Landscape Research

Mapping Alpine Landscape Values and Related Threats as Perceived by Tourists

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Mapping Alpine Landscape Values and Related Threats as Perceived by Tourists

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ABSTRACT   *Alpine environments are increasingly appreciated by nature-based tourism, notwithstanding recent economic crises. To benefit from this and maintain the attractiveness of a tourist destination, it is important to recognise the values of landscapes. We developed and tested a qualitative spatial valuation methodology, integrating existing quantitative survey methods, to support destination management and landscape planning at the local level. Data were collected through semi-structured interviews and a mapping exercise at a nature-based tourism destination in northern Italy. In identifying and mapping tourists' perceived landscape values and related threats, we also considered tourist profiles, experiences and preferences. The results indicated three tourist types (active seniors, families and sportive visitors). They identified five different landscape values (scenic, outdoor activity, aesthetic, historical-cultural and tranquillity) and seven categories of threats (urbanisation, lack of maintenance, congestion, visual and/or acoustic disturbance, pollution, overuse, and traffic). The maps show diverse 'tourism landscapes' and provide useful insights into sites with high value or with potential conflict between rival uses, which can effectively ground proposals for the management of valued sites and support local spatial planning to maintain perceived landscape values.*

1. Introduction

Nature-based tourism relies on a combination of education, recreation and adventure, including interaction with natural assets such as lakes, forests and mountains, as well as air and snow, together with infrastructures such as accommodation and transportation (Laarman & Gregersen, 1996). Tourists select their destination—and possibly return— based on their subjective perceptions and experiences of natural resources and the social environment (Beerli & Martín, 2004a; Goossens, 2000).Whilst the growth of the tourism sector has positive effects on the local economy, a rapid tourist inflow towards natural environments often leads to environmental degradation (Neto, 2003), negatively affecting the values attached to the places by tourists and having a detrimental impact on the local

economy (Romeril, 1989). In highly populated regions, outdoor recreational use can easily become intensive and people may feel disturbed by others, perceiving overcrowding. Conflicts between different user groups (for example between cyclists and hikers) have become a common issue in most of Europe, for example in Belgium, Denmark, Germany and the Netherlands (Bell, Tyrväinen, Sievänen, Pröbstl, & Simpson, 2007).

The relevance of such negative effects depends on several factors, including the objectives for which an area is managed, the values that are placed on the environment, the cause of the effects, and the trade-offs between the benefits from tourism development and the costs to the environment (McCool & Lime, 2001).

Most of these factors depend upon the local context; thus, spatial information on the values attached to the environment derived from visitors is decisive in terms of supporting decision-making for landscape conservation and planning of local tourist attractions and recreation opportunities (Dredge, 1999). To support such environmental decisions, surveys have been combined with Geographical Information Systems to identify place values (Brown & Raymond, 2007).The assessment of landscape visual quality has been used as a tool for the conservation and management of rural landscapes (Angler & Toccolini, 1993; Daniel, 2001), which are being reconsidered as areas rich in natural amenities and visual quality.

Since the 1960s, the US Forest Service has been undertaking research to provide information on the recreational use of forests, including scenic quality assessments and analyses regarding the effects of changes in landscapes on recreation activities (USDA Forest Service, 2013). With the recent rise in digital landscape visualisations, sophisticated and advanced Geographic Information System (GIS) tools have been developed using descriptive visualisations (Grêt-Regamey, Bebi, Bishop, & Schmid, 2008), as have three-dimensional (3-D) visualisations with data-driven models (Lange, Hehl-Lange, & Mambretti, 2004), and even multi-sensory experiences (Eckart, 2011). More recently, methodological approaches to landscape valuation have involved users' perspectives by participatory mapping (Brown & Reed, 2012) and have included ecosystem services (Raymond et al., 2009; Sherrouse, Clement, & Semmens, 2011). Such methods include paper maps in postal surveys, electronic maps on the internet, structured interviews and facilitated group activities, all with their advantages and disadvantages (Brown & Reed, 2012)

Most of the above-mentioned studies focus on the generalisation of results (e.g. Bishop & Hulse, 1994), inductively looking at value functions or indicators replicable beyond the studied sites (e.g. Schirpke, Tasser, & Tappeiner, 2013). Tourism geography studies primarily regard places (areas including features distinguishing them from other places) as an element of marketing and competitiveness in relation to regional or international perspectives (Hall & Page, 2009). The mapping of landscape values, identifying the most and the least appreciated sites within a destination area and exploring the specific associated motivations, can provide more functional knowledge to assist in destination management and planning. Information on local peculiarities would allow decision-makers to gain greater understanding of their key local resource —the landscape—helping to recognise possible strengths and weaknesses. Since the attractiveness of landscape depends upon subjective perceptions and expectations, as well as other factors, a decline in such attractiveness may not immediately be evident in terms of environmental degradation. Consequently, the negative effects on tourism may

be ignored. To the best of our knowledge, there has been no attempt thus far to identify and map landscape values and related threats as perceived by tourists at the local level.

