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Visitors' experience with conservation areas and their willingness-to-pay for the preservation of old-growth forests

Michael Getzner [a,*], Anna Kovarovics [b], Hanns Kirchmeir [b], Larissa Posch [b], Claudia Alessandrelli [c], Caroline Celis [d], Simone Mayrhofer [e], Ruth Vanhaecht [d]

[a] Department of Public Finance and Infrastructure Policy, TU Wien, Austria
[b] E.C.O. Institute of Ecology, Klagenfurt, Austria
[c] Abruzzo, Lazio and Molise National Park, Italy
[d] Sonian Forest Foundation, Belgium
[e] Nationalpark Kalkalpen, Austria

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ABSTRACT

The experience of recreationists is known to influence their willingness-to-pay for conservation. This paper presents key findings from a survey of visitors to three old-growth forests in Austria, Italy and Belgium. The results show that respondents hold preferences for nature conservation in regard to the expansion of old-growth and more naturally managed forests for their recreational purposes. Respondents indicated that they would be willing to pay between €2.1 and €4.1 per person a day to fund conservation management. The questionnaire identified the paths and areas where visitors spent their time in the forest. This approach makes it easier to distinguish between the actual use and the presence of old-growth forest. Visitors who experienced old-growth forests also expressed a higher willingness-to-pay for the conservation of these ecosystems. This is also an important finding for conservation management: While there are differences between socio-economic groups and the three forests, visitors who experienced the old-growth forests had a higher willingness-to-pay of roughly €1 per person a day. These results clearly show that visitors value recreation in old-growth forests, and that conservation management could capitalize on this higher valuation by directing visitors to areas associated with high biodiversity values while protecting sensitive areas and funding conservation activities.

1. Introduction and background

Old-growth forests are "consisting of native tree species that have developed, predominantly through natural processes, structures and dynamics normally associated with late-seral developmental phases in primary or undisturbed forests of the same type" (European Commission, 2023; Er and Innes, 2003). This concept "refers to forest ecosystems containing advanced structural stages of natural forest development such as the presence of more large old trees, higher structural complexity, and larger amounts of deadwood in advanced decay stage" (Hirschmugl et al., 2023, p. 762). In particular, old-growth forests maintain habitats for species that depend on these forests (Hendrickson, 2003; Martin et al., 2021). However, definitions of old-growth forests are not clear-cut, and concepts of primary or natural forests are often used as well (European Commission, 2023; Keenan and Read, 2012). "Old-growth forests" are not a separate conservation category (and are not necessarily conserved by a corresponding protection category) but can be described by their characteristics as highlighted above.

In Europe, the area of primary (virgin) forests is estimated to be about 1.4 million hectares, or 0.7 % of the total forest area (Hirschmugl et al., 2023; Sabatini et al., 2020). Primary forests are part of the broader category of old-growth forests, which cover an area of approximately 3 % of the total forest area (ebid.). Other studies such as the European Primary Forest Database estimate the land covered by primary and old-growth forests to amount to over 3 million hectares (Sabatini et al., 2021).

Conservation policies in Natura 2000 sites (according to the EU's [European Union] Habitat Directive), national parks (based on IUCN [International Union for the Conservation of Nature] management categories) and other nature reserves (based on national or other international laws and regulations) often target natural dynamics and natural processes to safeguard biodiversity and prevent further biodiversity loss.

* Corresponding author.
E-mail address: michael.getzner@tuwien.ac.at (M. Getzner).

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The EU Biodiversity Strategy 2030 sets a target to strictly protect all remaining primary and old-growth forests in Europe (European Commission, 2020). Old-growth forests with abundant deadwood have been shown to enhance the natural dynamics and preserve biodiversity (e.g. Burrascano et al., 2008), provided that they are managed according to conservation principles (De Assis Barros et al., 2022).

In regard to the public's perception of the benefits and costs of such forest conservation policies, many research projects have elicited public preferences for old-growth forests, such as willingness-to-pay for their conservation. One potential approach to evaluating conservation policies is to present visitors with different management options, and to ask them about their preferences for changes in the ecosystem (e.g. Becker and Freeman, 2009).

There are a number of methodological problems and uncertainties associated with this approach. The question often arises as to how visitors' preferences for forest ecosystems can be reconciled with the (necessary) ecological measures for a natural forest. Respondents often express preferences for more natural forests (e.g. tree species diversity), and the relationships between recreational values and forest naturalness are statistically significant (Getzner and Meyerhoff, 2020). However, visitors do not perceive forests uniformly, but express very different preferences, e.g., in regard to the amount of deadwood or shrubs in a forest, both of which are crucial for conserving forest biodiversity (Giergiczny et al., 2024). In addition, visitors' perception of the naturalness of a forest may be different from a natural science assessment in terms of ecological quality, biodiversity, or natural dynamics.

While there have been numerous studies on the determinants of recreational values in forests, there have been very few studies to date that specifically identify preferences for the conservation of old-growth forests as defined above in relation to the visitors' perceptions of the naturalness of the forest. This paper presents the results of a survey of visitors in three old-growth forests in Austria, Belgium and Italy. The novelty of the approach foremost lies in the elicitation of WTP for biodiversity conservation policies specifically depending on where the visitors went during their stay in the area. In addition to socio-economic and country-specific determinants, the dependence of preferences on concrete recreational experience is tested by presenting maps to respondents, and identifying the specific areas visited and the naturalness of the forest classified in four broad categories. By overlaying the areas visited by respondents and indicated on respective maps, and the actual ecological attributes of the forest (forest types according to naturalness and commercial use; see Section 4.2), this paper's methodology is able to closely relate visitors' perceptions and their WTP for conservation to the objective characteristics of the old-growth forest.

The following research questions are answered:

- Do visitors express different preferences when presented with two scenarios of conservation policies leading to a changed appearance of the forest?
- Is visitors' stated WTP sensitive to the specific area visited and to recreational experiences?
- Is visitors' willingness-to-pay for the conservation of old-growth forests different in the three reserves?

The paper thus contributes to the literature on the valuation and management of old-growth forests by linking naturalness to recreational experiences and consequently to the willingness-to-pay for conservation. Through the use of maps and the identification of the specific sites chosen by visitors, recreational values can be directly linked to ecological data.

The paper is organized as follows: A brief literature review on selected aspects of valuing old-growth forests is presented in Section 2. In Section 3, the case-study areas and the survey details are discussed, while Section 4 presents the descriptive and econometric results. Finally, a summary and policy conclusions are presented in Section 5.

2. Old-growth forest and visitors' valuation: a brief literature review

With respect to old-growth forests, there is only scant literature on their economic valuation (Becker and Freeman, 2009). Some of the characteristics of old-growth forests, such as the amount of deadwood or the naturalness of the forest, are regularly studied in the environmental valuation literature. However, only a few forest valuation studies have specifically focused on old-growth forests. Old-growth forests regularly represent not only ecological or recreational values, but often also spiritual or heritage values (e.g. Dafni, 2006; Brandt et al., 2015). As mentioned above, many old-growth forests are now part of a nature conservation area, and are often located in the core zone of a reserve. Therefore, the ability of visitors to walk through may be restricted, especially if the forest is protected as a wilderness area (see Długoński et al., 2023). However, respondents to surveys regularly state that they associate their personal well-being with old-growth forests (Elbakidze et al., 2017).

Consequently, studies on the valuation of old-growth forests consider not only use values (e.g., wood and water provision, recreational experience), but also non-use values such as the appearance of the landscape, biodiversity conservation, and spiritual and bequest values (Becker and Freeman, 2009; Paletto et al., 2017; Sutherland et al., 2016). The range of values associated with old-growth forests is quite wide, from about $ 17 to $ 100 per hectare for forest conservation in British Columbia, to over $ 100 per local household in the US (Becker and Freeman, 2009).

