



Wildly diverse: How Europeans vary in their views on forest landscapes

Jakob Derks^{a,*}, Dennis Roitsch^b, Marko Lovric^a, Ajdin Starcevic^a, Agata Konczal^a,
Rik De Vreese^{b,c}, Gert-Jan Nabuurs^a, Georg Winkel^a

^a Wageningen University and Research, Droevendaalsesteeg 4, 6708 PB Wageningen, the Netherlands

^b European Forest Institute, Yliopistokatu 6 B, 80100 Joensuu, Finland

^c GuangZhou Institute for Forestry and Landscape Architecture, 428 GuangYuanZhong Road, Baiyun District, 510405 GuangZhou, China

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ABSTRACT

The recent decade has seen academic and policy initiatives aiming to restore European nature and forests. Whether this caters to what Europeans expect and prefer has not been studied on a continental scale. Using a representative pan-European survey, this study assesses the importance people place on Forest Ecosystem Services (FES) and their landscape preferences, the latter drawing on a small series of illustrations representing a gradient from a wild to a more cultivated forest landscape. Our results show that beauty is a highly valued ecosystem service across the board, yet perceptions on what constitutes an attractive landscape vary. Based on the appreciation of the landscape drawings, over half of respondents prefer wilder surroundings, but preferences differ along socio-demographic and regional lines: Younger, female, and urban respondents favoured images showing cultivated landscapes relatively more when compared with older, male, and rural people showing relatively higher preferences for wilder landscape drawings. Geographically, Northern-Central Europeans generally preferred wilder landscapes more than South-Eastern Europeans, albeit with some outliers. This may be linked to cultural differences in nature perception, but also social and economic realities such as land abandonment and the importance of provisioning FES. These insights stress the need for EU policies, including the EU Nature Restoration Law, to consider the diversity in forest landscape preferences across the continent and respect varied social and regional preferences in forest restoration and rewilding initiatives.

1. Introduction

No other continent has a landscape that is more shaped by humans than Europe. Without human interventions, much of the continent would be characterized by forested landscapes. Today, forests cover around 35% of Europe's land (FOREST EUROPE, 2020), of which less than 0.7% are considered old growth or primary forests (Sabatini et al., 2018). Most of the remaining forest areas are impacted by forest management. The rest of the territory is dominated by agriculture and human settlements, albeit to varying degrees. Even in most nature conservation areas, e.g. within the Natura 2000 network, human management is the default (cf. O'Brien et al., 2021; Schnitzler, 2014). A recent estimate shows that strictly protected areas cover only 3.37% of the terrestrial area of the 27 European Union (EU) countries (Cazzolla Gatti et al., 2023). Moreover, about 80% of habitats in the EU are assigned to have a “bad” or “poor” conservation status, and only 15% are in “good” condition, according to a European Environment Agency's

(EEA) 2020 report. This situation provides the background for the EU Nature Restoration Law, which specifically promotes leaving deadwood in forests, enhancing forest and landscape diversity, close-to-nature or continuous-cover forestry and partial abandonment of management, as well as natural ecosystem dynamics in favour of promoting “naturalness and wilderness” as restoration measures (EU Nature Restoration Law, EP and EC 2024, annex VII nr. 23).

Political ambitions for rewilding, ecological restoration and more “nature inclusive” land use practices – aimed at allowing and supporting natural processes in managed nature – are connected to a wide array of expected Ecosystem Services (ES), defined as the benefits people obtain from ecosystems by the Common International Classification of Ecosystem Services (CICES) as introduced by the European Environment Agency (Haines-Young and Potschin, 2017). CICES distinguishes between three categories which are also used in this paper: provisioning (wood, fiber, water, food), regulating (air, water, climate) and cultural (recreation, aesthetics, spirituality) services. ES have been widely used

* Corresponding author.

E-mail address: jakob.derks@wur.nl (J. Derks).

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as study metrics since the popularisation of the concepts around the turn of the century, especially also for forests, given the wide spectrum of societal demands that are placed on forest landscapes, ranging from wood production to climate mitigation and recreation (Plieninger et al., 2015; Mori et al., 2017; Torralba et al., 2020; Hernández-Morcillo et al., 2022; Lovrić et al., 2025).

Important assumptions of the current EU policy initiatives pertain to expected biodiversity gains, as well as positive consequences for climate change adaptation and mitigation (cf. Perino et al., 2019; Schmitz et al., 2023; Knoke et al., 2025). Less prominently, the ambitions make reference to expected social benefits and socially fair transitions connected to ecological gains, related to for instance an increased sense of well-being, recreational opportunities or nature-based tourism (cf. Schepers and Jepson, 2016; Hall, 2019). Those aspects, related to cultural ES, are increasingly gaining attention in forest-related research and seem to be increasingly appreciated by European citizens (Fagerholm et al., 2019; Ranacher et al., 2020; Torralba et al., 2020), although recent studies have shown that wood harvesting remains the main source of income from forestry in Europe (Lovrić et al., 2025), to varying degrees, cultural and regulating ES are also considered in actual forest management practices (cf. Konczal et al., 2023; Nikinmaa et al., 2024), in a variety of formal and informal management regimes (cf. Scherpenhuijzen et al., 2025), and “close(r) to nature” forest management approaches including elements of old growth forests have been promoted in forestry at least in part of the continent (Gustafsson et al., 2020; Larsen et al., 2022).