The purpose of this study was to test a new valuation approach in estimating and mapping values and threats as perceived by tourists, with the aim of supporting sustainable destination management and landscape planning. Such an approach essentially consists of individual interviews and a procedure to map respondents' evaluations, indicating the distribution of each recognised value within a defined destination area. This paper consists of three distinct parts. In the first part, after a brief description of the study area, we describe the proposed approach to the mapping of perceived landscape values. In the second, we test the methodology on a case study in the Italian Alps. In the third, we discuss the results and the potential uses by local decision-makers.

2. Case Study

The study area, the Valle di Ledro, is located in the central Southern Alps in the Province of Trento in Italy (Figure 1), covering an area of 152 km^2. The valley is characterised by its lake, the Lago di Ledro, and the forest cover, with small cultivated areas at the bottom of valley and alpine grasslands and pastures at the higher elevation. The natural assets of the Valle di Ledro include beaches with facilities and opportunities for aquatic sports, several mountain trails and areas of interest in terms of nature conservation. The variety of open-air activities found in the Valle di Ledro is extensive, including hiking, angling, climbing, canoeing, roller skiing, snowshoeing, ski touring, paragliding, mushroom picking, hunting and mountain biking. Moreover, several events are organised during the summer, such as local food markets, festivals and concerts. This site is also recognised in specialised international sport journals, and international competitions have been hosted there, including mountain bike races and Optimist team races.

The site, which has traits common to other European mountain tourism destinations, is rather popular among summer tourists, with increasing visits in recent years (Osservatorio Provinciale per il Turismo, 2009). During the summer of 2011, more than
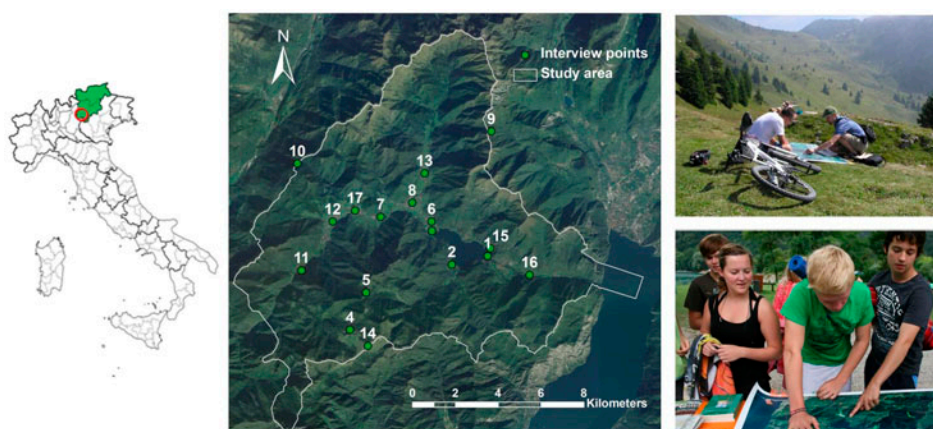

Figure 1. Study area, interview locations, and two examples of interviewing contexts.

86 000 tourists were recorded, in addition to the local population of about 5500 inhabitants (personal communication from the local tourism board). Almost half of the tourists were from outside Italy but within Europe, mainly from Germany. The accommodation structures in this area primarily consist of three equipped campsites, several small hotels (< 30 rooms), a few bed and breakfasts (B&Bs) and a small spa resort. According to a survey conducted by the provincial Tourism Observatory (Osservatorio Provinciale per il Turismo, 2009), 45.8% of the tourists were attracted by the beautiful natural environment and 24.5% by the outdoor or recreation activities available (equal percentages). More specifically, one third of the tourists coming to the Valle di Ledro were motivated by the opportunity to take part in "active holidays". On average, they stayed 11 nights and 63% of them have returned several times.

