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## **Ecosystem services related to small forests in temperate rural landscapes**

Marc Deconchat, Cécile Barnaud, Antoine Brin, Floriane Clement-Kumar,  
Laurent Larrieu, Annie Ouin, Clélia Sirami, Aude Vialatte

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# Ecosystem services related to small forests in temperate rural landscapes

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Marc Deconchat; Cécile Barnaud; Antoine Brin; Floriane Clément-Kumar; Laurent Larrieu; Annie Ouin; Clélia Sirami; Aude Vialatte

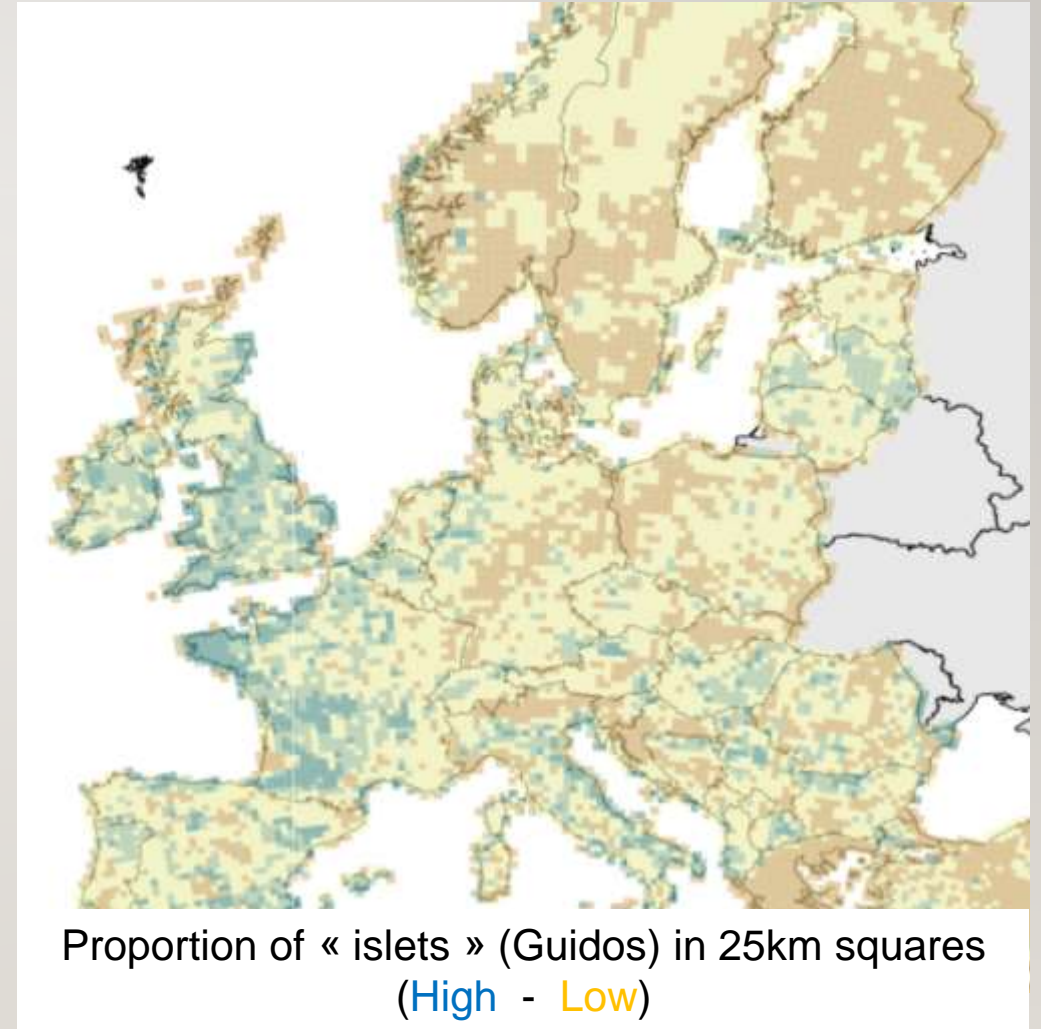
ESP10- Hanovre- 21-25/10/2019



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# So many small forest fragments in rural landscapes





