Elsevier Editorial System(tm) for Ecological Engineering

Manuscript Draft

Manuscript Number: ECOLENG-D-16-00621R1

Title: VISUAL LANDSCAPE PREFERENCES IN MEDITERRANEAN AREAS AND THEIR SOCIO-DEMOGRAPHIC INFLUENCES

Article Type: Research Paper

Keywords: European Landscape Convention (ELC); perception; scenic beauty; Mediterranean landscape; socio-demographic characteristics

Corresponding Author: Mr. Francisco López Martínez, MSc Geography

Corresponding Author's Institution: University of Murcia

First Author: Francisco López Martínez, MSc Geography

Order of Authors: Francisco López Martínez, MSc Geography

Abstract: The European Landscape Convention (ELC) suggests the population's perception is the main factor in landscape assessment and planning. As a result, this subjective approach assumes differences among the population's visual perception according to their personal factors, e.g. socio-demographic characteristics, which have to be studied in several areas in order to improve landscape management. In this regard, the goal of this paper is to know if the population's visual perception of Mediterranean landscapes is similar to other environments previously studied. In addition, we sought to determine whether certain socio-demographic characteristics of the respondents (age, gender and education level) influenced their visual preferences. We assessed the population's landscape preferences through several photographs of representative Mediterranean landscapes shown in an online survey. We then evaluated the average score of each photograph according to the landscape shown and the socio-demographic characteristics of the population. The final results demonstrate that water bodies and vegetation fundamentally contribute to a positive evaluation of whole landscape scenes. In contrast, human impact on landscapes (industrial or mining areas) reduces their scenic beauty. Despite the fact that these findings are consistent with previous research with respect to people in Mediterranean areas that have the same visual preferences as those in other locations, we did not find that any respondents' socio-demographic characteristics significantly influenced their general landscape perception. However, for certain landscapes several differences under the same socio-demographic characteristic were found.

