Forest Conservation: Preserving Maturity and Restoring Connectivity

A Case-Study at the Montaña de León (Spain)

Interreg Sudoe CERES

EUROPARC ESPAÑA

Fundación Interuniversitaria Fernando González Bernáldez para los Espacios Naturales

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The general objective of the CERES Project is to improve the environmental quality and connectivity across several regions at the Southwest of Europe. In order to do that, we developed a common methodology to define ecological connectivity of forest and riparian ecosystems at the SUDOE space that was implemented in several pilot areas

This work summarizes the results of our analysis on the connectivity across mature forest stands carried out in León province (Spain).

Credits

García-Martí, X., Barnard, B., Fernández, P., Aguado, O. 2021

Characterization of environmental quality and connectivity of forest ecosystems. Implementation in a pilot area in Castile and León

Supervision and coordination

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https://www.ceres-sudoe.eu

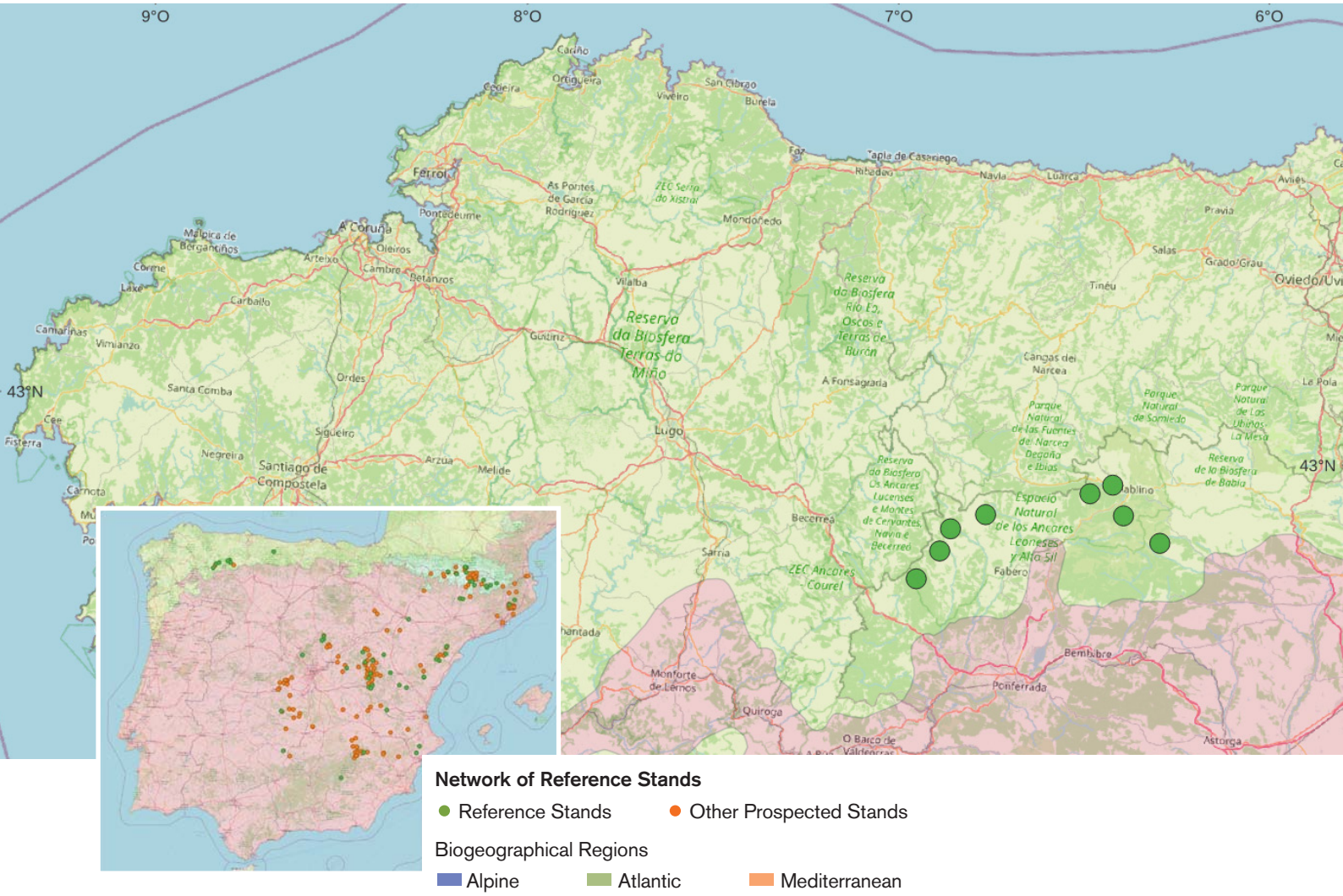
Old-Growth Forests. Quality and Connectivity

In Spain and in a large part of Europe, current forests are the result of centuries-old use for logging and cattle raising. Therefore, the best-preserved forests, with forest maturity characteristics and a highly specialized species diversity, are scarce: just about 2% of the total forest surface in the European Union.

