

HGG001-05

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## Forest Transition Theory and Thresholds of Reforestation in the Midwest United States and State of Sao Paulo, Brazil

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The Midwest United States experienced dramatic deforestation in the 19th century that was followed by a period of net reforestation in the 20th century. This reforestation phase has broadly followed a pattern consistent with the Forest Transition Theory, where areas that are marginal for long-term agricultural production are abandoned following initial settlement and clearing, resulting in a conversion from agricultural land uses back to forest. The proportion of land converting from agriculture to forest is now being counter-balanced by areas that are converting from forest to urban-suburban land uses. A corresponding reforestation trend has recently been observed in parts of the state of Sao Paulo, Brazil, a region within the Atlantic Forest regime of eastern Brazil.

This paper examines the relationship between urban deforestation and rural/exurban deforestation in the state of Indiana located in the Midwest United States. A spatial analysis is presented to identify at-risk forest areas in urban/suburban/exurban areas in both study areas. This urban analysis is integrated with an analysis of rural areas to examine the potential for urban deforestation to exceed current and future potential trajectories of reforestation. This analysis is performed in the context of the "right-hand" side of the forest transition curve, or in other words, trajectories of land cover change after the reforestation phase has started. Spatially explicit scenario-based models are used to identify regional areas where forest cover is likely to be stable, decreasing or increasing and the social and biophysical drivers that may be responsible for specific net land cover change trajectories.

Keywords: reforestation, agent-based model, forest transition theory, deforestation