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RESEARCH ARTICLE

IDENTIFICATION OF GROUND WATER POTENTIAL ZONE USING REMOTE SENSING AND GIS TECHNIQUES.

Dr. Jagadeesha. M. Kattimani[1], Ananda. B. Murthy[2], Ranjan. M. S[3], Srujan. D. Kumar[4] and Vaibhavi. K. R[5].

1. Assistant Professor, Department of Civil Engineering, JSS Academy of Technical Education, Bangalore, Karnataka.
2. Under Graduate Students, Department of Civil Engineering, JSS Academy of Technical Education, Bangalore, Karnataka.

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Abstract

The ground water is one of the important resources of natural water; ground water recharge potential zone to protect the water quality and to manage the ground water system. Using Geographic Information System (GIS) technology parameters like slope, geology, geomorphology, drainage density, land and land cover are obtained using top sheets. Vertical Electrical Soundings (VES) were conducted at 15 different locations at Channapatna Taluk. The fracture zones were available at 50, 90 and 100 feet depth in VES-7 at Kudluru. The depth at 50, 60 and 70 feet, fracture zones were also available and hence this area is considered as excellent zone in VES-10 at Sulleri. And below 200 feet depth, fracture zones were not observed which indicates the failure for the bore well in VES-15 at Sankalagere village.

Introduction:-

The resistivity method is aimed at measuring the potential differences on the surface due to the current flow within the ground. Since the mechanisms that control the fluid flow and electric current and conduction are generally governed by the same physical parameters and litho logical attributes, the hydraulic and electrical conductivities are dependent on each other (George et al., 2015). Ground water is an important resource contributing significantly in total annual supply. Assessing the potential zone of ground water recharge, a ground water developing program requires a large volume of data from various sources. Hence, identification and quantization of these features are important for generating a ground water potential model of a study area. The different hydro geological themes could be used to identify the ground water potential zone of the present area.

Location of the study area:-

The present study area is located in Channapatna, District Ramanagara. Channapatna is located at 12.65°N and 77.22°E. It has an average elevation of 739 meters (2424 ft.). The total selected area of the study is 54 sq.km. There are 3 sub-watersheds (i.e. Harokoppa, Malurpatna and Santemagenahalli).

Corresponding Author:-Jagadeesha. M. Kattimani.
Address:-Assistant Professor, Department of Civil Engineering, JSS Academy of Technical Education, Bangalore, Karnataka.

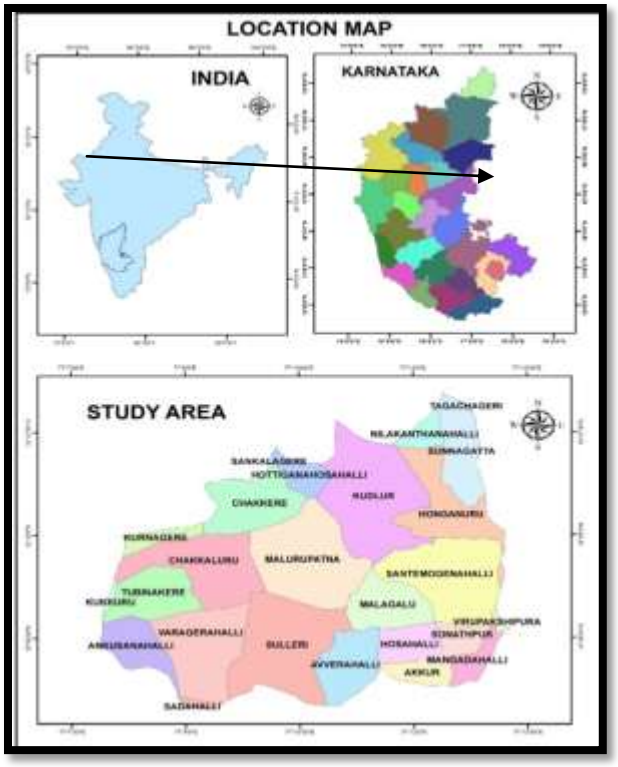

Fig.1:-Location map of the study area

Materials and Methods:-

The most widely used geophysical method for ground water exploration is electrical resistivity method as it is efficient in detecting water-bearing layers, being simple and inexpensive to carry out field investigations (Zohdy, 1974). Vertical Electrical Sounding (VES) is a geophysical method for investigation of a geological medium. The Vertical Electrical Sounding (VES) technique adopting a schlumberger array was used. The half current electrode spacing (AB/2) was varied from 1 meter to a maximum of 300 meters. There were totally 15 VES were conducted in the study area.

