DEVELOPING LAND COVER SCENARIOS IN METROPOLITAN AND NON-METROPOLITAN MICHIGAN, USA: A STOCHASTIC SIMULATION APPROACH

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ABSTRACT

We will develop a stochastic LCLUC modeling approach and apply it to both metropolitan and non-metropolitan counties in Michigan. The model will be parameterized and evaluated for the period 1984 - 2000 using land use data interpreted for ownership parcels within sample study areas and land cover data derived from Landsat TM data. We will evaluate the spatial and temporal variability of land use and land cover transition probabilities as they relate to both biophysical and socioeconomic location variables. We seek to compare the results of our model applied to and parameterized for metropolitan counties in an urban/agricultural region with those for non-metropolitan counties in a rural/extraction/recreational region. We will apply the modeling approach to predict land cover in 2010 and 2020 at the pixel level within each of our two regions using a four-stage process that (1) generates future land use proportions within each county using demographic and economic projections in an econometric modeling framework; (2) generates a sub-county map of land use change probabilities for development and agricultural abandonment, (3) determines the resulting probabilities of changes in tree cover (i.e., regrowth and clearing), conditioned on biophysical site attributes, and (4) applies stochastic simulation to generate multiple plausible realizations of future tree cover. This project serves to (1) *synthesize* our work on forest cover change and fragmentation in the Upper Midwest US by comparing rates and patterns of change in rural forested regions to those in urbanizing metropolitan areas and (2) develop *predictions* of land use and cover change that can be used to describe both the potential patterns of change and their effects on ecological services, including carbon storage. We seek to move well beyond the accomplishments of our Upper Midwest case study, to develop a robust spatial modeling environment for LCLUC that employs a geostatistical simulation approach.