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Integrating nature-based tourism and forestry in private lands under heterogeneous visitor preferences for forest attributes

Erkki Mäntymaa[a]*, Ville Ovaskainen[b], Artti Juutinen[c] and Liisa Tyrväinen[b]

[a]*Natural Resources Institute Finland (Luke), Oulu, Finland;* [b]*Natural Resources Institute Finland (Luke), Helsinki, Finland;* [c]*Natural Resources Institute Finland (LUKE), and Department of Economics, University of Oulu, Oulu, Finland*

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Developing nature-based tourism in private lands calls for new mechanisms to consolidate the interests of the tourism industry, visitors, and landowners. This choice experiment study elaborates on the heterogeneity of visitors' preferences and willingness to pay (WTP) for enhanced forest amenities and ecosystem services. The survey, targeting domestic and foreign tourists visiting the Ruka-Kuusamo area in Finland, considered four attributes: landscape quality, outdoor routes, forest biodiversity, and carbon sequestration. For observed heterogeneity, the visitors were grouped by their attitudes towards forest management. Unobserved heterogeneity in visitors' choice behaviour and WTP was examined with the latent class model. While most visitors had environmentally friendly attitudes and were willing to pay, especially for enhanced landscape quality and biodiversity, considerable heterogeneity was revealed in terms of three segments with distinctive attitudes, choice behaviour and WTP. The variation in WTP has important implications for the design of a scheme of payments for environmental management.

Keywords: nature-based tourism; private forests; payments for ecosystem services; preference heterogeneity; choice experiment

1. Introduction

Nature-based tourism is a rapidly expanding sector within tourism in Europe and elsewhere (Bell *et al.* 2008; Fredman and Tyrväinen 2010). The demand has created opportunities for nature-based tourism to develop as an economic diversification tool within regions rich in natural amenities, such as northern Europe. In Finland, for example, targets set for tourism growth rely strongly on nature-based tourism with an increasing number of foreign visitors (Roadmap for Growth… 2015).

Nature-based tourism refers to tourism leaning on the destination area's natural environment as its key attraction, or tourism primarily concerned with the direct enjoyment of some relatively undisturbed phenomenon of nature (e.g. Fredman and Tyrväinen 2010; Valentine 1992). Its operational environment is defined by the socio-economic and environmental features of each country, such as land ownership, landowner rights, and key land uses and rural livelihoods. The Nordic countries, in particular Finland and Sweden, have a high proportion of forest land (up to 69%) that is used for timber production but also for other uses such as recreation. A large share of the forests is privately owned. Moreover, unlike many other countries where nature-based

*Corresponding author. Email: erkki.mantymaa@luke.fi

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tourism and recreation often take place in designated areas, the Right of Public Access (everyman's right) allows access for recreation including the picking of berries and mushrooms in all undeveloped areas. These rights cause both challenges and opportunities to nature-based tourism entrepreneurs (Fredman and Tyrväinen 2010).

The scenic and recreational quality of the natural environment is a crucial success factor to nature-based tourism (Landscape and sustainable… 2006; Brown 2006; Tyrväinen *et al.* 2001, 2008). Accordingly, the present study investigates the possibilities of creating a market-based contractual mechanism to promote nature-based tourism by enhancing the landscape and recreational values in privately owned forests within and/or near to tourism areas through specific forest management practices. More specifically, we elaborate on visitors' willingness to contribute to the funding of environmental management with a special focus on preference heterogeneity across visitors. Our empirical case is the Ruka-Kuusamo tourism area, an important nature-based tourism area and ski resort in north-eastern Finland.

Relatively undisturbed, scenically pleasant natural environments are the main attraction for Finland's tourism, especially in the North of the country. Following substantial growth in nature-based tourism, outdoor activities that used to lean mainly on conservation areas have expanded into commercial forests including private forest lands. Given everyman's rights, however, the forest owner will not be compensated for providing recreational environments, and lacks a financial incentive to take the landscape and recreation into account in forest management. Especially large-scale clearcutting with intensive site preparation for regeneration have an adverse effect on the landscape (Ribe 2009; Silvennoinen, Pukkala, and Tahvanainen 2002; Gundersen and Frivold 2008; Tyrväinen *et al.* 2008; Tyrväinen, Silvennoinen, and Hallikainen 2017), but delaying or abandoning clearcutting inflicts upon the forest owner a loss of income that is presently not compensated for.

For a potential remedy to the issue, a new contractual mechanism has been proposed in Finland. As formulated in Tyrväinen, Mäntymaa, and Ovaskainen (2014), the initiative called landscape and recreational values trading (LRVT) seeks to create a voluntary contractual mechanism to be applied in the vicinity of tourism areas to collect payments for rewarding, through a specific fund, the participating forest owners for enhancing the landscape and recreational values on their land. The initiative seeks to promote nature-based tourism as a sustainable economic activity through enhanced landscape quality and recreational services in the area. More generally, this could contribute to the host community's social and economic sustainability by providing a new source of income and employment, by advancing fair income distribution by allocating part of the income from expanding tourism to the landowners, and by reducing potential conflicts between the local community and tourism industry through jointly agreed rules.[1]

The LVRT is an application of payments for ecosystem services (PES) approach, in which landowners receive payments for the voluntary production of public environmental benefits. PES, based on the assumption that the beneficiaries are willing to pay for desired ecosystem services, have received increasing attention as a policy instrument for improving the provision of forest amenity benefits (e.g. Wunder 2007). For example, under the instruments of BushTender, EcoTender, and BushBroker, the Victorian State Government, Australia, has developed innovative market approaches, such as auction and the trading of credits, to increase carbon sequestration, terrestrial biodiversity, and water quality and quantity (Eigenraam *et al.* 2007; Nemes, Plott, and Stoneham 2008; Stoneham *et al.* 2003). In Central America, Costa Rica is a pioneer among developing countries in the use of PES approaches by establishing a formal,

country-wide program of payments for mitigation of greenhouse gas emissions, hydrological services, biodiversity conservation, and provision of scenic beauty for recreation and ecotourism (Brown and Bird 2011; Pagiola 2006). Entry Level Stewardship, Organic Entry Level Stewardship and Higher Level Stewardship are the three elements of the Environmental Stewardship program for agri-environment schemes that provide funding to farmers and other land managers in the UK in return for delivering environmental management on their land (Entry Level Stewardship 2013; Higher Level Stewardship 2013). Finally in continental Europe, there are several PES systems for increasing and protecting recreational, hydrological, biodiversity and carbon sequestration services (Prokofieva and Wunder 2014).

