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Testing the difference between experts' and lay people's landscape preferences

The European Landscape Convention, ratified by 40 nations, has placed emphasis on the necessity that the value of the landscape is assessed by the population. However it is standard practice that a few experts decide which areas are of landscape interest and the transformations that are compatible with their conservation. To compare the landscape preferences of experts and lay people a study was done on the Po Delta Natural Park (Italy) using a psychophysical approach. In our case study the average scores of experts and lay people are not very different. However it was also ascertained that the experts evaluate the presence of some elements in a way that differs from lay people. As the responsibility for landscape policies is normally devolved to a few experts it would appear necessary that the preferences and opinions of lay people should always be carefully analysed.

Keyword: *Landscape evaluation, Landscape perception, Experts, Lay people, Riverscape*

Jel: H41, R14, Q51

1. Introduction

Many researches in the last decades highlighted that landscape quality affects people's wellbeing. It has been seen that the quality of the landscape interacts with numerous physiological parameters of an individual and that more pleasant landscapes tend to improve personal health (Berto, 2005; Hartig et al., 2003; Mun˜oz, 2009; Ulrich, 1984; Ulrich et al., 1991; Velarde et al., 2007; Wells, 2000). As stated by the Sustainable Development Commission (2008)

> The knowledge base shows that exposure to natural spaces – everything from parks and countryside to gardens and other green spaces – is good for health,

Some researches pointed out that the more pleasant landscapes tend to have a restorative effect on people (Kaplan, 1995; van den Berg et al., 2003). It can be argued that man prefers landscapes where he feels better, and, in general, he tries to pass as much time as possible in such landscapes. For this reason, in recent decades, laws have been passed in many countries to protect the quality of the landscape. In Europe, the European Landscape Convention, which was ratified by 40 countries, introduced important innovations in landscape policy. The first two articles of the European Landscape Convention state that

> landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.

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Landscape policy must allow "specific measures aimed at the protection, management and planning of landscapes" to be adopted to satisfy the "aspirations of the public with regard to the landscape elements of their surroundings". From this definition, one understands that landscape visual quality has to be judged by the general public and not only by experts.

Usually landscape policies are implemented exclusively by experts, but this practice can be considered correct only if the experts have preferences similar to those of lay people.

Several studies in the past compared the visual preferences of lay people and experts (Coeterier, 2002; Dandy and Van Der Wal, 2011; Daniel and Boster, 1976; Dearden, 1981; Hunziker et al., 2008; Kaplan and Kaplan, 1989; Rogge et al., 2007; Ryan, 2006; Strumse, 1996; Vouligny et al., 2009). However, the results obtained are not univocal. While for some authors there seems to be a significant difference (Hunziker et al., 2008; Kaplan, 1973; Rogge et al., 2007; Vouligny et al., 2009), other studies did not find any difference and in yet others the differences pertained only to some landscapes or to some categories of respondents (Anderson, 1978; Dandy and Van Der Wal, 2011; Daniel and Boster, 1976; Dearden, 1981; Hudspeth, 1986; Ryan, 2006; Strumse, 1996).

The disparity of results might be ascribed to the landscape types under investigation, the method used to elicit and analyse the preferences, and the definition of expert.

With reference to landscape types the previous studies have analysed woods (Anderson, 1978; Dandy and Van Der Wal, 2011; Daniel and Boster, 1976), rural landscapes (Rogge et al., 2007; Strumse, 1996; Vouligny et al., 2009) and wetlands (Hudspeth, 1986; Miller, 1984). Considering the possibility that the differences depend, among the other things, on the landscape types, it seems not possible to draw general conclusions from past studies.

The most widely used methods of elicitation of the preferences have been images scoring (Anderson, 1978; Daniel and Boster, 1976; Hudspeth, 1986; Kaplan, 1973; Miller, 1984) or interviews in which the opinions of different groups of people were recorded on the factors that affect the aesthetic value of the landscape and on the reasons underlying their preferences (Coeterier, 2002; Rogge et al., 2007; Vouligny et al., 2009). Since these are methods involving cognitive processes that are at least in part different it can be assumed that the results obtained are not entirely comparable. From the statistical point of view, the method usually utilised to verify the score or opinion differences between experts and lay people has been the analysis of variance. As pointed out by Nakagawa and Cuthill (2007), the null hypotheses significance testing by means of the ANOVA can be misleading in some cases and have some not negligible drawbacks. Moreover, from the point of view of the policy maker what is important is the magnitude of the differences and their rank, and not only its significance per se.

Finally, in the past researches have been considered as experts: students of disciplines connected to landscape management (Strumse, 1996), land planners (Dearden, 1981; Miller, 1984; Ryan, 2006), foresters (Anderson, 1978; Dandy and Van Der Wal, 2011; Daniel and Boster, 1976), landscape experts and architects

(Rogge et al., 2007). The categories of expertise are therefore very diverse, making the research results little comparable. There are two further elements that make the results of the previous research only partially useful for the implementation of landscape policies: in a few cases the effect on the landscape of the visibility of a single element has been analysed, the correspondence of individual expert assessments with that of lay people has never been analysed

Regarding the first aspect, it can be noted that the studies done in the past have not always tried to understand if the experts and lay people evaluate the various landscape elements differently. This limitation is particularly evident when one considers that landscape planning is generally divided into two distinct phases. In the first, the landscapes are divided into different classes of quality (landscape quality assessment). In the second phase, to preserve the landscape quality, it is necessary to assess the impact of any land use transformation (such as the construction of new homes or other buildings, power lines, roads, etc.). It can be assumed that the role of the experts is to a certain extent more important in the second phase than in the first. With regard to the second aspect, researches in the past usually compared the average value of the experts with the average value of the lay people. This approach does not take into account the fact that generally in the implementation of landscape policies only a few experts are involved (sometimes just one). The problem is thus not to verify if the average value is statistically equal but to understand how many experts are able to correctly interpret the preferences of the population.

It can therefore be said that currently there is no experimental evidence that unambiguously supports the hypothesis that experts evaluate the landscape in a different way from lay people. In an attempt to improve the knowledge in this field the present research aims to:

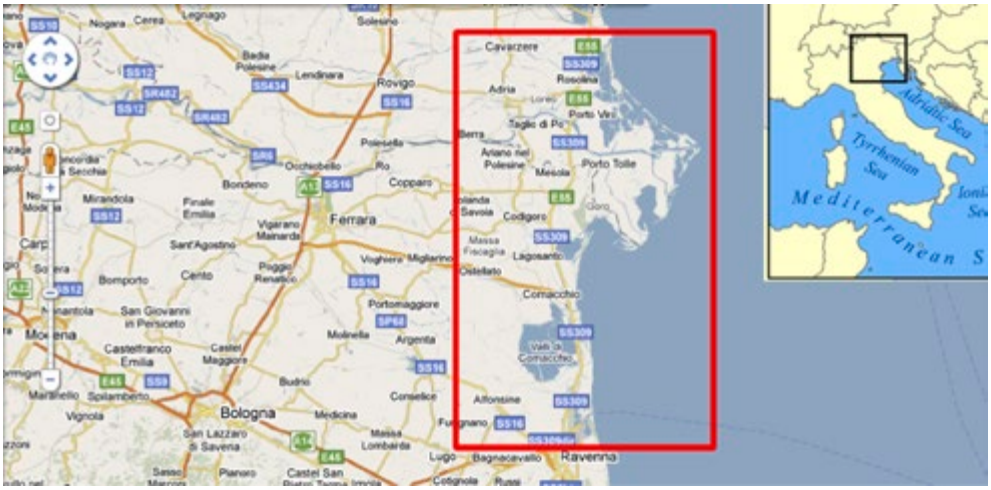
1. verify if the preferences expressed by means of opinions in the absence of visual stimuli are similar to those expressed by scoring images;
2. compare the landscape visual preferences of lay people with those of the experts for different types of landscape;
3. analyse the effect of the presence/absence of some elements on the preferences of the two groups of respondents;
4. analyse individually the ability of experts to correctly interpret the preferences of lay people.

With these aims this paper presents the results of a perceptive study conducted on the Po River Delta in Italy, an area that is entirely under landscape protection.

