Brief for GSDR 2015

Long term sustainability of agro-silvo-pastoral ecosystems: the case of montado cultural landscape

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Introduction

The montado (dehesa in Spain) is recognized as a unique agro-silvo-pastoral ecosystem found only in the Mediterranean basin. These savannah-like landscapes are dominated by cork and holm oaks, shaped over millennia of traditional land use practices. These multi-use forests are a typical example of agroforestry systems facing environmental pressures (climate, land use or degradation), social changes (rural abandonment, ecotourism) and economic trends (e.g. EU policy changes). Today the traditional management practices are threatened, as are the benefits associated with the montado.

Ecological and social relevance of the montado

The montado is a multi-use forest with a two-layered system that combines, in a single space, forest harvesting, extensive livestock husbandry, pastures and/or cereal cultivation, with other traditional uses. In the last years, increasing awareness arose on their benefits as biodiversity reservoirs, recreation grounds, and other ecosystem services providers (Pereira et al. 2005), but these non-productive functions are not equally perceived and valued by users, as they tend to be conflicting with productive ones (Surovà & Pinto-Correia 2008).

The montado is particularly susceptible to rare/episodic disturbance events as predicted in the future climate scenarios. This is even of higher concern in highly dynamic ecosystems, where inter annual variability is either due to climate unpredictability, heavy and changing human influences or a combination of both, such as in montado landscapes. Moreover is this system is dependent of human management and traditional practices to be environmentally sustainable and to avoid the soil degradation risks.

Montado drivers of change

Environmental stressors (climate, land-use or degradation, desertification) and social changes (rural abandonment, tourism), upon which economic trends (e.g. EU policy changes) are superimposed, threaten the traditional management practices which provide the benefits associated with the montado (Sá-Sousa 2013, Blondel 2006, Shakesby et al. 2002, Joffre 1992), essential for its long-term sustainability (Aronson et al. 2009).

Land-use policy changes, that lead to land abandonment (predicted by most IPPC projections for S Europe) or conversely over-intensification of mechanized agriculture, replacement of oaks by pine or eucalyptus or overgrazing by heavy livestock (Surová & Pinto-Correia 2008), together with global climate change (6-8ºC expected rise in maximum summer temperature and 50% reduction of rainfall, Santos & Miranda 2006), are recognized as the main driving forces that will affect all levels of ecological organization and ultimately change the structure and functioning of this ecosystem (SCBD 2006, Woodward & Keii 2008, Garcia-Fayos & Bochet 2009). This will result in desertification and land degradation, especially in semi-arid areas (UN 1994). Significant declines of adult trees is a new matter of concern, mainly because of its economic repercussions, but also due to conservation concerns about a generalised loss of biodiversity (e.g. Pereira & Pires da Fonseca 2003) in a habitat listed in the Habitats Directive and also a cultural landscape.

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The impact of present-day decisions in a long-term perspective

A growing research effort has attempted to describe, understand and model the complexity of this semi-natural system. However, the slow and strongly seasonal dynamics of the biotic and abiotic components of the montado systems clashes with the contrasting short time framework available for most studies, representing an important impediment to sound research. As a consequence, approaches are generally limited to only a few components – e.g. soil nutritional status, tree layer, species richness. Seldom are two or more of these aspects studied simultaneously, and relationships among them are usually inferred from studies made at different time and space-scales. Also, the results are spread in time and space, do not follow common indicators and sampling protocols, and rarely consider social aspects. Montado is included in UN framework within UNCCD, as one of the ecosystems with higher desertification risk due to agriculture intensification, drought and overgrazing.

The assumption is that characterizing management practices, financial and socio-cultural local realities is the key to fully grasp the present status of the Human-Nature equilibrium in montado, and to produce management recommendations under a long-term perspective that envisions the future sustainability of these landscapes and of its goods and services.

Recommendations for the long term sustainability of agroforestry systems in south Europe, as montado are:

- Synthesizing the short to long-term information and knowledge of traditional practices, economic profit and environmental changes
- Improve understanding of the functioning of the system and its response to current and future drivers and pressures
- Promote training of young scientists on agroforestry systems on the edge connected with the long-term factors affecting montado cultural landscape
- Create a legacy of well-designed long-term data for future generations
- Reach out the broader scientific community, natural resource managers, policymakers, and the general public by providing decision support, information, recommendations, knowledge and capacity to address complex environmental challenges

These recommendations had origin in the first Long Term Ecological Research Site devoted to montado, running in Portugal (LTER Montado), which is part of the international long-term ecological research network (http://www.ilternet.edu/). This could be generalized to other agro-silvo-pastoral systems around the world, particularly the ones with high desertification risk and increased abandonment of traditional practices.

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