

ABSTRACT

Geo-informatics encompasses a broad range of disciplines including Surveying, Remote sensing (RS), Geographic Information System (GIS), Photogrammetry and the Global Positioning System (GPS). Remote sensing and GIS are considered extremely important technologies for addressing various issues related to the earth's environment. Viewing the Earth from space is now crucial to the understanding of the influence of man's activities on his natural resource base over time. In situations of rapid and often unrecorded land use change, observations of the earth from space provide objective information of human utilization of the landscape. Over the past years, data from earth sensing satellites has become vital in mapping the earth's features and infrastructures, managing natural resources and studying environmental change. Urbanization is one of the most evident global changes. In India, unprecedented population growth coupled with unplanned developmental activities has resulted in urbanization. This has exerted heavy pressure on land and the resources surrounding them, and has resulted in serious environmental and social problems. Identification and analysis of Land Use/Land Cover (LU/LC) and the pattern of urban growth in advance would help in effective infrastructure planning and resource management.

The increase of urban surface temperature above urban area compared with suburban areas is called heat island. Understanding the distribution of Land Surface Temperature (LST) along with spatial extent will be helpful to study the Urban Heat Island (UHI) and also to find out the solution for reduction of UHI. Cities located in forested regions have stronger heat islands than cities situated in other environments. The study of rate of urbanization growth gives the primary idea about the ineffective infrastructure planning and resource management in advance. The local temperature is one of the major climatic elements to record the changes in the atmospheric environment brought about by industrialization, increasing population and massive urbanization. The information gained about land-use/land-cover permits a better understanding of the land utilization aspects on cropping patterns, fallow lands, forest, wastelands and surface water bodies, which is essential for developmental planning. Satellite remote sensing techniques proved its

capability in preparing accurate LU/LC maps and monitoring changes at regular intervals otherwise it is quite difficult with traditional method of surveying. Remote sensing techniques have proved their capability to study the change detection at global and regional scales with the availability of multi-sensor satellite data of high spatial, spectral and temporal resolutions. Thus it is now possible to prepare updated and accurate LU/LC map at lower cost with better accuracy and in a short span of time.

The study of processes of urban growth is essential for future planning and management of resources. In recent times Udupi city and its surroundings are experiencing unprecedented urbanization due to concentrated developmental activities resulted in the growth of population with consequent pressure on natural resources and infrastructure. Thus increase in built up area resulted in major environmental problems such as climate change, urban heat island effects, etc. The atmospheric changes mainly indicated by temperature. Therefore in the present work an attempt is made to study the contribution of spatial extent of urbanization for the variation of temperature in and around Udupi taluk and also for the UHI effect. Keeping the above in view, the present work has been undertaken to prepare the multi-date LU/LC maps of Udupi taluk from multi-sensor satellite data and monitor the changes in various LU/LC classes using digital image processing techniques.

In the present research work an attempt has been made to study urbanization using optical remote sensing data and surface temperature variation using thermal remote sensing data of Udupi taluk, Karnataka State, India. In this work satellite data of LANDSAT, IRS LISS-III data, hyper spectral data and stereo data of Cartosat-1 are used. In the present research work an attempt has been made to compare the urban growth of Udupi city and its surroundings with an effort to analyze urban growth contribution to temperature variation due to UHI effect. In addition, in order to understand heat island effect attempt is made to map LST variations across various land cover types. This study of process of urban growth is very much required for an efficient planning and management of resources.

This research focuses to analyze the contribution of the built up area growth due to change in land cover types of Udupi taluk during the years 2000, 2006, 2010 and 2014 to the

UHI using GIS technology and also an attempt to locate the spatial extent of urban heat island areas using the temperature distribution maps based on Moderate-resolution Imaging Spectroradiometer (MODIS) data of the dates March 29 (2000), March 30 (2006), March 29 (2012) and March 30 (2014) and LANDSAT 7 of March 14 (2000), LANDSAT 8 of March 13 (2014) processed using IDRISI Software developed by Clark university lab. This is an attempt to map land surface temperatures across various land cover types to understand heat island effect. This research aims to evaluate the use of various satellite data such as MODIS, LANDSAT for indicating temperature differences in urban areas, to analyze and compare the relationship between urban surface temperatures with land cover types using geoinformation technology.

Key Words: Remote Sensing (RS), Geographic Information System (GIS), Global Positioning System (GPS), Land Surface Temperature (LST), Urban Heat Island (UHI), Land Use and Land Cover (LU/LC).