ABSTRACT

The thesis deals with a detailed investigation of “Satellite Image Classification under Different Specifications”. Remote sensing and GIS have emerged as efficient and powerful tools in different fields of science over the last two decades. RS and GIS aid planners and decision makers to make effective and correct decisions and designs. Remote sensing and GIS can be used as a tool to formulate the plan for the natural resource management in day-to-day activities. Area of research is on remote sensing and GIS related to Land Use (LU) and Land Cover (LC) mapping. In the first part of the thesis, problems related to image analysis, image classification and image fusion techniques have been investigated and in the second part, applications like LU and LC mapping, horizontal accuracy assessment of digitized cadastral maps, watershed characterization, runoff estimation, change detection and urban sprawl of remote sensing and GIS are implemented. Over the past three decades, a number of classification methods have been developed for classifying remote sensing data, including parametric and non-parametric classifiers. With the availability of various classification techniques, it has now become important to compare, analyze and evaluate the accuracy and performance of these classifiers for generating LU and LC maps as the spatial resolution of remotely sensed images becomes finer. The research focuses on analyzing and comparing the different available classifiers like parametric and non-parametric classifiers. To study the behavior and efficiency of Maximum Likelihood, Minimum Distance Classifier (MLC), Mahalanobis Distance Classifier (MHDC), Decision Tree Classifiers (DTC) and Knowledge expert classifier methodologies are applied and evaluated on specific study area using multi-resolution images. Performances of the classifiers will be discussed in detail. The capabilities of image fusion techniques are investigated to study the effects of pre-processing techniques on the accuracy of different classification algorithms to improve the extraction and identification of different LU and LC classes. The areas selected for research are located in Karnataka State, India. In addition, detailed fieldwork and ground truthing was conducted for confirmation and effective validation of the prevailing LU and LC. Field data was also used to generate ground reference data set. Research findings and Information generated are applicable in preparing accurate LU and LC maps which can be used by planners, policy makers for managing natural resources and watersheds in Karnataka.
This thesis comprises of Eight chapters and Seven models where **Chapter 1** deals with a detailed introduction, scope and objectives and literature survey. **Chapter 2** deals with the formulation of the problem, prerequisites and a brief description of the tools used for the study. **Chapter 3** deals with the study of analysis and evaluation of parametric classifiers using multi-temporal Images in LU and LC mapping for the study area Heggadadevannakote taluk, Mysore District, Karnataka, India and the tools used are: ERDAS 8.5 and ARCGIS 9.2. The study reveals that Maximum Likelihood Classifier (MLC) produced satisfactory results for both the season images. The study revealed that MLC is the most suitable classification method for LU and LC mapping purpose. **Chapter 4** discusses the study of analysis and comparative study of Decision Tree Classifiers for LU and LC classification. Here multi-spectral IRS-1D/LISS III image is used as the experimental data and the area of study considered is Heggadadevannakote taluk, Karnataka and the software tools used are ERDAS 8.5, WEKA and ARCGIS 9.2. **Chapter 5** is about the analysis and comparative study of image fusion techniques for LU and LC classification. The software tools used for the purpose are ERDAS 8.5, ENVI 5.0 and ARCGIS 9.2. Anthrasanthe Hobli, Heggadadevann Kote Taluk, Mysore District, Karnataka is the area chosen for study. **Chapter 6** comprises the discussion of three models: **Model 1** discusses LU and LC mapping by using remote Sensing and GIS Techniques. The present study analyzes the dynamics of LU/LC using modern geospatial techniques of remote Sensing and GIS on Kasaba Hobli, Hoskote taluk, Bangalore District, India. ERDAS 8.5 and ARCGIS softwares were used for classification of LU/LC. **Model 2** discusses the assessment of horizontal accuracy of scanned cadastral map procured from the Department of Land Records and vector maps produced by using AutoCAD software with high resolution satellite images for generating digitized cadastral maps and mapping of the study area at parcel level. The detailed analysis is done for only one village –Vabasandhra village, Hoskote taluk, Bangalore District, India. Software tools used are: ERDAS 8.5 and ARCGIS 9.2. **Model 3** deals with Morphometric Analysis and Runoff Estimation for Kodasige micro watershed of Taraka watershed, Heggadadevanna Kote Taluk using remote sensing and GIS techniques. The software tools used for the purpose are ERDAS 8.5 and ARCGIS 9.2. **Chapter 7** discusses the analysis of LU and LC changes and urban sprawl using RS And GIS Techniques for Tumkur Hobli, Karnataka, India. Software tools used are: ERDAS 8.5, ENVI 5.0 and ARCGIS 9.2. LU and LC were distinctly developed for each study year but with more emphasis on built-up area to assess and quantify the urbanization.