These forests stands are often isolated and far from each other; they are surrounded by a transformed and fragmented landscape that hamper mobility of species and eventually, the functionality of the ecosystem.

In this study, the forest maturity of eight forest stands in the El Bierzo, Omaña and Laciana regions (León province) was described. The study area is a heterogeneous landscape of forests, scrubs, grasslands and small urban areas. Endangered species such as the bear and the Cantabrian capercaillie still survive in these forests.

The stands have been included into the Spanish Reference Stands Network, where stands with the most natural characteristics in each habitat are depicted (www.redbosques.eu).



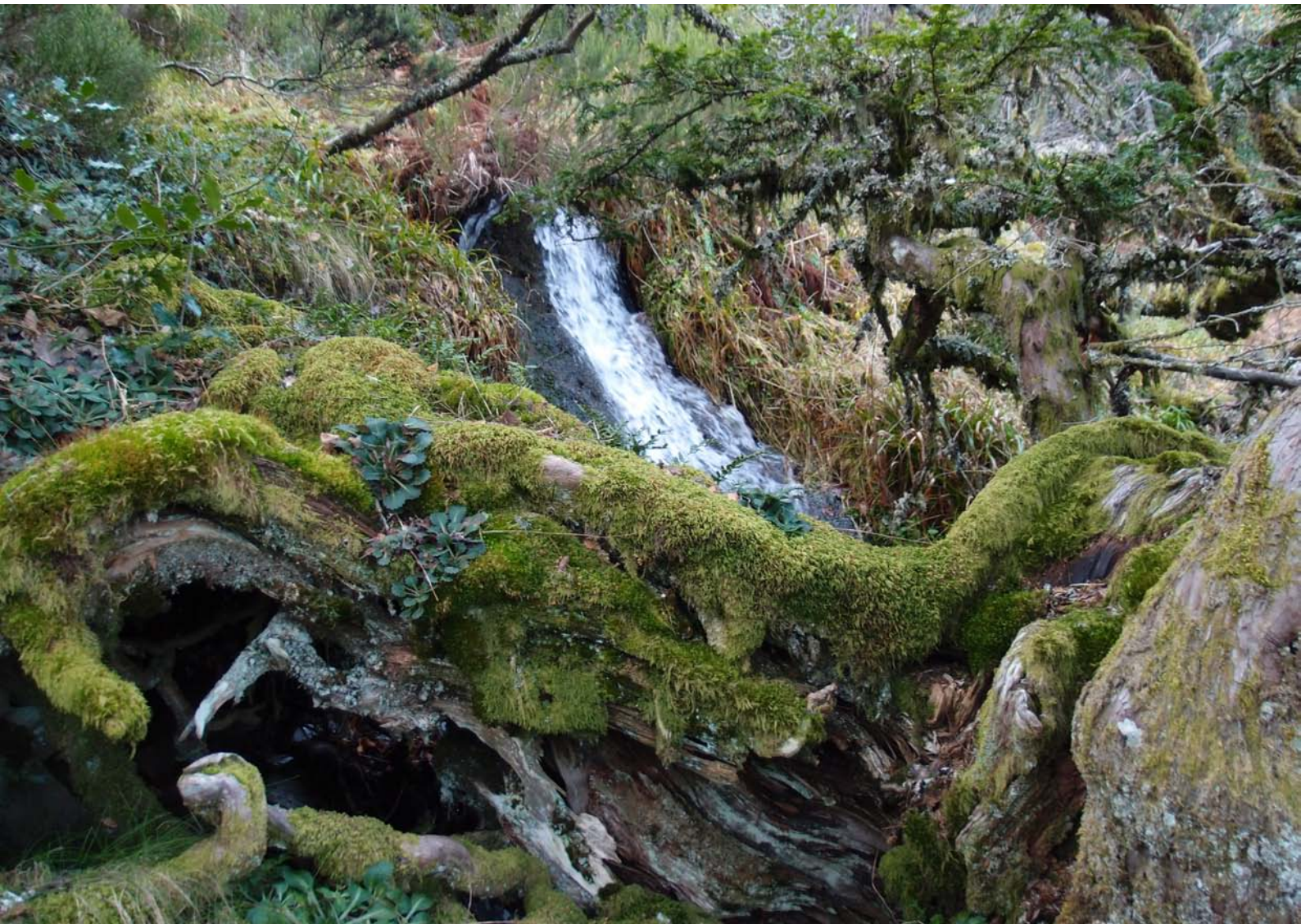
Forests at the Montaña de León

The Last Examples of the Atlantic Old-Growth Forests

The Northwest of the León province, has recently experienced a rural exodus that has led to the neglect of forestry and livestock farming that had been taken place for centuries. The forest landscape is deeply transformed by human activity, nevertheless, good samples of mixed Atlantic forests can still be found.

