

Claudine Egger, Veronika Gaube, Christoph Plutzer, Andreas Mayer, Anja Freudenberg, Iwona Dullinger, Andreas Bohner, Stefan Dullinger, Franz Essl, Andreas Gattringer & Helmut Haberl:



LUBIO

Land use, climate change and biodiversity in cultural landscapes: Assessing feedbacks and promoting land-use strategies towards a viable future

Contents



Institute of Social Ecology

- Aim of the project
- Modelling framework
- Study area
- Agent-based model
- Scenarios
- Results
- Conclusion

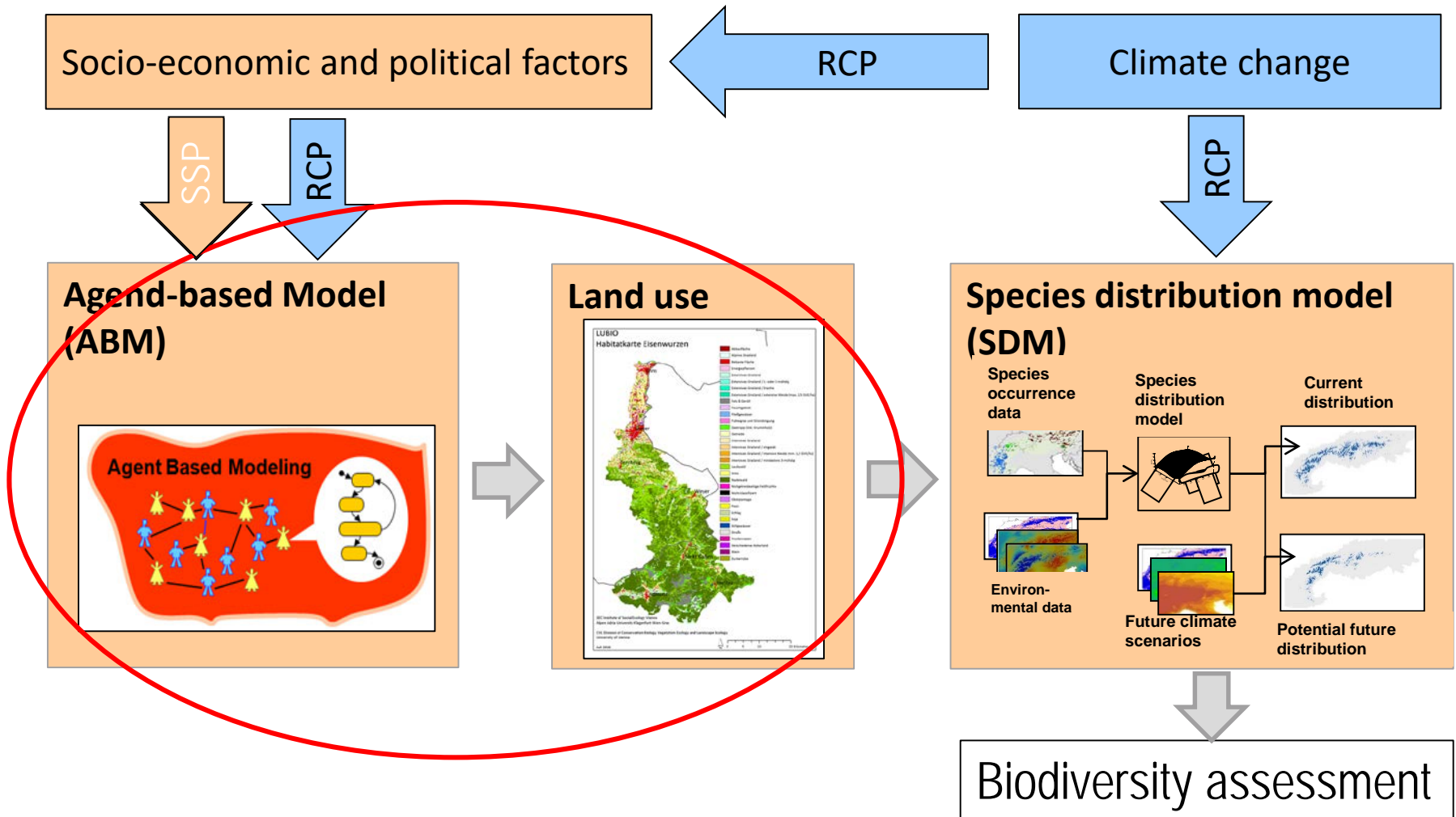
Aims & objectives