However, how those wilder landscapes and their social benefits are perceived among European populations is not known. Specifically, whether people perceive a wild(er) landscape as beautiful is far from certain (Capaldi et al., 2017; Zhang et al., 2014). This matters because people primarily observe and interpret their (natural) surroundings based on visual stimuli. The quality of the landscape is always determined by human appraisal, largely based on visual impressions (Karjalainen and Tyrväinen, 2002), and, furthermore, the perception of the landscape influences how people regard the ES this landscape provides (Carvalho Ribeiro et al., 2019; Gobster et al., 2007). This study therefore puts a special emphasis on aesthetic appreciation as a cultural ES, in relation to other ES.

To this date, no systematic cross-country comparison or large-scale study describing Europeans' perceptions of forests and nature, and visual landscape preferences has been conducted. For forests, most studies are situated on country or local scale (cf. Ranacher et al., 2020), are qualitative in nature (e.g. De Vreese et al., 2016), are based on a review of many (country) case studies (Ranacher et al., 2020), or rely on expert judgement (e.g. Edwards et al., 2012). There is also a notable geographical research gap, with Central and Western Europe being relatively more studied than Southern and Eastern Europe (Ciesielski and Stereńczak, 2018). existing studies at local or national levels have shown that forest stand features are crucial in determining its attractiveness (Ciesielski and Stereńczak, 2018), and that most Europeans show a dislike of visible signs of forest management (Ranacher et al., 2020). Related to that, studies mostly indicate some support of wilder nature in general, but also conflicting views on cultivated or wild landscapes (cf. Edwards et al., 2012), often distinguishing between different social groups (cf. Ceașu et al., 2015; Frei et al., 2020; Frei et al., 2022). Some studies have associated the growing popularity of wild nature with young, educated urbanites (Van den Berg and Koole, 2006; Bauer et al., 2009; Fischer et al., 2020; Zoderer and Tasser, 2021). People who rely on nature for their livelihood will likely have a different view on nature compared to such urbanites (cf. Gundersen and Frivold, 2008; Buijs et al., 2009; Carvalho Ribeiro and Lovett, 2011). This relates to findings that rural populations in remote areas are more likely to have an instrumental view on nature, determined by land use practices, while more urban dwellers tend to appreciate nature for its intrinsic value and want to protect it (Lyons, 1983; Ranacher et al., 2020), although nature connectedness and relation values are more complex than that (cf. Díaz

et al., 2015).

In sum, we know that (I) the appearance of a landscape influences the benefits people associate with it, and that (II) landscape preference is determined by social and cultural factors, which can change over time, and reflect personal development, but we lack a systematic assessment of (forest) landscape preferences and how they relate to the perceived provision of other ecosystem services. This is what this study aims to provide. Based on the first quantitative representative assessment of forest landscape preferences on a European scale, we address the following research questions:

- 1) How important is the beauty of nature for European citizens vis-a-vis other nature benefits?
- 2) How does perceived beauty relate to the perceived provision of other ecosystem services?
- 3) How does the perception of beauty and preference for wilder looking nature differ with regard to demographic and geographic patterns across Europe?

2. Methods

2.1. Data collection

This research was conducted based on a European-wide online survey focusing on wooded landscapes with over 13.000 respondents in 33 countries in the frame of the EU Horizon 2020 project “CLEARINGHOUSE” (for a research report with an overview on all surveyed data see Roitsch et al., 2022). The CLEARINGHOUSE project focussed specifically on the importance of urban forests in Europe and China. The European survey was complemented by a similar survey in China. The European survey covered however the entirety of forest landscapes, including in rural areas, and mapped, inter alia, peoples' association with various ecosystem services in relation to socio-demographic variables and values.

The complete survey consisted of 37 questions divided in seven thematic blocks, and took an average 20 min to fill out. This paper is based on a selection of those questions and uses only the European data. The questions used in this study are 1) personal information, 2) assessing importance of selected ($n = 17$) ES provided by forests and 3) aesthetic preferences towards forests. The selection of ES in this study is based on the CICES classification introduced above.

The survey was implemented by specialized polling agencies, aiming at minimum 384 valid responses (+10% oversampling) per included country with an incidence rate of 100% among the general population, meaning that the sample gives a representative overview of each country's population in terms of gender, age and occupation. The sample was randomly selected by a polling agency from a network panel of nearly 2 million individuals and represented the geographical, social, gender, and age distributions of each country. Respondents were drawn from each country's panel members, with the proportions of these characteristics based on current census data from national statistical offices or Eurostat. A national sample was considered representative if the likelihood of inclusion was the same for individuals across age, gender, and social characteristics, with a 95% confidence level. The data collection targeted the general population aged 18 and above, from all states and regions within the covered countries (cf. Roitsch et al., 2022).

After the general data cleaning, an additional cleaning was performed to eliminate invalid responses to the ES questions. Specifically, cases were excluded when (1) the mean of all ecosystem services and disservices, respectively, equalled 0, 50 or 100; meaning respondents always dragged the cursor to the same extreme end, (2) when the standard deviation of the perceived importance of forest ecosystem (dis) services was smaller than 1 (i.e., all questions answered with the same number, with an error margin for the bar dragging) or (3) when more than 50% of all answers were missing from each subsection. This led to a final sample size of 13.095 respondents. For the socio-demographic

information in this study, respondents were asked about their living environment (4 categories ranging from city to countryside), education (5 categories) and gender identification (female, male, other, prefer not to say). Regarding gender, only the male and female categories were used in the analysis because the number for the other categories were too low for reliable statistic conclusions.

