



Social-ecological modeling of pastoral land use under global change

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Research topics

Content-wise: Pastoralism under global change

1. What is the relative importance of **climatic** versus **socio-economic change** on pastoral land use?
2. What are **intended but also unintended effects** of new **policy instruments** and new technologies for risk management on **livelihood security** of pastoralists and **ecological sustainability**?
3. What is the potential of **local knowledge** for resilient pastoralism?

Methodological contributions:

1. MORE – Reference frame: Models for resilience thinking and ecosystem stewardship
2. Standard protocol to describe social-ecological models with emphasis on human decision making: ODD+D

Case study: (Post-)nomadic land use in Morocco

(1) High Atlas



(2) Eastern High Plateau

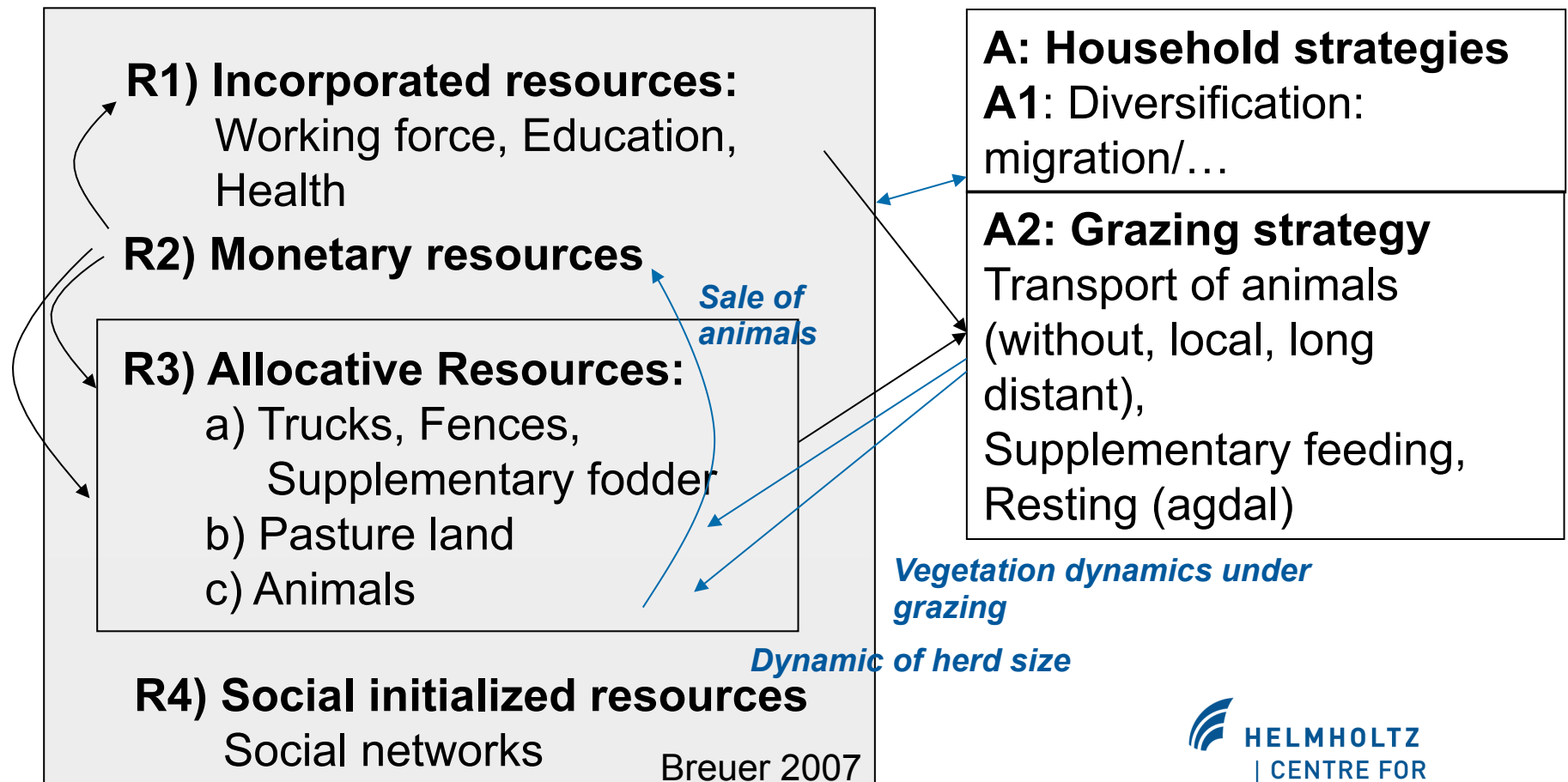


+ On the way: Case study Tibetan Highlands (Qinghai Province)

System components and interactions: Resource portfolio and activity portfolio

Household of nomad (agent-based view)

