Polarization of agricultural landscape across Europe?

An analysis of changing land use intensity in 14 case study sites

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1. Introduction

- In the last 20 years agriculture is under high pressure
- It must cover the increasing food demands, save the environment and remain profitable
- Certain farms intensify, while others are abandoned

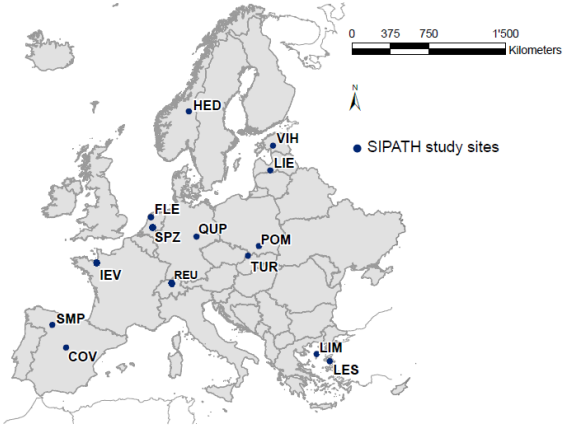

Fig. 1: Location of the 14 case study sites, with their acronym

2. Research question

- How does land use change in the past 20 years?
- Is there a polarization pattern?

3. Methods

- 14 case study sites, each 5x5km²
- Comparison between the years 2000 and 2020
- Land use interpretation of orthophotos in GIS
- Mathematical comparison of mapped polygons between both years
- Following land uses (n=19), ordered along intensity were used:

1 (extensiv)	2	3	4	5 (intensiv)
Heathland, tundra	Wooded pastures	Field margin vegetation	Intensive grassland	Settlements
Water	Extensive grasslands	High-stem orchards	Crops	
Wetlands	Stone piles	Extensive olive groves	Intensive olive groves	
Forest		Shrub plantations	Intensive orchards	
Unused land			Vineyards	

*Fig. 2: Land use classes ordered along intensity (*see hemeroby)*

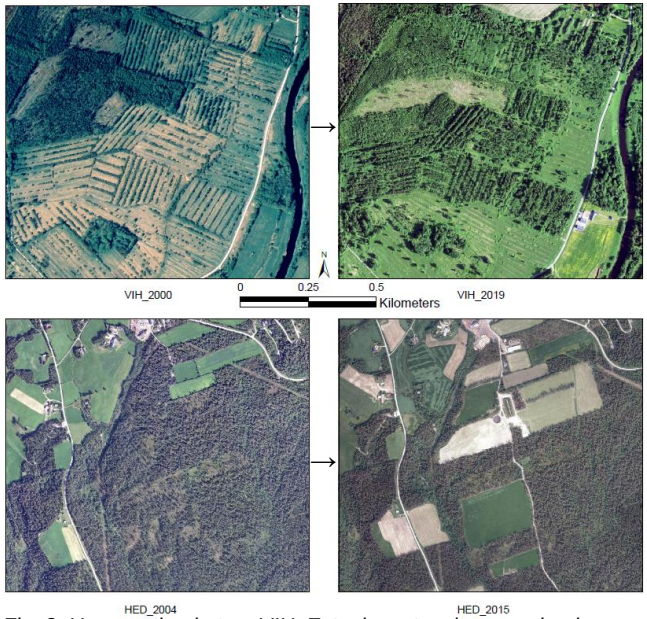

Fig. 3: Upper orthophotos: VIH, Estonia: extensive grassland becomes forest, indicating disintensification of the land use between 2000 & 2019.
Lower orthophotos: HED, Norway: new grassland and fodder in former forest, showing intensifying land use between 2004 & 2015.

4. Results and discussion

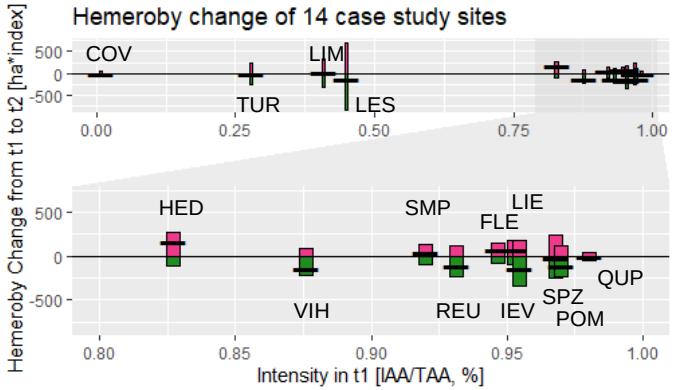

Fig. 4: Red bar: intensified area, green bar: disintensified area. Black stroke: sum of red and green bar resp. effective intensity change for each site. Intensity in t1 is based on IAA (intensive agricultural area) / TAA (total agricultural area).

- Land use change in the last 20 years is site-specific
  - Main disintensification process: more extensive grasslands on former intensive areas, more forests
  - Main intensification process: more settlements and more crops
- No polarization pattern visible over the 14 sites; intensive sites do disintensify and vice versa.
- Limitations: ignoring other factors like agronomic aspects (field size, inputs), economic (investments), biodiversity (field trees, biota)

5. Conclusion and outlook

Agricultural land use intensity depends on multiple factors. Hemeroby decrease is mainly due to forest growth, particularly on former extensively managed areas, while hemeroby increase is mainly due to the expansion of settlements and crops.

*Steinhardt et al. (1999). Hemeroby index for landscape monitoring and evaluation.

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