People were asked how important a selection of 17 forest ecosystem services were to them (following CICES). Specifically, options included wood for timber and furniture, fuelwood, non-timber forest products, hunting, water quality, air quality, beauty, carbon storage, habitat for flora and fauna, cultural, emotional and spiritual value, education, recreation, health and well-being, reducing hazards, jobs, noise reduction and temperature regulation. Later in the survey, the respondents were presented with a set of 5 drawings (Table 1). The pictures represent a gradient from a wild landscape (characterized by a low degree of visible human intervention) to a more cultivated alternative (with clear human influences, including recreational infrastructure). A detailed overview of the elements constituting and differentiating the images can be found in Annex 1. The basic design of the landscape preference study was not adapted to the local variations in typical landscapes across Europe. We attempted however to keep the images as generic as possible, by portraying a variety of tree shapes that do not necessarily reflect any given real ecosystem. The images were drawn by hand by an illustrator in an iterative process, following instructions from the authors. The respondents were then asked to indicate their preference for one of the five landscape pictures – under the assumption that these landscapes would be close to where they live – in response to the following two questions: 1) “From the 5 pictures below, please select the landscape which you find most attractive.” And 2) “From the 5 pictures below, please select the landscape which you think offers the most benefits provided by nature to society.” The set-up of the image selection and the connection between perceived benefits and attractiveness was partly based on a previous study by Derks et al. (2023), where 350 people were interviewed on site in different stands of a peri-urban forest in Central Europe, and where the correlation between perceived ecological and aesthetic values was clearly shown.

While images do not contain the same amount of information as a real landscape, and only appeal to one of the senses, the use of images in preference studies has been shown to be very effective and to yield similar results as on-site surveys (Ibarra et al., 2017, Karjalainen and Tyrväinen, 2002, Shafer Jr and Brush, 1977, Kaplan, 1987). Moreover, it would have been nearly impossible to collect the amount of data in 33 European countries through an on-site approach. Using drawings instead of pictures allowed to use the exact same base landscape for all 5 images, minimizing potential preference bias and noise based on factors such as weather condition, lighting and framing (cf. Shi-Han Huang and Lin, 2020). The only variable that was changed between the pictures was the “naturalness” or “wildness” of the landscape (Karjalainen and

Tyrväinen, 2002) (for a detailed description see Annex 1). The idea was also to make the landscape as neutral as possible in terms of location, not obviously recognisable as belonging to a certain geographic area.

2.2. Data analysis

The study employed a combination of descriptive and inferential statistics to analyse and describe the survey results. In order to rank the importance attributed to various forest ecosystem services, frequency distribution was used. The ratings of the images were considered as ordinal data, since there is an inherent order between them, but the distance between the categories is unknown as they represent discrete values (cf. Liddell and Kruschke, 2018, Chen and Wang, 2014). Kendall's T coefficient was hence used to analyse correlations between these data (cf. Kursa, 2022). A number of non-parametric tests was used to test the effect of socio-demographic variables on image selection. A Chi-square analysis was performed to compare the effect of gender, a nominal category, on image selection, revealing a statistically significant difference between male and female participants. The 0,3% of respondents who did not identify themselves as male or female were disregarded as the number was too low to perform statistical analysis for this group. Regarding rurality, age and education- ordinal categories - a Kruskal Wallis test was used (Annex 4).

In order to cluster the countries based on their image preference, a correspondence analysis was used. Correspondence analysis is a multi-variate visualization technique to show associations between data-points with respect to their values in a set of variables. It makes no assumptions about the distribution of values within the variables. Coordinates were scaled in a – 1 to 1 range on both axes. The proximity of data-points (in this case countries) reflects the similarity of their values in the set of variables (in this case the average beauty and benefit image selection). Proximity of data-points to symbols that were assigned to individual variables reflect associations of data-points to the variable (e. g. if a certain country scores very high on a certain variable, the symbol of the country will be very close to the symbol of the variable). Analogue to factors in factor analysis, a correspondence analysis also produces factors with varying explanatory power, expressed as share of variance they explain. In this case, the 5 images themselves appeared as factors in the correspondence analysis.

In order to describe variability among the variables listing benefits of forests, a factor analysis was used (Annex 6). Bartlett's test of sphericity showed that the observed correlation matrix was not an identity matrix ($\chi^2 = 12,874.95$, $p = 0.0$). A Kaiser-Meyer-Olkin test (KMO) showed then that the data was suitable for factor analysis (overall KMO was 0.937). We used oblique rotation that permits the factors to be correlated with one another. The factor analysis has produced only three factors with eigenvalues larger than 1 (Annex 5). We followed the scale of Comrey and Lee (1992) to use 0.32 (poor), 0.45 (fair), 0.55 (good),

Table 1

Overview of the 5 images of which respondents had to select one for each of the two questions.

1	2	3	4	5
				
Distribution of responses to: “From the 5 pictures below, please select the landscape which you find most attractive”				
27,30%	26,70%	11,20%	10,90%	23,90%
Distribution of responses to: “From the 5 pictures below, please select the landscape which you think offers the most benefits provided by nature to society”				
27,40%	24,30%	9,80%	8,90%	29,60%

0.63 (very good) or 0.71 (excellent) as the thresholds of association between a variable and a factor. Per factor, one ES was selected and compared to the image rating. Using a Kendall's T coefficient, correlations between ES selection and image preference were calculated (Annex 6). All correlations were significant at the 0.01 level (2-tailed).

3. Results

3.1. Importance and implications of ES preferences

3.1.1. Ecosystem service valuation

During the survey, respondents were asked to think about the forest landscape they most often visit, and to rate the importance of 17 ES provided by this forest (Annex 2). The results demonstrate that cultural and regulating ES scored the highest, while provisioning ES scored the lowest. Overall, the aesthetic value of nature was the most important aspect citizens attributed to forest landscapes, along with health and wellbeing and air quality. The next section will focus on what this aesthetic values entails and how it differs between groups (Fig. 1).

