

Developing integrative models using spatial and regional economic models and methods

Elena Irwin

*Swiss Federal Institute of Technology, Switzerland
and Ohio State University,
USA*

irwin.78@cfaes.osu.edu

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Abstract

This presentation reviews economic location and land use theories and spatial economic modeling methods in light of their usefulness in developing integrated models of human and natural systems. Traditional economic models of location and land use are elegant, but limited in their usefulness for developing models in which multiple forms of spatial heterogeneity are important. Theories of individual household and firm behavior can account for key sources of agent and spatial heterogeneity, but are limited in their ability to describe spatially-explicit outcomes. Empirical methods and data analysis tools, including geographic information systems and spatial econometrics, are extremely useful for model development. Spatial correlation analysis and landscape metrics are critical for describing observed spatial heterogeneity and patterns, which is important for model validation; spatial econometric modeling is essential for uncovering causal relationships among spatial variables. However, empirical analysis alone does not provide a full description of the system dynamics over time and space and can be limited in other ways. For example, estimated parameter values may not accurately capture important sources of heterogeneity across different types of agents or structural changes over time. Thus, while statistical modeling of land use outcomes can be very useful in uncovering spatial relationships and testing specific causal effects, empirical analysis should be used in conjunction with dynamic, process-based models. This underscores the important of primary data on agent preferences, behaviors and decisionmaking processes.