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Special Focus: Vegetation Diversity and Dynamics in Culture Landscapes of Coastal-island Regions

Persistent and Disappearing Species in Fragmented Grasslands: Can Changes in Phenotypic Performance Indicate Population Susceptibility to Future Extinction

Krista Takkis*, Liina Saar, Meelis Partel, Aveliina Helm
University of Tartu, Estonia

krista.takkis@ut.ee

Habitat loss and fragmentation can drive a number of specialist plant populations to local extinction. Often, the actual loss of species is delayed by the extinction debt and the remnant populations can be characterized by altered population structure and phenotypic performance. Previously, we have identified the vascular plant species that contribute to the development of extinction debt in calcareous grasslands (disappearing species) and those that persist in altered habitats even after the extinction debt is paid (persistent species) (Saar 2012). Now, we use this knowledge to study whether the phenotypic performance of disappearing and persistent species can be used to predict their susceptibility to habitat fragmentation. We use plant height and biomass allocation to reproductive organs to indicate plant susceptibility to habitat changes. Both of these traits are closely linked to the surrounding environment and reveal the effect of environmental conditions on population fitness (Obeso 2002). We studied the responses of five disappearing and five persistent habitat specialist species in 33 dry calcareous grasslands in Estonia where the extinction debt is yet unpaid (Helm 2006). Based on the analysis of covariance we demonstrate that the disappearing and persistent species respond differently to the changes in landscape and environmental conditions. Disappearing species are more strongly dependent on the surrounding environment and thus more susceptible to changes in habitat conditions. Responses of both species groups were especially pronounced in sites, which have lost proportionately more of their area (more than 90% of the original area) during the last century. In stable sites that have on average have retained ~40% of their original area, both species groups have similar responses to habitat changes, indicating the presence of viable populations in relatively good conditions. Monitoring the responses of species with different susceptibility to extinctions give us valuable information about the changes that occur in populations before extinction, thus enabling us to ease the consequences of habitat loss and fragmentation.

Fourier Transforms: A Continuum of Functions to Explore Landscape Dynamics in an Open Source Space

Duccio Rocchini*[1], Markus Metz[1], Carlo Ricotta[2], Martin Landa[3], Alessandro Frigeri[4], Markus Neteler[1]
[1]Edmund Mach Foundation, [2]University of Rome "La Sapienza", Italy, [3]Czech Technical University in Prague, Czech Republic, [4]Istituto Nazionale di Astrofisica, Italy

duccio.rocchini@fmach.it

Multi-temporal analysis based on remotely sensed data has played an important role in detecting changes, typically by creating land use maps from remotely sensed images acquired at different dates. However, general classification may present a number of drawbacks such as: i) an implicit degradation of the information content of images due to classification, coupled with ii) the loss of the continuous information about landscape processes, and iii) problems related to downscaling once images are classified with different resolutions. Alternative approaches based on continuous information for detecting landscape changes have been proposed, including fuzzy set theory, spectral unmixing, support vector machines, neural networks. The aim of this study is to describe Fourier transform open source functions to detect potential changes over the landscape.

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