

Hydrogeo Chemical Studies of Errimullivagu Basin, Rangareddy District, Telangana State India

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Abstract- water is widely distributed natural resource. The present Study area Erimullivagu Basin forms of Musi River Basin located in Erstwhile Ranga Reddy district, Telangana State. Falling under the Survey of India topo sheet No 56K/10, 56K/11. With an extant of about 183 km².The study area under investigations forms a part of the Precambrian shield and the rocks are referred to as the basement complex. Archean granites and gneisses in association with acid and basic intrusive, enclaves and recent alluvium patches can be classified as hard rock terrain with regard to groundwater studies .Topography plays an important role not only in controlling the distributions of precipitated water but also in occurrence and distribution of groundwater in the region. Water samples Collected During the period of pre monsoon seasons in the year 2014 and analyzed for pH, EC, TDS, TH, Ca²⁺, Mg²⁺, Na⁺, K⁺, CO₃²⁻, HCO₃⁻, Cl⁻, SO₄²⁻, NO₃⁻ and F- compared with drinking water quality limits of National and International standards .The Results showing that the concentrations are crossing the permissible limits for drinking water purpose in most of the samples .The higher values may be due to anthropogenic activities. The ground water quality may improve with proper treatment of domestic sewage and industrial effluents .Rainwater harvesting is advisable to improve the ground water quality in the study area.

Index terms- Ground water, Study area, Geology, Quality, Pre and post monsoon

INTRODUCTION

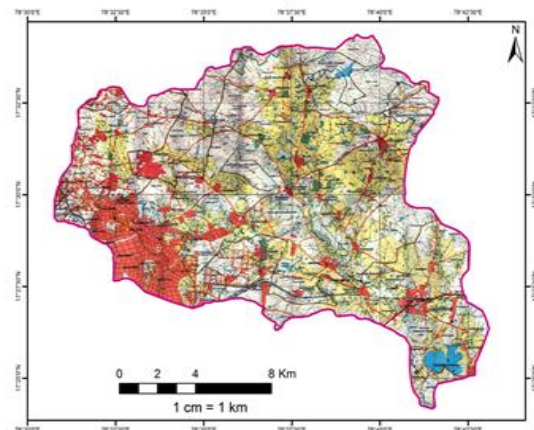
Water is the most precious natural resource. It is needed for the sustainability of ecosystems, socio-economic development and human beings (Humphreys et al, 2009 and Steube et al, 2009). Groundwater is the principle source for the agricultural, industrial and domestic usage (Alcamo et al, 2007). Water quality plays an important role in

promoting agricultural production and human health. The occurrence of groundwater depends upon the rock type and their water bearing characteristics (Reddy et al., 2009). The overexploitation of groundwater has destructively affected groundwater in terms of the quantity as well as quality (Balachander et al, 2010).

Study Area

The present Investigated area Erimullivagu Basin forms of Musi River Basin located in Erstwhile RangaReddy district, Telangana State. falling under the Survey of India toposheet No 56K/10, 56K/11,(Map -1) between the Longitudes 79015I-79030I and latitudes 170 15'-170 30'.Total study area is about 184 sq.km The area has been identified as chronically drought prone, due to frequent failures of Monsoon, the area experiences, and scarcity of water moisture leading to water problem.

**TOPOSHEET OF THE STUDY AREA
NO:56/K10,11**



Geology of the Area

The study area under investigations forms a part of the Precambrian shield and the rocks are referred to as the basement complex. Archean granites and gneisses in association with acid and basic intrusive, enclaves and recent alluvium patches can be classified as hard rock terrain with regard to groundwater studies. Granites predominately occur in pink and grey varieties. They are fine to coarse grain textured hard and compact, with no intergranular porosity. Granites are traversed by veins of quartz, aplite, pegmatite and epidote. Epidote veins in grey granites run for a few meters with a thickness of few millimeters. Pegmatites veins are cut across granites at some places in the area, which run for a few meters with a thickness of centimeters. Dolerite dykes are very common in the area.

