

**Título: Use of space and effects on vegetation structure by free-range cattle in a regenerating forest of *Quercus pyrenaica*.**

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**Palavras-chave:** silvo-pastoral systems, vegetation structure, cattle disturbance, GPS collars.

**Resumo:**

Farmland abandonment is causing severe changes in ecosystem structure. A fundamental consequence of abandonment is the decline in grazing disturbance by large domestic herbivores. The loss of extensive grazing systems, where moderate disturbance maintains habitat diversity and resilient landscapes, is leading to changes in the vegetation structure and in the fire regime. The Operational Group (OG) SILVPAST on the “Cost-efficient implementation of silvo-pastoral mosaics of *Quercus pyrenaica*” brings together a diverse partnership that includes companies involved in animal husbandry and forestry, associations of forest producers and of nature conservation, and research groups. The aim of the OG SILVPAST is to test and develop a method for the implementation of silvo-pastoral mosaics, using remote sensing approaches, that supports agricultural and forestry activity in areas of Pyrenean oak, which typically have low agricultural value.

As part of our goals and workplan we are currently investigating the use of space by livestock in a free-range regime in regenerating oak forests, as well as monitoring their effect on vegetation structure and oak recruitment. Cattle movement is being tracked by GPS collars. Positioning data collected in a test site of about 100 ha (Quinta da França, Covilhã, Portugal) are analyzed to investigate the factors associated to the use of space and habitat selection, including land morphology, vegetation cover and structure, distance to trails and to water points. Vegetation structure is being monitored by remotely sensed (UAV and satellite) and *in situ* data.

Preliminary results show that although animals have unrestricted mobility inside the test site, the use of space is affected by the distance to water and trails, slope and vegetation structure. Contrastingly, land cover classes were a bad predictor of cattle presence. Overall, cattle avoided sites far from water points and with complex vegetation (indicated by high NDVI values), preferred gentle slopes and used existing trails. First year results suggest a decline of oak recruitment in the lower vegetation layers (< 1.3m), a decline of tall grasses and forbs in the higher layers (> 1.3m) and an increase in forbs cover at the ground level. Whereas shrub cover showed little variation between the two years. These results illustrate the potential of cattle grazing and trampling to shape vegetation structure and hinder biomass accumulation in regenerating forest, but also signal limited control of shrub cover and possible impacts on oak recruitment. Additional management actions, such as mechanical shrub control, supported by models of cattle habitat selection and high-resolution updated monitoring data, are expected to enable a more precise management of biomass control by cattle.

**Nota biográfica:**

**Vânia Proença**

Assistant Researcher at MARETEC – Marine, Environment and Technology Centre at Instituto Superior Técnico of the University of Lisbon. She holds a PhD in Ecology from the University of Lisbon. Her research activity focus on biodiversity response to drivers of change from local to global scales. She is also interested in the management of biodiversity in extensive farming systems and the trade-offs posed by farmland abandonment to biodiversity conservation and ecosystem services. For the past decade she took part of several national and international research projects and initiatives on biodiversity and ecosystem services, including the Portuguese Millennium Ecosystem Assessment (co-editor) and the MA Sub-Global Assessments, GEO-BON (Terrestrial Species Group/Ecosystem Services Group), IPBES (technical report on biodiversity models and scenarios, and regional assessment for Europe and Central Asia), and the Livestock Environmental Assessment and Performance (LEAP) Partnership (hosted by FAO).

**Inês Ribeiro**

Research fellow at MARETEC – Marine, Environment and Technology Centre at Instituto Superior Técnico of the University of Lisbon. She holds a MSc in Conservation Biology. Her current research activity focus on the conciliation between biodiversity and ecosystem services conservation and the management of farmland and silvo-pastoral systems, for the project LIFE Food&Biodiversity and the Operational Group SILVPAST. She was previously involved in the LIFE MED-WOLF Project – Good Practices for the Wolf Conservation in Mediterranean Regions focusing on the human dimensions of wildlife, and in the Transbasin - Transboundary Water Basin Management Project, in the Jordan River Valley. She also contributed to the projects ADAPT FOR CHANGE, on climate change adaptation, and GREEN SURGE, on urban ecosystem services.

**Tiago Domingos**

Researcher and president of MARETEC – Marine, Environment and Technology Centre. His main areas of research are Ecological Economics and Ecological Modelling. His research aims at creating a theoretical, mathematical basis for sustainability assessment, integrating contributions from Ecology, Thermodynamics and Economics. He has most notably worked on Dynamic Energy Budget (DEB) theory for the metabolism of organisms, the useful exergy approach to energy accounting, energy and economic growth, carbon responsibility indicators, ecosystem services, comprehensive accounting and sustainable agriculture, with more than more than fifty papers in international peer reviewed journals.