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Integrating economic landscape valuation into Mediterranean territorial planning

Juan Ramón Molina [a,*], Francisco Rodríguez y Silva [b,1], Miguel Ángel Herrera [c,2]

[a] Department of Forest Engineering, University of Córdoba, Campus de Rabanales, Edificio Leonardo da Vinci, 14071 Córdoba, Spain
[b] Department of Forest Engineering, University of Córdoba, Campus de Rabanales, Edificio Leonardo da Vinci, 14071 Córdoba, Spain
[c] Department of Forest Engineering, University of Córdoba, Campus de Rabanales, Edificio Leonardo da Vinci, 14071 Córdoba, Spain

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ABSTRACT

Recent and rapid landscape changes have occurred over large areas in Mediterranean Basin. Wildfires and human activities are the most important disturbances at landscape-level due to their ecological and socio-economic impacts. The increasing demand which society places on the forest landscapes has led us to develop a tool to identify the economic landscape value around natural protected areas. Our research focused on the integration of social, ecological and economic components of landscape management based on stated social preferences and contingent valuation method (CVM). Landscape value research has been motivated by the need to assist land use planning and environmental management.

Geographic Information Systems (GIS) have provided new opportunities to spatially distributed modeling of landscape quality. Correlations were found between the representativeness of the landscape and its sense of belonging, and the contingent rating. Landscape with intensive agricultural practices and mining areas were the least preferred landscapes. There was a notable variation in the economic landscape value attributed to the study area based on the considered CVM scenario, ranging from 1,253,075.1 Euros to 3,650,827.8 Euros. We added the geospatial allocation of willingness to pay according to five landscape quality categories. Our approach could be used to identify priority areas for conservation based on maximizing landscape value, and would be useful in detecting interesting or conflict areas associated with new management and planning alternatives. In this sense, this approach offers managers to seek territorial management strategies to increase economic efficiency in the allocation of resources.

1. Introduction

Mediterranean landscapes have been configured by great natural and cultural processes and disturbances. Socio-economic changes in land use and population decline during the last 50 years have led to extensive revegetation with an increase in shrubland (Alados et al., 2004; Rodríguez y Silva and Molina-Martínez, 2012). Thus, changes in European agricultural policies have traceable effects on landscape esthetics (Schüpbach et al., 2008). The abandonment of rural areas and the impact of climate change have increased fire frequency and severity (Flannigan et al., 2006; Cardil et al., 2014) and ecological and socio-economic impacts on landscape (Molina et al., 2011; Chuvieco et al., 2012, 2014).

Environmental services and landscape goods are rarely incorporated into economic valuation of natural resources, even though these resources may constitute a large proportion of the total ecosystem value (Troy and Wilson, 2006; Román et al., 2013). For planning decisions, it is important for society to know not only what ecosystem goods and services will be affected by public and private actions, but also what their economic value is relative to other marketed and non-marketed goods and services, such as those provided by physical capital (e.g., roads), human capital investment (e.g., education), etc. (Costanza et al., 2006). It is essential that the socio-cultural and economic values of the landscape be fully taken into account in planning and decision-making (De Groot, 2006).

Geographic Information Systems (GIS) have emerged as a powerful tool used to assess landscape resource (Walpole and Sinden, 1997; Sayadi et al., 2005; Jackson et al., 2013). Landscape

* Corresponding author. Tel.: +34 957212044; fax: +34 957212095.
E-mail addresses: o92momaj@uco.es (J.R. Molina), ir1rosif@uco.es (F.R.y. Silva), mherrera@uco.es (M.&. Herrera).
[1] Tel: +34 957218393; fax: +34 957212095.
[2] Tel: +34 957212210; fax: +34 957212095.

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quality can be assessed by three general approaches: objectivist, subjectivist and holistic. While the objectivist approach values quality as inherent in the physical landscape, the subjectivist approach considers quality as a product of the mind (eye of the beholder) (Lothian, 1999). The holistic approach adheres to the axioms: "the whole is more than the sum of its parts" and "the whole is, to a large extent, independent of the individual parts" (Bishop and Hulse, 1994). A holistic approach to landscape assessment includes biological, physical and human components (Palang et al., 2000). This paper suggests that the holistic approach is the reliable way to identify landscape value similar to other studies (Antrop and Van Eetvelde, 2000; González and León, 2003; Arriaza et al., 2004).