Topography of the area

Topography of the area is an expression of long processes of denudation and accumulation that operate in that area. It plays an important role not only in controlling the distributions of precipitated water but also in occurrence and distribution of groundwater in the region. Dykes and Quartz reefs have their own prominence in the development of land forms standing out prominently extending often for kilometers together in conformity with the structural trend of the host rocks. Even though some of the features produced by differential weathering caused due to rainfall, temperature, wind etc., can hardly be grouped as land forms. Thus, the present study is aimed to investigate hydrogeochemical studies of Erimullivagu basin.

Methodology

Forty two water samples were collected from various dug wells, bore wells and surface water tanks from the study area during the premonsoon season in 2014 and analyzed the parameters like pH, EC, TDS, TH, Ca²⁺, Mg²⁺, Na⁺, K⁺, CO₃²⁻, HCO₃⁻, Cl⁻, SO₄²⁻, NO₃⁻ and F⁻ using standard methods (APHA,1995).The obtained results of the parameters in the study area are to be compared with drinking water quality limits of WHO, 2011 standards (Table -1).

Results and Discussions

The pH values are within the permissible limits (WHO 2011) pH values in the study area is ranging from 6.9 to 8.35 .The Ec values in the study area are falling in between 720 to 3820 microsiemens /cm at 25o C. The permissible limit of Electrical conductivity in drinking water is less than 1500 microsiemens/cm at 25o C (WHO, 2011) 12 % of the samples are exceeding the permissible limits. The TDS values of the study area ranging from 460 to 2444 mg/l. Generally based on the TDS values water is categorized in to desirable for drinking (up to 500 mg/l), permissible for the drinking (500-1000 mg /l), useful for irrigation (1000-3000 mg/l) and unfit for drinking and irrigation (above 3000 mg/l) as per ICMR and WILCOX (1955). In the present study 98 % of the samples are exceeding the limits. The limit of the Mg in drinking water is 50 mg/l (WHO 2011). 24 % samples in the study area are exceeding the permissible limits. Ca concentration of the ground water is between 24 to 320, permissible limit of Ca in ground water is 75 mg /l (WHO 2011) in the study area 77 % of the samples are exceeding the limits. The concentration of K in the study area is from 1 to 25 mg /l. 7 % of the samples are exceeding the limits The Cl concentration for drinking water is 250 mg/l (WHO 2011) 12 % of the samples are exceeding the limits. Permissible limit of Fluoride in the ground water is 1.5 mg/l (WHO 2011) ,in the study area 5 % of the samples are exceeding limits in the pre monsoon season.

Table 1: Statistics parameters of groundwater quality in pre monsoon

Parameters	Pre monsoon				WHO - 2011
	Min	Max	Mean	% of samples exceeded the limits	
pH	6.9	8.35	7.71	0	6.5 - 8.5
EC (µS/cm)	720	3820	1293	12	1500
TDS (mg/L)	460	2444	828	98	500
Na ⁺ (mg/L)	51	282	129	5	200
K ⁺ (mg/L)	1	25	5	7	12
Ca ²⁺ (mg/L)	24	320	77	31	75
Mg ²⁺ (mg/L)	9	296	49	24	50
TH	145	171	365	0	----

as CaCO ₃ (mg/L)		1		0	
HCO ₃ ⁻ (mg/L)	93	611	291	2	500
Cl ⁻ (mg/L)	46	794	196	12	250
SO ₄ ²⁻ (mg/L)	9	102	39	0	250
NO ₃ ⁻ (mg/L)	6	635	44	14	45
F ⁻ (mg/L)	0.1	2.34	0.73	5	1.5

*Min-Minimum and Max-Maximum

CONCLUSION

The present study reported that most of the water samples are exceeding the permissible limits in the study area, hence the water is not supposed to be used for various purposes. Thus the quality of the water to be improved by harvesting the rain water and preventing the polluting of the water by man made activities.

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