

A Review

Remote sensing in agriculture and soil resources

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Received : 14.06.2012; Accepted : 18.10.2012

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Summary

Reliable data gathered in time on land use/land cover, crop acreage and production estimates, soil resources with respect to their nature, extent, spatial distribution, evaluation of potentials and limitations namely soil erosion by wind and water, soil salinity/ alkalinity, moisture, soil compaction etc., plays a key role in advancement of agriculture and utilization of available natural resources on a sustainable basis. Efficiency of soil survey and other natural resources study programmes increased by the use of the data obtained from the remote sensing satellites. Beginning with the Landsat multispectral data during 1970s, spaceborne multispectral measurements from a variety of sensors *i.e.* Thematic Mapper, SPOT Multi Linear Array, Indian Remote Sensing Satellite (IRS) Linear Imaging Self-scanning Sensor (LISS-I, LISS-II and LISS-III), Wide Field Sensor, Panchromatic (PAN) sensor have been extensively used for carrying out soil surveys and various natural resources studies. In this article, an attempt has been made to figure out an overview of remote sensing applications in agriculture and soil resources.

Key words : Soil resources, Remote Sensing, Land use

How to cite this article : Singh, A.K. (2012). Remote sensing in agriculture and soil resources. *Asian J. Soil Sci.*, 7(2): 386-391.

Introduction

Remote sensing is defined as science and art of acquiring information about an object or a surface feature from a measurement made at a distance without coming in physical contact with an object or feature of interest. Use of remote sensing techniques in agriculture and soils got momentum with the availability of aerial photographs. The first series of air survey experiments were conducted in India in the early 1920s and the first regular survey aerial photography was flown for Chittagonj forest survey in January 1927 on a scale of 4 inch to 1 mile. The Indian Air Survey Company and Transport Ltd. (now Air Survey Company of India Pvt. Ltd.) was incorporated in India in 1928 and thereafter aerial photographs for mapping and other applications were undertaken on a regular basis. With the launch of first ERTS (Earth Resource Technology Satellite) latter renamed Landsat in 1972, multispectral data availability begun and interest in remote sensing data utilization started.

The Indian Remote Sensing (IRS) programme began with the launch of IRS-1A in 1988 and IRS-1B in 1991. Both the

satellites are equipped with sensors that acquire multispectral data with 72.5 m and 36.25 m spatial resolution. The LISS-I sensor acquires the 72.5 m data and LISS-II provides the 36.25 m data. A second generation of IRS satellite operation began with the launch of IRS-1C and IRS-1D in 1995 and 1997, respectively. These systems are identical in design and carry the sensors: LISS-III with 23 m resolution (70 m in the mid-IR band); a panchromatic sensor (PAN) with 5.8 m resolution and a wide field sensor (WiFS) with 188 m resolution.

Now the satellite data from various coarse to high resolution sensors are available to cater the needs of regional to village level users. It can be visualized that QuickBird 2.44 m multispectral and 0.61 m PAN. Orbview and IKONOS (4 m multispectral and 1 m PAN) data can be used for precision agriculture planning and monitoring.

Historical background :

During 1920 and afterwards natural resource studies and soil surveys were carried out using conventional techniques, which was tedious, time-consuming, costly and impractical. Subsequently, aerial photographs were used for topographical