Ecological Economics 147 (2018) 11–20

Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Analysis

Disentangling Distance and Country Effects on the Value of Conservation across National Borders

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ARTICLE INFO

Keywords:
Beech forests
Choice experiment
Denmark
Distance
Environmental valuation
International policy coordination
Sweden
Transboundary valuation

ABSTRACT

Coordination of conservation policies and conservation actions between countries is expected to reduce overall costs and increase effectiveness. It rests on the assumption that, as a global public good, the provision of biodiversity conservation is independent of geographical and political jurisdictions. However, from a welfare economic perspective this assumption requires testing and justification. Indeed, distance may matter, as may the country of provision. This study applies a choice experiment to estimate individuals' marginal willingness to pay for comparable biodiversity conservation measures and outcomes across country borders, and with different distances from their place of residence to conservation locations in Denmark and in Southern Sweden. The case is designed to distinguish the effect of distance from the effect of country of residence versus country of provision. We find a clear and distinguishable effect of both location and country of provision. We find distance-related attributes to reflect bridge tolls and per-kilometre transport costs, and Swedes and Danes to prefer provision in their own country, over provision in the neighbouring country. The results of this study may be useful in discussing cooperation on regional and even global biodiversity conservation efforts.

1. Introduction

The continued loss of natural habitats and biodiversity globally has prompted initiatives aimed at fostering international coordination of national conservation policies and actions like the Millennium Ecosystem Assessment (2005), the Convention on Biodiversity (2010), the European Natura 2000 framework (Davies, 2004), and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2017). Despite such efforts, the loss of biodiversity has not been halted (Butchart et al., 2010). Many countries have not met the targets set in 2010 under the Convention on Biological Biodiversity (Secretariat of the Convention on Biological Diversity, 2014), with renewed pledges being made at the subsequent conferences of the parties.

The challenges associated with migratory species conservation, habitat fragmentation, and variation in conservation costs at the continental scale and across countries underlie the call for international coordination of conservation efforts. Increased coordination across national boundaries is widely believed to be more cost effective, compared to independent national planning (Hull et al., 1998; Rodrigues and Gaston, 2002; Strange et al., 2006; Bladt et al., 2009; Moilanen and Arponen, 2011). Yet, the performance of existing agreements is still not clear, and the welfare consequences of such agreements are yet to be assessed (Bladt et al., 2009). In addition to free-riding, the lack of clear national priorities in some countries, and the delayed incorporation of international agreements into national laws have been pointed out as obstacles for the progress of trans-national agreements (Bennett and Ligthart, 2001; Dimitrakopoulos et al., 2004; Paavola, 2004; Pinton, 2001).

Global habitat and biodiversity conservation may be seen as a public good (Deke, 2008; Rands et al., 2010) and as such could offer long-term benefits at a global scale (Perrings and Halkos, 2012), independently of where it is provided. An example highlighted by Perrings and Gadgil (2003) is the option value embedded in preserving the *global gene pool*, which they suggest is independent of where the biodiversity carrying the gene pool is protected. However, in other situations the geographical distribution of conservation efforts may matter for conservation value. Some ecosystem services associated with conservation of habitats and biodiversity, such as recreational or regulatory services, have clear local values. Several studies have found

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https://doi.org/10.1016/j.ecolecon.2017.12.019
Received 19 January 2017; Received in revised form 6 December 2017; Accepted 8 December 2017
Available online 04 January 2018
0921-8009/

values of biodiversity conservation and other environmental goods to be distance-dependent (Bateman et al., 2006; Bateman and Langford, 1997; Hanley et al., 2003; Jørgensen et al., 2013; Loomis, 1996; Nielsen et al., 2016; Pate and Loomis, 1997; Schaafsma et al., 2012, 2013; Sutherland and Walsh, 1985; Yao et al., 2014). Securing global biodiversity benefits may require a coordinated system of local conservation efforts, for which benefits may mainly be local and distance dependent (Lundhede et al., 2014).

Longer distances between beneficiaries and conservation sites may reflect that conservation provisions are taking place in countries other than the beneficiaries' country of residence. This raises the question of whether it matters to the beneficiaries, and hence the value they derive from conservation efforts, if the country of provision, that is, the country where conservation efforts take place, is the same as the country of residence of the beneficiaries. For example, people could be concerned that access to the good in another country could be restricted in other countries, or that conservation efforts are outside their control (Baillie et al., 2004; Lim, 2016). A number of valuation studies have investigated cases where the environmental goods were provided in countries other than the country of residence of beneficiaries (Dallimer et al., 2014; Dumalisile et al., 2005; Horton et al., 2003; Hoyos et al., 2009; Ressurreição et al., 2012; Valasiuk et al., 2017). However, none of these studies were able to distinguish between the effects of distance to conservation site and country of conservation site for preferences and welfare measures.