2. Methods

The study area is the Po River Delta Regional Park located in north-eastern Italy between two Regions (Figure 1): Veneto and Emilia Romagna. The park has a surface of about 65,000 ha and is protected by national laws and international conventions

Figure 1. Study area map.



like the Ramsar Convention, Conservation of Wild Birds Directive (79/409/EEC) and Habitat Directive (92/43/EEC). The Po River Delta is the only Italian delta and one of the most important wetlands of the Adriatic Sea coast. To analyse the landscape preferences we used a psychophysical approach (Daniel, 2001; Daniel and Vining, 1983). Five landscape types were initially identified: agrarian, salt marshes, woods, fishing lagoons and rivers (Figure 2). Five elements that could theoretically affect the landscape aesthetic quality were then selected: traditional buildings, modern buildings, ruins, factories, presence of wild birds (seagulls, flamingos and cormorants)[1].

We considered these elements because the findings of previous researches (Arriaza et al., 2004; Kaplan et al., 2006; Rogge et al., 2007; Tempesta, 2010; Tempesta and Thiene, 2007) highlighted that they can influence the landscape appreciation in territorial contexts similar to the area under analysis. Crossing the 5 landscape types and the 5 elements, 18 scenes were identified (Table 1). Each scene has been obtained from the combination of a landscape type and an element. A variable number of images belongs to each scene. Note that some scenes were not considered because they were not present or plausible in the study area. This is especially true in the case of woods where, due to reasons of visibility, it is not possible to see the impacting elements (i.e. a factory in a wood).

All images presented in the questionnaire (see Appendix B) were selected from a set of 140 pictures of the Po River Delta area. The images were then catego-

[1] While several species of birds could have been chosen, we opted for the three mentioned species for the following reasons: 1) they are present in the study area; 2) they can be easily distinguished by both experts and lay people in pictures even if not covering the main portion of the picture (close focus); 3) these species are diversified by their rarity moving from seagulls (most common), cormorants, flamingos (most rare).

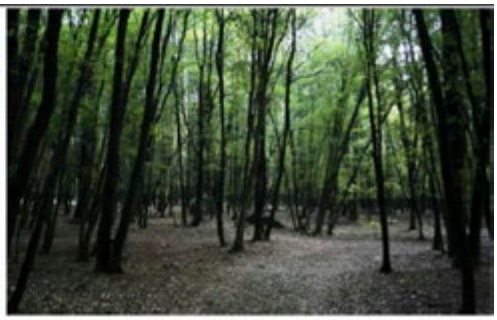
Table 1. Number of images selected for each landscape type and scene considered.

Scene		No.	%
Landscape type	Element		
agrarian	*	6	9.5
	with traditional buildings	5	7.9
	with ruins	2	3.2
	with modern buildings	3	4.8
	with factories	5	7.9
	total agrarian	21	33.3
fishing lagoon	*	7	11.1
	with wildlife	3	4.8
	with ruins	2	3.2
	with modern buildings	2	3.2
	total fishing lagoon	14	22.2
river	*	6	9.5
	with traditional buildings	1	1.6
	with modern buildings	2	3.2
	with ruin	2	3.2
	total river	11	17.5
salt marsh	*	6	9.5
	with wildlife	4	6.3
	with ruins	1	1.6
	with factories	1	1.6
	total salt marsh	12	19.0
woods	*	5	7.9
	total woods	5	7.9
Total	Total	63	100.0

rised according to the landscape type and to the presence or absence of the chosen landscape elements. We then choose 38 base images and modified a selection with Gimp® software. These modifications follow Stamps (1992, 1993), who found that the use of photomontages (see Appendix A) does not modify the appreciation of the landscape. Only a few people are able to identify photographic alteration, and the effect on mean scoring is negligible (Stamps, 1993). Using photomontages it is possible to directly verify the effect of an element on the landscape appreciation and this makes the interpretation of the preferences straightforward.

Figure 2. Landscape types: five examples.

(a) Picture 17 – river



(b) Picture 3 - wood

(c) Picture 19 - agrarian

(d) Picture 33 – fishing lagoon

(e) Picture 44 – salt marsh

We also tried to analyse the effect of the distance and visibility of certain elements (ruins and factories) on a given scene by modifying the shooting distance from the subject while keeping the same perspective. In some cases the effect of different elements have been analysed with reference to the same view.

This process led to a final set of 63 images (38 original, 25 modified) that focus on a balanced representation of key landscape scenes. We took care that the im-

ages obtained from photomontages or belonging to the same landscape type were separated by at least three photos of other landscapes scenes.

The questionnaire (see Appendix B) was delivered by means of a web application designed and built specifically for this study using PHP, JavaScript, HTML and CSS programming languages. The web survey (WBS) utilised a MySQL database to store data and provide real time statistics. We used JavaScript to create the images fading effect, making them disappear after 8 seconds, and PHP to build the engine of the application. We opted for an open survey format: no credentials were required from the respondents to complete the survey. We optimised the survey to be listed on search engines. Furthermore, we invited people to answer using mailing lists and, taking advantage of web 2.0, we promoted the WBS on social networks like Facebook*QR* and Twitter*QR* . In order to involve experts in the study we advertised the online questionnaire at two international conferences related to landscape, while some Italian experts have been contacted directly by the authors. Given the 'open nature' of the survey, some measures were adopted to check for data validity. First, the survey completion time was recorded for each respondent. All questionnaires completed in less than 10 minutes were ignored due to potentially random responses. Data integrity was ensured through server-side validation.

The questionnaire was divided in four sections. The first introduces the reader to the questionnaire. The second asks questions concerning socio-economic data and opinions about the elements that may affect landscape visual quality. The third shows the respondent some demonstration landscapes that will be rated in section four. The final section focuses on the landscape rating task.

Among the questions in section two, the interviewees were asked to express their opinion about the importance of some landscape elements in order to improve the visual quality using a five point rating scale without seeing any image. The elements considered were: woods, water bodies (rivers, streams, bays, sea etc.), meadows, hedges and tree rows, traditional rural buildings, poplars plantations, unpaved roads, uncultivated fields, urban settlements, paved roads, modern buildings, shopping malls, factories, power lines and antennas. The ratings lie in an integer range from -2 (very negative impact) to +2 (very positive impact).

People were then asked to rate the images portraying various scenes of the area using a 1 to 5 point scale (section four of the questionnaire), and their attention was drawn to the need to utilise the entire scale. Following a well-established methodology (Daniel and Boster, 1976), the interviewees were first shown eight photos (section three of the questionnaire) to allow them to adjust their evaluation scale. Each image was displayed for 8 seconds to obtain the respondent's first impression.

Image rating is widely used in this field of research. Empirical findings suggest that there is a close relationship between on site landscape appreciation and appreciation of a photo (Palmer and Hoffman, 2001; Stamps, 2000). We considered as experts all the respondents who declared that they work in the field of landscape planning, management, analysis and evaluation. Following this heuristic, from our dataset we classified 50 (21.9%) respondents as experts and 178 (78.1%) as lay people.

To compare the lay people and experts scores as recommended by the American Psychological Association (2009), we carried out both analysis of variance and analysis of the effect-size using Cohen's d statistics (Cohen, 1988). Comparing the landscape appreciation of two different groups it is important not only to know if the mean scores can be considered statistically different but also the magnitude of such a difference. In order to take into account the difference in size of the experimental (experts) and control group (lay people) we used a "pooled" estimate of standard deviation to calculate Cohen's effect-size (*Spooled*):

$$S_{pooled} = \sqrt{\frac{(n_E - 1)S_E^2 + (n_L - 1)S_L^2}{n_E + n_L - 2}} \tag{1}$$

Where nE and nL are the sizes of experts and lay people groups respectively, and SE and SL their standard deviations.

Cohen's effect-size has therefore been calculated[2] as:

$$d = \frac{\overline{x}_E - \overline{x}_L}{S_{pooled}} \tag{2}$$

Where $x\bar{}E$ and $x\bar{}L$ are the means of experts and lay people respectively.

To interpret the effect size value, following Cohen (1988), it is possible to consider that it is high when $d > 0.80$, medium when $0.5 < d < 0.80$ and small when $d < 0.5$.

To verify the capacity of each expert to correctly represent the preferences of the public two indexes were defined.

The Mean Interval of Confidence Index (MICI): is constituted by the number of images for which each expert has given a score that falls within the interval of confidence of the average scores of the lay people.

This index can provide a measure of the capacity of the experts to represent the average behaviour of the population. The Half Lay People Index (HLPI): is constituted by the number of images for which each expert has given a score that falls within the interval around the mean comprising 50% of the scores given by lay people. It is therefore a less restrictive index as it regards the capacity to approximate the preferences of half of the population.

In the first case the interval was calculated as:

$$x\bar{}Li - t \cdot Sx\bar{}Li \leq xij \leq x\bar{}Li + t \cdot Sx\bar{}Li \tag{3}$$

[2] The Cohen's d reported in this paper were calculate using the R software (R Core Team, 2013) and in particular the *cohensD()* function of the *lsr* package (Navarro, 2013).