3. Methods

We used a mixed methods approach to draw maps of perceived landscape values, complementing survey and spatial analysis. Our methodology consisted of a tailored approach in which interviewees were asked, during their holiday, to place coloured stickers on the study area map (as also by Raymond et al., 2009). In particular, the methodology consisted of the following steps:

(1) Semi-structured interviews, including the mapping of valued places and the interpretation and categorization of information resulting from open questions.
(2) GIS analysis, that is, the identification and mapping of the landscape features as referred to by the respondents, the mapping of landscape values according to the total number of mentions received, the different value categories, and the respondent types.

3.1. Interviews

The field work was undertaken during two summer seasons (August 2009 and August 2010), as the Valle di Ledro is predominantly a summer destination. A total of 106 respondents were involved, divided approximately equally across the two seasons. The sample had to represent a wide range of experiential emotions, perspectives and opinions concerning the study area. For this specific reason, the interviews were conducted in different contexts and at different times and sites, in places generally frequented by tourists, for example, at the end of a mountaineering activity, at the local market, or at the beach. In this way, it was assumed that respondents were relaxed and could accurately recount their preferences and feelings. Specifically, the interview sites were distributed across the study area (see the points in Figure 2), considering different altitudes, distances from villages and landscape types (e.g. lakes, grasslands, woodlands), or different features (such as mountain huts and hiking trails), to obtain a wide variety of respondents.

The participants were selected randomly by inviting individuals who were passing the survey point to be interviewed without further criteria for selection; in addition, to avoid homogeneous samples, the interviews were conducted for a maximum time of 1.5 h for each survey point, defined according to a trade-off between the number of
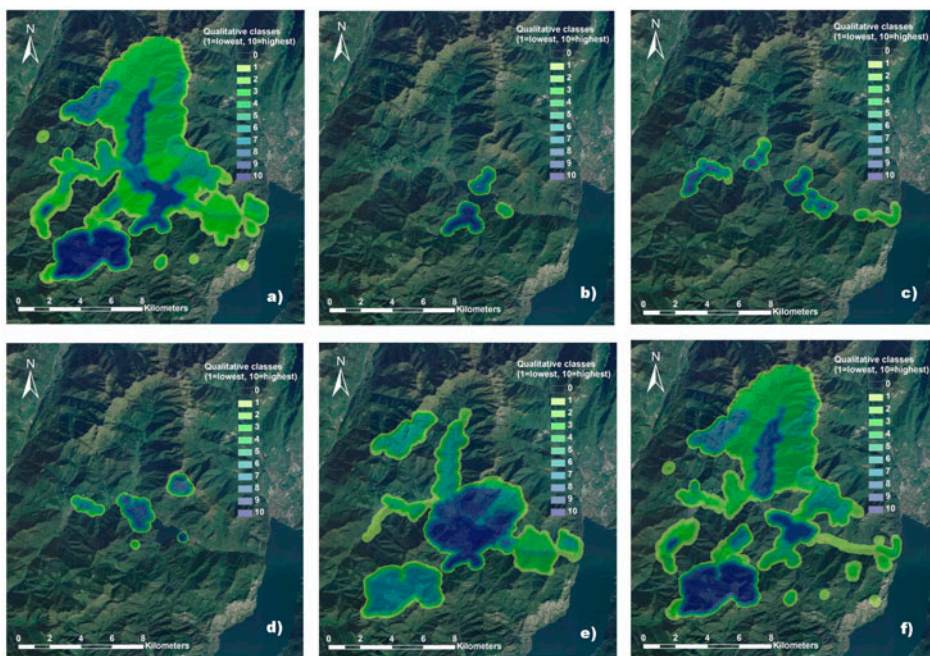
Figure 2. Perceived landscape values: a) total score, b) tranquillity, c) aesthetic, d) historical-cultural, e) outdoor activity and f) nature and scenic value.

interviews per site and the number of sites. We expected that sampling a full day at the same site (e.g. local market) would be likely to provide a more homogeneous sample of people (e.g. older people, residents in urban areas). The average time of an interview was 25 min., with a maximum duration of about 50 min. The languages used were Italian and English, depending on whether the interviewee was Italian or foreign.

