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RESEARCH ARTICLE

APPLICATION OF REMOTE SENSING AND GIS FOR SOIL MAPPING OF KOLLI HILL, SOUTH INDIA

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A B S T R A C T

The aim of the study was to investigate the relationship between maximal oxygen consumption and body composition of male university handball players. Twenty seven (27) male university handball players were selected from Department of Physical Education and Sports Sciences, Annamalai University, who voluntarily participated in this study. Maximal oxygen consumption and body composition (percent body fat, lean body mass and fat mass)
was selected as criterion variables which was measured through Yo-Yo intermittent recovery test level II and skinfold caliper was used for measuring percent body fat. The result of the present study showed that product moment correlation analysis showed significant correlation between maximal oxygen consumption with percent body fat (r = -0.688, *p* = 0.000) and fat mass (r = -0.603, *p* = 0.001). However, lean body mass showed no relationship with maximal oxygen consumption (r = -0.140, *p* = 0.485). The findings of the present study indicated significant negative correlation among maximal oxygen consumption with percent body fat and fat mass among male handball players. This clearly shows that players with greater maximal oxygen consumption will have low fat mass.

INTRODUCTION

Soil is a valuable non-renewable resource and exists throughout the World in a broad diversity. Different types of soil exhibit diverse behavior and physical properties. It provides essential support to ecosystems and to human life and society. Therefore, it is imperative to maintain soil functions and qualities to sustain the ecosystem and the human being (Blum, 1993; De Groot et al., 2002; European Commission, 2006). These alarmed authorities to plan and assess suitable parameters for land uses. It has been recognized that the quality of land suitability assessment, and the reliability of land-use decisions depend largely on the quality of soil information used to derive them (Mermut and Eswaran, 2001; Bogaert and D'Or 2002; Salehi et al., 2003; Ziadat, 2007).

Soil surveys are the main information source for sustainable agriculture, and land use management. Soil surveys mapping units are defined by the soil properties that affect management practices, such as drainage, erosion control, tillage and nutrition, and they involve the whole soil profile (Soil Survey Division Staff, 1993). In modern technologies such as Remote Sensing (RS) and Geographic Information System (GIS) provided unused approaches to meet the demand of resource related modelling (Mermut and Eswaran, 2001; Salehi et al., 2003). In recent years, thematic mapping has undergone a revolution as the result of advances in geographic information science and remote sensing. For soil, mapping archived data is often sufficient and this is available at low cost. Green (1992) stated that integration of Remote Sensing within a GIS database can decrease the cost, reduce the time and increase the detailed information gathered for soil survey.

Study Area

Kolli Hill, the study area lies between 11° 11' – 11° 30' N latitude and 78 ° 15' 00" - 78 ° 30'00" E longitude in the state of Tamil Nadu. It is situated in the Namakkal District of Tamil Nadu, north of the river Cauvery, covering an area of about485 km2 (Fig.1). Physiographically; it is a hilly region with an altitude ranging from 180 to 1415m at the foothill and plateau respectively. Slope of this region varies from gentle to very steep. Geologically the study area is occupied by acid charnockite with minor bands of pyroxene granulite and magnetite quartzite (Mani, 1976).

MATERIALS AND METHODS

IRS P6 LISS VIMX digital satellite image of false colour composite was used for the present investigation. Digital Image processing techniques were performed. The following steps were followed:

- Spatial Filtering
- Principal component analysis (PCA) techniques were used to demarcate the boundaries of the features.
- Digitizing the features.
- Supervised classifications were employed to check the quality of the output.
- Ground truth data were matched with the output.

After extensive fieldwork and sampling the soil profiles, four mapping units were determined. The soil series and their important phases were slope, texture, depth and stoniness, which were considered as basic mapping units. Henceforth, concluding soil map, scaled at 1:25,000 was produced after the finishing field checking and so the preliminary soil map (scaled at 1:100,000) was corrected. Soil profiles were described and sampled according to Soil Taxonomy (Soil Survey Staff, 1999, 2006) and Schoeneberger et al. (2002). Necessary analysis for classifying and determining physical and chemical properties were done according to Burt (2004). Based on morphological and physicochemical characteristics, the soil profiles classified according to Soil Taxonomy (Soil Survey Staff, 1999, 2006) and FAO-Unesco soil map of the World legend (FAO Unesco, 1974, 1990) classification systems.