3.1.2. Forest landscape preference

The respondents expressed a general preference for the “extreme” images; the wildest (image 1) and the most cultivated (image 5) landscapes were selected most often for both questions (see Table 2). The two wildest images (1 and 2) together attracted more than 50% of the sample. The images showing intermediate levels of wildness (3 and 4) received consistent low scores.

3.1.3. Correlation between perceived attractiveness and benefits of a landscape

Choosing between the same 5 images, each respondent was asked to “select the landscape which you think offers the most benefits provided by nature to society”. There was a slightly higher score attributed to the most cultivated landscape in terms of perceived benefits, as compared to its attractiveness. Overall, the wildest image (1) was considered the most attractive, but the most cultivated image (5) was considered to be the most beneficial one for society. Overall, the correlation between perceived beauty and benefits of the images was positive at a Kendall's T coefficient 0,463**, suggesting that people tend to perceive visually pleasing landscapes also as being beneficial to the society (Annex 3).

3.2. Demographic patterns determining the perception of beauty of nature

A further analysis of the dataset revealed demographic and geographic patterns in relation to the Europeans' aesthetical preferences for nature (Table 3).

Looking at **demographic** variables, the preference for the wildest image 1 was stronger among older, rural and male respondents (see also Roitsch et al., 2022). Furthermore, despite the aforementioned positive correlation between perceived beauty and perceived benefits of a landscape, the two questions did yield diverging results along some demographic lines (Table 3). Specifically, for **gender** differences, men showed a slightly higher preference for the wilder images than women, regarding their beauty as well as their benefits. On average, 30,3% of male respondents chose the wild picture (image 1) compared with 24% percent for the most cultivated picture (image 5). For female participants, those percentages were 24,5% for image 1 and 25,9% for image 5. The difference was moderate but statistically significant, as shown by a post-hoc Tukey's HSD Test (Annex 4). Regarding **rurality, age and education**, the differences displayed in Table 3 were statistically significant (confirmed by an Independent-Samples Kruskal-Wallis Test, see Annex 4). Specifically, landscape preferences varied strongly with respect to the **area where the respondents live** (city, suburb, rural near a town or the countryside). In general, people living in rural areas preferred the wilder images both in terms of beauty and in terms of benefits. 66,7% of the respondents living in the countryside expressed a preference for the first two (wild) pictures, whereas that percentage was significantly lower among urbanites at 46,2%.

The results for the perceived benefits of the portrayed landscapes were in line with those for the attractiveness. Regarding **age**, older people tended to find the wilder landscapes more attractive than young respondents. 59,1% of the participants age 50 and upward chose images 1 or 2, versus 49,9% for those younger than 50. In terms of the perceived benefits, the trend is less clear and even the opposite when looking at picture 5 only. Finally, respondents' **education** correlates with specific landscape preferences. In contrast to age or rurality however, there was no clear one-directional correlation relating to the level of education. In comparison to the other demographic variables, the differences between the perceived beauty and benefits of a landscape were the largest for education as a variable. Specifically, many people with a postgraduate degree preferred image 1 in terms of its benefits for society (38,9%),

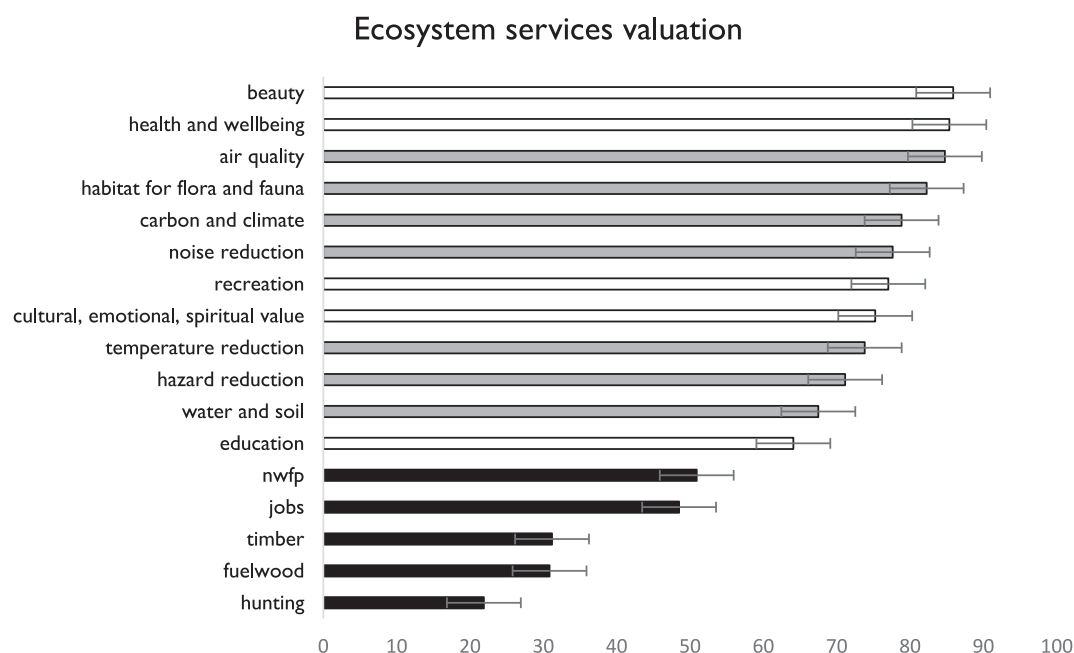


Fig. 1. Importance attributed to each ecosystem service on a sliding scale from 0 to 100. White: cultural ES. Grey: regulating ES. Black: provisioning ES.

Table 2

General image preference across Europe, as percentage of the total sample population that selected each image as a response to the abovementioned question ($N = 13.095$). Precise numbers per country can be found in Annex 5. Differences below 4% are not considered statistically significant.