The objective of this study was therefore to shed light on two empirical research questions: Does the value of biodiversity conservation depend on the distance to the site of conservation? Does the value of biodiversity conservation depend on whether the respondent resides in the country in which the biodiversity conservation takes place? To this end we carefully selected the location of our case areas, emphasising that the cultural and natural settings of the case areas should be very similar, while allowing us to separate the two effects of distance to site of provision and country of provision. Thus, we designed a Choice Experiment (CE) valuation study focused on habitat and biodiversity conservation measures in beech (*Fagus sylvatica*) dominated broadleaved forests in Southern Scandinavia. We selected three regions, two in Denmark (Funen and Zealand) and one in Sweden (Scania), where conservation measures would provide outcomes of comparable quality. We take advantage of the fact that the distance between Zealand and conservation sites in Funen is similar to the distance between Zealand and conservation sites in southern Sweden. Both Funen and southern Sweden are separated from Zealand by bridged waters and roughly similar distances.

1.1. Literature Review

As a background for our research questions, we reviewed the relevant literature, focusing on studies addressing the linkage between stated preferences for environmental goods, spatial dimensions and nationality. Distance decay models have been applied in a number of stated preference studies to estimate spatial heterogeneity. Sutherland and Walsh (1985) was one of the early studies to show that respondents living further from policy areas have lower estimated marginal WTP. Bateman et al. (2006) provided a theoretical justification for distance decay analysis from a use value perspective (recreational demand), where greater travel distances to a natural resource site implies lower net values, ceteris paribus, due to greater costs of reaching the site. Many studies have applied the basic form of the distance decay model to assess spatial welfare heterogeneity (Abildtrup et al., 2013; Adamowicz et al., 1997; Bateman et al., 2002, 2006; Brouwer et al., 2010; Jørgensen et al., 2013; Loomis, 2000; Meyerhoff, 2013; Morrison and Bennett, 2004; Nielsen et al., 2016; Pate and Loomis, 1997; Rolfe and Windle, 2012; Yao et al., 2014). They do so by applying the postal code of a respondent's mailing address (home or origin point) and a geocoded single point that represents the affected area (the destination point).

However, recent studies used patterns other than simple distance to capture spatial welfare heterogeneity. For instance, Campbell et al. (2009) presented a spatial kriging method, and Johnston and Ramachandran (2014) and Meyerhoff (2013) applied hot (or cold) spot analysis using local indicators of spatial association. Johnston and Ramachandran (2014) investigated spatial welfare distributions using geocoded choice experiment data in a river restoration case. They showed that the common distance decay methods could not capture spatial patterns in WTP estimates for non-market outcomes. Finally, it has been argued that theoretical distance decay justifications may not apply for non-use value (Bateman et al., 2006; Hanley et al., 2003).

While all these studies have addressed the effect of concepts of distance on welfare measures of environmental changes, they did not investigate if distance effects can be separated from nationality effects with respect to the site of provision. This has particular policy relevance when analysing the value of habitat and biodiversity conservation as a public good in an international context.

The effect of nationality of respondents relative to the country of provision for the environmental good has been addressed in various ways. For example, respondents' nationality was found to be a significant element of WTP for users of the whale-watching experience in an Australian marine park (Davis and Tisdell, 1999). Similarly, Samdin et al. (2010) compared Malaysians and international visitors' preferences and found that the respondents' nationality affected significantly their preferences for protection of the Taman Negara National Park. In a study focused on valuing marine species Ressurreição et al. (2012) found respondent nationality and the degree of attachment to the study site as the main driver of WTP. A study by Carlsson et al. (2012) also showed the effect of respondents' nationality on WTP for a climate change mitigation programme. A somewhat different take is that of Yao et al. (2014), who found a significantly higher WTP for conservation of national symbolic species (Brown Kiwi in New Zealand). Dallimer et al. (2014) showed that people in three different countries (Denmark, Estonia and Poland) were willing to pay significantly more for locally delivered services than for similar types of goods delivered in the two other countries, but did not account for differences in distance between the sites of provision and the respondents' locations. Possible explanations for such effects include sense of ownership or identity (Bateman et al., 2002; Hanley et al., 2003; Dallimer et al., 2014; Dallimer and Strange, 2015; van Houtum and van Naerssen, 2002), ethical concerns (Daw et al., 2015) by beneficiaries, notably if respondents have a belief system involving an obligation to protect biodiversity conservation in their own country, or strict border crossing constraints and differences in welfare (Valasiuk et al., 2017). In general, these studies addressed the nationality effects associated with the countries of provision, when these are far from each other and from the respondents' country of residence and/or have different culture, rules, environment etc.

The contribution of the present paper is to investigate the role of nationality on WTP for biodiversity. The case is two neighbouring countries, sharing a similar environment and easy access between the two countries, allowing for control of distance.

1.2. Hypothesis Formulation

Based on the above literature and taking advantage of the spatial layout of our experimental case, we formulate the following null hypotheses:

H1. *Distance to the site of biodiversity conservation does not matter for people's WTP for a given policy alternative.*

H2. *Country of biodiversity conservation provision does not matter for people's WTP for a given policy alternative.*

We will test these hypotheses in a model using the pooled sample from all three regions, as well as in models using specific regional subsamples. Details of the hypothesis test procedure are unfolded along with the econometric model specifications below.