Sheep integration into cropping systems for agroecological transition of farming systems in France

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Context and problematic

- **Context**
  - Negative impacts of specialization and concentration of agricultural systems
  - Specialization of both farms and regions
  - Integrated crop-livestock systems (ICLS) at territorial level as a relevant lever for agroecological transition *(Garrett et al., 2020)*

Objective

Explore **different forms** of ICLS in a given region to evaluate their **possible benefits** and **perspectives**

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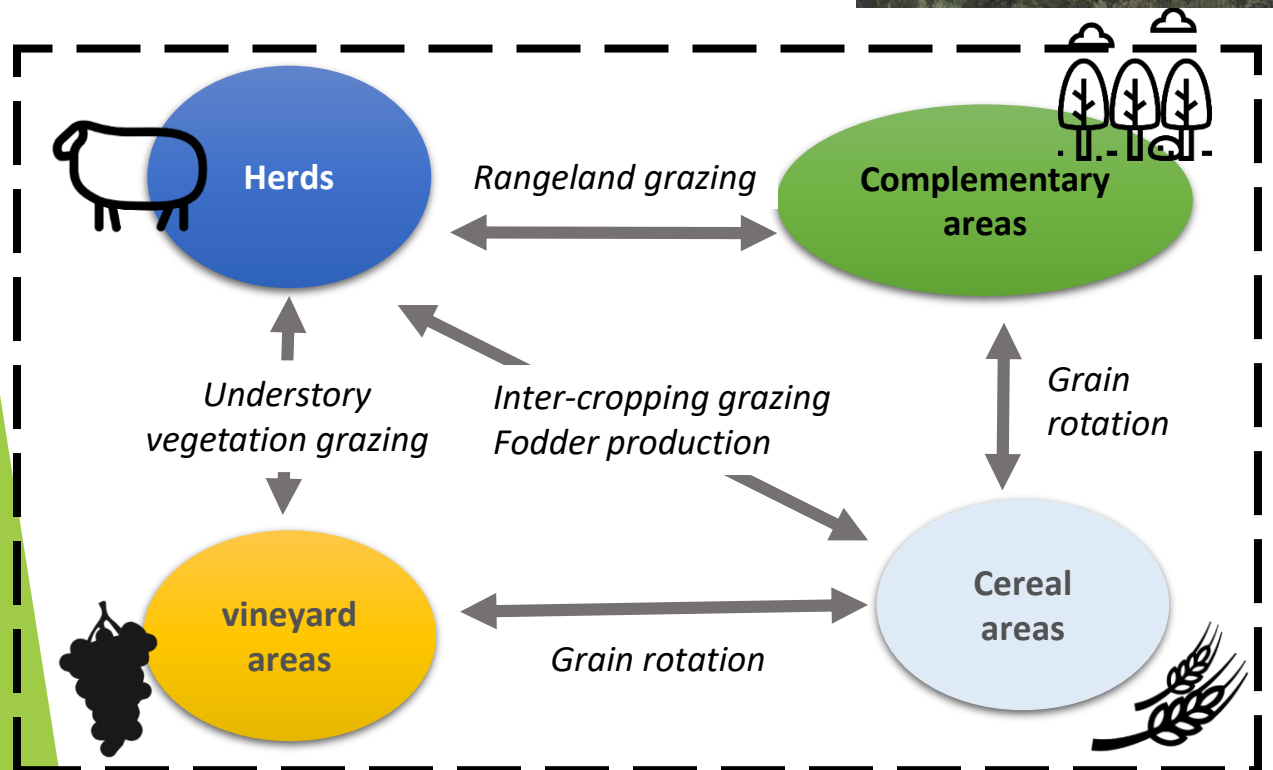
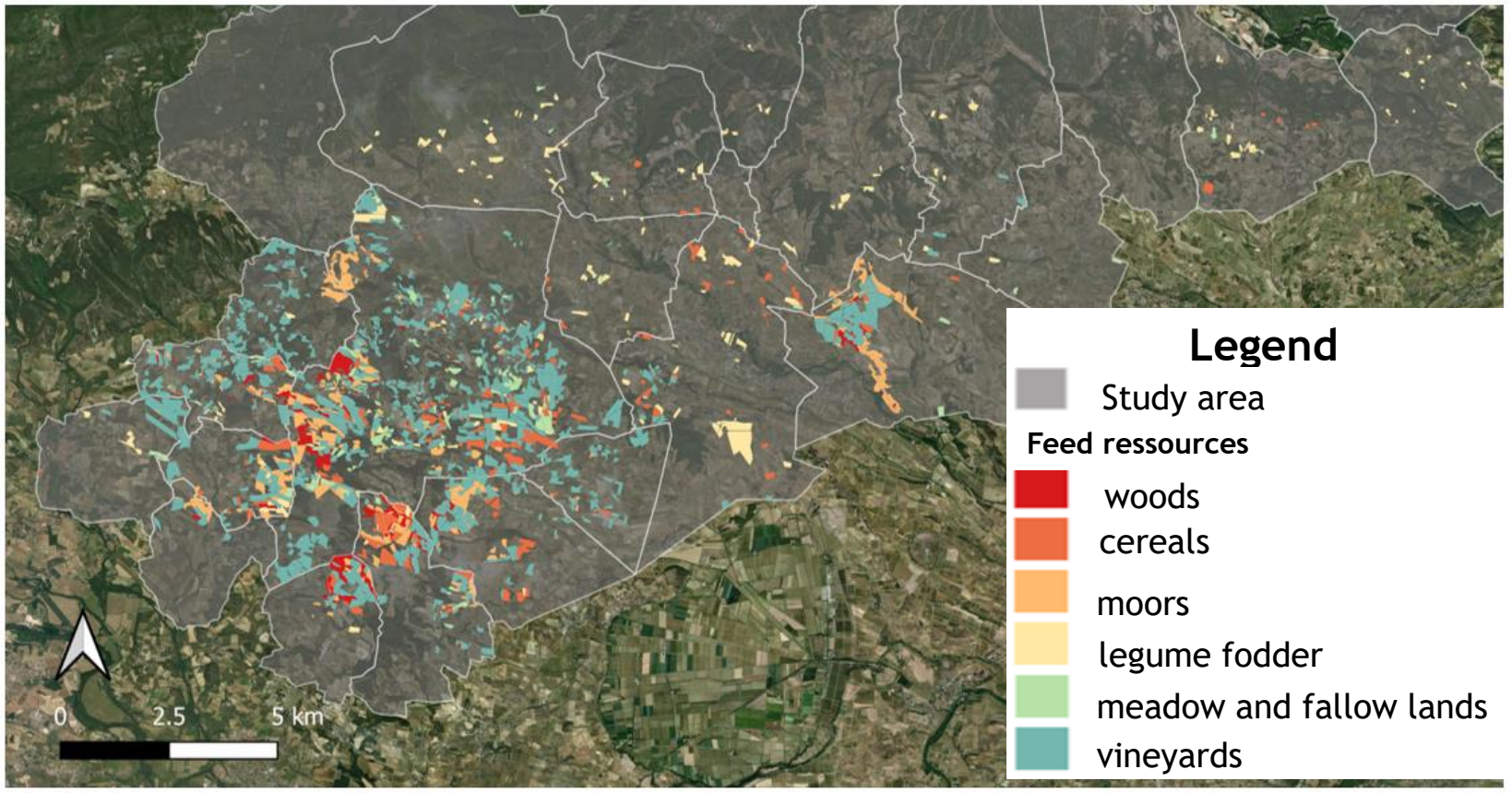
Material

