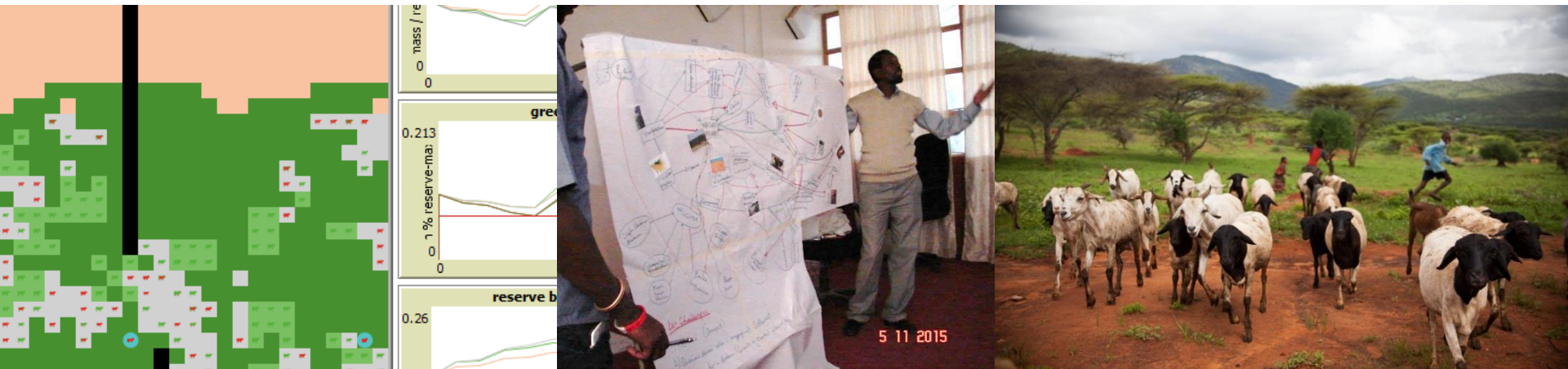


Combining Simulations, Social Science, and Stakeholder Engagement for Improved Social-Ecological Systems Analysis: Insights from a Pastoralist Landscape in Southern Ethiopia

Lance W. Robinson, Gunnar Dressler, Birgit Müller, and Niklas Hase

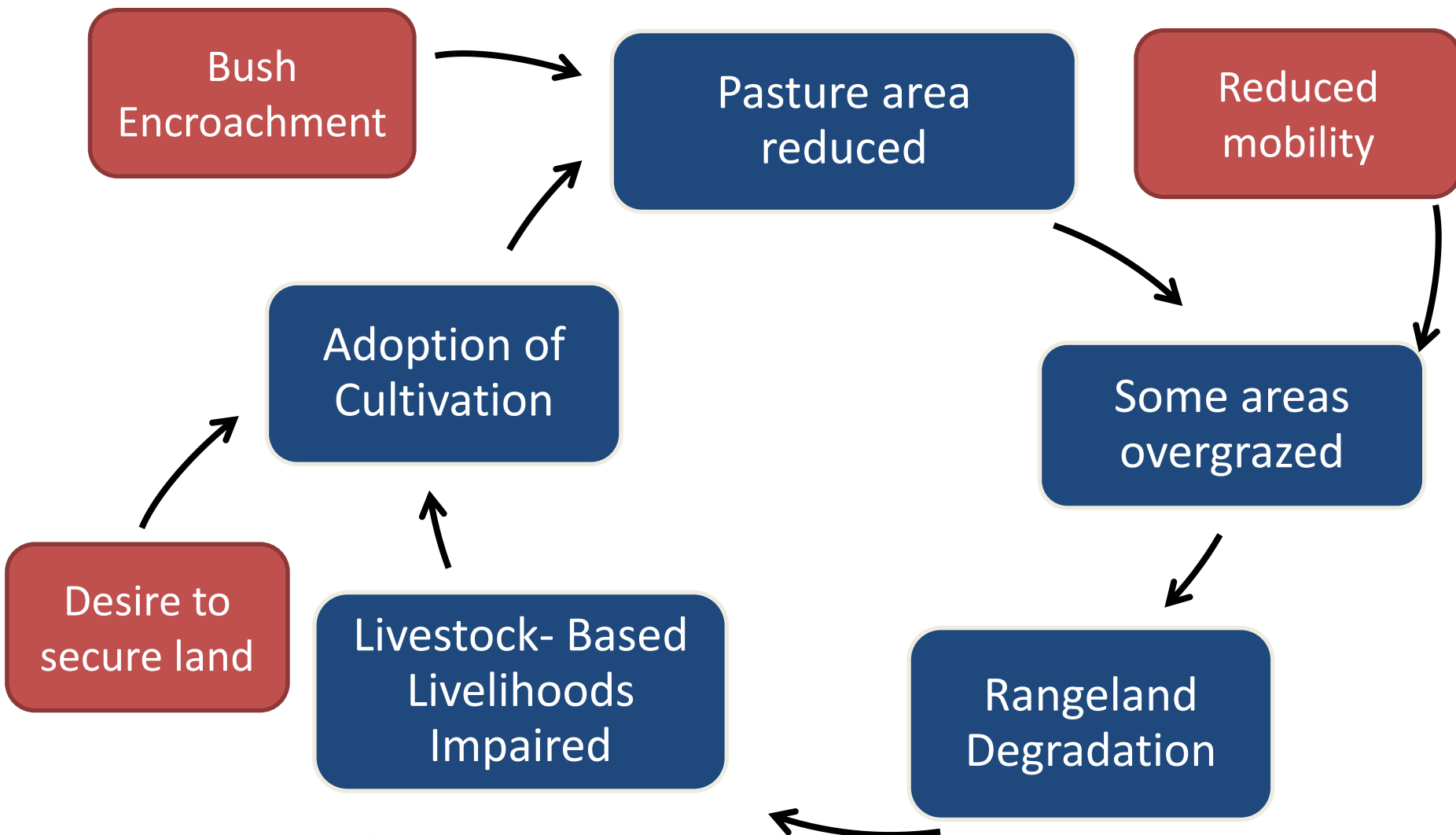
Resilience 2017: Resilience Frontiers for Global Sustainability,
Stockholm, 20-23 August 2017



