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RESEARCH ARTICLE

A STUDY ON GEOLOGY, GEOMORPHOLOGY AND SOIL CHARACTERIZATION IN YERCAUD TALUK USING GIS TECHNOLOGY

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ABSTRACT

A basic knowledge of the geology and geomorphology of an area is very important for conducting groundwater quality studies. In general groundwater variations involves understanding the geological and geomorphological environments, advantageous for the occurrence, availability of large quantities of ground water with good quality. In the present study, geology and geomorphological map of the Yercaud taluk was prepared Survey of India (SOI) map and the year of (1972). Since large part of the study area is inaccessible, remotely sensed data have played an important role in detailed mapping. The study area is mainly over the Archaean crystallines rocks, and the ground water occurrence under pharetic conditions in the weathered and fractured zones of the hard-rock aquifers. The area is made up of high grade of Archaean age, comprising Charnockite group. The Charnockite group occupying the Shevaroy hills is altered to bauxite and laterite. The geology of spatial distribution units as identified and delineated on the remotely sensed data are grouped under three types. Charnockite, Dolerite and Ultramafics.

INTRODUCTION

The geology and geomorphology pattern using Remote Sensing has been attempted in a number of previous investigations. Roy and Raina (1973) studied hydrogeomorphology of Kotepalli Catchment area of Hyderabad. Chatarjee *et al.,* (1978) studied the geomorphology of central Luni Basin of Western Rajasthan. Raju and Vaidyanadhan (1984) also used Remote Sensing techniques in the study of Sarada River Basin. Similar investigations were also attempted by some more workers (Raviprakash and Mishra 1993, Mangrukar *et al.,* 1993; Thomas *et al.,* 1995, Saini and Nathawat, 1996). Recently Jaisankar *et al.,* (2001) have under taken hydromorphogeological and Remote Sensing studies for groundwater exploration in Agnigundala area, Andhra Pradesh. In this investigation, geomorphology and land use pattern of Visakhapatnam urban industrial area has been taken up using IRS-IB and SPOT imageries with subsequent field checks.

Study Area

Yercaud Taluk, Salem District is located between latitudes 11042'58" to 11056'26''N and longitudes 7807'38'' to 78022'9'' E and spreads to an area of about 385 Sq. Km. The Yercaud Taluk, head quarter is Salem.

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In this study area covered within Survey of India (SOI) topographic sheet numbers 58I/1, 2, 5 and 6 and the boundary were marked in the scale 1:50,000. The city is well connected by transport and other facilities. It is located in the Shevaroys range of hills in the Eastern Ghats. The area is called the Shevaroy Hills. The yercaud taluk is a part of Salem district. In the north eastern boundary has a Valapadi taluk in Salem District, while its southern boundary is located in Salem taluk, which forms a boundary of northern side is Papirettipatti taluk in Dharmapuri District and the weastern boundary located in Omalur taluk in Salem District. The general elevation ranges from 300 to 520 m above MSL and higher elevation of 1200 to 1500 m confine to hill ranges due north with the exception of Yercaud which is at 1524 m above MSL the study area falls in three river namely 1) Thirumanimuthar, 2) Sarabanga and 3) Vaniyar River basin, which is a sub-basin of Cauvery River basin.

Geology

The study area is mainly over the Archaean crystallines rocks, and the ground water occur under pharetic conditions in the weathered and fractured zones of the hard-rock aquifers. The area is made up of high-grade supracrustals of Archaean age, comprising Charnockite group. The Charnockite group occupying the Shevaroy hills is altered to bauxite and laterite. The shevaroy hill ranges mainly consist of charnockites displaying vast flat topped hill and occasionally iter-banded with leptynites (Granetiferousfelspathic gneisses) and gondalites. The study area is endowed with economically exploitable deposits of magnesite and bauxite.

