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Stakeholder perspectives of wood-pasture ecosystem services: A case study from Iberian dehesas

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ABSTRACT

Ecosystem services (ES) research has rapidly gained momentum in environmental policy and practice. However, qualitative socio-cultural approaches are still limited, and therefore, ES important for people, are currently not commonly captured. We performed 34 face-to-face semi-structured interviews to describe stakeholders' appreciation of ES from dehesa landscapes in northern Extremadura, Spain. A total of 45 ES were mentioned, and compared among different sectors and levels of governance. At the local level, people appreciated especially provisioning and cultural services. In contrast, regional level respondents showed more appreciation for regulating and supporting services, which included biodiversity conservation and climate regulation. Private and public sector respondents appreciated provisioning services more, whereas the civil sector mentioned supporting and regulating services more. For instance, water regulation was only mentioned by civil and public sector respondents, while genetic resource preservation was only expressed by the private sector. All sectors noted cultural services as key ES. We discuss most mentioned ES by respondents, the co-production nature of ES in wood-pastures, as well as cultural services as key ES of dehesas in coupled social-ecological systems. We conclude with policy recommendations drawn from the insights of this study.

1. Introduction

Wood-pastures are land use systems that have been part of European landscapes from prehistoric times on (Mosquera-Losada et al., 2009), often characterising entire regions (Grove and Rackham, 2003). Wood-pastures can be defined as a land use that combines scattered trees with grazing animals (Rackham 2008; Costa et al., 2014). They occur in most biogeographic regions in Europe, but have declined sharply due to land use change, including both intensification and abandonment of agriculture (Bergmeier et al., 2010). Recent estimates of the areal extent of wood-pastures amount to 203 000 km^2 in the EU27 (Plieninger et al., 2015), of which the Mediterranean biogeographical region contains 54%. In Spain and Portugal, there are around 73 000 km^2 of wood-pastures, where they occur mainly as holm oak (*Quercus ilex*), cork oak (*Q. suber*), and Pyrenean oak (*Q. pyrenaica*) wood-pastures (named dehesas and montados, respectively) (Plieninger et al., 2015). Such wood-pastures host outstanding biodiversity (Bugalho et al., 2011; Diaz et al., 2013), and provide various ecosystem services (ES) including provisioning, regulating, supporting and cultural services important for human well-being. As a consequence they are considered as archetypes of High Nature Value farmland systems in Europe (Oppermann et al., 2012).

The management of these ES and nature values of wood-pastures poses, however, many challenges because of the institutional structure of the EU that is organised within mono-functional sectors. Several sectors are relevant at various administrative levels, but none of them acknowledge the characteristics and values of wood-pastures as a multi-functional system. For example, in the Common Agriculture Policy (CAP) the presence of too many trees can make pastures ineligible for direct payments (Beaufoy, 2014; Jakobsson and Lindborg, 2015). In EU conservation policy, management of wood-pasture habitats typically focuses on natural processes and aims to maintain or restore ungrazed, dense and tall forest, not recognising that livestock grazing supports many of the biodiversity and ES of wood-pastures (Bergmeier 2008; Plieninger

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et al., 2015). In addition, citizens are frequently not aware of the ES that they receive from wood-pastures (Gaspar et al., 2016). Taken together, this complicates the design of effective mechanisms to safeguard biodiversity and the provision of ES in wood-pastures. Novel policy frameworks such as payments for specific ES of wood-pastures have been proposed (Bugalho et al., 2011). However, the consequences of fostering some services (e.g., carbon sequestration) at the expense of other ES and for the wood-pasture system as a whole are not clear (Caparrós et al., 2013).

From a research perspective the ES framework has enhanced the understanding of human-nature relationships (Turner and Daily, 2008) gaining strong momentum in environmental policy and practice (MA, 2005; TEEB, 2010; Gómez-Baggethun et al., 2010; EC, 2013a,b; Hauck et al., 2013). This research framework has, however, been dominated by biophysical assessments and economic valuation approaches (Vihervaara et al., 2010; Nieto-Romero et al., 2014). In contrast, relatively little attention has been given to assessments of ES as perceived by stakeholders (Vihervaara et al., 2010), although such a socio-cultural perspective is critical to successfully tackle land management issues linked to human well-being (Martín-López et al., 2012). Additionally, qualitative socio-cultural valuation of ES is important to identify potential trade-offs and synergies among services demanded by different stakeholder categories, and is therefore critical as evidence-based input for landscape planning, management and stewardship (Raudsepp-Hearne et al., 2010). This is also captured by European green infrastructure policy (EC, 2013a,b).

ES are frequently produced by the combined effect of different natural ecosystem processes, and/or co-generated by natural processes in combination with human activities (Fischer and Eastwood 2016; Palomo et al., 2016). Hence, ES in cultural landscapes, have been recently re-framed as socio-ecological services (Huntsinger and Oviedo, 2014). Capturing the aspect of human-nature co-production is important to avoid mistakes caused by narrow assumptions about "natural" systems, and to understand the need for multi-functional landscape management (O'Farrell and Anderson, 2010; Huntsinger and Oviedo, 2014). Therefore, there is a theoretical and practical need for better understanding of how wood-pasture ES are co-produced by social and ecological factors (Huntsinger and Oviedo, 2014), how different wood-pasture ES are valued by different stakeholders (Gaspar et al., 2016) and how multiple ES can best be managed in a sustainable, integrated manner (O'Farrell and Anderson, 2010).

