Chapter 66
Agro-Geoinformatics, Potato Cultivation, and Climate Change

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ABSTRACT

The agriculture sector is reeling under the pressures of population, land and water scarcity, diseases, disasters and the most challenging of them all, climate change. Although climate change is yet to be charged with affecting agriculture, but in recent years trends of change have been witnessed in various crop production, with a hint of climate's role in it. With the advent of technology, these trends have become easier to analyse and in certain cases predict too. Information Technology (ICT) tools like Geoinformatics are playing a profound role in the agriculture sector and is helping to understand and assess the various factors affecting the growth of crops along with finding out the alternative suitability parameters for better production and distribution. The main aim of this chapter on agro-geoinformatics is to look into this linkage between technology usage and better potato production during adverse conditions.

INTRODUCTION

Agro-Geoinformation

Management of agricultural resources comprises of myriad activities in conservation practices and land/water resources aimed at increasing the food production. Substantial increase in crop production can also be achieved by bringing additional land under cultivation, improved crop management technology through use of high yielding, input responsive and stress tolerant crop varieties, improved pest control as well as by sustainably practicing irrigation and fertilizer inputs. These inputs together with reliable information on:

1. Existing land use and acreage under various crops;
2. Soil types and extent of problem soils;

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3. Monitoring of surface water bodies (to determine water availability in irrigation systems) for ground water development; and
4. Management of natural calamities etc., will enable formulation of appropriate strategies to sustain the pace of agricultural development.

This in turn calls for a holistic approach, which must combine short-term management of agricultural resources at micro-level with long-term global perspectives, keeping in view the socio-economic and cultural environment of the people (Rai et al., 2008).

Growth rates of crops are of utmost importance to planners and policy makers. These show the past trend of the variables and enable us to forecast the near future trend and to study the growth behavior in area, production and yield a sound technique is required. With the advent of information technology into the agriculture sector, these effects and trends can help in joining the dots and provide a holistic view of the entire scenario.

Agriculture-related geoinformation has become one of the key information sources in agricultural decision-making and policy formulation process. Recent advances in geoinformatics have created new opportunities and challenges in applying geoinformatics to agriculture. The issues related to handling and applying agro-geoinformation, such as collecting (including field visits and remote sensing), processing, storing, archiving, preserving, retrieving, transmitting, accessing, visualizing, analyzing, synthesizing, presenting, disseminating have been addressed actively in the past several years.

According to Wikipedia, Geoinformatics is an amalgamation of geography science and information science. It develops and uses information science to address the problems of geography, cartography, geosciences and related branches of science and engineering. It is an integrated technology for collection, transformation and generation of information from spatial and non-spatial databases. Geo-informatics constitutes of Remote sensing, Geographical Information Sciences (GIS), Global Positioning Systems (GPS), Relational Data Base Management Systems (RDBMS), etc.

Agro-Geoinformatics uses the power of Geoinformatics in bettering the agriculture sector. It uses it as a tool for assessment, monitoring, planning and management of agricultural research and development. Agro-geoinformation is therefore gaining more importance and prominence in the agricultural decision-making process. It is a powerful tool and is critical for agricultural sustainability, food security, environmental research, bio-energy, natural resource conservation, land use management, carbon accounting, global climate change, health research, agricultural industry, commodity trading, economy research, education, agricultural decision-making and policy formulation, etc. Concisely, Agro-geoinformation will help farmers better their produce in a much more efficient way in the face of today's climate and industry challenges.

Agricultural remote sensing involving crops and soils are quite complex. These complexities are due to the dynamic nature and inherent complexity of biological materials. In order to handle these complex problems, remote sensing technology offers numerous advantages over traditional methods of conducting agricultural and other resource surveys. Advantages include the potential for accelerated surveys, capability to achieve a synoptic view under relatively uniform lighting conditions, availability of multispectral data for providing intense information, capability of repetitive coverage to depict seasonal and long-term changes and availability of imagery with minimum distortion etc. Therefore, it permits direct measurement of important agro-physical parameters.

As is known, remote sensing of earth resources utilizes electromagnetic waves, which ranges from short wavelength ultraviolet to visible near infrared and thermal infrared in the longer wavelength, ac-