- **Minervois region (South France)**
  - Mediterranean climate
  - A plain zone/Causse zone
- **Various forms of ICLS**



Methodology: modelling

- Spatialized and temporalized regional supply-demand model
- Farming systems and CLI practices calibration: semi-structured interviews (n=22)
- Spatial distribution of surfaces already involving ICLS (3,000 ha - 20 % of the territory's agricultural surface)
- Feed resources estimation (legume fodder, moors, inter-row vineyard, …) (Farrié et al., 2015)



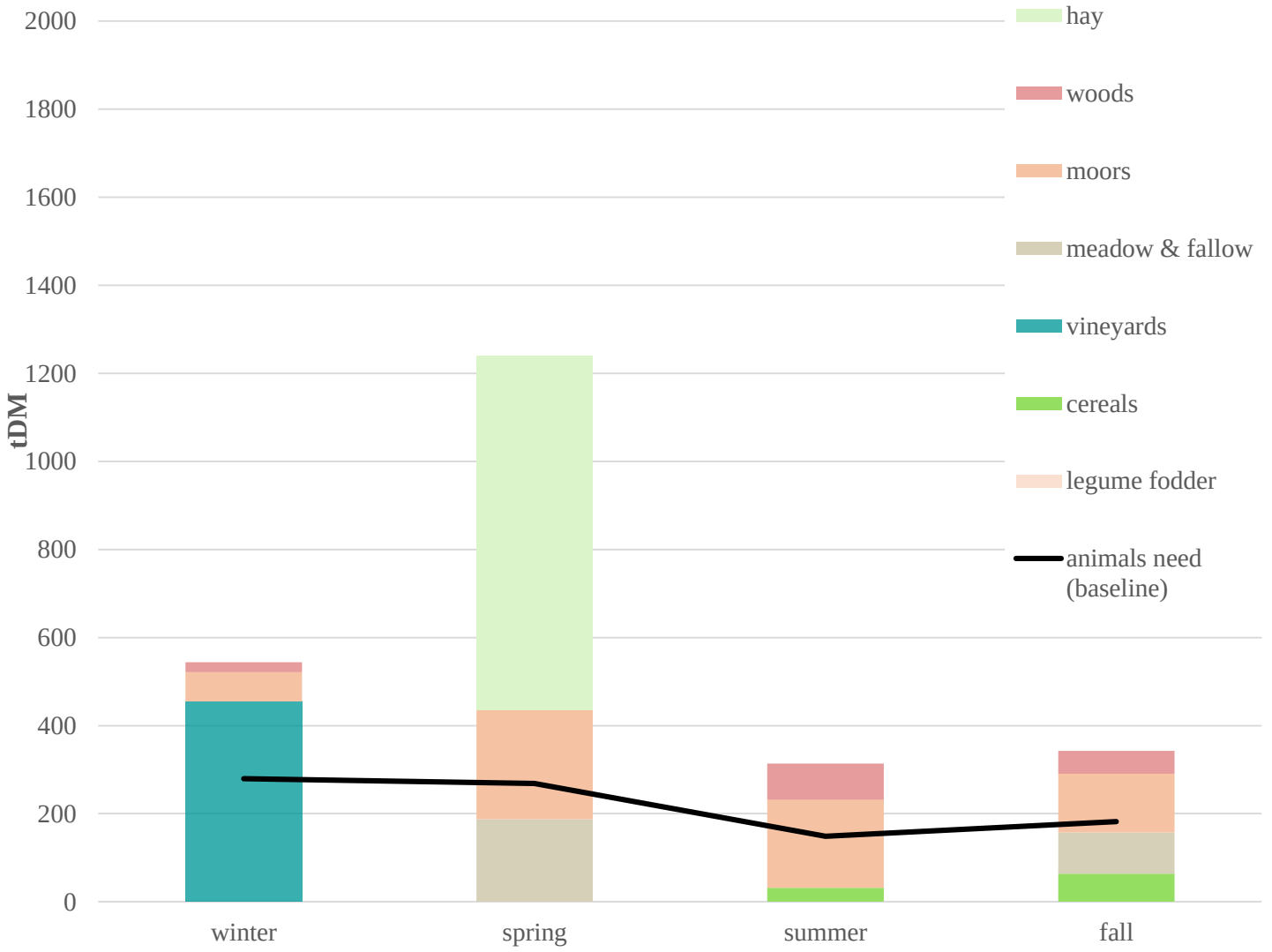
Methodology: simulation

Scenarios / Setting	CC impacts	Increase resources supply	Decrease herd demand	
Crops	Change in yields	Change in land use		
Livestock	-		Herd mobility (transhumance)	Batching and lambing period

- simulation plan elaborate with local actors
- settings consistent with farming system structures and functioning

