

## **Agent-Based Land Use Models for Teaching, Extension and Collaborative Learning**

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Multi-Agent Systems (MAS/LUCC) have in recent years been applied to the study of land use change, both in developing and in industrialized countries (see for an overview Parker et al, 2003). Their strength lies in their ability of combining spatial modeling techniques, such as cellular automata, with biophysical and socioeconomic models at fine resolution. MAS/LUCC are in particular flexible in their representation of human land use decisions which explains their appeal to scholars with diverse background in sociology, geography or economics (Schreinemachers/Berger, 2006). The behavior of individual human actors can be modeled one-to-one with computational agents which allows for direct observation and interpretation of simulation results. Large part of their fascination—especially to scholars who are otherwise skeptical of any attempt of quantifying and modeling human behavior—rests on this intuitive and potentially interactive feature.

Scholars from CIRAD, for example, combine MAS/LUCC with role-playing games in which a group of resource users, typically farmers jointly using some common-pool resource, specify the decision rules of computational agents and observe how these decisions rules might affect both people's well-being and their natural resource base (Bousquet et al., 2001; D'Aquino et al., 2003; Becu et al., 2003).

In this paper we reflect on the interactive use of MAS/LUCC not only for participatory simulation but also for teaching, extension and collaborative learning in general. At the University of Hohenheim, we used our MP-MAS software (Berger, 2001; Berger et al., 2007) for teaching at MSc. and PhD level, taught training courses for resource managers in Chile (Berger, et al., 2006) and parameterized it for empirical applications in Thailand, Uganda, Chile and Ghana (Berger et al., 2006; Schreinemachers 2006). Here we discuss critical issues such as:

- Approaches to empirical model parameterization
- Participatory techniques for model validation
- Building trust in model results
- Using MAS/LUCC for agricultural extension
- Development of teaching and training programs

Our conclusion is that initial results from using MAS/LUCC in interactive settings are promising but that more methodological research is needed on how to insert MAS/LUCC into existing teaching and extension programs.

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