Getzner and Meyerhoff (2020) provide a comprehensive study on the recreational value of forests. Austrian forests provide an annual recreational value of about € 500 per person, depending on the degree of naturalness and quietude. An increase of about 10 % in naturalness by reducing logging[1] increases the recreational value by € 13 per person a year. Many of the forests studied in the paper by Getzner and Meyerhoff (2020) are old-growth forests in conservation areas (for instance, about 8 % of forests of the Austrian Federal Forests (ÖBf) are strictly protected).

Although not specifically looking at old-growth forests, an international study in 12 European countries found that respondents in a choice experiment setting preferred older stands with diverse tree species and high structural complexity. Visitor benefits are country-specific, but the basic correlation between benefits and forest complexity was found in all countries (Giergiczny et al., 2024). Another recent study in the U.K. shows that respondents stated a significant willingness-to-pay "for a greater variety of sensory attributes and for an indicator of improved ecological functioning (deadwood for decomposition)" (King et al., 2025, p. 1). Respondents exhibited a WTP of about £ 16 (per person) for a 'medium' scenario of biodiversity indicators, while WTP increased to £ 29 (per person) for a 'high' improvement over the status quo. One of the main biodiversity indicators was the amount of deadwood typical of old-growth forests. As Pastorella et al. (2016) show, around 60 % of visitors prefer natural forests with a significant amount of deadwood, in contrast to 40 % of respondents who said that they would prefer a forest with deadwood removed. These contrasting views show that forest management options (e.g., increasing naturalness by more deadwood) are not per se perceived as being beneficial by all groups of visitors.

Old-growth forests have been ascertained as important foundations of ecotourism (Gunes and Hens, 2007). In regard to other ecosystem services, old-growth forests have been highlighted as important carbon sinks (Bono et al., 2024). In comparing different forest conservation policies, a recent paper emphasized the importance of protecting old-growth forests rather than promoting younger forests through logging (Kellett et al., 2023).

[1] On average, logging is reduced by about 16 % in the relevant nature conservation scenario.

Protected areas (conservation areas, such as national parks) are often established in order to protect old-growth forests; logging bans and other changes of forest management (e.g., hunting) are especially important to conserve these forests (Brandt et al., 2015). Old-growth forests have been shown to be particularly resilient to global warming in terms of carbon sinks and species richness (Thom et al., 2019). Studies suggest that large-scale conversion of old-growth forests into intensive commercial forests may not yield net benefits and therefore cannot be justified on the ground of economic efficiency (Getzner and Kirchmeir, 2021; Van Kooten and Bulte, 1999).

3. Case study areas and valuation methodology

3.1. Case study areas

This study as part of the EU funded LIFE PROGNOSES project (life-prognoses.eu) was carried out in three prominent old-growth forest reserves in Austria, Belgium and Italy (Fig. 1), which are all part of the serial transnational UNESCO World Natural Heritage Site (WNHS) "Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe" (UNESCO, 2025).

This WNHS network of primeval and old-growth forests encompasses 93 sites in 51 protected areas in 18 European countries and illustrates the post-glacial recolonization process of *Fagus sylvatica* (European Beech) in Europe. It represents a wide range of beech forest types, genetic reservoirs, and environmental conditions, thus capturing the full diversity of beech forests across the continent.

The **Abruzzo, Lazio and Molise National Park** is the oldest national park in Italy together with Gran Paradiso National Park. It is located in central Italy and covers an area of approximately 500 km^2. Around 60 % of the park is forested, including what has been identified as the oldest beech forest in Europe (Schirone et al., 2005). As noted by Filibeck et al. (2023), "forest vegetation is dominated by deciduous oaks (*Quercus pubescens* and/or *Q. cerris*) at low elevation, while above c. 1100 m a.s.l. [*1,100 meters above sea level; remark by the authors*] forests are made up almost exclusively of European beech (*Fagus sylvatica*)."

The old-growth forests of the national park are characterized by complex communities with rare indicator species like important bird species associated with old-growth forests (e.g. *Dendrocopos leucotos*, *Accipiter gentilis*), deadwood insects (e.g. *Rosalia alpina*, *Osmoderma eremita*), lichens (e.g. *Lobaria pulmonaria*), fungi and bats. The Marsican Brown Bear (*Ursus arctos marsicanus)*, the Appenines Wolf (*Canis lupus italicus*), the Wildcat as well as the endemic Abruzzo-Chamois (*Rupicapra ornate)* are also present in the area (Kirchmeir and Kovarovics, 2016). The national park was inscribed on the UNESCO World Heritage List in 2017.

Visitors to the park can use the official network of trails. Some of the trails cross the old-growth forests of the national park, but it is not allowed to leave the marked trails (Kirchmeir and Kovarovics, 2016). In 2022, 3.2 million visitors entered the national park and surrounding area.

The Austrian **Kalkalpen National Park,** established in 1997, covers an area of about 200 km^2 and defined the preservation of forest wilderness within its boundaries as a priority goal (Mayrhofer et al., 2015). In total, 16,000 ha of the national park area are covered by forests, all of which have been without economic use since 1994 (Nationalpark O.ö.