From the 5 pictures below, please select the landscape which you find most attractive					
	1	2	3	4	5
					
Overall	27,30%	26,70%	11,20%	10,90%	23,90%
Gender (n=13.095)					
Female	24,5%	25,8%	12,0%	11,9%	25,9%
Male	30,3%	25,1%	10,0%	10,6%	24,0%
Rurality (n=13.095)					
City or town centre	23,2%	23,0%	11,1%	12,9%	29,9%
Suburb of a city or town	26,8%	28,3%	11,1%	11,4%	22,4%
Rural area nearby a city or town	36,4%	28,1%	11,9%	7,5%	16,1%
Rural area/countryside	38,7%	28,0%	9,1%	7,4%	16,7%
Age (n=13.095)					
18-30	21,2%	25,1%	12,1%	14,7%	26,9%
31-50	28,0%	25,6%	11,4%	10,7%	24,3%
51-65	33,4%	25,7%	9,5%	8,4%	22,9%
66+	33,9%	25,3%	8,3%	7,8%	24,7%
Education (n=13.095)					
no education	32,9%	28,5%	9,5%	9,7%	19,4%
until 16	29,2%	26,4%	10,5%	10,4%	23,6%
until 19	25,3%	24,6%	11,3%	12,1%	26,7%
undergraduate	26,6%	24,5%	11,6%	11,8%	25,5%
postgraduate	31,5%	21,3%	10,2%	6,5%	30,6%

compared to the share that selected it in terms of attractiveness (31,5%). The opposite was true for image 5, which was seen as quite attractive by postgraduates (30,6%), but was perceived as providing little benefits (22,2%). People without formal education on the other hand found image 5 relatively unattractive (19,4%) but estimated its benefits for society higher (28,6%). It should be noted that the small group size of postgraduates ($N = 108$; 0,8% of the sample) limits the relevance of these differences.

3.3. Geographical patterns determining the perception of beauty of nature

The results also showed a marked **geographical** variation in the image selection (Annex 5). Central-Western and Northern European countries, ranging from France to Finland (with the exception of the British Isles) expressed the strongest preference for the most wild image 1. South-Eastern Europeans showed a greater preference for the cultivated landscape in image 5. Intermediate outcomes were found in South-Western and Central-Eastern Europe (see the map in Fig. 2). The differences between South-Eastern and Central or Northern-Central Europeans were in parts remarkable: For instance, more than 40% of the surveyed Albanians, Romanians, Turks, Ukrainians and Russians preferred the cultivated landscape in image 5, while in Austria, Belgium, France, Czechia, Switzerland or Finland this image scored below 15%.

The map below, showing the preference for image 1 in terms of attractiveness, gives a general overview of the geographical differences across Europe (Fig. 2).

3.3.1. Country clusters

Given these striking geographical differences, a correspondence analysis was conducted based on average scores for the images (on country level). It shows the share of the image selection per country, as well as the clustering of countries around the 5 images (Perceived beauty in Fig. 3a, perceived ES benefits in Fig. 3b).

In terms of image preference in relation to their perceived attractiveness, the images form separated clusters. Besides being the most popular ones, images 1 and 5 also have the strongest clusters of countries around them. The countries clustered around image 1 (the wildest landscape) include central and Northern European countries like Austria, Switzerland, Germany, Norway, Denmark and the Netherlands. Respondents in these countries expressed a strong visual preference for the wilder landscape. On the opposite side of the spectrum, as a rule, respondents from Eastern and South-Eastern countries such as Turkey, Bulgaria, Romania, Albania, Russia and Ukraine as well as Portugal can be found clustered around image 5 (the most cultivated landscape). The results regarding the perceived benefits are similar, but the clusters of the two most cultivated images, 4 and 5, are much closer together. In some countries wilder landscapes were seen as more beneficial for people than more cultivated ones, despite not being seen as very attractive. This was notably the case in Portugal. However, the opposite trend was more common. Mainly in Central and Eastern European countries like Czechia, Poland, Slovenia, Romania and Bulgaria, but also in the Netherlands and Sweden, people rated cultivated landscapes higher in terms of potential ecosystem services than could be expected based on visual preference.

Table 3

Overview of demographic groups and their image selection, as a percentage of their total number (N = 13.095). The colour scale represents the relative score of each image. The darker the box, the higher the share of people who selected it. Precise numbers per country can be found in Annex 5. Differences below 4% are not considered statistically significant.

From the 5 pictures below, please select the landscape which you think offers the most benefits provided by nature to society					
	1	2	3	4	5
					
Overall	27,40%	24,30%	9,80%	8,90%	29,60%
Gender (n=13.095)					
Female	25,3%	23,9%	9,5%	9,5%	31,8%
Male	29,9%	23,1%	9,4%	8,4%	29,2%
Rurality (n=13.095)					
City or town centre	23,8%	20,8%	10,0%	10,0%	35,6%
Suburb of a city or town	28,2%	26,4%	10,1%	8,5%	26,7%
Rural area nearby a city or town	35,0%	28,1%	8,2%	7,1%	21,5%
Rural area/countryside	36,6%	25,1%	7,3%	6,7%	24,3%
Age (n=13.095)					
18-30	23,5%	24,7%	11,7%	11,4%	28,7%
31-50	28,0%	23,4%	9,2%	9,1%	30,3%
51-65	28,0%	23,4%	9,2%	9,1%	30,3%
66+	32,7%	21,4%	6,5%	6,7%	32,8%
Education (n=13.095)					
no education	31,5%	24,1%	8,6%	7,2%	28,6%
until 16	29,7%	24,0%	8,9%	8,6%	28,7%
until 19	25,5%	23,4%	10,1%	8,8%	32,1%
undergraduate	26,4%	22,8%	9,4%	9,8%	31,6%
postgraduate	38,9%	17,6%	11,1%	10,2%	22,2%

