

Research Article

Application of remote sensing in characterization and mapping of soil resources for sustainable development

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Received : 30.06.2012; Revised : 28.07.2012; Accepted : 02.10.2012

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Summary

A study was carried out to characterize and classify the soils of Lower Palar – Manimuthar watershed, Tamil Nadu State using satellite data on 1:50,000 scale and to evaluate soils for their capability, productivity and suitability for agricultural crops. Ten soil series were recognised in the study area and they were classified as Entisols, Inceptisols and Alfisols. The soils were grouped under the land capability classes II, III, IV and V with soil and erosion as major limitation. Soil suitability for different land utilization types (LUT) were also assessed. The potential LUTs for each soil were suggested keeping into account the productivity index. Based on the major limitations, suitability to crops and productivity rating were calculated and these were integrated in GIS to generate action plan for sustainable development.

Key words : Remote sensing, Soil classification, Land evaluation

How to cite this article : Arunkumar, V. (2012). Application of remote sensing in characterization and mapping of soil resources for sustainable development . *Asian J. Soil Sci.*, 7(2): 235-238.

Introduction

Management of soil resources on scientific principle is essential to maintain the present level of soil productivity and prevent soil degradation (Sharma, 2004). In the recent years increasing emphasis has been on characterization of soils and developing rational and scientific criteria for land evaluation and interpretation of soils for diverse land uses (Sarkar, 2005). This calls for comprehensive knowledge on soil resources in terms of types of soil, their spatial extent, physical and chemical properties and limitations or capabilities. Remote sensing technology has emerged as a powerful tool for studying soil resources because it helps in studying the soils in spatial domain in time and cost-effective manner (Saxena, 2003).

The present investigation was carried out in Lower Palar - Manimuthar watershed, Tamil Nadu to characterize and classify the soils using remote sensing and GIS techniques and also suggest land use plan for achieving sustainable crop production.

Resources and Research Methods

Study area:

The study area (28,824 hectares) is distributed in

Sivaganga and Pudukottai districts in Tamil Nadu State. It lies between 9°7'36" and 10°31'07" N latitude and 78°32'43" and 78°48'23" E longitude. The geology of the area comprised of laterite and gneissic rocks. The soil moisture regime of the area is 'ustic' and the temperature regime is 'isohyperthermic'. The mean annual rainfall is 710.75 mm and bulk of the rainfall is received during North - East Monsoon. The mean annual air temperature is 28.7 °C. The mean maximum and the minimum temperature are 33.9°C and 23.4 °C, respectively.

Field studies :

The field survey was preceded by interpretation of images for preparation of base map. The basic data used in the present investigation were IRS 1B LISS II geocoded false colour composite with spectral bands 2,3 and 4 on 1:50,000 scale imageries corresponding to Survey of India (SOI) toposheets 58 J12, 58 J16 and 58 K9 which was visually interpreted based on image characteristics such as tone, texture, size, shape, pattern, association and mottles. Mapping units were prepared on prefield maps and were checked during ground truth verification. Image interpretation units (IIUs) having similar soil characteristics were grouped into one