and Mathur R, 1995 Seasonal changes in groundwater quality in Gwalior: Health risk assessment. Pollution Research 14 (4): 373-376.

[12] Saxena, M, 1978. Environmental Analysis water, soil and Air. Agro Botanical pub. India, 1-16. Subba Rao, 1993. Fresh water molluscs of Indian Recent advances in fresh water. Anmol publications pvt. ltd. New Delhi pp. 47-52

[13] Tiwari, T.N., Mishra. M.A. (1985), a preliminary assessment of water quality index of major Indian rivers, Indian journal of environmental protection, 5, 276- 279.

[14] World Health Organization, Guidelines for drinking water quality Recommendations, 4th Edition Geneva WHO, 1993.