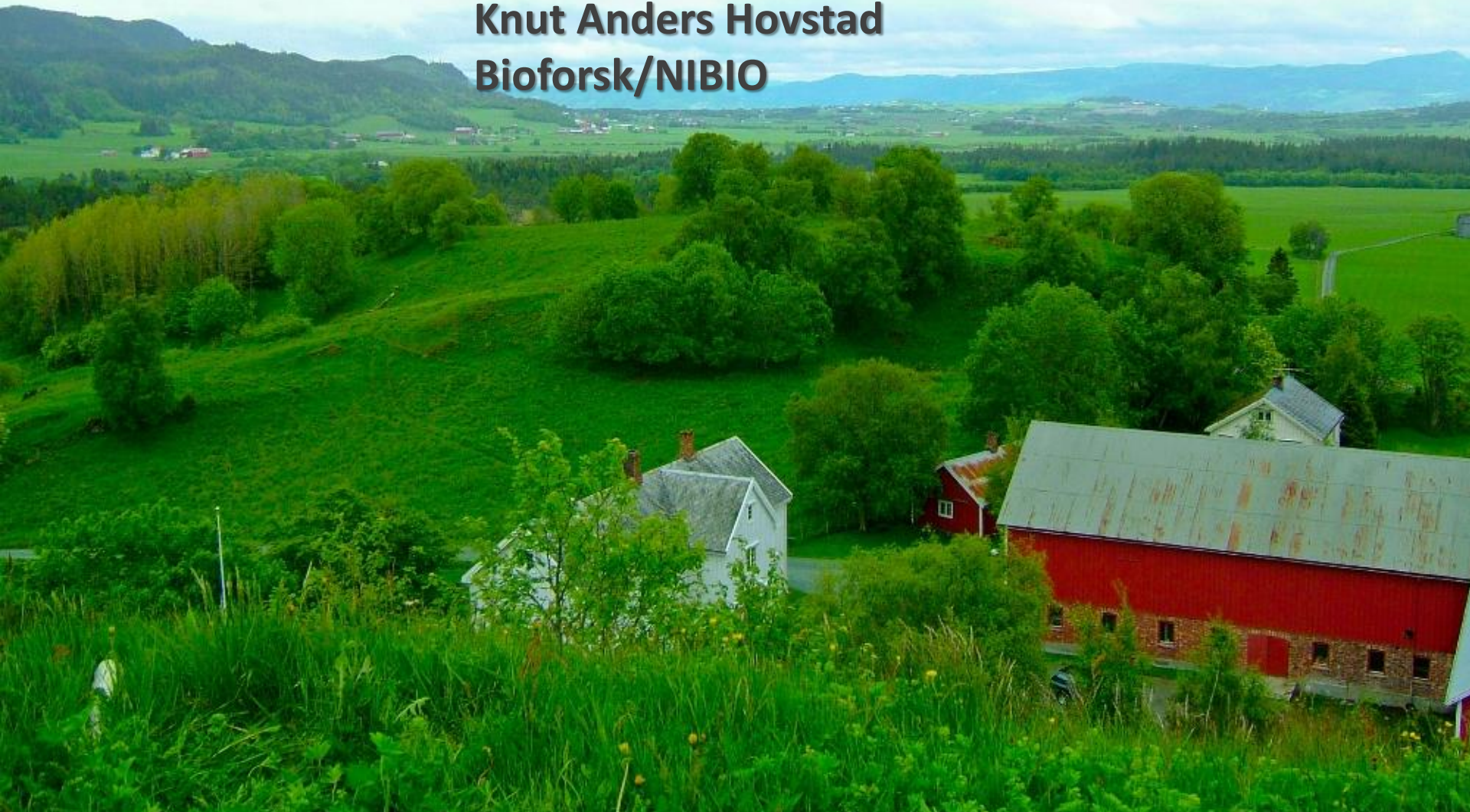# WP 8: Exploring the sustainability of the "smart" bioeconomy

