

APPLICATION OF REMOTE SENSING TECHNIQUES FOR MAPPING OF SOILS OF KANIGIRI AREA, PRAKASAM DISTRICT (ANDHRA PRADESH)

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ABSTRACT

Landsat 5 multispectral scanner black and white imagery in bands 2,4 and false colour composites have been employed in a small scale (1:250000) subgroup association level mapping of soil in Kanigiri tehsil of Prakasam district, Andhra Pradesh (India).

INTRODUCTION

Knowledge about the soil types, their distribution and characteristics is prerequisite for the development planning in an area. For this purpose aerial photographs are commonly used (Abichandani, 1965; Iyer, 1978, Dhir and Joshi, 1980; Singh and Dwivedi 1980). Availability of landsat MSS data has opened new horizons in view of the value in providing synoptic view of large area, repetitiveness, lower cost and faster data processing and plotting capability.

Distribution of soil in relation to physiography using landsat data has been reported by many workers (Ahuja 1978; Manchanda et al., 1984). This paper presents an attempt of using landsat multispectral scanner (MSS) of different bands and false colour composites (FCCs) to study nature and distribution of soils by employing physiography-soil association relationship to prepare small scale soil map.

MATERIALS AND METHODS

The study area : Kanigiri taluk and adjoining areas (79°15' E to 79°35' E; 15°20' N to 15°35' N) of Prakasham district in Andhra Pradesh. Entire western part of the study area is covered by Valikonda hill ranges, the area around hill ranges is represented by upper pediments (near the hills) and lower pediments with or without sand cover. There are two fairly large sand hummocks near Kondareddipalle village. The area is drained by numerous streams. The general slope of the area is from west to south-east and Palleru is the biggest river of the area originating from Vellikonda hill ranges. There are several ponds and tanks scattered all over the low lying areas; the biggest one is Hajipuram tank.

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Data base : Landsat 5's multispectral scanner (MSS) bands 2, 4 and false colour composites (FCCs) on scale 1:1000000 and 1:250000 respectively were used. The study area is covered by path no. 143-045 of April 24, 1984. Survey of India toposheet at 1:250000 was used as base map. Visual interpretation method was followed.

Ground truth collection : To study soil profile characteristics and to correlate landsat imagery interpretation units, field visits were made. Two profiles and five auger holes per mapping unit were studied and the soils were classified according to soil taxonomy (USDA, 1975).

RESULTS AND DISCUSSIONS

Based on different tonal variations in bands 2 and 4 and colour changes in FCC, five physiographic units were demarcated: three of hills and one each of upper pediments and lower pediments. Lower pediments were further divided into two subgroups: with mottled tone and without mottled tone. Sandy area in certain parts, water bodies, drains and rivers throughout the study area were also demarcated.

Physiography and soil associations

Based on different interpretations of imagery with limited field checks alongwith profile studies, different physiographic units have been depicted in Fig. 1. Landsat image characteristics of these units and soils associated with these physiographic units are set in Table 1. Characteristics of soils associated with physiographic units are discussed below.

Hills and hillocks (H)

The western part of the study area is surrounded by hills and hillocks covered with sparse vegetation, mainly trees and shrubs. Such hillocks also occur scattered in other parts of the area. The rock type encountered in this unit consists mainly of quartzites. The soils of these areas are shallow skeleton. They have been classified as Lithic Typic ustorthents and occupy 13430 ha.

Pediments (P)

Major part of the area is covered by pediments, which can be further subdivided into following units :

Upper pediments (P 1): The areas a km away from foot hills are shallow in depth. These are wastelands devoid of vegetation except shrubs and palm trees. Soils of this unit are shallow, dark brown and variable in texture having lithic contact (R) at a depth of 12 cm.

