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Landscape Agroecology and ecosystem services

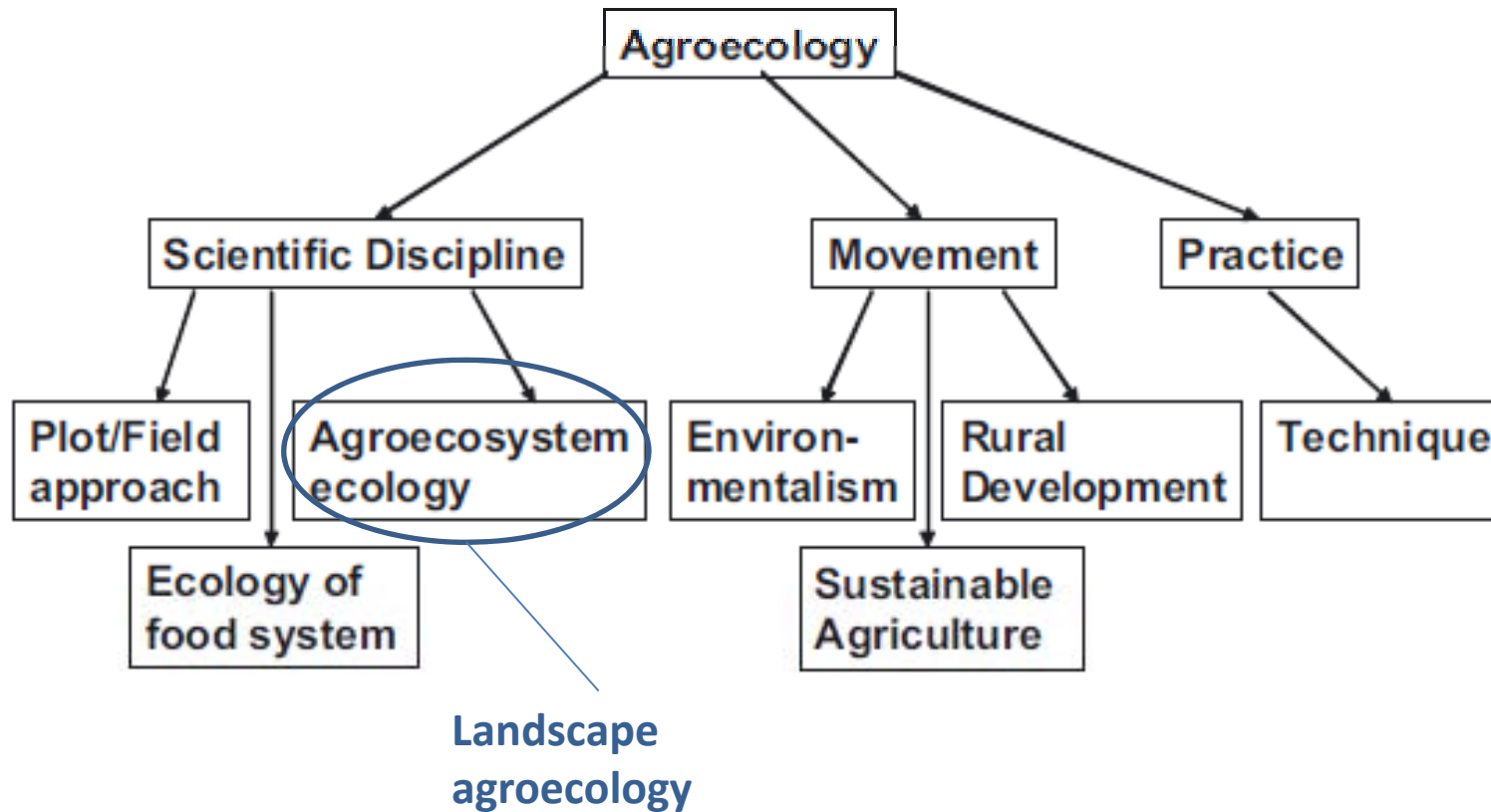
Deconchat M.; Thenail C. Baudry J.;
Aviron S.; Magda D.