As an aid to collect spatially explicit information, we used a printed aerial colour orthophotograph of the study area (dimensions A0, 841 mm × 1189 mm). The aerial photograph, at an approximate scale of 1:27 000 and a resolution (pixel size) of 0.5 m, clearly showed major roads and settlements and primary cover types (i.e. rocks, lakes, alpine pastures, woods).

The complete set of open questions asked during the interviews is reported in Table 1. The respondents were asked to identify their subjectively valued places on the printed map, using 10 green sticky labels, and to specify the particular value associated with these sites. In this way, the respondents were free to express their own opinions and share their motivations and experiences about the sites without a pre-defined (and thus limited and easily biased) set of values. In particular, we took note of all adjectives or spatial attributes tourists expressed in their stories about their experiences and landscape values at the destination area. A maximum number of 10 labels was assigned based on the limited set of sites (i.e. approximately 15–20 sites) designated in tourist maps or guides.

Table 1. Interview structure

Type of information	Questions
General motivation, previous visits	• Why did you choose to come to the Valle di Ledro? • Have you been here before? • How many times (summers) have you visited?
Valued places	• Which are the places you value most based on your personal opinion/experience? (Please use the ten green stickers to indicate the places. You can assign places a higher weighting by using more stickers).
Motivation and activities in the valued places (attribution of weights)	• Why do you value this place/these places? • Which element of that place do you like in particular? • What kind of activity/experience did you do/have there?
'Threatened' places and motivation (attribution of weights)	• Thinking about the places you have indicated, but not only those, which are the places you think are threatened or may, in your personal opinion, lose their value? (Please indicate these places using the five red stickers. You can assign places a higher weighting by using more stickers). • What are the threats/risks or related problems?
Free notes/observations	• Free comments, or additional information
Auxiliary information on respondents	• Date • Place of interview (using GPS or toponym) • Number identifying the photo of sticker positions on the map • Respondent number, gender, age, place of origin • Accommodation type (e.g. hotel, campsite, B&B)

The respondents were then asked to identify places perceived as threatened or at risk of losing their values, using five red sticky labels and expressing their opinions about possible problems in the area. The rationale for using a maximum of five labels was that we assumed there would be fewer possible problematic places (as the area is appreciated by the many tourists travelling from a considerable distance) and also we were inviting the respondents to be more selective. Concerning both the green (positive) and the red (negative) value labels, the respondents could assign a weighting indicating the importance of each site using more than one label. Once the participants had placed all their stickers on the map, the interviewer recorded these stickers by taking a picture. Subsequently, this information was spatially referenced onto a GIS layer and integrated into the analysis of the open questions.

3.2. Spatial Analysis

In the GIS analysis, we mapped the landscape values through landscape feature editing. The valued sites (landscape feature), as indicated by the respondents' place descriptions and coloured stickers on the printed aerial photograph, were identified and mapped as areas (polygons in vector data, using ESRI® Arc Map 9.3). Such elaboration entailed an interpretation of respondents' descriptions and digitalization on-screen using land cover maps, aerial orthophotographs and viewshed analysis (based on digital elevation models provided by the Province of Trento), in addition to all the information from the interviews. As an example, descriptions such as "the bike trails nearby the Refugio Tremalzo" or "the lawn where we usually have a picnic, close to the lake. . ." were used as bases for identifying areas around the location of the stickers. Subsequently, each polygon was characterised by the details obtained from the interviews, such as the total number of stickers, respondent type and qualitative descriptors, storing these data in a table associated with the vector data. The subjectivity of interpretation and the resulting spatial uncertainty of area digitalization were not expected to be relevant because of the intrinsically qualitative nature of the whole approach.

As vector data introduce an unrealistic and abrupt discontinuity in landscape values, we applied kernel density estimation (Silverman, 1986), using one piece of information at a time (e.g. the total number of green and red stickers for each site/polygon). The kernel density estimation calculates the density of values in the neighbourhood around each point, accounting for the statistical spatial distribution, and creates hotspot surfaces for each value (as also applied, albeit using different information, by Alessa, Kliskey, & Brown, 2008; Vizzari, 2011). The input for the kernel density estimation was a regular 5×5 m grid of points which were obtained from the polygon maps by converting them into a raster with a resolution of 5 x 5 m. In our case, the kernel density output cell size was set equal to the input cell size (5 m), assuming that survey respondents could determine the locations on the printed map within—at best—a range of 5 m; the neighbourhood width (or kernel size) was set at 300 m, considering the minimum width of the Valle di Ledro. The kernel density output values were reclassified into 10 qualitative classes, using geometric intervals (in which the class breaks are based on a geometric series), where 1 is the lowest value and 10 is the highest.