3.3.2. Link between landscape preference and the perceived importance of ecosystem services

Given the link between perceived beauty and provision of ES, we also looked into country-based differences with regards to the expressed importance of the 17 selected ES. A factor analysis distinguished three factors with an eigenvalue larger than 1 (Annex 6), resulting in three factors of valuations of forest ES, which largely coincided with three categories used in the Millenium Ecosystem Assessment (provisioning, regulating and cultural). The first one comprised hunting, wood and fuel production. A second group consisted of ecological values like air and water quality or biodiversity. The last cluster included mainly cultural ES such as beauty, education and recreation. Per cluster, one ES was selected and compared to the image rating (Annex 6). The selection included fuelwood (provisioning), biodiversity (regulating) and beauty (cultural). Using a Kendall T correlation coefficient, we found a negative correlation between a preference for the more cultivated landscapes with the stated importance of biodiversity ($-0,352^{**}$) and beauty ($-0,405^{**}$) as forest ES, but a positive one with fuelwood ($0,439^{**}$). There was also a negative correlation between a country's GDP and its average preference for image 1 ($-0,420^{**}$). This means that people who live in countries with a high GDP indicated provisioning forest ecosystems as less important, tended to prefer wild landscapes, while those living in less affluent societies or with a bigger reliance on forest resources tended to prefer the cultivated alternatives.

4. Discussion and conclusions

4.1. Findings

Our study shows some interesting patterns related to the appreciation of forest landscapes and their ecosystem services.

First, our study confirms the importance of the **beauty of nature as an ecosystem service** for most Europeans, also found in a European survey by [Fagerholm et al. \(2019\)](#). Beauty was however not just intrinsically valued, but was also connected to the perceived benefits that a landscape has to offer: respondents that found a scenery visually attractive were likely to assess it as also being beneficial for people, thus confirming the results of earlier studies ([Gobster et al., 2007](#); [Derks et al., 2023](#)). This was true for both the wild and the cultivated images included in the study.

Second, our study revealed significant **demographic differences regarding landscape preferences** – as measured with the five landscape pictures – in relation to the degree of visible human influence on the landscape. An unexpected finding was that, on average, it were not the young urbanites who expressed the biggest preference for the wilder landscape pictures, but rather older male respondents from the countryside. This is an interesting result of our study, indicating a (possible) reverse urban-rural divide when it comes to perceptions of nature when compared to other studies conducted on a local level ([Van den Berg and Koole, 2006](#), [Bauer et al., 2009](#), [Fischer et al., 2020](#), [Zoderer and Tasser, 2021](#)). One possible explanation is the fact that people tend to prefer

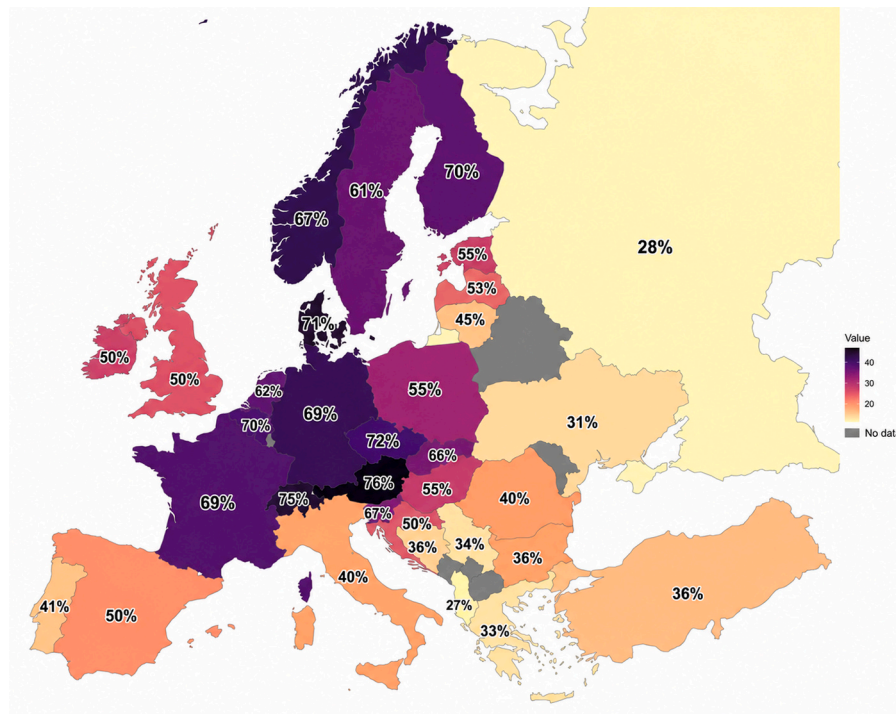


Fig. 2. Percentage of each country's population that selected image 1 as the most attractive image. The darker the colour, the higher the population share. The map lines delineate study areas and do not necessarily depict accepted national boundaries. Note that the colours on the map do not represent delineated categories but rather a gradient. Precise numbers per country can be found in Annex 5. Differences below 4% are not considered statistically significant.