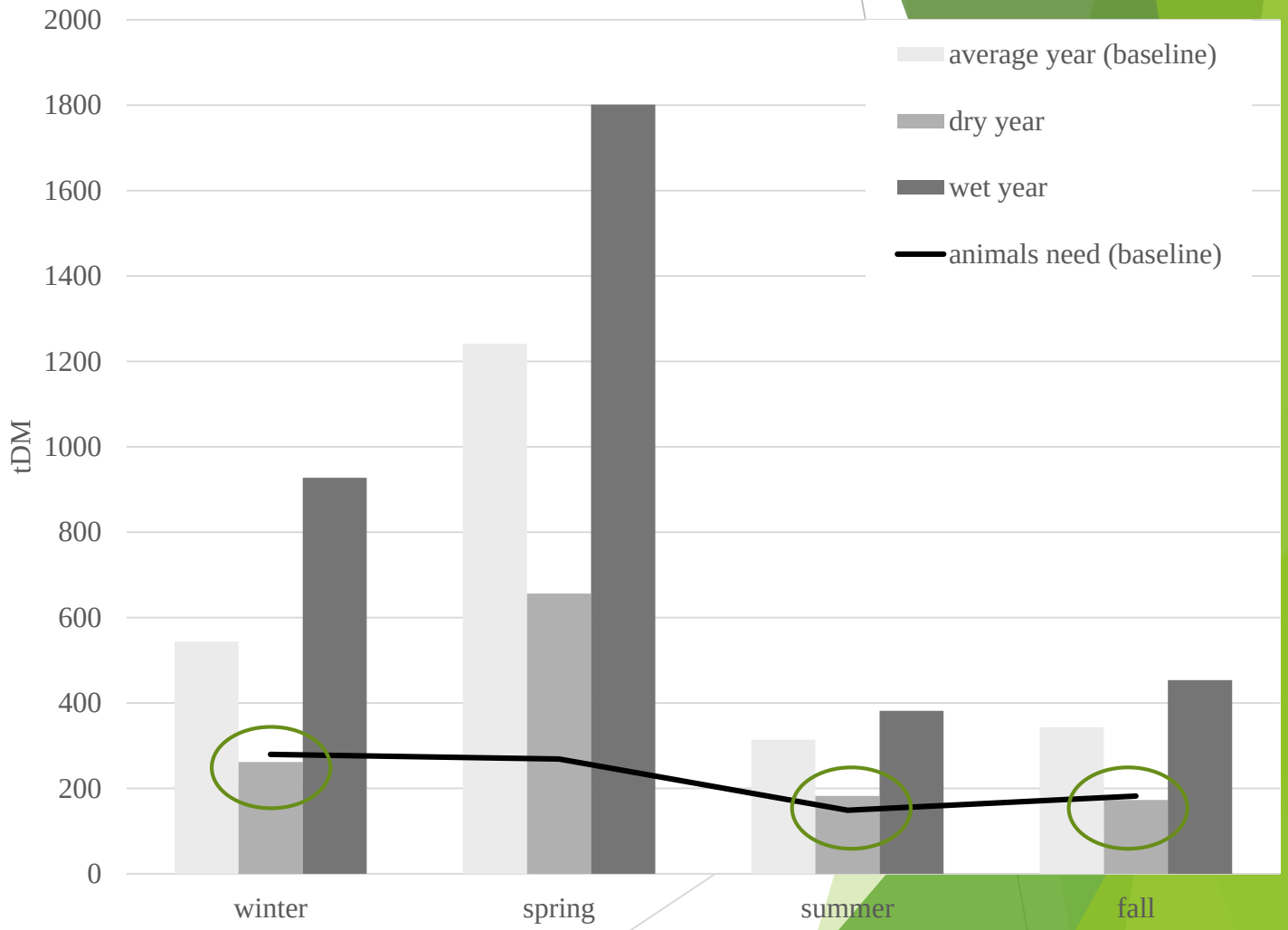
Results: Baseline scenario

- Herd of 1,000 ewes feed on the territory (shepherd)
- Diversity of feed resources
- Complementarity of ressources between seasons