We produced specific maps for distinct values by repeating the above procedure for each category of landscape value as identified by the respondents. After identifying different tourist types, we created more specific maps by applying the same procedure to distinguish different perceptions and uses of the landscape by different users. In the same way, we mapped the perceived threats or risks for the recognised landscape values.

4. Results

4.1. Tourist Types and Perceived Landscape Values

The results presented here are based on the interviews. The respondents included 56% men and 44% women, with an average age of 49 years (within a range of 20–72 years). Most of the visitors had frequented the area for several years (Table 2) motivated by: relaxing in nature (58%), outdoor activities (23%), holidaying with family (13%), less

crowded sites (4%) and cultural heritage (2%). Based on these motivations and the socio-demographic characteristics, and also considering the statistics of the local tourism board, three different tourist categories were identified: active seniors, families and sportive visitors (Tables 3 and 4). The first group included retired adults, over the age of 50, from cities in Italy or other European countries. The families were mainly from urban areas of northern Italy. The third group, the sportive tourists, were typically visitors on short stays, often individuals or small groups that were enjoying mountaineering activities. This group generally came from Central and Northern Europe (mainly Germany and the Netherlands).

The respondents identified heterogeneous sets of places; some appreciated the valley as a whole, while others valued particular locations. In total, 57 places were recognised as having outstanding positive value. These were categorised into five types in order of the number of mentions as follows: built environments (e.g. villages or cultural sites), natural sites (biotopes or other ecological features), valley traits (i.e. panoramas or viewsheds), mountain trails and alpine huts.

The views expressed about landscape experiences by the respondents were interpreted and classified into five classes of value: 'nature and scenic value', 'outdoor activity value', 'aesthetic value', 'historical-cultural value' and 'tranquillity' (Table 3). The first, the nature and scenery value (50% of cases), referring to natural components of the landscape, was used whenever the respondents mentioned specific elements of the natural environment (e.g. pastures, woodland, the flowering of alpine vegetation). The outdoor activity value (30%) was assigned when the respondents valued a particular site mainly for its pleasurable activities (e.g. hiking, mountain biking or mushroom picking). In many cases, the same respondents also expressed appreciation for nature; in these cases, or similar, the first or repeated views expressed by respondents were considered. Aesthetic value (10%) was related to man-made sites (typical expressions were "nice and lively village" or "colourful urban centre"). Historical-cultural value (5%) was associated with historical places or monuments in the valley, predominantly related to nineteenth and early twentieth century artefacts (e.g. churches, ruins, First World War foxholes). The value of tranquillity (1%) was recognised when respondents exclusively referred to relaxing and peaceful places (e.g.

Table 2. Traits of respondents in terms of place of origin, number of visits, and category

Place of origin	Returns/ Times	Tourist types*			
Germany	9.5%	First time/ visitors	21.9%	Active seniors	41.4%
Austria, Belgium, Poland, Czech Republic, Sweden, Ireland and Netherlands	8.6%	From 2nd time to 5th year	25.0%	Families	35.6%
Extra Europe	1.0%	6th to 20th year	32.3%	Sportive	23.0%
Milan hinterland and Lombardy	30.5%	> 20th year	18.8%		
Trento Province	14.3%	No data	2.1%		
Rest of Italy	36.2%				

*9.3% of total interviewees were locals, not tourists, this subset of sampling was not included in the analysis.

Table 3. Perceived landscape values by respondent type (total number of stickers used on the printed map)

Landscape values	Sportive (101 stickers)	Families (108 stickers)	Seniors (168 stickers)	All respondents (377 stickers)
Quietness	–	1.9%	1.8%	1.3%
Aesthetic	11.9%	6.5%	8.9%	9.0%
Historical-cultural	4.0%	6.5%	6.5%	5.8%
Outdoor experience	33.7%	27.8%	20.8%	26.3%
Naturalistic scenery	44.6%	51.9%	59.5%	53.3%
others	5.9%	5.6%	2.4%	4.2%

Table 4. Perceived threats to landscape values by respondent type (total number of stickers used on the printed map)