In the second case as:

$$x^{-}Li - t \cdot SLi \leq xij \leq x^{-}Li + t \cdot SLi \quad (4)$$

Where: $x^{-}Li$= the average lay people's score for the *i-th* image; $Sx^{-}Li$ is the standard deviation of the lay people's average score for the *i-th* image; *SLi* is the standard deviation of the lay people's score for the *i-th* image; *xij* is the score of the *j-th* expert for the *i-th* image.

3. Results

3.1 Interviewees' characteristics

From July to November 2009, 228 questionnaires have been collected. The mean interviewee age is 40 years and is not statistically different between experts and lay people (Table 2). Nearly half of the interviewees from both groups spent their childhood in rural areas but only 10% of them declared that their father was a farmer.

There are some important differences between the two groups. Experts have a higher educational level and are, with few exceptions, all university graduates. The majority of experts work at a university (64%), while lay people exhibit more occupational heterogeneity. Among the experts, 28% are female, whereas the lay people's group had a female participation rate of 51%. Less than 50% of experts are Italian, whereas almost all lay people are from Italy. With reference to the sector of expertise, 44% of experts are architects or landscape planners, 28% are landscape ecologists, and 28% landscape economists.

3.2 Opinions

As mentioned in section 2 the interviewees were preliminarily asked to express their opinion about 16 elements that could have a negative or positive impact on landscape by using a five point scale without seeing any image. The results are reported in Table 2.

For the experts the four elements that increase the landscape quality are in order of importance: water bodies (rivers, streams, bays, sea etc.), woods, traditional rural buildings and hedges and tree rows. The opinion of the lay people is not very different, even if the presence of meadows is more important to them than that of traditional rural buildings. The elements that reduce the visual quality of the landscape for the experts are in the order: power lines, paved roads, antennas, shopping malls, factories. These are also the five elements that chiefly reduce the quality of the landscape for lay people, although their order of importance differs (Table 3).

The analysis of variance shows that the scoring of the experts differs from that of the lay people ($p<0.05$) in 8 cases out of 16 (50%). Considering Cohen's *d* test,

Table 2. Interviewees' socio-economic characteristics.

	Experts (%)	Lay people (%)
Educational level		
primary	0	0.60
lower secondary	0	7.90
secondary	2	34.30
graduate	98	57.30
Total	100	100.00
Father's sector of activity		
agriculture	12	8.40
industry	30	40.40
services	58	51.10
Total	100	100.00
Sector of activity		
agriculture	6	2.20
industry	2	10.10
services	22	44.90
university	64	32.00
retired, students or housewives	6	10.70
Total	100	100.00
Gender		
male	72	49.40
female	28	50.60
Total	100	100.00
Country of residence		
Italy	46	93.30
Europe	50	4.50
other	4	2.20
Total	100	100.00
Place of residence during childhood		
urban area - centre	36	27.50
urban area - suburbs	18	24.20
rural area - village	38	28.10
rural area - scattered housing	8	20.20
Total	100	100.00
Current place of residence		
urban area - centre	58	41.00
urban area - suburbs	6	30.90
rural area - village	24	16.30
rural area - scattered housing	12	11.80
Total	100	100.00

in one case the difference can be considered big (modern buildings) and in three cases medium (antennas, woods and poplar plantations).

Compared with experts, on average lay people assigns a more positive score to the impact of natural elements (hedge, woods, water bodies and meadows) and a more negative score to man-made elements (modern buildings).

Table 3. Experts and lay people opinion about the elements that affect the landscape visual quality. Data ordered from the less impacting element to the most impacting one.

Landscape elements	Experts		Lay people		Mean Difference[a]	Cohen's $\lvert d \rvert$	Sign.[b]
	Mean	sd	Mean	sd			
Water bodies	1.40	0.53	1.44	0.52	-0.04	0.08	
Woods	1.18	0.52	1.53	0.52	-0.35	0.68	***
Traditional rural buildings	1.16	0.65	1.03	0.69	0.13	0.19	
Hedges and tree rows	1.14	0.64	1.17	0.61	-0.03	0.05	
Meadows	1.06	0.51	1.33	0.60	-0.27	0.47	***
Unpaved roads	0.86	0.61	0.82	0.80	0.04	0.05	
Poplar plantations	0.30	0.81	0.83	0.77	-0.53	0.68	***
Uncultivated fields	0.14	0.83	-0.28	0.94	0.42	0.46	***
Urban settlements	-0.28	0.83	-0.62	0.77	0.34	0.44	***
Modern buildings	-0.30	0.95	-1.15	0.85	0.85	0.97	***
Paved roads	-0.62	0.78	-0.79	0.87	0.17	0.20	
Factories	-1.28	0.81	-1.57	0.62	0.29	0.43	***
Shopping Malls	-1.30	0.86	-1.56	0.68	0.26	0.35	
Antennas	-1.32	0.74	-1.62	0.56	0.30	0.50	***
Paved roads (high traffic)	-1.38	0.75	-1.58	0.67	0.20	0.30	
Power lines	-1.42	0.78	-1.58	0.61	0.16	0.24	

a: $mexperts - mlaypeople$
b: Mean difference significance (t-test) of $H0 : mexperts \neq mlaypeople$ with $p<0.05$

3.3 Images and scenes preferences

The average score for each image by experts and lay people differed ($p<0.05$) in 15 cases (24%) (Table 4). This difference occurs especially in the cases of images portraying rivers (alone or with ruins), woods, agrarian scenes and fishing lagoons. However the Cohen's d value is greater than 0.5 in only 7 cases out of 63. We can therefore conclude that the means' difference is generally moderate and can be considered small in 56 scenes out of 63. Considering the scenes (Table 5), the ranking of the preferences differs only slightly between the two groups. The

Table 4. Percentage of cases for which the difference between experts and lay people score is statistically significant ($p < 0.05$) and percentage of cases by effect-size value.

Scene		n. images	ANOVA (p<0.05)		$\|d\| < 0.50$		$0.50 \leq \|d\| \leq 0.80$		$0.80 < \|d\|$	
Landscape type	Element		n.	%	n.	%	n.	%	n.	%
agrarian		6	1	17	5	83	1	17	0	0
	factory	5	0	0	5	100	0	0	0	0
	modern building	3	0	0	3	100	0	0	0	0
	ruins	2	0	0	2	100	0	0	0	0
	traditional building	5	0	0	5	100	0	0	0	0
fishing lagoon		7	2	29	6	86	1	14	0	0
	modern building	2	0	0	2	100	0	0	0	0
	ruins	2	0	0	2	100	0	0	0	0
	wildlife	3	1	33	3	100	0	0	0	0
river		6	4	67	3	50	3	50	0	0
	modern building	2	1	50	2	100	0	0	0	0
	ruins	2	2	100	2	100	0	0	0	0
	traditional building	1	0	0	1	100	0	0	0	0
saltmarsh		6	0	0	6	100	0	0	0	0
	factories	1	0	0	1	100	0	0	0	0
	ruins	1	0	0	1	100	0	0	0	0
	wildlife	4	1	25	4	100	0	0	0	0
wood		5	3	60	3	60	2	40	0	0
total		63	15	24	56	89	7	11	0	0

three most and least appreciated scenes are exactly the same (least appreciated: salt marshes and factories, agrarian and factories, agrarian and modern buildings; most appreciated: salt marshes and wildlife, fishing lagoons and wildlife, woods). In general, the presence of buildings tends to reduce visual quality. This is particularly evident in the case of factories and modern buildings. Ruins have a negative impact while the effect of traditional buildings is unclear. It is also interesting to observe how the presence of wildlife is without fail positively correlated with landscape appreciation. The scores are statistically different ($p<0.05$) in the case of agrarian scenes, woods, fishing lagoons, fishing lagoons and wildlife, rivers, rivers and ruins (Table 5). However the d statistics shows that the difference is small in all cases (d in absolute value is never higher than 0.50).

Table 5. Mean rating by landscape types and scenes: t-test and d statistic.

