Chapter 1

INTRODUCTION

Watershed management studies have become most appropriate in the present era as it gives a holistic development of an area. Soil, water and vegetation are the basic natural resources required for sustainability. Improper management of these resources has lead to depleted resource base, poor crop yields and returns apart from environmental and ecological imbalance. This calls for concerted efforts to conserve, upgrade and manage the natural resources through integrated watershed approach for sustainable development of an area. Watershed by definition is a geo-hydrological entity or a piece of land that drains to a common outlet.

Watershed programmes are evolved through interaction of water and land area comprising arable and non-arable lands as well as drainage system existing in the watershed area. The watershed area delineated based on distribution and flow of rainwater, is considered as a unit for scientific development of natural resources.

In the past, developmental activities in our country were carried out with sectoral approach rather than integrated approach. Development based on administrative units such as district, taluk, block and village have resulted in imbalance and sometimes no overall development in some areas. In nature, all the resources are interlinked and thus, the integrated developmental approach is the best method for optimum development of any area. Considering this, watershed development based on integrated approach has been given prime importance for sustainable development in the recent years.

Remote sensing has emerged as a powerful tool in recent years for planning and development of a watershed on a sustainable basis. The capability of space technology for obtaining systematic, synoptic, rapid and repetitive coverage has enhanced the spectrum
of remote sensing applications in natural resource management. With the availability of indigenous remote sensing satellites with high-resolution sensors, stereo coverage and fast turn around time, the concept of watershed planning at micro level is becoming simpler, reliable and more efficient.

The repetitive coverage of the satellite provides an excellent opportunity to monitor the land resources and evaluate the land cover changes and its impact on environment through a comparison of images acquired for the same area at different times. Changes like increased or decreased forest cover, irrigated area, change in water spread / levels, soil erosion status could be monitored using temporal satellite data.

Geographic Information System (GIS) is a set of powerful tools, which can store, retrieve at will, and analyze spatially referenced data for a specific set of purpose. It is an important additional tool in monitoring and management of natural resources. GIS helps in handling voluminous data, updating of information on geographic features, which is helpful for water resource management.

A study on landform relationship with soil, physical and chemical properties and its relationship with parent material will give greater insight of the dynamics of soil and information needed for proper management of natural resources. The genesis and classification of soil is helpful in improving and better understanding among the scientists and others working in related fields.

Therefore, a study was undertaken in two watersheds (Fig.1.1 &1.2) namely Itagi watershed, Ranebennur taluk, Haveri District and Chennammanagathihalli watershed, Challakere taluk, Chitradurga District to identify the dominant soils occurring in major landforms and their characterization using remote sensing and GIS techniques with the following objectives:
• To study landform relationship with soil variability

• Relationship of parent material and soils in the watershed

• To study morphology, genesis and classification of soils of the area

• Soil fertility relationship with soil series.

• Terrain modelling of watershed and Geomorphology

• Application of remote sensing and GIS techniques for watershed resource development

BRIEF DESCRIPTION OF THE CHAPTERS

This thesis is divided into seven chapters. The first chapter introduces the background information about Itagi watershed and Chennammanagathihalli watershed, Remote sensing, GIS and natural resources, followed by aim and objectives of the study. Second chapter presents a review of related literature. The literature review covers related work in the field of morphological, physical and chemical characteristics of soils, soil genesis, classification and application of remote sensing and GIS in soil studies.

The third chapter covers the description of study area, methodology followed in the preparation of base maps and other thematic maps. In brief, analytical methods followed in the determination of important chemical characteristics are discussed. Chapter-4 presents the results obtained in respect of soils and different types of landforms, parent materials, morphology and their genesis. Soil classification, soil fertility relationship with soil series in the study area, agricultural and water resources
Fig. 1.1 Location map of Itagi Watershed
Fig. 1.2 Location map of Chennammanagathihalli Watershed
development studies in the watersheds are discussed and the results are presented in the form of Figures and Plates.

The results obtained in respect of various parameters are discussed in Chapter-5. Summary and conclusions with recommendations are presented in Chapter-6.