HIGHLIGHTS

1. Study about visual preferences in Mediterranean areas and its relation with personal characteristics.

2. Landscape's attributes influences are similar to other locations.

3. Respondents' characteristics are not related to landscape's perception.

4. Certain landscape's preferences appear according to the characteristic studied.

Figure_1
Click here to download high resolution image

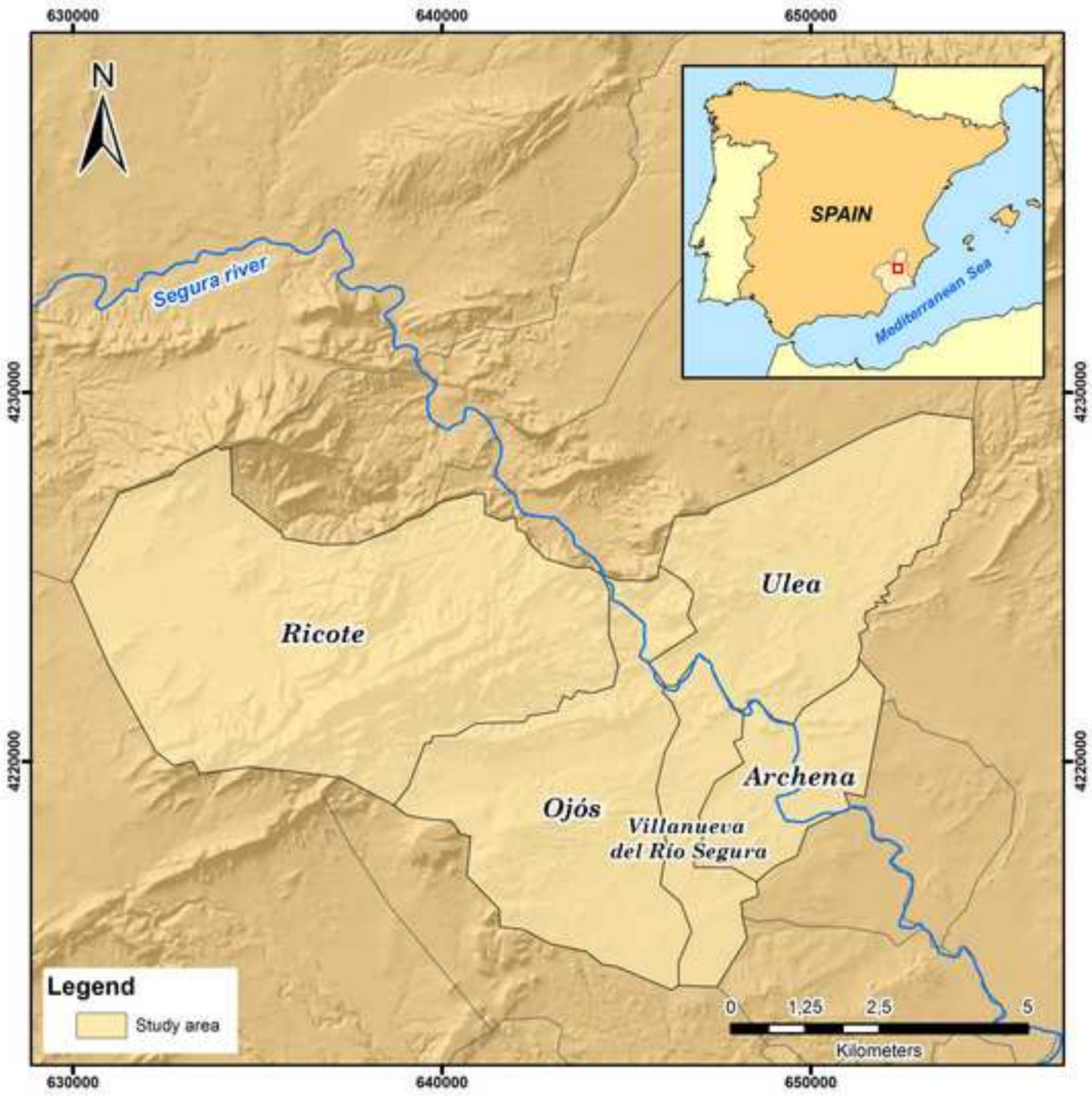


Figure_2
Click here to download high resolution image

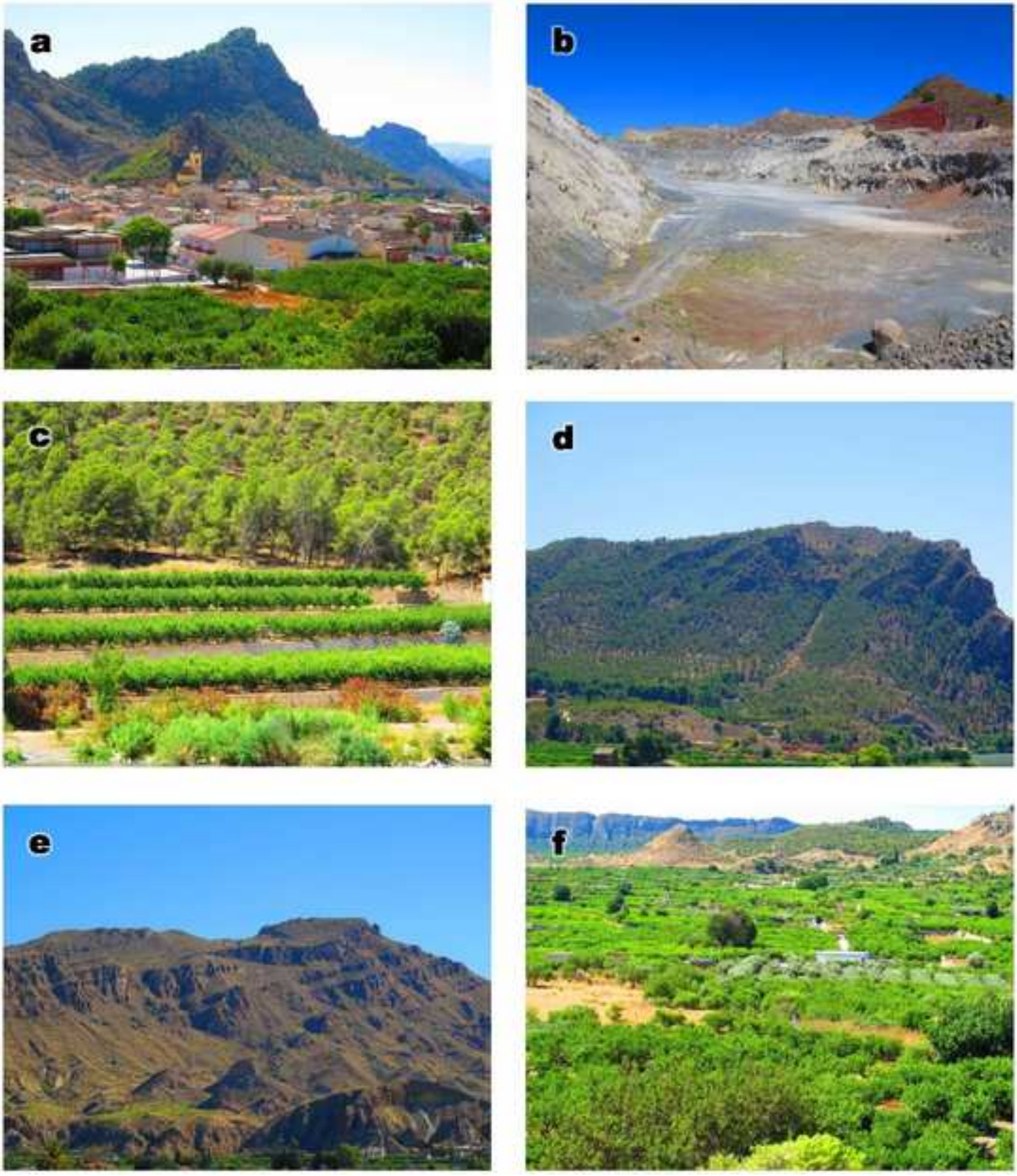


Figure_3

Click here to download high resolution image

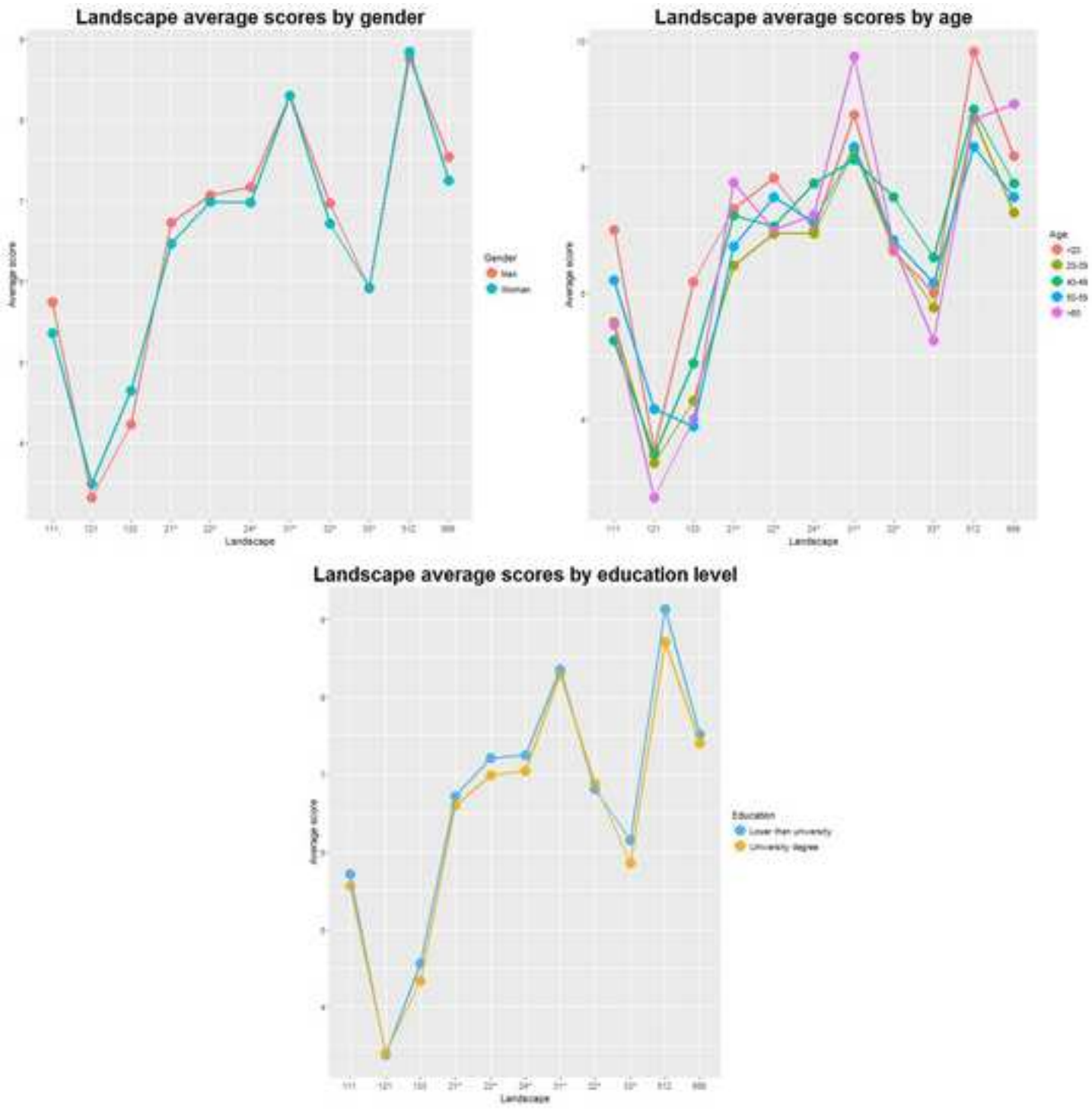
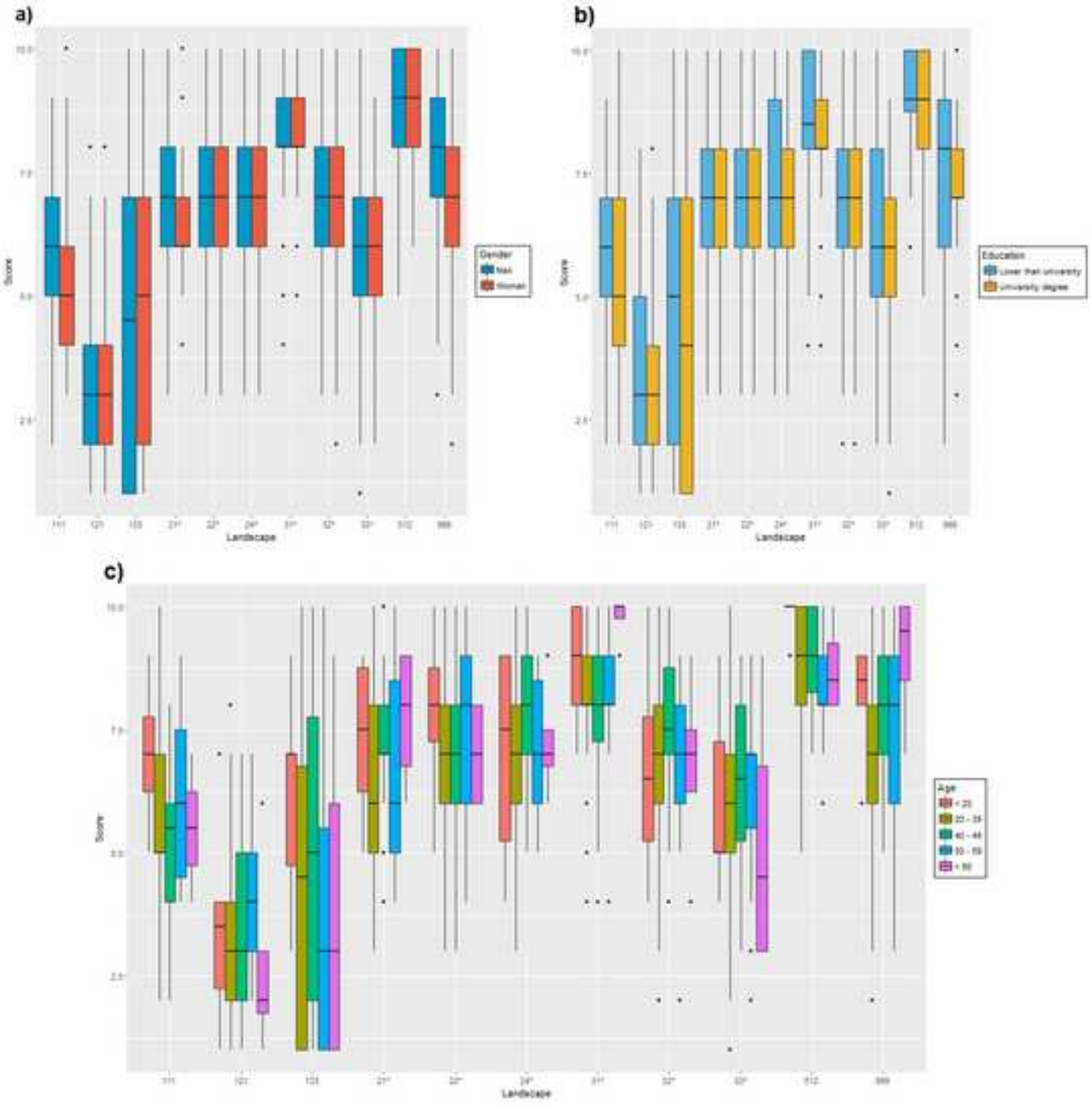


Figure_4

Click here to download high resolution image



Table

Table 1: Land use units and landscapes presented in the study area before and after digitizing the traditional orchard and grouped them.