Institute of Social Ecology

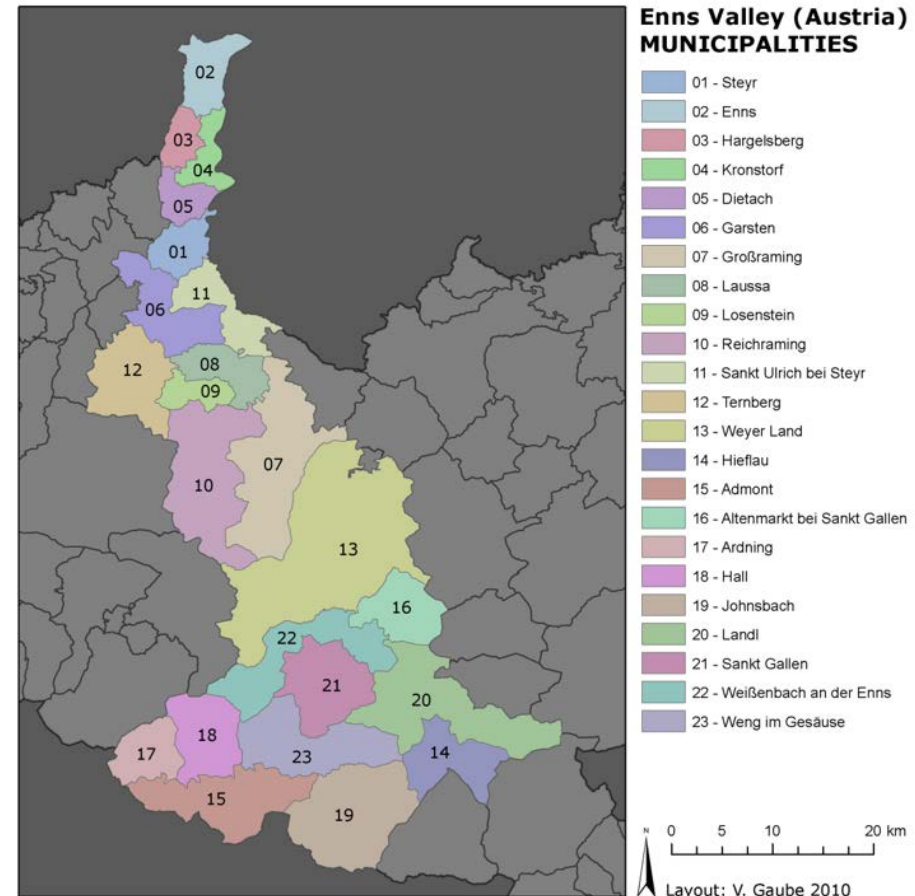
- LUBIO assesses potential interactive effects of different societal and economic scenarios on regional plant diversity in the Upper Austrian Enns valley (LTSER platform Eisenwurzen).
- In LUBIO, we explore the anticipated systemic feedbacks between
 - (1) climate change,
 - (2) land owner's decisions on land use,
 - (3) land-use change, and
 - (4) changes in biodiversity patternsduring the coming decades in a regional context which integrates a broad range of land use practices and intensity gradients.

