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FROM PATTERN AND PROCESS TO PEOPLE AND ACTION

How do farmers' representations influence landscapes?

A multi-scale approach combining mental models and forest monitoring in southwestern France

Julien Blanco[a], Anne Sourdril[b], Marc Deconchat[a], Sylvie Ladet[a], Emilie Andrieu[a]

[a]Dynafor, Université de Toulouse, INRA, INPT, INPT - EI PURPAN, Castanet-Tolosan, France / [b]CNRS, UMR 7533 Ladyss, Université Paris Ouest - Nanterre
Corresponding author: julien.blanco@inra.fr

RURAL FORESTS: a key social-ecological component of rural landscapes

Rural forests are **woodlands and trees outside forests** — including in France groves, hedgerows and scattered trees — that constitute substantial components of agricultural systems. They provide a vast range of **provisioning**, **regulating** and **cultural** ecosystem services.

What are the dynamics of rural forests in southwestern France?

In Europe, rural forests have declined during the last decades, mainly because of the intensification of agriculture and the separation of forest and agricultural systems. But beyond global trends, little is known about small-scale dynamics and factors affecting rural forests. In the Long-Term Social-Ecological Research (LTSER) platform ***Vallées et Coteaux de Gascogne***, we combined **GIS monitoring**, **ethnographic investigations** and **mental models** to understand rural forests dynamics and related anthropogenic factors.

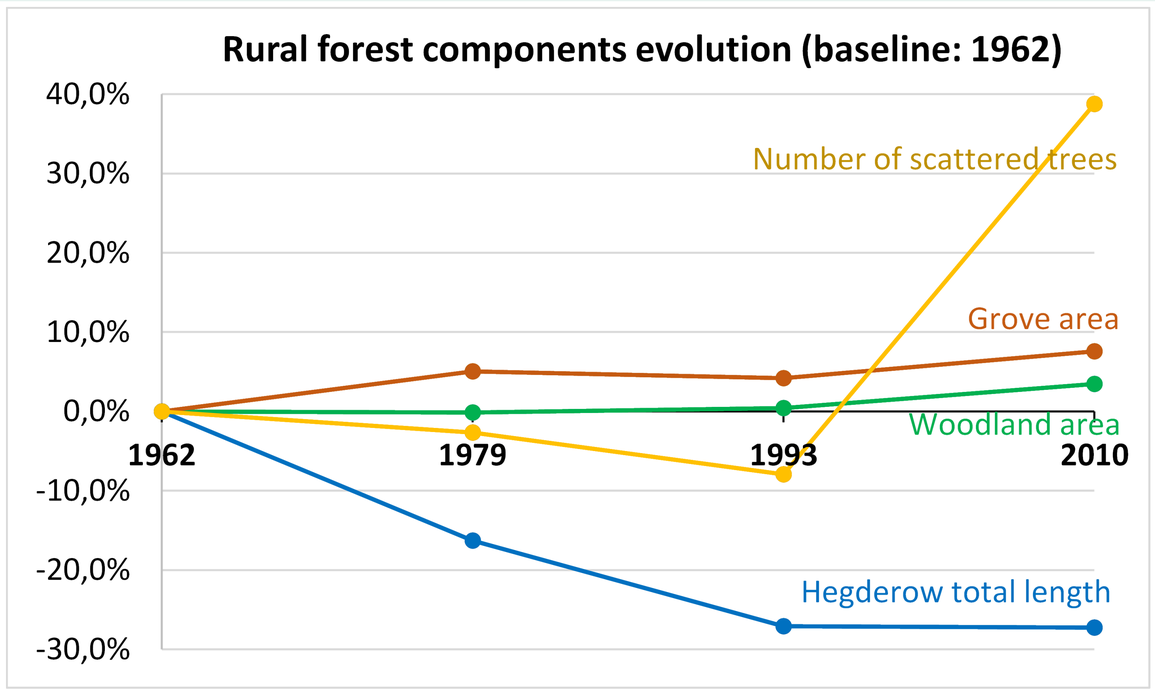
Linking landscape patterns & social norms

Rural forests, social organization, and agriculture modernization

Methods

***GIS analysis*:** photo-interpretation on ca. 14,000 ha was used to digitize rural forests from 4 forest maps (1962, 1979, 1993 and 2010) from the National Institute of Geographic and Forest Information. Rural forest components were classified into woodlands, groves, hedgerows and scattered trees.

Ethnographic investigations: conducted since 2003 in the LTSER through (i) interviews with farmers, forest owners and other forest users, (ii) participative observation and (iii) land registries analysis.



⇒ Farmers tend to be self-sufficient in diversifying the types of lands they own.

This **social practice resulted in the presence of fragmented woodlands throughout the landscape.** The local house-centered system associated with a single heir inheritance system contributed to **the maintenance of farmers' real estate and of the woodlands .**

⇒ The intensification of agriculture caused the decline of hedgerows. But **boundary hedgerows were reinforced** as they enable farmers to delimit their estates, while **in-farm hedgerows declined** as they obstruct mechanization.

