

Appendix 4:
LUCITA Pseudo-class templates for “Mr. Potatohead” generic ABM/LUCC modeling
framework
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I. Information/Data classes:

1. Landscape Representation
 - Structure (Functionality)
 - *Realism
 - Real-world
 - *Spatial data structure:
 - cell-based (raster, hex, etc.)
 - *Parcel structure
 - Fixed
 - *Agent holdings
 - One parcel per agent
 - *Decision-making units
 - Multiple uses/management units per parcel
 - Data Layers/Themes
 - Parcels
 - Land cover
 - Soil quality
2. Institutional/Political rules and constraints
 - Land tenure rules (agent control land use, no transfer rights)
3. Economic structures
 - Local markets for land inputs and outputs (functions)
 - Labour pool
 - Economic data values (data)
 - Input prices
 - Output prices
 - Subsistence costs
4. Potential Land Uses
 - Forest
 - Secondary succession
 - Rice (Annual)
 - Beans (Annual)
 - Manioc (Annual)
 - Cacao (Perennial)
 - Black pepper (Perennial)
 - Pasture

II. Interfaces to other models:

1. Biophysical process models
 - Secondary succession
 - Soil fertility
 - Crop yields

III. Demographics classes:

1. *Agent class
 - Farming household
 - *Agent decision model (function)
 - *Calculate payoffs: Expected Yields
 - *Decision strategy
 - Heuristic
 - Internal characteristics (Data)
 - Human capital
 - Expertise (knowledge of soil quality and appropriate crops)
 - Household composition
 - Each household member identified by age and gender.
 - Resources (Data)
 - Physical capital/Financial capital
 - Combined to produce a single measure.
 - Human capital
 - Available farm labour
2. Demographic dynamics (functions)
 - Labour participation rates for household members
 - In-migration and out-migration
 - Arrival cohorts (size of arriving household varies with cohort)
 - Reproduction
 - Fertility rates by cohort
 - Birth/death
 - Births can increase household size over time
 - Mortality rates
 - Life cycle dynamics
 - Aging
 - Marriage (addition of household member)

IV. Land-use decision class

1. *Land-use decision

- *Agent decision model (function, (III.1)
 - Heuristics

Data

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- *Potential land uses (choice set, I.1)
- Agent Internal and External characteristics (III.1)
- *Institutional rules and constraints
 - Land-tenure rules (I.4)
- Economic data values (I.5)
 - Required labour, annual maintenance labour,
 - Initial cost, annual maintenance costs
 - crop prices
- Biophysical suitability/capability
 - Expected yield, last obtained yield

V. Land exchange class

1. Acquirers of land

- Motivation for acquiring land
 - Migration
- Parcels they hope to acquire
 - Determined by distance to main road and nearest town.

2. Suppliers of land: Bankrupt agents

3. Exchange rules

- Event sequencing/triggers for land transfers
 - Household bankruptcy
- Allocation mechanism
 - In-migration

VI. Model operation class

1. Model initialization

- *Initial landscape structure (I.1)
- Transport networks and initial accessibility/travel costs (I.2)
- *Institutional rules and constraints (I.4)
- Economic data values (I.5)
- Initial input from external biophysical and socioeconomic models (II)
- *Agent types, numbers, and resource endowments (III)

2. Temporal Dynamics

- *Number of iterations: 30
- *Event Scheduling: Discrete time, synchronous