Land Conversion: The Effect on Livelihoods

- Land converted from pasture to cultivation tends to be the most productive land:
 - Better soils and moisture
 - Key dry season pasture areas
 - Competition for use as community enclosures for milk herds
 - A disproportionate effect on the pastoralist system

A Vicious Circle?

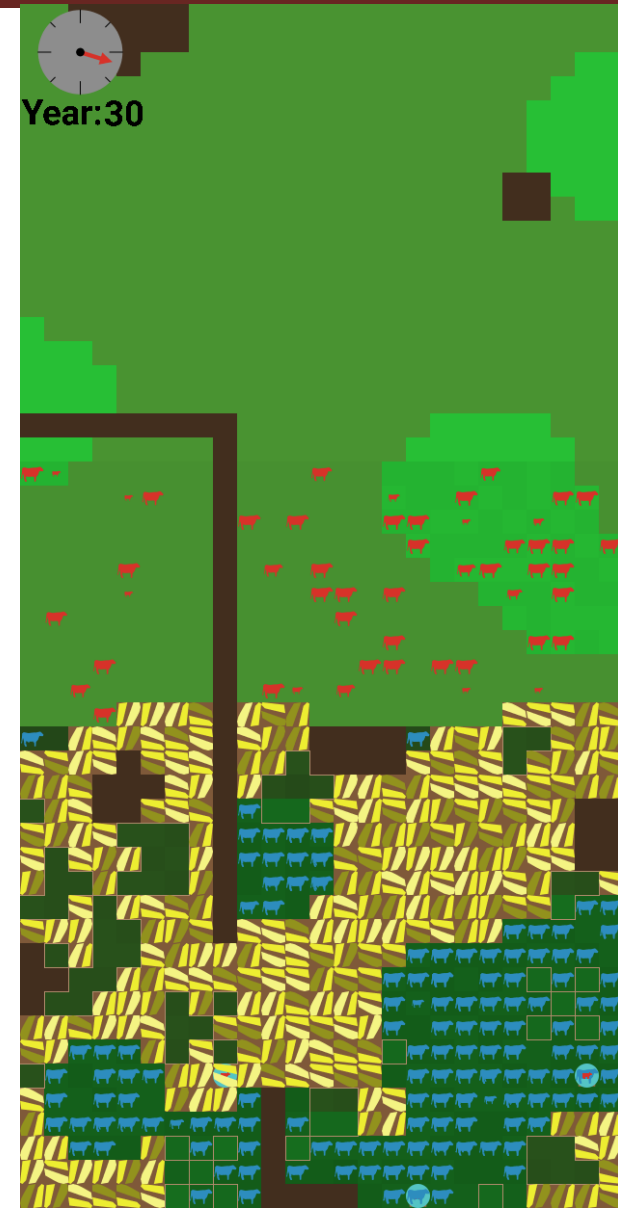


Addressing the challenge through simulation modeling and Land Use Planning

- Expansion of cultivation is almost certainly undermining livestock production
- However, farming is important for poor pastoralists who have lost livestock
- Can land use planning achieve an optimal balance between protecting key pasture areas while allowing for cultivation?
- The Land Use Competition in Drylands (LUCID) model addresses this question

Context and the LUCID Model

- Developed based on data and experience from southern Ethiopia
- Plans for validation in the near future
- Many of the key dynamics are similar in other pastoralist settings
- Adaptation of the model to other settings will not be difficult but would need validation



Decision-making in LUCID

- Agents represent households.
- Currently, key agent characteristics are two assets:
 - Livestock
 - Cultivated land
- Interests and decision-making rules induced from past research and experience in southern Ethiopia.
- Key decisions:
 - Where to graze
 - Whether and where to cultivate
- Currently, alternative motivations & rationalities are implicit in decision-making. E.g., cultivation as a means to secure land.

Scales and Levels in LUCID

- Geographic scale: patches, pastures, landscape
- Geographic extent is the landscape: 25 km x 50 km
- Larger? Increasing the extent is possible but would need additional features to meaningfully capture larger scale dynamics.
- Smaller? Now considering adding more detail to household level decision-making: esp. greater heterogeneity in interests

SOCIAL & BIOPHYSICAL ENVIRONMENT

A range of institutional interventions

INDIVIDUAL

Different kinds of actors

State
Goals / Needs
Values
Knowledge
Assets

Perceived behavioural options

Evaluation

Selection

Perception

Behaviour

Next Developments

- Modeling more heterogeneous actors and incorporating heterogeneity of knowledge, interests, etc.
- Widening the range of institutional interventions (e.g., land use planning, alternative zoning schemes), primarily as scenarios that bound agents' choices.

Further thoughts?

- Focus often is on individual and household decision-making – how can we account for collective decision-makers?
- Two or more types of agents within the model: e.g., community grazing committee, households.
- Is there a value to modeling institutional changes (e.g. tenure) rather than inserting institutional phenomena into the model top down?

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