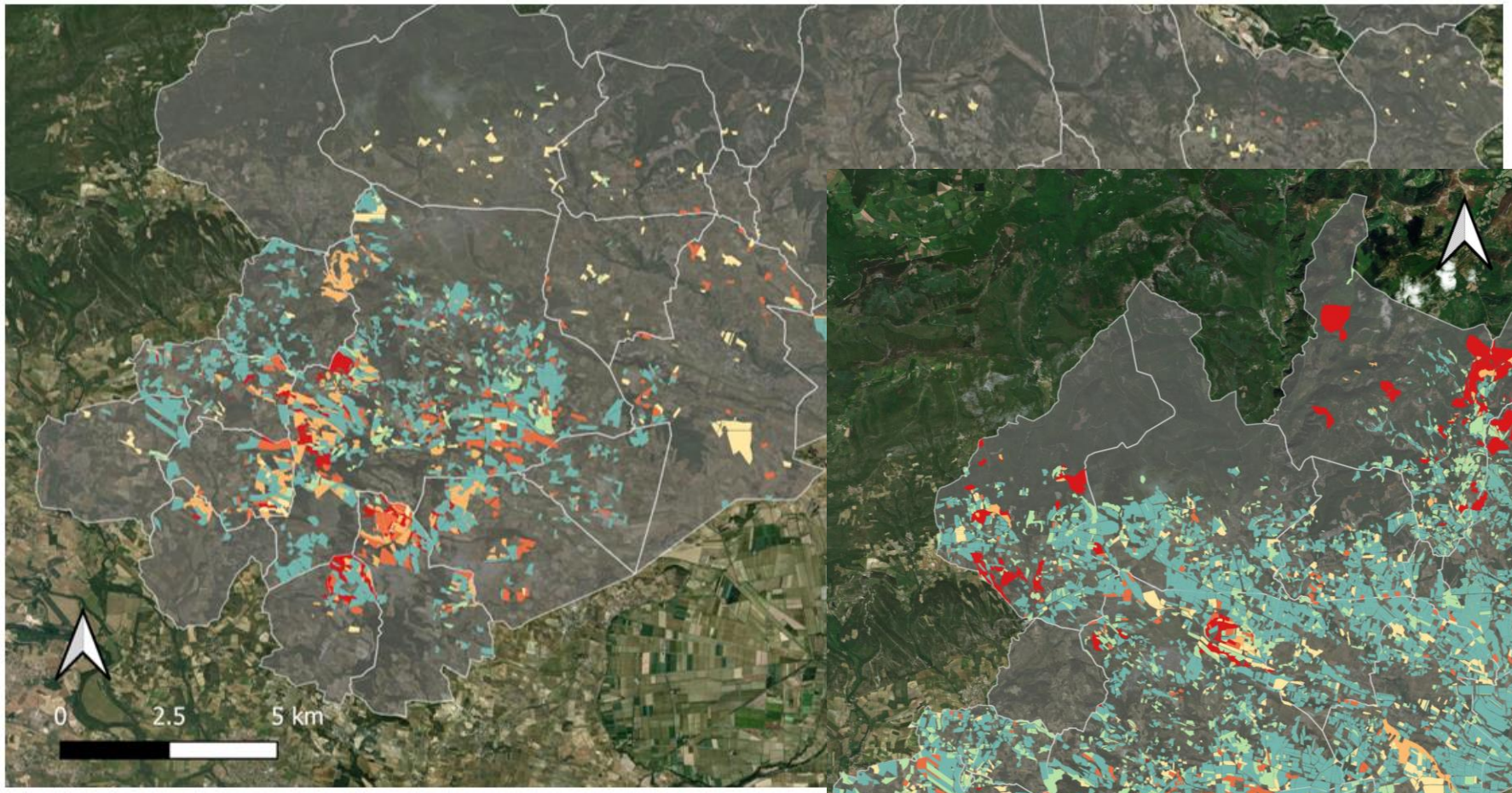


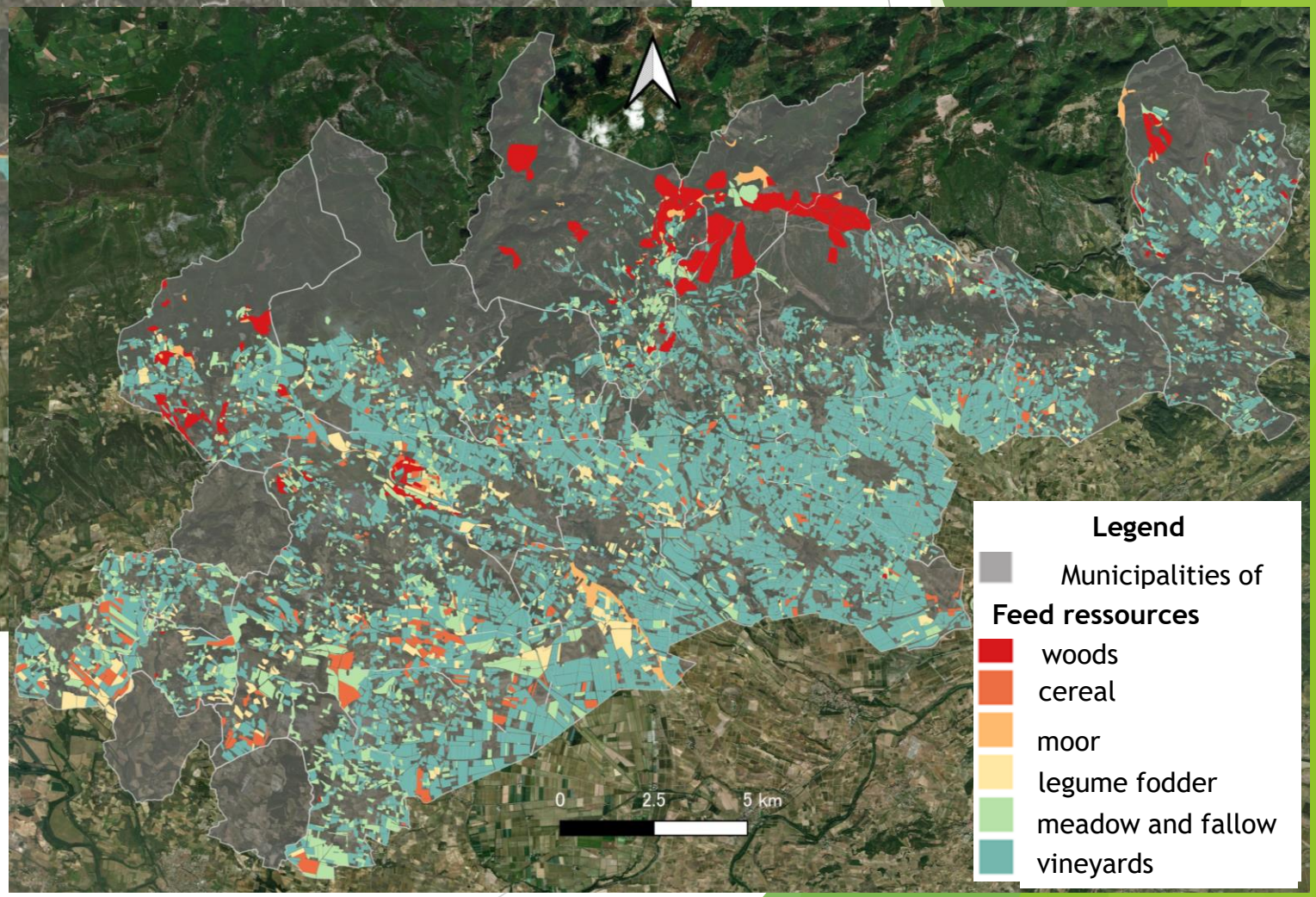
Results: Climatic change impact

- Setting: Change in yields
- Fall and winter become also limiting in dry years
- Not enough ressources to feed the actual herd



