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Research Paper

Benefits of clearing forest plantations to restore nature? Evidence from a discrete choice experiment in Flanders, Belgium

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HIGHLIGHTS

- We investigate WTP for nature restoration compared to forest plantations.
- Preference heterogeneity is explored through mixed logit and latent class models.
- People prefer landscape diversity, high biodiversity and good site accessibility.
- We find support for small-scale conversions of forest plantations.
- We find no distance-decay, but a significant effect of perceived substitution.

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ABSTRACT

To ensure the long-term survival of its most valuable and threatened habitats, the European Union (EU) is committing its Member States to develop a network of protected areas. Flanders (northern Belgium) is a highly urbanised region, where natural environments are scarce. Policy-makers are converting existing forest plantations (mostly former coniferous plantations) into natural areas to comply with the EU requirements about nature restoration and satisfy the growing demand for recreation and amenity spaces.

The conversion of forest plantations into higher value nature, however, sometimes meets public opposition because it often involves clearcuts and landscape modification. Regional planning authorities are looking for case studies demonstrating which type of nature restoration is valued and thus supported by citizens. Past valuation studies show that personal, site-specific and spatial characteristics influence preferences. However, little is known about the relative importance of such factors.

We conduct a discrete choice experiment to investigate preferences for nature restoration scenarios that involve forest conversion. A mixed logit and a latent class model are estimated and the influence of socio-demographic characteristics is explored. Willingness-to-pay (WTP) estimates are elicited. Though people generally prefer the forest habitat type, our results suggest that public support exists for converting forest plantations if this contributes to increasing landscape diversity and species richness. Based on our findings, we recommend small scale cuts. This in order to gently open the landscape, assist the natural regeneration process and help current species adapt to that landscape modification.

1. Introduction

To ensure the long-term survival of Europe's most valuable species and habitats, European Union (EU) Member States are committed to designate protected areas and considerable funds are allocated with the aim to protecting biodiversity in Europe. Several nature restoration projects are being implemented through the EU Birds and Habitats Directives and Natura 2000,

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a network of protected areas throughout the EU. Meeting such EU targets is not an easy task in densely populated and urbanised areas.

Flanders (northern Belgium) is a highly urbanised region with a strongly fragmented landscape, where natural environments remain scarce. Most notably, forests represent 13.1% of the Flemish territory (177,424 ha) and are mostly scattered in pieces of less than 1 ha. Biodiversity is consequently threatened. About half of the plants and animals are "red-listed" species (INBO, 2014a). The loss of suitable habitats and the decline in environmental quality explain most of this negative trend.

To date, Flanders has 62 Natura 2000 areas (i.e. 166,187 ha or 12.3% of the territory). In addition, the Flemish Government committed itself, through the Flemish Decree for Nature Conservation, to implementing an effective ecological network via two initiatives: the Flemish Ecological Network ("VEN") and the Integral Interrelation and Support Network ("IVON").

This nature restoration effort involves turning many agricultural lands, plantations and woodlands back to heathland or native broadleaved forest. Existing research (Liekens et al., 2013) demonstrates public preferences for converting agricultural lands into nature areas in a similar context. Conversions to forests in particular are found to be preferred over other habitat types, such as wetland or heathland. However, Flanders is witnessing a trend of clearing forests (especially coniferous plantations introduced in the late 19th century) to restore heathland (Verheyen, Lust, Carnol, Hens, & Bouma, 2006). Nowadays, this unique habitat is one of the most threatened habitats in Belgium (Maes, van Dyck, Vanreusel, & Cortens, 2003) and accommodates a number of endangered species. The willingness to pay (WTP) estimates from Liekens et al. (2013) suggest that converting forest to heathland might result in a loss of societal value. However, it is unclear if one can extrapolate those results (preferring forest over heathland) to the conversion of forest plantation into higher value nature areas.

Understanding public preferences for converting production-oriented forest stands back to heathland or native broadleaved forests is a complex matter that deserves attention and the careful consideration of its implications on land use planning decisions. Forest conversion involves clearcutting practices that traditionally meet strong opposition from the public (Bradley & Kearney, 2007; Ribe & Matteson, 2002). The size of the logged area is particularly influential. Past studies show that public opinion of small clearcut areas is usually more positive than of larger areas (Bradshaw, 1992; Tahvanainen, Tyrväinen, Ihalainen, Vuorela, & Kolehmainen, 2001). Bliss (2000) points out that people's opinion about forest clearcutting is also based on the perceived ecological benefits.