Seminar with Dr. Miguel Altieri, Professor of Agroecology at UC Berkeley organized by the Agroecology group of the SAD division. February 1st 10h00 - 17h00 ENGREF, 19 avenue du Maine PARIS XVIème



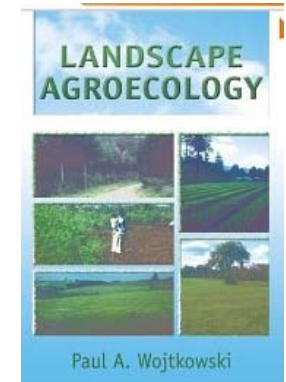
Landscape agroecology



From Agroecology as a science, a movement and a practice. A review
A. Wezel, S. Bellon, T. Dore, C. Francis, D. Vallod, C. David

« Landscape agroecology: ecology of a productive countryside »

- **Interaction** between human-derived, -managed, and/or –influenced ecosystems
- **Interaction** between those that yield useful output and neighboring natural and nonproducing ecosystems



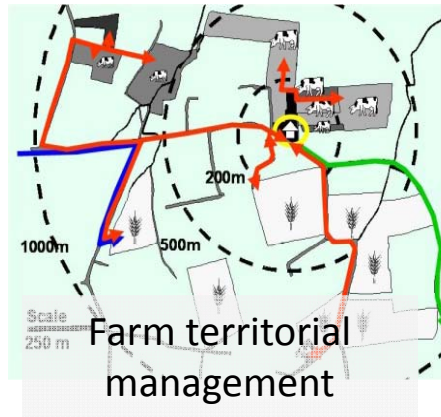
2004

See also Dalgaard 2009

Links with landscape ecology

- 1) the understanding of how the functioning of farming systems within a landscape drive spatiotemporal landscape patterns, hence part of ecological processes **AND**
- 2) how the design of farming systems at individual farms and sets of farms can foster the management of ecological processes, hence of natural resources.
- Landscape: spatial organization produced by a society to manage natural resources

Farming systems :
Decisions, practices,
transformations



Contribution of farming practices to landscape organization, impact on biodiversity...

Landscape as a resource
(stock and changes)



Delivered service: biological corridor, biodiversity conservation...



Biodiversity as a resource
(stock and changes)

Delivered service: patrimonial service
Local communities

Synergies, antagonisms ?

