

INDIANA UNIVERSITY



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Michael Goodchild
Department of Geography
University of California – Santa Barbara

Date: January 29, 2007
Re: Agent-based Modeling Workshop

Dear Dr. Goodchild:

This is an application to the recently announced Workshop on Agent-Based Modeling of Complex Spatial Systems. The following describes my views on the direction of this field, my prior research related to agent-based modeling, and my future planned directions.

I have been working with agent-based models with respect to land cover change research since 2000 with a particular emphasis on household decision-making dynamics and landscape outcomes. Since this time I have seen agent-based models move from relatively abstract representations to those more tightly linked to empirical foundations. Yet, while those employing agent-based models of land cover change (as an example) often use observed land cover data to ‘validate’ the model (avoiding the discourse on what ‘validation’ means for the moment), I believe there has been less attention given to validate the unique characteristics of agent-based models that make them more attractive than other modeling approaches. In my mind, these characteristics include: 1) the ability to represent agents and their decision-making strategies heterogeneously and 2) the ability to explicitly incorporate interactions between agents.

Now that the agent-based modeling community has made progress in supporting models with empirical data, I believe that the next logical step is to test the performance of our models with data that explicitly tests the above two characteristics. This is admittedly a considerable challenge as the data collection costs necessary is potentially prohibitive for many projects. To truly assess the role of agent interactions in a system will require complex new datasets to be collected that are both rich and longitudinal – quite a daunting task. However, this next step should be considered if we are to convince the broader community (both modelers and others) why agent-based models are more suitable for some tasks than say spatial regression or cellular automata.

My personal background in agent-based modeling began with a NSF award from the Biocomplexity program for a project titled: “Biocomplexity in Linked Bioecological-Human Systems: Agent-Based Models of Land-Use Decisions and Emergent Land-Use Patterns in Forested Regions of the American Midwest and the Brazilian Amazon” on which I was a Co-PI.

From this research I have published manuscripts utilizing agent-based modeling in *International Journal of Geographic Information Science*, *Environmental Management*, and several book chapters along with manuscripts in review with *Geoforum*, *Land Change Science*, and *Journal of Economic Dynamics and Control*. These papers have broadly explored topics including the role of scale dependence in agent-based models, the use of agent-based models for backcasting, and the integration of methods from experimental economics and agent-based modeling.

Other activities include co-organizing (with Steve Manson) a special issue of the journal *Environment and Planning B* focused on modeling and complexity in geographic research. This special issue is the product of a series of organized sessions on geographic complexity at the 2005 AAG meeting. The special issue is planned for publication in the March 2007 issue of EPB.

My most recent research involves the use of agent-based modeling to explore the dynamics of reforestation in Indiana and Sao Paulo, Brazil. I am the principal investigator of a new project titled "Dynamics of Reforestation in Coupled Social-Ecological Systems: Modeling Land-Use Decision Making and Policy Impacts" recently funded by the NSF HSD program. In this extension of previous research, we will incorporate a more diverse set of agents to explore land cover change dynamics. In particular, we will represent actors such as NGO's and governmental officials and their interactions with household level actors in these new modeling efforts. This research will also be tightly integrated with complex physical models (hydrology, forest ecology) at various spatial scales of analysis. As on prior research, the approach of this project is highly multi-disciplinary with colleagues from anthropology, hydrology, forestry and political science.

While I expect this to be a popular workshop, hopefully there is room to allow me to attend. I look forward to hearing if that is the case.

Sincerely,

A handwritten signature in black ink, appearing to read 'Tom P. Evans', with a stylized, cursive script.

Tom P. Evans