CLC06 Land uses		Landscape groups		
Code	**Nomenclature level 3**	**Code**	**Name**	**Area (ha)**
111	Continuous urban fabric	111	Urban fabric	296.4
121	Industrial or commercial units	121	Industrial units	81.53
133	Construction sites	133	Mine sites	28.08
211	Non-irrigated arable land	21*	Arable land	204.18
212	Permanently irrigated land			
221	Vineyards	22*	Permanent crops	6,682.22
222	Fruit trees and berry plantations			
242	Complex cultivation patterns	24*	Heterogeneous agricultural areas	2,721.78
243	Land principally occupied by agriculture, with significant areas of natural vegetation			
312	Coniferous forest	312	Forests	3,313.93
321	Natural grasslands	32*	Scrub and/or herbaceous vegetation associations	5,158.39
323	Sclerophyllous vegetation			
324	Transitional woodland-shrub			
331	Beaches, dunes, sands	33*	Open spaces with little or no vegetation	1,006.98
333	Sparsely vegetated areas			
512	Water bodies	512	Water bodies	32.77
		999	Traditional orchard	625.46

Table 2: Socio-demographic characteristics of the respondents.

Socio-demographic characteristic		Total	%
Gender	Male	136	60,44
	Female	89	39,56
Age	< 20	6	2,67
	20 - 39	162	72,00
	40 - 49	34	15,11
	50 - 59	19	8,44
	> 60	4	1,78
Education level	Lower than university	48	21,33
	University degree	177	78,67

Table 3: Landscape´s average scores and scores by socio socio-demographic characteristic.

Socio-demographic characteristic		Landscape scores											
		Mean	**111**	**121**	**133**	**21***	**22***	**24***	**31***	**32***	**33***	**512**	**999**
Gender	Male	6.52	5.74	3.32	4.23	6.73	7.06	7.17	8.30	6.96	5.91	8.76	7.54
	Female	6.45	5.36	3.49	4.64	6.46	6.99	6.97	8.30	6.71	5.92	8.84	7.24
Age	< 20	7.12	7.00	3.50	6.17	7.33	7.83	7.00	8.83	6.67	6.00	9.83	8.17
	20 - 39	6.39	5.54	3.30	4.29	6.43	6.94	6.95	8.28	6.73	5.77	8.79	7.28
	40 - 49	6.77	5.24	3.44	4.88	7.24	7.06	7.74	8.12	7.53	6.56	8.91	7.74
	50 - 59	6.62	6.21	4.16	3.89	6.74	7.53	7.11	8.32	6.84	6.16	8.75	7.53
	> 60	6.70	5.50	2.75	4.00	7.75	7.00	7.25	9.75	6.75	5.25	8.32	9.00
Education level	Without higher education	6.62	5.71	3.38	4.56	6.71	7.21	7.25	8.35	6.81	6.15	9.13	7.52
	Higher education	6.46	5.56	3.40	4.34	6.60	6.98	7.05	8.29	6.88	5.85	8.71	7.40
AVERAGE SCORE			6.49	3.39	4.39	6.62	7.03	7.09	8.30	6.86	5.92	8.80	7.42

Table 4: Differences found for the same socio-demographic characteristics for all the landscapes and between landscapes according to respondent´s socio-demographic characteristics (only shown if $P < 0.05$).

Socio-demographic characteristic		**General**	**Landscapes**										
			111	121	133	21*	22*	24*	31*	32*	33*	512	999
Gender	Male	---	0.0261	---	---	---	---	---	---	---	---	---	---
	Female												
Age	< 20	---	---	---	---	0.022	---	---	---	0.023	---	0.034	---
	20 - 39												
	40 - 49												
	50 - 59												
	> 60												
Education level	Lower than university	---	---	---	---	---	---	---	---	---	---	0.0131	---
	University degree												

1. INTRODUCTION

1.1. Mediterranean agricultural landscapes and the European Landscape Convention

Mediterranean landscapes are a fundamental feature of territorial identity as a result of the historical human's interaction with the environment (Blondel, 2006; Blondel et al., 2010; Zeder, 2008). This interplay has produced very heterogeneous features where agricultural landscapes represent the main "cultural landscape", i. e. a clearly defined landscape which combines works of nature and humankind, into the Mediterranean Basin (UNESCO, 1992). However, over the last decades of the 20th century, in Spain agricultural landscapes have been declining due to rural exodus (Gómez-Limón and De Lucio, 1999) and entering an intense transformation and degradation process due to other uses - mainly the construction of new buildings and infrastructures (Sayadi and Calatrava, 2001; García and Ayuga, 2007). In fact, according to Morales Gil (2001), in the Region of Murcia more than 50% of agricultural landscapes have been urbanised and the rest is threatened by the same process. As a result, agricultural environments have compromised their conservation and continuity due to their lack of economic and social roles (Mata and Fernández, 2010). Inside these cultural landscapes, the traditional orchard must be highlighted as one of the historical, ethnographic, urban, cultural, and irrigated Mediterranean landscape references (Mata and Fernández, 2004) characterized by a mosaic of regular small parcels of a green colour palette due to intensive horticultural crops (Mata and Fernández, 2010).

According to the European Landscape Convention (ELC) (Council of Europe, 2000), landscape is "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors". In this regard, we have to forget the individual influence of landscape's intrinsic attributes (e.g. Arriaza et al., 2004; Kaltenborn and Bjerke, 2002; Otero Pastor et al., 2007; Sayadi et al., 2009) and start to asses it and to determine priorities for conserving and maintaining the significant and characteristic features of a landscape, according to the population's perception (Sevenant and Antrop, 2009). On the other hand, despite the representativeness and importance for the cultural and natural heritage of the traditional orchard within the Mediterranean Basin (Meeus et al., 1990), it has to be managed equally instead of as an outstanding landscape, due to the fact that the ELC considers all the landscapes equally (urban, peri-urban, rural and natural areas) regardless of their current state (article 2).

1.2. Landscape assessment, from physical to socio-demographic approach.

In a review of the different methodologies for assessing landscape (e.g. Briggs and France, 1980; Daniel and Vining, 1983; Zube et al., 1982), we found two main paradigms: objective or physical, beauty is an inherent quality of the landscape, and subjective or psychological, beauty is the product of the multisensory composition of the visual receptor (Lothian, 1999). However, according to the democratic view of landscapes established by the ELC (Gulinck et al., 2001; Sevenant and Antrop, 2009, 2010), they have to be evaluated by the general public (e. g. Arriaza et al., 2004; Brown and Brabyn, 2012; Dramstad et al., 2006) instead of by a group of experienced observers (e. g. Amir and Gidalizon, 1990; Bishop and Hulse, 1994) or its physical attributes (e. g. Otero Pastor et al., 2007).

This participative or psychophysical approach (Svobodoba et al., 2012) evaluates different landscape types according to the people's preferences. Despite this a landscape is a product between their biophysical features and the human observer's response (Lothian 1999; Daniel, 2001; Sung et al., 2001), we have to consider that, in the same way there are differences between people, there are also differences in their visual preferences according to their economic, sociological, physical, and psychological characteristics (Daniel, 2001; Lothian, 1999; Sevenant and Antrop, 2010; Tveit et al., 2006). Shafer and Brush (1977) were one of the first to evaluate the scenic perceptions of Adirondack's landscapes (USA) through 100 black and white photographs. Their survey was conducted with a random sample of 250 campers which had to score their landscape preferences on a scale ranging from 50 for the "least preferred", to 250 for the "most preferred".

Although several studies suggest similarities between observers' visual preferences regardless of their personal factors (e.g. Cañas et al., 2009; De La Fuente and Mühlhauser, 2014), there is a general consensus that socio-demographic characteristics influence people's perception of a landscape (e.g. Misgav, 2000; Strumse, 1996; Tveit, 2009). However, in both aspects (dependent or independent of personal factors), we have to consider that due to the influence of cognitive motives (Webster and Kruglanski, 1994), variations between landscapes are generally greater than between observers (Daniel, 2001). Galloway (2002) split the different socio-demographic characteristics related to perception into two main groups: push factors, which included needs, personal values, and personality, and pull factors, features of the world, external to a person, which determine their behaviour. Among all the socio-demographic characteristics previously defined, e.g. place of residence (Misgav, 2000), place of birth (Dramstad et al., 2006), nationality (Buijs et al., 2009), occupation (Svobodoba et al., 2012), social class (Howley, 2011) or motivational needs (Kalterbong and Berje, 2002), in this paper we only consider age, gender and education owing to them being the main factors which influence personal landscape preferences (Aoki, 1999). In fact, these three socio-demographic characteristics are the most considered in studies related to people's landscape preferences (e.g. De La Fuente and Mühlhauser, 2014; Muñoz-Pedreros et al., 1993; Filova et al., 2015; Kalterbong and Berje, 2002; Sayadi et al., 2009; Svobodoba et al., 2012; Tveit et al., 2009).