As raising the funds for rewarding the forest owners is also crucial for the feasibility of the LRVT initiative, this study focuses on visitors' willingness to contribute to its implementation and funding. We use data from a choice experiment (CE) study targeted at domestic as well as foreign tourists visiting the Ruka-Kuusamo area.[2] As the CE method (Adamowicz *et al.* 1998; Hanley, Wright, and Adamowicz 1998; Louviere, Hensher, and Swait 2000) considers the resource as a set of management relevant attributes, it provides particularly useful information to resource managers about the importance of specific attributes and their value trade-offs (e.g. Holmes and Boyle 2003).

The monetary valuation of environmental benefits using stated preference methods, e.g. contingent valuation, has been criticized and biases related to the method have been analysed comprehensively (see e.g. Mitchell and Carson 1989). The use of CE, however, has been found to avoid some of the shortcomings (e.g. respondents' strategic behavior) and has been seen to give more versatile information related to environmental benefits (see e.g. Carson and Czajkowski 2014). In practice, however, a stated preference approach is often the only possible way to find monetary values for a non-market commodity, especially if it includes non-use values. In our case, monetary valuation of environmental goods provided by forests is needed for the evaluation of the feasibility of the proposed LRVT scheme, i.e. whether the users' WTP is sufficient to justify the suggested market-based mechanism. Moreover, for a policy maker the approach may also be useful in demonstrating the relative importance of various environmental attributes in addition to assessing their values in monetary terms.

Our main research questions are as follows: first, how visitors' can be grouped based on their attitudes towards landscape and environmental benefits? Second, how much are the visitors' willing to pay for improved landscape quality and provision of other environmental services? Third, how do visitors' preferences and willingness to pay (WTP) vary across segments of visitors, and what are the policy implications of this heterogeneity?.

Most remarkably, the attitudes[3] toward the environment in general as well as preferences for specific environmental management attributes are likely to vary across visitors. Customer segmentation to account for variation in consumers' tastes is a standard approach in marketing research and practice. Similarly, preference heterogeneity is intrinsic in public preferences for most non-marketed environmental goods. The same can be assumed to hold for the visitors of tourism areas and their preferences for the environmental characteristics and services of such areas. Most environmental policy programmes involve both winners and losers, and different motivations are likely to result in different reactions to policy changes. Thus, failure to account for taste heterogeneity can result in confusing valuation results as well as potentially misleading policy recommendations (Boxall and Adamowicz 2002; Christie,

Hanley, and Hynes 2007; Juutinen *et al.* 2012; Morey, Thacher, and Breffle 2006; Scarpa and Thiene 2005; Scarpa, Thiene, and Tempesta 2007).

This study considers the heterogeneity in visitors' preferences using two alternative approaches to taste heterogeneity and segmentation. For observed heterogeneity, the visitors are first grouped by using principal components analysis (PCA) and cluster analysis (CA) on a set of attitudinal questions concerning the management of the area's forest resources. After this, we analyse the manifestation of unobserved preference heterogeneity in visitors' choice behaviour and WTP for improvements in specific management-related forest attributes with the latent class model (LCM) and elaborate on the visitors' WTP for alternative management scenarios. The LCM approach provides an insight into the differential welfare effects and reactions to policy changes across respondents.

2. Data and methods

2.1. Case study: the Ruka-Kuusamo tourism area

Kuusamo is a town and municipality in north-eastern Finland in an area rich with hills and fells. The population density is low (3.2 inhabitants/km^2), with 70% living in the town centre and the rest in sparsely populated rural area. Of employed people about two-thirds work in services such as tourism, one-sixth in processing industries, and about 10% in agriculture, forestry and reindeer husbandry. As much as 84% of the municipality's total land area is forested, and most forested land (82%) is in non-industrial private ownership (National Forest Inventory 9 2016).

Tourism has a significant role in the region's economy. One of the largest ski resorts in Finland, *Ruka*, is situated in Kuusamo. Annually, around one million tourists visit Kuusamo leaving total revenue of over 90 million Euro and providing full-time employment to over 800 people. The annual number of registered overnight stays in hotels of over 20 beds (excluding stays in own or rental cottages) is 490,000. About 23% of visitors staying overnight are from abroad. The key tourism activities include down-hill and cross-country skiing, snowshoeing, snowmobiling, husky safaris as well as hiking, cycling, canoeing and observation of birds and other boreal species. The accommodation capacity is 40,000 beds including hotel rooms and holiday homes, and 6,900 holiday apartments and cottages. (Facts about Ruka and Kuusamo 2016).

2.2. Survey of tourists visiting the area

Contents of the questionnaire

The main sections of the questionnaire were the respondent's background, characteristics of the present visit and attitudes towards forest management, and environmental benefits. The latter section contained the CE with six choice tasks, debriefing questions, and opinions on the payments for environmental management. Besides attitudinal questions on the environmental aspects of forest management, opinions on the compensation payable to forest owners, on visitors' willingness to contribute to the funding of environmental management, and on the preferred form of the payments were also asked. Questions on accommodation, income, and occupation were included.

Table 1. Attributes, attribute levels and variable names used in the choice experiment (status quo *levels in italics*).

Attributes	Attribute levels	Variable name
Alternative specific constant	n/a	ASC
Outdoor routes in private forests	Decrease: 80 km of routes	ROUT1
	No change: 100 km of routes	
	Increase: 120 km of routes	ROUT3
Quality of landscape: traces of intensive forestry operations	*No change: visible along 20% of routes*	
	Slightly improved: visible along 10% of routes	LAND2
	Clearly improved: not visible along routes	LAND3
Forest biodiversity: endangered species	Decrease: 10% of species extinct	BIO1
	No change: 200 endangered species	
	Increase: populations increase by 10%	BIO3
Carbon sequestration by forests: carbon emissions eliminated	Decrease: emissions of 80,000 tourists	CARB1
	No change: emissions of 100,000 tourists	
	Increase: emissions of 120,000 tourists	CARB3
Payment for environmental management: €/visitor/week	*No payment*, 5€, 10€, 20€, 30€ and 50€	PAY

