Land Use/Land Cover Change Assessment of Dane County, Wisconsin: Contemporary Trend and Future Projections

Eric Fabian, Dr. Cyril Wilson, University of Wisconsin-Eau Claire

Abstract

Assessing changes in land use and land cover (LULC) is an important component of managing the health and sustainability of our natural systems. Remote sensing technology is a powerful tool utilized for the assessment of current trends in land change and more importantly when coupled with spatially explicit methods can be used to improve our understanding of future changes and modifications of landscapes. This study was performed in Dane County, Wisconsin and is an assessment of land cover change between the years 2000 and 2010. The main focus of this study was to assess the differences in LULC between 2000 and 2010 in Dane County, Wisconsin and to project the future state of LULC through the year 2030. The study was undertaken to provide a comprehensive assessment of contemporary changes in Dane County’s LULC and more specifically to project the future state of high photonemters. The study was conducted using a multitemporal approach supported by Markov Chains. Results of this study demonstrate significant changes in residential, commercial, and bare soil between 2000 and 2010 and projections highlights potential changes for these LULC by 2030.

Methods

Two hundred seventeen False Color Raster images were used in the development of LANDSAT images for 2000 and 2010. This approach was preprocessed to achieve georegistration accuracy and remove identified areas of data redundancy for spectral analysis. Furthermore, a supervised classification approach was programmed where image was engaged object-based classification to segment the change based on spatial and spectral characteristics of each image. Results from segmentation was then used to train an ANN (后勤, agriculture, water, and urban). The LANDSAT images generated using this approach were preprocessed and classified using object-based image analysis within the eCognition software by Sitas Solutions. Other inputs to the system were used to make up the image-processing framework. All input data and processed images were produced from 3 and 4. The classified images were then assessed for accuracy (Table 1). The study expanded on recent work that has used supervised techniques for land classification. The dataset comprises vegetation and urban land use data and was used to modify and update the urban LULC. At the end of stage two classifications, the Landsat images were produced from 3 and 4. The classified images were then assessed for accuracy (Table 1 and 2).

Land Cover Classifications

Drivers

The study area

The study area

Conclusion

This study shows that in Dane County, WI LULC are undergoing change but residential, commercial, and bare soil are the most significant for future modification in the County. A hybrid classification approach has huge potential for producing classified images with high accuracy. Using the right ANN model changes, a multitemporal approach supported by Markov Chains can provide answers around critical LULC images for an urban area at future time scales. The study highlighted potential changes for these LULC by 2030. The revised classification highlights that there are significant changes in land use between 2000 and 2010. The expansion of the urban LULC is projected to continue over the next 30 years and modify agricultural land to urban land. All urban areas are projected to see an increase in LULC. Agricultural land is projected to decrease because of the urbanized areas increase in the urban LULC. The future BULC information provided in this study is pivotal for land use and green infrastructure planning for Dane County, WI.