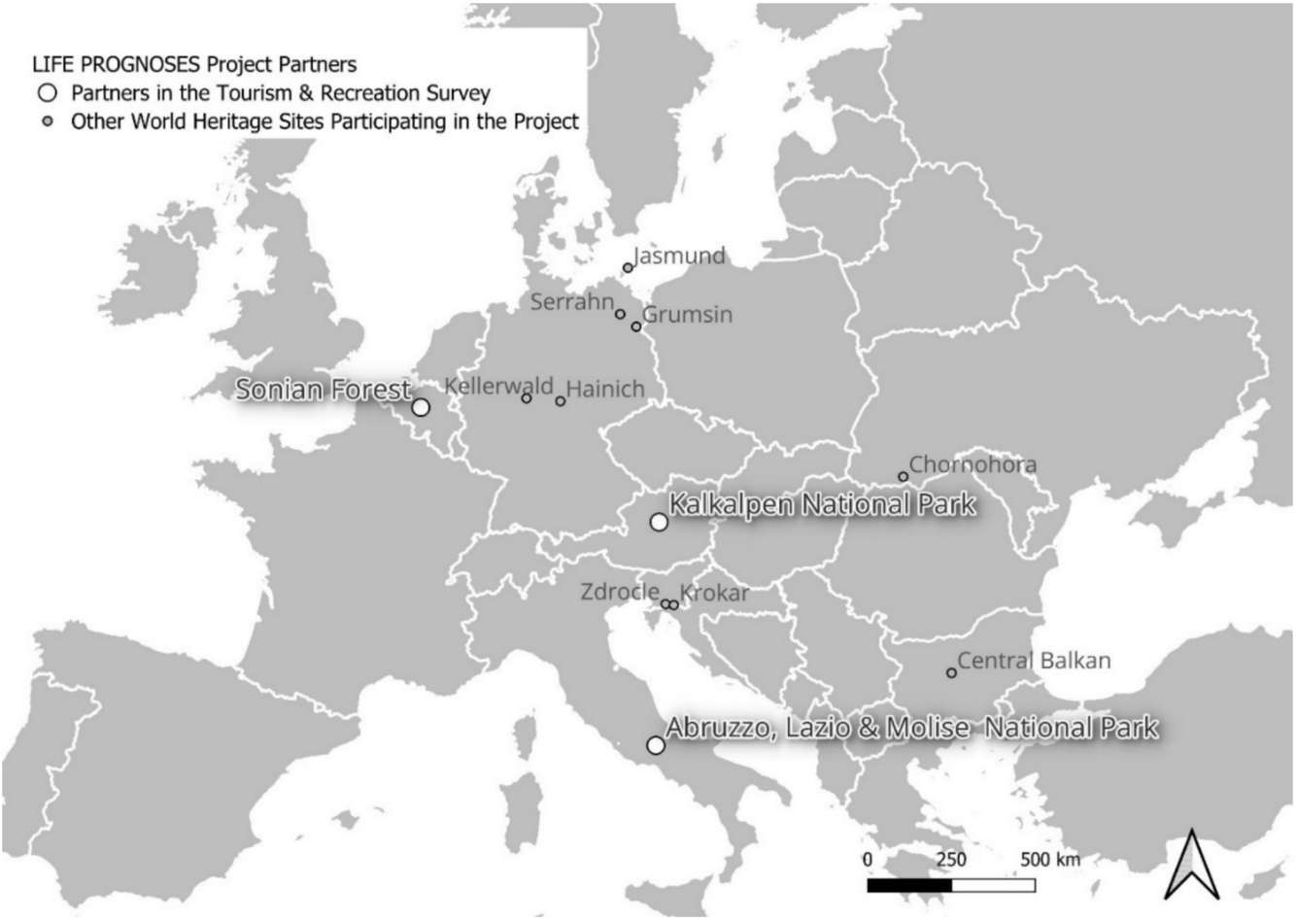


Fig. 1. Map of the case study areas and other partners of the LIFE PROGNOSES project.
Source: own draft based on LIFE Prognoses, 2025 (lifeprognoses.eu).

Kalkalpen Ges.m.b.H, 2018). However, most of the forests have been free of human influence for a much longer time and exhibit a high degree of naturalness and numerous valuable forest habitats (Mayrhofer et al., 2015). In 2021, researchers from the University of Tuscia documented beech trees up to 550 years old in the national park.

In their study, Mayrhofer et al. (2015) conducted an assessment of the state of wilderness in the Kalkalpen NP after 20 years of research and without silvicultural management. "High naturalness and resulting high habitat quality are confirmed by results of the hemeroby analysis and by the existence / high density of primeval indicator species" (Mayrhofer et al., 2015).

In terms of visitor management, the park follows the principle of maintaining "90% of visitors on 10% of the protected area" (Nationalpark O.ö. Kalkalpen Ges.m.b.H, 2023) in order to protect its most sensitive areas. According to the park's ongoing visitor monitoring system, approximately 240,000 people visit the Kalkalpen National Park each year.

The **Sonian Forest** near Brussels covers approximately 5,000 ha of beech forests and has been listed in the UNESCO World Heritage list since 2017. It is the largest old-growth forest area in the Belgian lowlands with a very high natural value (Derks et al., 2020).

The Sonian Forest is unique in Western Europe for its large number of impressive old beech trees and stands. About 74 % of the surface area consists of beech-dominated stands. About 1/3 of them are more than 180 years old (Kirchmeir and Kovarovics, 2016). The frequent occurrence of very large trees (diameter at breast height DBH $\geq$ 80 cm) is a typical element of both primary and secondary old-growth forests. A study conducted in 2011 revealed exceptionally high densities and sizes of such trees in the Sonian Forest (Vandekerkhove et al., 2018).

Due to its proximity to Brussels—less than 10 km away from the city center—and its location in one of the most densely urbanized regions in Europe, the forest receives over two million visitors a year. As noted by Derks et al. (2020), "its central location in one of Europe's most urbanised areas, with over 2 million visitors per year, means that the cultural ecosystem services (tourism, recreation) are very important, and are therefore a predominant focus for the management."

3.2. Methodological approach

In order to assess the visitors' willingness-to-pay for conserving the old-growth forests in relation to their recreational experience on-site and to the objective type of forest visited (naturalness according to four forest types presented to respondents), a comprehensive survey was implemented by the project partners in the three above-mentioned old-growth forests in Belgium, Italy and Austria.

The questionnaire started out with introductory questions regarding information levels on forest management and environmental issues, followed by the frequency of trips to forests in general, and to the specific old-growth conservation area. Furthermore, the main motives for visiting the area, as well as activities and facilities deemed necessary for one's visit were asked for. A central question on the linkages between the perception of visitors and the actual naturalness of the landscape visited asked visitors to mark the approximate route of today's visit on a colored map. An example of the maps presented to respondents is displayed in Fig. 5 in the appendix. Furthermore, the survey asked for the landscape elements (e.g., grassland, forest, lakes) and the conservation category of the area.

In order to assess visitors' willingness-to-pay for conservation, four forest types ranging from natural (virgin) to intensively managed (commercially used) forests were presented to respondents (see Section 4.2 below) and described through attributes such as species diversity, natural structures, the amount of logging, and the extent of the overall human impact. Visitors could then indicate which of the four types could be experienced during today's visit, and which one they would prefer for their next stay.

Two scenarios were then presented to respondents. Scenario A described a slight reduction of the human impact on forests in the area; scenario B was framed as a significant reduction of human impacts, leading to large benefits for biodiversity conservation (see details in Section 4.2 below).

Visitors were asked to state whether they would be willing to accept an additional fee, the amount of which was randomly assigned to each respondent in the framework of a dichotomous choice question. If respondents accepted a proposed bid, a second round asked whether they would also accept an even higher bid. Otherwise, bids would be lowered. Proposed bids ranged from € 0.5 to € 20 for the first round, and € 0.25 up to € 40 for the second bid. The range of bids was taken from studies of forest recreation and conservation (Getzner and Meyerhoff, 2020; Giergiczny et al., 2024) and discussed in several discussions with local experts. Respondents were finally asked for the reasons for rejecting bids (e.g. unimportance of biodiversity, high expenses of vacations, biodiversity conservation being a public task), before the questionnaire closed with socio-economic variables (e.g. income, gender, education, age). Besides the usual descriptive analyses of the survey data, a WTP bid curve was estimated by means of a standard binary logit model (see for an overview of different approaches Hutchinson et al., 2001) with the sample indicating each individual's four answers by accounting for ID clusters (with fixed effects) and thus, treating the sample as a short panel (maximum likelihood estimation, extreme value distribution).[2] The field work took place from June to October 2022 with a focus on the months of July and August. Time and date as well as weather conditions and exact location were recorded by interviewers who were instructed on how to conduct the survey in the field. Such information, as well as some selected questions from the survey, are not reported here owing to limitations of space. Some variables might be used in the econometric estimations in the following sections. The questionnaire was developed in several rounds of feedback loops between the authors and the project partners, also using small focus groups from fall 2021 to spring 2022.

A total of 668 questionnaires were collected. Interviewers reported response rates of 80 % in Italy/Abruzzi, 65–70 % in Belgium/Sonian (depending on the time and location of the survey), and 60 % in Austria/Kalkalpen.

Given the diversity of landscapes and local conditions, the survey response rates can be considered satisfactory. However, the sample of respondents cannot be considered representative of the whole population (neither local or regional residents nor tourists). As the distribution of socio-economic characteristics is also not known for the whole group of visitors, it cannot be concluded that the sample is fully representative of visitors. Table 1 presents a condensed overview of the socio-

Table 1
Overview of socio-economics of respondents.

Socio-economic variable	Mean	Std.Dev.
Age (years)	46.44	16.98
Income (€)	2759.07	1065.05
Gender (share of female respondents)	47.23 %	
Profession	Employed	44.53 %
	Retired	17.54 %
	Student	8.25 %
Education	College/University	64.47 %
Country (sample, N)	Austria	96
	Belgium	344
	Italy	227

Source: own estimation.

[2] Simply pooling the sample of all observations instead of identifying the individual's four answers (double-bounded dichotomous choice for two scenarios each) by means of ID clusters does not exhibit different coefficients of the WTP curve but leads to biased (larger) standard errors.

economics of the sample.