Perceived threats	Sport (10)	Families (19)	Seniors (34)	All respondents (63)
Abandonment, lack of maintenance	10.0%	–	5.9%	4.8%
congestion (e.g. mountain trails, places)	–	26.3%	11.8%	14.3%
visual and/or acoustic disturbance	10.0%	10.5%	5.9%	7.9%
pollution	20.0%	21.1%	2.9%	11.1%
overuse (e.g. excessive taking of wild flowers)	10.0%	–	5.9%	4.8%
traffic and danger to pedestrians	30.0%	10.5%	8.8%	12.7%
urbanisation	20.0%	31.6%	52.9%	41.3%
others	–	–	5.9%	3.2%

for their "silence" and "quietness"). Tranquillity was often mentioned together with other values, principally associated with aspects such as nature and panorama; here, the 1% refers to cases in which the respondents expressed tranquillity as the first and most distinctive quality of the site.

4.2. Popular Sites, Distribution of Values and Threats

Based on the spatial analysis and considering the total number of stickers assigned, the most valued places are situated at Lago di Ledro (darker areas in Figure 2a), the Val Concei floor (dark strip to the north in Figure 2a) and the Monte Tremalzo (dark area in the lower centre of Figure 2a). These latter two areas are semi-natural (typical alpine pastures and woods) and less urbanised but also easily accessible (e.g. by road and several mountain bike trails). The distribution of landscape values differs significantly according to the value class (Figures 2b–f).

Spatial differentiation also appeared for the same landscape values when different tourist types were considered (Figure 3). The active seniors primarily attributed high values to relatively more natural areas, even those at higher elevations (often mountains and hiking trails were explicitly mentioned). The other two groups seemed to prefer the middle and lower parts of the valley, including the areas surrounding the Lago di
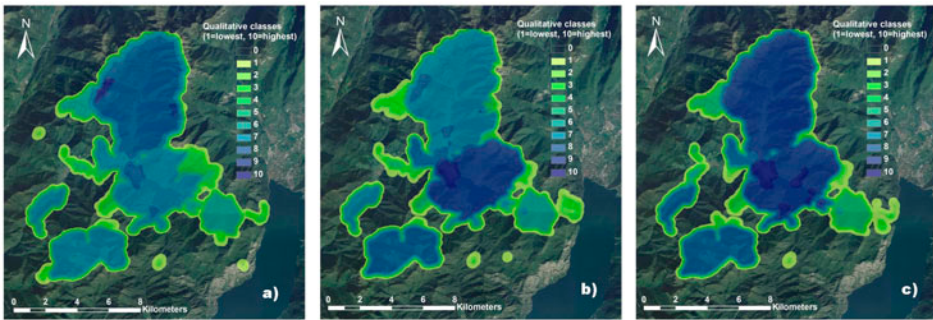
Figure 3. Landscape values as perceived by different tourist types: a) seniors, b) sport tourists, and c) families.

Ledro; for instance, families considered camping areas to be among the most important sites.

   The landscape values shown in Figure 3 refer to the total general ranking of the area, but the detailed value maps derived from each tourist type offer some insights into areas of potential conflict where activities that are not compatible are likely to overlap. Areas with outdoor activity value (expected to be associated with outdoor sports such as mountain bike racing) may compete for space in areas with tranquillity value (Figure 4a). Besides, even for the same use, the tourist groups differed, revealing possible areas of contention, for example, between senior and sports tourists (Figure 4b).

   In addition to the values assigned to different sites, respondents also identified a series of threats in terms of the risk of losing or decreasing those values (Table 4), grouped in six classes. The type of threat most mentioned was urbanisation (41%;
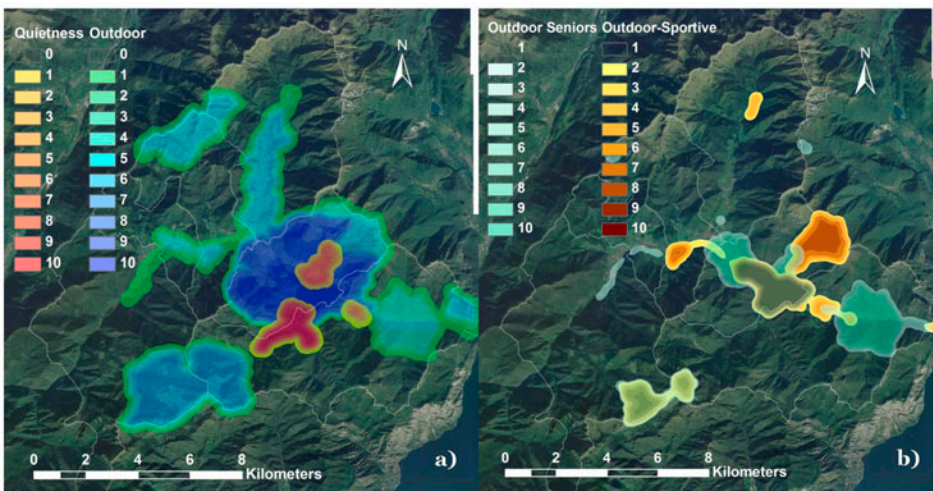