Preferences/goals

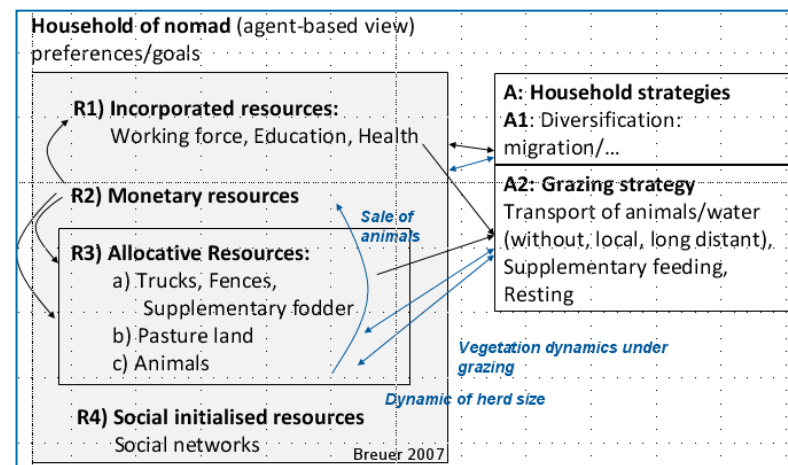


Influence of change processes and policy instruments

Technological change (use of trucks, supplementary feeding)

Subsidies

*Social change
(alternative income sources)*



*Liberalization:
Fodder Markets
Animal Markets*

Access regimes

Climate change

System components that confer resilience

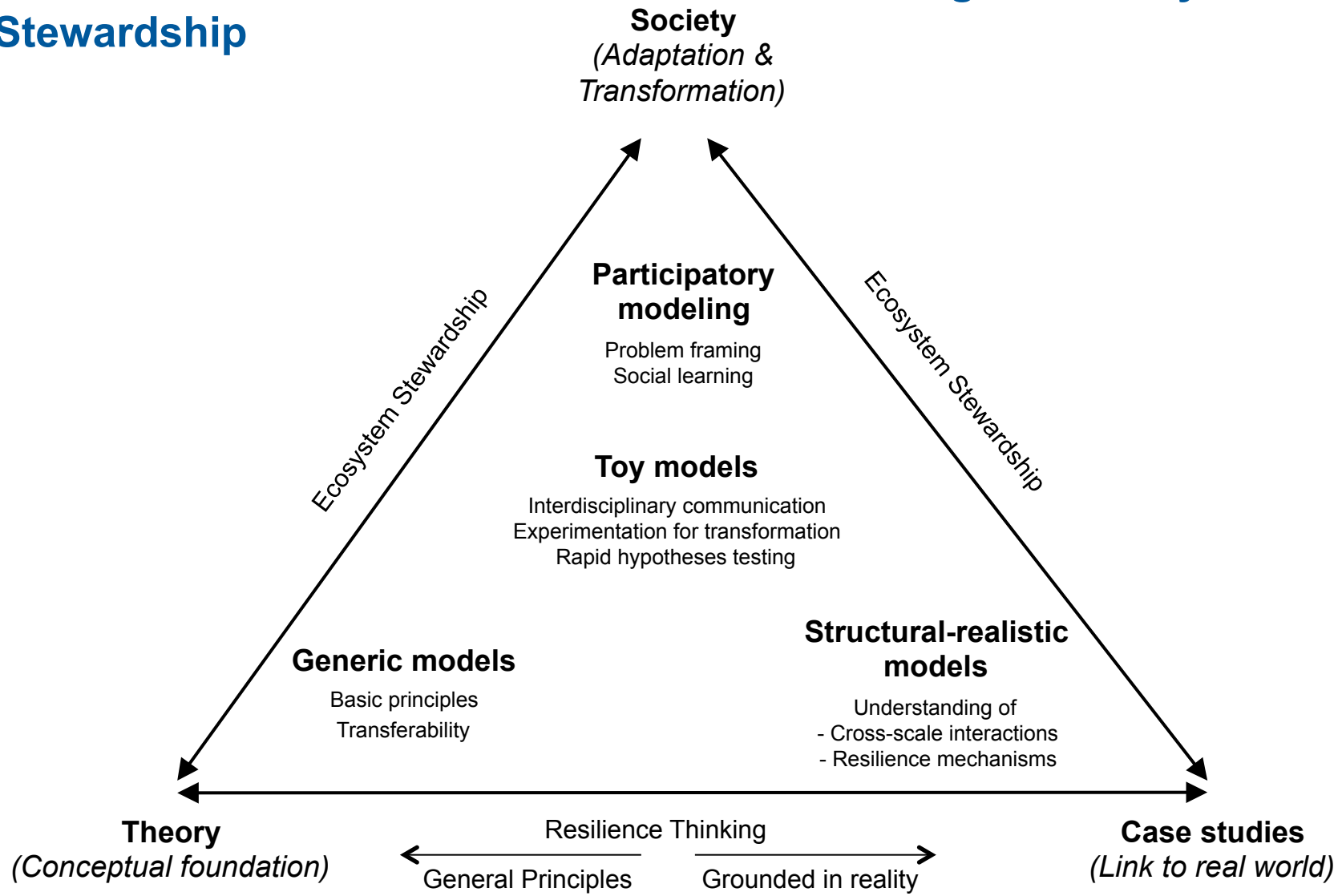
- Ecological buffer mechanisms / key resources (incl. resting: Agdal, Mahmia)
- Additional income from national and international migration
- High mobility of animals by use of trucks

