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Outdoor recreation in various landscapes: Which site characteristics really matter?

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ABSTRACT

This paper investigates the role played by different site characteristics in influencing people's choice of outdoor recreation destinations. Contrary to prior studies, our experiment accounts for a large diversity of eligible landscapes described using photomontages. We use a discrete choice experiment (DCE) proposing respondents to choose among hypothetical destinations described in terms of eight site characteristics. We study the trade-offs made by various profiles of respondents among those site characteristics, resulting in different destination choices. The DCE attributes are spatially explicit to represent recreational patterns in the form of site quality maps using Geographic Information Systems (GIS). We conclude by stressing implications of this research for tourism and land management policy-making in peri-urban environments. Interestingly, preferences for site characteristics vary significantly with the recreational activities that respondents engage in. Hikers and cyclists preferences should be particularly considered in future planning decisions.

1. Introduction

Outdoor recreation[1] is becoming increasingly popular in peri-urban areas. For many people nature proximity contributes to improving their health and well-being (de Vries et al., 2003; Matsuoka and Kaplan, 2008). Being able to value cultural ecosystem services (Daniel et al., 2012; MEA, 2005), especially outdoor recreation, is important to support sustainable land management policy-making. Although outdoor recreation has largely been covered in the literature, prior valuation studies have generally targeted specific nature areas, including: forests (Christie et al., 2007; Jones et al., 2010), mountains (Hanley et al., 2002a; Thiene and Scarpa, 2009), lakes (Parsons and Kealy, 1992; Schaafsma and Brouwer, 2013), rivers (Morey et al., 2002), coastal areas (Ghermandi and Nunes, 2013; Hynes et al., 2013) and national parks (White and Lovett, 1999). Little attention has been paid, however, to the eligibility of production landscapes, such as agricultural landscapes (Fleischer and Tsur, 2000) for recreation. Studies valuing both natural and production landscapes as recreational destinations remain scarce (Van Berkel and Verburg, 2014).

Moreover, despite a large body of literature about destination attractiveness (Lee et al., 2010), the decision-making process involved in the choice of the recreational destination is still insufficiently treated in the context of nature valuation. The trade-offs made by recreationists among certain site characteristics are not fully understood, especially the trade-off between the travel distance and the site characteristics that determine the attractiveness of a destination. As recreation implies short trips, outdoor recreationists may be highly constrained by their spatial environment. Because of the travel distance, a priori less attractive sites that are close may be deemed more attractive by distance-averse recreationists. In peri-urban environments, agricultural landscapes and, more generally, sites with low naturalness may then become eligible substitutes to natural landscapes.

Sustainable land management should take into account that preferences for outdoor recreation might be heterogeneous. However, valuation studies that account for preference heterogeneity by looking into different recreational activity groups remain limited (Haener et al., 2001; Hanley et al., 2002b; Hynes et al., 2008, 2013; Loomis and McTernan, 2014). In Christie et al. (2007), “specialist users” such as

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[1] By ‘outdoor recreation’ we refer to a leisure activity performed near one’s home and lasting no longer than a whole-day with no overnight stay at the destination site, contrary to ‘tourism’ that implies an overnight stay (Neuvonen et al., 2007).

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nature watchers attain a greater consumer surplus per trip from the provision of activity-specific facilities compared to "non-specialist users" (e.g. dog walkers). However, specialist users traditionally represent a low number of users, so policy-makers should be aware of the trade-offs between maximising benefits for specific individuals and maximising the overall benefits that can be generated at one site. In addition, policy-makers need to better understand recreational behaviour to optimise resource allocation. In Flanders (Belgium) and probably in other regions, little is known about the link between site characteristics and the benefits of outdoor recreation.

In this paper, we present a method to investigate preferences for different site characteristics and to better understand outdoor recreational behaviour in various landscapes in the Province of Antwerp, Belgium. Our research objectives are:

i. To study preferences for different characteristics of outdoor recreational sites, including natural areas and production landscapes (e.g. arable lands);
ii. To better understand the trade-offs made by recreationists among site characteristics when choosing to go to one site relative to a substitute site, especially the trade-off between the distance separating them from the site and the site characteristics that contribute to the attractiveness of the site.

We use a variant of the discrete choice experiment (DCE) technique (Hoyos, 2010) called "distance-based DCE" to estimate preferences for different hypothetical recreational sites. One novelty is that we use distance rather than a direct cost (e.g. tax) as payment vehicle; meaning that respondents have to trade off the distance they would be willing to travel to reach the hypothetical site with the other characteristics of that site. In line with Smith et al. (1983) or McConnell (1992), we explore whether the time spent covering the distance to a recreational destination is perceived as a cost (scarcity value) or may also be enjoyed as part of the recreational trip (commodity value).