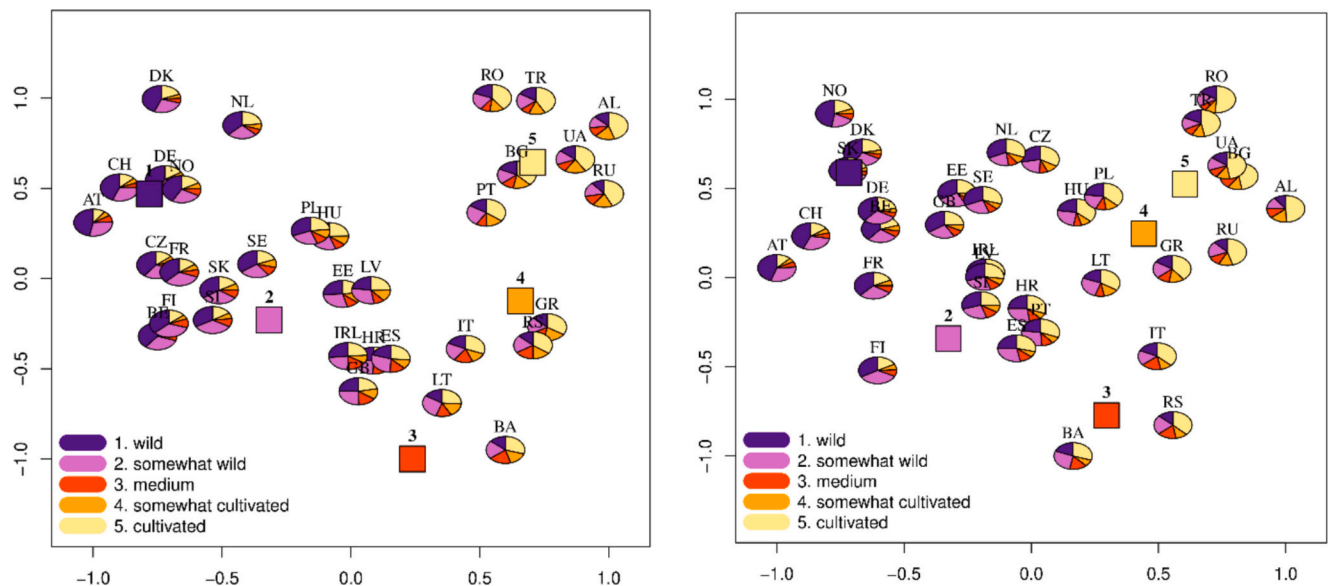


Fig. 3. a. Groupings of countries grouped around the 5 different images on the basis of their perceived attractiveness. The closer countries are together, the more similar the answers of their inhabitants were. The x-axis explains 60.5% of variance, the y-axis 19.9%, implying that proximity of countries on the x-axis is 3 times more important than on the y-axis.

b. Groupings of countries grouped around the 5 different images on the basis of their perceived benefits. The closer countries are together, the more similar the answers of their inhabitants were. The x-axis explains 60.5% of variance, the y-axis 19.9%, implying that proximity of countries on the x-axis is 3 times more important than on the y-axis.

familiar landscapes that remind them of the environment in which they grew up (cf., Zube and Pitt, 1981; Balling and Falk, 1982; Buijs et al., 2009; Svobodova et al., 2011), which could explain why urban dwellers, on average, preferred more cultivated landscape pictures more than their rural counterparts.

Another remarkable result was that, while overall the selection for

the most attractive and most beneficial landscape was correlated, the preference for image 5 in terms of expected benefits was larger than expected compared to the image choice for attractiveness. This was true across the board, but most noticeably for older respondents, who were both the biggest proponents for the wildest image in terms of beauty and for the most cultivated image in terms of perceived benefits. This may be

linked to the perceived disbenefits of wild looking nature, which have been identified by Roitsch et al. (2022) as being mainly related to security and safety. Older people may perceive more personal risks in a less maintained landscape, lacking elements like paved roads or street lamps. The security concern was higher in urban settings, and was the highest in Turkey, Greece, Czechia, the UK and the Netherlands. Only one demographic group valued image 5 lower in terms of benefits than in terms of beauty: people with a postgraduate degree. It should be noted, however, that this group only represented 0.8% of the survey group ($N = 108$). Yet, the impact of this academic group on the overall rewilding debate may be disproportionate because of their better access to media and politics.

Third, a key finding of our study are the **larger geographical patterns**, and specifically the significant general gradient in preferences between Northern-Central Europeans preferring pictures showing wilder landscapes in contrast to South-Eastern Europeans preferring those showing cultivated landscapes. This patterns may be connected to patterns of nature use (less people involved in the primary sector) and economic prosperity, and diminishing importance of traditional rural livelihoods (cf. Ranacher et al., 2020). Yet, there were also interesting outliers. For instance, on the British Isles and in the Netherlands, there was a much larger preference for cultivated landscapes than for instance in Scandinavia, Switzerland, Austria or Germany. This could potentially relate again to preferences towards what citizens are used to, given the high share of urbanised and cultivated agricultural landscapes in these two countries. It could also relate to diverging ideas about what constitute “wild nature” that may be more connected (to maintained) open landscapes in these regions, with many protected areas being characterized by moors or heathland compared to forests in the latter group of countries. Another possibility is that countries where rural abandonment leads to undesired rewilding and forest regrowth (mainly located in Southern and Eastern), people who mourn the loss of their traditional cultural landscape prefer those images where human influence is visible (cf. Frei et al., 2020).

How all those preferences will change in the future is hard to predict. Given that European societies are becoming increasingly urbanised, and that younger and urban people tend to prefer more anthropogenic landscapes, wilder landscapes could lose appeal. In addition, an influx of migration from the southern and eastern periphery of Europe towards central and western Europe, combined with densifying urban areas (cf. Cortinovis et al., 2022) may change nature views (cf. Buijs et al., 2009). On the other hand, higher rates of urbanisation have also been connected with a surge in “spiritualisation” of forest views (Roux et al., 2022), and a growing GDP also seems connected to a preference for wilder landscapes. The increasing shares of people with non-utilitarian nature connections in rural areas, aligned with the further decreasing number of classical nature users such as farmers or foresters, may also alter the still existing rural-urban divide (see Torralba et al., 2020). Lastly, the ageing of Europe's population may lead to shifting nature views. All of those factors may support the popularity of wild nature among Europeans, also in countries where this it is currently less favoured. Clearly, repeating this or a similar survey with a representative European sample at a later moment in time would be highly interesting to reliably track evolutions in the nature image of European citizens.