Attributes and attribute levels

In the CE study, the respondents chose the preferred alternative from the status quo and two generic alternatives described by four environmental attributes and a monetary attribute (Table 1). The *quality of landscape* attribute deals with the scenic quality of the forest environment, and *outdoor routes* are related to recreational facilities and access. Both attributes represent factors that are important to the quality of visitors' recreational experience, hence to the attractiveness of the destination and to nature-based tourism as a sustainable economic activity. The quality of landscape was represented by the frequency of visible traces of forestry operations, especially clearcutting, along the routes.[4] Similar attributes, such as evidence of forestry activities and the size and shape of harvesting gaps, have been found in several previous studies to be of primary importance to the benefits of forest recreation (Hanley, Wright, and Adamowicz 1998; Boxall and Macnab 2000; Holmes and Boyle 2003; Tyrväinen, Mäntymaa, and Ovaskainen 2014; Juutinen *et al.* 2017). Outdoor routes (paths, ski tracks, husky, and snowmobile routes) are not only important for recreational access (Adamowicz *et al.* 1998; Boxall and Macnab 2000; Campbell *et al.* 2013; Tyrväinen, Mäntymaa, and Ovaskainen 2014) but also contribute to the environmental sustainability of nature-based tourism by mitigating degradation in the natural environment through excess trampling (Hill and Pickering 2009; Törn *et al.* 2009). The *biodiversity* and *carbon sequestration* attributes are related to the environmental responsibility and sustainability of nature-based tourism. Various measures of biological diversity have been used in previous studies (Adamowicz *et al.* 1998; Horne, Boxall, and Adamowicz 2005; Meyerhoff, Liebe, and Hartje 2009; Juutinen *et al.* 2011; Tyrväinen, Mäntymaa, and Ovaskainen 2014). In this study, biodiversity was represented by changes in the populations of endangered species. Carbon sequestration was linked to the carbon emissions from tourism travel (Becken and Patterson 2006) eliminated by forest growth.

The payment vehicle for obtaining a monetary measure of visitors' WTP for enhanced environmental forest services, and examining their willingness to contribute to the funding of the proposed environmental management, was *a payment for environmental management*. The payment was assumed to be charged in connection with accommodation prices by the tourism enterprises. Such a payment vehicle was chosen for its similarity with environmental taxes that are included in the hotel bill in many tourism destinations internationally and, accordingly, are familiar to tourists. One week being the typical length of stay in the Ruka-Kuusamo area, the payment in this study was presented as being charged in Euro per visitor per week. Of other potential payment vehicles, direct user fees for outdoor activities were rejected since given the tradition of everyman's right and free access to statutory special areas, such fees are not practicable and credible to Finnish people. Taxation, in turn, is not relevant, since the proposed mechanism is to be truly market-based rather than public sector driven.[5]

Data collection and analysis

The visitor survey covered both domestic and foreign tourists visiting the area.[6] In addition to Finnish, the questionnaire was provided in English, French, German, and Russian. The data were collected with an on-site survey administered in the Ruka tourist resort and Kuusamo town centre in the 2011 winter–spring ($n = 558$, 20% foreign tourists) and summer–fall seasons ($n = 547$, 22% foreign) with a total of 1,105 completed forms. Thirty-nine respondents (3.5%) were identified as protesters due to objections to the payment vehicle or lack of faith in the scenarios.

The CE attributes were dummy coded except for the payment that was treated as continuous. For dummy coded attributes, the current situation was used as the reference level. Notably, for all of the environmental attributes, both an increase and a decrease from the status quo were assumed. Based on the well-known asymmetry in the valuation of gains and losses (e.g. Hess, Rose, and Hensher 2008), the WTP for an increase in an attribute is likely smaller than the WTA compensation for a decrease of an equal size. The ASC was also dummy coded with the value one for the current situation and 0 for the two generic alternatives. A design optimized by NGene 1.0.2 for D_B efficiency, with priors based on a pilot survey, was used. The final design had 24 choice tasks in four blocks, resulting in six choice tasks per respondent.

2.3. Latent class model for choice experiment data

While the conditional logit (CL) model is often used as a benchmark in analysing CE data, its assumption of homogeneous preferences implies that the results represent average effects over the respondents. To shed light on the differential welfare effects and reactions to policy changes across respondents, the LCM (Boxall and Adamowicz 2002; Greene and Hensher 2003) was applied. The LCM deals with preference variation that comes in the form of groupings of individuals and assigns individuals into relatively homogeneous segments.[7]

The LCM can be derived from a random utility model, where the utility function of each respondent is the sum of a deterministic term described as a function of factors that influence respondents' utility, and a random term that is stochastic and unobservable to the researcher. Assuming that S classes exist and individual n belongs to class s ($s = 1,\ldots, S$), the unobservable overall utility U of alternative i for respondent

n is represented by:

$$U_{ni\,|\,s} = \beta_s x_{ni} + \varepsilon_{ni\,|\,s}, \tag{1}$$

where β_s is a class-specific vector of utility coefficients of observed variable x_{ni} for respondent n. Thus, the deterministic term of the utility function is $V_{ni|s} = \beta_s x_{ni}$.

Assuming a type I extreme value distribution for ε_{ni}, the logit probability for choosing alternative i conditional on class membership is defined as:

$$L_{n\,|\,s}(i) = \frac{\exp(\mu_s \beta_s x_i)}{\sum_{k \in C} \exp(\mu_s \beta_s x_k)}, \tag{2}$$

where C denotes the respondent's choice set and μ_s is a class-specific scale parameter. The joint probability $P_n(i)$ that individual n belongs to class s and chooses alternative i is

$$P_n(i) = \sum_{s=1}^{S} \pi_{ns} L_{n\,|\,s}(i), \tag{3}$$

where π_{ns} is the membership probability. Preference heterogeneity is accounted for by simultaneously assigning individuals into behavioural classes and estimating the choice model. Thus, preferences are assumed to be homogeneous within each class, but vary between the classes. Individual-specific variables can be used to explain class membership.

The welfare effects of alternative management scenarios are obtained with the formula (Hanemann 1982):

$$\mathrm{CV}_s = \frac{1}{\lambda_s}(V_s^0 - V_s^1), \tag{4}$$

where CV_s is the compensating variation and λ_s is the marginal utility of income (the coefficient of the cost attribute) for segment s. The 0 and 1 superscripts in the indirect utility refer to the initial state and a new state following a change in attributes, respectively. Thus, measuring a change in welfare associated with decreasing some attribute in the utility function involves estimating the amount individuals must be compensated to remain at the same utility level as before the decrease. In addition to the LCM, the standard single-class CL model is also used as a benchmark. Formally, the CL is similar to the LCM except that the former includes only one segment, and therefore, it does not include the membership probability function.