Knut Anders Hovstad
**Bioforsk/NIBIO**

WP 8: Exploring the sustainability of the "smart" bioeconomy

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Three aspects of a sustainable bioeconomy:

- Implications of agricultural land-use and technology change on GHG emissions

- Relationships between agricultural management/land-use intensity and large scale patterns of biodiversity

- Energy use in the new bioeconomy
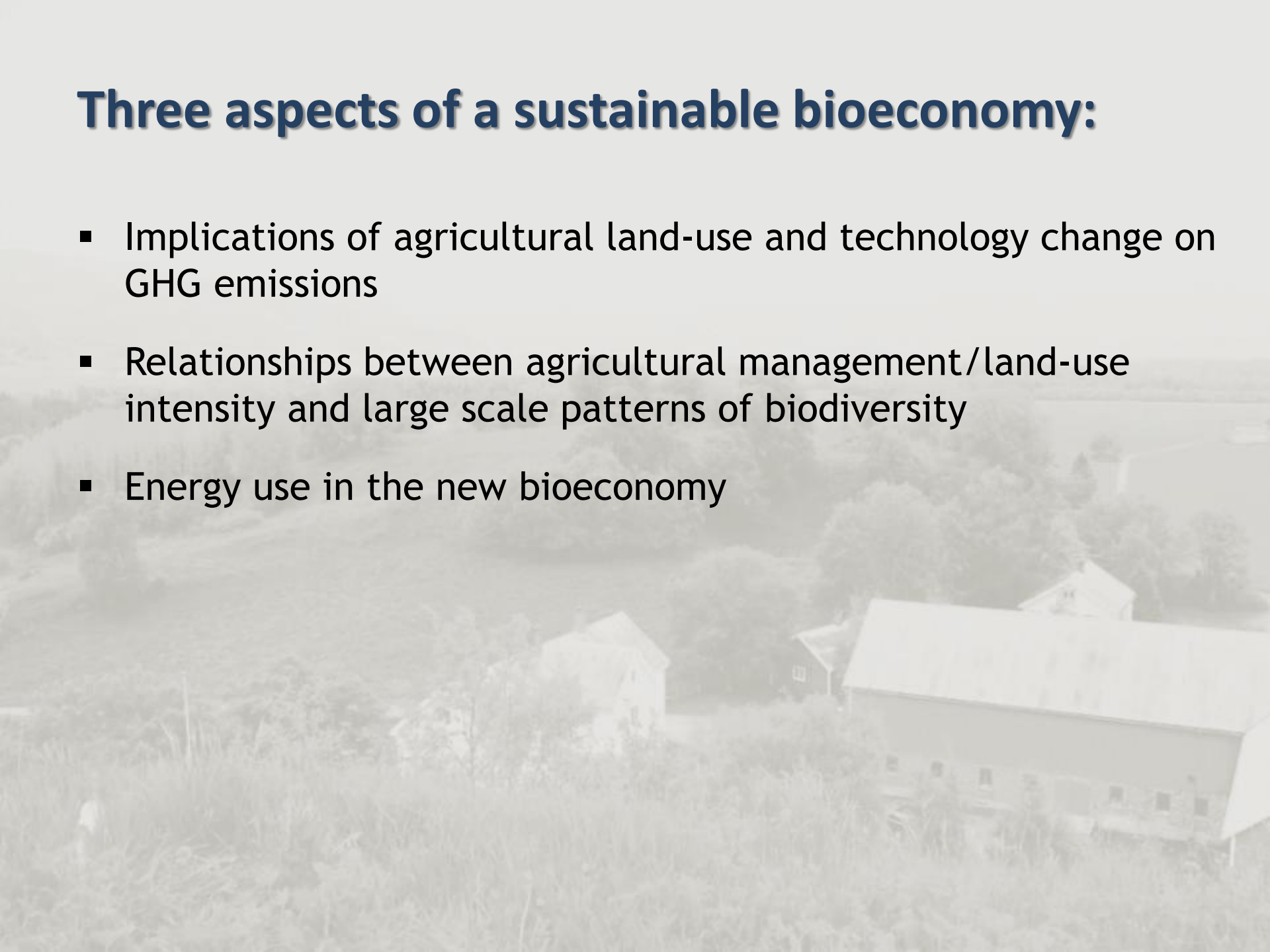
Large scale spatial shifts in agricultural production and implications for GHG emissions

The task takes results from the spatial analyses in WP2, WP 6 and 7 as input and examines potential implications of spatial and structural changes in agricultural production on GHG emissions.