Methodological framework

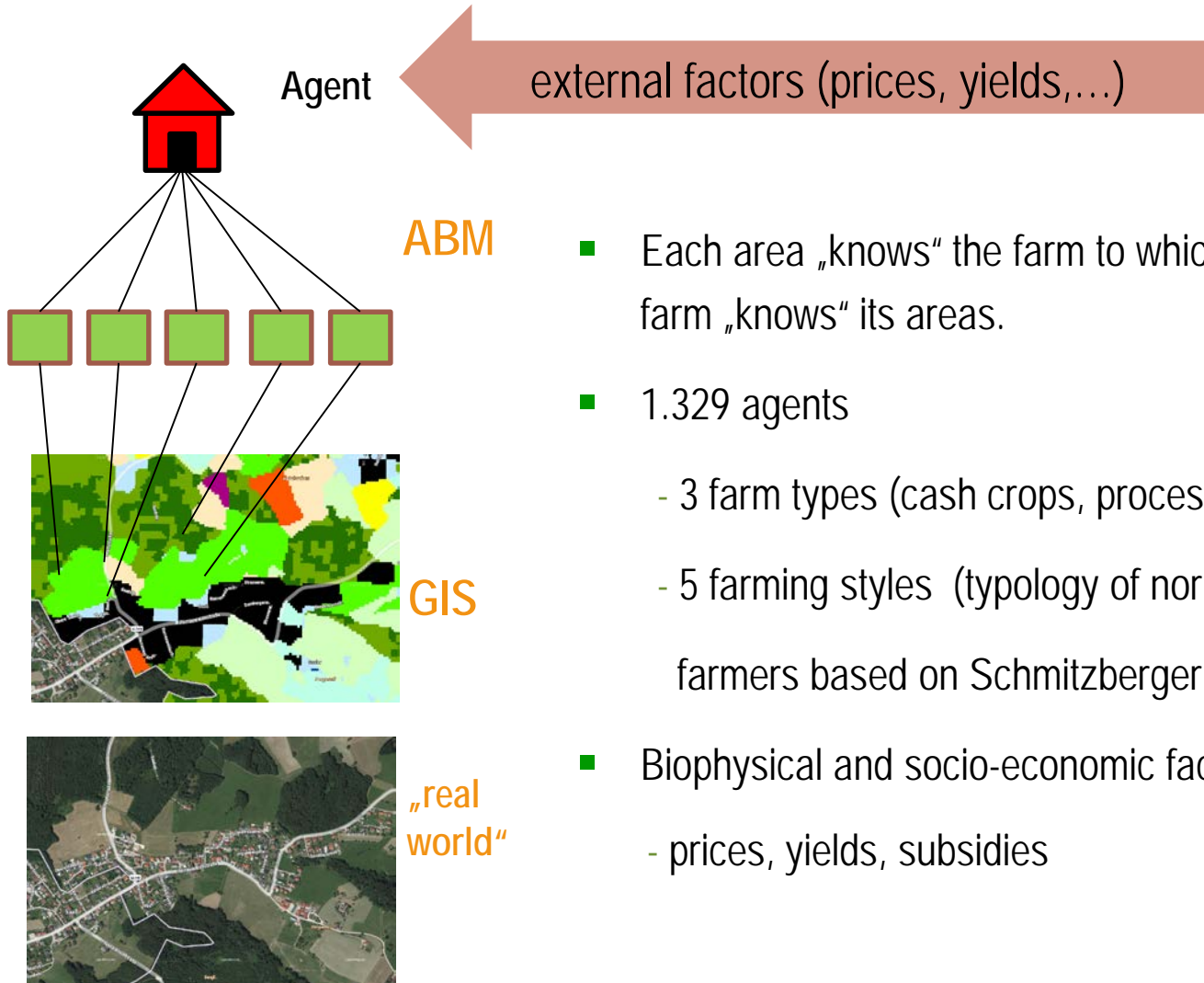


Study area

- Subregion of LTSER Region Eisenwurzen
- Size: app. 1600 km², 23 communities
- Highly diverse landscape
- Land uses from intensive cropping to livestock (grasslands), forestry, alpine grasslands
- 2 National Parks

