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The importance of ecosystem services in coastal agricultural landscapes: Case study from the Costa Brava, Catalonia

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ABSTRACT

Agricultural landscapes are increasingly valued by society for their potential to provide multiple benefits and values, such as landscape beauty or habitat for biodiversity. Yet, Mediterranean agricultural landscapes are still following a pattern of changes under the narrow focus of increased agricultural productivity, while other benefits and values are depleted. In this study, we assess the importance and multiple benefits Mediterranean agricultural landscapes provide using the ecosystem services approach. Our research aims at assessing different social perceptions concerning the importance of coastal agrarian landscapes for human wellbeing. Using a case study from a coastal agricultural landscape at the Costa Brava, Girona (Spain), we combined non-monetary and monetary methods to assess social perception and the willingness to pay for ecosystem services' delivery. Our study involved different social groups including local residents and tourists visiting the area. Results show that provisioning services and non-productive ecosystem services, such as supporting and cultural services are seen as almost equally important and trade-offs emerge between their prioritizations. A strong preference for cultural ecosystem services, especially aesthetic value (non-monetary valuation) and environmental education (monetary valuation), can be observed. Our results suggest that different preferences are influenced by the respondents' place of residency and place of visit.

1. Introduction

Agriculture is the most important land use in Europe (Rounsevell et al., 2003; Lazrak et al., 2010). In the Mediterranean basin, agricultural land is primarily managed for the production of crop, livestock, forage, and fibre. Yet, agricultural land provides other benefits to humans than material goods (Sayadi et al., 2009; Power, 2010) that are increasingly described as ecosystem services (TEEB, 2010). Besides for the generation of agricultural products, i.e. provisioning services, the ecosystem service literature highlights the importance of agricultural landscapes for the generation of regulating services, such as flood control, carbon storage, water quality control and pollination (Klein et al., 2007; Aizen et al., 2009; Gallai et al., 2009; Smith et al., 2008), supporting services like habitat for flora and fauna, the maintenance of genetic resources for potential future agricultural uses (Daily, 1997; Perfecto and Vandermeer, 2008), as well as cultural ecosystem services. The latter include for example scenic beauty, education, recreation, tourism, and place identity (Van Berkel and Verburg, 2014). In agricultural landscapes, communities and ecosystem services are strongly interdependent, for instance the maintenance of the agriculture production shapes the landscape providing beauty and identity values, which at the same time are essential for leisure, ecotourism or sense of place of the population. As such ecosystem services provided to society can be understood as social–ecologically co-produced (Blondel, 2006; Anderson et al., 2007; Plieninger and Bieling, 2012; Fischer et al., 2012).

Since the 1950s, agricultural landscapes in the Southern

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European Mediterranean region changed drastically, driven by (mass) tourism, urbanization, in combination with an intensification and homogenization of agricultural production. Rural areas are increasingly becoming residential areas and destinations for (nature) tourism (Paquette and Domon, 2001). In the light of an ever stronger disconnection between locations of production and consumption of agricultural produces, agriculture is no longer the sole or predominant economic base for the rural economy. Where traditional agriculture, in Southern Europe dominated by small-scale mosaic farming (Pinto-Correia and Kristensen, 2013), is replaced by agro-industrial practices, farmers and employees in the agricultural sector are becoming a minority (Surová et al., 2011). This new socioeconomic trend in agricultural landscapes affects the relationship between people and the environment (Fischer et al., 2012) and leads to degradation of ecological functions and loss of ecosystem services (Foley et al., 2005; Meeus et al., 1990; Plieninger and Bieling, 2012). This stands in sharp contrast to European policy goals, especially *The EU Biodiversity Strategy to 2020* (Target 2), highlighting the importance to maintain ecosystem services and to restore multi-functional landscapes "that are capable of delivering benefits to both biodiversity, the land user, and to society at large" (European Commission, 2011).