Furthermore, while on-site surveys are a common and appropriate approach to valuing visitors' perceptions and experiences, one should be aware that these surveys also have shortcomings, including at least two types of self-selection bias. Firstly, survey respondents can be considered as more interested in the survey topics and are therefore over-represented in the survey sample in comparison to potential respondents who are less interested either in answering a questionnaire or in the survey topics itself. Secondly, frequent visitors are more likely to be contacted by interviewers than, for example, first-time visitors. Thus, on-site surveys may be biased towards frequent visitors who appreciate the landscapes more. Weighting procedures are available to account for this bias. As this research does not aim at drawing general conclusions regarding recreation in forests, but concentrates on the specific recreational experiences and the willingness-to-pay of visitors to the areas, the chosen survey instrument is methodologically robust and can be used to design management policies in these old-growth forests.

4. Descriptive and econometric results

4.1. The respondents' visit(s) to the area

As briefly outlined above, the survey started with introductory questions concerning the respondents' visits to forests and their self-perceived level of information on forests and nature conservation. The information levels of respondents are well distributed over the 5-point Likert scale (1 = not informed at all; 5 = very well informed), with a mean value of the information levels of 3.40 for recreational activities and opportunities, 3.42 for nature and species conservation programs, and 3.25 for forest ecosystem services. The information levels are quite similar across the sample, with some minor country-specific deviations from the general mean information levels. It is interesting to note that more than 50 % of respondents felt at best moderately informed (information level score of 3), contrary to the authors' expectations that tourists in conservation areas would be particularly well informed about conservation and biodiversity. (Table 11 in the annex provides the details of the general and country-specific information levels.)

On average, respondents in the sample visit forests on average about 60 times per year, which is quite frequent compared to representative household surveys. Getzner and Meyerhoff (2020) find that a representative Austrian household visits forests about 20–30 times per year, depending on the recreational activities. This comparatively high frequency points to the uneven probabilities of on-site surveys, i.e., the survey of visitors is certainly biased in regard to the overall frequency of trips. However, it is interesting to note that the frequencies are rather different in the three countries, with Austrian respondents reporting a frequency of about 85 trips a year, whereas Italian respondents state a significantly lower frequency of about 30 forest visits per year (for details, see Table 12 in the annex).

For most of the respondents, trips to the specific old-growth forest areas in Austria, Belgium and Italy are quite frequent. Only 25 % of the respondents are first-time visitors to the forest, while 75 % of the respondents have visited the area before. About 45 % of the regular visitors stated that they had visited the area more than 10 times. There are also differences between countries and regions. Taking all respondents (excluding first-time visitors) together, the mean frequency of visits to the area is 9.81 times, ranging from 10.8 (Belgium) to 9.62 (Austria) and 7.63 (Italy) (Table 2). It is usually assumed that the frequency of visits depends – ceteris paribus – on the distance from the respondent's place of residence to the respective destination.

The main activities undertaken while in the area include walking and hiking (including dog-walks) (80 %), nature observation (50 %) and other sports (18 %). Corresponding to the preferences for activities, respondents indicated that trails (hiking, walking, bicycling) were the most important facilities during their visit. However, around a third of respondents explicitly indicated that rest areas, benches, and other types of visitor infrastructure would be very important.

Table 2
Total frequency of visits to the protected area (total sample and country-sub-samples).

Region of survey		Total frequency of visits to the protected area	Sample (n)
Austria	Mean	9.62	71
	Std.-Dev.	5.17	
Italy	Mean	7.63	112
	Std.-Dev.	5.099	
Belgium	Mean	10.8	262
	Std.-Dev.	2.694	
Total	Mean	9.81	445
	Std.-Dev.	4.094	

Source: own estimation.

4.2. Perception of landscapes and forests, and preferences & willingness-to-pay for conservation

In regard to the respondents' perceptions of landscapes and forest appearance, the questionnaire included a number of items related to landscape elements experienced by respondents.

Given the ecological focus of the research project (old-growth forests), it is not surprising that most of the respondents (over 3/4) experienced forests as the most important landscape element during their visit. Still, from the opposite perspective, it seems that about 25 % of respondents did not perceive forests as the most important ecological element during their stay. Lakes and rivers, as well as forests clearings, are also important landscape elements. (This was also indicated by some respondents on the respective maps of the area.)

As one would expect, owing to the topology and types of local ecosystems, the samples in the three countries vary considerably in terms of the most important landscape elements as experienced by respondents. While forests are the most important landscapes in all three countries, Austrian respondents seem to have experienced the most diverse landscapes, with rivers/lakes, summits, viewpoints, and grasslands, having the highest proportion of respondents. Summits and viewpoints are also most important for Italian respondents, while Belgian respondents mostly saw lakes/rivers and small clearings in forests (Table 3).

As the current study also evaluates the conservation status of the protected areas as perceived by respondents, a number of questions in the survey explored respondents' knowledge in this regard. 87 % of all respondents knew that they were visiting a protected area, but this share varied considerably between sites. While almost all Italian respondents were aware of the protection status, visitors to the Kalkalpen park in Austria were less sure (Table 4).

The perceived category of conservation again varies substantially between countries. About 52 % of all respondents thought that they

Table 3
Landscape elements as perceived by respondents in the three countries (each multiple answers, %).

Landscape element	Region of survey		
	Austria	Italy	Belgium
Forests	55.79 %	67.86 %	87.50 %
Lakes, rivers	23.16 %	26.34 %	52.03 %
Small clearings within forest	9.47 %	24.11 %	22.67 %
Viewpoints	24.21 %	38.84 %	7.85 %
Grassland	47.37 %	9.82 %	4.36 %
Summits	31.58 %	20.98 %	1.16 %
Wetlands	3.16 %	3.13 %	5.81 %
Villages, towns	2.11 %	3.57 %	0.87 %

Source: own estimation.

Table 4
Status of conservation (protection) as perceived by respondents in the three countries (%).

Conservation status	Total sample	Region of survey		
		Austria	Italy	Belgium
Protected	87.00 %	75.80 %	99.60 %	83.40 %
Not protected	4.50 %	6.30 %	0.00 %	7.00 %
Not sure	7.60 %	17.90 %	0.40 %	9.60 %

Source: own estimation.

were in a national park, with Natura 2000 and UNESCO WHS (biosphere reserves/World Heritage sites) less frequently named. However, there are differences between sites. Interestingly, the perception of the area as a national park is prevalent in Austria and Italy, while in the Belgian park respondents stated Natura 2000 as the main category (Table 5). It is important to note that the Sonian Forest was not designated as a national park during the survey conducted in 2022; however, it was subsequently classified as such in 2024.

Around 30 % of respondents also indicated that the area's conservation status as a UNESCO site was the reason for their visit. Around 35 % of respondents stated that they had previously visited a UNESCO site, while about 30 % were not sure, or had not yet visited such a site.

Turning now to the forest types perceived during the visit, the questionnaire included a detailed description of different types of forests along four attributes (species diversity, natural structures and microhabitats, logging, and human impact). Fig. 2 includes the presentation (verbal description, photographs) of the different forest management regimes as designed for the visitor survey.

As described above (see Section 3.2), in addition to these presentations, the interviewers provided a map of the area. Respondents indicated their walks and trails they had used during their visit. By overlaying the trail maps with a spatial representation of forest types, interviewers were able to assess which type of forest respondents had primarily enjoyed during their visit. Fig. 5 presents an example of the map included in the survey where respondents could mark the areas visited during their current stay. By overlaying the indicated areas with the types of forests (from natural to heavily modified forests; see Fig. 2), interviewers were able to assess the forest type objectively. This approach facilitates the analysis of subjective perception versus the objective forest type as determined by ecology and forest science.

The majority of respondents (on average about 70–80 %) perceived the forest they visited as semi-natural forest, while they also considered the forest as old-growth in about 38 % of the cases. Austrian visitors (respondents) are less likely to perceive the forest as natural. It is interesting to note that large shares of respondents also considered the forest they visited as moderately or, in few cases, even intensively managed forests (Table 6).

