UNIVERSITÄT HOHENHEIM
Department for Agricultural Economics and Social Sciences in the Tropics and Subtropics

Agent-Based Assessment of Land Management Strategies in Southern Amazonia

Researchers:

- Thomas Berger
- Marcus Finco
- Matthias Siebold

Objectives

- Assessment of land management strategies at farm level
- Modeling the interactions between agents when moving from farm to regional level
- Scenario analysis to explore impacts of land use changes and policy interventions

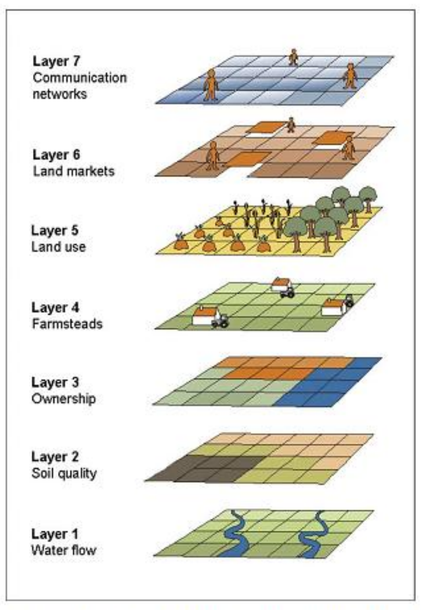


Fig. 1. Spatial data representation of empirical multi-agent systems. (Layout: C. Block, ZEF-Bonn. First published in Berger and Ringler (2002).)

Methods

- Multi-Agent Systems consist of two key components:
  1. Cellular model representing the landscape under study
  2. Agent-based model representing autonomous decision-making entities and their interactions
- The cellular model component can be coupled with biophysical models to account for spatial heterogeneity at disaggregated level
- Farmers' decisions are modeled using mathematical programming considering differences in resource endowments and decision behavior
- Each real-world farm can be represented by a computational agent and their population is generated using Monte Carlo techniques
- A large variety of scenarios and research questions can then be simulated and analyzed

Workplan

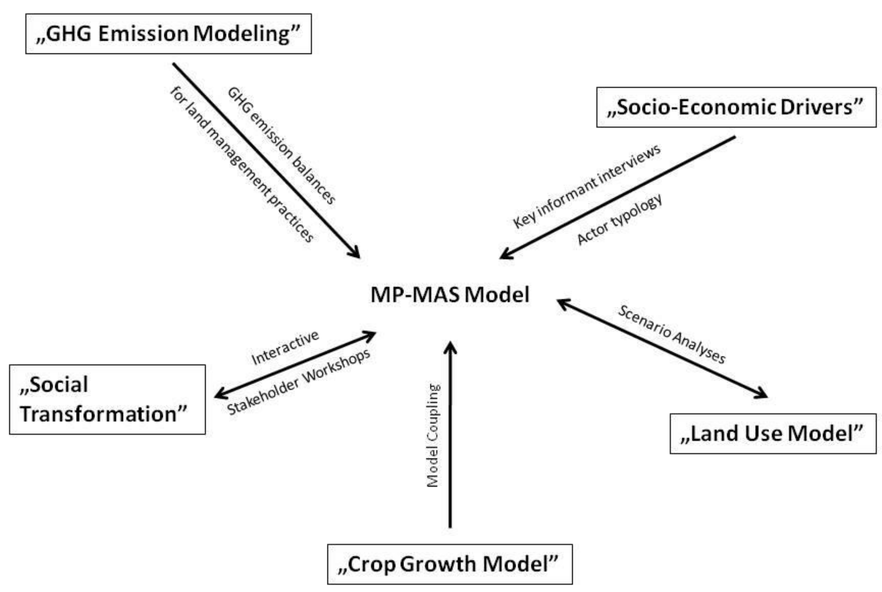
The following sub-project milestones are expected to be achieved:

- Whole farm models, to assess land management strategies at farm level (**M1**), by the end of 2012
- Coupling of crop growth model and empirical parameterization of MP-MAS (**M2a**) by the end of 2013
- Modeling of land markets, structural changes on farms, C stocks and GHG balances at regional level (**M2b**), by mid 2015
- Scenario analysis for adoption of GHG reducing land management strategies (**M3a**), by mid 2013
- Assessment of GHG balances, government interventions and policy trade-offs (**M3b**), by the beginning of 2016

During the whole project period intensive interaction with the other sub-projects and stakeholders is essential for getting feedback, parameterizing and training.

Expected Results

- Production functions for different crop and livestock production systems/enterprises, including carbon management
- Whole farm plans for representative farms for interactive validation with stakeholders
- Single farm models to assess different land use strategies
- Capturing the interactions amongst agents when implementing the MP-MAS model
- Implementation of land market models
- Implementation of GHG emission balances to analyze different options of GHG reducing strategies



FONA
Research for Sustainable Development
BMBF

Contact:
i490d@uni-hohenheim.de
http://www.uni-hohenheim.de/i490d
https://mp-mas.uni-hohenheim.de/

SPONSORED BY THE
Federal Ministry of Education and Research