Scene		Experts		lay people		Mean difference[a]	**Cohen's $\|d\|$**	Sign.[b]
Landscape type	Element	mean	sd	mean	sd			
agrarian	*	2.78	1.04	3.01	1.08	-0.23	0.22	***
	factory	1.99	0.90	1.94	0.88	0.05	0.06	
	modern building	2.41	1.07	2.54	1.08	-0.13	0.12	
	ruins	2.78	1.03	2.78	0.97	-0.00	0.00	
	traditional building	2.99	0.97	3.09	1.05	-0.10	0.09	
fishing lagoon	*	3.60	1.01	3.76	1.02	-0.17	0.16	***
	modern building	3.17	0.88	3.03	1.00	0.14	0.15	
	ruins	3.03	1.15	3.08	1.08	-0.05	0.04	
	wildlife	3.68	0.91	3.93	0.94	-0.25	0.27	***
river	*	3.46	0.97	3.79	1.05	-0.34	0.33	***
	modern building	2.88	1.09	3.06	1.12	-0.18	0.16	
	ruins	2.82	0.88	3.19	1.00	-0.36	0.38	***
	traditional building	3.62	0.75	3.84	0.88	-0.22	0.26	
salt marsh	*	3.65	0.96	3.64	1.04	0.01	0.01	
	factories	1.78	0.82	1.65	0.80	0.13	0.17	
	ruins	2.92	1.12	3.02	0.96	-0.10	0.10	
	wildlife	3.80	0.91	3.84	0.98	-0.04	0.05	
wood	*	3.69	1.00	4.06	0.94	-0.37	0.39	***

a: $mexperts - mlaypeople$
b: Mean difference significance (t-test) of $H0 : mexperts \neq mlaypeople$ with $p<0.05$

3.4 Landscape elements: photomontages

As described in the Methods section, to isolate the effect of individual landscape elements, some images were obtained using photomontage (see Table 6 and Appendix A for the full list of photomontages). The presence of wild birds significantly increases the landscape aesthetic value for experts and lay people in 3 cases out of 4. The only exception is couple 2 where a flock of flamingos occupy a small part of the view. Considering the Cohen's d statistic it is possible to observe that the appreciation of the wild birds seems also to be driven by the rarity of the species for experts while lay people seem to consider their visibility more. For experts Cohen's d is highest for the flamingos while for lay people it is highest for the seagulls, which are very common.

The preferences of the two groups are also similar in the case of factories. They generally have a strong negative impact regardless of the landscape type.

Table 6. Analysis of perceived difference in photomontages. Means difference significance (t-test) and Cohen's d statistic

Picture	Base scene	Modified scene	Experts			Lay people		
			Mean diff.	Sign.[a]	**Cohen's *d***	Mean diff.	Sign.[a]	**Cohen's *d***
1	P14: salt marsh and reeds	P9: salt marsh and reeds + wildlife (seagulls)	0.54	0	0.56	0.79	0	0.83
2	P36: fishing lagoon	P47: fishing lagoon + wildlife (flamingos)	-0.08	0.49	-0.08	0.05	0.33	0.05
3	P50: fishing lagoon	P23: fishing lagoon + wildlife (flamingos)	0.72	0	0.83	0.61	0	0.61
4	P18: fishing lagoon	P42: fishing lagoon + wildlife (cormorants)	0.44	0	0.46	0.37	0	0.35
5	P31: agrarian	P19: agrarian + traditional building	0.38	0	0.39	0.22	0	0.23
6	P43: agrarian	P46: agrarian + traditional building	0.2	0.08	0.22	0.17	0.04	0.17
7	P59: river	P32: river + traditional building	-0.06	0.61	-0.08	-0.29	0	-0.33
8	P52: agrarian	P10: agrarian + modern building	-0.5	0	-0.53	-0.45	0	-0.46
9	P62: fishing lagoon	P33: fishing lagoon + modern building	0.06	0.5	0.07	-0.43	0	-0.41
10	P5: river	P21: river + modern building	-0.08	0.65	-0.11	-0.43	0	-0.49
11	P7: agrarian + ruin (close focus)	P22: agrarian + ruin (distant focus)	-0.28	0.03	-0.4	-0.03	0.63	-0.05
12	P58: agrarian	P7: agrarian + ruin (close focus)	0.34	0.05	0.32	0.01	0.95	0.01
13	P58: agrarian	P22: agrarian + ruin (distant focus)	0.06	0.74	0.06	-0.03	0.67	-0.03
14	P44: salt marsh and reeds	P20: salt marsh and reeds + ruin	-0.26	0.11	-0.27	-0.08	0.31	-0.08
15	P26: fishing lagoon	P12: fishing lagoon + ruin	-0.64	0	-0.52	-0.75	0	-0.69
16	P8: fishing lagoon	P54: fishing lagoon + ruin	-0.94	0	-1.11	-0.94	0	-0.98
17	P38: river	P11: river + ruin	-0.08	0.44	-0.09	-0.27	0	-0.28
18	P17: river	P45: river + ruin	-0.12	0.32	-0.15	-0.17	0.01	-0.18
19	P40: agrarian + factory (close focus)	P49: agrarian + factory (distant focus)	0.1	0.39	0.12	0.33	0	0.41
20	P1: agrarian	P13: agrarian + factory	-1.52	0	-1.46	-2.12	0	-2.08

Picture	Base scene	Modified scene	Experts			Lay people		
			Mean diff.	Sign.[a]	**Cohen's *d***	Mean diff.	Sign.[a]	**Cohen's *d***
21	P16: agrarian	P4: agrarian + factory	-0.6	0	-0.65	-0.87	0	-0.88
22	P4: agrarian + factory (close focus)	P28: agrarian + factory (distant focus - changed factory)	0.06	0.62	0.08	-0.22	0	-0.31
23	P16: agrarian	P28: agrarian + factory	-0.54	0	-0.58	-1.09	0	-1.1
24	P20: salt marsh and reeds + ruin	P57: salt marsh and reeds + factory	-1.14	0	-1.02	-1.37	0	-1.43
25	P44: salt marsh and reeds	P57: salt marsh and reeds + factory	-1.4	0	-1.43	-1.45	0	-1.41

a: Means difference significance (t-test) of $H0$: $mexperts \neq mlaypeople$.

However the *d* value is higher for salt marshes than for agrarian landscapes, suggesting that the negative effect of some modern buildings is particularly strong in natural areas.

For lay people the negative effect of the factories tends to diminish if the distance increases and their visibility is reduced (couple 19) but this does not happen in the case of experts who probably tend to judge a view more in terms of presence/absence of an element than in terms of its visibility.

For the other categories of buildings analysed through the photomontages the perception seems to differ more between the two groups. A traditional building along a river has a negative effect for lay people but it does not influence experts' appreciation (couple 7). Experts probably tend to evaluate, at least to certain extent, the importance of the ecosystem underlying the landscape instead of the aesthetic quality of a view. This emerges clearly considering the presence or absence of modern buildings. The latter reduce the appreciation of experts only in the case of agrarian landscapes but they do not reduce the value for fishing lagoons and rivers (couples 8 and 9), while for lay people the negative impact is almost the same in the three settings. It is possible to observe the same phenomenon in the case of the presence of ruins along the rivers (couples 17 and 18).

It is interesting to note that the tendency to give more importance to the ecosystem rather than to the aesthetic quality is common to all three categories of expertise considered.

3.5 Individual preferences of the experts and preferences of the lay people

It is normal practice that landscape policies are implemented by one or a few experts who decide both the value of the landscape and the type of actions that are compatible with its transformations. However, an analysis of the average preferences of experts may lead to mistaken conclusions about their real capacity to correctly interpret the expectations and needs of the lay people. In order to verify the ability of each individual expert to correctly interpret the preferences of the population the two indexes described in section 2 were used.

The Mean Interval of Confidence Index (MICI) assumes values that vary widely among the experts interviewed. They go from a minimum of 1 (1.5% of the images) to a maximum of 18 (28.5% of the images). The average value is 10.57 and the standard deviation 4.34. The median is 11. Therefore 50% of the experts have given a score that falls within the interval of confidence of the scores of the lay people in less than 17.4% of the images. The Half Lay People Index (HLPI) is less restrictive because it considers the number of scores that fall within the interval around the mean that covers 50% of the scores given by lay people. The value of HLPI is therefore higher than that of MICI and goes from a minimum of 2 to a maximum of 46. The average value is 28.22 and the standard deviation is 9.37. The median value is 29 (46.0%). Half of the experts have not provided an evaluation even approaching that of the lay people.

4. Discussion and conclusions

The aim of the research was to verify if the landscape preferences of experts differ from those of lay people. In the several studies conducted on this subject in the past the results obtained were not uniform. Especially in Europe, where 40 nations have ratified the European Landscape Convention, it has become particularly important to understand if and to what extent the judgment of experts reflects that of the population as a whole. In fact, under the Convention, landscape policy must to be aimed at satisfying the aspirations of the general public with regard to the landscape where they live.