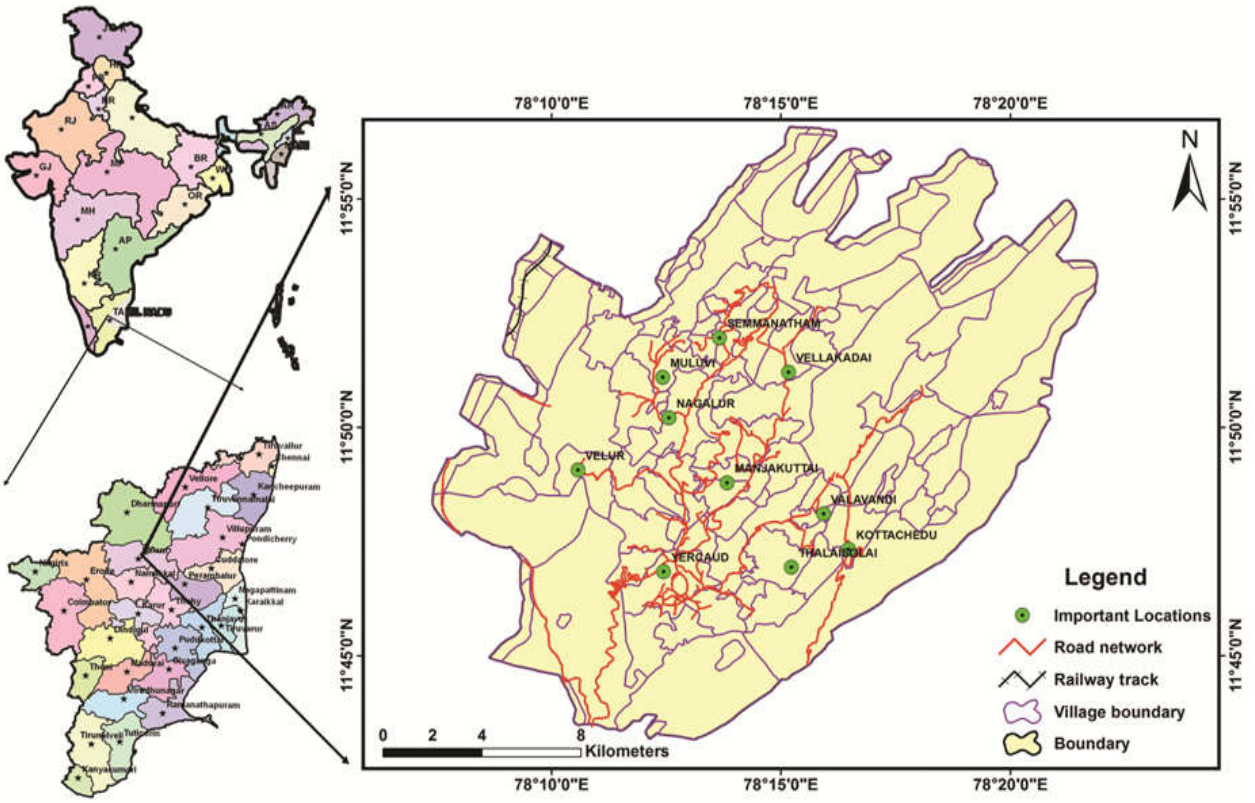

Fig. 1. Location of the study area

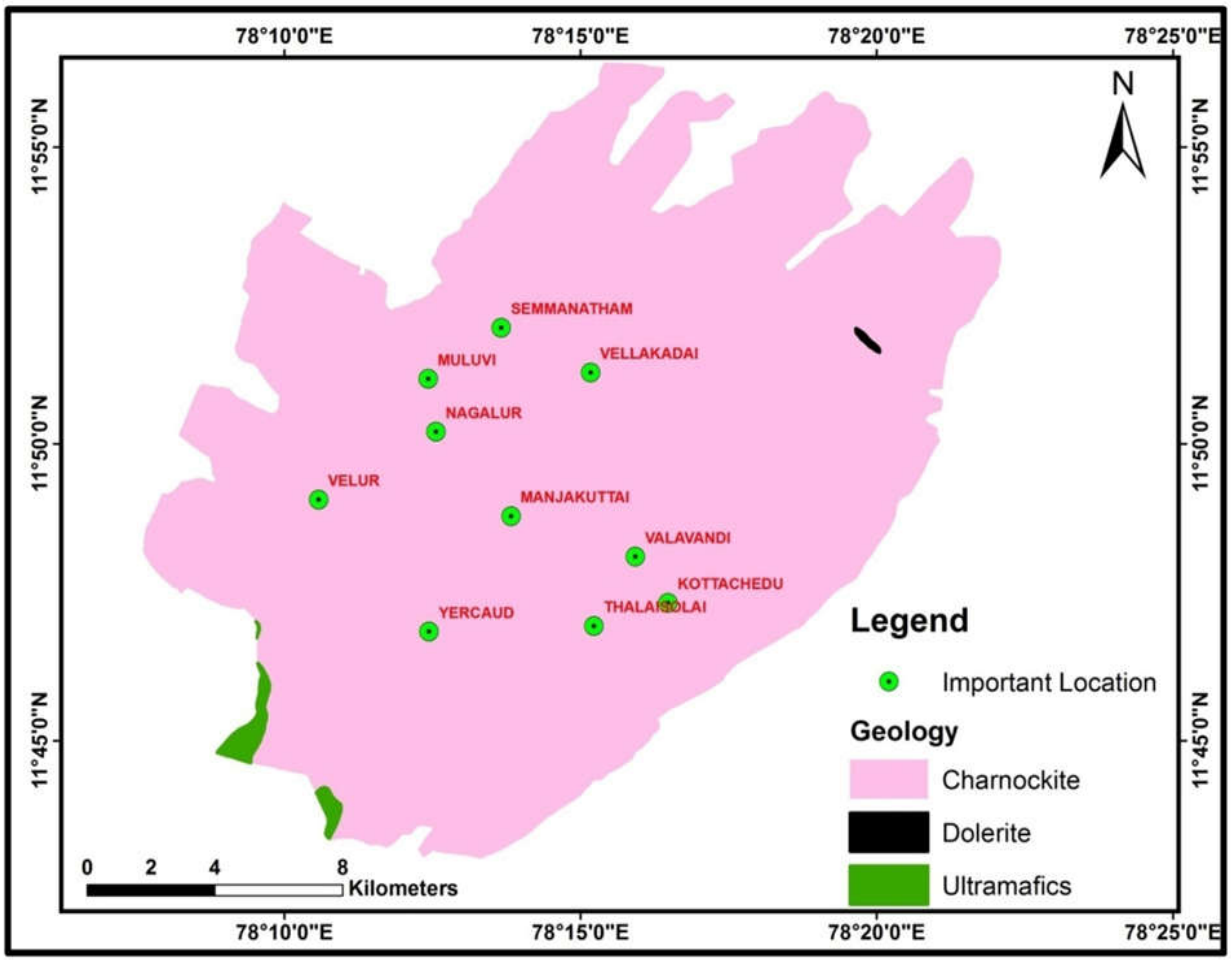

Fig. 2. Geology of the study area

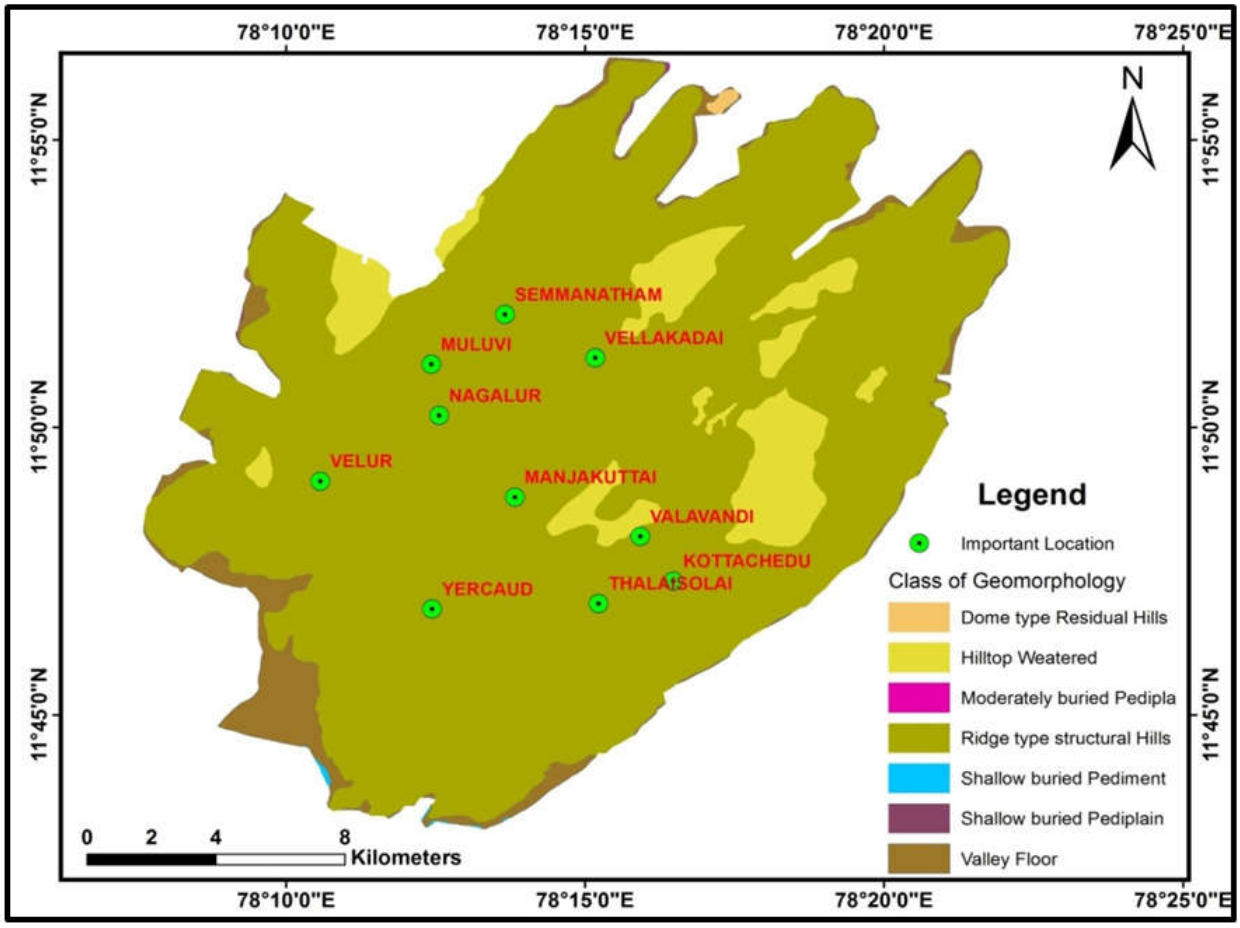

Fig. 3. Geomorphology of the study area

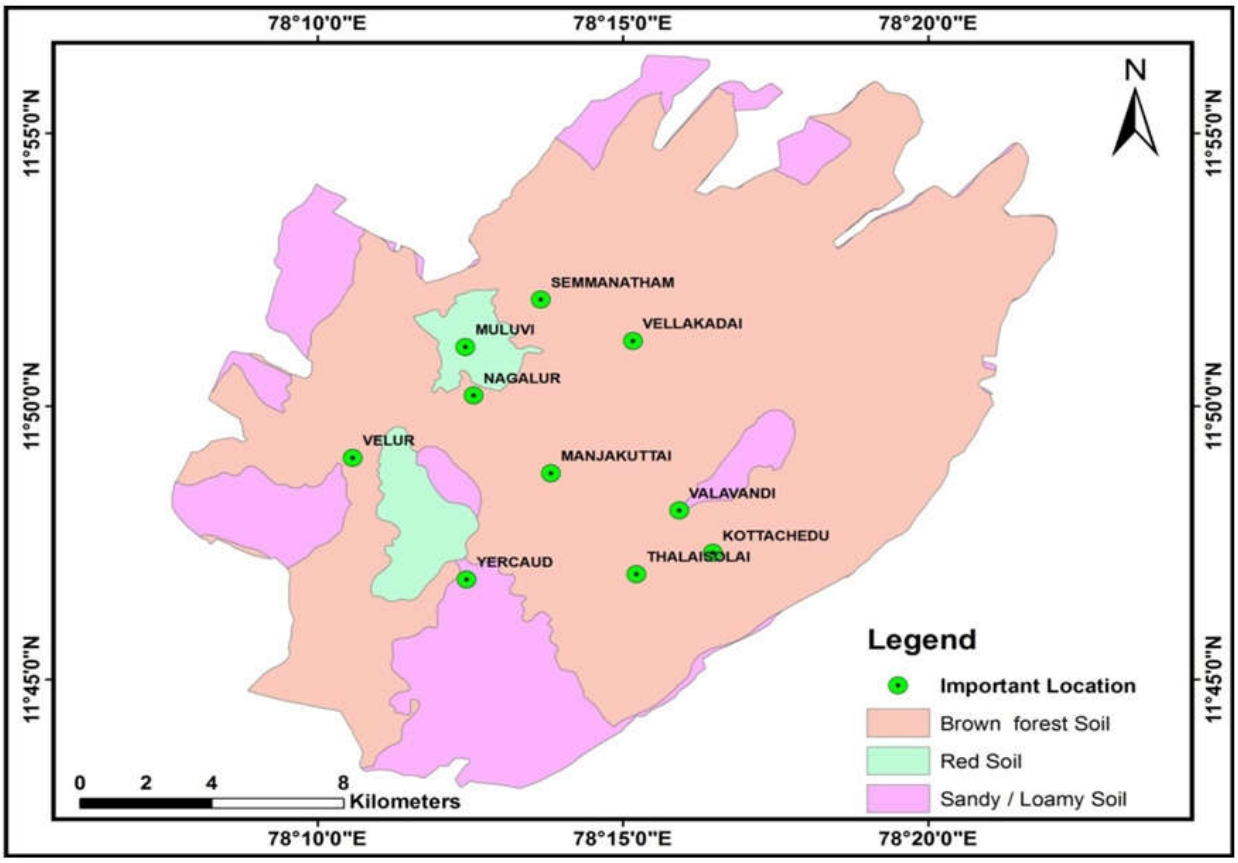

Fig. 4. Soil of the study area

All the rocks of the region have a general strike of N30°E and dip steeply towards south-east. The map thus prepared for the shevaroy hills is predominanlty covered by charnockites followed by ultramafics. The Charnockite rock (381.51 Sq. Km) occupies in more or less the entire portion of the study area followed by Ultramafics (2.09 Sq. Km) this type of rock occurs in southwestern part of the study area and Dolirite dyke (0.4 Sq. Km) small patch of the younger intrusive dolerite (Black Gold) in and around Maramangalam.

Geomorphology

Geomorphologically shevaroy hill is an erosion plateau looks like in the form of displaying, a vast flat topped hill. The plateau flanked on all sides by the escarpments in irregular nature and the same in further encircled by composite slopes. The processes and rate of weathering, erosion and deposition lead to the surface marked by undulations with the passage of time. Surface and near to surface modified by the external forces, which leave the remnant peaks and finally, this would result the Shevaroy hills with various nature undulating topography. The lateritic bauxite deposits formed due to chemical weathering process, which suggest that the plain surfaces it would indicate that this plain surface (Pediplain) is the end product of the cycle of erosion. In Shevaroy hills, chemical weathering played crucial role in the oldest formation like charnockite formation, was produced in laterite and bauxite deposits on the flat topped hills.