3. Results

3.1. Visitor grouping based on attitudinal responses

For a general view of the visitors' attitudes towards the management of forest resources, the respondents were presented with 14 attitudinal statements related to forest management and landscape and environmental amenities that they were asked to evaluate on a five-point Likert scale from *strongly disagree* to *strongly agree*. For a concise description of the attitudinal diversity among the visitors, the responses were analysed

Table 2. Principal components based on attitudinal statements related to the management of forest resources and landscape and environmental amenities (Varimax rotation with Kaiser normalization. Loadings of 0.50 or above in boldface).

	I	II	III	IV
Timber production should be limited for enhanced biodiversity	**0.808**	0.074	−0.007	0.135
Timber production should be limited for a more pleasant landscape	**0.748**	−0.036	0.013	0.163
Timber production should be limited for preventing climate change	**0.664**	0.145	−0.063	0.033
Forests are already sufficiently protected so there is no need for additional protection	**−0.607**	−0.044	0.305	−0.013
The forests of the area should mainly be managed for maximizing timber production	**−0.594**	0.113	0.276	−0.031
Biodiversity should be preserved	**0.583**	0.217	−0.010	−0.140
Off-road vehicles disturb nature and other people in nature	0.409	0.325	0.193	−0.193
People can slow down climate change by changing their behaviour	0.409	0.374	0.024	−0.224
Tourists should pay their share for preserving the landscape	0.034	**0.793**	0.056	−0.013
I would be prepared to pay my own share into the Ruka-Kuusamo Environmental Management Fund	0.101	**0.768**	−0.069	0.206
Forest-owners' participation in landscape management should be voluntary	−0.140	−0.231	**0.780**	0.053
Private forest owners should be compensated for the costs of landscape management and lost income	−0.065	0.359	**0.650**	0.018
More hiking and skiing routes should be opened in the forests of the area	−0.121	0.098	0.042	**0.728**
Privately owned forests should be managed primarily with the interests of tourism in mind	0.282	−0.016	0.014	**0.694**
Eigenvalue (rotation sum)	3.177	1.745	1.253	1.211
Cumulative variance explained, %	22.69	35.16	44.10	52.76

Note: Interpretation of principal components:
I Environmentalism,
II the user pays principle,
III forest owner's view, and
IV tourism business orientation.

with PCA and CA (e.g. Afifi and Clark 1996). The interpretation of PCA results is based on the statements with the highest loadings on each component. The four-component solution (Table 2) was considered most appropriate in terms of interpretation and statistical performance.

The first component was characterized by high loadings of variables related to biodiversity, landscape, and climate change. Consequently, it was taken to represent *Environmentalism*. Support to payments by tourists in general and by the respondent personally had high loadings on the second component accordingly labelled *The user pays principle*. The third component, *Forest owner's view*, was established by an emphasis on the voluntary basis of private forest owners' participation in landscape

Table 3. Visitor groups based on attitudinal principal components (*K*-means clustering).

Visitor group	*n*	Mean of original variable scores			
		I	II	III	IV
1. Responsible recreationalists	460	**3.63**	**3.82**	3.08	3.16
2. Forest-owner minded	341	3.49	3.29	**4.27**	**2.83**
3. Everyman's rights enthusiasts	283	3.35	**2.13**	2.99	**2.78**
F ratio		41.24	676.15	544.12	28.98
p Value		0.000	0.000	0.000	0.000

Note: Interpretation of principal components:
I Environmentalism,
II the user pays principle,
III forest owner's view, and
IV tourism business orientation.

management and on the importance of compensating private forest owners for the costs. Finally, the fourth component was characterized by support to the construction of more outdoor routes and to taking the interests of tourism into account in the management of privately owned forests. Thus, it was labelled *Tourism business orientation*.

As such, the principal components only identify the main attitudinal dimensions in the data. Indicating their relative frequencies in the population, and even the very existence of respective groups, requires a further grouping that also allows combinations of the dimensions. Therefore, attitudinal variables for further use were created as the sum of original scores for the variables loaded onto each principal component (e.g. de Vaus 1996, Ch. 15).[8] The resulting variables were used as grouping variables in the CA. *K*-means clustering was used. As 2–5 groups were tried, a three-group solution (Table 3) turned out to be the most appropriate for interpretation.

The attitudinal groups, established by the principal components with the largest upward or downward deviations from the overall mean of the scores (3.24), were labelled as follows: *Responsible recreationalists* (42.4% of respondents) supported the protection of biodiversity, landscape, and climate ($3.63 > 3.24$) as well as visitor payments ($3.82 > 3.24$), but were not interested in forest owners' or the tourism industry's views. *Forest-owner minded* respondents (31.5%) strongly supported the forest owner's view ($4.27 > 3.24$) but objected to the tourism business orientation ($2.83 < 3.24$). *Everyman's rights enthusiasts* (26.1%), while more or less supporting conservation and the forest owner's view, strongly disapproved of the 'user pays' principle ($2.13 < 3.24$) as well as the tourism business orientation ($2.78 < 3.24$).

The findings suggest significant attitudinal diversity among visitors. Based on the PCA, rather different and potentially conflicting orientations are represented from an environmentally friendly overall attitude and specific support to visitors' participation through payments, to an emphasis of forest owners' views and tourism business. For the CA, combinations of attitudinal dimensions reveal visitor groups with distinct attitudinal profiles. The environmentalist attitude and acceptance of visitor payments in combination establish a group of environmentally responsible visitors who also seem to be willing to carry a part of the costs of environmental management. A distinct group emerges from sympathy with forest owners' views combined with dislike of the tourism business. A final group is characterized by the disapproval of all types of 'commercialization' in the use of nature, whether through direct user payments or a more pronounced role of the tourism industry.

3.2. Segmentation by choice behaviour: the latent class model

We next focus on the importance of changes in specific forest attributes as reflected in the visitors' choice behaviour and WTP. For the visitors, on average, a single-segment CL model (Table 4) suggested that the largest WTP effects were related to a clear improvement in the quality of landscape (LAND3) and to an increase in biodiversity (BIO3). The highest compensation claims were associated with a decrease in biodiversity (BIO1) and for staying at the status quo (ASC). Since significant variation in preferences across visitors can be expected, however, the LCM was estimated. Based on the AIC and BIC information criteria and goodness-of-fit measures (McFadden's pseudo R^2), the three-class model in Table 4 was the preferred solution.

