Testing socio-cultural valuation methods of ecosystem services to explain land use preferences

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ABSTRACT

Socio-cultural valuation still emerges as a methodological field in ecosystem service (ES) research and until now lacks consistent formalisation and balanced application in ES assessments. In this study, we examine the explanatory value of ES values for land use preferences. We use 563 responses to a survey about the Pentland Hills regional park in Scotland. Specifically, we aim to (1) identify clusters of land use preferences by using a novel visualisation tool, (2) test if socio-cultural values of ESs or (3) user characteristics are linked with land use preferences, and (4) determine whether both socio-cultural values of ESs and user characteristics can predict land use preferences. Our results suggest that there are five groups of people with different land use preferences, ranging from forest and nature enthusiasts to traditionalists, multi-functionalists and recreation seekers. Rating and weighting of ESs and user characteristics were associated with different clusters. Neither socio-cultural values nor user characteristics were suitable predictors for land use preferences. While several studies have explored land use preferences by identifying socio-cultural values in the past, our findings imply that in this case study ES values inform about general perceptions but do not replace the assessment of land use preferences.

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1. Introduction

Ecosystems provide a variety of benefits to sustain human well-being (MA, 2003). These benefits are accounted for in the ecosystem service (ES) approach, which is set up to be used to guide land management and decision-making (Daily et al., 2009). Despite the multitude of values that can be attached to ESs as acknowledged by science and policy (Christie et al., 2012; de Groot et al., 2002; Díaz et al., 2015; MA, 2003; TEEB, 2010), the assessment of monetary and biophysical values has prevailed since the introduction of the ES concept (Gómez-Baggethun et al., 2014; Seppelt et al., 2011). Only in recent years the integration of socio-cultural values gained momentum in ES research (Nieto-Romero et al., 2014; Scholte et al., 2015).

Reasons to include socio-cultural values in landscape management and planning are manifold. They are used for instance to find feasible and acceptable solutions in land use planning (Farber et al., 2002), to set policy targets and measure progress in reaching those targets (Reyers et al., 2013), as well as "to enable a fuller characterization and representation of diverse ecosystem values in research and practice" (Chan et al., 2012).

In this context, socio-cultural valuation emerges as a methodological approach in ES research and because of its infancy, it still lacks of a consistent and widely accepted formalisation (Kelemen et al., 2014; Scholte et al., 2015). In spite of this, socio-cultural valuation is increasingly recognised in international initiatives, such as the Millennium Ecosystem Assessment (MA; MA, 2003), The Economics of Ecosystems and Biodiversity (TEEB; TEEB, 2010) and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES; IPBES, 2015). Recent research has provided an overview of methods that are used for the assessment of non-monetary values including observation approaches, document research, expert based approaches, in-depth interviews, focus groups, and questionnaires (e.g. Arias-Arévalo et al., 2017; Kelemen et al., 2014; Scholte et al., 2015). However, the robustness of socio-valuation valuation methods is still in question, for instance, of normative approaches that enable people to rate ESs without any constraints, implying that all ESs can equally and simultaneously be provided, which is rarely the case (Horne et al., 2005; Scholte et al., 2015). Further, Martin-Lopez et al. (2014) show that the choice of methodological approach determines which values and trade-offs of ESs are addressed in the assessment, hence not only uncovering but also constructing value. Furthermore, Kenter et al. (2015) emphasise that different dimensions of social value yet seek routine integration into ES

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assessments. Within this study, we test two techniques (i.e. rating and weighting) and two intentions (i.e. self- and other-oriented) of socio-cultural valuation of ESs and examine their quality to predict preferences in land use.

In the light of rapid land use transitions (Antrop, 2005; Pearson and McAlpine, 2010), sustainable land management has become a central challenge in environmental policy (Garcia-Llorente et al., 2012). Several European as well as national policies recognise people's preferences in land use and management as a crucial element to determine land use policies (ELC, 2000; EC, 2001). For instance in Scotland, the Land Use Strategy (SG, 2016) and the Scottish Biodiversity Strategy (SG, 2013) both aim to increase public involvement in land use and ecosystem management and decision-making while also introducing the ecosystem approach in policies. In Scotland, public participation in management planning is currently implemented in the Pentland Hills regional park, which is the research site of the present study. After an informative public survey in 2014, several stakeholders have engaged in a workshop to contribute to the understanding of land use preferences in the area.

In Europe, several studies have explored land use preferences by identifying socio-cultural values in the past. For example, Garcia-Llorente et al. (2012) explored social preferences toward semi-arid rural landscapes in south-eastern Spain by assessing social preferences towards 20 representative Andalusian landscape views based on photographs. López-Santiago et al. (2014) used photographs to assess social perceptions of ecosystem services in a transhumance landscape in Spain and Zoderer et al. (2016) explored how socio-cultural value changes with different landscape types in the Central Alps also based on photographs. These studies use landscape perception to detect socio-cultural values of ESs.