In our study in many cases the experts have evaluated the landscape in a similar way to the population as a whole. This finding is particularly evident if we consider the magnitude of the differences and not simply their statistical significance. Both groups tend to prefer the more natural landscapes, in particular woods and wetlands. Whereas the least appreciated landscapes are those with modern buildings and factories. In this respect the preferences of our sample are similar to those of other studies (Arriaza et al., 2004; Cook and Cable, 1995; Eleftheriadis and Tsalikidis, 1990; Kaplan et al., 2006; Kaplan and Kaplan, 1989; Palmer, 2008; Rogge et al., 2007; Schroeder, 1988; Tempesta, 2006; Ulrich, 1986). These findings are supported both by the opinions expressed by the interviewees and by their evaluation of the images. However, it is interesting to note that the difference between experts and non-experts is more accentuated in the case of the opinions than that of the scores attributed to the images. In the case of the opinions, ANOVA showed that in 50% of the landscape elements considered the difference in scoring is statistically significant ($p<0.05$). Cohen's d test resulted as large in one case (6.2%) and medium in three cases (18.7%). In the case of the preferences for the images difference in scores is only statistically significant in 24% of the photos, and in seven cases (11%) Cohen's d test has a value between 0.5 and 0.8 (medium). This would seem to suggest that the results obtained comparing opinions and those obtained evaluating images are not entirely comparable.

The use of photomontages has evidenced some important differences between experts and lay people. This approach made it possible to analyse more specifically what effect the presence/absence of an element might have on the preferences of the two groups of interviewees.

In our study, experts tend to make a less critical assessment of the decay of buildings. Moreover, contrary to our expectations, experts exhibit a higher tolerance to possible interventions of landscape transformation. The presence of modern buildings, with the exception of factories, seems to have a lower negative effect for experts than for lay people. It seems that experts have judged the effect of buildings with regard to the context of where they are built. In particular experts tend to evaluate the importance of the ecosystem more than the aesthetic quality so they are more tolerant of the presence of some anthropogenic elements that can have only a moderate impact on the ecosystem. This result is in agreement with the results found by Coeterier (2002): experts tend to pay more attention to the context while lay people are more focused on evaluating the quality of the artifacts.

With reference to wildlife, it emerged that lay people valued the presence of very common birds (seagulls) with high visibility more than that of rare birds (flamingos) that occupy a small part of the view. Experts rated the images valuing the rarity of the species more than their visibility. It is possible to suppose that the evaluation of experts has a more relevant cognitive basis, so they are less affected by the visibility of an element than lay people and tend to attribute more importance to the landscape type or to the element itself.

The results of our research seem to suggest that when analysing the impact of new buildings and applications for the restoration of existing ones the public authorities should carefully consider the preferences of the general public since the opinion of experts might be misleading. This is particularly important if it is considered that only a few experts are normally involved in the implementation of the landscape policies in a given territory.

The fact that on average the preferences of the experts do not differ greatly from those of the population does not exclude that within the ambit of a specific landscape plan or in the evaluation of the impact of a particular element the opinions of just one expert may differ markedly from those of the population as a whole. From this point of view the research has demonstrated that the individual experts tend to make evaluations that may diverge notably from those of lay people. Given this knowledge, it would appear opportune that in every case the preferences of the lay people are taken carefully into consideration regarding landscape policies as there may be many factors that render the opinions of experts alone unreliable.

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Appendix A

Table 7. Landscape images.

Couple 1	
	
picture 14	picture 9
Couple 2	
	
picture 36	picture 47

Continued on next page

Table 7. Continued from previous page.

Couple 3
 picture 50  picture 23
Couple 4
 picture 18  picture 42
Couple 5
 picture 31  picture 19

Continued on next page

Table 7. Continued from previous page.

Couple 6
 picture 43
 picture 46
Couple 7
 picture 59
 picture 32
Couple 8
 picture 52
 picture 10

Continued on next page

Table 7. Continued from previous page.

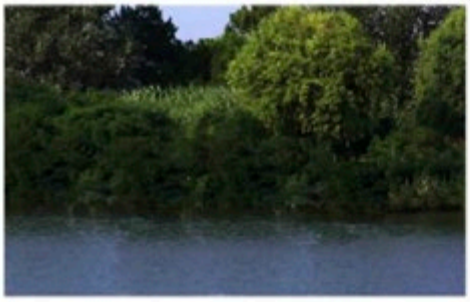
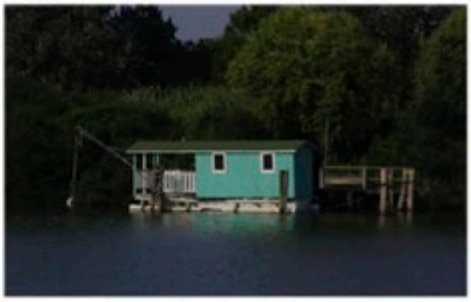
Couple 9
 picture 62
 picture 33
Couple 10
 picture 5
 picture 21
Couple 11
 picture 7
 picture 22
Continued on next page

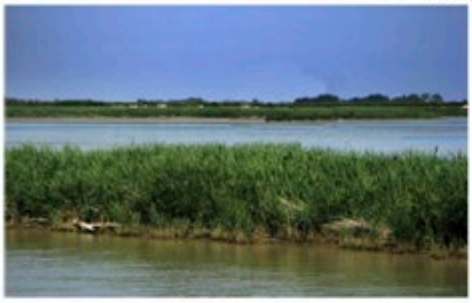
Table 7. Continued from previous page.

Couple 12
 picture 58  picture 7
Couple 13
 picture 58  picture 22
Couple 14
 picture 44  picture 20

Continued on next page

Table 7. Continued from previous page.

Couple 15



picture 26

picture 12

Couple 16

picture 8

picture 54

Couple 17

picture 38

picture 11

Continued on next page

Table 7. Continued from previous page.

Couple 18

picture 17

picture 45

Couple 19

picture 40

picture 49

Couple 20

picture 1

picture 13

Continued on next page

Table 7. Continued from previous page.

Couple 21
 
picture 16 picture 4
Couple 22
 
picture 4 picture 28

Continued on next page

Table 7. Continued from previous page.

Couple 23
 picture 16  picture 28
Couple 24
 picture 20  picture 57

Continued on next page

Table 7. Continued from previous page.

Couple 25	
	
picture 44	picture 57

Appendix B

For editing purposes some pages of the questionnaire have been cropped in order to make them fit the page size and therefore the rate of completion indicator and other details are missing in the version reported here. Only the first landscape rating task is reported for brevity out of the 63 proposed.

The completion of the questionnaire will take approximatively 15 minutes

The questionnaire is subdivided in **4 sections**.

You are at Section 1.

Section 1

The first section, where you actually are, introduces the respondent to the questionnaire.

Section 2

Section 2 is constituted by 2 pages where you will face socio-economic and attitudinal questions.

Section 3

Section 3 will introduce the respondent to the effective landscape evaluation task.

Some landscape preview images will be presented.

In this way you will be able to understand their beauty in order to evaluate them properly on a scale range from 1 (low liking) to 5 (high liking).