Bottom-up approach to modelling:
The implications of spatial and structural change on GHG emissions are studied as effects that emerge from changes in farm-level activities. These activities on individual farms are represented in the model.
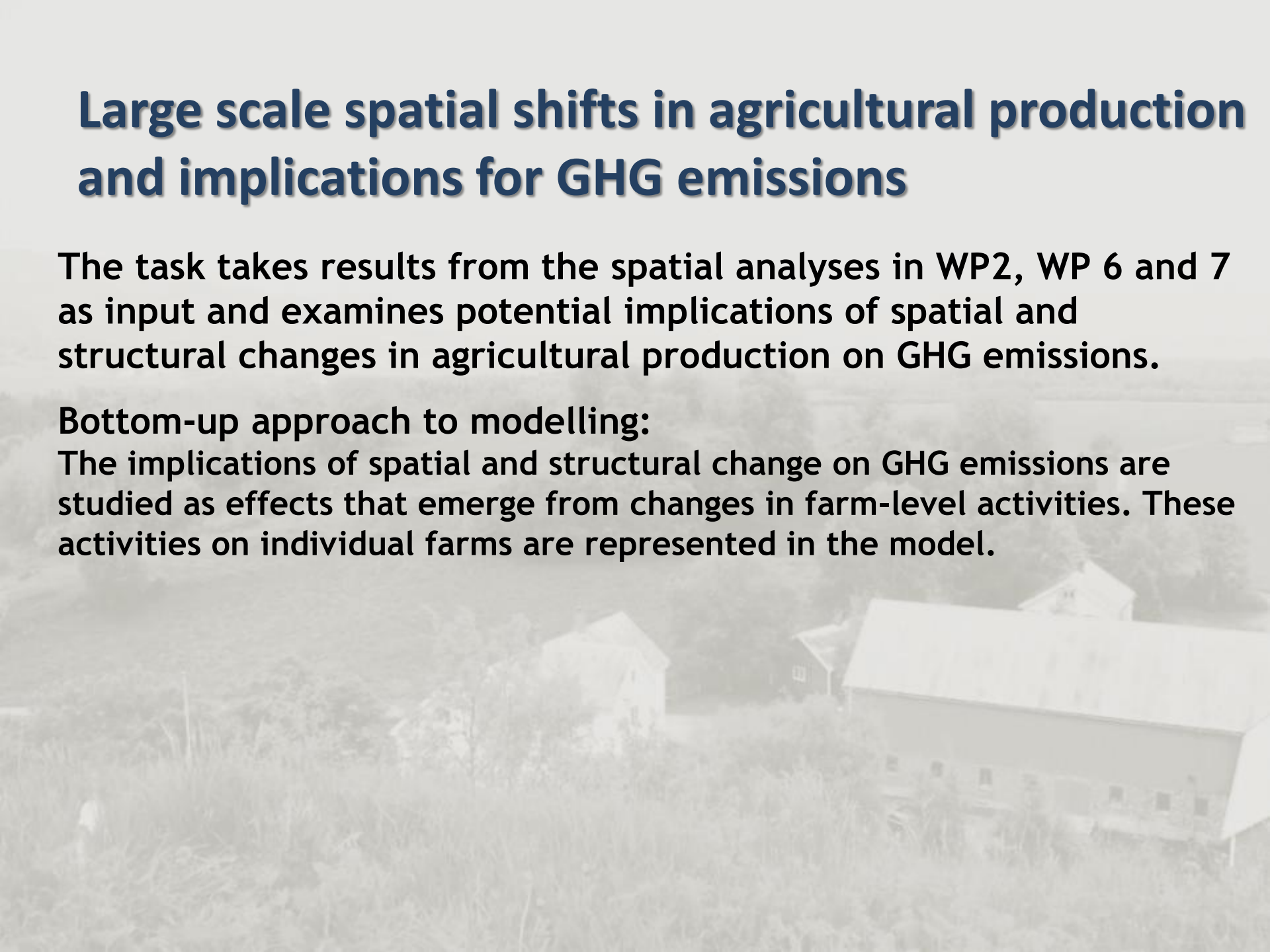
Emergence

