



Implementation of SEBI 2010 Indicator Fragmentation and Connectivity of Ecosystems: Preliminary results over one EBONE regional site

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Definitions and concepts

Landscape level ecosystem spatial pattern: spatial arrangement or configuration of focal ecosystem across the landscape.

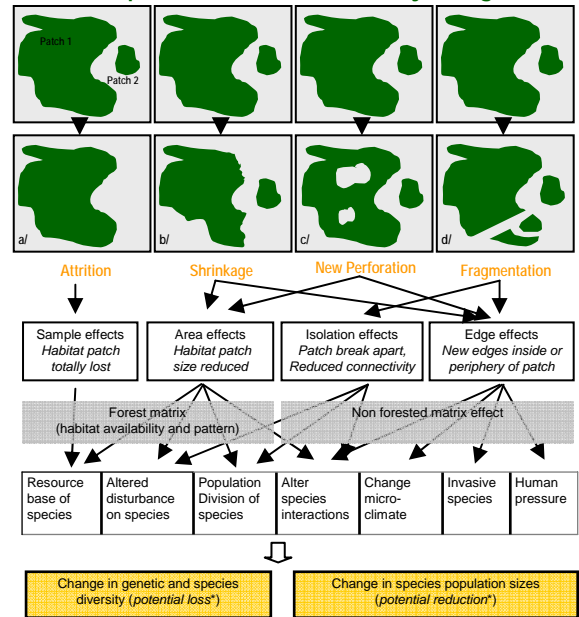
Fragmentation: breaking up of large habitat into smaller parcels. In the broader sense, fragmentation refers to ecosystem loss and isolation.

Spatial processes in ecosystem loss (Forman 95, Fahrig 2003...):

- New perforation: holes in ecosystem patch (e.g. logging in forest).
- Shrinkage: decrease in the size of patches
- Attrition: total removal of patches
- Fragmentation: breaking up of patches

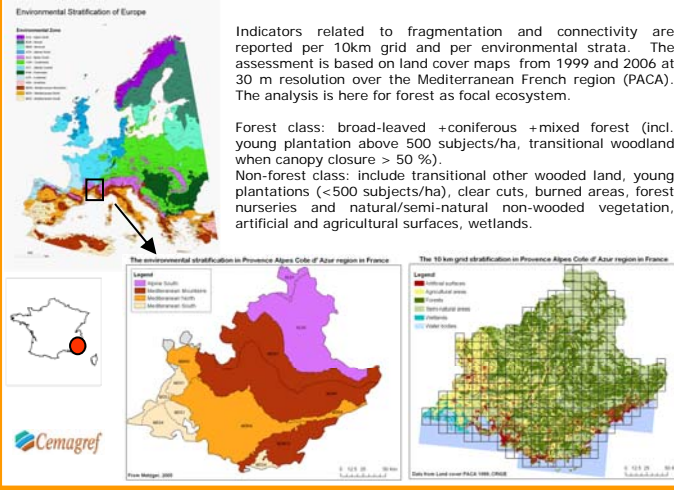
Connectivity: 'property of landscape structure (state) is a degree to which the landscape facilitates or impedes movement among resource patches'. Connectivity is crucial for the viability and survival of species, for the control of invasive species and diseases.

Spatial pattern (fragmentation) processes with potential link to biodiversity change

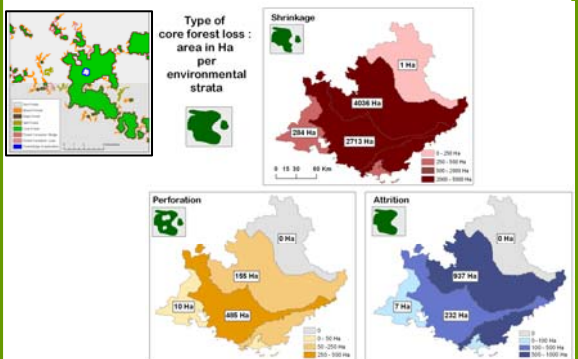


Adapted from Zuidema, 1996 ; Lindenmeyer & Franklin, 2003 ; Kupfer, 2004

EBONE regional Mediterranean case study Two reporting frame (Env. Strata and 10 km grid)



Indicator 1 : Spatial processes in core forest loss
- Attrition of core patch - Shrinkage of core patch - New perforation in patch - Fragmentation of core patch (Type of forest conversion to agriculture, artificial or non forested semi-natural land not shown here).
Core forest : area of forest patch minus an edge of a certain width arbitrarily defined (here, protection belt 30m corresponding to generic forest edge width)
Method: GIS change analysis with as input forest spatial pattern maps obtained with the **JRC Morphological Spatial Pattern Analysis (MSPA) Guides freeware** (Soille and Vogt, 2009 : spatial pattern classes automatically and precisely generated at pixel level).



Indicator 2: Forest connectivity change in 1999-2006

Method: GIS change analysis from the Probability of forest Connectivity (PC) index calculated with the software Confor Sensinode 2.2 (Saura and Torne, 2009) based on topology (inter patches distance) and patch attributes (area) for forest dwelling species with low or high mobility (average dispersal distance 1km, 10km). The non-forested landscape is considered as homogeneous.

$$PC = \sum_{i=1}^n \sum_{j=1}^n a_i a_j p_{ij}^*$$

$$p_{ij}^* = \exp -kd_{ij}$$

a_i, a_j = size of patch i, j

$p_{ij} = 0.5$ at 1km (or 10km) avg dispersal distance

$P_{1km}^* = 0.23$
 $(A=9, B=8) = 0.5 \times 0.5$