Section 4

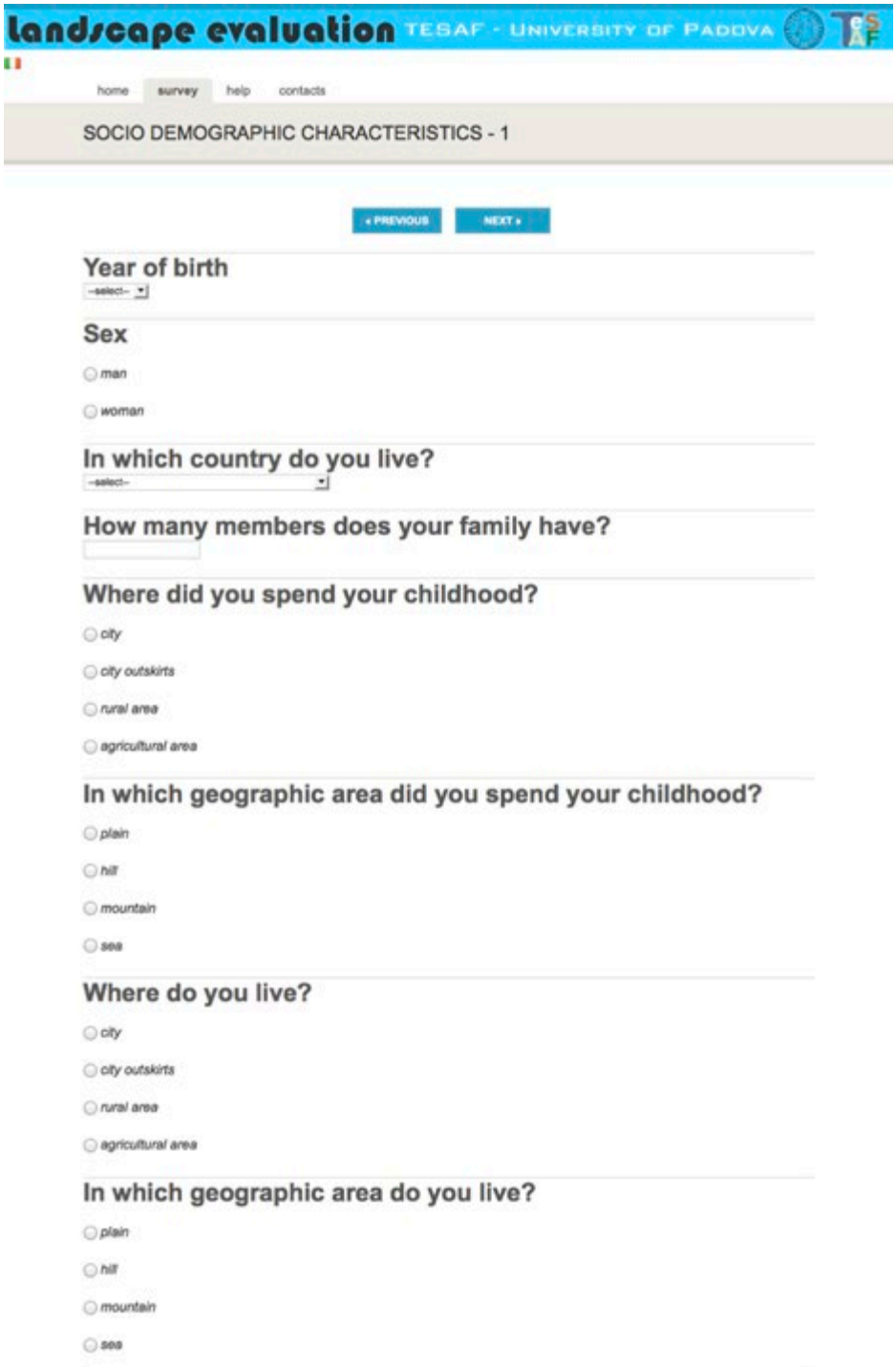
Section 4 presents 63 landscape scenarios.

Each scenario/photo will be displayed for **8 seconds**. When you have looked at the displaied scenario you will be asked to provide your preference for it on a rating scale from **1 (low liking)** to **5 (high liking)**.

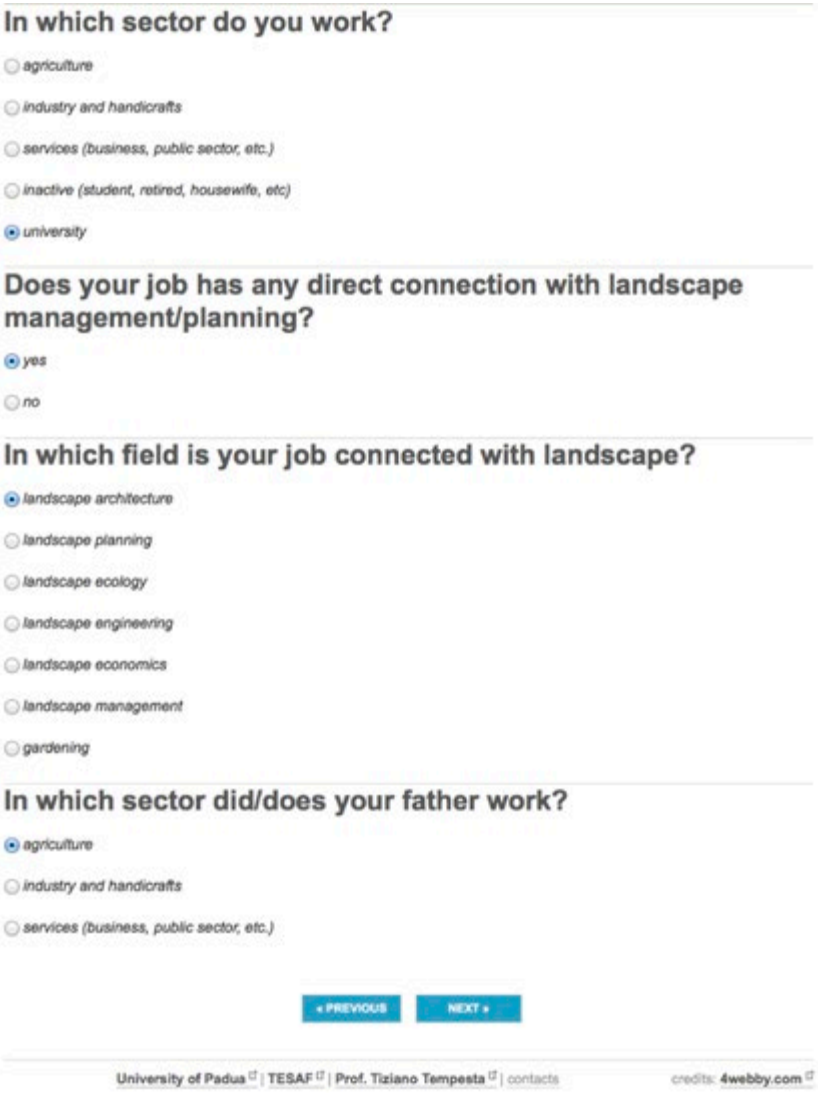
It is important that you provide your preference thinking at the first impression you got looking at the displaied landscape.

Privacy

The data collected will be use exclusively for research purpuses and will remain absolutely anonymous respecting your privacy.


landscape evaluation
TESAF - UNIVERSITY OF PADOVA
home
survey
help
contacts
SOCIO DEMOGRAPHIC CHARACTERISTICS - 1
« PREVIOUS
NEXT »
Year of birth
--select--
Sex
man
woman
In which country do you live?
--select--
How many members does your family have?
Where did you spend your childhood?
city
city outskirts
rural area
agricultural area
In which geographic area did you spend your childhood?
plain
hill
mountain
sea
Where do you live?
city
city outskirts
rural area
agricultural area
In which geographic area do you live?
plain
hill
mountain
sea


Education
primary school
secondary school
high Diploma
university degree
Specify your university degree MAIN area of study
multidisciplinary
agricultural and biological sciences
arts and humanities
architecture
biochemistry, genetics and molecular biology
business, management and accounting
chemical engineering
chemistry
computer science
decision sciences
earth and planetary sciences
economics, econometrics and finance
energy
engineering
environmental science
immunology and microbiology
materials science
mathematics
medicine
neuroscience
pharmacology, toxicology and pharmaceutics
physics and astronomy
psychology
social sciences
veterinary science
other



In which sector do you work?

- ○ agriculture
- ○ industry and handicrafts
- ○ services (business, public sector, etc.)
- ○ inactive (student, retired, housewife, etc)
- ◉ university

Does your job has any direct connection with landscape management/planning?

- ◉ yes
- ○ no

In which field is your job connected with landscape?

- ◉ landscape architecture
- ○ landscape planning
- ○ landscape ecology
- ○ landscape engineering
- ○ landscape economics
- ○ landscape management
- ○ gardening

In which sector did/does your father work?

- ◉ agriculture
- ○ industry and handicrafts
- ○ services (business, public sector, etc.)