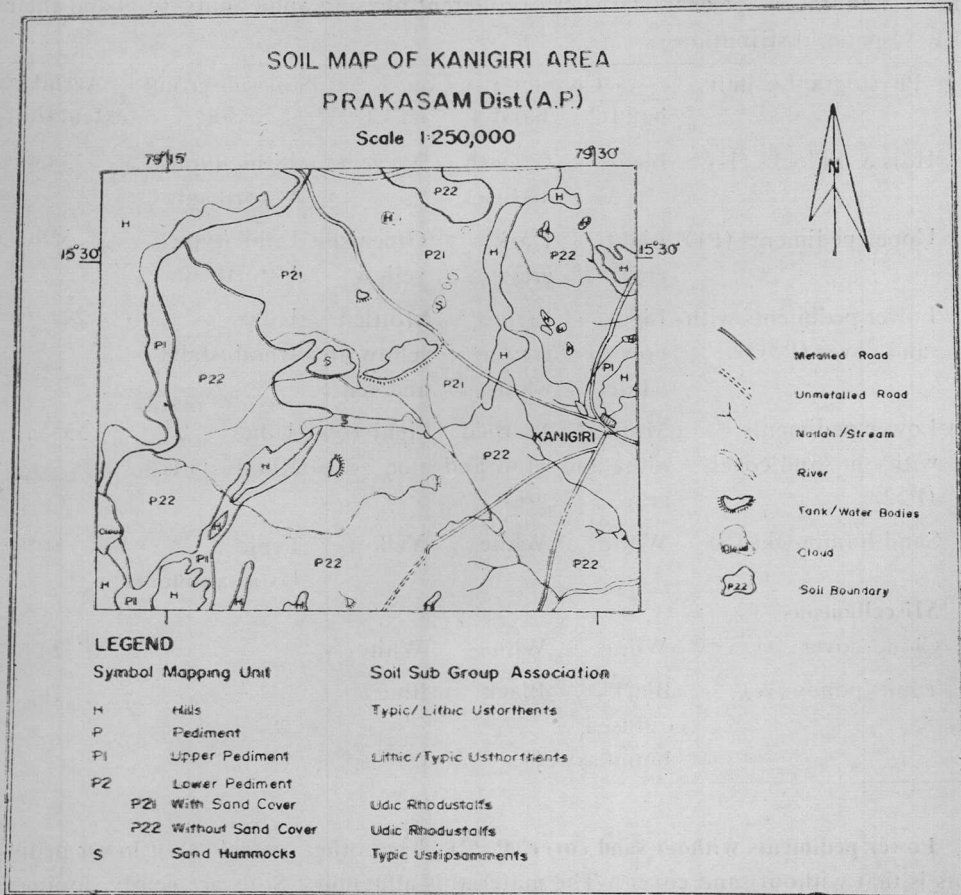


Fig. 1. Different physiographic units of the study area

The parent material is conglomerates. The area covered by this unit is 5890 ha.

Lower pediments (P 2)

Major portion of the study area comes under this unit.

Lower pediments with sand cover (P 21) : These are the areas having light textured soils on surface and slightly heavier below. The upper part extends up to 36 cm and is characterised by sandy to loamy sand texture, yellowish red colour and non-calcareous soils. The lower parts of the soils extend beyond 89 cm having sandy clay to clay loam texture and dark reddish colour. These are well drained soils. Parent material is alluvium and deposition of sand layer over these is due to aeolian effect. As these soil are dark red in colour with argilic horizon these have been classified as udic Rhodustalfs. The area covered by this unit is 22176 ha.

Table 1. Landsat image characteristics of different physiographic units, soils and their spatial distribution

S. No.	Physiographic unit	Characteristics on			Soil sub-group assoc.	Aerial extent (ha)
		band 2	band 4	FCC		
1.	Hills & hillocks (H)	Black	Greyish to black	Magenta	Lithic/typic Ustorthents	13430
2.	Upper pediments (P1)	Light grey	Dark grey	Greenish yellow	Lithic/typic Ustorthents	5890
3.	Lower pediments with sand cover (P21)	Light grey to white	Light grey to white	Mottled yellow grey and red	Udic Rhodustalfs	22176
4.	Lower pediments with out sand cover (P22)	Mottled white and grey	Mottled white and grey	Light blue	Udic Rhodustalfs	53587
5.	Sand hummocks (S)	White	White	Yellow	Typic Ustipsamments	808
Miscellaneous						
6.	Cloud cover	White	White	White	—	244
7.	Tanks/ponds (W)	Black diffused boundary	Black	Blue	—	765

Lower pediments without sand cover (P 22) : The other category of lower pediments is that without sand cover. The material is alluvium. Soils are gently sloping, deep, heavy textured, non-calcareous with dark reddish to dark reddish brown colour.

These soils have been classified as Udic Rhodustalfs. Area covered by this unit is 53587 ha.

Stabilised sand hummocks (S)

The area experiences localised sand activity due to low rainfall, high temperature, sparse vegetation and high wind velocity especially during dry season. As the area is surrounded by hills in all directions except in the south-west, the wind blows over the area surrounded by hills causing the movement of the silt and sand particles which result in the formation of sand hummocks. There are two stabilised sand hummocks near Navagopalampuram and Velichera villages. Two more stabilised sand hummocks of relatively smaller sizes near Kondareddipalle village are also seen. These have sandy to loamy sandy texture and colour reddish brown at the surface and darker subsoil. They are classified as Typic Ustipsamments and cover an area of 808 ha.

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