# Lots of interactions with surrounding agriculture and other human activities



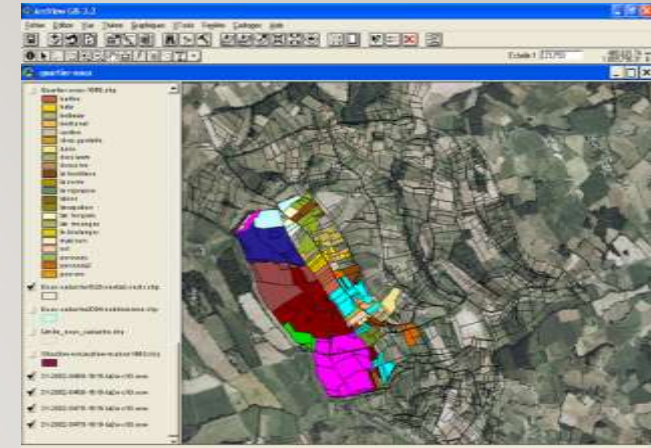


# Study sites and methods



ZA-LTSER Pygar

<https://pygar.omp.eu/>

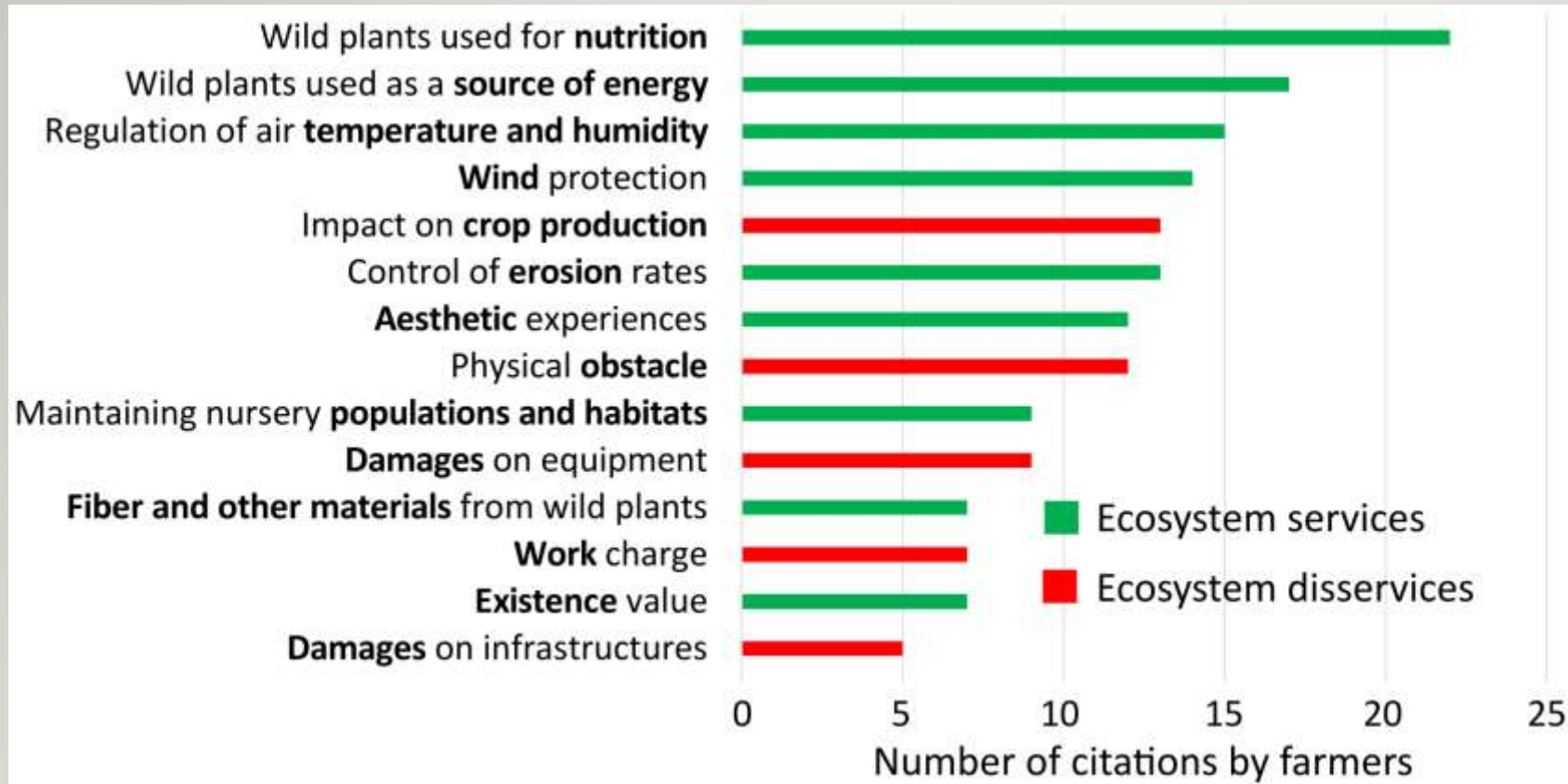


Social drivers of rural forest dynamics: A multi-scale approach combining ethnography, geomatic and mental model analysis

Julien Blanco<sup>\*,\*</sup>, Anne Sourdri<sup>l</sup>, Marc Deconchat<sup>\*,</sup>, Sylvie Ladet<sup>\*,</sup>, Emilie Andrieu<sup>\*,</sup>



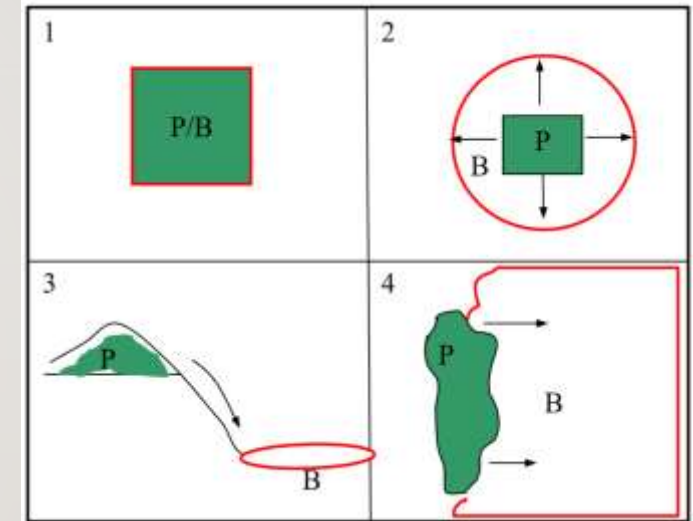
# Which ecosystem (dis)services are listed by farmers?



