



Analysis of high variability of inter-state land use land cover change using remote sensing and GIS techniques primarily agriculture in Krishna river basin, India

Yesu Sharma and Krishnan Sundara Rajan

Lab for Spatial Informatics, International Institute of Information Technology, Hyderabad, India
(yesu.sharma786@gmail.com)

In last few decades with the advancement in geospatial technologies, it has become possible to understand & analyse complex real-world phenomena across space and time. With the increasing population, there is an ever-increasing demand for food, shelter and energy which results in varying changes in the land use and land cover pattern. This change affects humans as well as biotic & abiotic parts of our ecosystem. Land-use land-cover (LULC) change is a dynamic process governed by human aspirations. [In today's world, almost all problems affecting humans and nature directly or indirectly are due to various human-induced activities.]. In the current study, satellite-derived LULC data is used for time series land use change analysis. To formulate effective policies for combating climate change and to develop effective mitigation strategies, the correct information about LULC change intensity is required. Therefore, there is great need to capture this change information which will help in systematic and sustainable management. For this particular research, the region for study taken is Krishna river basin [Karnataka (~44%), Maharashtra (~26%) and Andhra Pradesh including Telangana (~30%)], the third largest river basin in India after the Ganges and Godavari. It encompasses a total area of ~2,62,000 sq. Km, which is about ~8 % of the total geographic area of India. In addition to multiple states, the basin also has varying climatic zones ranging from semi-arid to humid regions. LULC changes are quantified in last decade at 1:250k level and at 50 m spatial resolution in geospatial domain for years 2005, 2007, 2009, 2011, 2013 and 2015, targeting rapid urbanisation and agriculture intensification. The results showed that almost half of the region (44 to 48 %) is entirely used for the sole purpose of farming, comprising of 3 highly fluctuating seasonal crops such as Rabi, Kharif, Zaid and a multi-cropping pattern due to various factors such as availability of water resources (seasonal and annual precipitation, presence of perennial and transient rivers), temperature variations, availability of seeds and policies adopted by all the three states. On one hand there is tremendous change in farming practices (in terms of % area w.r.t to total basin area, Kharif crop percentage grows from 19% to 24%, double/triple crop from 14% to 17% and Rabi crop reduced from 10% to 6% and Zaid crop has reduction rate of -87%), but there is almost no change in forest cover due to the state's good conservation policies. In case of water resource, there is a massive decline in large water bodies (-18% rate of change) due to over usage resulting in an increasing trend of 121% rate of change in case of shallow or small water bodies. All these parameters together with statistical analysis with climatic rainfall data will aid in highlighting the causes of the problems faced by farmers today in a rapidly changing environment. Further analysis of the high variability of inter-state land use land cover change indicates the impact of socio-economic drivers in addition to the biophysical factors on the land use choices across the basin.