New online atlas shows how climate change will affect distribution patterns of forests

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Researchers from Universitat Autonoma de Barcelona and CREAF have developed the Suitability Atlas of Woody Plants of the Iberian Peninsula, a series of digital maps available online which for the first time reveal the present and future degree of adaptation to climate conditions of the main plant species found in the forests throughout the Iberian Peninsula (south-western Europe). Data shows the tendency of forests to move higher in altitude and migrate towards the north.

Today, territory and species conservation managers need to rely on data and empirical methods on which to base their protection policies. Within the context of Global Change, the maps offered can be useful to evaluate possible changes in the distribution of forests in the future, which could lead to an in depth study of mitigation and/or adaptation tools needed to face these changes.

Until now, a few maps had been drawn for specific woody plants or for partial areas of the peninsula. The Suitability Atlas of Woody Plants however offers a global view of the Iberian Peninsula. The series of maps were created to determine the degree of suitability to climate and/or topographic conditions of the forests' main woody plants. With the help of these maps one can verify, in an area of 200 metres, the topo-climatic suitability of the Iberian Peninsula. In addition, these values can be consulted for the current climatic scenario (1950-1998) and for future projections proposed by one of the foremost research centres dedicated to climate change, the Hadley Centre, located in Exeter, UK.

The Atlas combines advanced methodologies and technologies such as Geographic Information Systems, multivariate statistics and interoperable geoportals to offer both rigorous cartographic standards and information that can be consulted by the general public.

The Atlas was developed by a group of researchers from the UAB Department of Animal Biology, Plant Biology and Ecology, in collaboration with the Centre for Ecological Research and Forestry Applications (CREAF), under the framework of the R&D&I National Plan.

Main features of the Atlas

- Completeness: covering almost all woody species found in forests
- Quality initial data: both the Digital Climate Atlas of the Iberian Peninsula (ACDPI) and the third National Forest Inventory are cartography databases with high spatial resolution and with proven data quality.
- Detailed resolution: 200 m spatial resolution
- Objectivity: numerical quality (known level of error) calculated and documented for each map.
- Interoperability: format in which maps can be viewed allows users to contrast information with other map databases
- Accessibility: maps can be consulted online in GIS format without the need of additional installations.

First results

Researchers have already obtained the first scientific results with the help of Atlas data. They were able to verify that many species could be affected by the reduction in suitability in the regions they currently inhabit. They detected a tendency in forests to migrate towards higher altitudes and more northern latitudes. In this sense, mountain ranges such as the Pyrenees are seen as important protection areas of biodiversity within the context of Climate Change.

Nevertheless, not all species react the same when suffering the consequences of climate change. Species such as aleppo pine, stone pine, or holm oak are more resistant and may even occupy larger areas in the future. In contrast, species such as scots pine or beech are more affected by rising temperatures and longer dry periods and therefore the space they occupy may begin to decrease.

At these moments researchers are studying the total forest surface which could be lost or substituted by scrubs, as well as interactions between forest species when their area of distribution is modified. The fact that forest surfaces are decreasing is of great relevance, since this represents a reduction in CO2 consumption, an increase in the risk of land erosion and modifications in water cycles.

Provided by Universitat Autonoma de Barcelona

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