Blanco, J., Sourdril, A., Deconchat, M., Barnaud, C., San Cristobal, M., & Andrieu, E. (2019). *Farmers compose with ecosystem services and disservices for managing on-farm trees: insights from a French case study*. Paper presented at the 4. World Congress of Agroforestry

# Which ecosystem (dis)services from a location point of view ?

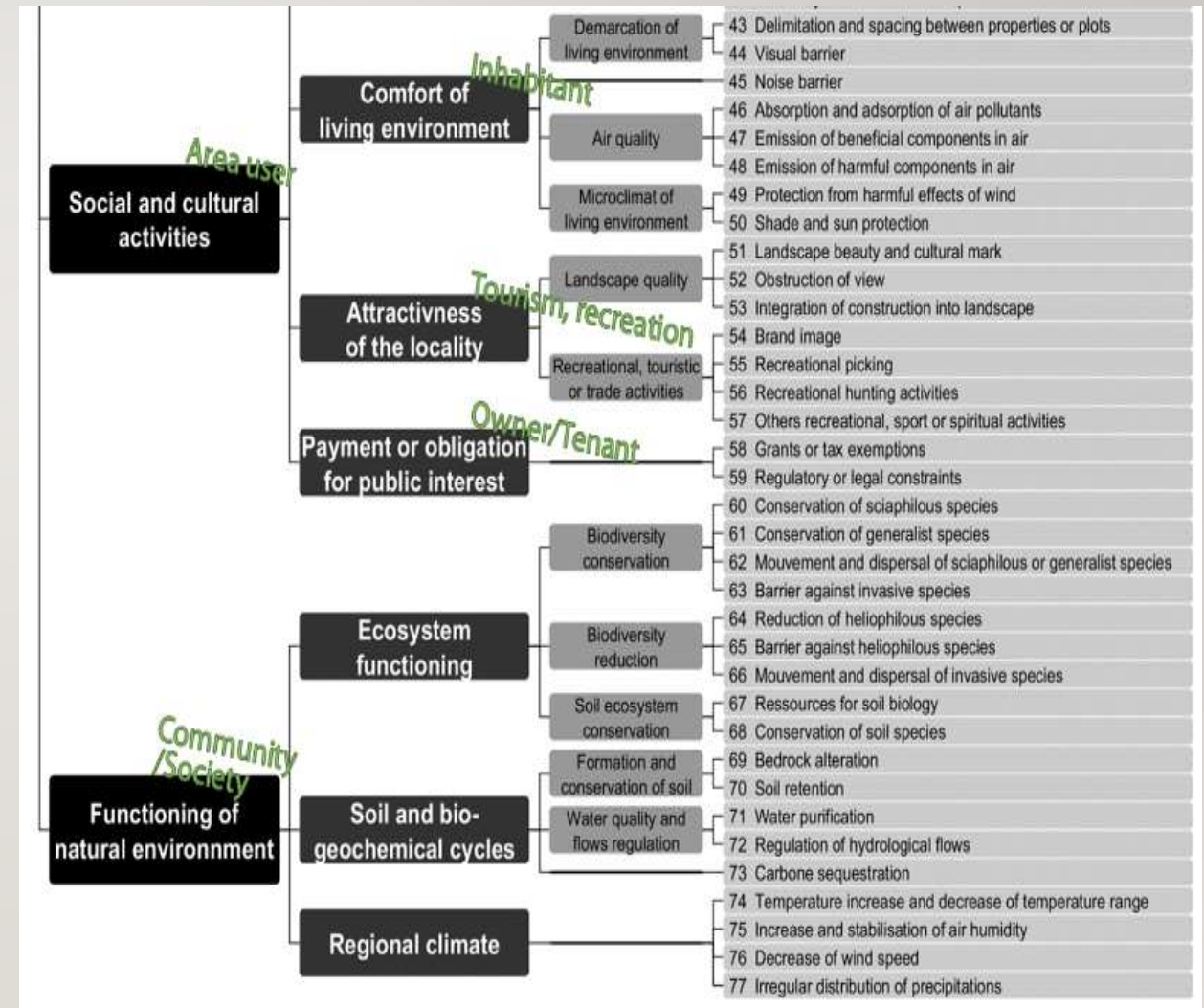
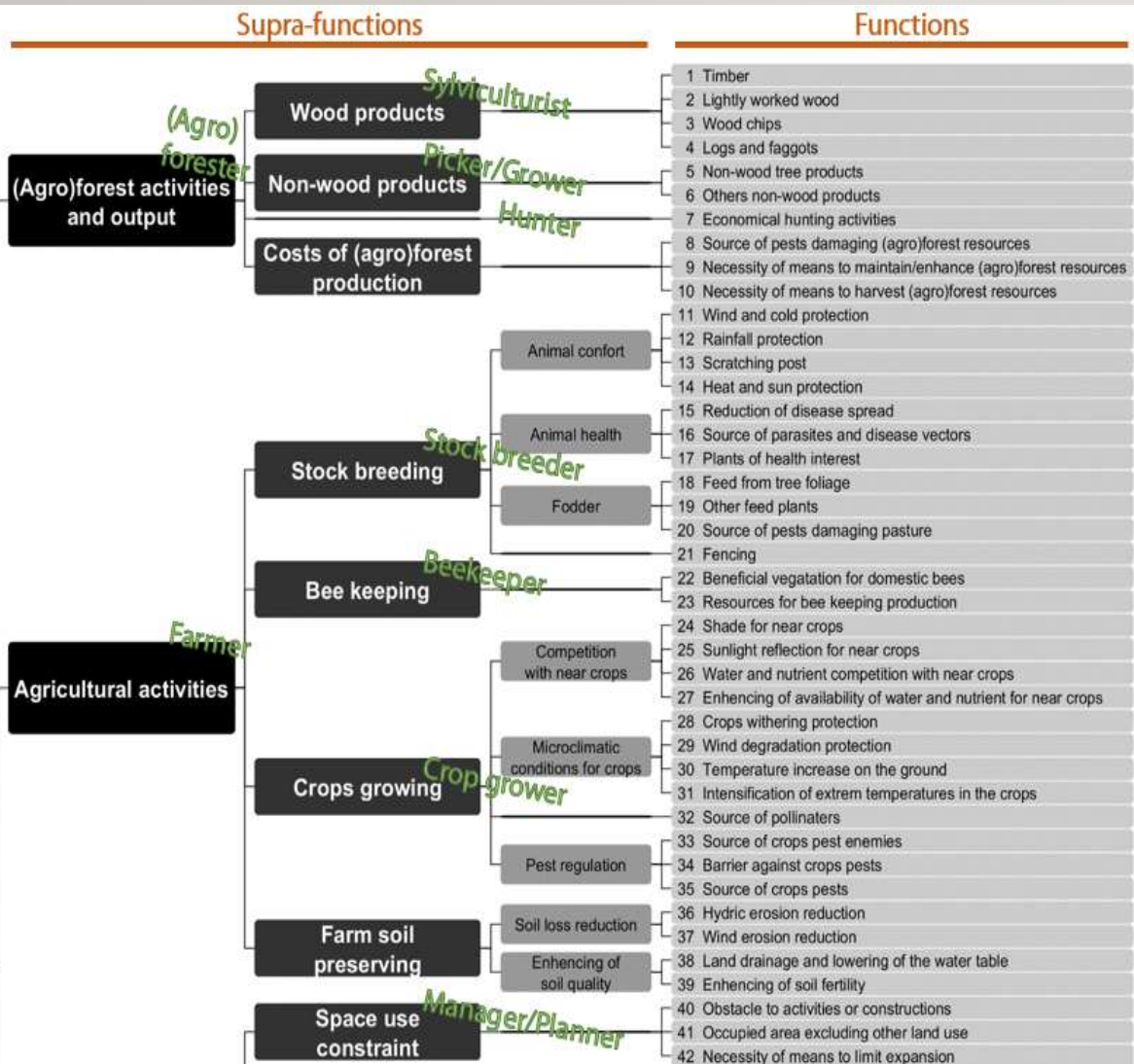
<p><b>In situ services</b> = services delivered within the forest patch</p>	<ul style="list-style-type: none"> <li>• Biodiversity</li> <li>• Wood production</li> <li>• Wild food production</li> <li>• Biological invasion risk (<i>disservice</i>)</li> </ul>
<p><b>Local-proximal services</b> = services depending on the spatial proximity of the forest patch</p>	<ul style="list-style-type: none"> <li>• Disturbance regulation</li> <li>• Habitat &amp; refuge</li> <li>• Biological pest control</li> <li>• Pollination</li> <li>• Infectious diseases (<i>disservice</i>)</li> </ul>
<p><b>Directional flow-related services</b> = services extending from the forest patch to the point of use</p>	<ul style="list-style-type: none"> <li>• Water regulation</li> <li>• Water supply</li> <li>• Erosion control</li> <li>• Carbon storage &amp; climate regulation</li> </ul>
<p><b>Global services</b> = services independent from the forest patch location</p>	
<p><b>User movement-related services</b> = services involving a movement of people towards the forest patches</p>	<ul style="list-style-type: none"> <li>• Recreational activities</li> <li>• Aesthetics</li> <li>• Construction of local identity</li> </ul>