Results: Increase resources supply

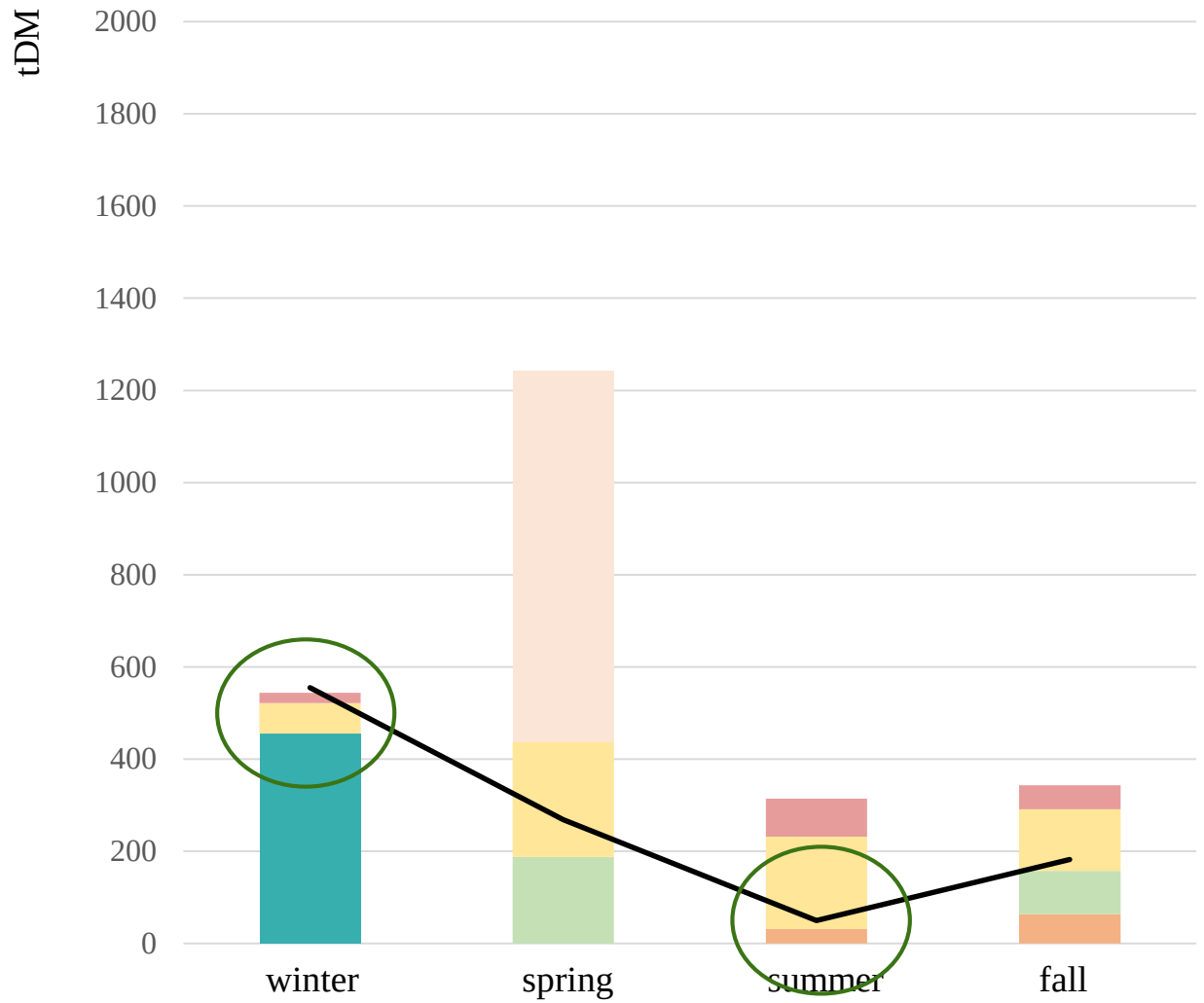




