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Spatio-Temporal Relationship between Land Use and Transportation

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Land use and transportation interaction is a dynamic process that involves changes over spatial and temporal dimensions between the two systems. Changes in land use systems can modify the travel demand patterns and induce changes in transportation systems. Transportation system evolution, on the other hand, creates new accessibility levels that encourage changes in land use patterns. There have been many studies to identify interaction between the two systems in terms of a time lag, the magnitude of impact, and the spatial relationship. Property value change has been popularly used in the regression model as an indication of land use change as well as increased development.

In this study, a framework for identifying the spatial and temporal interactions between transportation and land use was developed based on statistical analysis of time series, which was applied to selected corridor areas in Miami-Dade County, Florida. The results of the time-series analysis showed that transportation improvements impacted land uses at varying rates and intensities. Cumulated impact was also measured with time series techniques.

To provide temporal variables for land use and transportation, historical land use and transportation data were collected and converted to GIS data. Historical data collected was time-stamped. GIS program, ArcView, that was capable of handling and manipulating spatiotemporal data was used and a framework for identifying the spatial and temporal interactions between transportation and land use was developed. Enhanced ArcView with avenue scripts was capable of storing temporal spatial data and extracting useful information to support the visualization and analysis of transportation and land interactions. This study was able to account for interactions spatially and temporally at smaller geographic scales.