Decocq, G., Andrieu, E., Brunet, J., Chabrierie, O., De Frenne, P., De Smedt, P., Deconchat, M., Diekmann, M., Ehrmann, S., Giffard, B., Mifsud, E.G., Hansen, K., Hermy, M., Kolb, A., Lenoir, J., Liira, J., Moldan, F., Prokofieva, I., Rosenqvist, L., Varela, E., Valdés, A., Verheyen, K., Wulf, M., **2016. Ecosystem Services from Small Forest Patches in Agricultural Landscapes. Current Forestry Reports 2, 30-44.**



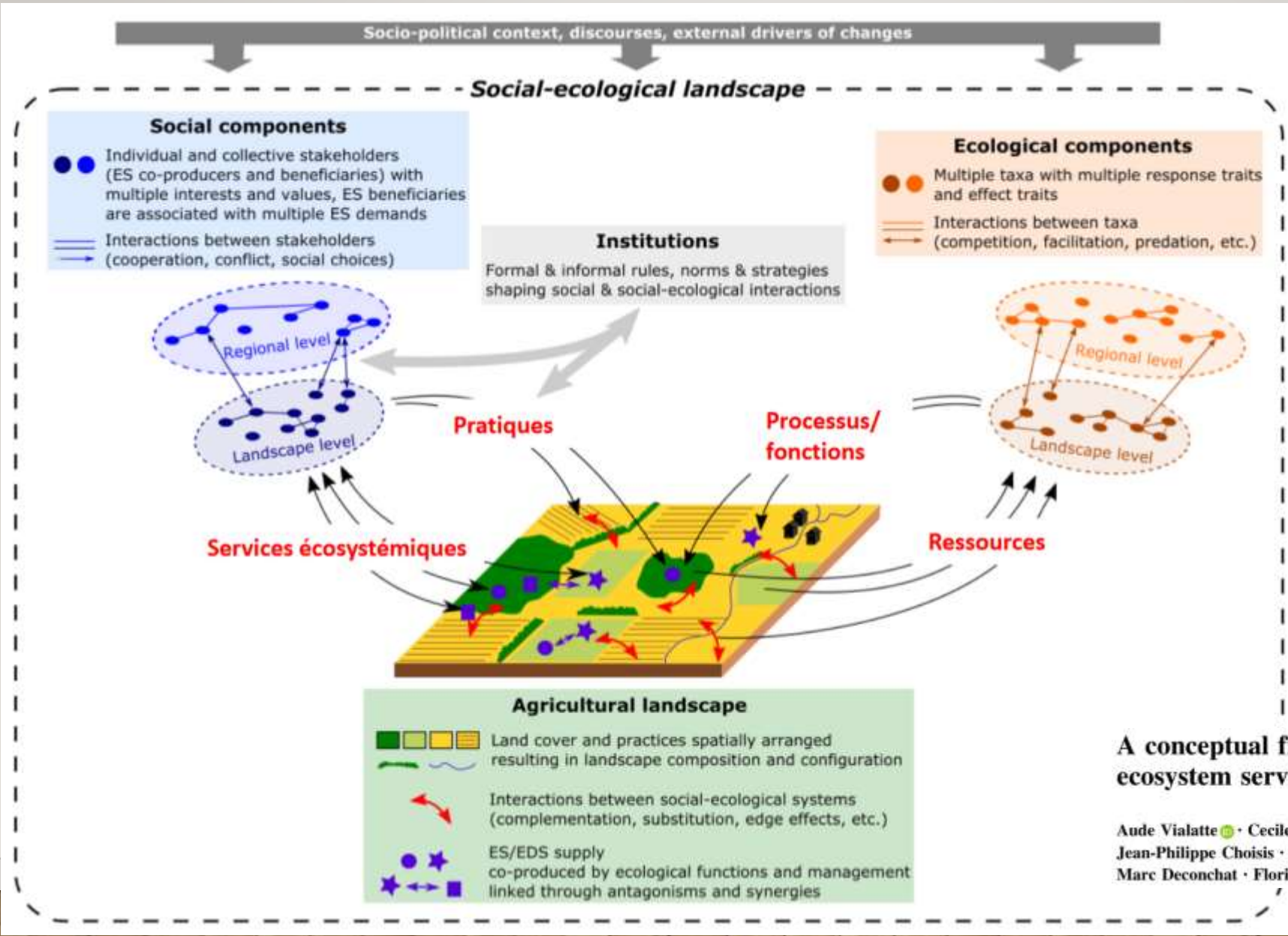
# Which ecosystem (dis)services can we imagine?



Terafor: DEXI-based multicriteria model to consider all multiple fonctions of tree formations in temperate agroforestry area