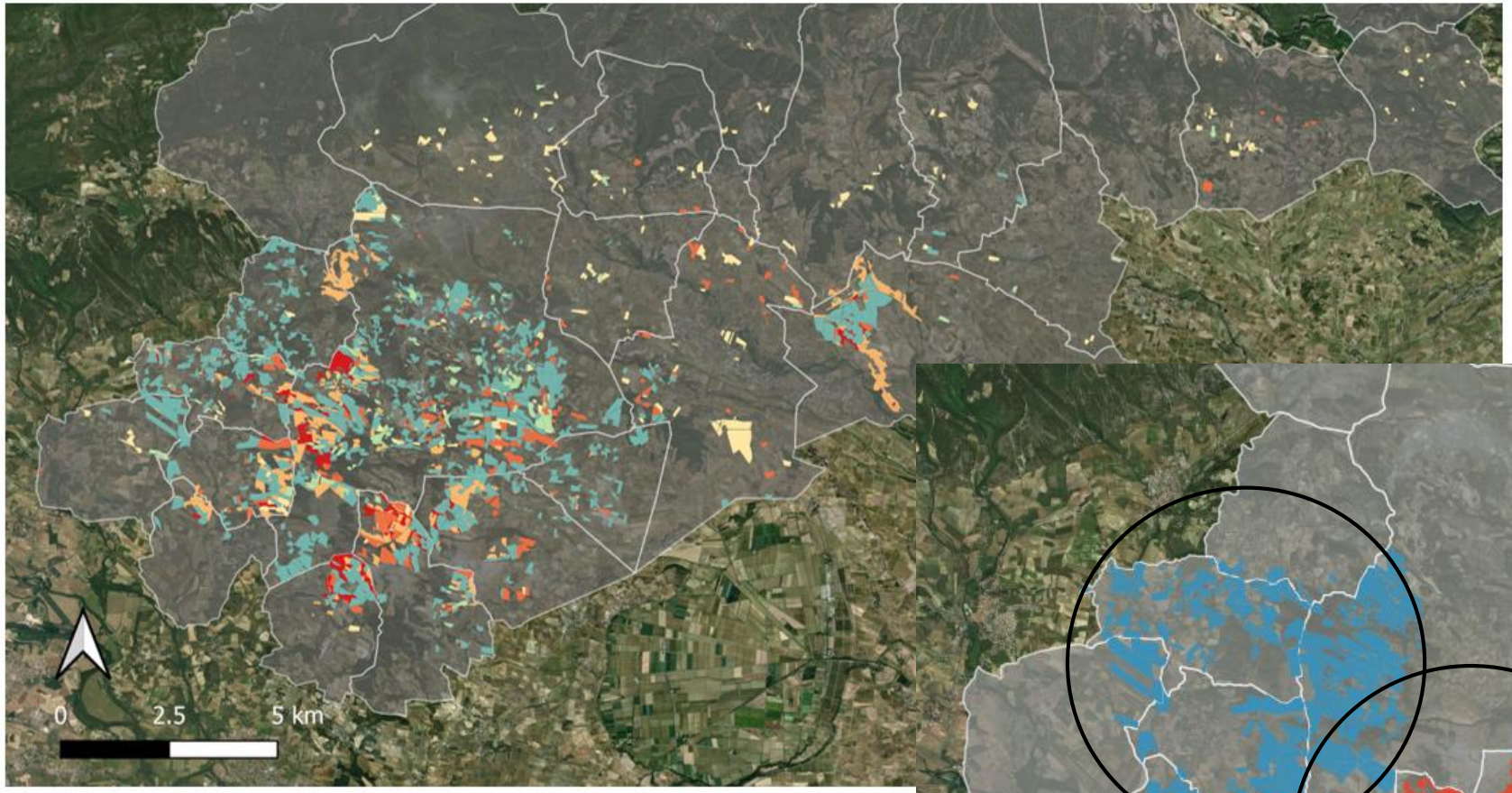
- Consider ICLS all over the territory
- Increase number of ewes (> 8,000)

