Factors influencing land-use changes : analysis at territorial scale.

Elise Ygaunin, Maude Quinio, François Coléno, Aude Barbottin

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Context

French public policies and private schemes implemented for:

- **Development of farming systems** that are less dependent on chemical inputs
- **Environment** and **biodiversity** preservation

Crop rotation [1]

- analyzing land use
- monitoring environmental constraints
- evaluating crop performance

good indicators of changes in cropping and livestock systems [2,3].
BUT have rarely been studied at the **territorial scale**.

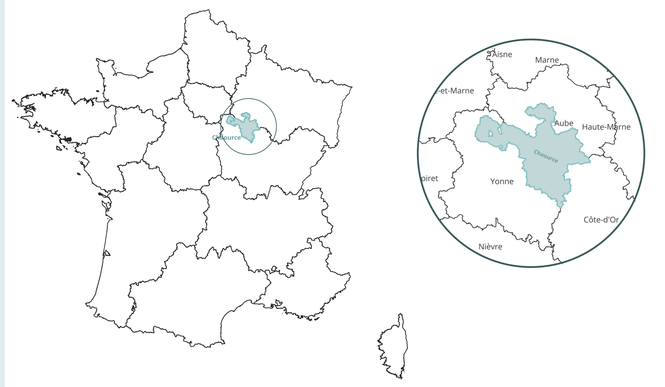
Objective

Analyse the shifts in land use and the factors driving these changes.
Emphasize two key aspects:

- Preserving meadows
- Diversifying crop sequences

Materials and methods

Map depicting geographical region the Chaource PDO



2007 — **2021**

Land Parcel Identification System (LPIS) data
Identify changes in cropping and livestock systems by observing shifts in land use

15 semi-directive interviews coded for analysis with local stakeholders
(PDOs and IGs, agricultural advisors, agroindustry, Regional Natural Parc, cooperative, water syndicate and policymakers)

Key facts

2 departments : Yonne (89), Aube (10)
Surface: 327 869ha

In the two departments :
8524 farms
10% of farmland in organic agriculture
Between 2010 and 2020 :
-10% in the number of farms
+13% average UAA per farm

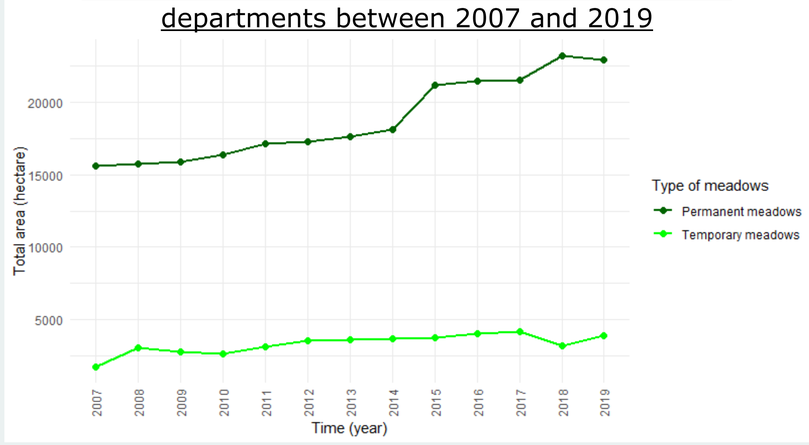
National decline in the number of farms specializing in livestock farming [3]

Results

Meadows maintenance supported by several economic measures

"It's closely related to the type of soil. Regions that were able to abandon livestock in favor of crop have nearly all made the switch."

Variation in meadows area in the Aube and Yonne departments between 2007 and 2019



Response element

- Terms of reference PDOs/IGs:
Higher milk price than conventional
Minimum livestock units per hectare

"Since they have opened a SES* and then blocked it on their territory, we can't open any MAEC there."