1.3. Landscape attributes, scenic beauty, and its evaluation

Assuming that visual preferences depend on personal characteristics, literature also indicates that there are several general landscape attributes related to scenic beauty in a positive way – e. g. water features (Arriaza et al., 2004; Wu et al., 2006), vegetation (Misgav, 2000; Dramstad et al., 2006), cultural man-made elements (Bulut and Yilmaz, 2008; Arriaza et al., 2004; Tempesta, 2010), slopes (Bulut and Yilmaz, 2008; Bishop and Hulse, 1994) – or in a negative way – e.g. man-made elements (Bulut and Yilmaz, 2008; Wu et al., 2006). However, these studies related to the landscape's human activities, physical attributes, and biotic attributes (according to the categories established by Otero Pastor et al., 2007) have three main weaknesses: (1) the influence of each attribute on visual preference is not clear (Williams et al., 2007), (2) attributes can describe landscape but do not reflect human perceptions (Schirpke et al., 2013), and (3) most importantly, its influence depends on the location (Bulut and Yilmaz, 2008).

Regardless of the importance and composition of the different attributes within a landscape, in this work it will be evaluated according to the people's preferences expressed by scenic beauty. In this way, we understand scenic beauty as "a particular response to the effect of the observed landscape scenes"; it is a measure of agreeableness, or how much the subject likes the scene (De La Fuente and Mühlhauser, 2014). Despite the fact that several studies have evaluated in situ (e.g. De La Fuente and Mühlhauser, 2014; Sevenant and Antrop, 2009; Bulut and Yilmaz, 2008) the relationship between a landscape's scenic beauty and socio-demographic factors, planning, doing, and analysing face to face surveys is an expensive and time consuming process which requires more specialist skills (Lothian, 1999). On the other hand, some papers (Bishop, 1997; Roth, 2006; Wherrett, 1999) have shown that the Internet is a valid substitute for conducting studies of perception with similar results to face-to-face surveys (Lindhjem and Navrud, 2011). However, even though the Internet is an appropriate medium to undertake visual preference surveys, and one which has improved over time (Roth, 2006), there are still several issues which should be considered: (i) effects of monitor resolution and colour resolution can distort the image quality (Wherrett, 1999), (ii) the sample profile is more related to Internet users than general public (Roth, 2006; Wherrett, 1999), (iii) people which score landscape images after having visited them probably overestimate their scores because they remembered their on-site experiences instead of judging the photographs (Roth, 2006).

According to Tahvanainen et al., (2001), when a survey is carried out, it is better to use visual presentations than verbal questions, because the image shown can be different to the respondent's mental composition and, by extension, can condition their visual preference. Although representing a landscape through photographs has some limitations (Daniel, 2001; Palmer and Hoffman, 2001; Steinitz, 2001), it is the most frequently used and valid methodology for the aesthetic evaluation of a landscape (Barroso et al., 2012; Daniel, 2001; Palmer and Hoffman, 2001; Steinitz, 1990). In fact, photographs of landscapes have been applied as perceptual stimuli in different locations with different landscapes and respondents' socio-demographic characteristics (e.g. Sevenant and Antrop, 2010; Svobodoba et al., 2012; Schirpke et al., 2013), including the Mediterranean area (e.g. Arriaza et al., 2004; Gómez Limón and de Lucio, 1999; De La Fuente and Mühlhauser, 2014; Sayadi et al., 2009; Muñoz-Pedreros et al., 1993). However, in Mediterranean areas the studies are more focused on evaluating the visual preferences of the observers and their relationship with different landscape attributes such as water, vegetation or man-made elements (Arriaza et al., 2004), landscapes' scenic beauty (Muñoz-Pedreros et al., 1993), agricultural crops (Sayadi et al., 2009), or land use (Gómez Limón and de Lucio, 1999), than with the socio-demographic characteristics of the respondents influence (De La Fuente and Mühlhauser, 2014).

1.4. Objectives

Accepting that landscape preferences depend on personal intrinsic and extrinsic factors, the aim of the present study is twofold: 1) to know what the most relevant landscapes in the Mediterranean areas are according to peoples' preferences and to analyse their similarities and/or differences with previous works carried out in alternate locations, and 2) to evaluate the influence of three socio-demographic characteristics (age, gender, and education on respondents' landscape preferences). For the purpose of this study, we chose a framework based on the scores of an on-line questionnaire survey with photographs of a typical Mediterranean area, the Ricote Valley (South-eastern Spain), and its further statistical analysis.

2. METHODOLOGY

2.1. Study area

The Ricote Valley (202.5 km^2) is one of the twelve districts of the Region of Murcia (Zorita and Calvo, 1984), in southeastern Spain. The valley is located north of the central area of Murcia and is composed by the inland municipalities of Archena, Ojós, Ricote, Ulea, and Villanueva del Río Segura (Figure 1). The study area has a historical relationship with the Segura River, a watercourse which has shaped a rosary valley in its immediate vicinity area, where narrow spaces sit side by side with broader ones

Figure 1: Location of study area.

The study area has two main landscapes: natural and cultural. The first landscape is composed by a typical Mediterranean forest located on the more inaccessible slopes around the valley. The second is a cultural or man-made landscape in the surrounding area of the Segura River, which has played a major role during the last 500 years of agricultural activity, specifically with traditional polycrop orchards.

2.2. Local land uses and landscapes in the study area

The different landscapes presented in the study area were obtained from one of the key digital European cartographic databases for environmental assessment (Smith and Wyatt, 2007): the CORINE Land Cover 2006 (CLC06) seamless vector database version 16 (EEA, 2012). The CLC06 provides a quick and easy diagnosis of the different landscapes present from local land uses (Gulinck et al., 2001). In addition to landscape management (Filova et al., 2015; Gulinck et al, 2001; Arriaza et al., 2004; Schirpke et al., 2013, this database has been used in several topics such as: floods (Feranec et al., 2010), spatial planning (Tapiador and Casanova, 2003), wildfire (Carmo et al., 2011), natural areas conservation (Rossi et al., 2008; Edman et al., 2011), habitat identification (Mücher et al., 2009), urban characteristics (Kabisch and Haase, 2013), or erosion risk (Le Bissonnais et al., 2001). Lee et al., (1999) made one of the first European landscape evaluations through land use according to the aerial photographs of Buckinghamshire County Council for 1946, 1985, and 1995. His study highlighted the importance of land use and aerial photographs to obtain landscape indices as well as using a GIS to calculate them.

Despite the many advantages of CLC, there are certain types of local uses not reflected in CLC06 (Gulinck et al., 2001) that have been considered in spatial analysis. For our study, we have to differentiate a cultural local use characteristic of the Mediterranean region: the traditional orchard (Mata and Fernández, 2004, 2010). This cultural element was digitized on screen using a 1:25.000 scale and differentiated from the cartographic CLC06 database by a new numeric code (999). After defining local uses, to simplify the photographic capture and the survey process, the different landscapes were grouped and/or simplified according to their characteristics in 11 groups (Table 1).

Table 1: Land use units and landscapes presented in the study area before and after digitizing the traditional orchard and grouping them according to their characteristics.

After defining landscapes, the next step was to determine, in the laboratory, a series of paths and/or observation points able to capture the most relevant features of each landscape. Five criterions were used to select the best positions: visual accessibility (Wu et al., 2006), amplitude (Schirpke et al., 2013), shape of viewshed, distance to the major urban centres (Wu et al., 2006), and distance between landscapes.

2.3. Landscapes images

During late July 2013, 356 photographs were taken at the points and/or routes defined for the study area. The photos were taken using a Nikon D3200 digital camera with a lens of 18-55 mm. on clear days, without use of any special filters, effects, or any other digital manipulation that could distort its content (Bishop, 1997; Barroso et al., 2012). Furthermore, during the image capture, no tools (e. g. a tripod) were used to elevate the position of the camera relative to the visible field of the researcher (an approximate height of 170 cm, i.e. from the average adult's view).

Finally, among all the photographs captured, 22 representative photos (two for each landscape) were selected for the scenic beauty survey (Figure 2). The photos were chosen by four researchers and landscape experts available from the Geography Department of the University of Murcia.

Figure 2: Examples of selected photographs shown in the study to evaluate landscape scenic beauty. a: Urban fabric; b: Mine sites; c: Heterogeneous agricultural areas; d: Forests; e: Scrub and/or herbaceous vegetation associations and f: Traditional orchard.

