Connectivity patterns and processes along a gradient of European landscapes with woody vegetation and spatial heterogeneity

WOODNET

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Funded projects final conference, 12-13 November 2019, Brussels

BiodivERsA COFUND Call (2015-2016)

« Understanding and managing biodiversity dynamics to improve ecosystem functioning and delivery of ecosystem services in a global change context: the cases of soils and sediments, and land- river and sea-scapes »

Please detail the composition of your consortium:

*Partner 1 (coordinator): OSUR (*Observatoire des Sciences de l'Univers de Rennes)*, CNRS, France, Funded by Agence Nationale de la Recherché (landscape ecology, remote sensing, biodiversity conservation, biocontrol, public law and policies)*

*Partner 2 UPM (*Universidad Politécnica de Madrid*), Spain, funded by the Spanish Government, Ministerio de Ciencia, Innovación y Universidades (ecology, connectivity modelling)*

*Partner 3 UCL (*Université Catholique de Louvain), Belgium, funded by Service public de programmation Politique scientifique (remote sensing, biocontrol, ecology, public law and policies)*

*Partner 4 UPJV (*Université de Picardie Jules Verne), France *Funded by Agence Nationale de la Recherché* (landscape genetics, ecology, biocontrol)*

PROJECT DESCRIPTION

A policy question: the impact of Green Infrastructure on biodiversity conservation and biocontrol
How to manage uncertainties?

Need more science based guidelines

Need for a better landscape and landscape elements characterizations
Role of landscape legacies
Biodiversity data collection
Landscape scale models of interactions among elements (connectivities)

To manage uncertainties on biodiversity drivers (wooded features)
In a **diversity of landscapes with wooded features**

Brittany

Salamanca

Picardie
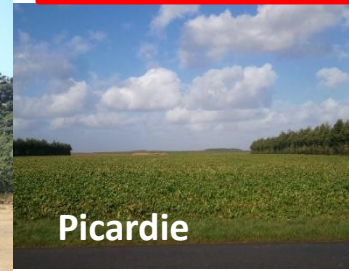
1) network of linear features *v.s.* continuous forest and dehesa

Permits to test a variety of remote sensing images

Sentinel 1 (radar) & 2 (optical)
Lidar

Making land cover and crop phenology maps (1 paper published), algorithms validated for tropical forest)
Up to now, difficult to use for linear features

Alos (radar)
SPOT (optical)
Lidar

Used to produce maps of linear features (hedgerows). Yield information on their structure (woody vegetation density)
Similar power to explaining hedgerow dwelling species distribution (SPOT is the cheapest, easier to use)

………

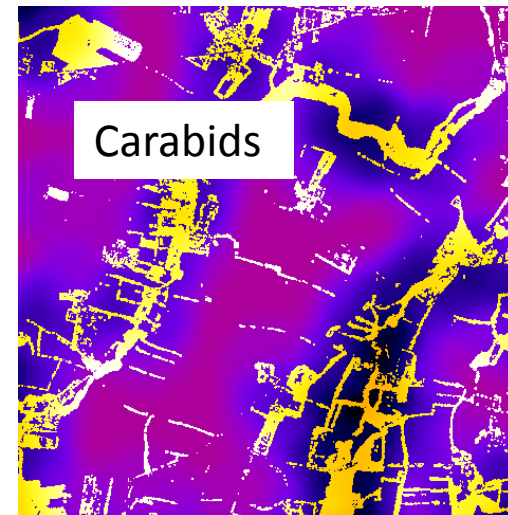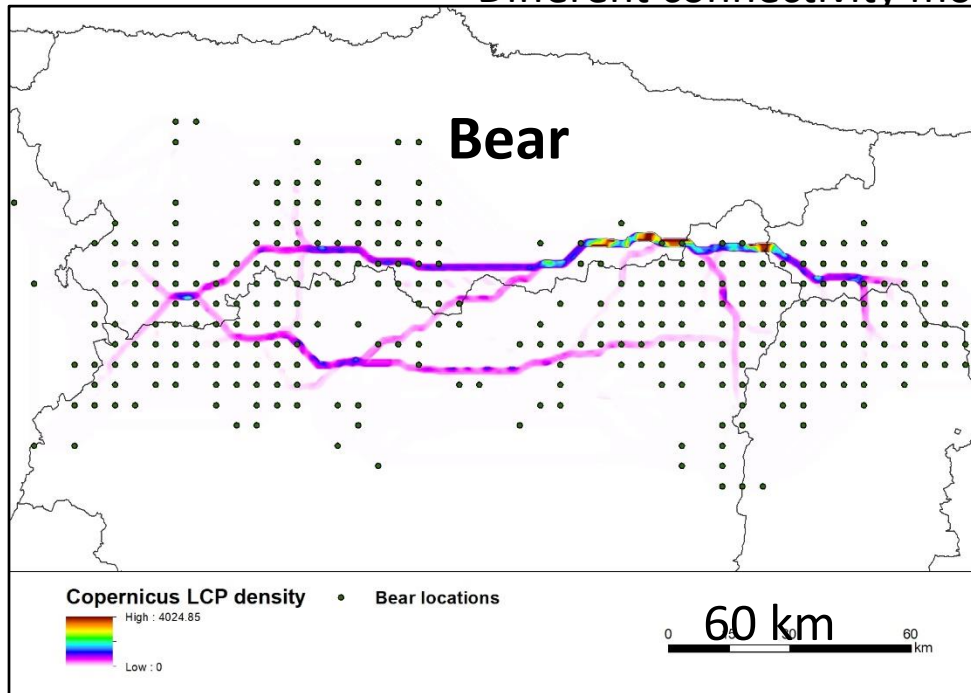# Permits to study a variety of species in terms of dispersal ability