The estimated LCM strongly supports the expectation of significant heterogeneity in visitors' preferences. The model establishes three classes of visitors that clearly differ in terms of the coefficients for the payment attribute (PAY), as well as the significance of and WTP effects for the environmental attributes. For each class, the last column shows the class-specific marginal WTP (Euro/visitor/week) related to changes in the levels of the attributes, i.e. willingness to pay for a gain (positive WTP) or willingness to accept compensation for a loss (negative WTP).

For classes 2 and 3, most of the coefficients are highly significant with the expected signs, and positive WTP effects are expectedly obtained for improvements in most of the environmental attributes. For class 1, in contrast, there are several insignificant coefficients suggesting that the visitors assigned to this segment are indifferent to changes in many attributes. As such, the result that some attributes in some classes are insignificant is not unusual in LCMs (Boxall and Adamowicz 2002; Birol, Karousakis, and Koundouri 2006; Putten *et al.* 2011; Juutinen *et al.* 2017). Furthermore, some changes that are supposedly improvements are perceived as undesired (i.e. losses). Examples of such somewhat unexpected reactions are the negative WTP effects for

Table 4. Estimated conditional logit model with marginal WTP effects for significant variables.

	Coefficient	Std. error	WTP
ASC	***−0.5148	0.071	−18.74
ROUT1	***−0.3481	0.061	−12.67
ROUT3	−0.0868	0.068	
LAND2	***0.2655	0.061	9.66
LAND3	***0.3580	0.055	13.03
BIO1	***−1.0922	0.066	−39.75
BIO3	***0.2819	0.049	10.26
CARB1	−0.0956	0.062	
CARB3	−0.0480	0.062	
PAY	***−0.02 748	0.001	
R squared	0.0920		
Log-likelihood	−5663.8028		
AIC/*N*	1.986		
BIC/*N*	1.997		
N	5715		

***significant at 0.01 level.
**significant at 0.05 level.
*significant at 0.10 level.

Table 5. Estimated latent class model with marginal WTP effects for significant variables.

	Class 1: Common outdoors activists			Class 2: Environmentalists			Class 3: Well-behaved majority		
	Coefficient	Std. error	WTP	Coefficient	Std. error	WTP	Coefficient	Std. error	WTP
ASC	*−0.6486	0.381	−3.93	0.0988	0.228		***−1.5199	0.125	−76.15
ROUT1	−0.0896	0.441		***−1.4933	0.269	−18.27	***−0.3305	0.097	−16.56
ROUT3	0.3803	0.424		0.0091	0.271		*−0.1950	0.108	−9.77
LAND2	−0.5257	0.360		***0.9720	0.290	11.89	**0.2263	0.101	11.34
LAND3	***2.4060	0.504	14.58	0.1436	0.300		***0.3245	0.075	16.26
BIO1	***−2.7852	0.453	−16.88	***−2.0375	0.319	−24.93	***−1.0065	0.098	−50.43
BIO3	−0.2876	0.315		***0.5649	0.180	6.91	***0.3391	0.080	16.99
CARB1	−0.0999	0.340		***−0.7965	0.268	−9.75	0.0708	0.103	
CARB3	***−1.4398	0.522	−8.72	**0.6363	0.263	7.79	0.0110	0.102	
PAY	***−0.16 504	0.032		***−0.08 172	0.010		***−0.01 996	0.002	
Class probabilities		0.143			0.364			0.494	
R squared		0.3048							
Log-likelihood		−4336.73							
AIC/*N*		1.529							
BIC/*N*		1.566							
N		5715							

***significant at 0.01 level.
**significant at 0.05 level.
*significant at 0.10 level.

increased outdoor routes (ROUT3) in class 3 and for increased carbon sequestration (CARB3) in class 1. The results of the LCM can be summarized by labelling the latent classes as follows.

Class 3, a dominant segment with a membership probability of nearly 50%, can be labelled *Well-behaved majority: landscape and biodiversity matter*. The significant negative ASC suggests a preference for a change from the status quo, and the smallest coefficient for the payment attribute implies the largest propensity to pay across the classes. The visitors assigned to class 3 wish to keep the length of outdoor routes at the current level, as they clearly dislike a reduction in routes (ROUT1) as well as an increase (ROUT3). The quality of landscape matters expectedly, as indicated by the positive WTP effects for both slight and clear improvements (LAND2, LAND3) in this attribute. The level of biodiversity also matters, since the visitors perceive a decrease in biodiversity (BIO1) as a major loss and show a remarkable WTP for an increase (BIO3). Given the perceived loss from reduced biodiversity, the objection to more outdoor routes might be motivated by concerns that an increased density of routes is detrimental to biodiversity. Another plausible motivation to the latter result is that an excess of constructed routes would reduce the naturalness of the recreation environment in terms of the landscape, and also increase encounters with other tourists. With both CARB1 and CARB3 insignificant, the visitors assigned to this class do not care about changes in carbon sequestration, though.

Class 2, with a membership probability of 36%, can be labelled *Environmentalists: biodiversity and climate change matter*. The insignificant ASC suggests neither preference for, nor reluctance to, a change from the status quo, and the coefficient of the payment attribute is at a medium level across the classes. While the visitors assigned to this class dislike a reduction in outdoor routes (ROUT1), they are not willing to pay for an increase in routes (ROUT3). They are willing to pay for a slight improvement in the quality of landscape (LAND2) but, somewhat surprisingly, not for a clear improvement (LAND3). Biodiversity also matters in that a reduction (BIO1) is perceived as a loss, while the WTP for an increase (BIO3) is modest. Notably, the visitors assigned to this class are the only segment of respondents who also care about climate change, with a modest perceived loss from a reduction in carbon sequestration (CARB1) and a WTP in the same order of magnitude for an increase (CARB3) therein.

Finally, class 1 with a minor probability of 14% can be labelled *Common outdoors activists: everyman's rights matter*. The insignificant ASC suggests neither clear preference for nor reluctance to a change. With the largest coefficient for the payment attribute, visitors in this segment have the smallest propensity to pay across the classes. While indifferent to changes in outdoor routes (ROUT1, ROUT3), they appreciate a 'clear improvement' in the landscape (LAND3) with rather modest WTP. Even though they perceive a reduction in biodiversity (BIO1) as a loss, they are not willing to pay for an increase therein (BIO3). Notably, while indifferent to a reduction in carbon sequestration (CARB1), the visitors in this class even seem to perceive an increase therein (CARB3) as undesirable.