2.4. Questionnaire survey

The photographs selected were presented in an on-line questionnaire available to the general public. The questionnaire was available for five months and was advertised through several social networks, public administrations and media outlets. During this period the participants had to evaluate, according to their preferences, the scenic beauty of each of the 22 photographs in a Likert-scale (Strumse, 1996; Tahvanainen et al., 2001). The questionnaire had a brief introduction to the research and it was anonymous but included three questions regarding the socio-demographic characteristics of the respondent. The aim of this web questionnaire was to find out the participants' landscape preferences and their socio-demographic characteristics.

The photographs had to be scored through a 10-point evaluation scale (Sung et al., 2001) from 1 ("not beautiful") to 10 ("very beautiful"). Despite several authors' recommendations (Givon and Shaphira, 1984; Crask and Fox, 1987; Jaccard and Wan, 1996) to use at least a five category composite scale (e. g. Cañas et al., 2009; Steinitz, 1990) although preferably seven categories (e.g. Tahvanainen et al., 2001; Svobodova et al., 2012), there seems to be an absence of consensus amongst the number of categories and its scale. In fact, in previous works we can find papers with different categories, e.g. 1 to 4 (Schirpke et al., 2013), 1 to 5 (Dramstad et al., 2006; Strumse, 1996; Tveit, 2009), 1 to 6 (Howley, 2011; 2012), 1 to 9 (Bishop and Hulse, 1994; Bishop, 1997), 0 to 9 (Sung et al., 2001), 0 to 10 (Sevenant and Antrop, 2009; 2010) or 0 to 100 (Purcell and Lamb, 1998), and scales e. g. positive (Kaltenborn and Bjerke, 2002; Misgav, 2000; Bulut and Yilmaz, 2008) or in a positive and negative (e.g. Arriaza et al., 2004; Filova et al., 2015; Svobodova et al., 2012).

After scoring each landscape, participants had to indicate their personal characteristics of gender, education, and age. While education was divided into two main categories (with a higher education or without, e. g. Svobodova et al., 2012), age was divided into five categories (<20; 20-39; 40-49; 50-59 and >60) according to the division and subdivision (only for adults) defined by Martin (2005).

2.5. Statistical analysis

Once the survey was closed, the Likert-scale results were assumed to be on an ordinal level (Roth, 2006; Tahvanainen et al., 2001; Tveit, 2009; Van den Berg and Koole, 2006). On the one hand, scenic beauty was calculated according to the mean score for each image. Despite this process implying a simplification, it has been used in several previous works for interpreting preference surveys (e. g. De La Fuente and Mühlhauser, 2014; Dramstad et al., 2006; Tveit et al., 2006; Tveit, 2009). On the other hand, to assess the statistical significance of the differences between the perceptions of landscapes according to the socio-demographic characteristic considered, the results were analyzed using non-parametric tests (Bulut and Yilmaz, 2008; Tahvanainen et al., 2001; Tveit et al., 2006). Wackerly, Mendenhall, and Scheaffer (2008) indicate that non-parametric tests are more powerful in detecting differences than parametric tests, and that they are also useful for analyzing studies of consumer preferences data.

Depending on the socio-demographic characteristic studied, two non-parametric tests were carried out: 1) Mann-Whitney U-test for characteristics with only two kinds (gender and education level) and 2) one-way variance analysis of Kruskal-Wallis for more than two kinds (age groups). If we found significant differences for the age groups, they were localized through pairwise comparison by means of the Mann-Whitney U-test, but using a correction factor (Bonferroni). In all of the statistics tests the significance level used was $\alpha = 0.05$. All the tests were carried out by the Rstudio (R Core Team, 2015) statistical software.

3. RESULTS

The survey was carried out in December 2013 with a share of 225 people with different socio-demographic characteristics (Table 2). Due to the platform used to conduct the survey (Google Docs™), we were able to measure the different characteristics related to the study's aims. However we did not ask or were unable to measure several metadata which could have been analyzed, e.g. reaction times (Roth, 2006), the length of time each photo was seen (Dramstad et al., 2006; Strumse, 1996), technical setup (Roth, 2006), time to fill in the questionnaire (Schirpke et al., 2013; Svobodova et al., 2012), authors' contact information (Svobodova et al., 2012) or to explain the reasons for their choices (Barroso et al., 2012).

Table 2: Socio-demographic characteristics of the respondents.

3.1. Preferences based on scenic beauty

The respondent's visual preferences vary according to the landscape images showed. Regarding the mean score of each landscape (Table 3), water bodies (code = 512; mean score = 8.80; sd = 1.07) was the landscape with the highest scenic beauty followed by forest (code = 312; mean score = 8.30; sd = 1.28). On the other hand, mine sites (code = 133; mean score = 4.39; sd = 2.89) and industrial units (code = 121; mean score = 3.39; sd = 1.58) were the worst valued landscapes. While water bodies landscapes images were given a 100% high score (> 5) by respondents (31% gave it the highest score and no one the lowest score), 78% of the respondent gave to industrial areas a low score (< 5; 8% rated it with the lowest score and its maximum score was 8 points gave by 16% of respondent). The most neutral landscape image was urban fabric, which was rated by 24% of respondent with 5 points.

Table 3: Landscape´s average scores and scores by socio socio-demographic characteristic.

3.2. Scenic beauty and preferences by socio-demographic characteristics

In general, the respondent's visual preferences do not vary according to the three socio-demographic characteristics studied: gender, age, and education level, i.e. we did not find a significant influence between people's landscape preferences and their personal characteristics. In fact, regarding the mean score assigned by the surveyed people depending on their different socio-demographic characteristics (Figure 3), the results are practically the same (the mean score differences by gender, age, and education level groups were, respectively, 0.20, 1.41, and 0.17). However, if we consider in more detail the rating gave to each landscape according to the different respondents' socio-demographic characteristics, some statistically significant differences appear (Table 4).

Figure 3: Average scores of each landscape according to the three socio-demographic characteristics studied.

Table 4: Significant differences found between landscape's scenic beauty according to respondents' socio-demographic characteristics (only shown if $P < 0.05$).

3.2.1. Gender

On average, for most of the landscapes shown in the survey (apart from industrial units, open spaces with little or no vegetation, and water bodies; Table 3; Figure 3a) women (mean = 6.45; sd = 1.55) were more critical of landscape's scenic beauty than men (mean = 6.52; sd = 1.63). Although the influence of gender on the perception of scenic beauty was found not to be significant (Table 4; $P > 0.05$), there were significant differences for certain groups such urban fabric landscape (Table 4; $P < 0.05$).

3.2.2. Age

Young peoples' (<20 years) mean score was greater (mean = + 0.50) than other age groups, especially for mine sites landscapes (mean = + 1.90; Table 3; Figure 3b). Regarding all the landscapes, the respondent's age did not significantly influence their preferences (Table 4; $P > 0.05$), however, according to the age we found some statistically significant differences for arable land, scrub and/or herbaceous vegetation association, and water bodies (Table 4; $P < 0.05$). In particular, these influences appeared for the age groups between 20-39 years and 40-49 years for the first and second landscape, and between <20 years and >60 years for the third landscape mentioned above.

3.2.3. Education level

Participants with a lower education level scored higher (mean = 6.52; sd = 1.63) most of the shown landscapes (except for industrial units and scrub and/or herbaceous vegetation associations; Table 3; Figure 3c) than those with higher education (mean = 6.39; sd = 1.58) (Table 3; Figure 3c). Education did not have significant influences (Table 4; $P > 0.05$) over the general respondent's evaluation/rating of landscape's scenic beauty. However, according to the different landscapes shown, statistically significant differences between education level groups were found (Table 4; $P < 0.05$) for water bodies landscapes.

Figure 4: Visual preferences boxplots according to (a) gender, (b) education, and (c) gender.

4. DISCUSSION

The results show two main points about landscape scenic beauty in Mediterranean areas: 1) participant's preferences have similarities with previous works findings and 2) socio-demographic characteristics do not influence visual preference.

4.1. Landscape preferences

In accordance with previous findings (Arriaza et al., 2004; Brown and Brabyn, 2012; Bulut and Yilmaz, 2008; Kaltenborn and Bjerke, 2002; Wu et al., 2006), the survey results show a positive effect of the water bodies on landscape scenic beauty. In fact, water bodies have been the landscape with the highest score (8.80/10) followed by forest (8.30/10) (Brown and Brabyn, 2012; Misgav, 2000; Svobodova et al., 2012). On the other hand, the questionnaire survey also shows that the presence of vegetation (e.g.: forest, traditional orchard or agricultural areas) has a positive influence on Mediterranean landscapes' scenic beauty (Arriaza et al., 2004; Gómez-Limón and de Lucio, 1999; De La Fuente and Mühlhauser, 2014; Misgav, 2000; Tempesta, 2010). In last place, and according to the findings of Kalterbong and Berje (2002) and Arriaza et al., (2004), the traditional orchard is the third most positively evaluated landscape.