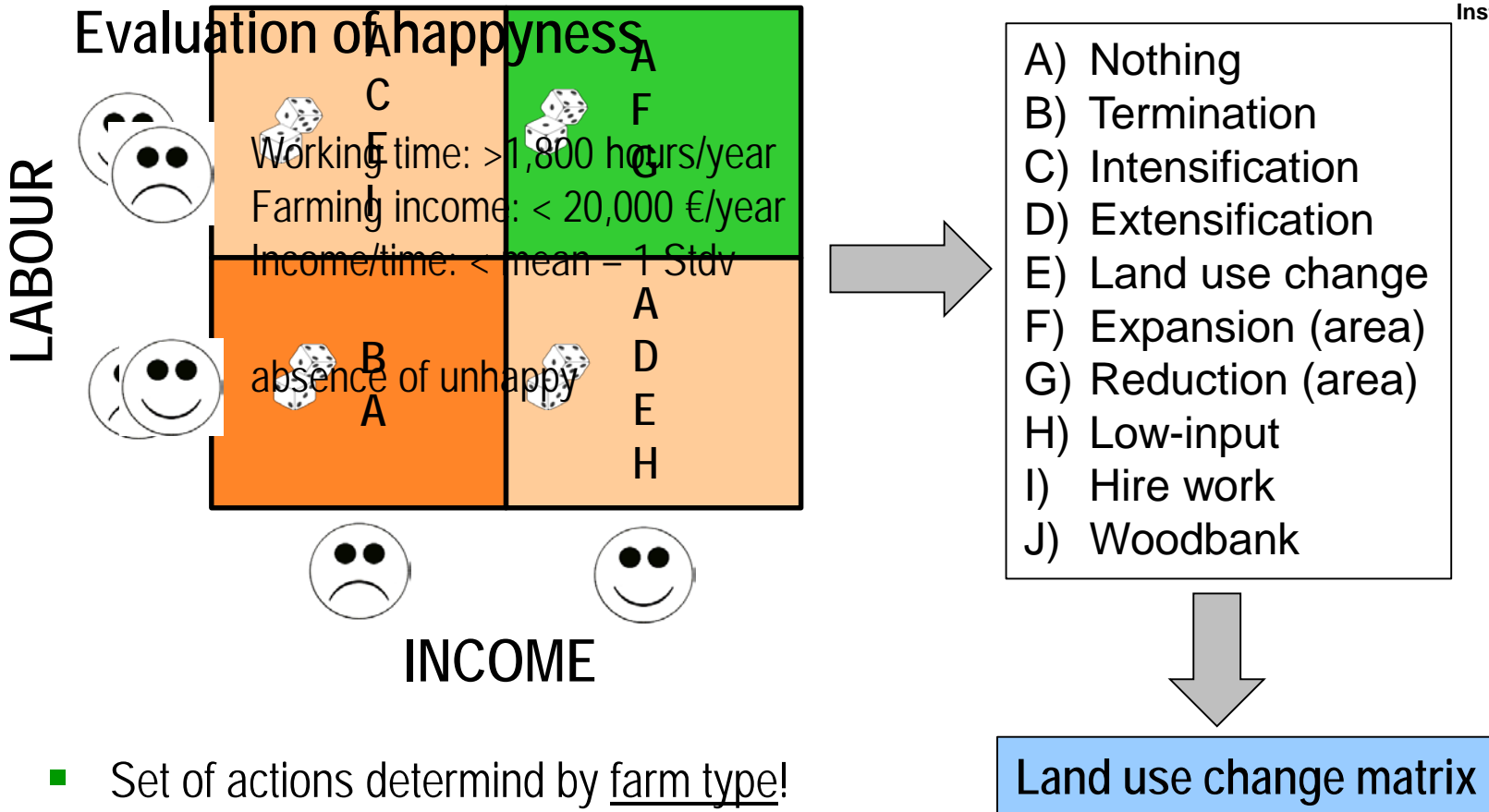


Agent-based model (SECLAND)



- Each area „knows“ the farm to which they belong, and each farm „knows“ its areas.
- 1.329 agents
 - 3 farm types (cash crops, processing, livestock)
 - 5 farming styles (typology of normative orientation of farmers based on Schmitzberger et al. 2008)
- Biophysical and socio-economic factors
 - prices, yields, subsidies