One of the main findings was that the visitors assigned to classes 2 and 3 exhibit positive WTP effects especially for enhanced quality of landscape and biodiversity. That is, the majority of the visitors seem to be willing to contribute to improvements in these attributes of the recreation environment through payments for environmental management. In this respect, the LCM results are in line with the overall picture given by the single-segment CL model (Table 6). On the other hand, however, the LCM reveals significantly different and potentially conflicting preferences for some of the attributes (i.

Table 6. Compensating variations (CV) for management scenarios (€/visitor/week).

	Latent class model (probability)			Conditional logit
Scenario	Class 1 (0.143)	Class 2 (0.364)	Class 3 (0.494)	
1. Recreation oriented	14.58	0.00	6.49	13.03
2. Multiple-use forestry	14.58	6.91	33.25	23.29
3. Environmentally friendly	−8.72	14.7	16.99	10.26

e. indifference or perceived loss rather than gain from what is supposedly an improvement) across the segments. Thus, accounting for preference heterogeneity brings out more subtle nuances of visitor preferences that may have important implications regarding the design of actions aimed at engaging tourists with the funding of environmental management.

3.3. Welfare effects and feasibility of management scenarios

To examine how alternative management practices would influence visitors' economic welfare (compensating variation, CV, see equation 4), three scenarios were created. In each scenario, two attributes were changed from the current level with the other attributes kept at their current levels. In scenario 1, *Recreation-oriented management*, outdoor routes in private forests are increased (ROUT3) and the landscape clearly improved so that no visible traces of intensive forest management along the routes remain (LAND3). For scenario 2, *Multiple-use forestry*, the landscape is clearly improved (LAND3) and biodiversity is improved with increased populations of endangered species (BIO3). In scenario 3, *Environmentally friendly management*, biodiversity is improved (BIO3) and carbon sequestration by forests increased (CARB3). To highlight the advantage of the LCM, the welfare effects based on the single-segment CL model are also reported.[9]

Based on the average WTP effects from the CL, the *Multiple-use forestry* scenario would result in the highest and the *Environmentally friendly management* scenario in the lowest welfare improvement (Table 6). Notably, however, applying the average WTP values as a benchmark for the visitor payments on an LRVT scheme would imply a welfare loss to some segments of visitors. For example, the WTP of classes 1 and 2 for the *Multiple-use forestry* scenario is lower than the average WTP. Thus, the payments in the LRVT scheme must be set at a conservative level to avoid losses to some visitor segments and to achieve a wide acceptance for the new policy instrument. In addition, it seems that *Recreation oriented management* is not the best option but an improvement in biodiversity should also be pursued along with the quality of the landscape. This multiple-use scenario is also practically feasible, since management practices that improve the landscape, such as reduced clear-cutting and site preparation, also support biodiversity.

For the LRVT initiative to be viable, the visitor payments cannot exceed the benefits accruing from the enhanced management practices. On the other hand, the sum of payments must exceed private forest owners' perceived costs of provision (i.e. compensation claims for a contract), since otherwise they are not willing to participate in the programme. For an illustration, the LCM results suggest that 7 Euro/visitor/week (i.e. 1 €/visitor/night) would be a payment level that all the classes are willing to pay for the implementation of the *Multiple-use forestry* scenario. Assuming an estimated annual

number of 500,000 registered overnight stays in the Ruka-Kuusamo area, such a payment could eventually result in an annual revenue of half a million Euro. The average compensation required for the Ruka-Kuusamo area's forest owners to engage in a 10-year contract roughly corresponding to the *Multiple-use forestry* scenario would be around 225 €/hectare/year (Ovaskainen *et al.* 2014). At this estimated per-hectare cost, about 2,200 hectares of forest land and a few hundred landowners (at, say, 5–10 ha each) could be contracted annually. This suggests that the LRVT initiative could be financially feasible in the Ruka-Kuusamo tourism area.

3.4. Latent class model with attitudinal variables

One may note that the latent classes have some obvious similarities with the attitudinal groups. Class 2 (*Environmentalists*) resembles group 1 (*Responsible recreationalists*), characterized by environmentally friendly attitudes and acceptance of visitor contributions, as does class 3 (*Well-behaved majority*). Similar to group 1, the members of classes 2 and 3 (together representing the majority of visitors) seem to be willing to support environmental management in the area through payments. On the other hand, group 3 and latent class 1 are very similar in that both disapprove of visitor payments and show little WTP for any of the environmental attributes.

Following the use of motivational statements in the LCM by Boxall and Adamowicz (2002), the attitudinal variables were also included in the LCM as individual-specific characteristics (Table 7).[10] The magnitudes and significance of the effects of some attributes change due to changes in class sizes and in the magnitude of the price coefficient. All in all, however, the attitudinal variables add some insights into the sources of preference heterogeneity.[11]

The previous interpretation of class 2 with the highest probability (cf. class 3 in the basic model) as *Well-behaved majority* remains valid. Based on the class membership parameters, this class is more likely to accommodate visitors who have environmentally oriented attitudes and accept user payments. For the smallest class 1, few attributes are significant, as before, but the effects are better in line with a priori expectations. Class 1 is less likely to accommodate visitors who have environmentally oriented attitudes, accept the user pays principle, or support tourism business interests. Thus, its previous interpretation as *Common outdoor activists* is strengthened. For the *Environmentalists*, the main change is that while biodiversity matters roughly the same as before, changes in carbon sequestration have no significant effects at all. Unlike the basic LCM, a clear improvement in the landscape gets a positive WTP effect that is expectedly larger than that of a slight improvement.

4. Discussion

4.1. General lessons learned

This study focused on potential means to enhance the quality of forested environments within and/or nearby tourism areas by engaging the tourism sector and private landowners in specific forest management practices on private land. Visitors' attitudes towards forest management and their willingness to contribute to environmental management were investigated with a focus on the heterogeneity of preferences among the visitors of the Ruka-Kuusamo area in Finland. Such information is crucial for assessing the feasibility of the LRVT initiative in the area. To address the challenge of

Table 7. Latent class model with attitudinal variables (class membership parameters for class 3 fixed to identify other coefficients).