« PREVIOUS NEXT »

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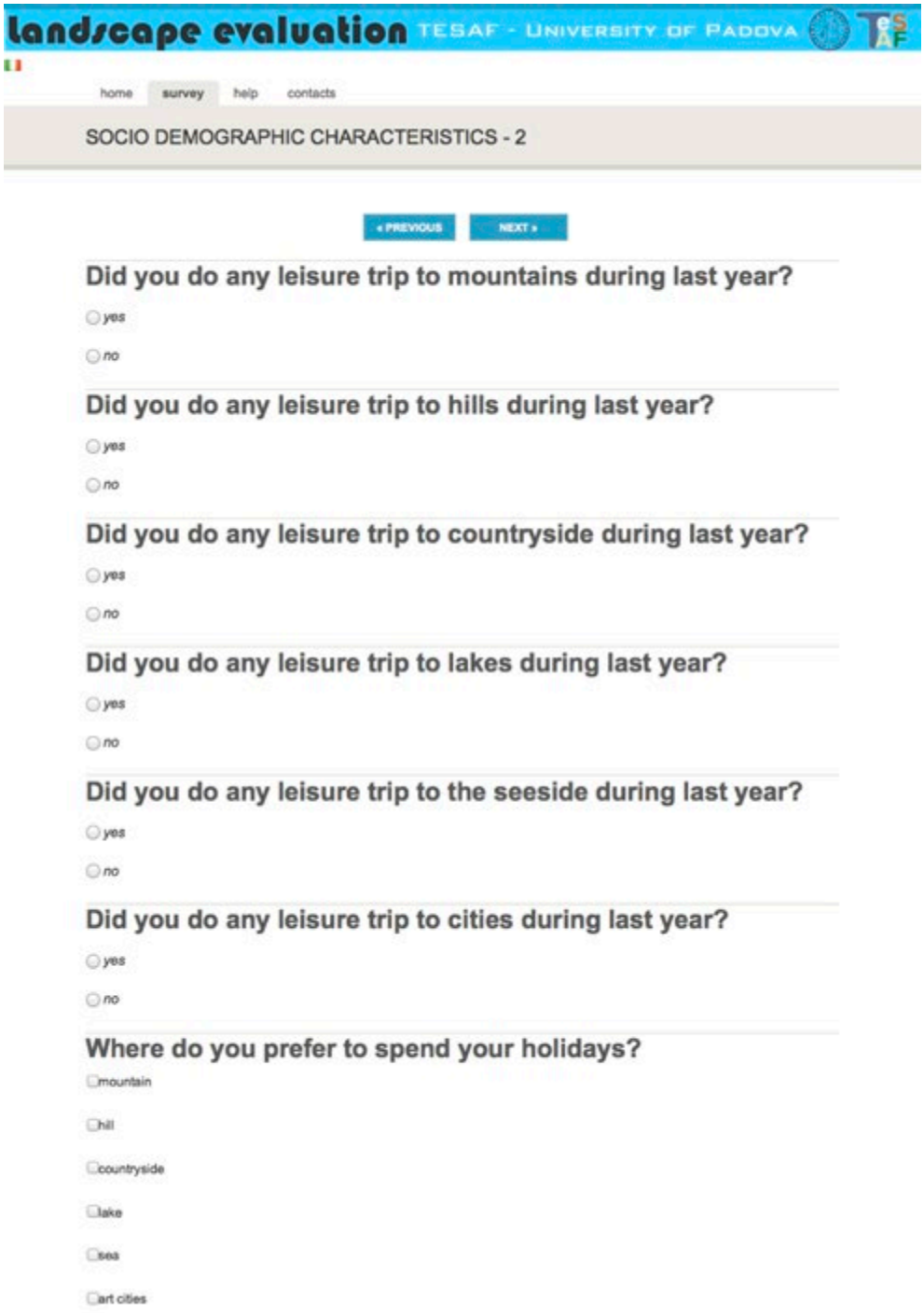

landscape evaluation
TESAF - UNIVERSITY OF PADOVA
home
survey
help
contacts
SOCIO DEMOGRAPHIC CHARACTERISTICS - 2
« PREVIOUS
NEXT »
Did you do any leisure trip to mountains during last year?
yes
no
Did you do any leisure trip to hills during last year?
yes
no
Did you do any leisure trip to countryside during last year?
yes
no
Did you do any leisure trip to lakes during last year?
yes
no
Did you do any leisure trip to the seeside during last year?
yes
no
Did you do any leisure trip to cities during last year?
yes
no
Where do you prefer to spend your holidays?
mountain
hill
countryside
lake
sea
art cities

Are you member of environmental associations?

- yes
- no

How much do you care for the conservation of the tipical landscape of a certain area?

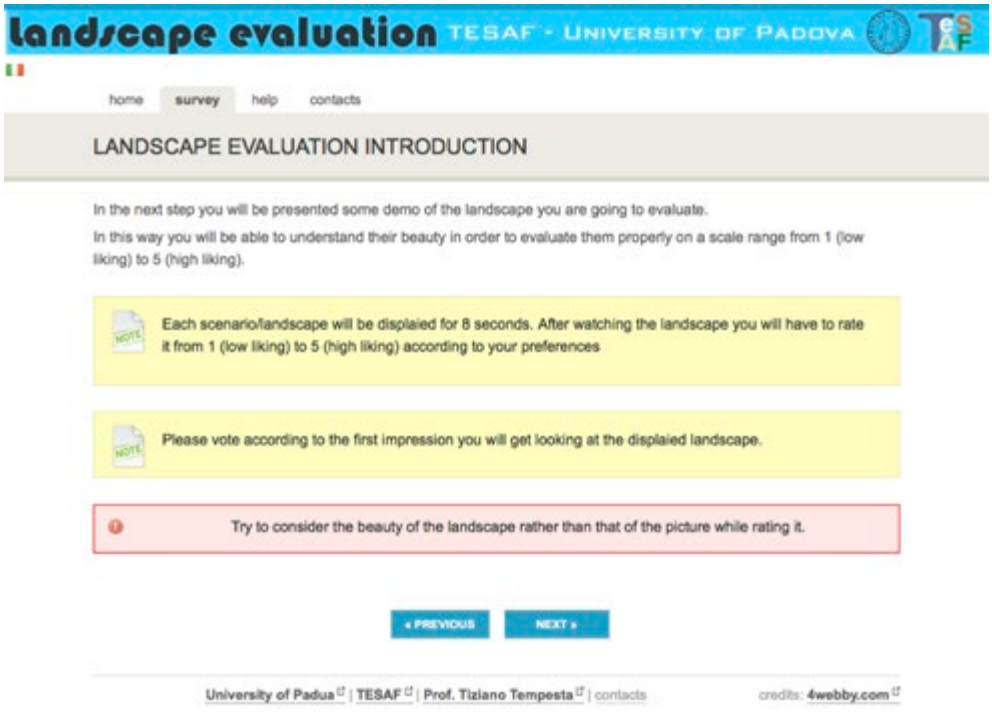
- very much
- much
- enough
- little
- very little

When do you plan a daily recreational journey which elements do you take into account?

	very little	little	enough	much	very much
quiet of the place					
leisure facilities					
sport facilities					
landscape beauty					
travel cost					
distance from home					
familiarity (you have already been there in the past)					

How do you consider the effect on landscape quality of the presence of the following elements?

	effect on landscape quality				
	very negative	negative	indifferent	positive	very positive
hedges and tree lines					
woods					
poplars					
water bodies (rivers, streams, gulfs, seas etc.)					
meadows					
unpaved roads					
typical rural buildings					
urban settlements					
antennas					
power lines					
traffic routes					
paved roads					
factories					
malls					
modern buildings					
uncultivated fields					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LANDSCAPE EVALUATION INTRODUCTION
In the next step you will be presented some demo of the landscape you are going to evaluate.
In this way you will be able to understand their beauty in order to evaluate them properly on a scale range from 1 (low liking) to 5 (high liking).
Each scenario/landscape will be displaied for 8 seconds. After watching the landscape you will have to rate it from 1 (low liking) to 5 (high liking) according to your preferences
Please vote according to the first impression you will get looking at the displaied landscape.
Try to consider the beauty of the landscape rather than that of the picture while rating it.
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Watch carefully the 8 previews of the 63 landscapes that you will rate in next pages.
It is really important that you will make use of the full range of the rating scale from 1 to 5
hugly 1 2 3 4 5 beautiful
Therefore we ask you to watch carefully the images below and to rate with score 1 that you like the less, and with score 5 that you like the most.
ugly 1 2 3 4 5 beautiful
ugly 1 2 3 4 5 beautiful
ugly 1 2 3 4 5 beautiful
ugly 1 2 3 4 5 beautiful
ugly 1 2 3 4 5 beautiful
ugly 1 2 3 4 5 beautiful
ugly 1 2 3 4 5 beautiful
ugly 1 2 3 4 5 beautiful