- Soils unsuitable for other crops
- Regional quotas for meadows conversion
- CAP subsidies (Agri-Environmental and Climate Measure)
- Partnerships and economic players (Subsidy for Environmental Services*)

Key stakeholders involved

PDO syndicates · Water syndicate · Organic farming groups · Local economic players · Food industry · Regional and departmental authorities Chamber of agriculture

Factors limiting the preservation of meadows

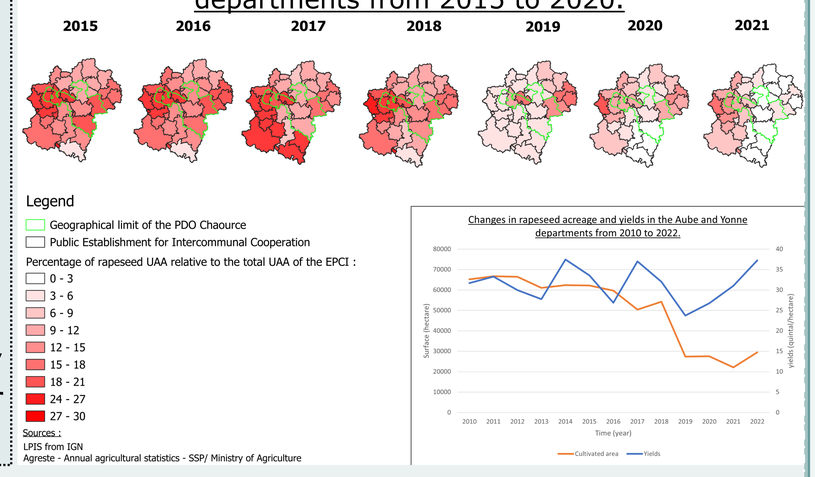
- More profitable production
- Climate Change
- Lack of territorial coordination, a limited number of collaborative projects
- Financing and other difficulties (manual labor, farm transmission)
- Difficulties in identifying a use for meadows in the absence of livestock

The influence of local stakeholders and climate change on production

Crop rotation context in the area

Decline in rapeseed yields
Increase in resistant pests
Worsen drought conditions
↓
Rapeseed-wheat-barley rotation ineffective
↓
Disappointing profitability from new crops after diversification attempts

Change in the proportion of UAA cultivated with rapeseed within the total UAA by EPCI in the Aube and Yonnes departments from 2015 to 2020.



Factors hindering diversification in crop rotation

- Increased occurrence of climatic hazards combined with a lack of knowledge on alternative crops
- Public policies (eg. Water restriction, pesticides reglementation)
- Fluctuating prices and market opportunities

"Some wanted to stop producing carrots and celery because it was much more lucrative to produce wheat, which was at 400 euros per ton."

Sectoralization of production due to

- Influence of agri-food industries, cooperatives, and origin appellations:

Contractualization and development of market opportunities for specific productions in the collection area.

- Significant soil heterogeneity
- Insufficient communication between sectors

"Insufficient communication among the various players is hindering progress. There's still a need for more collaboration and networking."

Map of various crop rotations reported to CAP in 2022 in the Aube and Yonne departments.

Conclusion and perspectives

Major elements influence agricultural production at the territorial scale

Restricted communication, influenced by an industry-focused perspective and emerging opportunities

Risks of oversimplification and economic difficulties exacerbated by climate change and technical barriers

Hyperspecialization of territories, with a growing emphasis on industrial crops

Evolution of land-use involves numerous stakeholders:

- **Collective regional action** is crucial for global resilience
- **Cooperation and shared responsibility** are essential to achieving sustainable and effective territorial development

Need for: synergy between different agrosystems, which may involve land use [4].

[1] Barbieri P., Pellerin S., Nesme T., 2017. Comparing crop rotations between organic and conventional farming. DOI:10.1038/s41598-017-14271-6
[2] Mignolet C., Schott C., Benoît M., 2004. Spatial dynamics of agricultural practices on a basin territory: a retrospective study to implement models simulating nitrate flow. The case of the Seine basin. Agronomie, EDP Sciences, 2004, 24 (4), pp.219-236. <10.1051/agro:2004015>. <hal-00886024>
[3] Chambres d'agriculture, 2023. Regards d'avenir sur l'élevage en France. Available at: https://chambres-agriculture.fr/fileadmin/user_upload/National/FAL_commun/publications/National/rapport-elevage1-web.pdf
[4] Accatino F., Tonda A., Dross C., Leger F., TichitM.. Trade-offs and synergies between livestock production and other ecosystem services. Agricultural Systems, 2019, 168, pp.58-72. 10.1016/j.agsy.2018.08.002. hal-02012646

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