	Class 1: Common outdoors activists			Class 2: Well-behaved majority			Class 3: Environmentalists		
	Coefficient	Std. error	WTP	Coefficient	Std. error	WTP	Coefficient	Std. error	WTP
ASC	−0.0489	0.286		***−3.0930	0.513	−215.99	***−0.6763	0.138	−18.64
ROUT1	*** −1.3997	0.341	−9.57	***−0.6312	0.197	−44.08	***−0.3124	0.113	−8.61
ROUT3	−0.3313	0.340		***−0.6799	0.235	−47.48	0.1636	0.127	
LAND2	0.0587	0.284		0.2908	0.215		***0.3099	0.114	8.54
LAND3	***0.8048	0.257	5.50	*0.2245	0.117	15.68	***0.5175	0.105	14.26
BIO1	***−2.1860	0.392	−14.94	***−0.8113	0.177	−56.66	***−1.4002	0.162	−38.60
BIO3	0.2094	0.202		***0.5260	0.165	36.73	**0.2001	0.093	5.51
CARB1	−0.2920	0.285		0.1722	0.201		−0.0911	0.133	
CARB3	0.1936	0.344		0.1168	0.205		−0.0228	0.117	
PAY	***−0.1463	0.026		***−0.0143	0.003		***−0.0363	0.004	
Class membership parameters									
Intercept	***3.4462	1.055		***−4.6462	1.283				
SUM1P	** −0.6099	0.278		**0.7202	0.336				
SUM2P	*** −0.4204	0.137		***0.5686	0.165				
SUM3P	0.0054	0.021		0.0032	0.007				
SUM4P	**−0.2868	0.144		−0.1613	0.156				
Class probabilities		0.174			0.418			0.408	
R squared		0.3132							
Log-likelihood		−4284.02							
AIC/*N*		1.513							
BIC/*N*		1.560							
N		5715							

***significant at 0.01 level.
**significant at 0.05 level.
*significant at 0.10 level.

collecting a representative sample of tourists in a tourism area, a relatively large data-set was gathered to represent different groups of tourists and nationalities visiting the area.

According to our CE results, the visitors, on average, were prepared to pay for improvements in the recreation environment, in particular for enhanced landscape quality and biodiversity, that are achievable through the proposed contractual mechanism for adjusted forest management. This result, along with the responses to direct questions on the visitors' opinions, can be interpreted to imply that the majority of the visitors were willing to contribute to the implementation of the proposed LRVT mechanism through payments for environmental management. This is in line with previous research suggesting that a large share of nature-based tourists are environmentally aware and willing to make sustainable consumption choices during their stay (Dwyer *et al.* 2009; Tyrväinen *et al.* 2014).

However, considerable variation in valuations was expectedly found due to the heterogeneity of visitors' preferences for environmental quality. The heterogeneity was linked to visitors' socio-demographic characteristics as well as differences in attitudes regarding environmental quality and landowner rights. Perceptions of the quality of the recreation environment may also vary with specific outdoor activities and, consequently, with the season (Tyrväinen, Silvennoinen, and Hallikainen 2017; Jackson 1986, 1987). In the present case, however, no significant difference in preferences was found between the summer-season and winter-season visitors.

The study confirms previous findings suggesting that the landscape and its maintenance is one of the key attractions of nature-based tourism destinations (Tyrväinen *et al.* 2008; Tyrväinen, Silvennoinen, and Hallikainen 2017). For Ruka-Kuusamo, the most important visitation motivations were the attractive scenery, tidy surroundings, and the environment in general (Tyrväinen, Mäntymaa, and Ovaskainen 2014). Hudson (2000) and Bell *et al.* (2007) concluded that resorts with fairly natural conditions and sound programmes for environmental management, in general, show an increase in the number of visits. Similarly, tourists in Finnish Lapland consider the implementation of sustainable tourism principles by the resorts important (Tyrväinen *et al.* 2014). As tourists, however, are not willing to take too much trouble during their stay, the core issue in enhancing sustainable tourism development is to create an easy, relatively effortless way of participation for the tourists. Tourism entrepreneurs' as well as landowners' attitudes are also vital.

A couple of the findings of this study may seem to be somewhat contradictory, i.e. some environmental changes that are presumably improvements are perceived as undesired or losses for visitors. However, this kind of conflicting preferences may occur, for example, when tourists who value wilderness and untouched nature might experience loss of welfare from the increase in tourism facilities, such as hiking or skiing routes (e.g. Juutinen *et al.* 2011). Moreover, visitors are often willing to engage in actions that are relatively easy and have direct value for them, but do not restrict considerably their holiday experience or cause much inconvenience (Tyrväinen *et al.* 2014). This may also be the reason why most tourists are willing to contribute to landscape and biodiversity protection and enhancement. Finally related to carbon sequestration, for example, one reason for conflicting preferences may be the fact that all people do not believe that human activity is a cause for, or could hinder, climate change.

4.2. Attitudinal and preference heterogeneity

Significant heterogeneity was found in visitors' attitudes and preferences regarding landscape and biodiversity values. Based on general attitudes, three groups were identified: *Responsible recreationalists*, *Forest-owner minded*, and *Everyman's rights*

enthusiasts. Three classes were also found in visitors' choice behaviour and WTP for changes in specific forest attributes: *Well-behaved majority*, *Environmentalists*, and *Common outdoors activists*. Both analyses identified two closely similar visitor segments: one emphasizing landscape quality and biodiversity, the other focusing on everyman's rights with less attention to the quality of the environment. It is no surprise that not all of the three groups/classes coincide. This is because the attitudinal questions covered a wide spectrum of general issues related to sustainable tourism and forest management that may not all be linked to the specific management attributes considered. In particular, issues related to social acceptability that are the main determinants of the *Forest-owner minded* group are not directly related to the considered attributes.

4.3. Policy implications

Although a large majority of the visitors were willing to pay for enhanced forest landscape and biodiversity in private forests used for recreation, converting the latent demand and stated WTP into a real flow of funds to the suppliers of ecosystem services is challenging. The crucial condition for successful new practices is creating a credible and cost-effective scheme of participation for environmental management. A key issue in designing a functional mechanism is the appropriate level of visitor payments, especially as the diversity of attitudes and WTP across visitors needs to be considered. While the payments must be moderate not to exceed the benefits of adjusted management, the compensations paid to private landowners must fully cover their perceived costs for the landowners to be willing to enroll. An illustration with tourists' aggregate WTP and forest owners' estimated compensation claims suggested that a substantial area of private forest lands could be contracted annually with a reasonable payment per overnight stay. Thus, the LRVT initiative could be financially feasible in the case area.