"…the arising of novel and coherent structures, patterns and properties during the process of self-organization in complex systems." *

*Goldstein, J. 1999. Emergence as a construct: History and issues. *Emergence: Complexity and Organization* 1: 49–72.

Emergence

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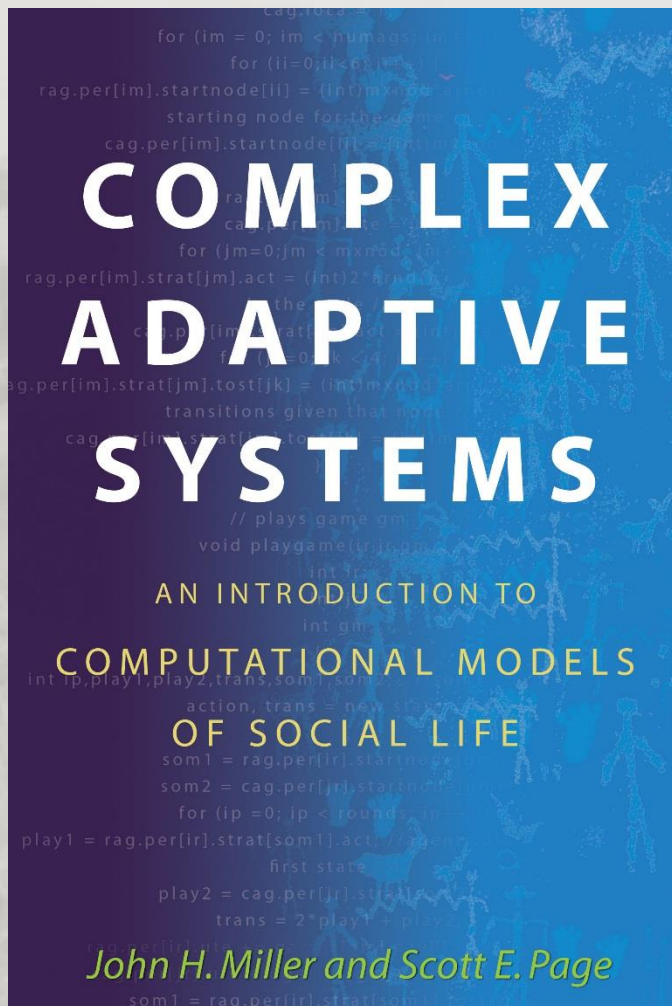
Large scale spatial shifts in agricultural production and implications for GHG emissions

Build on existing models for estimating GHG emissions (– probably an adaptation of the HOLOS model)

Data on climate and soil properties are important input to this model. We plan to develop and use six municipalities as case studies distributed on different regions of Norway.

The model building in this task can benefit from model development in the NEWPATH project.

Collaboration with Gary Polhill, the James Hutton Institute. Other partners may be included as the project proceeds.

Agricultural production, land-use intensity and large-scale patterns in biodiversity

- Examine relationships between agricultural land-use and large-scale patterns in biodiversity

- National scale. Observational units are grid cells (10×10 km??) or in some cases municipalities

- Biodiversity as a response can be represented by either species distributions or indirect biodiversity indicators, e.g. data on status of semi-natural grasslands from the Nature Index for Norway

- Species distribution data from GBIF

- To develop good indicators of land-use intensity will be important

- Statistical modelling (MaxEnt and other approaches)