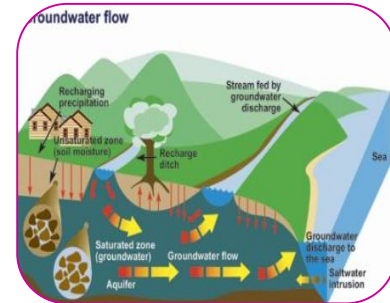




## USING RS & GIS TECHNIQUES FOR SPATIAL ANALYSIS OF GROUND WATER QUALITY OF VISAKHAPATNAM CITY

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### ABSTRACT :

*This paper pertains the water quality parameters were depicted by various color combinations for different ranges of concentrations.*

*The average results of various parameters like PH, TDS, and total hardness, ca, mg, Na, k, Fe, no<sub>3</sub>, l, so<sub>4</sub> respectively were 7.82,1420,62 machos/cm, 220mg/l,128mg/l,80mg/l, 92mg/l,0.09mg /l,40mg /l,240mg /l,1.60mg/l ground water quality map should the poor quality of ground water, primarily due to its hardness, digital elevation model and other statistical parameters were also studied. The analysis includes the study of spatial and temporal variations of quality of ground water in the region. The ground water samples were collected from all 72 waters of the Vishakhapatnam city. Taking representation samples from each ward these were analyzed in the laboratory for physical, chemical parameters.*

**KEYWORDS :** ground water quality, spatial analysis, Gis, water quality assessment.

### INTRODUCTION

Today there is a threat to the freshwater resources all over the world, owing to the rapid industrialization, urbanization and population growth, besides these, poor management and over exploitation of these freshwater resources are leading to ecological degradation. The ground water require of any area is generally a sensitive part of the ecosystem and will be the immediate victim to environmental degradation, resulting due to industrialization and urbanization. But the recent technological developments achieved by men are to a great extent resulting in exfoliation of the important natural resources.

### STUDY AREA

The study area comes under dry humid climate zones, and attempt her been made to assess the ground water quality of Visakhapatnam city, the city is situates altitude of 83°11'30" and longitude of 83°22'16". The city is limited by the Kailas range in the north and south side is bounded by the yarada range, these two ranges are separated from each other by vast tidal basin, a few scattered hillocks and portions of low land. These two hill ranges attain a maximum height of 506m and 356m respectively.

The temperature is to and to be uniformly fluctuating the temperatures are observed to the higher is the dry season than in the monsoon period there is a steady progress in temperature from February to May and will come down during water. Observations indicate that the mean temperature gradually increased because of the negative cover in the study area.

The Indian meteorological observations have recently made an interesting observations that there is increasing hydrogen in concentration, in other words decrease in PH values of the rain water in Visakhapatnam area. The PH value of the rain water used to be in the range of 7.1 to 7.3 prior to the establishment of major industries and now, it has came down to the range of 6.6 to 6.8 this may attributed to the even increasing dissolved gases in rainwater as a result of industrialization and related activities.

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**METHODOLOGY:-**

The study area has been subdivided into 140 sub areas of 3.7cmx3.7cm size from 14 grids with the depth of the top sheet, this procedure is used for identifying the areas for water sample collection and for making further study of the ground water quality and also for electing information relating to water level fluctuations etc.

Ground water quality depends on the quality of recharged water, atmospheric precipitation, in land surface water and subsurface geo chemical processes. Temporal changes in the origin and constitution of the recharged water, hydrologic and human factors may cause periodic changes in ground water quality. The quality of ground water is steadily deteriorating at the faster rate due to pollution ranging from septic tanks. (Obaniya and saxena, 1977. Gilson and patmant, 1983). Land fill leachiest, cleans tic sewage (Eason and Anderson,1980 Sharma and kaur,1995)

In majority of the areas ground water has become the main resource to meet the Domestic, agricultural, industrial and other activities are leaving contaminated continuously by anthropogenic activities. Since the surface water is their contaminated, the pressure on the usage of ground water is steadily increasing hence the quality of ground water has been deteriorating over exploitation of ground water also cause depletion of the ground water level (Jha and simha 2007)

Water pollution not only effects water quality but also threatens human health, economic development and social property degradation of water quality affects the animals plants or human beings when polluted water is consumed, contamination of drinking water sources by sewage Canocurs from raw sewage over flow, septic tanks, leaking sewer lines, and applications of sludge and partially treated waste water (Jain and Vivek Sharma,2011)

**Spatial analysis of ground water quality using RS&GIS techniques:**

The area of investigation has been sampled for ground water samples, following the procedure suggested prrown et al (1974) and those (1970). Samples have been collected in Pre cleared water bottles for water quality studies. A total of 75 wells were sampled during pre monsoon and post monsoon periods.