Figure 4. Overlapping areas between different values and different landscape users, indicating potential conflict.
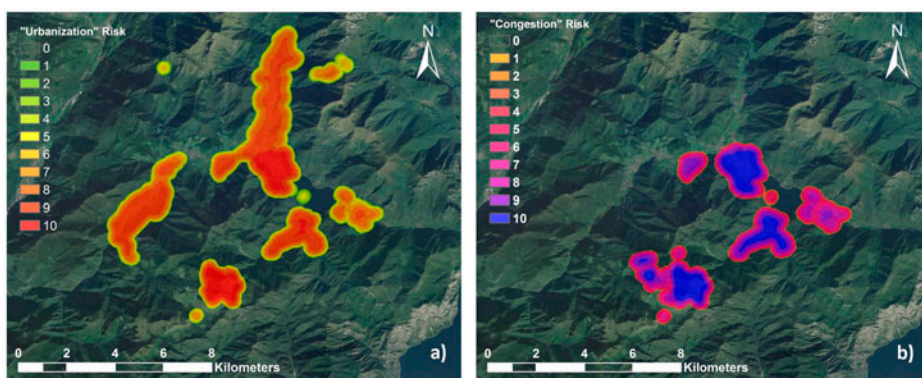
Figure 5. Two of the seven types of perceived threats to landscape values: a) urbanisation and b) congestion.
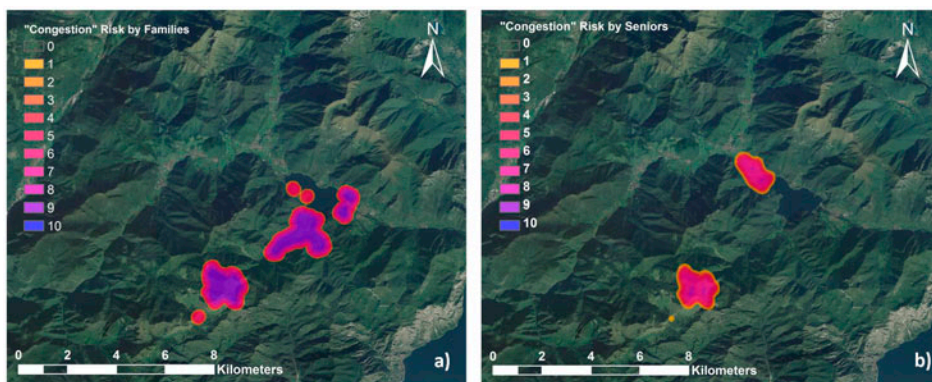

Figure 6. Congestion risk as perceived by two tourist types: a) families and b) active seniors.

Figure 5a), followed by congestion (people crowding specific sites, 14%; Figure 5b), danger from vehicle traffic (especially from trucks, 13%), pollution (mainly concerning the Lago di Ledro, 11%), and visual and/or acoustic disturbance (from noisy activities such as races or visual blight due to new buildings, 8%), abandonment or lack of maintenance (5%) and overuse (5%). Different perceptions emerged from different respondents: while the active seniors and the families perceived a risk predominantly from urbanisation, the sport group (particularly, the cyclists) considered traffic a particular threat. The risk of congestion was only perceived by the families and active seniors, but in different locations (Figures 6a–b). Abandonment or lack of maintenance and overuse were not mentioned by the families.

5. Discussion and Conclusions

The approach adopted provided information on perceived landscape values requiring relatively small input data and modest time resources. In this study, it required an

orthophotograph and two months of field work involving one interviewer. The sophisticated information obtained was at the cost of a small sample of tourists (106 interviewees). The assessment methodology is not intended to substitute for quantitative survey methods, but rather to complement them. Considering the relatively small area of the case study (approximately $152 \, km^2$), the sample size is comparable to other similar qualitative studies (e.g. Beerli & Martín, 2004b; Brown, 2004; Chhetri, Arrowsmith, & Jackson, 2004).