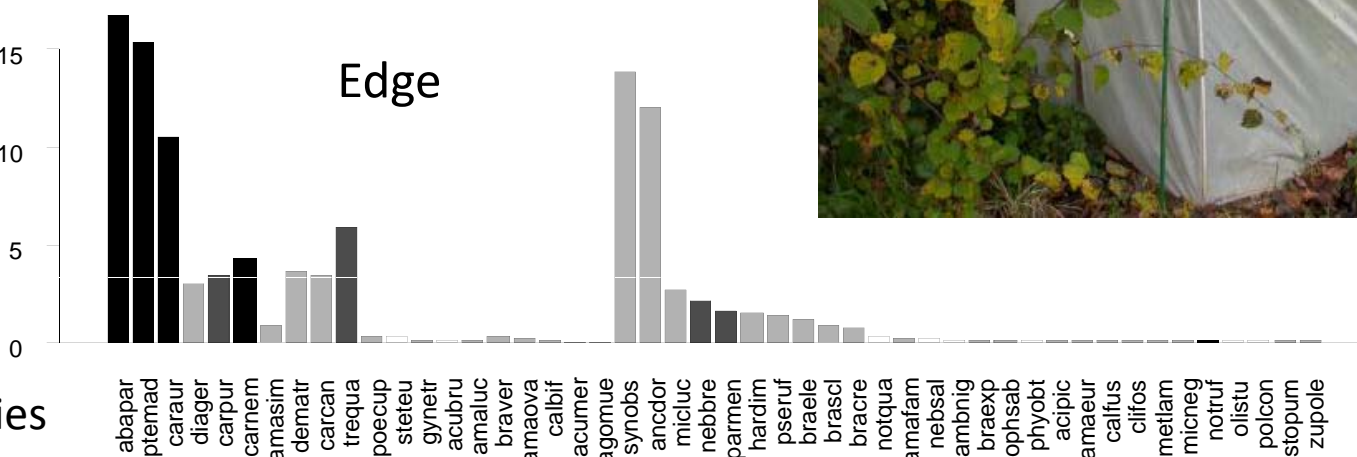
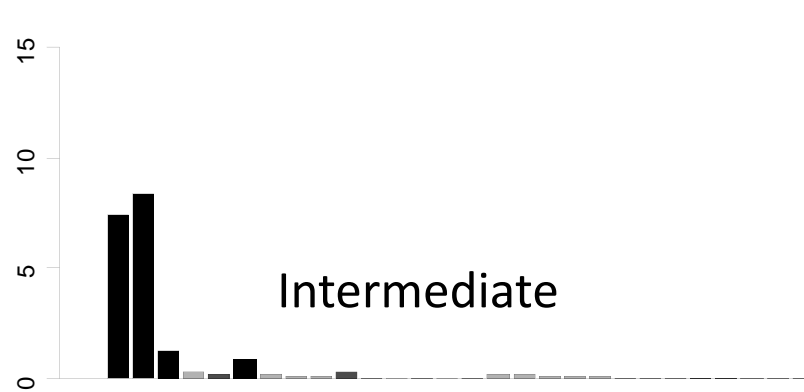
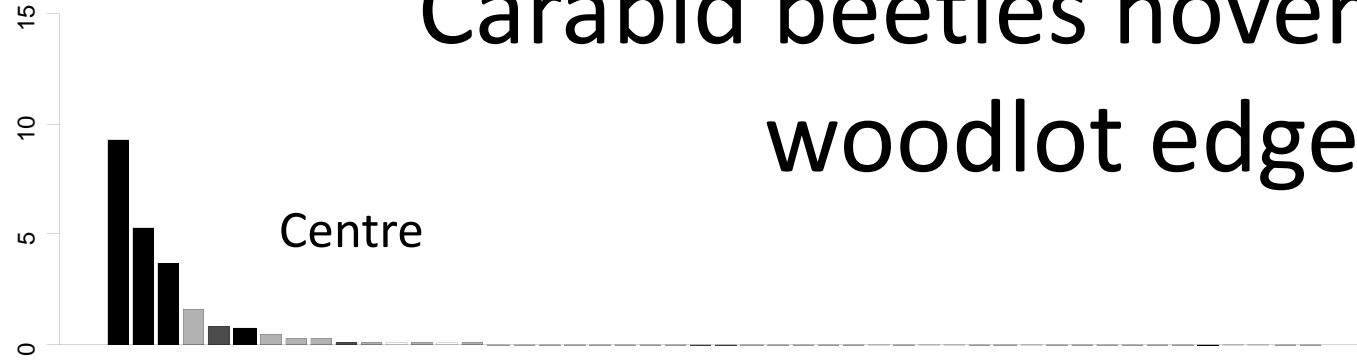
Hot issues

- Plant & animal movements between habitats. Where do they come from?
- Ecological vs management levels of organization: which is the best level for agroecology?
- Multiple services/multiple managers: how to get a compromise for landscape agroecological engineering?