This case study has the double objective (i) to contribute to the limited literature related to public preferences for nature restoration involving forest conversion, and (ii) to inform policy-makers on how to design community-supported restoration policies. We address this question in response to a strong demand for literature on landscape preferences from policy-makers and regional planners. A discrete choice experiment (DCE) is conducted to elicit preferences for hypothetical restoration scenarios. WTP estimates are derived by means of mixed logit and latent class models that control for taste heterogeneity.

The remainder of this paper is organised as follows: the next section presents the rationale behind preferences for nature restoration. Section 3 briefly introduces the case study. Then, Section 4 describes our methodology and Section 5 outlines our modelling approach. The results of the estimated models and consequent marginal WTP are presented in Section 6. Section 7 discusses those results and Section 8 concludes the paper.

2. Public preferences for nature restoration

Public preferences are heterogeneous (Swallow, Weaver, Opaluch, & Michelman, 1994). Environmental valuation studies typically account for this by including environmental (Adamowicz, Nelson, Naidoo, Polasky, & Zhang, 2011), infrastructural (Brainard, Bateman, & Lovett, 2001; Roovers, Hermy, & Gulinck, 2002), spatial (Geoghegan, Wainger, & Bockstael, 1997; Johnston, Swallow, & Bauer, 2002), or individual parameters (Adamowicz, Swait, Boxall, Louviere, & Williams, 1997) to their econometric model. In our study, we investigate three dimensions of preference heterogeneity which, in turn, lead to different WTP: (i) site characteristics, (ii) individual-related characteristics, and (iii) off-site spatial characteristics.

2.1. Site characteristics

Site characteristics are not in essence a source of preference heterogeneity. However, WTP will vary across sites because of the diversity of site characteristics. When selecting environmental attributes for a DCE, priority must be given to demand-relevant, policy-relevant and measurable attributes (Blamey, Bennett, Louviere, Morrison, & Rolfe, 2002). In this context, three site characteristics are particularly important: biodiversity, habitat composition, and accessibility.

First, biodiversity is a crucial ecological characteristic and the subject of numerous valuation studies (Meyerhoff, Liebe, & Hartje, 2009; Xu, Lippke, & Perez-Garcia, 2003). As "biodiversity" encompasses a large number of concepts, we only approach it from a "species richness" viewpoint. Higher species richness is expected to positively affect preferences. Second, the mosaic of natural habitats that shapes the landscape also affects its valuation (Rambonilaza & Dachary-Bernard, 2007). Studies find public preferences for restoring broadleaved woodlands (Mill, van Rensburg, Hynes, & Dooley, 2007; Scarpa, Chilton, Hutchinson, & Buongiorno, 2000) or, on the contrary, native pinewood forests over other habitats (McMillan & Duff, 1998). The attachment to unique or traditional habitats may thus also influence landscape preferences. Note that, by contrast, relative preferences for heathland restoration are scarcely addressed in the nature valuation literature (Strange, Jacobsen, Thorsen, & Tarp, 2007).

Third, site characteristics that affect use values, and outdoor recreation in particular, strongly influence nature valuation (Stenger, Harou, & Navrud, 2009). Past studies reveal that users' WTP for the conservation of nature areas exceeds non-users' WTP (Hanley, Wright, & Adamowicz, 1998). WTP seems particularly correlated to the accessibility of natural areas (i.e. trails, car parking and facilities) (Watson, McFarlane, & Haener, 2004). Recent research shows, however, that attributes related to nature characteristics (e.g. water quality) may be preferred over accessibility (Perni, Martínez-Paz, & Martínez-Carrasco, 2012). In any case, site accessibility is expected to affect the recreational attractiveness of a nature area and deserves particular attention.

2.2. Individual-related characteristics

A common practice to account for individual taste heterogeneity is to include attitudinal and socio-demographic variables. Respondents' characteristics like age, gender, level of education and income are particularly helpful. They validate individual responses to WTP questions, and help limit biases when transferring values across populations and sites (Rosenberger, Needham, Morzillo, & Moehrke, 2012; Turner et al., 2003). Landscape preferences often find their origin in each individual's experience of nature, which can be approached by adding attitudinal variables. For instance, the importance a respondent attaches to adjacent nature when they