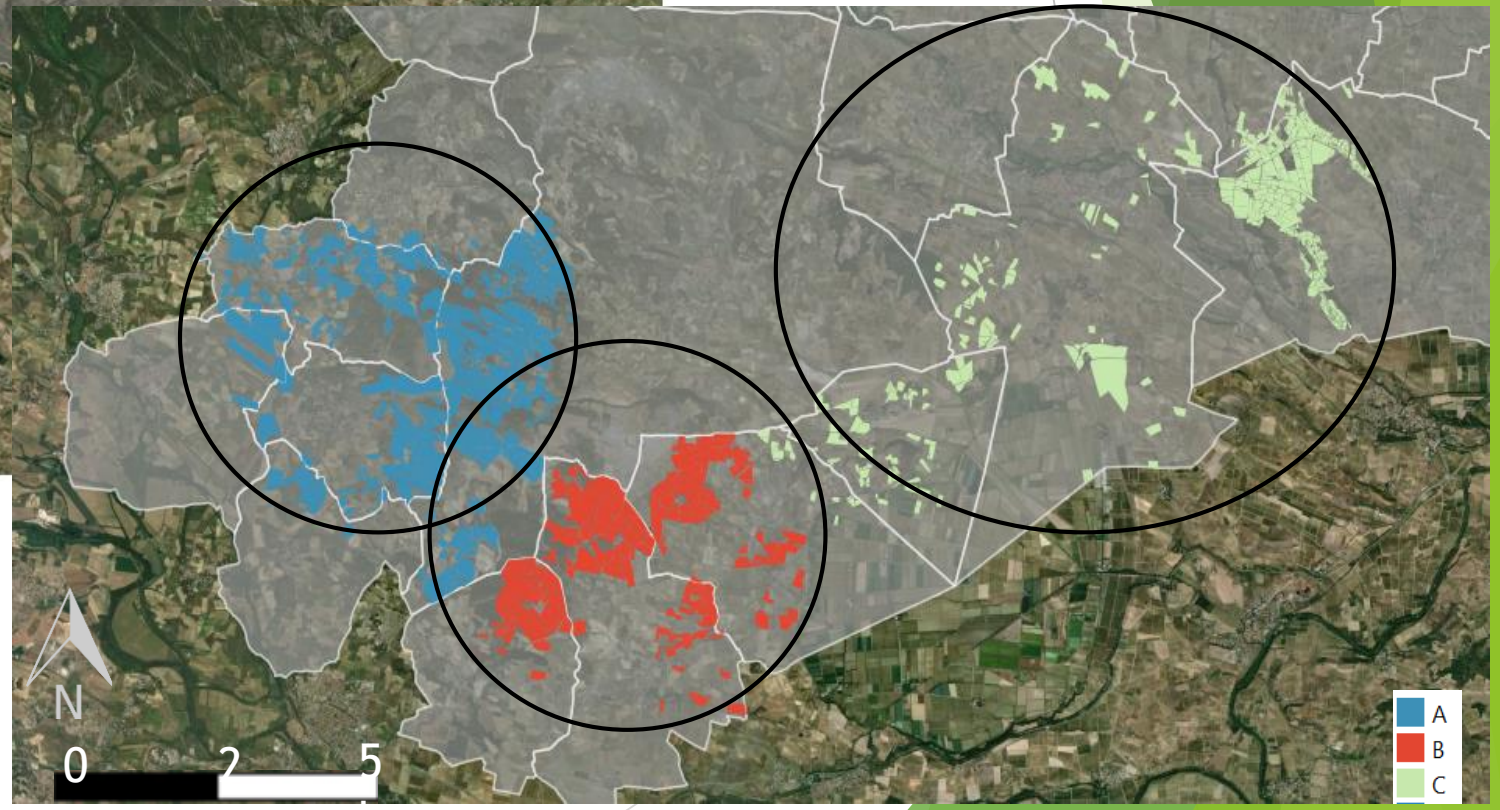
Results: Herd mobility

- Setting: Change in grazing periods
- Summer transhumance (estive) to reduce pressure on ressources
- Inverse transhumance to optimize the use of available resources in winter



Results: Batching





- separate the herd into 3 batches
- decrease animal density
- facilitate management

Discussion & Perspectives

- « **simple** » territorial simulations based on **real** CLI **practices** involving **local actors** (participatory research project)
- Interest in combining **dynamic analysis** (seasonality) and **spatial analysis** (heterogenity of land use) to **design future landscapes**
- Social & Environmental « concerns » on cropping systems are an **opportunity to reintroduce livestock systems** and provide **additional services** to territories
- **Brakes and levers** to adoption of ICLS **& multicriteria assesment** of associated benefits in addition

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