Carabid beetles hoverwinter in woodlot edges

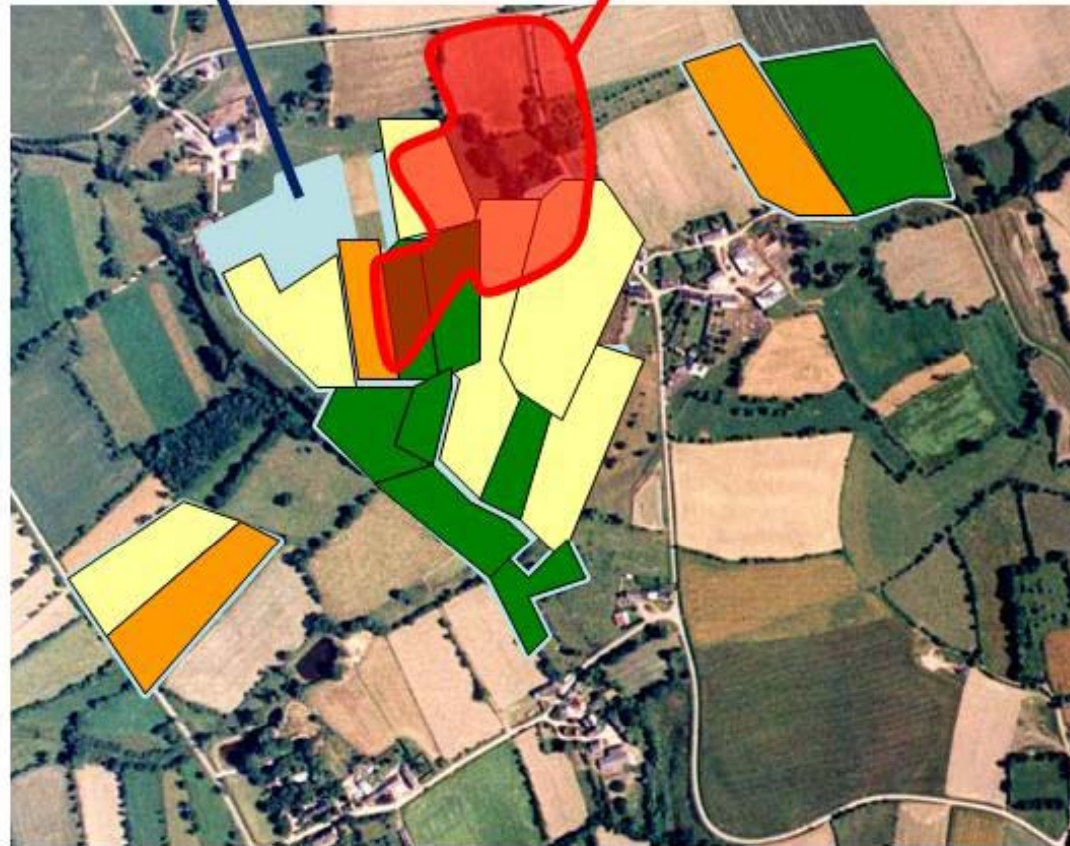
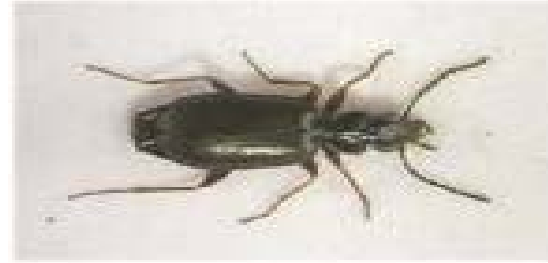


Mean Density (nb carabids/m²)



Species

(Roume *et al.*, 2011)



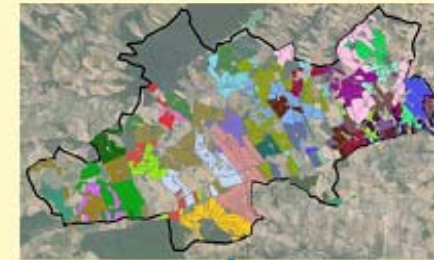
See also
=>

Pelosi, C., Goulard, M. and Balent, G. 2010. The spatial scale mismatch between ecological processes and agricultural management: Do difficulties come from underlying theoretical frameworks? *Agriculture Ecosystems & Environment* **139(4)**: 455-462

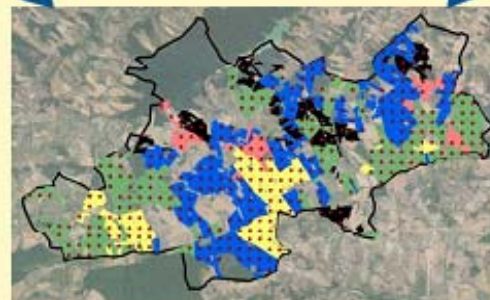
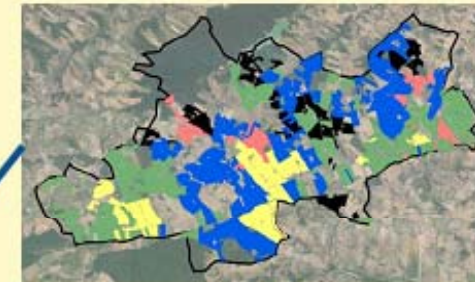
Birds and farming systems