Analysing social perceptions and preferences regarding the demand for ecosystem services in an agricultural landscape can help to visualize this contrast (Anton et al., 2010) and help to adapt agricultural and management practices, to local users' and society's needs (Surová et al., 2011). Local assessments of ecosystem services support an understanding of the multi-functional and multi-beneficial character of agricultural landscapes, and may indicate potential losses in ecosystem services caused by changing agricultural practices. Understanding these trade-offs between traditional and industrial agriculture has been described as one of the major challenges of land-use planning in agricultural landscapes (Ruiz and Domon, 2012; Seppelt et al., 2011). The maintenance and restoration of multifunctional agricultural landscapes at a local scale is essential for the persistence of rural communities. Yet, it requires a sufficient recognition of different social groups and an explicit understanding of their relationships with and the benefits they obtain from the landscape (Martín-López et al., 2012; Plieninger et al., 2013). Few studies have focused on the relationships between rural non-farming populations and agricultural landscapes (Vouligny et al., 2009). Our study addresses this gap by assessing social preferences for the delivery of ecosystem services, using monetary and non-monetary valuation methods that help identifying potential trade-offs across the interests of different social groups (Foley et al., 2005). Our goal is to provide better understanding of the relationship and to account for social perception between rural non-farming populations and the agricultural landscape through the lens of ecosystems, in order to support the maintenance and restoration of multifunctional rural landscapes. The three specific objectives consist in: (1) the characterization of beneficiaries, (2) the non-monetary prioritization of ecosystem services, and (3) an assessment of the monetary willingness-to-pay for ecosystem services.

2. Methods

2.1. Study area

The assessment was carried out for the *Plana de l'Empordà* a plain region that forms the coastal hinterland of the Costa Brava (coast) in the province of Girona, located in the north east of Catalonia (Spain) (Fig. 1). The study area was selected because it is

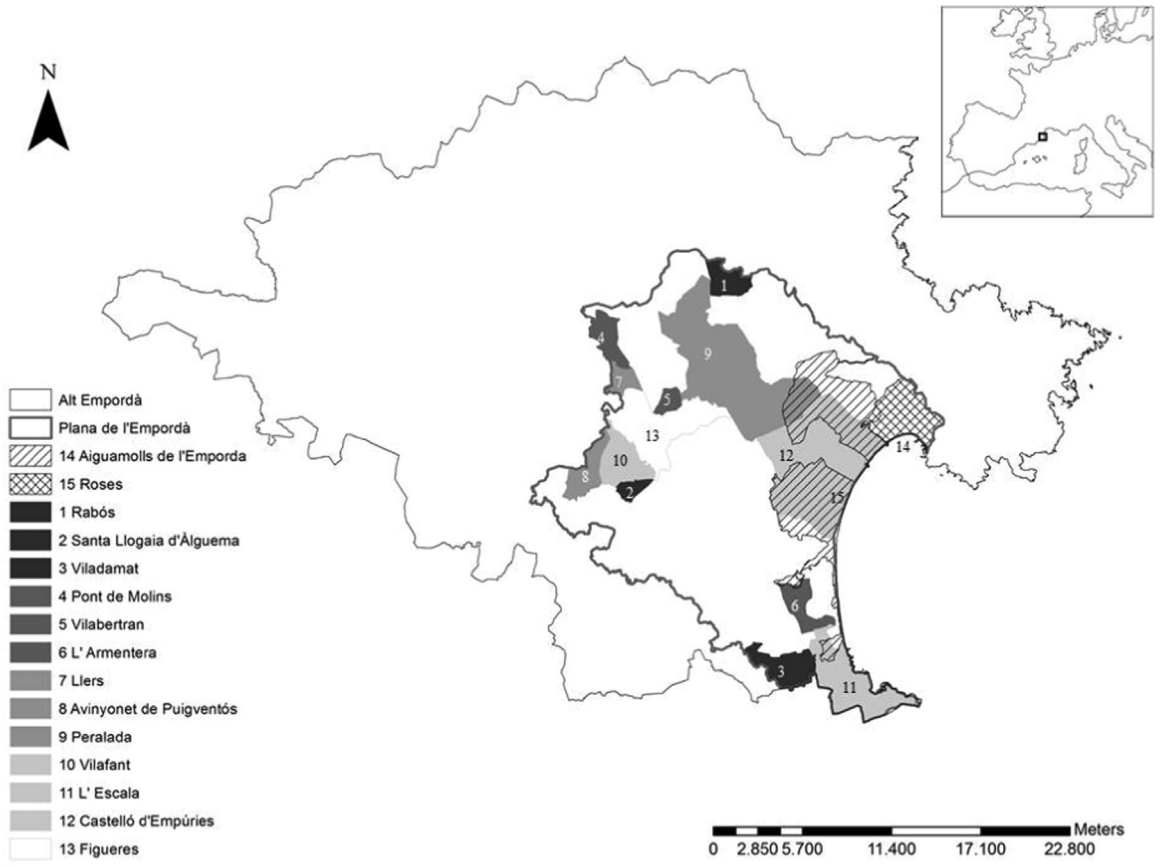

Fig. 1. Study area Plana de l'Empordà, Costa Brava (Spain): location, protected areas and sample points.