The questionnaire also asked respondents for their preferred development scenario that would increase biodiversity and the ecological conditions of old-growth forests and reduce the management intensity.

Over 63 % of respondents indicated that their preferred development scenario would be forest type 1 (old-growth forests), while forest type 2 (seminatural forests) was preferred by 32 % of respondents.

Table 5
Conservation category as perceived by respondents in the three countries (%, multiple answers with $n = 662$).

Conservation status	Total sample	Region of survey		
		Austria	Italy	Belgium
National park	52.10%	97.50 %	94.59 %	6.62 %
Natura 2000 site	39.60 %	6.25 %	22.52 %	62.02 %
UNESCO WHS	35.50 %	8.75 %	42.34 %	37.63 %
Protected landscape area	15.80 %	3.75 %	18.02 %	17.42 %
Nature park	11.00 %	1.25 %	10.36 %	14.29 %
Biosphere reserve	9.70 %	0.00 %	1.80 %	18.47 %

Source: own estimation.

The next question asked for the respondents' willingness-to-pay for scenario A, which was described in the questionnaire as a slight reduction in human impacts, particularly logging. Biodiversity and natural structures would also improve slightly. Some of semi-natural forests would be transformed into natural forests over time, but there would still be limited logging in parts of the reserve. The presentation of the two scenarios was introduced by the following description of the program[3]:

> *"Changing the harvesting volume will have an economic, biodiversity and recreational impact. We would like you to consider the following two scenarios of different forest management compared to the current state. An increase in old growth forests and seminatural forests and a reduction in moderately and heavily modified forests in all scenarios would lead to more natural structures and an increase in diversity of species and recreational quality in the future. This would also mean a reduction in logging and, as a consequence, a decrease in tax revenues from forestry. Let us now assume that such shifts in forest types in the following scenarios could only be realized with your financial help. The additional revenues would be earmarked for nature conservation. The financial support for the realization of the following scenarios would be paid, for example, in the form of additional entrance fees, parking fees or tourist taxes. A discount would be offered for stays of several days."*

The chosen payment vehicle was an earmarked fee in the form of an additional parking fee, admission or tourism tax (€ per visit) that visitors would pay during their stay, with discounts for longer vacations, which would help finance the scenario policies (reduction of logging, conservation programs).

As described before in Section 3.2, respondents were offered different payment bids in a dichotomous choice setting; the bid vectors are displayed in Table 13, together with the acceptance or rejection of each bid. The range of bids was determined in the course of the design of the survey following comparable European valuation studies (e.g., Getzner and Meyerhoff, 2020; Giergiczny et al., 2024). After an initial bid offer was made, respondents were asked whether they would accept an increased bid (if they accepted the first offer) or a reduced bid (if they rejected the first offer). The results clearly show that, as can be expected (Johnston et al., 2017), higher bids reduce acceptance. However, those who accepted the first bid were more likely to accept a second bid than those who initially rejected the bid.

Initial bids ranged from €0.5 per person up to €20 per person; 361 respondents accepted the first bid (about 54 %), with acceptance rates of over 87 % for the lowest bid and around 31 % for the highest bids. 304 respondents declined the first offer.

Of those who accepted the first offer, 249 respondents (69 %) also accepted the increased second bid (with 112 respondents rejecting the second offer).

Respondents who rejected the first offer accepted the reduced second bid in 32 % of all cases (97 respondents), while a fairly large majority of these respondents (207 or 68 %) also rejected the second bid. (Details can be found in Table 13 in the appendix).

After inquiring about the respondents' reasons for rejecting the proposed bids (documented below), the questionnaire included a question to ascertain the willingness-to-pay for an improved scenario B. This

[3] The description of the programs offered to respondents in stated preference survey is considered paramount for the survey's validity (Johnston et al., 2017). The questionnaire of this study contained thorough descriptions of different types of forests, details on the provision of the programs, the payment vehicle and the use of funds. However, time is particularly scarce in visitors' surveys in regard to the length and comprehensiveness of information that can reasonably be presented to respondents. Thus, not all details of the ecological programs that would take place in scenarios A and B of this study could be included in the questionnaire.

Forest type 1 / old-growth forest




Characteristic of forest type	• = very low | ••••• = very high	Additional Information
Species diversity	•••••	High number of rare species and native uneven aged trees
Natural structures and microha-bitats	•••••	
Timber production	•	
Human impact	•	Only some hiking trails, no tree stumps created by logging

Forest type 2 / seminatural managed forest




Characteristic of forest type	• = very low | ••••• = very high	Additional Information
Species Diversity	••••	Moderate number of rare species and native uneven aged trees
Natural structures and microha-bitats	••••	
Timber production	••	
Human impact	••	Sparse forest road network, tree stumps created by logging

Forest type 3 / moderately managed forest




Characteristic of forest type	• = very low | ••••• = very high	Additional Information
Species Diversity	•••	Mean number of rare species and mainly native even aged trees
Natural structures and microha-bitats	•••	
Timber production	••••	
Human impact	•••	Moderate forest road network, tree stumps created by logging

Fig. 2. Presentation of four types of forests in the visitors' survey ranging from "old-growth forests" to "intensively managed forests". Source: own draft.

Forest type 4 / intensively managed forest



Characteristic of forest type	• = very low | ••••• = very high	Additional Information
Species Diversity	•	Low number of rare species and non-native even aged trees
Natural structures and microha-bitats	••	
Timber production	•••••	
Human impact	•••••	Dense forest road network, tree stumps created by logging

Fig. 2. (*continued*).

Table 6
Perceived forest type (%, multiple answers with $n = 966$).

Forest type	Total sample	Region of survey		
		Austria	Italy	Belgium
Forest type 2: Seminatural managed forest	73.90%	80.68 %	69.55 %	75.00 %
Forest type 1: Old growth forest	38.20 %	22.73 %	59.55 %	28.49 %
Forest type 3: Moderately managed forest	34.20 %	36.36 %	15.00 %	45.93 %
Forest type 4: Intensively managed forest	1.80 %	1.14 %	0.00 %	3.20 %

Source: own estimation.

scenario would offer a significantly less human impact, with a large reduction or even elimination of lumbering, leading to a substantial increase in biodiversity and natural structures. Most forests in the reserve would be transformed into natural forests in the long term, also by allowing natural dynamics in the forest ecosystems. Table 14 in the appendix shows the acceptance and rejection of the proposed offers (with the same bid vector as with scenario A).

It is interesting to note that, with the exception of few respondents, agreement with the first proposed bid did not change significantly, increasing only slightly from 54 % to 55 %. However, acceptance of the second proposed bid increased in both scenarios. Respondents who accepted the first offer increased their agreement to the second increased bid from 68.98 % to 71.35 %, while respondents who rejected the first bid increased their agreement to the second lower bid slightly from 31.93 % to 32.09 % (details can be found in Table 14 in the appendix).