Decision making



- Set of actions determined by farm type!
- Result of dice roll depends on farming style!
- Set for 3 years, resp. 1 year

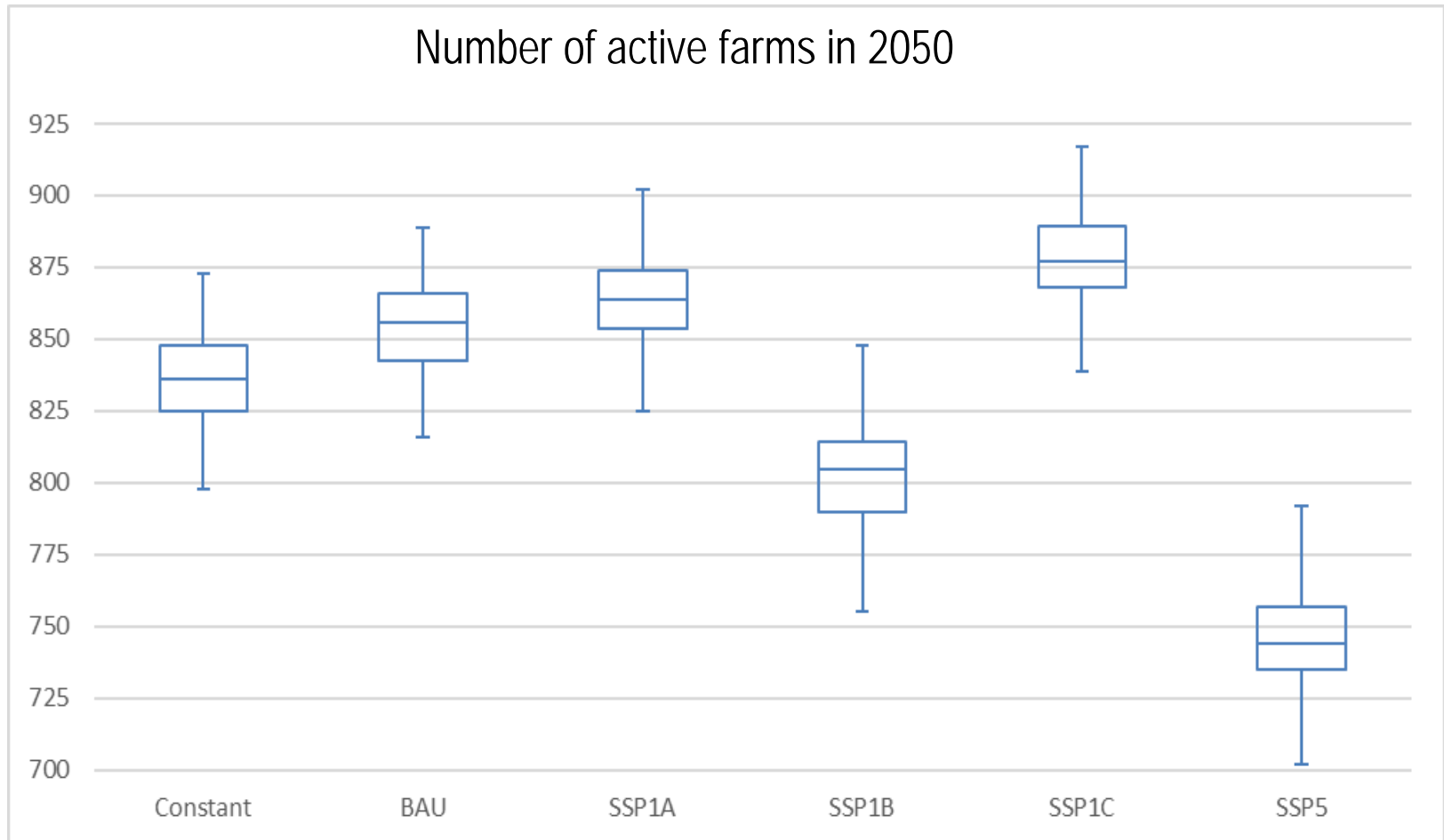
Scenarios



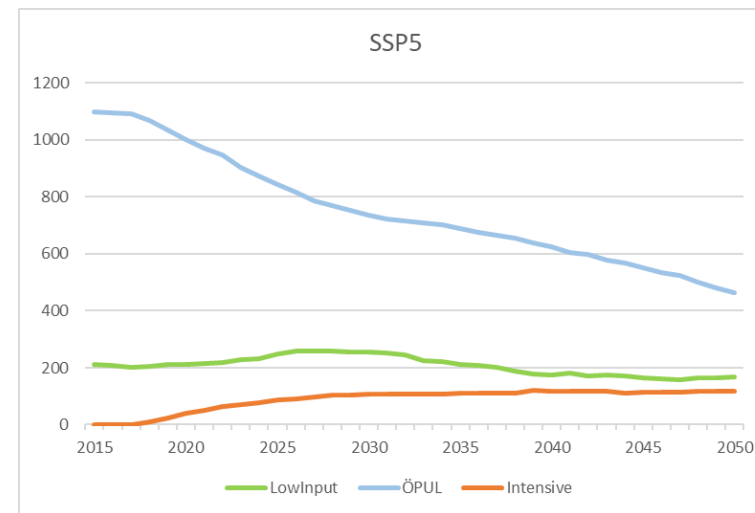
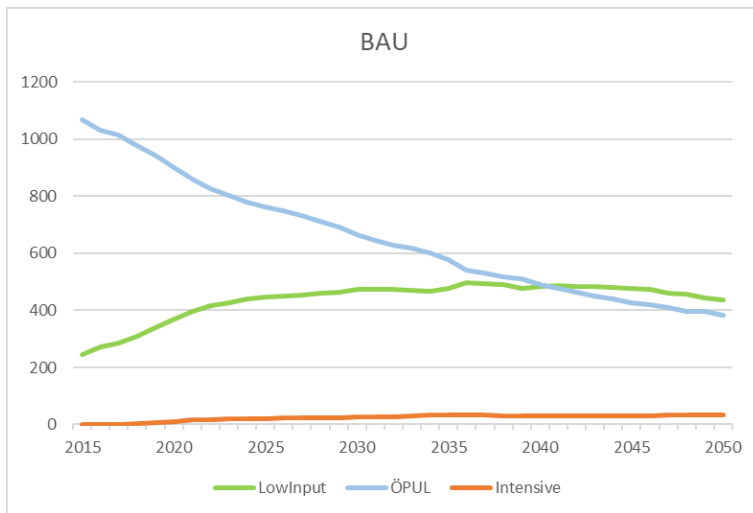
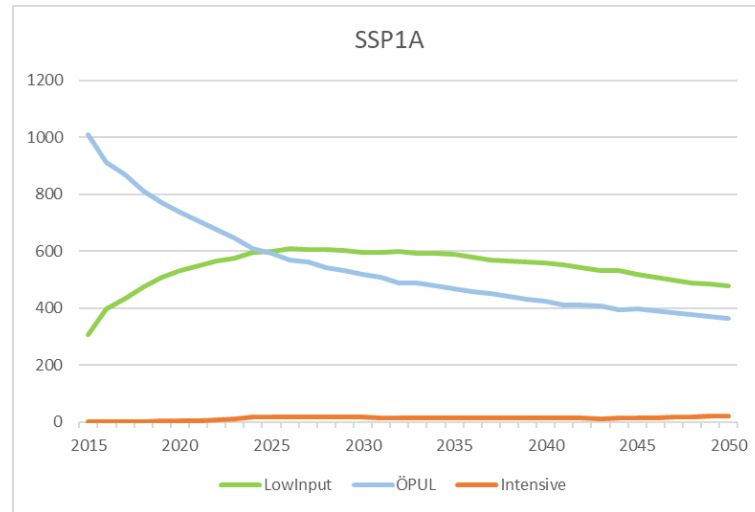
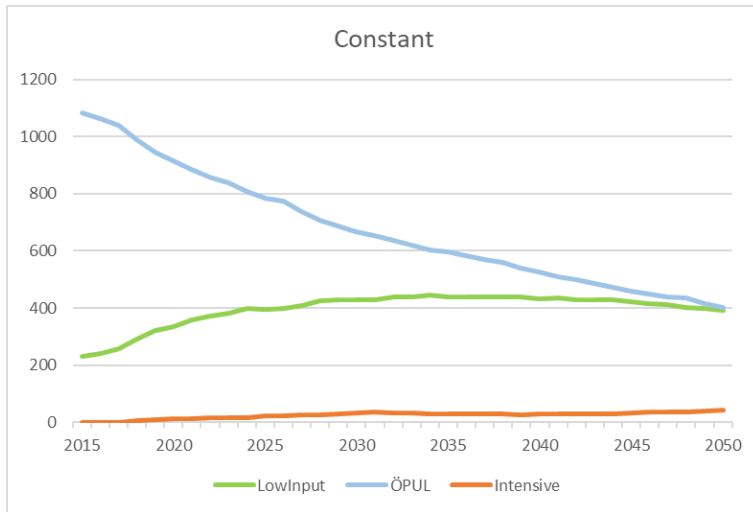
- BAU (business as usual)
Index adapted prices & costs, midsize yield increases
 - SSP1 (green growth/sustainability)
increased subsidies for energy plants and extensive cultivation,
low yield increases
 - SSP5 (fossil-fueled development)
declining subsidies (0 in 2026), high yield increases, cost increases
- SSPs from O'Neill et al. 2017

