

Linking Landscape Patterns with Ecological and Social Processes

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Abstract

Patterns on the land affect ecological and human well-being, and structure the adaptive capacity of communities and ecosystems to environmental change. Understanding the relationships between land-change patterns and the ecological and social processes with which they interact is critical, therefore, to understanding and responding to the consequences of environmental change. This talk will consider the role and relative merits of models of various types in linking patterns and processes in land-change science. Consideration is given to productively defining pattern and process, developing formal links between them, and approaches to testing their interactions. Models of land change can take a wide range of forms, trading off such characteristics as spatial detail, temporal specificity or process fidelity in service of multiple objectives that include forecasting, process understanding, and integrated assessment. Spatially aggregate models are useful for characterizing and projecting dynamics in land-use or land-cover quantities; data-based spatial models covering long temporal intervals are useful for projecting; and system dynamics models are useful for understanding interacting system dynamics. Cellular automata and agent-based simulations provide flexible platforms that can balance these demands, but pose empirical and scaling challenges. The issues presented pose to the land-change community the trade-offs we face in the context of modeling land change for regional and global-scale assessment and analysis.