Future trajectories or alternative (undesirable) states

- Degradation of pastoral areas
- Livelihood (in)security / Polarization of pastoralists

Methodological contribution (1)

Review: MORE – Models for Resilience Thinking and Ecosystem Stewardship



Schlüter, M., Müller, B., & Frank, K. 2012, available at SSRN

Methodological contribution (1)

Toy models - tool of thinking

Stylized process-based models which include ecological and socio-economic components and feedbacks in time

Pitfalls and chances of new technologies/ policies to manage climate risk for pastoralists

Identification of **unintended side-effects** of new instruments → change to less sustainable land-use strategies

1. Example: Rain-index insurance

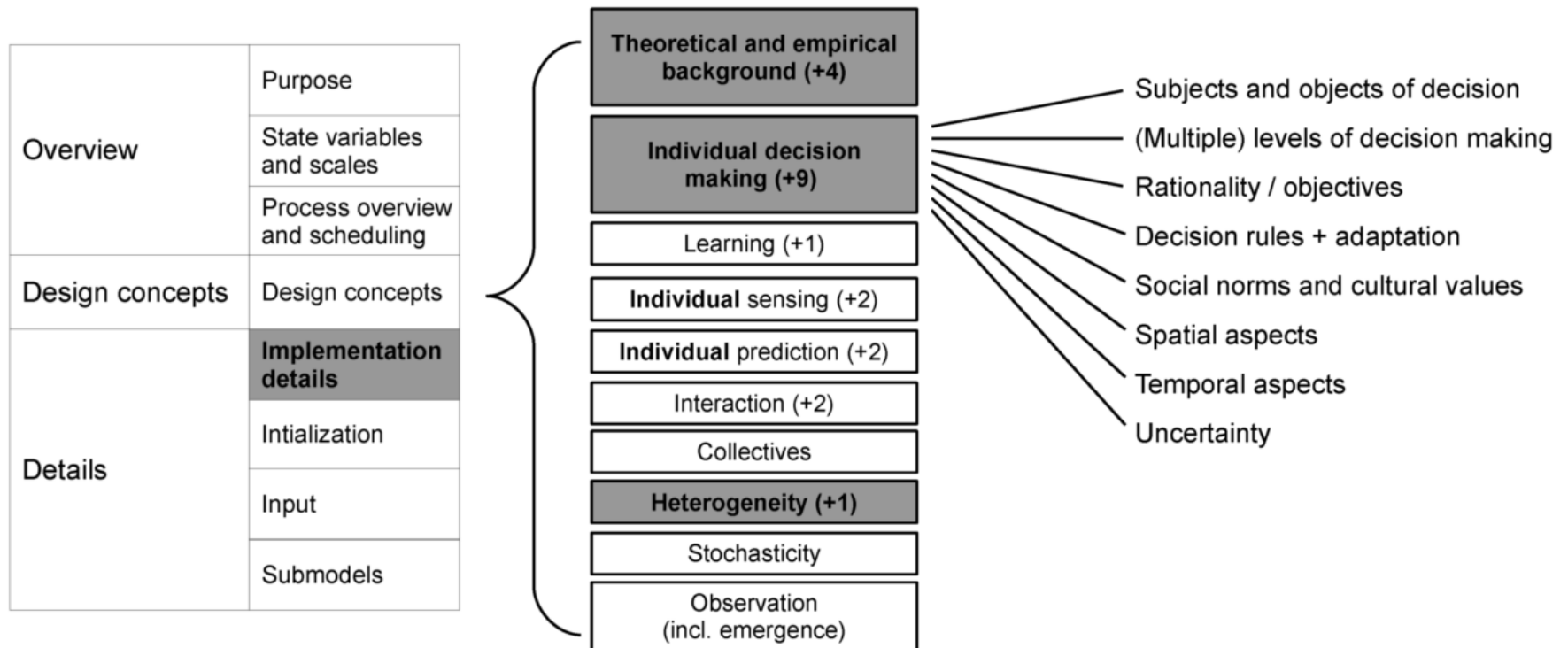
Farmer with access to rain-index insurances may choose less sustainable strategy than without access

Müller, B., et al. (2011) in *Ecological Economics*

2. Example: Supplementary feeding

Methodological contribution (2)

Standard protocol to describe ABMs (with focus on human decision making) - ODD+D



Based on Grimm et al. 2006, 2010 in *Ecological Modelling*

Müller, B. et al. 2012 available at SSRN (www.ssrn.com)

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