The making of permeability maps

Different connectivity models According to functional groups

Bear

Copernicus LCP density • Bear locations
High : 4024.85
Low : 0

60 km

0   60
km

Carabids

2 km

unsuitable
hedgerow

Suitable
hedgerow

Landscape "quality" for species moving fast and far   **"corridor = habitat continuity**

hedgerow networks three types of interacting connectivities, at plot, field, landscape scales

connections with adjacent land uses

Structural connectivity of the network to enhance species movement, and gene flow along hedgerows

High structural connectivity favors forest species movement but impedes crop species movement

Connectivity among hedgerows that controls physical fluxes (wind, solar radiation...)

Older hedgerows harbor more forest species

Fine grain landscape provides a favorable environment (shade, humidity) to "forest species" (carabids, plants)

3) Interactions between crop phenology, biocontrol and woody network patterns

Region

Climate/ landscape history, heterogeneity

Landscape Species pool
Gradient of species richness and abundance from Brittany to Wallonia

Effect on

Potential for yield?

Landscape

Wooded features connectivity

Cropping systems

Carabid species involved in biocontrol are "open field species".. Hedgerows may impede movement
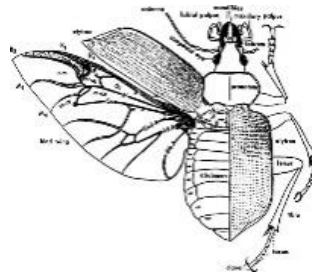
Field

Meteorology
Crop phenology

Disservices from hedgerows (pests)

More predators near grassy strips

4) Deciphering and managing uncertainties in the design and implementation of green infrastructures

WP1-4 decrease uncertainties on the driving factors of biodiversity related to GI

- By using maps providing information on the internal structure of the woody vegetation
- Developing novel landscape metrics to measure interactions among landscape elements
- Testing a range of connectivity models
- Reduction of uncertainties on services and disservices produce by GI
- **The key role of interdisciplinarity remote sensing/landscape ecology/ modeling**

Abax parallelipipedus

Pterostichus cupreus

6) Input to the design of policies

1- **Clarify the notion of green infrastructure** the challenges involved in the ambiguity in the goals of GI (protection of biodiversity versus preservation of ecosystem services).

2- Ensure the development of green infrastructure in all EU policies. How to implement it the CAP

3-Manage scientific uncertainties - Adaptive management as one response to uncertainty.

Nature conservation/ policy making

Spain: Participation in workshops with key stakeholders for the conservation of Brown Bear and Iberian Lynx. Collaboration with the Government of Spain to develop a common methodology of assessment of ecological connectivity priorities to support the national green infrastructure plan.

Advisor of the ministry of environment on ecological connectivity

Produce models of landscape connectivity with public access data to support decision making for endangered species

Farming

For Belgium: Two meetings with a follow -up committee compose of members for NGO for nature conservations (Natagora) and agricultural services (Natagriwal) and representative of regional administration of agriculture (SPW) and communication of the main results. »

Environmental assessment

France: Cooperation with the National Institute of Geography for the program "changes in b___ landscapes"

Landscape planning

France: input to the implementation of green infrastructures (Trame Verte et Bleue) collaboration with both administrative entities and private sector. Two projects with EU funds from European Regional Development Funds (ERDF). With a territorial community to plan green infrastructure. The interactions permit to develop methods that can be transferred to environmental consultants. A project with an NGO promoting environmental management.

Education

On line courses ENVAM digital campus (www.envam.org):
(1) MOOC "Dynamique des paysages": input to the coming update;
(2) Remote sensing modules : Application cases
(3) Lanscape ecology module: Application cases

Courses for Master students in remote sensing: Applications using remote sensing data provided by Kalideos (French Spatial Agency)

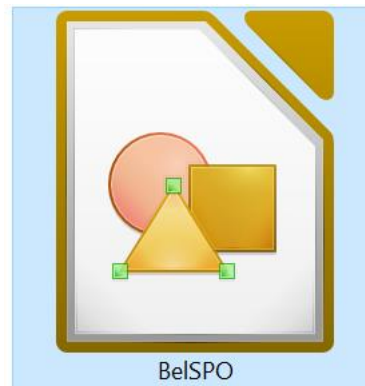Workshop for farmers (Chamber of Agriculture)
Teaching in technical cursus

Press release (at the end of the project)

ACKNOWLEDGEMENTS

Please acknowledge here the different funders of your project (names of the different funding organisations and logos)

Agence Nationale de la Recherche

Service public de programmation Politique scientifique

Ministerio de Ciencia, Innovación y Universidades