Finally, all attributes (or site characteristics) used in the DCE are spatially-explicit, a rather uncommon practice in the literature (Tutsch et al., 2010). That is, aside from estimating preferences for different site characteristics, we also map those preferences for different groups of recreationists. We conclude the paper by drawing some useful implications of this research for spatial planners and land managers.

2. Methods

2.1. Case study

The study area is the province of Antwerp (Fig. 1), located in the Flemish Region (northern Belgium). This province possesses a good mixture of landscapes, ranging from farmlands to forests, heathlands, moors and wetlands. As such, it offers a compromise between the flat lands (polders) in the west and the dense forests of Limburg in the east.

The proximity of the city of Antwerp makes this province an interesting place to study preferences for outdoor recreation. The province has undergone large landscape modifications in the past decades because of the expansion of Antwerp (3rd busiest port in Europe), resulting in increased urbanisation. A growing number of citizens are now searching for green spaces to recreate in peri-urban areas.

2.2. Distance-based discrete choice experiment

The DCE is a stated preference non-market valuation technique that was introduced by Louviere and Hensher (1982) and whose theoretical basis is grounded in Lancaster's (1966) consumer theory. It is used to elicit preferences for scenarios described in terms of their component attributes (Louviere et al., 2000). In ecosystem services valuation, the DCE is usually embedded in a survey inviting respondents to state their preferences for hypothetical environment-related policy scenarios. Respondents are presented with a series of choice tasks requiring them to choose between several alternatives described by attributes. Different combinations of attribute levels are shown in each choice situation. This allows the computation of preference parameters of an indirect utility function (Carson and Louviere, 2011). That capacity to understand relative preferences for certain attributes makes DCEs well suited to study the trade-offs among the characteristics of recreational destinations.

DCEs rely on the random utility theory (McFadden, 1974). In the context of a mixed logit (MXL) model (Hensher and Greene, 2003), the utility function of a consumer i (U_i) comprises a deterministic component (V), represented as a vector of attributes (X_{ijt}) associated with the j alternatives of a choice situation t, and a random component (ε_{ijt}), which represents all other unobservable components influencing an individual's choice:

$$U_i = V(X_{ijt}) + \varepsilon_{ijt} = \beta_i X_{ijt} + \eta_i X_{ijt} + \varepsilon_{ijt} \quad (1)$$

In the MXL specification, β_i – the vector of preference parameters associated with the attributes – is random with zero mean and standard deviation η_i in order to account for taste heterogeneity among respondents (Hensher and Greene, 2003). In such choice situation t, the probability that an individual i chooses an alternative k over any other alternative l means that the utility attached to alternative k is superior to that associated with any other alternative l, which translates into (Hanley et al., 2003):

$$P[(U_{ik} > U_{il}) \ \forall \ l \neq k] = [(V_{ik} - V_{il}) > (\varepsilon_{ik} - \varepsilon_{il})] \quad (2)$$

As the error term ε_{ijt} is typically assumed to be independently and identically distributed according to an Extreme Value Gumbel distribution (Louviere et al., 2000), the probability of an alternative k being chosen can then be expressed using the conditional logit model:

$$P[(U_{ik} > U_{il}) \ \forall \ l \neq k] = \frac{\exp(U_{ik})}{\sum_j \exp(U_{ij})} \quad (3)$$

The unit of analysis used for the rest of this analysis is the compensating variation (CV) in welfare:

$$CV = -\frac{1}{\beta_D}(V_0 - V_1), \quad (4)$$

where V_0 is the determined utility level corresponding to the reference state and V_1 is the utility level corresponding to the alternative state. The coefficient β_D is the coefficient of the distance attribute.

2.3. Experimental design

We went through a thorough design and testing process before launching the survey on the Internet. To select the most important site characteristics to include in the questionnaire, we organised two focus group discussions with Flemish citizens and met with local authorities in charge of tourism and recreation in the Province of Antwerp.

The DCE contained seven attributes varying across three levels and a cost attribute (distance) varying across nine levels (Table 1). The full factorial experimental design produced 19,683 (=3^9) combinations, which was impossible to reach in practice. We used the Ngene software package to generate a D-efficient main effects fractional factorial design (Louviere et al., 2000). The experimental design was optimised for a multinomial logit (MNL) model and consisted of 6 blocks of 6 choice sets (so 36 in total). We initially selected the design with the lowest D-error (0.0782). We generated a model that used intuition-based fixed prior parameter values and tested it on 115 respondents to check the overall model behaviour. Then we used the model coefficients of that pre-test as new priors to improve the accuracy of the model (D-error = 0.0595). The actual survey was conducted from the 1st till the 22nd of December 2014.