Soil

Soil types are highly active and play an essential role to encourage or discourage the recharge of ground water and main factor is the quality of parameters of ground water. The soil types could be classified in the study area. The same has shown three types of soil were mapped using geospatial technology, they are 1) Brown forest soil 2) Red soil, and 3) Sandy/ Loamy soil. Different types of soil and its regional distribution are described under this section.

Table.1. Result of the Soil Spatial Distribution in the Yercaud Taluk

S.No.	Soil Class	Area in sq.km	Area in percentage
1	Brown Soil	295.4	76.73
2	Sandy / Loamy Soil	73.2	19.01
3	Red Soil	16.4	4.26
Total		385	100

Brown forest Soil

Brown forest soil formed in the forest areas developed on sandstone, limestone or colluvium, under sub humid climatic environments and Pinus and/or mixed vegetation are Brown forest soil. These soils occur in association with podzolic group of soil Siddhartha (2003). They are characterized by broad transition zones, rather than horizon boundaries, due to the mixing action of earthworms across the topsoil/subsoil boundary. Originally these soils would have developed under broadleaf woodland (or possibly natural grassland). It covers most of the study area about 295.4 Km^2.

Red soil

Red soils are essentially ferrous material and get oxidized when exposed to different climatic conditions and would form ferric components. Soils are reddish brown colored and consists of sandy clay loams derived from colluviums weathered gneiss and charnockite. These soil variations are generally found in few parts of the study area. The red soil is rich in iron content and often well aerated and it is poor in lime, magnesium and nitrogen content. It could be noted that on being exposed to rainy area especially in the hilly terrain laterite formation would take place due to leaching of oxidized materials. The soil has least area in the study area.

Sandy/ Loamy soil

These soils are highly evaluated on higher elements of topography including pediments and rolling plains with favorable slopes up to six degrees and prove to be processing erosional hazards. In this soil very shallow in nature and its effective depth ranges from 20 to 60 cm with poor profile development, even though, the soil appears homogeneous in nature over the surface and beneath the surface they are broadly filled with supply to lithology of parents rocks. The soils types over pediments are large sandy in nature while further below, sands occur with less quartzite of silt and clay. In this soil mainly covered weathered zone area and slope area.

Conclusion

Remote Sensing technology has been found useful in generating geology, geomorphology and soil map units are classified under charnockite formation, was produced in laterite and bauxite deposits. The landform units include hill ridges/cuestas, detached isolated non-linear hills, and under hill domain. The remote sensing and GIS approach helps in effective mapping, characterization and classification of the soils. These properties of soils show variations due to its position on the landscape. The study shows that the application of remotely sensed data and GIS are very helpful in geology and geomorphology resources appraisal.

REFERENCES

Chatterji, P.C., Singh, S. and Qureshi, L.H. 1978. Hydrogeomorphology of the Central Luni Basin, Western Rajasthan, India*, Oeoforum*, 9:211-214.

Jaisankar, G., Rao, M.J., Rao, B.$.P. and Jugran, D.K. 2001. Hydromorphogeology and Remot~ Sensing Applications for Ground water Exploration in Agnigundala Mineralised Belt, Andhra Pradesh, India. Photonirvachak, *Jour. Of Indian Society of Remote Sensing*, 29(3):165-174.

Mangrulkar, A.D., Kondawar, V. K. and Krishna Murthy, Y. V. N. 1993. Geo-Environmental Characteristics and Identification of Hydro Potential Zones in Tansa and Bhastsai Reservoir Catchments. Photonirvachak. *Jour. of the Indian Society of Remote Sensing,* 21(1): 127-134.

Raju Pmdhvi, K. V. N. and Vaidyanadhan. R. 1984. Photohydrogeomrphology of the Sarada River basin in Visakhapatnam District, A. P. *Jour, of Assoc. Expl. Geophysicists,* 4(3):31- 39.

Roy, A.K. and Raina B. M. 1973. Hydrological Studies of Kotepally Catchment in Hyderabad (A. P), Based on Aerial Photographs Inst. Symp. On Development of Groundwater Resources, Madras, 1 (1 h): 13-27.

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