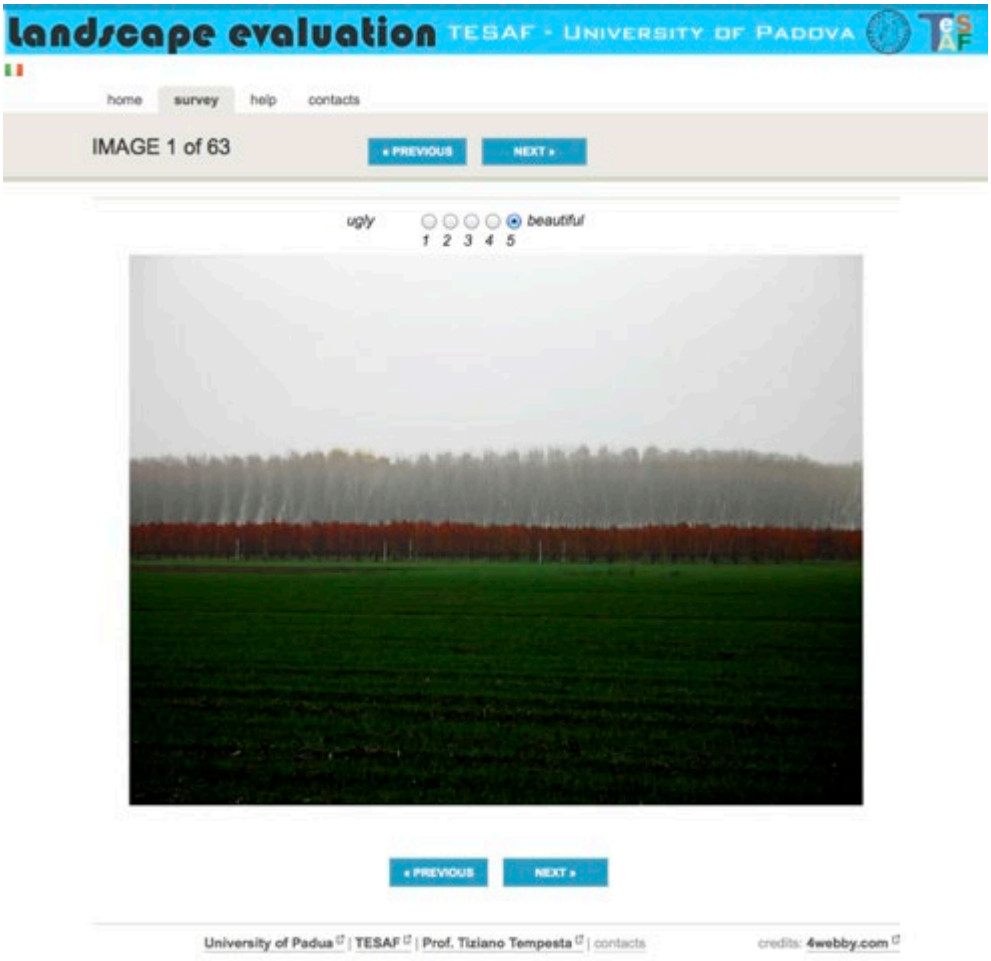
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IMAGE 1 of 63
« PREVIOUS
NEXT »
ugly
beautiful
1 2 3 4 5
« PREVIOUS
NEXT »
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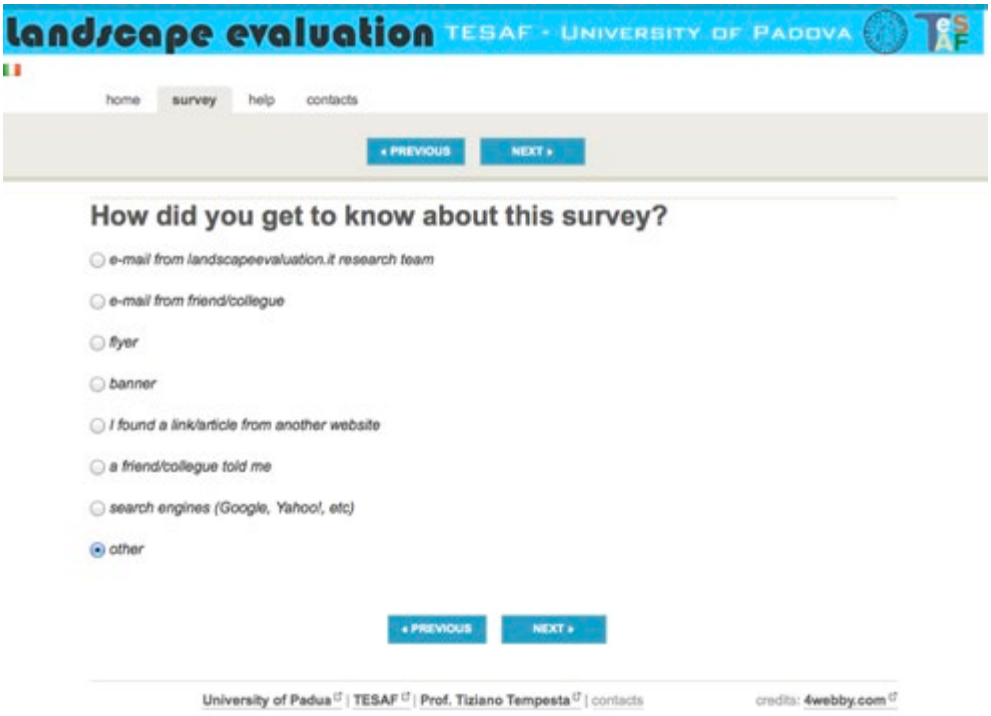
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How did you get to know about this survey?
e-mail from landscapeevaluation.it research team
e-mail from friend/collegue
flyer
banner
I found a link/article from another website
a friend/collegue told me
search engines (Google, Yahoo!, etc)
other
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NEXT »
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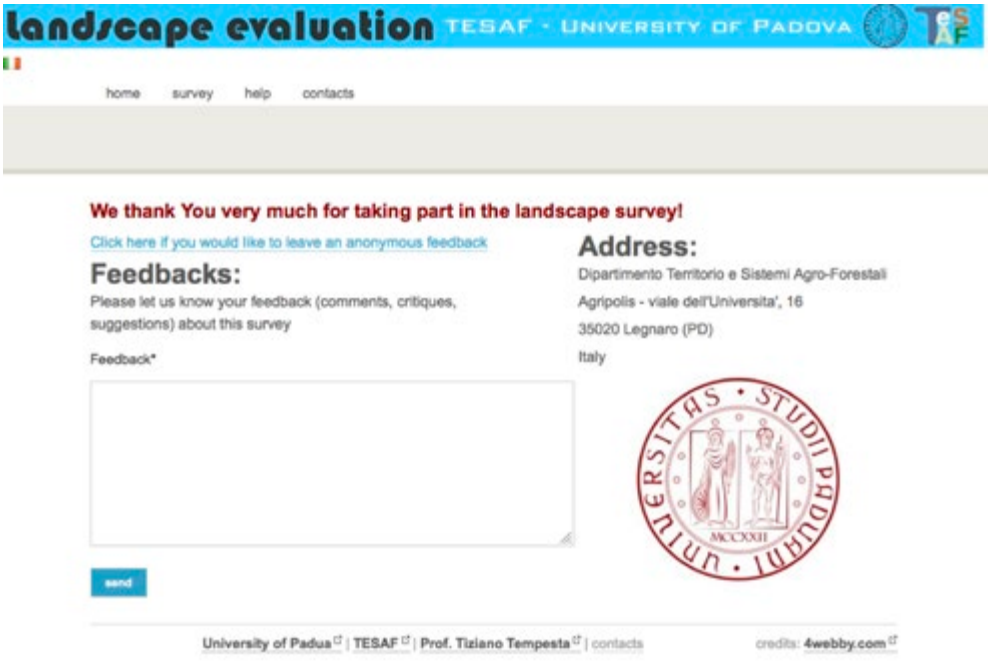
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We thank You very much for taking part in the landscape survey!
Click here if you would like to leave an anonymous feedback
Feedbacks:
Please let us know your feedback (comments, critiques, suggestions) about this survey
Feedback*
send
Address:
Dipartimento Territorio e Sistemi Agro-Forestali
Agripolis - viale dell'Universita', 16
35020 Legnaro (PD)
Italy
UNIVERSITAS STUDII PADUANI
MCCXXII
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Help/Faqs

The completion of the questionnaire will take approximatively 15 minutes

The questionnaire is subdivided in **4 sections**.

Section 1

The first section introduces the respondent to the questionnaire, presenting the same information you are reading in this page.

Section 2

Section 2 is constituted by 2 pages where you will face socio-economic and attitudinal questions.

Section 3

Section 3 will introduce the respondent to the effective landscape evaluation task.

Some landscape preview images will be presented.

In this way you will be able to understand their beauty in order to evaluate them properly on a scale range from 1 (low liking) to 5 (high liking).

Section 4

Section 4 presents 63 landscape scenarios.

Each scenario/photo will be displayed for **8 seconds**. When you have looked at the displaied scenario you will be asked to provide your preference for it on a rating scale from **1 (low liking)** to **5 (high liking)**.

It is important that you provide your preference thinking at the first impression you got looking at the displaied landscape.

Privacy

The data collected will be use exclusively for research purpuses and will remain absolutely anonymous respecting your privacy.