# A more general framework

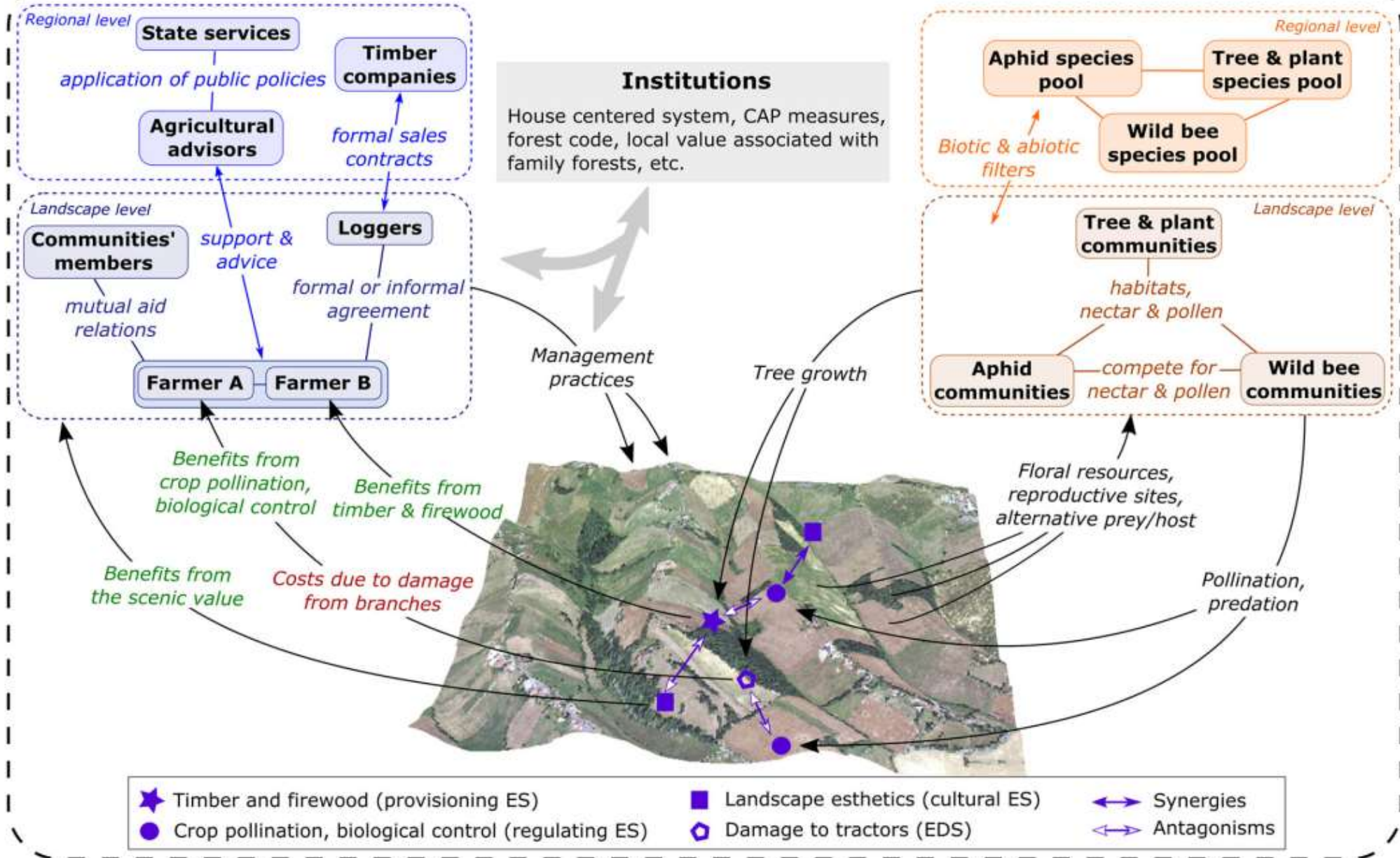


**A conceptual framework for the governance of multiple ecosystem services in agricultural landscapes**

Aude Vialatte · Cecile Barnaud · Julien Blanco · Annie Ouin · Jean-Philippe Choisis · Emilie Andrieu · David Sheeren · Sylvie Ladet · Marc Deconchat · Floriane Clément · Diane Esquerré · Clélia Sirami

Global agricultural market, timber market, societal values associated with trees and forests, climate change

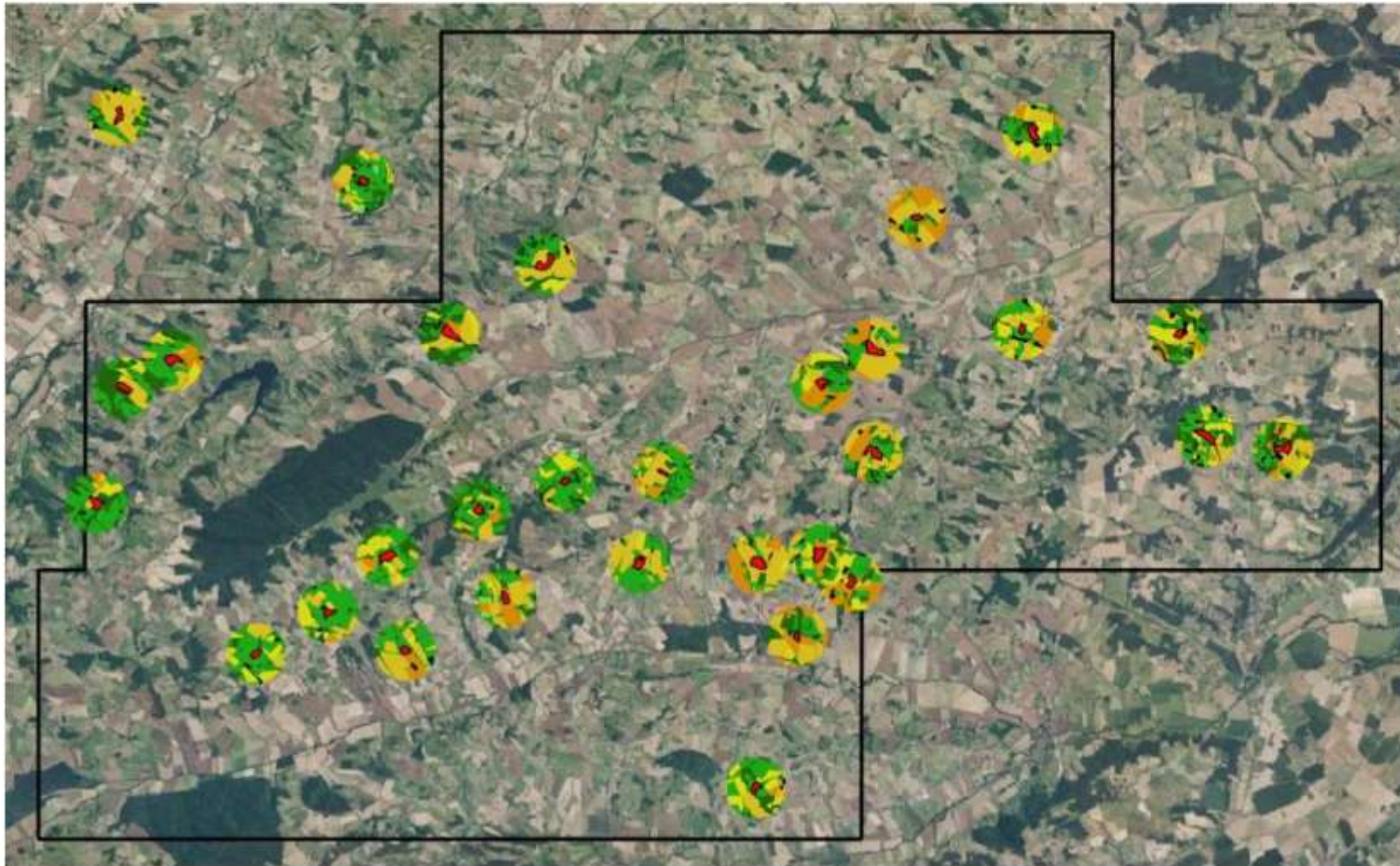
**The social-ecological landscape of 'Vallées et Coteaux de Gascogne'**