4.2. Limitations

This study is based on a large scale European survey conducted via a network of polling agencies. The survey did not contain detailed geographical information past country level. Zooming in on NUTS2 or NUTS 3 would have been preferable, given the expected differences within some countries, and would be recommendable for a follow-up study. Working on a smaller scale would also allow for more accurate planning on a regional level. The analysis of perceptions of wild versus cultivated landscapes is linked to a set of five pictures presented in the survey. This is a considerable limitation of this study for two main

reasons: First, even though the images were designed to be generic, they may still resonate differently among the broad set of respondents from so many different countries. The international team behind the design of the study had checked the pictures and has supported their use to illustrate cultivated vis a vis “wild” landscapes, but still differences in perceiving the drawings that go beyond the gradient from wild to cultivated cannot be ruled out. Second, the conclusion from the visual appearance of these picture on how people view their actual natural surroundings (i.e. if they would have been surveyed in diverse landscapes directly) is similarly challenging and can only be drawn with caution. Yet, given the large and geographical diverse sample across Europe, it would have been impossible to have such a design. We still argue that the use of pictures is insightful in a comparative (not absolute) manner, as we have aimed for in this paper (cf. Karjalainen and Tyrväinen, 2002).

Furthermore, we did not ask respondents to decide about trade-offs, e.g. related to provisioning versus regulating or cultural ecosystem services. In landscapes more characterized by agricultural use, these trade-offs may even be more decisive (e.g. related to food security). Also, the representativeness of the underlying survey data against socio-economic parameters was not explicitly tested after the data was collected – rather, the claim of representativeness is based on the distribution of the polling agency's panel across socio-economic parameters. This means that deviations from the “average population” in the countries are possible in the sample. Finally, the clusters of correspondence analysis in Fig. 3 are not formal clusters, but rather a groupings of countries based on similar image selections.

Still, despite these limitations, we believe that this study offers significant and in parts surprising insights in varying forest landscape preferences across Europe that are novel at the continental scale.

4.3. Implications

This study has implications for both research and policy making in Europe. For a start, the beauty of landscapes is rarely at the centre of nature policy, at least explicitly, but scored the highest in this study among all ecosystem services forest landscapes do provide. Citizens and voters longing for “more wild” nature may form an important constituency for conservation policy makers and environmental NGOs, and preferences for nature aesthetics may even underpin professional ideologies related to conservation, forestry and agriculture, including related academic fields (Sotirov and Winkel, 2016). In other words: what people consider to be beautiful nature may drive support for and opposition to conservation policies. Our study indicates that there may be substantial support for wilder landscapes in Europe, but there are also significant parts of the population who prefer more cultivated ones, indicating considerable potential for conflict along socio-demographic and geographical gradients. Both those general patterns as well as the observed difference highlighted below are of importance for policy and decision makers trying to push the agenda of a more nature-oriented and resilient approach to forest management. The reverse urban-rural divide on perceptions of (wild) nature found in this study is remarkably differing from other studies. The rather high support for rewilding in rural areas calls for caution with both academia and policy making when assuming the “support for nature” mostly being located in urban centres.

Furthermore, the geographical divide in perceptions of wild nature across Europe this paper indicates may pose a considerable challenge for European-wide conservation policies. The impetus for wilder forest landscapes was mainly found in Central-Western and Northern Europe, whereas – in some regards at least – the largest potential for wild nature is located in peripheral regions in the South and the East. Romania and Bulgaria host the highest share of remaining old-growth forests in Europe, and the South-Eastern and Southern European countries do have the highest shares of non-managed land within Europe (Lasanta et al., 2017). This divide calls for culture-sensitive localized approaches in European conservation policy, including participatory management

planning in conservation and forestry (Konczal et al., 2025), being aware of significant differences in nature perceptions. It may also call for a stronger emphasis on nature restoration and wild nature/rewilding in countries where less “nature” is left, but support for wild landscapes is higher (cf. Iordăchescu, 2022).

Our findings may not only resonate on a policy level but also be insightful to forest managers, who deal with the effects of societal perceptions on their work on a daily basis (cf. Konczal et al., 2023). Understanding how and why certain FES are appreciated by the respective society may help to adjust and align the long-term vision of forest management and increase the acceptance of forestry practices.

Going forward, it is important to note that this study presents a snapshot of the current situation in Europe, reflecting present geographical divides and contemporary demographic patterns. While the study identifies correlations between nature perceptions and demographical and geographical patterns, the influencing factors cannot be causally linked to landscape preference with certainty. In-depth-qualitative research, or more structured surveys using multiple drawings in diverging configurations, would be needed to unveil the patterns underlying people's nature preferences and to study how they evolve over time.

CRedit authorship contribution statement

Jakob Derks: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Den-nis Roitsch:** Methodology, Investigation, Formal analysis. **Marko Lovric:** Visualization, Validation, Methodology, Investigation, Formal analysis. **Ajdin Starcevic:** Visualization, Formal analysis. **Agata Konczal:** Writing – review & editing, Supervision. **Rik De Vreese:** Project administration, Funding acquisition, Conceptualization. **Gert-Jan Nabuurs:** Writing – review & editing, Validation, Supervision. **Georg Winkel:** Writing – review & editing, Writing – original draft, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.forpol.2026.103800>.

Data availability

Data will be made available on request.

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