At the river heads and some shady and valley bottom areas we can find the last remnants of forest free of ancestral use and that have not suffered recurrent fires. We were able to identify the characteristics typical of forest maturity in these forests:

Big and very old trees, usually oaks or yews, maples or birch trees, of almost one metre in diameter, in densities of up to 50 trees per hectare. Due to their old age, they have many holes, wounds and cracks of various types that have become micro-habitats used by hundreds of species of **fungus and lichens**, and also by many birds, bats and insects.



There are many dead trees that still stand, together with big fallen trunks: they amount to around 20% of the total volume. These **dead trees** harbour a great diversity of species highly specialized in this type of habitat.

Trees of different ages, very young and huge hundred-year-old specimens, live together in these stands. We also find trees belonging to **different species**: sessile oaks, yews, holly trees, birch trees, whitebeams and hazelnuts that form a complete and varied ecosystem.

The fall of big trees when they die leads to **openings in the tree canopy**, allowing for more light to get in and thus helping the forest to regenerate.

Barriers and Corridors

Assessing Connectivity for Species Linked with Forest Maturity

In order to guarantee that viable populations of species linked with forest maturity, it is essential that exchange of specimens across the various old-growth stands takes place. Connectivity models allow to assess if the territory facilitates dispersion to these species. The following steps were followed to develop these models:

1. Choosing a Target Species

In order to assess connectivity among mature stands, we chose the saproxylic beetles, since they are a group of species that are highly dependent on old-growth stands and many of them are threatened. We chose *Gnorimus nobilis*, a species that in order to complete its cycle needs fallen and standing dead trees and also the presence of big dead branches.

2. Allocating Resistance Values to Dispersion

Considering current kknowledge about the *Gnorimus nobilis* habitat preferences and dispersion skills, we allocated a resistance to dispersion value to each of the types of vegetation present in the studied area.

For species such as *Gnorimus nobilis* to survive and function in the ecosystem, on top of preserving isolated mature forests in the territory, heterogenous landscapes which include grassland areas, watercourses and natural peatlands that have suffered little human intervention is also needed. Photo Óscar Aguado

3. Identifying Source Areas

We identified the areas that are considered to be source of dispersion of the specimens, in this case those mature forest stands that were previously described.