Results: Active Farms Overview

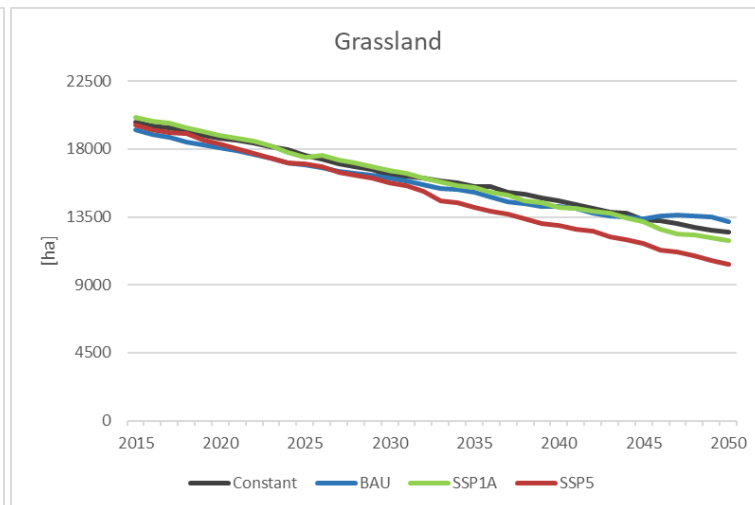
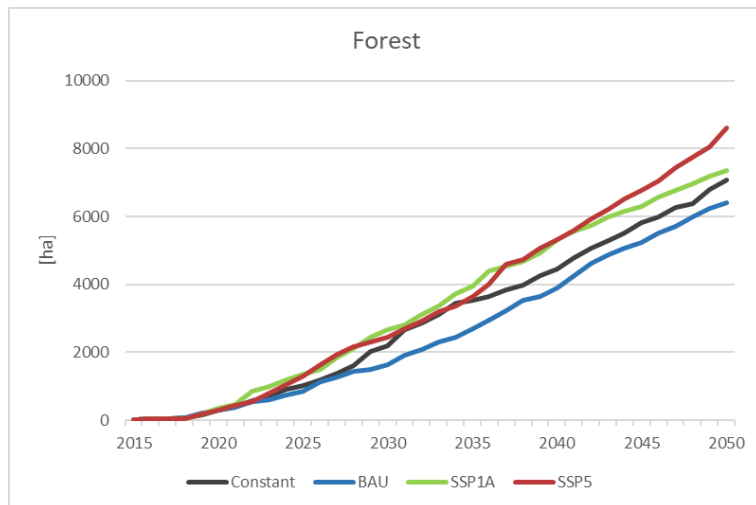
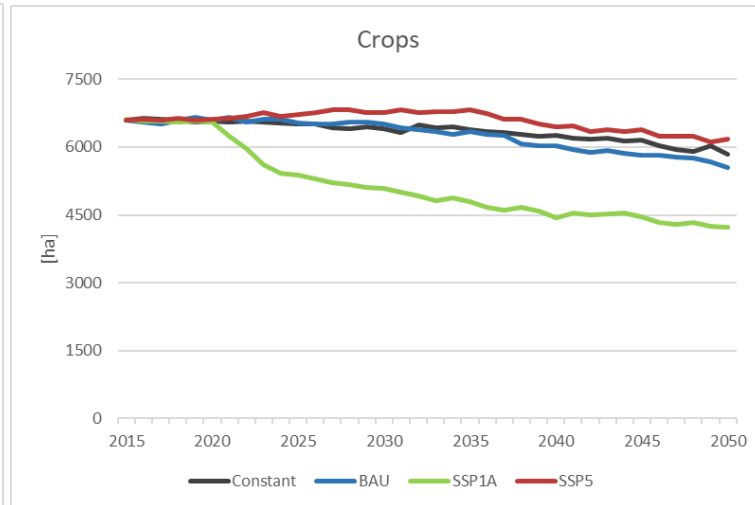
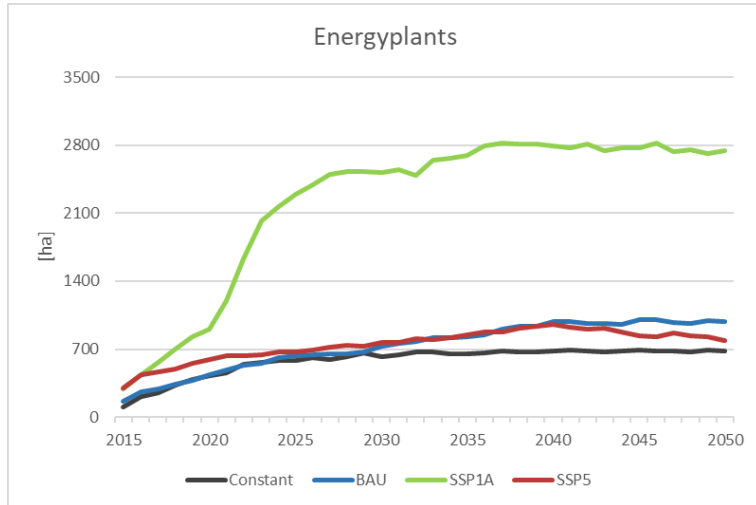
- Avg. reduction of active farms by -36% to -44%



Results: Active Farms 2014-2050 by intensity level



Results: Area development 2014-2050



Results: Maps – example of an Austrian case study

BAU

SSP1

SSP5

- Conifer forest
- Broad-leaved forest
- Felling area
- Scrub and Shrub
- Scrub and Shrub seasonal use
- Misc. arable land
- Non-cereal crop
- Energy crop
- Non-cereals low-input
- Cereal
- Cereal low-input
- Cropland fallow
- Orchard / fruit plantation
- Lake
- River
- Road
- Built-up area
- Extractive industrial site
- Intensive pasture
- Intensive meadow
- Intensive pasture sown in
- Extensive pasture
- Extensive pasture NP
- Extensive meadow
- Extensive meadow fallow
- Alpine grassland
- Wetland
- Dry grassland
- Rock and scree



Conclusions

- Limitations
 - Data
 - ABM Evaluation
- Land-use change
 - low-input/output vs. high-input/output
 - fuel vs. food production
 - forest increases
- Further development of SECLAND



Institute of Social Ecology

ÖAW
ÖSTERREICHISCHE
AKADEMIE DER
WISSENSCHAFTEN

Further information:

www.boku.ac.at/sec

<https://www.gisualize.org/lubio/>

Email:

claudine.egger@boku.ac.at

Thank you for listening!