Most studies analysing stakeholders' demands for ES have been performed at the local level and have focused on a few services and narrow stakeholder profiles (Martín-López et al., 2012). While some research on socio-cultural valuation of ES is currently emerging (Oteros-Rozas et al., 2014; Villamor et al., 2014; Scholte et al., 2015), a systematic review by Fagerholm et al. (2016) highlighted a general scarcity of such research approaches on European wood-pastures. This review found a clear bias towards assessments of the potential supply of regulating, supporting and provisioning services, whereas cultural services have been mostly reduced to aesthetic values. Quantitative methods clearly dominate the research arena (Fagerholm et al., 2016). Therefore, there is a need to broaden research approaches by carrying out qualitative socio-cultural assessments of ES in wood-pastures. Iberian dehesa landscapes represent a good model system to assess the importance of stakeholders' perceptions on ES due to its vast biogeographical extension and biological importance.

Qualitative approaches "interpret phenomena in terms of the meanings people bring to them" (Denzin and Lincoln, 2011), and are therefore fundamental to articulate the expression of ES important for people (Chan et al., 2012a, 2012b). To tackle the above-mentioned knowledge gaps, this study presents a qualitative socio-cultural assessment of ES for the dehesa landscape of northern Extremadura (Cáceres region), Spain. The aim of the study is three-fold: (1) to perform an in-depth survey of the full suite of wood-pasture ES, as perceived by stakeholders, (2) to compare how stakeholders from different sectors and levels of governance perceive ES provided by dehesas. This approach allows to (3) explore particular services that are not commonly included into ES assessments, and are therefore rarely and poorly documented. We discuss most mentioned ES by respondents, the co-production nature of ES in wood-pastures, as well as cultural services as key ES of dehesas in coupled social-ecological systems. We conclude with policy recommendations drawn from the insights of this study.

2. Material and methods

2.1. Study area

The Extremadura region is located in southwestern Spain (ca. 39°N, 6°O) (Supplementary material, Fig. S1 in the online version at DOI: http://dx.doi.org/10.1016/j.landusepol.2016.10.022), covering a total area of more than 40 000 km^2 (Ezquerra Boticario and Gil Sanchez, 2008). The province of Cáceres was selected as the study area; it includes 219 municipalities grouped in 10 agro-regions based on agricultural productivity indexes in compliance with CAP requirements, with a total population of 412 498 (Fernández et al., 2012). The mean population density is relatively low (21 people/km^2) in comparison to the country mean population (91 people/km^2); ranging from 7 people/km^2 in Brozas agro-region to 38 people/km^2 in Plasencia. One of the main pillars of the economy is agriculture, along with the industry derived from it. This region produces wine, olive oil, cheese and meat products among others (Fernández et al., 2012). Agricultural land represents 15% of the total area; grasslands 29%; forest land 48%; and others 9%. The main cultivated species are oats (*Avena sativa*; 16%), grassland species (14%), corn (*Zea mays*; 14%), cereals for winter forage (12%), tobacco (*Nicotiana tabacum*; 8%), peas (*Pissum sativum*; 6%), wheat (*Triticum aestivum*; 4%), rice (*Oryza sativa*; 4%), tomato (*Solanum lycopersicum*; 3%), and onion (*Allium cepa*; 3%). Among tree groves olive predominate (*Olea europaea*; 83%); there are also orchards and vineyards (Fernández et al., 2012). The service sector contributes the most to the gross domestic product (GDP), followed by construction, industry and agriculture. Additionally, services comprise 51% of the active population, agriculture 32%, construction 12% and the industry 4% (IMT, 2015). The total forest and woodland cover equals 16 000 km^2 of which 77% (12 370 km^2) correspond to dehesas (Pulido et al., 2010).

Dehesa is the major cultural landscape element covering more than 25% of the study area (Ezquerra Boticario and Gil Sanchez, 2008; Pulido et al., 2010). The dehesa is mostly privately owned by big estates (>100 ha). The land tenure system includes privately owned dehesas, municipally owned, i.e., dehesa estates which belong to villages and the use of the different resources (especially the grazing regimes) are assigned by auction to local ranchers; in case no local ranchers exist others can also apply, and commons, i.e., dehesa estates which are commonly owned by villagers normally through a certain kind of cooperativism. For this study respondents belonging to the first two categories were included. Tree species such as holm oak, cork oak and Pyrenean oak dominate the tree canopy of dehesas. Tree density varies (10–100 ha^{-1}) depending on land use (Moreno and Pulido, 2009). The trees are a fundamental component of the dehesa system, producing not only feed (acorns, fodder, browse), energy (firewood and charcoal), and cork, but also creating favourable micro-climatic conditions for herbaceous understory and providing shelter for livestock (Joffre et al., 1988; Marañón, 1988). The traditional multi-purpose land management has generated a mosaic of habitats with high plant species diver-