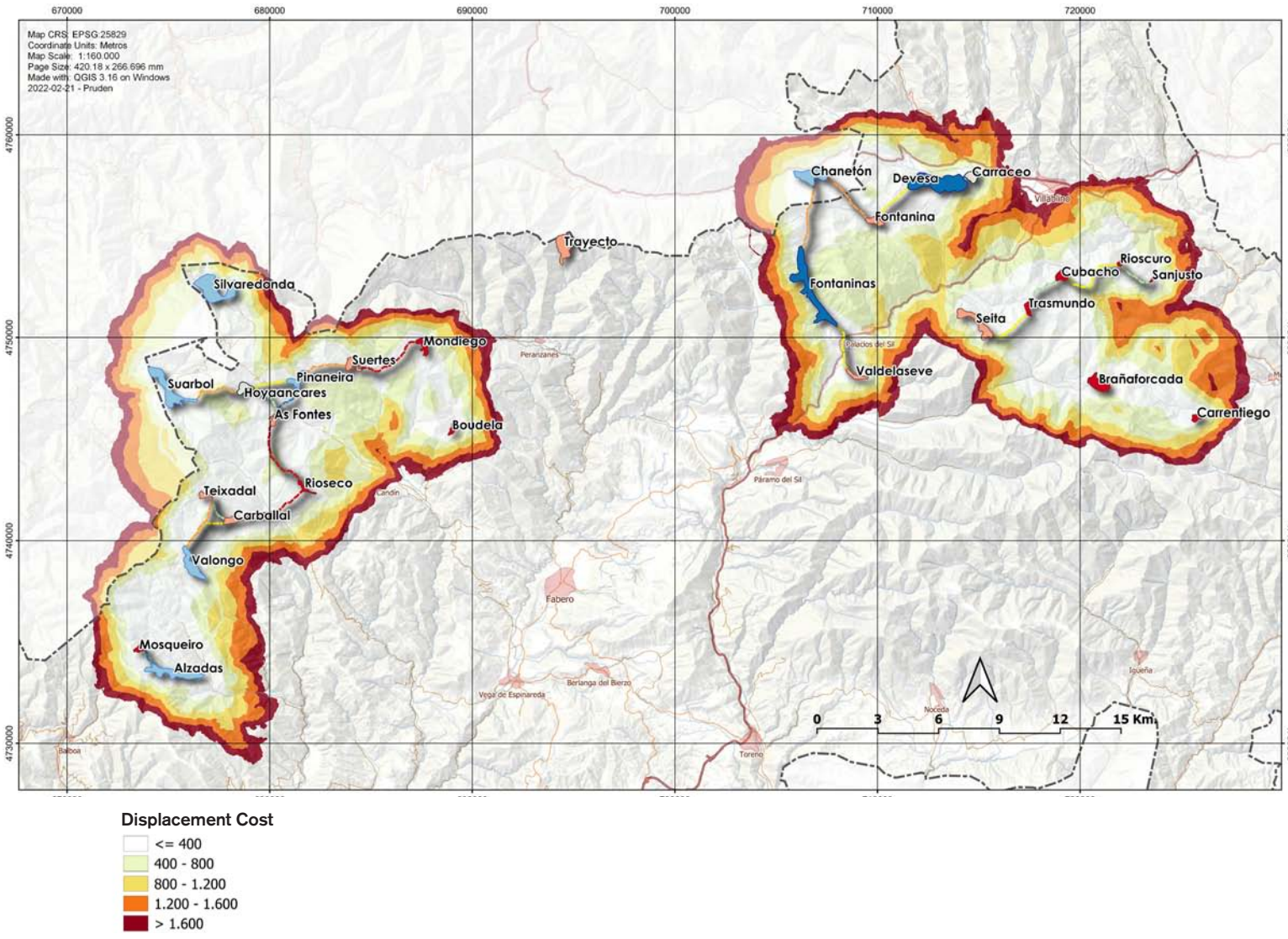
4. Estimate of Dispersion Costs

Starting from source areas and using a Geographic Information System, the cost of moving (aggregate resistance) from each source areas to each pixel in the territory is calculated, leading to the so-called aggregate cost maps.

5. Identifying Corridors and Barriers

The aggregate cost maps reveal the existence of preferent paths (minimum cost areas) and barriers to dispersion (maximum cost areas), allowing us to quantify the landscape resistance or permeability to the *Gnorimus nobilis* dispersion.

In the study area we can appreciate two sets of old-growth stands separated by a very low connectivity area which acts as a barrier to dispersion.



The Importance of Landscape

Islands of Diversity in a Highly Altered Territory

From an ecological perspective, the landscape that harbours a forest stand is just as important as the quality of the forest stand itself. The types of vegetation, how the land is used and how this use is distributed determine the landscape structure.

Landscape structure can be studied through the calculation of various indices that measure the size of vegetation patches, how fragmented they are, or the variety of vegetation types and how they intermingle in the territory.

The analysis of the landscape infrastructure in the study area shows a heterogenous and fragmented mosaic made by a combination of small and middle-sized forest stands intermingled with mid and high-altitude meadows, with a moderate presence of deciduous forests, but where fragments of forests with maturity traits stand for a tiny fraction of the total area.

High-quality landscape for *Gnomius nobilis* at Valdeprado Valley. Together with dense deciduous forests, the river banks, scrubs, pastures and hay meadows provide the habitat for this and other many species to feed, reproduce and move. Photo X. García

PROPOSALS FOR ACTION
To Preserve, Restore and Connect Mature Forests

Preserving

In general, for the few existing stands, a management based on non-intervention and natural evolution should be recommended.

Prospecting and characterizing of new forest stands with high levels of maturity is still needed.

Restoring

For those stands that will likely achieve a relevant level of maturity in the short or mid-term, actions that favour typical maturity structures, such us maintenance of special trees, promoting dead trees or generating small forest clearings, could be considered.

In the forest areas that surround the most mature stands, forestry treatments to promote greater naturalization could be considered.

Connecting

Key landscape elements with a potential role in the improvement of connectivity must be considered:

- Extensive young or managed forests, connecting scattered, more mature stands.
- Forest stands embedded in the agrarian landscape matrix, that could function as “stepping stones” between sectors with a high level of isolation.

In order to allow connectivity among the most mature stands, the restoration of some other key landscape elements, such as riparian forests and hedgerows in mid-mountain meadows need to be considered.

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