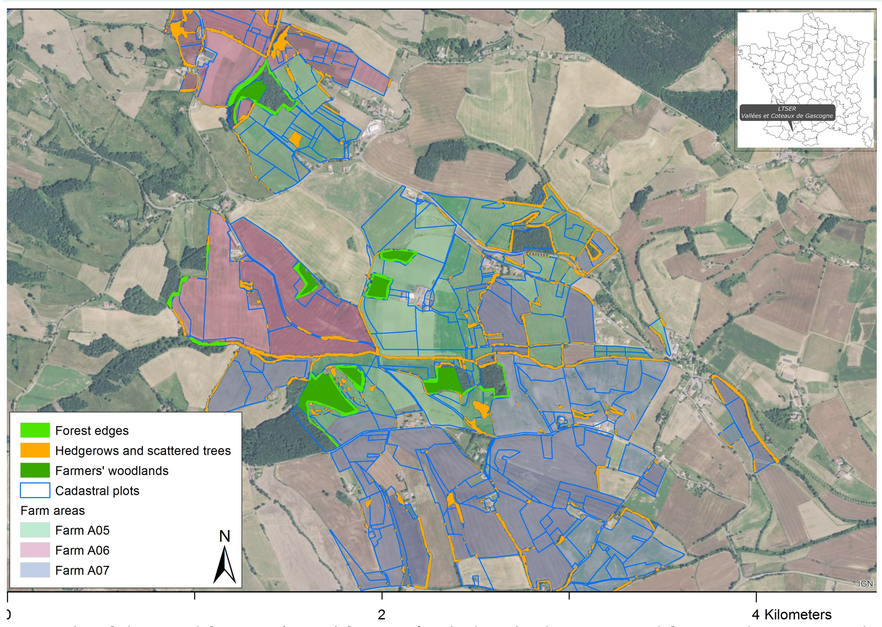
⇒ **Scattered trees** declined as they obstruct mechanization. The recent increase was explained by **bush encroachment** of the least fertile lands, which leads to the development of scattered trees in a first step.

Linking farm-scale forest mapping & mental models

Rural forests: a source of perceived ecosystem services & disservices

Methods

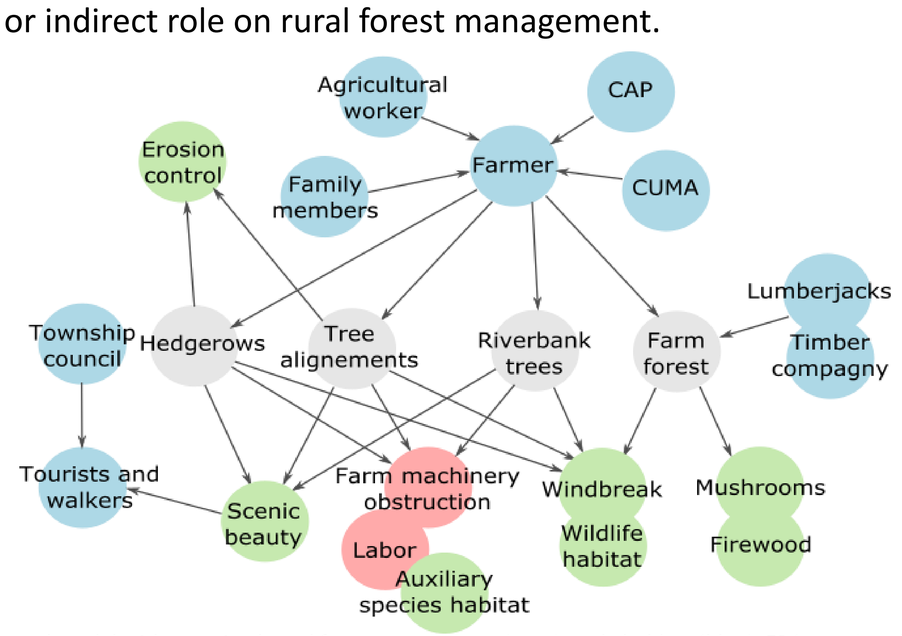
***GIS analysis*:** photo-interpretation of rural forests on 19 farms (ca. 2,600 ha) from the IGN BD Topo high resolution photographs (2010, 1/1500[e]).
Mental models: interviews with the 19 farmers using a direct elicitation method for establishing individual mental models of rural forest management, and perceived ecosystem services and disservices.



Farmers own **4.1 ha (± 3.7) of woodlands** and **rural forests occupy 11.7% (± 8.4) of farmlands**.
The proportion of rural forest is not significantly different between mixed farms (with cattle and crops) and other farms.

Example of digitized farmers' rural forests (including hedgerows and forest edge surrounding farmlands).

Farmers identified a total of **28 ecosystem services** (ES) and **14 disservices** (EDS) associated with **9 types of rural forest components**. Each single farmer cited 7.1 (± 1.7 SD) ES and 3.1 (± 0.7) EDS. A total of 19 stakeholders were playing a direct or indirect role on rural forest management.



Example of mental model with perceived rural forest components (grey), stakeholders (blue), ES (green) and EDS (red).

Conclusion & perspectives

⇒ **Coupling social sciences and natural sciences** is crucial for understanding **landscape changes and their drivers**. However, the development of innovative frameworks, tools & methods is necessary to conduct an effective multi-scale and multidisciplinary research.

⇒ The **ecosystem services framework** is relevant to analyze local managers perceptions & decisions, but a **more systematic integration of ecosystem disservices is required** to fully grasp people's perceptions and decision making process.

⇒ Network analysis from mental models could provide significant outputs for a better coupling between social and ecological data.