Chapter 9

Remote Sensing Techniques and Its Application in Arid Zones of India

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ABSTRACT

Remote sensing technologies offer the potential for contributing the security to human existence on arid zones in the country in variety of ways. Remote Sensing in agriculture particularly for natural resource management. It provides important coverage, mapping and classification of land cover features. The remote view of the sensor and the ability to store, analyze, and display the sensed data on field maps are make remote sensing a potentially important tool for agriculture. The aerial photography gives two main advantages viz., speedy survey in very large area or remote area and precise description and recording of resources status. Remotely sensed images provide a means to assess field conditions and gave valuable insights into agronomic management. It led to understanding of leaf reflectance and leaf emittance changes in response to leaf thickness, species, canopy shape, leaf age, nutrient status, and water status. Understanding of leaf reflectance has led to quantify various agronomic parameters, e.g., leaf area, crop cover, biomass, crop type, nutrient status, and yield.

INTRODUCTION

The ancient peoples were totally dependent on the astronomy i.e. the behavior of planets and stars and their movement to follow the field practices starting from field preparation to harvesting along with daily routine activities. The predictions were almost perfect and still dominant and active particularly for rural in Indian context. It was similar to modern remote sensing techniques in terms of no physical contact between object and planets. The present remote sensing technique is only varying in terms of more and more realistic and comprehensive study as it is science and technology based. The agriculture in ancient times was subsistence types so farming community is limited to their locality only. As the agriculture is changed and it became a business so wide spread and informative study is needed in present time of technology. Comprehensive, reliable and timely information on agricultural resources are very much necessary for a country like India whose mainstay of the economy is agriculture (Mittal, 2013). In fact, agricultural survey is a backbone of planning and allocation of the limited resources to different sectors of the economy. To make the agriculture from subsistence to sustainable, the adaptation of new research tools particularly from aerospace is one of the prime objectives and ensures food security without affecting the agro-ecological balance. This area is still relatively new compared with other agronomic fields; however, the information content is providing valuable insights into improved management decisions.

In this chapter I tried to elaborate the efficient use of natural resources using remote sensing techniques so sustainability may be maintaining in the dry tracts of India defined by very difficult normal life under extremes of climatic conditions.

DEFINITION AND IMPORTANCE OF REMOTE SENSING

Remote sensing is defined as the art and science of gathering information about objects or areas from a distance without having physical contact with objects area being investigated. The word remote sensing was coined by Fisher in 1960AD. Remote sensing has been used in detection and analysis of resources. There are several types of remote sensing systems used in agriculture but the most common is a passive system that senses the electromagnetic energy reflected from plants. The sun is the most common source of energy for passive systems. Passive system sensors can be mounted on satellites, manned or unmanned aircraft, or directly on farm equipment. Interactions between reflected, absorbed, and transmitted energy can be detected by remote sensing. The relationship between reflected, absorbed and transmitted energy is used to determine spectral signatures of individual plants as spectral signatures are unique to plant species. Interactions between reflected,

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