On average, mean willingness-to-pay increased (documented below

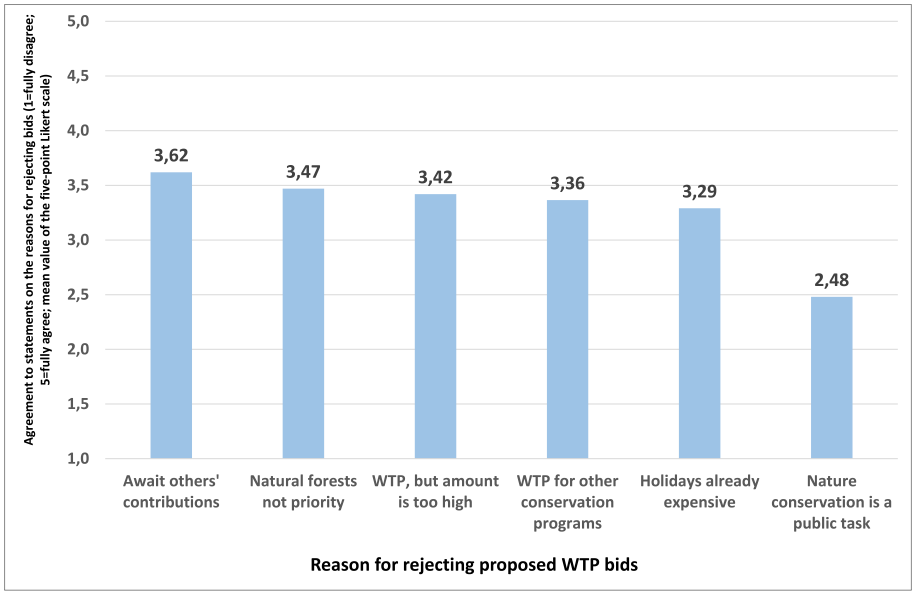


Fig. 3. Reasons for rejecting the WTP bids (agreement to statements, mean value of a 5-point Likert scale; $n = 250–258$, depending on the question).
Source: own estimation and graph.

in Section 4.3). In interpreting these results, it is noteworthy that the second round of WTP questions for scenario B may have caused some survey fatigue, as the number of respondents willing to answer these questions was lower than for scenario A. (Answers are also not independent from each other; see Section 5 below on the limitations of this type of survey).

For respondents who did not wish to answer one or both of the WTP questions, the survey also explored the reasons for rejecting WTP. As Fig. 3 shows, the main reasons for rejecting the proposed bid are uncertainties about the willingness of others to pay, which may be translated into a lack of information on the provision of the policies and the payment vehicle. It is also somewhat surprising, given the landscapes visited, that some respondents also rejected bids offered because natural forests would not be their priority.

4.3. Econometric estimations of the determinants of the respondents' willingness-to-pay for conservation

Based on the descriptive survey results, a econometric analysis of the determinants (influencing factors) of the respondents' willingness-to-pay (WTP) for conservation programs is presented below.

As the survey and the WTP questions were designed as a double-bounded dichotomous choice question, the dependent variable consists of the respondents' agreement to the proposed WTP bids. Such questions are typically analyzed using diverse econometric models, estimation procedures and specifications. These estimations usually exploit decisions made by respondents in the form of 'Yes' and 'No' answers. In this paper, a standard logistic regression model (with extreme values, maximum likelihood estimation, and with ID-clusters, as described above in Section 3.2) is used to assess these responses, resulting in a probability of the respondents agreeing with the proposed bid and a distribution of predicted bids depending on the estimated model and the individual observations.

Based on economic theory (Johansson, 1993; Johnston et al., 2017), we expect the respondents' answer to depend on the proposed bid (the higher the offer, the lower the probability of a 'Yes' answer), but also on a number of variables denoting socio-economics, perceptions and preferences, and, in the case of on-site surveys, recent experiences with the visit to the area. Table 7 shows the dependent and explanatory variables and their operationalization.

The variable BID denotes the bid proposed to the respondents in the dichotomous choice setting (both the first and the second bids are included). It can be expected that the higher the proposed bid, the lower the probability of accepting the bid. In regard to the scenarios (variable SCEN), the descriptive analysis above showed that respondents accepted higher bids in scenario B; hence, we expect a positive sign.

Again, we hypothesize to observe positive signs of coefficients for those respondents who indicated that they had experienced an old-growth forest during their visit (FORESTTYPE), or who expressed a preference for old-growth forests (FORESTPREF).

As a basic socio-economic variable, we include household income (net of taxes/social contributions) as it is expected (based on economic theory) that a higher income will lead to a higher acceptance rate of proposed bids.

Usually, variables denoting regional differences or information levels are said to influence the respondents' WTP. However, the signs of the variables INFO, REGION_AT and REGION_IT are a priori unclear.

The results of the econometric estimation of the WTP estimation model used are displayed in Table 8. While there are several ways to estimate data originating from a dichotomous choice question, we refer to a model that includes the variables described above to compute willingness-to-pay. The estimation shows that basically all the expectations described above are met. For example, the probability of accepting a proposed bid is lower with higher bid levels and increases with higher income of the respondents. Those who have experienced old-growth forests during their visits – as indicated on the respective maps and assessed by interviewers – also exhibit higher probabilities of accepting the bid.

In regard to the scenarios offered, scenario B draws significantly higher acceptance rates from respondents, as biodiversity is conserved more stringently.

Based on the results of the estimations, the mean and std. deviation of WTP (in EUR), and confidence intervals, can be computed by using the parameters of the estimated bid function (Fig. 4). The results are displayed in Table 9.

As can be seen, the mean WTP for the pooled sample of both scenarios amounts to around €2.9 per person a day. Scenario A draws a mean WTP of around €2.1, while WTP for scenario B is significantly

Table 7
Dependent and explanatory variables of the logistic regression model explaining respondents' WTP.

Variable name	Description	Expected sign of the estimated coefficient
Dependent variable		
YN	Acceptance of the first or second bid offered to respondents (=1 for accepted bid)	
Explanatory variables		
BID	Proposed bid, ranging from €0.5 to €20 (first bid) and from €0.25 to €40 (second bid)	−
SCEN	Scenario A or B proposed to respondents (=1 for scenario B)	+
INFO	Self-reported information level of respondents (=1 for good or very good information levels)	?
FORESTPREF	Preference for a certain type of forest (=1 for a preference for forest type 1/old-growth forests)	+
FORESTTYPE	Forest type during the actual visit (=1 for old-growth forests experienced during the visit)	+
INCOME	Income of household net of taxes and social security contributions (ln €, per month)	+
REGION_AT	Regional variable (=1 for respondents in Austria)	?
REGION_IT	Regional variable (=1 for respondents in Italy)	?

Source: own concept.

Table 8
Estimation results of the logistic regression model explaining respondents' WTP.

Variable name	Coefficient	z-Stat.	Prob.
Constant	−2.044	−2.304	0.021
BID	−0.068	−9.646	0.000
SCEN	0.390	3.871	0.000
INFO	−0.283	−2.772	0.006
FORESTPREF	0.361	3.459	0.001
FORESTTYPE	0.194	1.827	0.068
INCOME	0.221	1.955	0.051
REGION_AT	1.574	7.503	0.000
REGION_IT	0.862	7.740	0.000
S.E. of regression	0.467		
Log likelihood	−1134.130		
LR statistic	242.097***		
N (sample size)	667		
n (observations)	1812		

Dependent variable: YN; standard binary Logit model specification (extreme value, maximum likelihood estimation, ID clusters); total sample. 667 respondents; as not all respondents answered the WTP question, the number of observations is less than four times the sample size (ideally, 4 observations per respondent). *** $p<0.01$.
Source: own concept.