An attempt has been made to evaluate the total ground water regime of the study area in terms of subsurface geology, hydro geomorphology, lineament pattern and ground water quality.

A detailed discussion is presented on the data and ground water quality as informed by the factors such as PH, distance has the industrial zone, litholosy, depth, seasonal fluctuation ad the lmeaiment Pattern etc. remote sensing techniques that have been used in the study to determinate the hydro geomorphology. Land use land cover and requirements of the area using spot nadirs visual products.ss

**Physico-chemical parameters of the six characteristics of ground water of study locations along with IS 10500:**

parameter	sample1	Sample2	Sample3	Sample4	Sample5	Sample6	standard is 10500	
							mg/L acceptable	maximum
PH	7.20	7.10	7.09	6.71	6.61	6.39	6.5-8.5	No rdaxation
Turbidity	1.1	1.2	2.0	1.0	1.3	1.3	5	10
Conductivity	2420	2580	1026	746	723	738	1500	3000
TDS	1546	1613	799	688	672	681	500	2000
Chlorides	720	809	726	245	152	151	250	1000
Sulphates	132	86	49	39	38	40	200	400
Phosphates	2.7	5.1	3.1	1.8	1.7	1.9	-	-
Total hardness	751	581	329	309	300	318	300	600
Total alkalinity	359	340	352	288	198	168	200	400
Nitrates	11	12	8	7	6	39	45	100
fluorides	0.63	0.9	0.70	0.42	1.0	1.2	10	1.5

S.NO	PH	TDS	TH	Ca	Mg	Na	K	Fe	F	NO <sub>3</sub>	CL	SO <sub>4</sub>
1	7.3	870	416	53	48	32	8	0.10	1.1	60	110	32
2	7.5	610	700	60	134	44	10	0.10	0.9	30	180	60
3	8.0	520	350	31	60	17	2	0.06	1.2	18	100	40
4	7.8	600	830	54	166	48	16	0.06	0.9	16	215	72
5	7.7	800	280	52	36	32	7	0.01	1.0	28	130	32
6	8.6	950	500	52	90	30	12	0.05	1.0	44	140	50
7	7.2	1040	160	13	31	12	3	0.04	0.7	16	100	36
8	7.6	640	400	48	68	36	8	0.05	1.0	14	80	38
9	8.1	550	850	80	158	60	20	0.18	0.9	20	150	66
10	7.9	780	320	32	58	44	12	0.09	0.9	44	130	42
11	8.0	1900	460	48	83	54	18	0.05	1.2	40	380	86
12	7.7	1200	620	24	136	80	20	0.05	0.8	28	300	78

**RESULTS AND DISCUSSION:**

Hydrologically, majority of the wells sampled confine to the plains areas of the study area. The ground water fluctuations have shown an increase with increase in the depth of the wells. Lineaments are found to have an impact on the ground water occurrence and ground water table configuration and fluctuations. The influence of high density lineaments is prominent on the wells in the plain areas. The quality data strongly suggest that the pH has very high influence on the concentration of certain chemical elements and depletion of certain other elements. The ANOVA of the quality data has been observed between trace elemental concentrations with the parametric ratio namely SO<sub>4</sub>/TDS indicating occurrence of other metals in these ground waters. Field information and pollution zone map indicates the sources for pollution of groundwater is chemical industries which are situated in southern side and north western side. The impermeable and massive Charnockite body occurring along E-W direction of study from south to the north eastern unpolluted waters. The ground water quality studies and pollution zonation map indicate that HCl, AF, HPCL and CF are pollute the areas Mulagada, Sriharipuram, Natayyapalem, Malka Puram, Kapparada. Whereas the area Venkatapuram and Gopalapatnam. The area old town although far away the chemical industries, the pollution may be due to the sources of the contamination poor sewage system organic wastes and sea water intrusion.

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