Landscapes have been the focus of a wide range of disciplines such as urban planning, forest management, rural development and territorial planning. It is important to distinguish between landscape evaluation (the process of rating the quality of landscape) and landscape valuation (the assignment of economic value to landscape). From an economic point of view, landscapes are thought of as a physical entity, valued for its esthetic attributes (Hanley et al., 2009). Although the link between esthetics and economics is not easily established (Christie et al., 2006), economics provides the justification for landscape conservation. Non-market valuation methods have been widely used to identify the economic values of natural resources. Landscape can take the form of monetary values through indirect methods such as Travel Cost (Hesseln et al., 2003; Fezzi et al., 2014), Hedonic Technique (Hunt et al., 2005; Cavailhès et al., 2009) and Contingent Valuation (Bateman et al., 1994; Lee and Han, 2002; González-Cabán et al., 2007). Public preferences methods have been conducted in conjunction with stated preference approaches (González and León, 2003; Hynes et al., 2011; García-Llorente et al., 2012). In this sense, contingent valuation (CVM) is the main stated preference method over the last three decades. CVM is a means of eliciting a willingness to pay value for the preservation of landscape attributes. In the United States, the legal status of evidence of resource impacts based on stated preferences (the US Water Resources Council, 1983; US District Court of Appeals, 1989; US Department of Interior, 1994), is giving a significant contribution to the improvement of these indirect methods.

Economic methods have considered recreational resources of which landscape resource is stated but not clearly linked as an indicator of territorial planning. This paper aims at developing a landscape-level tool to identify the economic value around a natural protected area. A new scheme has been developed as for the integration of three aspects: landscape evaluation (landscape quality), landscape valuation (socio-economic value) and a spatially distributed modeling of landscape quality based on a previous landscape units characterization. Then, landscape value was estimated by the integration of social preferences and contingent valuation method. This paper comments the different components that were used to generate landscape value, and then it proposes a technique for the spatial integration of different aspects. The results could emphasize in the economic resources behind landscapes and the role of the rural population on landscape conservation.

2. Methods

2.1. Study area

The study was carried out in the province of Huelva, in southern Spain (Fig. 1), bordering with Portugal and covering about 200,000 ha of great economic and recreational importance on a regional scale. This district has been exploited for thousands of years due to its mineral deposits, in particular pyrites. At present, the area is mainly exploited by traditional agroforestry systems with cereal cultivation on the floodplains and swine farming in the

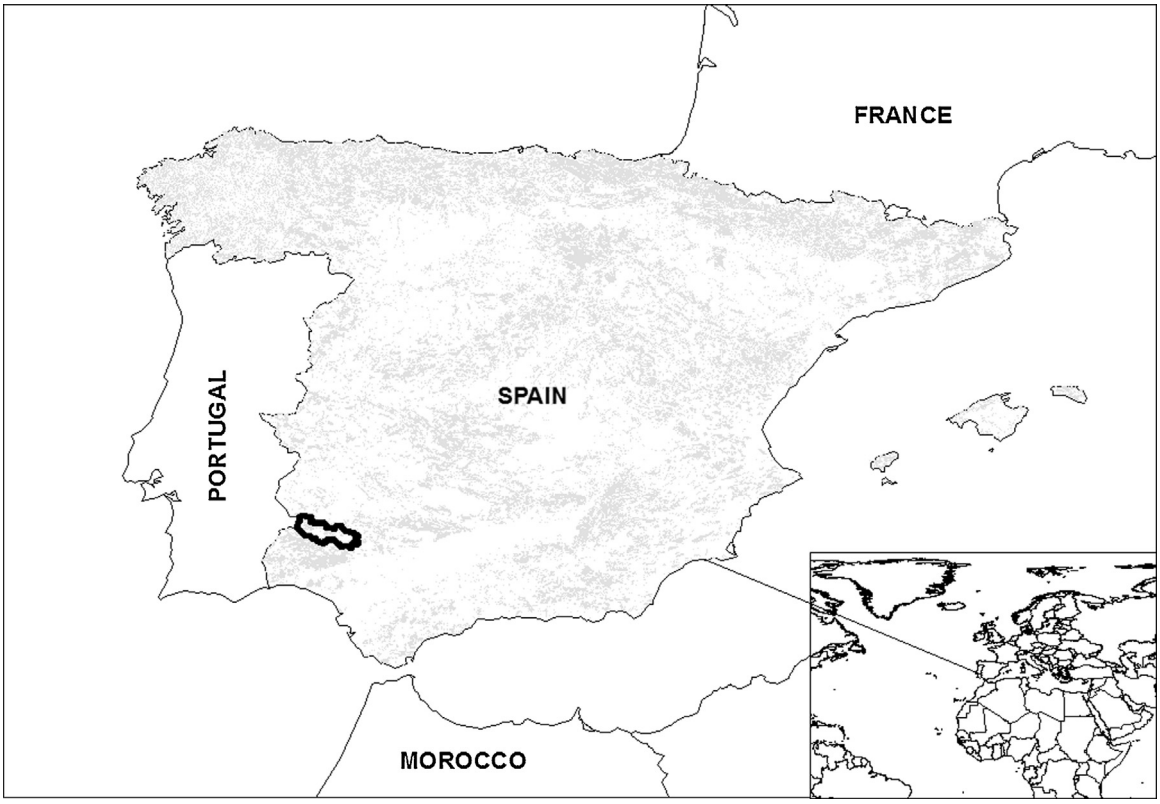

Fig. 1. Study area location.