Considering the potential for improving the social sustainability of nature-based tourism within the studied tourism area, the central finding is the existence of a particularly environmentally oriented segment of visitors. The mere launching of a contractual scheme for environmental management could enhance the public image of the area's tourism as a socially sustainable and environmentally responsible business (e.g. Beerli and Martin 2004). Along with an actual improvement in environmental quality over time, this could attract new groups of tourists with a preference for environmental quality. More generally, improvements in the provision of public benefits and distribution of tourism income could increase the acceptability of the tourism sector locally and improve the integration of forestry and tourism sectors in the long run.

5. Summary and conclusions

Related to the research questions, the following summarizes the main results of the study: first, as expected significant heterogeneity was found in visitors' attitudes regarding landscape and environmental benefits in the nature-tourism area. Based on general attitudes, three groups were identified: responsible recreationalists, forest-owner minded, and everyman's rights enthusiasts. Second, linked to the proposed contractual PES mechanism for adjusted forest management, the visitors on average were prepared to pay for improvements in the recreation environment, in particular for enhanced landscape quality and biodiversity. This result, along with other information received from the respondents, can be interpreted to imply that the majority of the visitors were willing to contribute to the implementation of the proposed mechanism through payments for

environmental management. Third, on top of the heterogeneity of visitors' attitudes, considerable variation in valuations was found due to the heterogeneity of visitors' preferences for environmental quality. More precisely, three classes were identified in visitors' choice behaviour and WTP for changes in specific forest attributes.

From a policy point of view, the preference heterogeneity of potential payers is important when planning and implementing a PES system in a nature-tourism area. Along with an actual improvement in environmental quality over time, a well-functioning PES could attract new groups of tourists to the area, increase the local acceptability of the tourism sector, and improve the integration of forestry and tourism sectors in the long run.

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Notes

1. Sharpley (2000, 11) argues that while environmentally responsible practices have been largely adopted in the tourism industry, especially the objectives of social sustainability have failed, as reflected in local communities' split attitudes towards tourism.
2. In this study, we examine a mechanism, in which funding for payments to landowners could be collected from visitors to the area. In Finland, the mechanism is unique in the sense that private sector compensates private business to increase the quality of environment. The funding could also be collected directly from tourism companies, who benefit from the increased landscape quality. It is, however, difficult to assess what are the exact benefits for each company, and they may have an incentive to free-ride. The willingness of tourists to contribute to the environmental management, however, is useful information to companies and may improve the acceptability of the system within the tourism sector. Hence, the approach in which the funding is collected from visitors seems to be more promising as a starting point than to collect the money from companies. A separate survey has recently been conducted to study nature-based tourism companies' willingness to participate in the LRVT in the study area.
3. In this study, attitudes are regarded as positive, negative or indifferent feelings towards something. Attitudes do not include a dimension of comparison like preferences do. In addition, attitudes do not behave according to the basic preference axioms (Opaluch and Segerson 1989). However, preferences and associated marginal valuations may have a basis in individuals' attitudinal beliefs. To reveal respondents' attitudes our survey included several attitudinal statements covering a wide spectrum of general issues related to sustainable tourism and forest management and a 5-point scale ranging from a 'fully agree' to 'fully disagree' response.
4. The attribute 'quality of landscape' has two hypothetical levels, both improving the quality. The reason for not including a decreasing level is that in the case study area commercial forestry in Ruka-Kuusamo is often conducted in an intensive way aiming at maximising timber production including clear cutting and soil preparation. Discussions with the experts

from the local forestry and tourism industry also supported the choice of the two improving levels that improve the landscape for tourism use.

5. According to visitors' opinions concerning the compensations payable to landowners and their willingness to contribute to environmental management, the payment charged along with accommodation prices was the most preferred way of collecting the funds, supported by almost half of the respondents (Tyrväinen, Mäntymaa, and Ovaskainen 2014). The relatively low proportions of serial non-participants (around 10%) and respondents disapproving of the payment vehicle or rejecting the programme as unconvincing (fewer than 4%) point to the same conclusion.
6. Although local visitors are not 'proper tourists' as defined through an overnight stay, for example, a small share of local visitors (people living in the municipality of Kuusamo) were included in the sample. Because local visitors are also recreational users of the tourism area, we preferred to give them 'a say' as well. In the end, as the local visitor variable was tried as a class membership variable, local visitors' preferences did not significantly differ from those of the 'proper tourists'.
7. The LCM, previously used in marketing and psychology, was applied to recreational data by Provencher, Baerenklau, and Bishop (2002) and Boxall and Adamowicz (2002). Boxall and Adamowicz considered latent classes in destination choices for wilderness recreation and, to incorporate social and psychological influence with choice attribute data, applied factor analysis to a set of motivational statements. Further applications to recreation and landscape include Provencher and Bishop (2004), Scarpa and Thiene (2005), Grammatikopoulou *et al.* (2012), and Juutinen *et al.* (2017). A different model for unobserved taste heterogeneity, the random parameters logit (RPL) (Train 1998, 2003; Hensher and Greene 2003), deals with preference heterogeneity at the individual level across all attributes (Hynes, Hanley, and Scarpa 2008).
8. For original variables with negative loadings, the scale was reversed to make an increasing score for all of the variables depicting an increasing intensity for the respective attitude. The new variables were scaled to the Likert-scale range by dividing the score sums by the number of variables involved in each.
9. Since dummy coding was used for the qualitative attributes, the ASCs capture both the observed (attributes related) and unobserved (latent) information about the status quo. As it is not possible to separate these two components, the ASC was not included in calculating the CV estimates.
10. To avoid loss of observations, missing values were replaced by the average scores.
11. The rationale of using attitudinal responses to explain choice behaviour and WTP has also been challenged. Morey, Thacher, and Breffle (2006) and Morey *et al.* (2008) argue that attitudinal responses cannot determine WTP responses or choice behaviour because WTP responses, observed choices, and answers to attitudinal questions all manifest the same latent preferences. Econometrically, attitudinal variables in a choice model might induce an endogeneity bias on the goodness-of-fit measures. In our case, however, a major problem is unlikely to exist, since the attitudinal questions deal with much more general cognitive and motivational constructs (values) than do preferences manifested in the choice situations contingent on the specific attributes. For more rigorous treatment of attitudes in discrete choice models, hybrid choice models have been developed (e.g. Kim, Rasouli, and Timmermans 2014), but the issue is beyond the scope of the present paper.

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