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Exploration of Groundwater Quality to Promote Sustainable Environment

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Abstract: ***Groundwater is the combination of different minerals and salts which is available to the human kind for the survival primarily and also for all the developmental activities of the society. Around the world the quality of the groundwater at majority of the fresh water aquifers is good and recommendable for consumption with basic treatment where as the accessibility of groundwater[6] depends on the practices taking place for lifting of water, rate of consumption along with the climatic conditions. Groundwater is the most important and the essential need for all the living beings irrespective of age and the species they belongs to, because almost more than ninety percent of metabolic activities of the human beings and the other living organisms depends on the water itself, even though water is available in the other notable form as surface water [5] it is not at all recommendable for consumption without proper required treatment [7]. In the present scenario accessing of quality groundwater is the most difficult and complex issue to meet the daily demand of the public especially in the developing cities [9] and the towns it is very big complicated issue due to the continues addition of unpredictable population year by year which makes the situation more worse. Apart from the above man made activities quality and the quantity of groundwater also depends on the existed soil conditions and its function with respect to the water holding capacity and rate of infiltration. The present study was carried out at downstream area of Krishna River in mangalagiri mandal of Guntur district, Andhra Pradesh. The study area had been divided into eight locations based on the possible interference of groundwater by human activities to find out the complete and detail composition of various cationic, anionic and heavy metals of water to estimate the suitability of water for consumption***

Key words: Absorbing, Aquifers, Consumption, Ground Water, Holding, Minerals.

I. INTRODUCTION

Groundwater is the high priority essential natural resource lies just below the surface of the land filled by all the faults and folds of the rocks along with the pores and voids of the soil. Groundwater plays vital role in the process of water cycle where the water percolates into the soil reaches to the underground aquifers and then eventually comes out its major portion as part plant growth requirement, from the plants through the pores of the leaves comes out and gets evaporate in to the open atmosphere. Major portion of groundwater is available in the saturated soils as well as in all the pores of the rocks below the water table which constitutes an aquifer. The moment of groundwater in the aquifers is approximately with an extent of up to 6o cm per day due to this reason only, the water content in aquifers will retain for hundreds to thousands of years. Even though water is available in different forms groundwater is the major source of water for almost forty percent of public consumption along with thirty five to forty percents of agricultural activities, to study the groundwater characteristics in a comprehensive scale it is not possible to study both quality and quantity separately as an isolated issues, because the lifting of water beyond the acceptable and permissible limits leads to damage of groundwater quality permanently, in addition to it at present scenario of excessive groundwater lifting, the industrial hazards especially radioactive materials, high toxic chemicals added to the groundwater by careless and unauthorised releasing of effluents in to the open soil makes the problem more severe. Groundwater recharge and its consumption rates gradually differing to each other with a great extent especially in the urban areas where the population is increasing rapidly due to the migration of people from the rural areas, at the same time the recharge capacity of soil is getting disturbed and reducing everywhere at notable level by the manmade activities like laying metal roads, concrete flooring of the land by removing vegetative cover of the soil, if the same situation continues, supply of quality groundwater to future generation is not at all possible. By keeping this in view we have initiated this study to find out the potentiality of groundwater quality. The study was conducted in the duration of three months where ten sampling locations were identified to collect the samples for three times and all the samples were examined to assess the quantity of various important groundwater parameters [11] with standard water quality determining analytical procedures to describes the quality scenario of groundwater [12] at study area.

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II. OBJECTIVES

1. Exploration of groundwater quality by determining various parameters of water quality
2. To find out the existed scenario of water quality at study area by comparing the results obtained with IS 10500-2012 drinking water quality standards.

III. METHODOLOGY

III.I Location Identity:

1. The total study area has been divided into ten locations
2. All the locations were given codlings

III.II Sampling of Ground Water:

1. Three months study period was allocated to collect the samples
2. All the samples were collected from the wells and hand pumps
3. Sterilized labeled glass bottles were adopted to collect the samples
4. All the glass bottles were labeled with location codes after the sampling of groundwater

III. III. Analysis of Samples:

1. All the samples of groundwater were examined with respect to various cationic, anionic and heavy metals.
2. The samples were analyzed by analytic methods [10] of respective parameters
3. Total analysis was done for three times and the average values were given as final values of different parameters which describes the quality of groundwater [8] at study area

IV. RESULTS AND DISCUSSIONS

F (mg I"^{1}):

Fluoride in the groundwater at certain locations is within the acceptable limit [4] but it needs treatment before consumption to bring down its concentration less than 1ppm

Fe (ppm):

The concentration of Fe in all the locations was within the acceptable limits and it is feasible to use for consumption with respect to this particular parameter

Mn (ppm):

In all the samples of all the locations the concentration of Manganese is within the acceptable limits and it can be used for consumption with respect to this particular parameter

Zn (ppm):

In the analysis of groundwater the concentration of the Zinc is within the actable range and it can be used for consumption with respect to this particular parameter

Cu (ppm):

The copper concentration of all the locations in the study area is within the acceptable range and can be used for consumption with respect to this particular parameter

Cationic and Anionic compounds:

The remaining cationic and the anionic compounds of the groundwater samples analysis results were within the acceptable limits can be use for consumption with basic treatment

Table 1: Cationic Compounds in the Ground Water

Location Code	Ca^{2+} (meq/l)	Mg^{2+} (meq/l)	Na^{+} (meq/l)	K^{+} (meq/l)
	Mean	Mean	Mean	Mean
L1	9.32	7.41	25.1	1.2
L2	6.84	4.53	9.68	0.82
L3	5.38	5.16	14.98	1.38
L4	5.82	6.17	13.1	1.01
L 5	4.65	5.04	13.74	0.56
L6	6.04	4.32	12.72	0.61
L7	6.63	5.6	10.73	1.34
L8	3.8	5.87	13.55	1.57
L9	6.09	3.2	10.72	1.77
L10	8.64	5.6	16.5	1.28

The Ground Water Quality of Cationic Compounds concentrations mean values shown in Table 1. Anionic Compounds and Heavy Metal Concentrations in the groundwater concentrations mean values shown in Table 2. Graphical representation of Ca2+, Mg2+, Na+, and Na+ in were shown in figure 1 - 4.