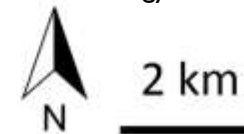


# How to map ecosystems services related to small forests?

- > 28 woodlands were sampled in Coteaux de Gascogne / Toulouse
- > Hyperspectral images were acquired for the study zone



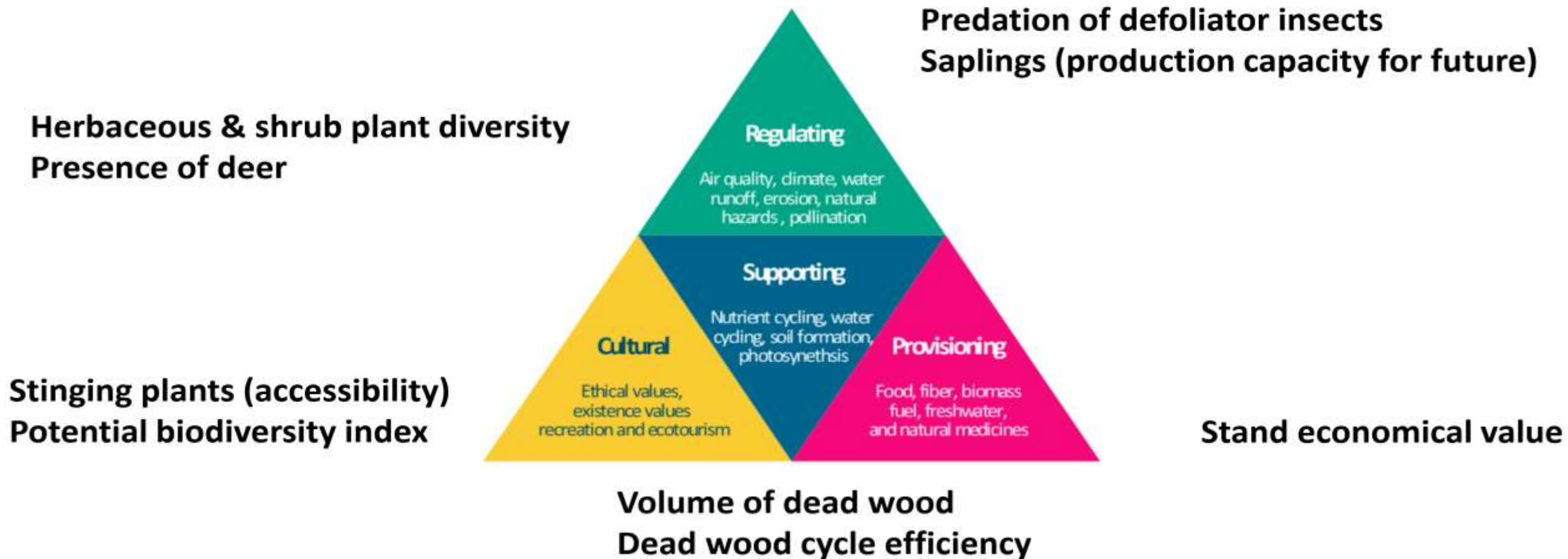
Duflot, R. ; San Cristobal, M. ; Fauvel, M. ; Vialatte, A.  
Understanding the complex relationships between  
landscape structure and various ecosystem services of  
agricultural woodlands IUFRO 8.01.02 Landscape  
Ecology Conference 2017





# Which ecosystem (dis)services can we measure?

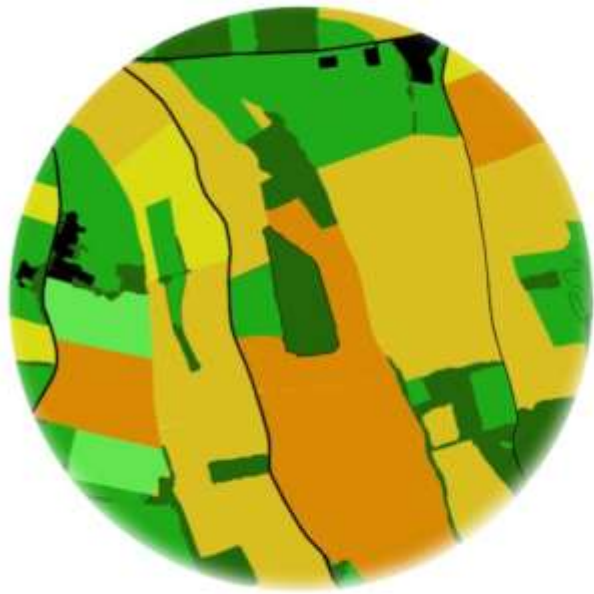
> 19 measure of services using standard protocols





# Spatial data: land cover not always the best descriptor

- New data: high spatial, spectral and temporal resolution
- New methods for highly multidimensional data