The questionnaire-based surveys and the value mapping provide insightful details concerning tourists' priorities within the study area by identifying five classes of landscape values: 'nature and scenic value', 'outdoor activity value', 'aesthetic value', 'historical-cultural value' and 'tranquillity'. The open questions in the semi-structured interview (Table 1) helped to capture the tourists' responses associated with their landscape experience. The qualitative results provided a detailed level of information, which should be included when tourism is considered for landscape planning and resource management purposes (Gnoth, 1997). The qualitative and spatial information allows the identification of a diversified 'tourism landscape' related to different landscape values of different tourist types. The value maps are easy to interpret and can help to comprehend landscapes in terms of key and vulnerable resources for local tourism. For example, the maps indicate the most valued places and provide detailed spatial information about the different landscape values (Figure 2) and the spatial differentiation of the different tourist types (Figure 3). In this study, the most valued sites can be characterised as natural areas which are, at the same time, easily accessible. However, high landscape values can be threatened, for example by urbanisation or congestion (Figures 5 and 6) as expressed by the respondents during the survey.

The maps may also be used to involve stakeholders in more informed decision-making. The scope of the study encompassed providing support for local decision-making for landscape management; for each new study area, the analytic scheme should be repeated to obtain maps of the specific landscape values for the area. Nonetheless, some general lessons can be learned: the approach is especially informative where tourism carrying capacity may be linked to perceived landscape values. The specific results from the case study indicate that natural scenery is one major aspect of nature-based tourism, as in other case studies (Daniel, 2001). For example, according to Arriaza, Cañas-Ortega, Cañas-Madueño, and Ruiz-Aviles (2004), perceived visual quality increases with the degree of wildness of the landscape, the percentage of plant cover and the amount of water. The added value of the proposed approach is due to the spatially detailed insights concerning the values attributed by recreationists to specific sites within the same landscape. These results may contain relevant information for local administrations; by providing a detailed picture of recreational uses and preferences they can facilitate site assessment and management, in addition to other standardised visitor surveys. Future applications of the proposed approach should be integrated with the verification of the recreational use of landscapes in order to confirm the perceived values and related threats.

5.1. Relevance for Landscape Planning

Based on the different perceived landscape values and tourist groups, the results indicate overlapping areas of rival uses and potential fringe areas between tourist groups. The rivalry in this case refers to possible conflicts between uses or users in the same area, for example sport tourists who are mountain biking may disturb families or elderly tourists relaxing in the natural environment; both groups may complain of a lack of 'free space' for their use and may therefore choose other sites or destinations. In other cases, congestion, due to too many people using the site and belonging to the same group, is perceived as a risk for valued sites. The fact that the majority of respondents return regularly on holiday means that they can perceive some land use changes potentially threatening landscape values. The identification of such potential conflict zones can assist managers, local owners and decision-makers in managing zones and their use. Furthermore, the simple recognition of the environmental value of particular sites, for example, historical sites or landscape features related to community identity, may promote their maintenance.

The maps of perceived threats, although these should be validated by further study, draw attention to places where values are particularly sensitive. Such insights can effectively ground proposals for the management of specific sites in the studied landscape. Informed recommendations may include managing the valued places in a way that does not decrease their natural scenic value. This may require setting limits on visitor numbers or certain activities in defined areas to ensure the environment maintains the appreciated values. For example, we could suggest avoiding or limiting 'noisy' activities, such as summer festival concerts or cycling races, in the areas most valued for their tranquillity. Moreover, local decision-makers and tourism managers may influence tourist flows by creating appropriate infrastructures and by providing informative maps.

The study results have been presented to local administrators and tourism stakeholders; according to these groups, the results presented potentially constitute an important foundation for land use planning and will serve as a baseline to define future strategic tourism plans. In particular, local administrators and stakeholders expressed their interest in the approach and considered the illustrated information functional in identifying appropriate uses of sites, as well as of use in imagining desired scenarios for the valley. The common trends show that increasing numbers of people are likely to enjoy nature tourism in the future; thus, planners and managers will have to deal with increasing demand for recreation activities and associated areas and consequently will have to address the increasing pressure on the environment. Therefore, there is also a greater need for advanced methods and integrated approaches to evaluate and plan for this.

Acknowledgements

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