Fig.2:-Drainage map of the study area

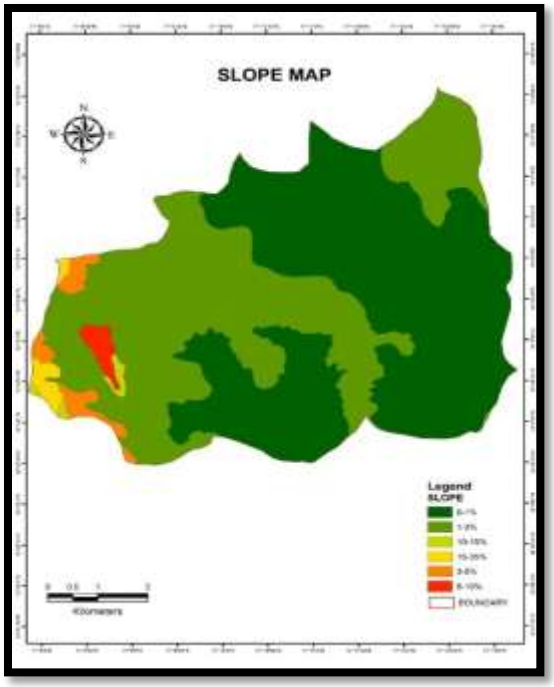

Fig.3:-Slope map of the study area

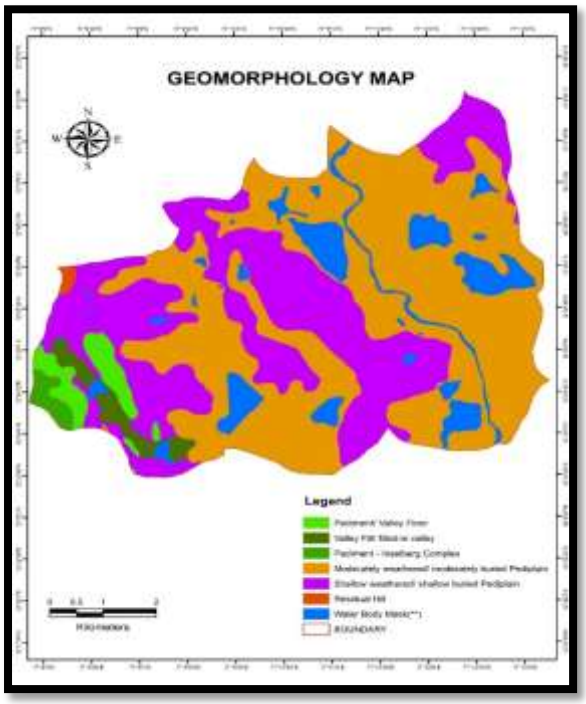

Fig 4:-Geomorphology map of the study area

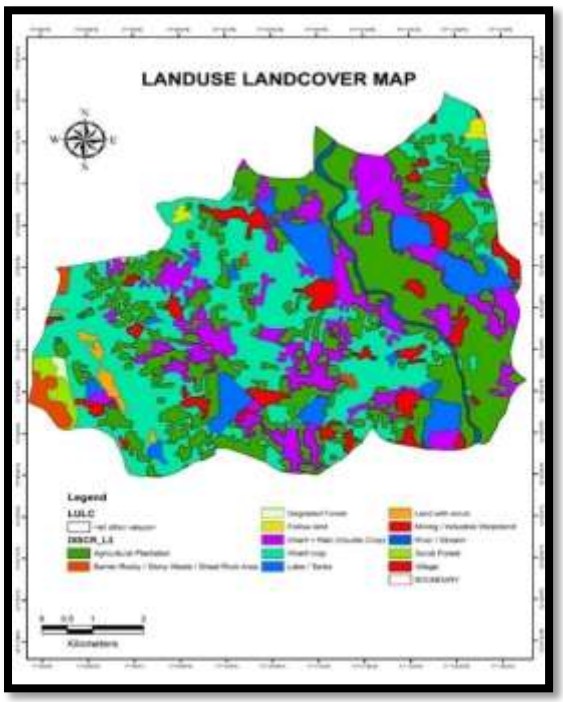

Fig.5:-Land used map of the study area

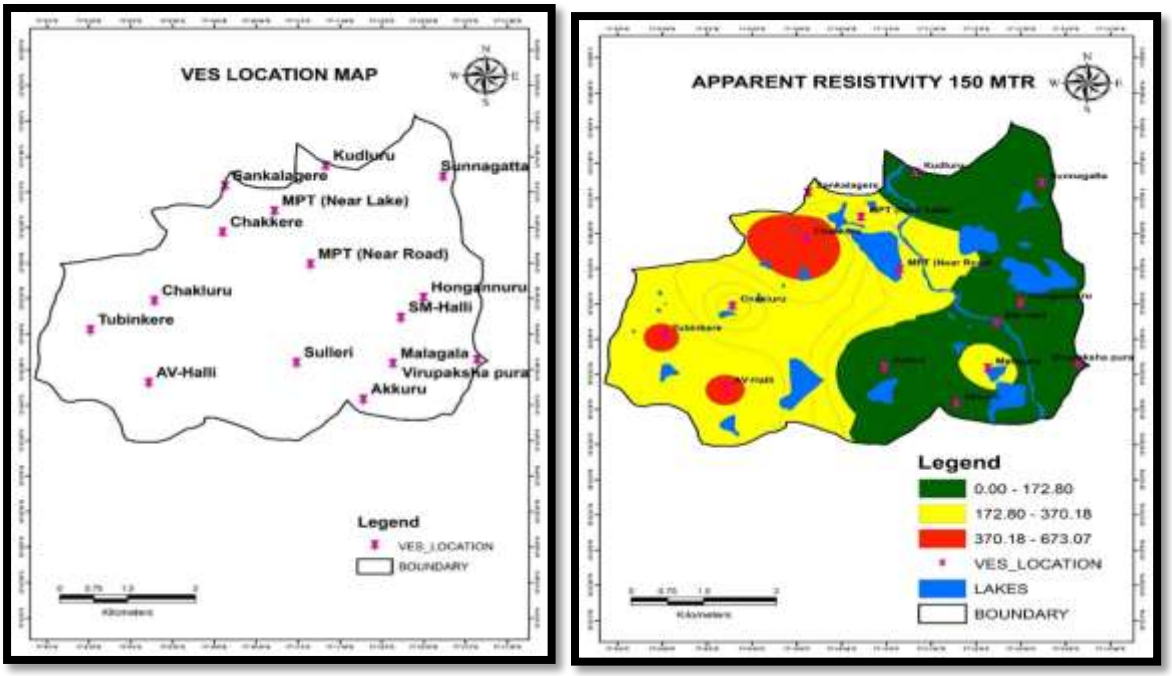

Fig.6:-VES Location Map and Resistivity Data at 150 meters depth

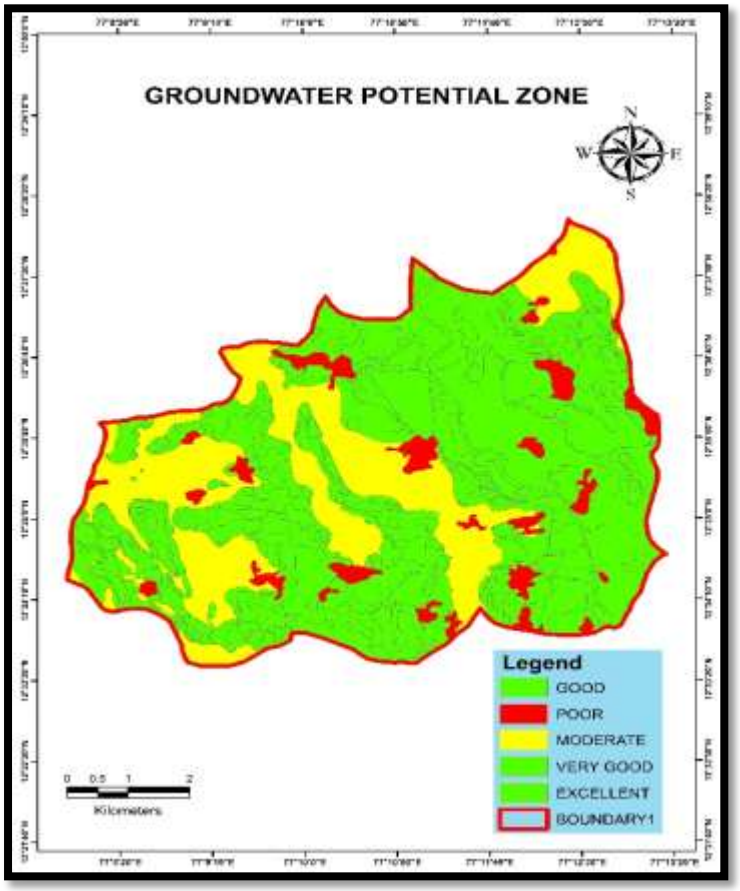

Fig: 7:-Ground water potential zone of study area

Table 1.1:-Ground water potential zone of study area

S.No	Thematic layers	Map weight (wt)	Individual features	Feature score (wi)	Total
1	Geomorphology	25	Valley fill	80	2000
			Pediment valley	70	1750
			Pediment inselberge	60	1500
			Moderately weathered	50	1250
			Shallow weathered	40	1000
			Residual hill	30	750
			Water body mask	0	0
2	Soil	20	Sandy skeletal	100	2000
			Fine loamy	90	1800
			Fine	80	1600