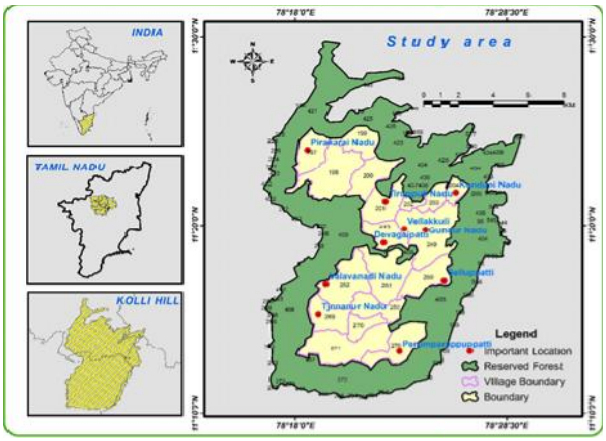
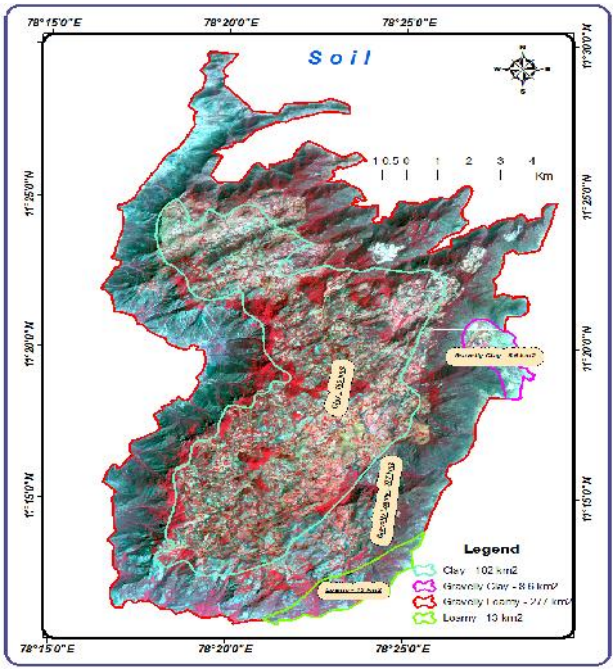


Fig.1 Key map of the study area.

RESULTS AND DISCUSSION

Clay Soil

The major soils of this map symbol include fine, mixed, typic Rhodustalfs and fine mixed typicHaplustalfs. These are characteristically deep to very deep, well drained and clayey in nature and are associated with moderately sloping areas. These soils are prone to severe - moderate erosion.



Soils of this category are found to occur in the upper portion of the hills, especially in the plateau portion of the area 182 Km2 (Fig.2).

Gravelly Loamy

The major soils of this unit include loamy - skeletal mixed lithic Ustropepts and loamy, mixed lithic Ustorthents. These are characteristically shallow to very shallow, well drained and loamy in nature and represent areas of severe soil erosion. Soils of this category are found to occur in the steep slope areas on the hills (277 Km2) (Fig.2).

Loamy Soil

The major soils of this map symbol include fine loamy, mixed typic Rhodustalfs and fine loamy mixed typicUstropepts. These are characteristically moderately shallow, well drained and loamy in nature. Soils of this category are found to occur in a small pocket in the southeastern part within the study area (13 Km2) (Fig.2).

Gravelly clay Soil

The major soils of this unit include clayey skeletal, mixed, Rhodustalfs and clayey skeletal, mixed, typic Rhodustalfs. These are characteristically well drained, gravelly clay soils found on the gently sloping lands. Soils of these categories are found to occur in a small pocket in the eastern part to the study area (8.6 Km2)(Fig.2).

CONCLUSION

The study of soils from different physiographic units revealed that nature of parent material, topography and time are the factors responsible for the pedogenic differences in the soils developed on different physiographic units. Other than hills, generally little difference was found among various physiographic units in profile stratification. The study established a well-defined relationship between physiography and development of soils. Digital image processing techniques of IRS P6 LISS VIMX data reveals that the main landforms units in the study area are plains, sloping lands and hilly area. The supervised classification technique to discriminate between the soils of Clay, Gravelly clay, Gravelly loamy and Gravelly clay Soil. The total area for each soil type could be determined.

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