Land-cover



NDVI



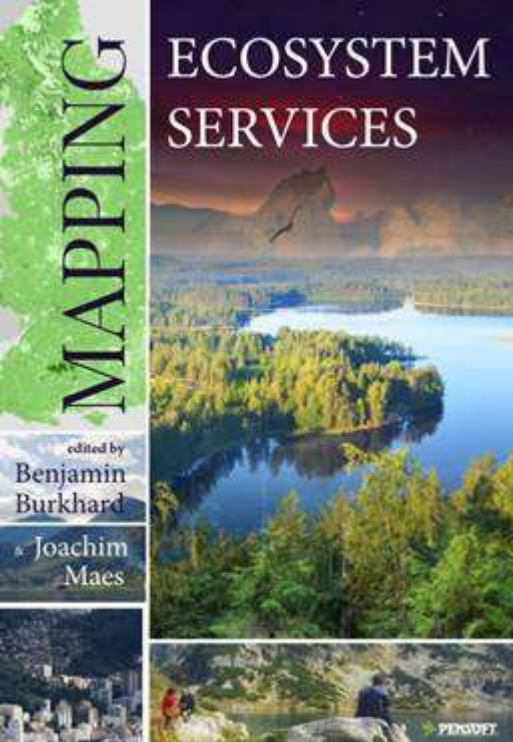
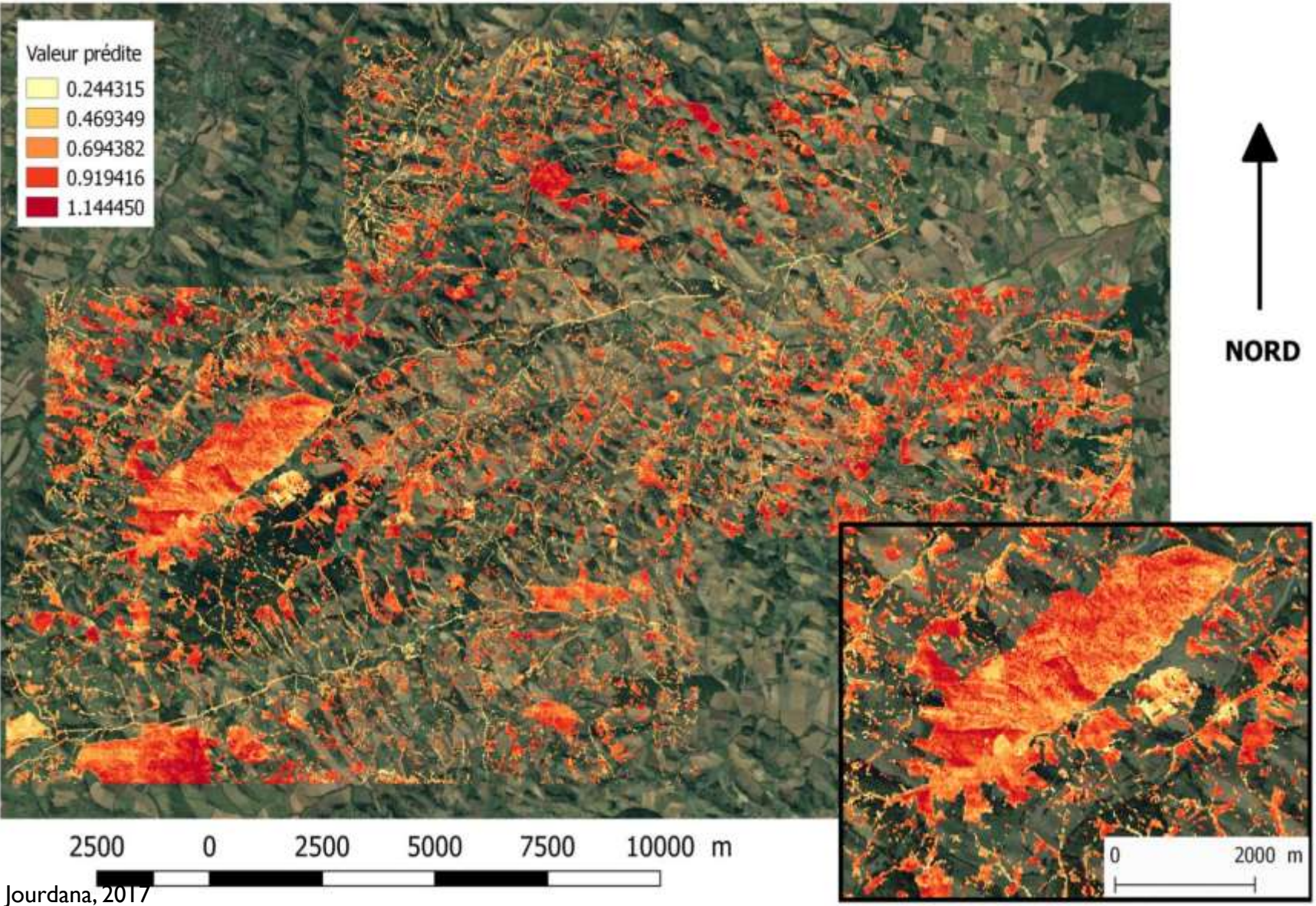
NDWI



VARIre



# Map of potential impact of roe deer browsing on forest vegetation





Conclusion: small but important,  
consider small forests  
for ecosystem services with adequate methods !