			Clayey soil	70	1400
			Water body mask	0	0
3	LULC	15	Agricultural land	70	1050
			Forest	60	900
			Built up land	40	600
			Wasteland	30	450
			Water body mask	0	0
4	Slope	15	Moderate slope	90	1350
			Nearly level	80	1200
			Gentle slope	70	1050
			Moderately slope	60	900
			Very gentle slope	50	750
			Strong slope	40	600
5	Litho logy	10	Granodiorite	60	600
6	Ground water	10	Very good to good	50	500
			Moderate	40	400
			Moderate to poor	30	300
			Poor	20	200
			Poor to nil	10	100
			Water body mask	0	0
7	Forest	5	Forest land	40	200

S.No	Ranges	Class	Area (Sq.kms)	Percentage
1	1800-3550	Poor	3.031	5.55
2	3550-4900	Good	19.132	35.01
3	4900-5350	Very good	11.297	20.67
4	5350-6450	Excellent	21.186	38.77
		Total	**54.646**	**100**

Results:-

Drainages are dominantly spread in the western part of the study area around the Malurpatna shows less drainage pattern. 0 to 1% to 3% of slope observed in the western part of the study area, valleys are dominantly observed in the eastern part of the study area. Moderately weathered and shallow weathered pediplain and agricultural lands are also observed in the study area. Apparently resistivity at 150 meters (fig 6) shows those areas such as Sulleri, Akkuru, Malagala, Kudluru and surrounding areas possess low resistivity ranging between 0.00-172.80Ω·m. The yellow zone consists of Chakluru and Sankalagere where the resistivity ranges between 172.80-370.18Ω·m. Tubinkere, A V Halli and Chakkere comes under Red Zone which is the high resistivity ranging between 370.18-673.07Ω·m (fig 6). Using Arc GIS 10.3 through integration method identified ground water potential zone in the study area classified poor to excellent in very good to good 55%, excellent 39% and poor is 5% (Table 1.1).

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