Agronomical data
34 interviewed farms

Ecological data
A grid of point counts to record birds



A typology of farming systems
in 5 modalities



Few links between Farming systems and bird populations

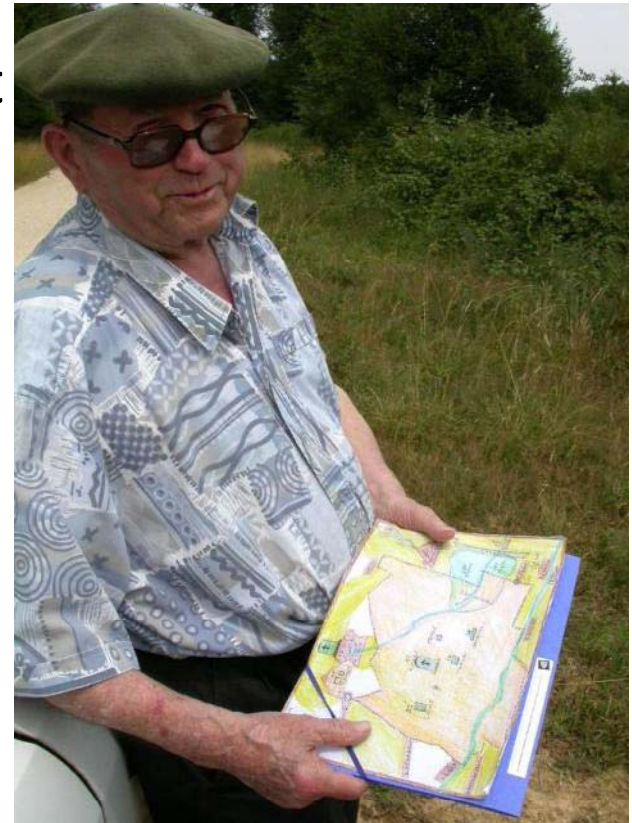
Bonthoux S. et al.

Landscapes: levels and scales

- Modifications in farms have consequences at landscape level:
 - can be difficult to deduce consequences at landscape level from modifications at the farm level
- Availability of spatial data needs careful methods
- Uncertainty of (spatial) ecological models

Landscape agroecological engineering

- How to use and modify landscape structures to improve ecosystem services?
- Policy & regulation of land management
- Must consider the social & technical limits and opportunities
 - Local cultural rules
- Involve people (farmers, foresters, land managers...) :
 - As producers of patterns that influence biodiversity at different scales
 - As managers who adapt their practices according to landscape structure



Landscapes change

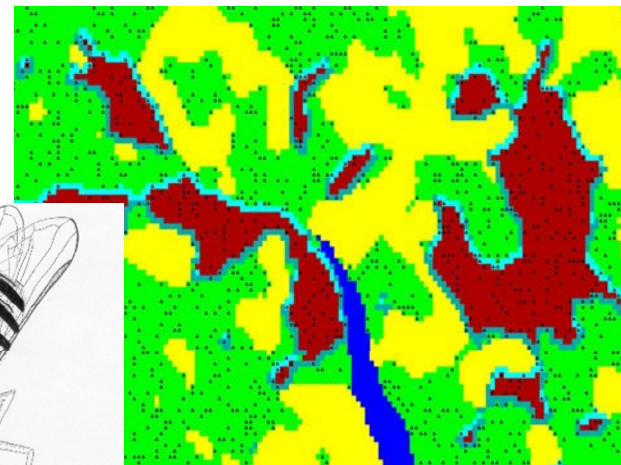
- Slowly for their structure and global pattern
- Rapidly for their land covers (rotation of crops)
- They have (small) components that play key roles
- How to identify them?



Models : tools to study landscapes as complex changing ecological systems

- Realistic models (ex: Multi agent models)
- Spatially explicit/ availability of spatial data
- --> In silico landscape

- Companion modeling (Commod)
- RECORD
- Modelisad
- Payote



HoverWinter model
(Arrignon *et al.*, 2007)

Long term and integrated socio-ecological studies (LTER)

- Detailed analysis of processes
- History
- Scenario
- Participative research
- Interdisciplinarity
- Comparative studies:
 - Networks: LTER-Europe, ILTER, ZA, ...