In this study, we use the Pentland Hills Regional Park, Scotland as a case study to understand to what extent socio-cultural values of ESs can be used to predict land use preferences. In doing so, we specifically aim to (1) identify clusters of land use preferences by using a novel visualisation tool based on trade-offs in land use

management, (2) test if socio-cultural values of ESs elicited by different valuation techniques (i.e. rating and weighting) and different value intentions (i.e. self- and other-oriented well-being) are associated with the different clusters of land use preferences, (3) test if user characteristics are linked with the different clusters of land use preferences, and (4) determine whether both socio-cultural values of ESs and user characteristics are able to predict land use preferences.

2. Methods

2.1. Study area: Pentland Hills Regional Park

Located to the south-west of Edinburgh and covering areas in Midlothian, West Lothian and the City of Edinburgh Councils, the Pentland Hills comprise a variety of land uses and provide an important recreational asset to the region. The northern part of the Pentland Hills is designated as a Regional Park since 1986 under the provisions of the Countryside (Scotland) Act 1981 and covers an area of 9200 hectares (Fig. 1). The vision statement of the Pentland Hills Regional Park (PHRP) Plan recommends "To guide and assist all stakeholders in the sustainable management of the Pentland Hills Regional Park's changing environment in a way which supports communities living and working within the Pentland Hills Regional Park, promotes responsible access for all, develops public understanding of the mixed land use resource and conserves and enhances the Pentland Hills Regional Park's landscape, cultural and natural heritage features" (PHRP, 2007).

The land within the Pentland Hills Regional Park is mostly privately owned by over 30 landowners and farmers, smaller sections are owned by the City of Edinburgh Council, Midlothian Council, West Lothian Council and Scottish Water. The Regional Park is designated as an Area of Great Landscape Value and comprises a landscape of hills (up to 580 m a.s.l.), upland heather moorland, small pockets of woodland, Military of Defense firing ranges and reservoirs. The main land use of the hills is sheep farming on upland and lowland areas, agricultural farming on lower sections and liv-
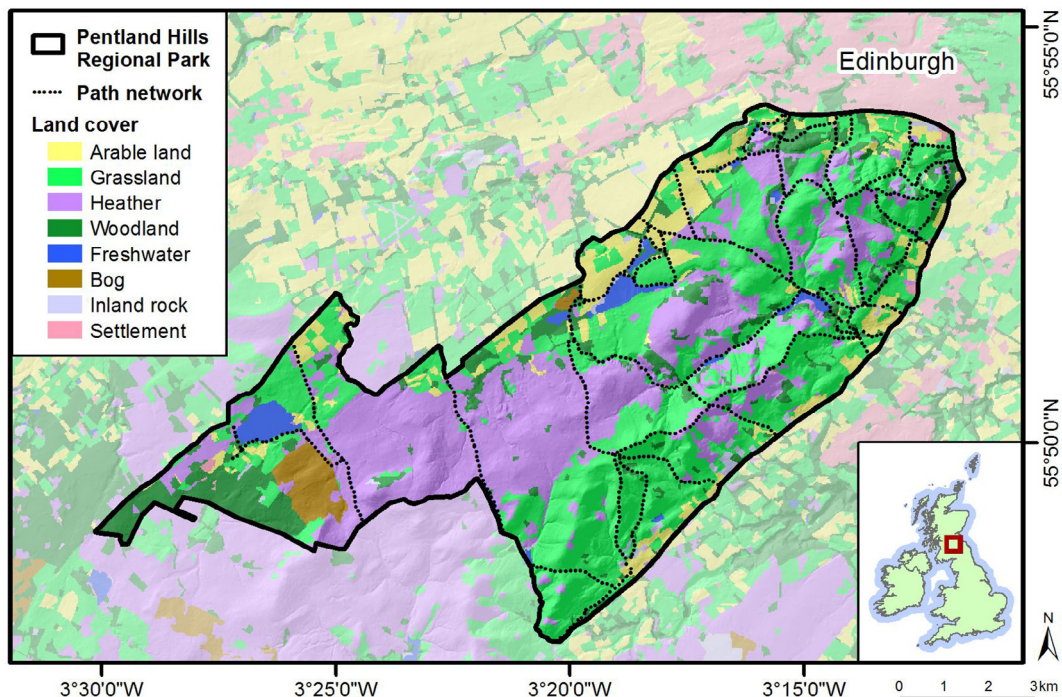

Fig. 1. Location, land cover and paths of the Pentland Hills Regional Park. The shaded areas indicate elevations.