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A socio-ecological framework for the analysis of forest edges dynamics and their consequences on ecosystems services in temperate landscapes.

Marc Deconchat, Audrey Alignier, Annie Ouin, Emilie Andrieu, Antoine Brin, Luc Barbaro, Hervé Jactel

IALE2015, Portland, OR
Forest edges are very common in many temperate landscapes.

« Edge effect »: what does it mean?

Forester/farmer interactions?
2 adjacent vegetation structures
...different patterns

- Forest / non-forest discontinuity
- Different types of forests
- Many possible non-forest habitats
  - Water bodies
  - Human infrastructures
  - Pastures
  - Crops
Dynamics

- Natural dynamic of forest is expansion
- Old edges can disappear into the forest behind new edge
- Or, new edge can appear by clearing part of the forest
- Edges have an age
- Private ownership of land induces stability of edges

Andrieu et al., 2011
2 rates of disturbance

- Forest edges has to be reset regularly
- Disturbance of vegetation limits tree expansion
- Higher rate of disturbance in non-forest habitat than in forest
2 interacting managers

- Forester / farmer with their own objectives
- Edges are a consequence of their practices
- Farming is the main origin of forest edges in temperate landscapes

Sourdril et al, 2012; Du Bus et al., 2006; Andrieu et al., 2011
An object of a management

- Edges are consequence of management
- But they are also managed themselves
  - To control tree dynamics
  - To exploit their resources
- Generally managed by/for farmers
- Importance of secondary features associated to forest edges: ditches, paths, stone walls, fences

Du Bus et al., 2006; Ouin et al., 2015
Physical and biological gradients

- Combination of several physical, chemical and biological gradients
- Edge = zone of gradient

- Measures of edge effect

- What is a “strong edge effect”?  
  - Short depth + high magnitude  
  or  
  - Long depth + low magnitude

Alignier & Deconchat, 2011, 2013
Interfaces between habitats

- Edges influence fluxes of matter, energy, information
- Edges as filters
- Consequences for the adjacent habitats

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Roume et al., 2011a
Forest edges: key role in ecosystem services

- Some fluxes support ecosystem services (or dys-services)
- Modifications of edges may enhance or degrade ecosystem services

Arrignon et al., 2007; Roume et al, 2011b
Forest edges as a spatially-defined socio-ecological system

Ecological systems

Social systems

- Forest
- Non-forest

- Practices
- Services

- Other social actors

Forester
Farmer
Discussions

FOREST EDGES ARE VERY DIVERSE

- Many factors influence edge characteristics
- What are the most important?
- Which one can we modify?

EDGE EFFECT AT PATCH LEVEL

- Edge effects at fragment scale are not the same as local edge effect