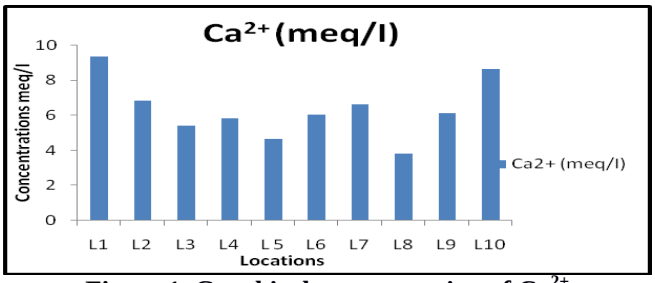

Figure 1. Graphical representation of Ca^{2+}

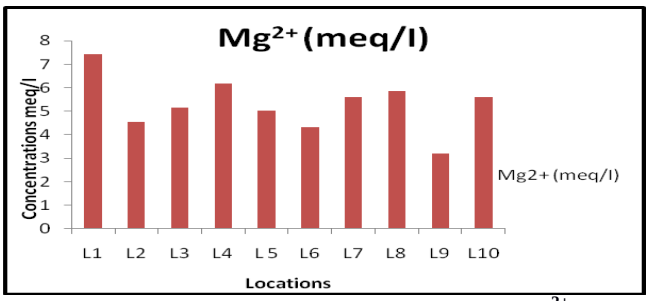

Figure 2. Graphical representation of Mg^{2+}

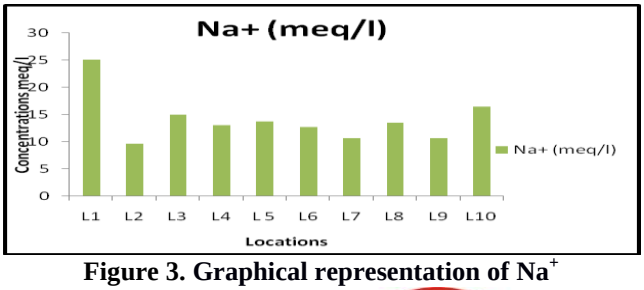

Figure 3. Graphical representation of Na^{+}

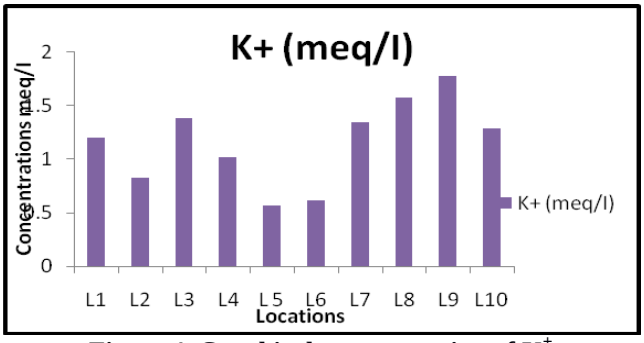

Figure 4. Graphical representation of K^+

Table 2: Anionic Compounds and Heavy Metal Concentrations in the groundwater

Location Code	Carbonates (me/l)	Bicarbonates (me/I)	Chlorides (me/I)	Sulphates (me/I)	F (mg I"[1])	NO_3-N (mg I"[1]	Fe (ppm)	Mn (ppm)	Zn (ppm)	Cu (ppm)
	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value
L1	2.86	8.63	31.42	1.38	1.16	6.82	0.07	0.03	0.31	0.03
L2	0.61	8.78	12.14	0.78	0.89	9.23	0.13	0.013	0.02	0.01
L3	0.97	10.16	14.5	1.52	1.13	5.720	0.11	0.004	0.016	0.014
L4	0.84	8.13	16.6	1.4	1.04	6.93	0.096	0.003	0.012	0.006
L 5	0.95	10.22	12.97	1.18	1.15	7.39	0.07	0.011	0.005	0.005
L6	0.33	8.13	14.36	1.59	0.86	5.85	0.039	0.009	0.013	0.014
L7	0.89	8.27	13.02	1.45	0.89	8.3	0.08	0.031	0.016	0.008
L8	1.43	8.1	14.95	2.13	1.05	7.38	0.093	0	0.003	0.013
L9	0.85	6.83	12.83	1.57	0.51	8.36	0.058	0.02	0.03	0.011
L10	0.79	7.73	21.56	2.14	0.7	7.85	0.072	0.058	0.024	0.011

V. CONCLUSIONS

1. Groundwater is ever in static conditions [3] it is always influenced by the soil practicing methods for various requirements
2. Existed environmental conditions always shows its influence on the quality and quantity of groundwater
3. In the present study the groundwater quality is within the acceptable limit [2] but it needs basic water treatment with respect to few parameters concentration before the consumption
4. Green belt maintenance and the increased recharging pits were suggested to improve the quantity and quality of groundwater at study area.
5. Periodical monitoring of groundwater quality [1] is recommended to improve sustainable environmental conditions

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