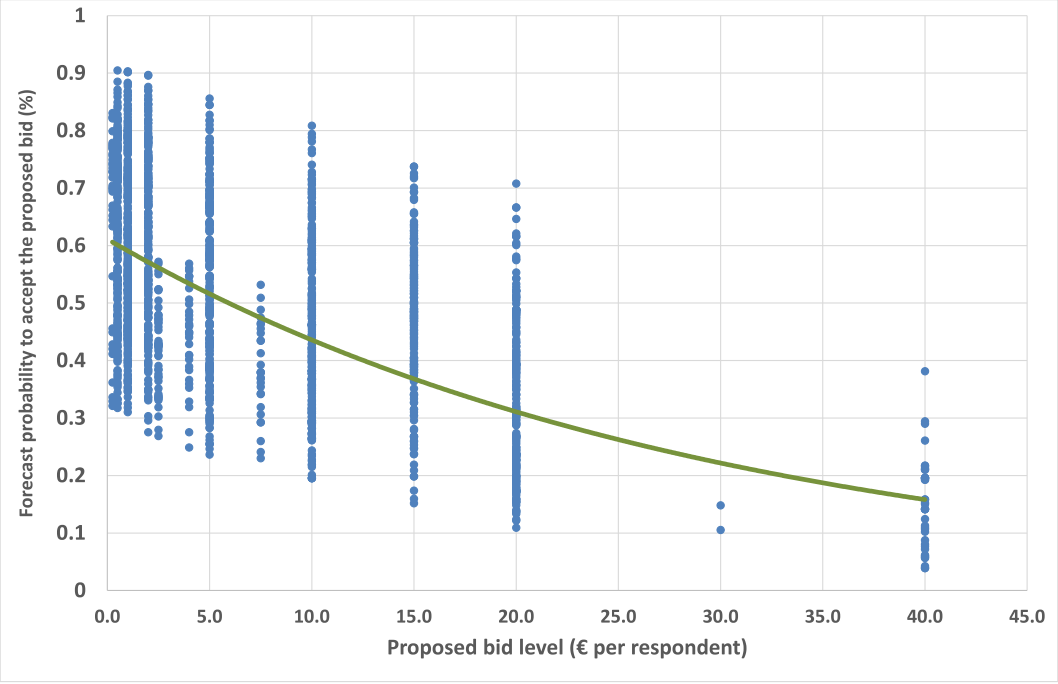


Fig. 4. Forecast probabilities and estimated bid curve, depending on bid levels.
Source: own estimation and graph.

Table 9
Computed mean and std. deviation of WTP, and confidence intervals, based on scenarios (€ per person and visit).

	Mean	Std. Dev.	Confidence interval (95 %)	
			Upper bound	Lower bound
WTP (average of both scenarios)	2.950	2.773	3.571	2.364
WTP for scenario A	2.088	1.963	2.899	1.278
WTP for scenario B	4.137	3.889	5.075	3.198

Computation based on estimation results displayed in Table 8.
Source: own estimation.

higher at €4.1. However, as the standard deviation around the mean is quite high (and the confidence intervals are quite large), there is a considerable uncertainty in the estimated WTP. Yet, a Wald test confirmed that the WTP for scenarios A and B are significantly different.

Given the amount of respondents' WTP, it could be argued that respondents would be willing to pay about the same amount for conservation as they would normally pay as a daily tourism tax, or a parking fee for an average stay in the region. Thus, although uncertainties are considerable, the estimated willingness-to-pay is roughly within a reasonable range of what visitors to protected areas are used to pay.

In order to highlight potential differences in both the appearance of the forest and the specifics of the sites (preferences, acceptance, legal-institutional differences), an estimation was conducted for each forest separately.

Table 10
Mean WTP of visitors in the three countries (€ per person and visit) according to the two scenarios.

	Mean WTP (€ per person and visit)			
	Whole sample	Austria	Italy	Belgium
WTP (average of both scenarios)	2.950	4.699	2.573	2.986
WTP for scenario A	2.088	3.326	1.821	2.113
WTP for scenario B	4.137	6.590	3.609	4.187

Computation based on estimation results displayed in Table 8.
Source: own estimation.

Table 10 presents an overview of mean values of willingness-to-pay (WTP) according to the different scenarios for all three countries.

The results show that the WTP of visitors in Belgium was roughly around the mean value of WTP of the whole sample. The coefficients indicate that Austrian respondents held a WTP that was about 50 % higher than the mean, while Italian visitors stated a WTP about 10 % lower than the mean.

While there are significant differences between countries, we did not find significantly different willingness-to-pay between day visitors and overnight visitors.

In regard to forest preferences, we tested for differences between respondents who held strong preferences regarding old-growth forests and those who did not. Those with strong preferences stated a WTP of 5.05 € per person and visit for scenario B, while those without strong preferences held a WTP of 3.56 € per person and visit. These amounts are again significantly different, and could be expected given the different strength of preferences.

5. Discussion, summary, and conclusions

This paper highlights important findings of a survey of visitors to three old-growth forests in Austria, Italy and Belgium. The results show that respondents hold strong conservation preferences for the expansion of old-growth and more naturally managed forests for recreational purposes, which – as expected given the landscapes – are mostly related to walking and hiking, and enjoying nature.

With regard to the uncertainties of the survey, the results can only be interpreted for a specific group of respondents who visited the area. On-site surveys have advantages (e.g., practical and on-site experience of the area), but also disadvantages (e.g., self-selection and a higher probability of surveying more regular visitors). This survey specifically exploited the advantages of on-site surveys by ascertaining the areas where respondents spent their time in the reserve.

It is interesting to note that, taken together, respondents indicated

that they would be willing to pay a reasonable amount of additional fees of the size of a tourism tax or parking fee, which visitors are mostly accustomed to when visiting an area.

The overall mean value of willingness-to-pay for implementing the moderate conservation scenario ("scenario A") was around €2.1 per person and visit. For the more comprehensive conservation scenario ("scenario B") that would transform most parts of the forest to a natural state, WTP increased to about €4.1 per person and visit. Country-specific mean WTP bids ranged from €3,6 (Italy) and €4.2 (Belgium) to €6.59 (Austria) for scenario B. While we did not find differences between day visitors and overnight visitors, we did find that forest preferences had a stronger impact on WTP. Those with a strong preference for old-growth, near-natural forests had a WTP for scenario B of €5.05 per person and visit, while those holding no strong preferences exhibited a WTP of €3.56 per person and visit.

These results clearly show that visitors appreciate recreation in old-growth forests. The questionnaire identified the specific paths and areas where visitors spent their recreational time in the forest. Visitors were asked to indicate the paths they used during their stay on a map of the whole reserve. Thus, interviewers were able to note which type(s) of forest the visitors experienced during their stay. This novel approach makes it easier to distinguish between the use of the forest and the presence of old-growth forests in the specific area. Visitors who experienced old-growth forests also expressed a higher willingness-to-pay for the conservation of these ecosystems. This is also an important finding in terms of conservation management. Methodologically, the chosen approach of presenting visitors with maps of the area to indicate the location of their recreation time proved successful in determining the presence of old-growth forests.

In terms of policy, the willingness-to-pay of visitors may justify the levying a small fee on top of existing taxes, such as the tourism tax, or slightly increasing the price of parking fees. This could support the funding of conservation areas: As the WTP is modest, the three parks involved in this project indicated that an elaborate administrative system to collect a completely new fee would not seem to be justified. In terms of administrative costs, using an existing payment instrument with a "conservation surcharge" on top could help protected areas to finance their conservation management. While it is usually assumed that higher prices lead to a reduction in demand, there may be some scope for "conservation fees" in protected areas, as demand may be rather inelastic, depending on the specific area and context (e.g. Thapa et al., 2024). However, it should also be noted that some respondents emphasized that the costs of visiting the protected area were already quite substantial, and that additional fees would not be accepted. This also points to the function of nature reserves as public recreational facilities to which low-income families should have access as well.

Even if no fees were charged, this study highlights the strong preferences of visitors for conservation as expressed by their willingness-to-pay. In addition, the results support the notion of environmental education and information, as well as the planning of the forest's network of trails to facilitate the visitors' experience of old-growth natural forests.

CRediT authorship contribution statement

Michael Getzner: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Anna Kovarovics:** Writing – review & editing, Validation, Project administration, Funding acquisition, Data curation, Conceptualization. **Hanns Kirchmeir:** Writing – review & editing, Validation, Project administration, Investigation, Funding acquisition, Data curation, Conceptualization. **Larissa Posch:** Writing – review & editing, Project administration, Data curation, Conceptualization. **Claudia Alessandrelli:** Writing – review & editing, Project administration, Data curation. **Caroline Celis:** Writing – review & editing, Project administration, Data curation. **Simone Mayrhofer:** Writing – review & editing, Project administration, Data curation. **Ruth Vanhaecht:** Writing – review & editing, Project administration, Data curation.

