Broadening the Set of Econometric Models Used for Land Transitions:
What has been done, what could be done, and some thoughts about why

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There have been many excellent reviews of the many different kinds of existing models applied to land-use change (see, for example, Kaimowitz and Angelson, 1998; Briassoulis, 2000; Irwin and Geoghegan, 2001; U.S. EPA, 2000; Agarwal, et al. 2002; Bell and Irwin, 2002; Nelson and Geoghegan, 2002; Verburg, et al. 2004; Koomen and Stillwell, 2007). We propose a narrower focus upon only econometric models to facilitate a discussion of how to broaden the use of a larger suite of econometric models for land transition modeling in the tropics. Specifically, we would join an overview of the well-established (and well-cited) literature with an introduction to relevant developments just starting to enter the applied economics literature.

One reason we feel this could contribute to this conference, is that many of these new developments have taken place outside of the tropical lands context. We will discuss techniques and methods developed and used from many areas of economics: urban, development, and environmental, for instance, including models of government policies that attempt to influence rates of land-use change (such as agricultural preservation programs (Nickerson and Lynch, 2001; Lynch et al., 2007) or urban growth controls (Bento et al. 2008)). We believe there is a potential for cross-fertilization among these subfields that will inform future models of land-use change in the tropics. We will review both the traditional and recent advances in theoretical behavioral models that lead to the hypotheses that can be tested by econometric models (e.g. Irwin and Bockstael, 2002).

This review could take the form of a two-dimensional typology that considers both the questions that the researcher is hoping to answer concerning land use transitions in the tropics and the data setting in which one finds oneself and then discusses potential empirical methods that could be applied in each case. As the data situation can of course be affected by the researcher, this typology should also inform the choice of data collection/acquisition strategy for a given question, keeping in mind what the applicable empirical strategies can produce in terms of estimated impacts of drivers.
Any such discussions must consider the unit of observation and the scale of analysis (this may naturally arise within the discussion of question and data but we feel it is important to highlight). For example, we will compare microeconomic approaches, where the unit of observation is the individual decision maker, to macroeconomic approaches, where the unit of observation in a region or country. Even within this dichotomy, there are many spatial scale issues, some that are simply driven by data availability issues, for example the use of aggregate census data versus individual household level data (see discussion in Geoghegan, et al. 2001 for example), or more substantive conceptual questions concerning, for example, the impact of exogenous variables on decision making and where the variation in those variables comes from. Examples include a global price shift common across large portions of space versus the differences in households’ endowments which could vary significantly even within one site in one place in one country. Both are hypothesized to affect choices but may be modeled and measured in different ways. Their interactions could matter as well, i.e. we may well expect that the impact of a national policy, such an ecosystem services payment of $50/hectare for any plot of land in the country, will have different impacts depending on the characteristics of the households responding to it.

Putting all this most generally, we propose to present these econometric modeling approaches but also to discuss in detail both their linkages to theoretical behavioral models relevant for the questions of interest and their requirements for data to ensure proper implementation. The choice of econometric modeling approach depends critically on both the theoretical hypotheses which one would like to test and the characteristics of the data to be used (be those a constraint arising from what data exist or elements of research choice about how to allocate data collection effort).

Related to this will be discussions of the implication for model choice when using standard regression models misses key issues, such as the potential endogeneity of variables (Pfaff 2007), sample selection bias (Vance and Geoghegan, 2004), spatial autocorrelation in the residuals (e.g., Geoghegan, Lynch, Bulchol, 2003). As a result, the methods that will be covered include both static and dynamic approaches such as, traditional and modified regression models, limited dependant variable models, survival analysis (e.g. Irwin, et al., 2003; Vance and Geoghegan, 2002) and propensity score matching approaches (e.g. Lynch et al, 2007; Bento et al, 2008).
References:


