

Habitat level implementation of the SEBI2010 Indicator Fragmentation and Connectivity of Ecosystems

Christine Estreguil, Giovanni Caudullo

European Commission - DG Joint Research Centre, Institute for Environment and Sustainability
<http://forest.jrc.ec.europa.eu/forest-pattern> , christine.estreguil@jrc.ec.europa.eu



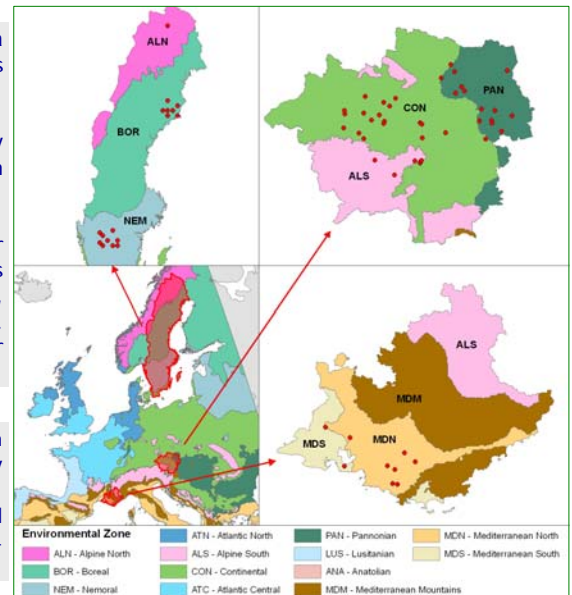
The EBONE project aims at European-wide habitat mapping to deliver area estimates and characterize habitat pattern, fragmentation and connectivity. Methodologies should be standardized and easily repeatable across scales. Reporting is expected by using the European Environmental Stratification. Automatic mapping and assessment of spatial pattern and connectivity are demonstrated for forest phanerophytes from the EBONE 1 km² in-situ samples, which offer harmonized General Habitat Categories maps.

Landscape level spatial pattern: spatial arrangement of a focal habitat across the landscape. Interior and edge habitats with their landscape context are important to discriminate.

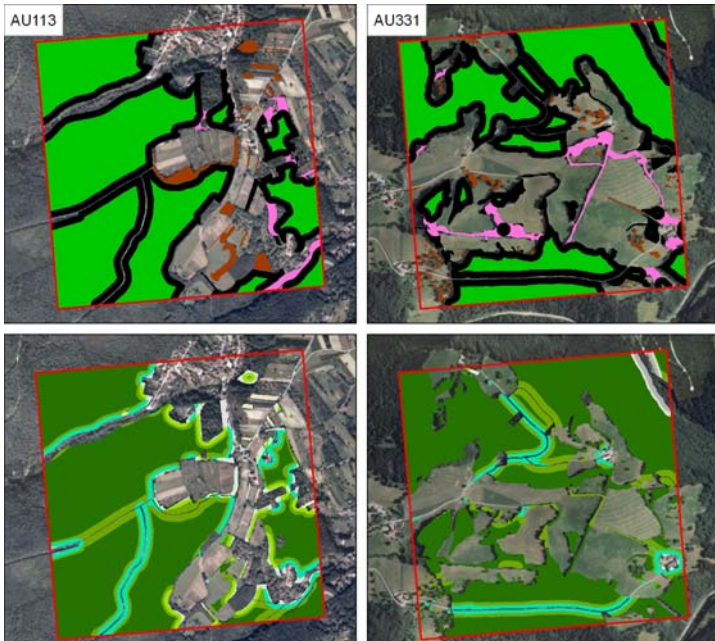
Fragmentation refers to loss of habitat area and connectivity (increased isolation). Shift of land uses at the edges of certain habitat types also relate to fragmentation.

Connectivity is the "degree to which the landscape facilitates or impedes species movement among resource patches". It depends on habitat availability (area) and topology (inter-patch distance), species' dispersal abilities and landscape matrix permeability. Connectivity is crucial for the viability and survival of species, for the control of invasive species and diseases.

General Habitat Categories maps (400 m² Minimum Mapping Unit): 'Urban', 'Cultivated', natural 'Sparsely Vegetated' (vegetation cover below 30%), 'Herbaceous', 'Trees/Shrubs', further described according to 16 life forms based on plant characteristics (height and leaf retention division). The 4 Trees/phanerophytes classes are forest (>5 m), tall, mid, low.



http://www.ebone.wur.nl



Tools and products

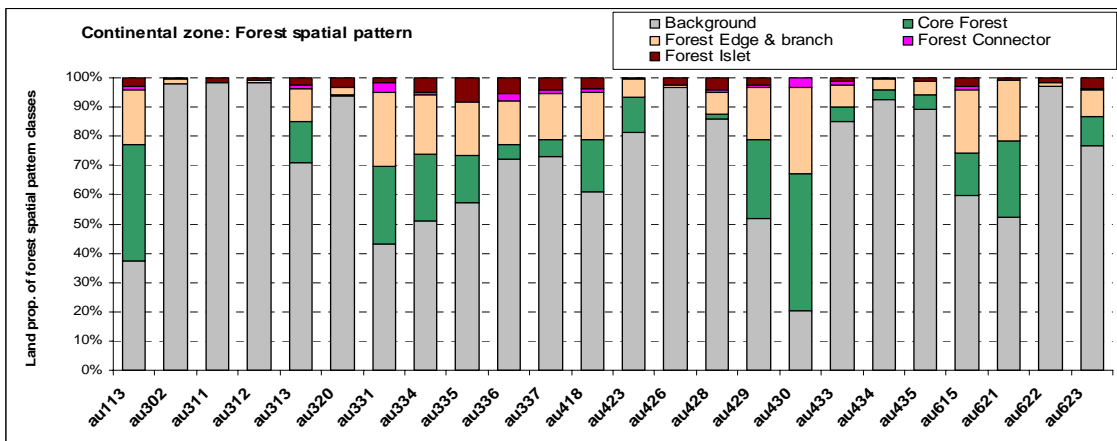
- Forest phanerophytes cover detailed into 4 pattern classes using the mathematical morphology spatial pattern analysis (MSPA) GUIDOS freeware with a 25 m edge width (top 2 maps).
- Forest context mapped using a landscape mosaic index: natural (N), cultivated (A) or urban (U) habitat dominant contexts (25 m radius disk around each forest pixel) (bottom 2 maps)
- Connectivity assessed with two indices (freeware <http://www.conefor.org>) for forest species with specific dispersal abilities.

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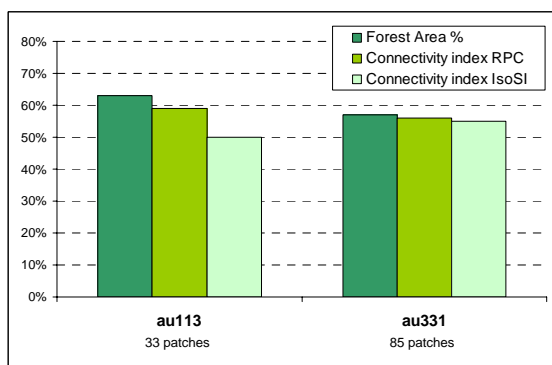
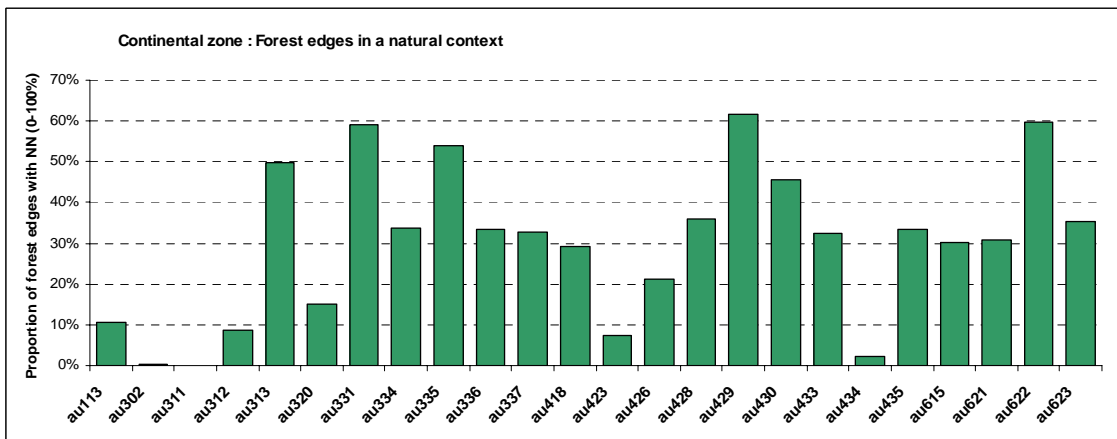
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Spatial pattern of forest phanerophytes: differences among the in-situ samples in an environmental zone are shown on the proportion of forest habitats, core habitat versus edge habitat, proportion of small isolated elements (islets), proportion of connecting elements (connectors between core patches)



Natural dominance in the surroundings of forest edges: forest edge communities are possibly influenced by their adjacent non forested habitats, which "similarity" to forest tells about the permeability of interfaces. Forests fragmented by natural habitats (like herbaceous), therefore with a high proportion of forest edges in a natural context (NN) are intuitively less vulnerable to further fragmentation than forests fragmented by anthropogenic sources (cultivated and urban habitats).



Forest connectivity is calculated for species dispersing in average 500m distance and accounts for the cost of movement through the different habitats between the forest patches.

This chart shows how the two connectivity indices assess different forest spatial patterns and permeability contexts (au113 with fewer and large nodes and a less permeable landscape than the sample au331). IsoSI is more sensitive to the inter-patch landscape permeability and barrier effects while RPC reacts more to forest habitat area and pattern.