In contrast, industrial units (3.39/10) followed by mine sites (4.39/10) were the worst scored. The negative effect on the observer's preferences by these man-made elements is consistent with the findings of many authors (Arriaza et al., 2004; Bulut and Yilmaz, 2008; Wu et al., 2006; Svobodova et al., 2012). However, despite the fact that intrusion by man leads to negative landscape scenic beauty, the studies of Arriaza et al., (2004), Sayadi et al., (2009) and Tempesta (2010) show how some man-made elements (typical constructions, farm-buildings, and beauty spots) are evaluated positively. Unfortunately, this approach was unable to be checked in to our study due to the landscape attributes shown in the photographs.

4.2. The effect of respondents' characteristics on landscape preferences

Except for some specific landscape groups, in general from the three studied socio-demographic groups, men, young people, and people with no higher education tended to be less critical (see average evaluation in Table 3). However, the results showed that the respondents have similar visual preferences regardless of gender (Van den Berg and Koole, 2006; Howley, 2011; Howley et al., 2012; Muñoz-Pedreros et al., 1993), age (Svobodova et al., 2012), or education (Cañas et al., 2009). These findings are opposite to many other studies which have shown how personal variables such as gender (Kaltenborn and Bjerke, 2002; Strumse, 1996; Svobodova et al., 2012; Howley, 2012), age (Strumse, 1996; Kaltenborn and Bjerke, 2002; Svobodova et al., 2012, Howley, 2011, 2012; Tahvanainen et al., 2001), or education level (Svobodova et al., 2012; Kaltenborn and Bjerke, 2002; Muñoz-Pedreros et al., 1993) significantly influence visual preference.

Maybe the differences found between the results of this study and previous works could lie in the study area and, by extension, in the evaluated landscapes (e.g. Svobodova et al., 2012, evaluated mining and post-mining landscapes in the Czech Republic; Kaltenborn and Bjerke, 2002, evaluated agricultural landscapes in Norway and Howley, 2011, evaluated rural landscape in Ireland). In fact, despite the fact that

literature provides several studies about scenic beauty in Mediterranean areas (e.g. Arriaza et al., 2004; Sayadi et al., 2009; Gómez-Limón and de Lucio, 1999; Muñoz-Pedreros et al., 1993), we were only able to find one paper which evaluated the significant effects on scenic beauty in Mediterranean landscapes depending on the socio-demographic characteristics of the respondents', the study of De La Fuente and Mühlhauser (2014), carried out in the Andean foothills (Chile). In this study, age and gender did not have significant effects on landscape scenic beauty ratings, whereas the education level did.

However, despite checking how scenic beauty is independent of socio-demographic characteristics, the different scores found for each landscape could lie in several causes. With regard to gender (although the difference in the average evaluation between men and women was less than 0.1), evolutionarily speaking women tend to show a more positive stance towards natural landscapes than men. However, the opposite is true once an urban intrusion occurs in a natural landscape (Strumse, 1996).

Regarding age groups, young people (<20) and older people (>60) are complete opposites in terms of scenic beauty for water bodies. While water bodies were scored the highest for young people (9.83/10), this landscape was the least attractive for older people (9.32/10). This result is similar to that found by Van den Berg and Koole (2006) and Howley (2011), who indicate a negative association between water related landscapes and age due to fear generated by these types of landscapes on older people. On the other hand, due to the study area's peculiarities, the different perceptions according to age could lie in several local causes such as respondent's age, and wilderness. In fact, the water body showed in the photographs is a man-made structure known as "el Azud de Ojós" built to control floods at the end of the 70's. Another aspect to highlight is the lower preference of young people for landscapes with high human impact, a situation which shows a higher environmental awareness and respect for nature (Strumse, 1996; Tahvanainen et al., 2001). At least, the greater appreciation of a traditional orchard above the other agricultural landscapes shows an inverse relationship between the level of agricultural industrialization and its landscape rating (Kaltenborn and Bjerke, 2002). This situation has special importance for older people (>60), who have a greater affinity to that which has been their traditional livelihood, despite the fact that nowadays it is in disuse. All of these findings confirm the variation of scenic beauty for the same landscape between different generations (Dramstad et al., 2006; Tveit, 2009).

Finally, respondents with a university degree reacted differently than respondents with a lower education level (Svobodova et al., 2012; De La Fuente and Mühlhauser, 2014). Most of the respondents with lower education gave higher scores to all landscapes, especially wilderness landscapes as spaces with a little vegetation and water bodies. However, regardless of education level, respondents scored almost equally (with a difference of 0.02) for the mining landscape (Svobodova et al., 2012).

4.3. The questionnaire

Unfortunately the survey was not balanced with respect to age and education level. This aspect could be improved by choosing respondents by census (Kaltenborn and Bjerke, 2002), agency (Howley et al., 2012), selecting groups (Filova et al., 2015) or *in situ* (De La Fuente and Mühlhauser, 2014). However the Internet provides a cheaper

and faster way. In this study, we have a low number of surveyed people at the top and lower age categories and also a large number of participants with a university degree. Maybe, for the age categories the problem lies in a lack of interest for young people and the difficulty of accessing to the Internet survey for older people (Wherett, 1999). On the other hand, and in keeping with our experience, we may have had a higher participation rate of non-university students if the survey had been dispersed through other locations such as: educational or institutional centres, organizations, websites, social networks, or any information websites (i.e. newspaper, TV, radio).

4.4. Suggestions for future research

1) A balanced survey. As we said before, we need a balanced respondent's sample able to show all the perceptions, opinions, and valuations of the general public. However, despite the fact that we think the current high accessibility to the internet does not balance (Wherett, 1999) and limit the sample of respondents, the results suggest that future research would be better done with face to face surveys, selecting target groups, or an equal distribution to represent perceptions of the whole community (Lothian, 1999). This recommendation should be especially considered for some social groups (young, older people, and lower than university studies).

2) More focused research on landscape preferences in Mediterranean areas according to different socio-demographic characteristics. In spite of the several previous studies about scenic beauty in Mediterranean areas, there are very few which have considered the personal characteristics of the respondents and their influences with regard to scenic beauty. This is a very important distinction for future research, especially due to the local landscape's peculiarities within the study area and their relationship with how people perceive scenic beauty (Zube and Pitt, 1981).

5. CONCLUSIONS

On the one hand, the results have shown the positive and negative influences of several attributes with regard to the scenic beauty of landscapes. The score of each landscape suggests that water features and man-made elements are the main components which respectively lead to determine positive and negative effects in their scenic beauty. On the other hand, despite the environmental and cultural role of the traditional orchard in the study area, this landscape did not have the expected result in the survey (it was the third preferred after water bodies and forest).

In contrast with several previous works, the most important finding is that landscape's perception is not affected by any of the socio-demographic characteristics of the respondents studied: gender, age, and education. However for certain landscape groups some significant differences between socio-demographic characteristics have been found. According to the literature review, we did not identify relevant empirical studies about landscape preferences in Mediterranean areas, so it has not been possible to determine if the influence on landscape perception is dependent upon the characteristics of respondents or local causes derived from the study area (kind of landscape, peculiarities, culture, etc...). Finally, the study has also confirmed the inverse relationship on visual preferences between age versus water features and agricultural industrialization versus traditional agricultural landscapes.

Acknowledgements

The author thanks the constructive comments of the two anonymous reviewers which have substantially helped to improve this manuscript.

