The forests are an integral part of earth's life support system. They support highly diverse ecosystems, supporting millions of species and supply a wide range of goods and services. Forests regulate the local hydrological cycle, protect soils from excessive erosion, slow down and moderate the flood and other harmful fluctuations in the stream flows.

The forests are an important part of the resource base for tourism, and they are of inestimable cultural value, source of beauty and majesty for contemplation, recreation, amenity, religion, art, music and poetry.

The material development of the world forests to meet the growing demands of the rapidly increasing population without causing imbalance in the global greenhouse effect and for preserving the climate and maintenance of ecological balance calls for a rational, practical and immediate attention towards monitoring.
management of our natural forests. The deforestation increases albido and this alters the energy balance in the environment.

Forests are absolutely necessary to preserve the rich bio diversity on the planet. The science has shown that the nature has its own devices for restoring the balance which if disturbed has disastrous effect on the whole ecosystem. The forests resources over the years have suffered serious depletion due to heavy demands of ever increasing population.

In view of the above the forests have to be managed for sustainable development so that it can exist in perpetuity to preserve life support system and biological diversity within all the constraints.

This calls for (1) priority of research to gain full understanding of the ecology of the forests to increase their productivity and to improve the conservation and utilisation of the scarce resources and (2) strengthening the research in the field of forest inventory for collecting relevant information on resources qualitatively which will form sound basis for preparation of effective management pl
taking management decisions, development and monitoring of resources on long term basis.

The comprehensive, reliable and timely collection of data is still a major problem for effective management of the forest resources. The assessment of changes taking place in the forest cover over a period of time require periodic or repeated inventories.

The conventional ground surveys, even though more reliable and accurate in forest inventory are not cost and time effective and therefore can not be used for updating the desired information at short interval of time. This calls for an alternative approach to present method of ground survey in forest inventory.

The thesis deals with this problem. The present thesis is organised into eight chapters. The first chapter is introductory in nature and deals with the importance of forests in the life support system on the earth and requirement of informations to manage it on sustainable basis. The role played by forests in regulating various

III
aspects of life on the planet and the adverse effect of deforestation has been discussed in this chapter.

Chapter II deals with forest inventory and its relevance for management of forest resources on scientific basis for sustenance of life support system in perpetuity. It also deals with the data requirement and problem associated with the traditional survey method in forest inventory. The need for forest inventory and its data requirement has been discussed.

The present method of data collection with its limitation and availability of modern science of remote sensing and its applications in forest inventory with advantages have been enumerated in this chapter.

Chapter III deals with the alternative methods available for collection of inventory data using remote sensing technology which includes aerial photographs and satellite imagery comes handy in monitoring the fast changes taking place due to conflicting pressure of various demands on the limited resources. It also deals with the
improvement which are expected from application of modern technology of remote sensing in forest inventory in terms of cost and efforts and improvement in quality of managerial decisions.

In this chapter the details of study area and method of data collection using remote sensing method have been discussed. The processing of satellite digital data for analysis and its uses in forest inventory has been discussed in details along with the algorithm used to make satellite data useful for forestry purposes.

Chapter IV deals with the analysis of data using known statistical techniques and formulation of mathematical models to assess stand volume of growing stock per hectare. The models have been formulated on the basis of the tree volume equations which are presently in use in forestry science.

The field and remote sensing data have been used to formulate mathematical models and attempt has been made to relate the field growing stock volumes with the volumes derived using remote
sensing data by means of statistical methods and the significance of regression have been calculated.

Chapter V deals with field validation of models formulated on the basis of validation plot data which was collected using random samples from similar forest type. It also deals with various statistical methods for model validation such as correlation coefficient, coefficient of determination, fit index and calculation of standard deviation, etc. The models formulated have been ranked on the basis of various indicators.

In chapter VI an attempt has been made to compare the forest growing stock volumes per hectare calculated by using various models developed with actual field volumes collected from independent ground samples to assess the proximity of values derived from models and actual ground values. In this chapter the information on volumes per hectare available with the Karnataka forest department has been compared with that derived from remote sensing models.
Chapter VII deals with the cost associated with the traditional ground inventory method and remote sensing method of data collection. These are compared along with the efficiency of both the methods to assess the relative superiority of these methods.

In Chapter VIII various predictor variables have been studied for their contributions to the calculation of inventory information and degree of association among themselves so as to find out the relative significance of various predictor variables in the inventory of the forest resources.

The models developed in this thesis can be used in similar type of forests for the purpose of fast collection of informations and monitoring of the growing stock which will be cost and time effective at the same time provide better quality of timely information to enable continuous monitoring of nature's dynamic resources.