Declaration of competing interest

The authors declare no conflict of interest.

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Appendix A. Annex

Table 11
Information levels on recreation, nature conservation and forest ecosystem services (total sample and country-sub-samples).

Region of survey		Information levels regarding…			Sample (n)
		… recreation activities	… nature conservation	… forest ecosystem services	
Austria	Mean	3.71	3.40	3.63	96
	Std.-Dev.	1.095	1.201	1.233	
Italy	Mean	3.08	3.12	2.71	223
	Std.-Dev.	1.03	1.158	1.366	
Belgium	Mean	3.52	3.63	3.49	344
	Std.-Dev.	1.284	1.285	1.414	
Total	Mean	3.40	3.42	3.25	663
	Std.-Dev.	1.200	1.251	1.424	

Source: own estimation.

Table 12
Annual frequency of visits to forests (total sample and country-sub-samples).

Region of survey		Annual frequency of trips to forests	Sample (n)
Austria	Mean	85.23	96
	Std.-Dev.	68.17	
Italy	Mean	28.70	223
	Std.-Dev.	44.52	
Belgium	Mean	78.25	344
	Std.-Dev.	85.10	
Total	Mean	62.51	663
	Std.-Dev.	75.30	

Source: own calculation.

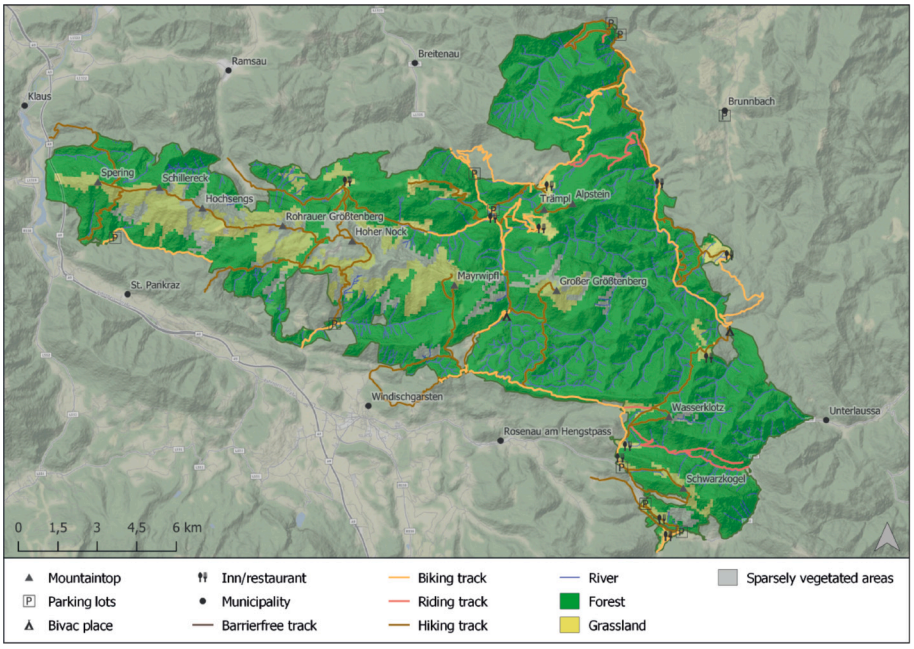


Fig. 5. Example map of the Kalkalpen national park (Austria) included in the survey so that respondents could indicate the visited areas during their stay. Source: own draft / survey.

Table 13
Agreement to proposed bid levels for scenario A (No. and %).

Initial bid					If the intial bid level was accepted, respondents were offered respective higher bids				If the intial bid level was rejected, respondents were offered respective lower bids			
€		N	Yes	No	€		Yes	No	€		Yes	No
0.5	No.	107	94	13	1	No.	84	10	0.25	No.	3	10
	%		87,85 %	12,15 %		%	89,36 %	10,64 %		%	23,08 %	76,92 %
1	No.	104	81	23	2	No.	58	23	0.5	No.	5	18
	%		77,88 %	22,12 %		%	71,60 %	28,40 %		%	21,74 %	78,26 %
2	No.	96	67	29	4	No.	14	14	1	No.	8	21
	%		69,79 %	30,21 %		%	50,00 %	50,00 %		%	27,59 %	72,41 %
5	No.	100	38	62	5	No.	26	13	2	No.	11	6
	%		38,00 %	62,00 %		%	66,67 %	33,33 %		%	64,71 %	35,29 %
10	No.	96	30	66	10	No.	20	18	2.5	No.	8	37
	%		31,25 %	68,75 %		%	52,63 %	47,37 %		%	17,78 %	82,22 %
15	No.	74	24	50	15	No.	15	4	5	No.	22	44
	%		32,43 %	67,57 %		%	78,95 %	21,05 %		%	33,33 %	66,67 %
20	No.	88	27	61	20	No.	17	15	7.5	No.	3	21
	%		30,68 %	69,32 %		%	53,13 %	46,88 %		%	12,50 %	87,50 %
					30	No.	1	2	10	No.	19	42
						%	33,33 %	66,67 %		%	31,15 %	68,85 %
					40	No.	14	13	15	No.	18	8
						%	51,85 %	48,15 %		%	69,23 %	30,77 %
	No.	**665**	**361**	**304**		**No.**	**249**	**112**		**No.**	**97**	**207**
	%		**54,29 %**	**45,71 %**		**%**	**68,98 %**	**31,02 %**		**%**	**31,91 %**	**68,09 %**

Source: own estimation.

Table 14
Agreement to proposed bid levels for scenario B (No. and %).

Initial bid					If the intial bid level was accepted, respondents were offered respective higher bids				If the intial bid level was rejected, respondents were offered respective lower bids			
€		N	Yes	No	€		Yes	No	€		Yes	No
0.5	No.	107	94	13	1	No.	86	8	0.25	No.	3	10
	%		87,85 %	12,15 %		%	91,49 %	8,51 %		%	23,08 %	76,92 %
1	No.	103	78	25	2	No.	60	18	0.5	No.	6	19
	%		75,73 %	24,27 %		%	76,92 %	23,08 %		%	24,00 %	76,00 %
2	No.	96	68	28	4	No.	15	12	1	No.	6	22
	%		70,83 %	29,17 %		%	55,56 %	44,44 %		%	21,43 %	78,57 %
5	No.	99	40	59	5	No.	26	15	2	No.	11	5
	%		40,40 %	59,60 %		%	63,41 %	36,59 %		%	68,75 %	31,25 %
10	No.	95	36	59	10	No.	22	18	2.5	No.	7	36
	%		37,89 %	62,11 %		%	55,00 %	45,00 %		%	16,28 %	83,72 %
15	No.	73	22	51	15	No.	14	6	5	No.	19	40
	%		30,14 %	69,86 %		%	70,00 %	30,00 %		%	32,20 %	67,80 %
20	No.	86	25	61	20	No.	20	14	7.5	No.	4	19
	%		29,07 %	70,93 %		%	58,82 %	41,18 %		%	17,39 %	82,61 %
					30	No.	2	2	10	No.	21	40
						%	50,00 %	50,00 %		%	34,43 %	65,57 %
					40	No.	14	11	15	No.	18	10
						%	56,00 %	44,00 %		%	64,29 %	35,71 %
	No.	**659**	**363**	**296**		**No.**	**259**	**104**		**No.**	**95**	**201**
	%		**55,08 %**	**44,92 %**		**%**	**71,35 %**	**28,65 %**		**%**	**32,09 %**	**67,91 %**

Source: own estimation.

Data availability

Data will be made available on request.

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