6. REFERENCES

1. Amir, S., Gidalizon, E., 1990. Expert based Method for the Evaluation of Visual Absorption Capacity of the Landscape. Journal of Environmental Management 30(3):251-163, http://dx.doi.org/10.1016/0301-4797(90)90005-H
2. Aoki, Y., 1999. Review article: trends in the study of the psychological evaluation of landscape. Landscape Research 4(1):85–94, http://dx.doi.org/10.1080/01426399908706552
3. Arriaza, M., Cañas-Ortega, J.F., Cañas-Madueño, J.A., Ruiz-Aviles, P., 2004. Assessing the visual quality of rural landscapes. Landscape and Urban Planning 69(1):115-125, http://dx.doi.org/10.1016/j.landurbplan.2003.10.029
4. Barroso, F.L., Pinto-Correia, T., Ramos, IL., Surová, D., Menezes, H., 2012. Dealing with landscape fuzziness in user preference studies: Photo-based questionnaires in the Mediterranean context. Landscape and Urban Planning 104(3-4):329-342, http://dx.doi.org/10.1016/j.landurbplan.2011.11.005
5. Bishop, I.D., 1997. Testing perceived landscape colour difference using the Internet. Landscape and Urban Planning 37(3-4):187-196, http://dx.doi.org/10.1016/S0169-2046(97)80003-5
6. Bishop, ID., Hulse, DW., 1994. Prediction of scenic beauty using mapped data and geographic information systems. Landscape and Urban Planning 30(1-2):59-70, http://dx.doi.org/10.1016/0169-2046(94)90067-1
7. Blondel, J., 2006. The 'Design' of Mediterranean Landscapes: A Millennial Story of Humans and Ecological Systems during the Historic Period. Human Ecology 34(5):713-729, http://dx.doi.org/10.1007/s10745-006-9030-4
8. Blondel, J., Aronson, J., Bodiu, J., Boeuf, G., 2010. The Mediterranean Region: Biological Diversity through Time and Space. Oxford University Press, Oxford.
9. Buijs, A.E., Elands, B.H., Langers, F., 2009. No wilderness for immigrants: Cultural differences in images of nature and landscape preferences. Landscape and Urban Planning, 91(3): 113-123, http://dx.doi.org/10.1016/j.landurbplan.2008.12.003
10. Bulut, Z., Yilmaz, H., 2008. Determination of landscape beauties through visual quality assessment method: a case study for Kemaliye (Erzincan/Turkey). Environmental Monitoring and Assessment 141(1-3):121-129, http://dx.doi.org/10.1007/s10661-007-9882-0
11. Briggs, D.J., France, J., 1980. Landscape Evaluation: A comparative study. Journal of Environmental Management 10(3):263-275.
12. Brown, G., Brabyn, L., 2012. An analysis of the relationships between multiple values and physical landscapes at a regional scale using public participation GIS and landscape character classification. Landscape and Urban Planning 107(3):317-331, http://dx.doi.org/10.1016/j.landurbplan.2012.06.007
13. Cañas, I., Ayuga, E., Ayuga, F., 2009. A contribution to the assessment of scenic quality of landscapes based on preferences expressed by the public. Land Use Policy 26(4):1173-1181, http://dx.doi.org/10.1016/j.landusepol.2009.02.007
14. Carmo, M., Moreira, F., Casimiro, P., Vaz, P., 2011. Land use and topography influences on wildfire occurrence in northern Portugal. Landscape and Urban Planning 100(1):169-176, http://dx.doi.org/10.1016/j.landurbplan.2010.11.017
15. Crask, M.R., Fox, R.J., 1987. An exploration of the interval properties of three commonly used marketing research scales: a magnitude estimation approach. Journal of the Market Research Society 29:317-339.

16. Council of Europe, 2000. The European landscape convention. Strasbourg. http://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/176. Accessed 5 Nov 2015
17. Daniel, T.C., 2001. Whither scenic beauty? Visual landscape quality assessment in the 21st Century. Landscape and Urban Planning 54(1-4):267-281, http://dx.doi.org/10.1016/S0169-2046(01)00141-4
18. Daniel, T.C., Vining, J., 1983. Methodological issues in assessment of visual landscape quality. In: Altman I, Wohlhill J (Eds.), Behavior and the Natural Environment. Springer, New York, pp. 39-84.
19. De La Fuente de Val, G., Mühlhauser, H., 2014. Visual quality: An examination of a South American Mediterranean landscape, Andean foothills east of Santiago (Chile). Urban Forestry & Urban Greening 13(2):261-271, http://dx.doi.org/10.1016/j.ufug.2014.01.006,
20. Dramstad, W.E., Tveit, M.S., Fjellstad, W.J., Fry, G.L.A., 2006. Relationships between visual landscape preferences and map-based indicators of landscape structure. Landscape and Urban Planning 78(4):465-474, http://dx.doi.org/10.1016/j.landurbplan.2005.12.006
21. Edman, T., Angelstam, P., Mikusiński P., Roberge, J.M., Sikora, A., 2011. Spatial planning for biodiversity conservation: Assessment of forest landscapes' conservation value using umbrella species requirements in Poland. Landscape and Urban Planning 102(1):16-23, http://dx.doi.org/10.1016/j.landurbplan.2011.03.004
22. EEA, 2012. Corine Land Cover 2006 (CLC06) seamless vector database – version 16 (4/2012). http://www.eea.europa.eu/data-and-maps/data/clc-2006-vector-data-version-2. Accessed 25 Nov 2015
23. Filova, L., Vojar, J., Svobodova, K., Sklenicka, P., 2015. The effect of landscape type and landscape elements on public visual preferences: ways to use knowledge in the context of landscape planning. Journal of Environmental Planning and Management 58(11): 2037-2035, http://dx.doi.org/10.1080/09640568.2014.973481
24. Feranec, J., Jaffrain, G., Soukup, T., Hazeu, G., 2010. Determining changes and flows in European landscapes 1990–2000 using CORINE land cover data. Applied Geography 30(1):19-35, http://dx.doi.org/10.1016/j.apgeog.2009.07.003
25. Fuentes Zorita, J.S., Calvo García-Tornel, F., 1982. La Comarcalización de la Región de Murcia. Estudios territoriales 7:89-125.
26. Galloway, G., 2002. Psychographic segmentation of park visitor markets: evidence for the utility of sensation seeking. Tourism Management 23(6):581-596, http://dx.doi.org/10.1016/S0261-5177(02)00025-0
27. García, A.I., Ayuga, F., 2007. Reuse of abandoned buildings and the rural landscape: the situation in Spain. Transactions of the ASABE, 50(4):1383-1394, http://dx.doi.org/10.13031/2013.23627
28. Givon, M., Shapira, Z., 1984. Response to Rating Scales: A Theoretical Model and Its Application to the Number of Categories Problem. Journal of Marketing Research 21(4):410-419, http://dx.doi.org/10.2307/3151467
29. Gómez-Limón, J., de Lucio, J.V., 1999. Changes in use and landscape preferences on the agricultural-livestock landscapes of the central Iberian Peninsula (Madrid, Spain). Landscape and Urban Planning 44(4):165–175, http://dx.doi.org/10.1016/S0169-2046(99)00020-1
30. Gulinck, H., Múgica, M., de Lucio, J.V., Atauri, J.A., 2001. A framework for comparative landscape analysis and evaluation based on land cover data, with an

application in the Madrid region (Spain). Landscape and Urban Planning 55(4): 257-270, http://dx.doi.org/10.1016/S0169-2046(01)00159-1
31. Howley, P., 2011. Landscape aesthetics: Assessing the general publics' preferences towards rural landscapes. Ecological Economics, 72(15):161-169, http://dx.doi.org/10.1016/j.ecolecon.2011.09.026
32. Howley, P., Donoghue, C.O., Hynes, S., 2012. Exploring public preferences for traditional farming landscapes. Landscape and Urban Planning, 104(1):66-74, http://dx.doi.org/10.1016/j.landurbplan.2011.09.006
33. Jaccard, J., Wan, C.K., 1996. LISREL approaches to interaction effects in multiple regression. Sage, nº 114.
34. Kabisch, N., Haase, D., 2013. Green spaces of European cities revisited for 1990–2006. Landscape and Urban Planning, 110:113-122, http://dx.doi.org/10.1016/j.landurbplan.2012.10.017
35. Kaltenborn, B.P., Bjerke, T., 2002. Associations between environmental value orientations and landscape preferences. Landscape and Urban Planning 59(1):1-11, http://dx.doi.org/10.1016/S0169-2046(01)00243-2
36. Lee, J.T., Eltonm M.J., Thompson, S., 1999. The role of GIS in landscape assessment: using land-use-based criteria for an area of the Chiltern Hills Area of Outstanding Natural Beauty. Land Use Policy 16(1):23-32, http://dx.doi.org/10.1016/S0264-8377(98)00033-7
37. Le Bissonnais, Y., Montier, C., Jamagne, M., Daroussin, J., King, D., 2001. Mapping erosion risk for cultivated soil in France. CATENA 46(2–3):207-220, http://dx.doi.org/10.1016/S0341-8162(01)00167-9
38. Lindhjem, H., Navrud, S., 2011. Are Internet surveys an alternative to face-to-face interviews in contingent valuation?. Ecological Economics 70(9):1628-1637, http://dx.doi.org/10.1016/j.ecolecon.2011.04.002
39. Lothian, L., 1999. Landscape and the philosophy of aesthetics: is landscape quality inherent in the landscape or in the eye of the beholder?. Landscape and Urban Planning 44(4):177-198, http://dx.doi.org/10.1016/S0169-2046(99)00019-5
40. Martín, J.F., 2005. Los factores definitorios de los grandes grupos de edad de la población: tipos, subgrupos y umbrales. Scripta Nova. http://www.ub.es/geocrit/sn/sn-190.htm. Accessed 8 Dec 2015
41. Mata, R., Fernández, S., 2004. La Huerta de Murcia: Landscape guidelines for a peri-urban territory. Landscape Research 29(4):387-397, http://dx.doi.org/10.1080/0142639042000289028
42. Mata, R., Fernández, S., 2010. Paisajes y patrimonios culturales del agua. La salvaguarda del valor patrimonial de los regadíos tradicionales. Scripta Nova. http://www.ub.edu/geocrit/sn/sn-337.htm. Accessed 15 Dec 2015
43. Meeus, J.H.A., Wijermans, M.P., Vroom, M.J., 1990. Agricultural landscapes in Europe and their transformation. Landscape and Urban Planning 18(3–4):289-352, http://dx.doi.org/10.1016/0169-2046(90)90016-U
44. Misgav, A., 2000. Visual preference of the public for vegetation groups in Israel. Landscape and Urban Planning 48 (3-4):143-159, http://dx.doi.org/10.1016/S0169-2046(00)00038-4
45. Morales Gil, A., 2001. Agua y territorio en la Región de Murcia. Fundación Centro de Estudios Históricos e Investigaciones Locales Región de Murcia. Murcia, 270 pp.
46. Mücher, C.A., Hennekens, S.M., Bunce, R.G.H., Schaminée, J.H.J, Schaepman, M.E., 2009. Modelling the spatial distribution of Natura 2000 habitats across

Europe. Landscape and Urban Planning 92(2):148-159, http://dx.doi.org/10.1016/j.landurbplan.2009.04.003
47. Muñoz-Pedreros, A., Badilla, A., Rivas, H., 1993. Evaluación del paisaje en un humedal del sur de Chile: el caos del río Valdivia (X Región). Revista Chilena de Historia Natural, 66(4):403-417.
48. Palmer, J.F., Hoffman, R.E., 2001. Rating reliability and representation validity in scenic landscape assessments. Landscape and Urban Planning 54(1-4):149-161, http://dx.doi.org/10.1016/S0169-2046(01)00133-5
49. Otero Pastor, I., Casermeiro Martínez, M.A., Ezquerra Canalejoa, A., Esparcia Mariño, P., 2007. Landscape evaluation: Comparison of evaluation methods in a region of Spain. Journal of Environmental Management 85(1):204-214, http://dx.doi.org/10.1016/j.jenvman.2006.09.018
50. R Core Team, 2015. R: a language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/
51. Rossi, P., Pecci, A., Amadio, V., Rossi, O., Soliani, L., 2008. Coupling indicators of ecological value and ecological sensitivity with indicators of demographic pressure in the demarcation of new areas to be protected: The case of the Oltrepò Pavese and the Ligurian-Emilian Apennine area (Italy). Landscape and Urban Planning 85(1):12-26, http://dx.doi.org/10.1016/j.landurbplan.2007.09.002
52. Roth, M., 2006. Validating the use of Internet survey techniques in visual landscape assessment - An empirical study from Germany. Landscape and Urban Planning 78(3-9):179-192, http://dx.doi.org/10.1016/j.landurbplan.2005.07.005
53. Sayadi, S., González-Roa, M.C., Calatrava-Requena, J., 2009. Public preferences for landscape features: The case of agricultural landscape in mountainous Mediterranean areas. Land Use Policy 26 (2):334-344, http://dx.doi.org/10.1016/j.landusepol.2008.04.003
54. Sayadi, S., Calatrava, J., 2001. Análisis funcional de los sistemas agrarios para el desarrollo sostenible (Functional analysis of farming systems for sustainable development). Ministerio de Agricultura, Pesca y Alimentación, Madrid.
55. Schirpke, U., Tasser, E., Tappeiner, U., 2013. Predicting scenic beauty of mountain regions. Landscape and Urban Planning 111:1-12, http://dx.doi.org/10.1016/j.landurbplan.2012.11.010
56. Shafer, E. L., Brush, R.O., 1977. How to measure preferences for photographs of natural landscapes. Landscape Planning 4: 237-256, http://dx.doi.org/10.1016/0304-3924(77)90027-2
57. Sevenant, M., Antrop, M., 2009. Cognitive attributes and aesthetic preferences in assessment and differentiation of landscapes. Journal of Environmental Management 90(9):2889-2899, http://dx.doi.org/10.1016/j.jenvman.2007.10.016
58. Sevenant, M., Antrop, M., 2010. The use of latent classes to identify individual differences in the importance of landscape dimensions for aesthetic preferent. Land Use Policy 27(3):827-842, http://dx.doi.org/10.1016/j.landusepol.2009.11.002
59. Smith, G.M., Wyatt, B.K., 2007. Multi-scale survey by sample-based field methods and remote sensing: A comparison of UK experience with European environmental assessments. Landscape and Urban Planning 79(2):170-176, http://dx.doi.org/10.1016/j.landurbplan.2006.02.011

60. Steinitz, C., 1990. Toward a sustainable landscape with high visual preference and high ecological integrity: the loop road in Acadia National Park, U.S.A. Landscape and Urban Planning 19(3):213-250, http://dx.doi.org/10.1016/0169-2046(90)90023-U
61. Steinitz, C., 2001. Visual evaluation models: some complicating questions regarding memorable scenes. Landscape and Urban Planning 54(1-4):283-287, http://dx.doi.org/10.1016/S0169-2046(01)00142-6
62. Strumse, E., 1996. Demographic differences in the visual preferences for agrarian landscape in western Norway. Journal of Environmental Psychology 16(1):17-31, http://dx.doi.org/10.1006/jevp.1996.0002
63. Sun, D.G., Lim, S.H., Ko, J.W., Cho, G.S., 2001. Scenic evaluation of landscape for urban design purposes using GIS and ANN. Landscape and Urban Planning 56(1–2):75-85, http://dx.doi.org/10.1016/S0169-2046(01)00174-8
64. Svobodova, K., Sklenicka, P., Molnarova, K., Salek, M., 2012. Visual preferences for physical attributes of mining and post-mining landscapes with respect to the sociodemographic characteristics of respondents. Ecological Engineering 43:34-44, http://dx.doi.org/10.1016/j.ecoleng.2011.08.007
65. Tahvanainen, L., Tyrväinen, L., Ihalainen, M., Vuorela, N., Kolehmainen, O., 2001. Forest management and public perceptions - visual versus verbal information. Landscape and Urban Planning 53(1–4):53-70, http://dx.doi.org/10.1016/S0169-2046(00)00137-7
66. Tapiador, F.J., Casanova, J.L., 2003. Land use mapping methodology using remote sensing for the regional planning directives in Segovia, Spain. Landscape and Urban Planning 62(2):103-115, http://dx.doi.org/10.1016/S0169-2046(02)00126-3
67. Tempesta, T., 2010. The perception of agrarian historical landscapes. Landscape and Urban Planning 97(4): 258-272, http://dx.doi.org/10.1016/j.landurbplan.2010.06.010
68. Tveit, M., Ode, Å., Fry, G., 2006. Key concepts in a framework for analysing visual landscape character. Landscape Research 31(3):229-256, http://dx.doi.org/10.1080/01426390600783269
69. Tveit, M., 2009. Indicators of visual scale as predictors of landscape preference; a comparison between groups. Journal of Environmental Management 90(2): 2882-2888, http://dx.doi.org/10.1016/j.jenvman.2007.12.021
70. UNESCO, 1992. Convention Concerning the Protection of the World Cultural and Natural Heritage. World Heritage Committee. http://whc.unesco.org/archive/repcom92.htm. Accessed 13 Nov 2015
71. Van den Berg, A., Koole, S.L., 2006. New wilderness in the Netherlands: An investigation of visual preferences for nature development landscapes. Landscape and Urban Planning 78(4):362-372, http://dx.doi.org/10.1016/j.landurbplan.2005.11.006
72. Wackerly, D.D., Mendenhall, W., Scheaffer, R.L., 2008. Mathematical Statistics with Applications (7th ed.). Thomson, Belmont.
73. Webster, D.M., Kruglanski, A.W., 1994. Individual differences in need for cognitive closure. Journal of Personality and Social Psychology 67(6):1049-1062.
74. Wherrett, J.R., 1999. Issues in using the Internet as a medium for landscape preference research. Landscape and Urban Planning 45(4):209-217, http://dx.doi.org/10.1016/S0169-2046(99)00053-5

75. Williams, K.J.H., Ford, R.M., Bishop, I.D., Loiterton, D., Hickey, J., 2007. Realism and selectivity in data-driven visualisations: a process for developing observer oriented landscape surrogates. Landscape and Urban Planning 81:213-224, http://dx.doi.org/10.1016/j.landurbplan.2006.11.008
76. Wu, Y., Bishop, I.D., Hossain, H., 2006. Using GIS in Landscape Visual Quality Assessment. Applied GIS 2 (3):18.1-18.20.
77. Zeder, M., 2008. Domestication and early agriculture in the Mediterranean Basin: Origins, diffusion, and impact. PNAS 103(33):11597-11604, http://dx.doi.org/10.1073/pnas.0801317105
78. Zube, E.H., Pitt, D.G., 1981. Cross-cultural perceptions of scenic and heritage landscapes. Landscape Planning 8(1):69–87, http://dx.doi.org/10.1016/0304-3924(81)90041-1
79. Zube, E.H., Sell, J.L., Taylor, J.G., 1982. Landscape perception: Research, application and theory. Landscape Planning 9(1):1-33, http://dx.doi.org/10.1016/0304-3924(82)90009-0