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heritage



Article

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Article

Integrating Cultural Sites into the Sesia Val Grande UNESCO Global Geopark (North-West Italy): Methodologies for Monitoring and Enhancing Cultural Heritage

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Abstract: UNESCO Global Geoparks are recognised in the scientific community for their exceptional geological significance, but their potential to embrace and preserve cultural heritage sites is underestimated. This study delves into a pioneering approach within the Sesia Val Grande UNESCO Global Geopark (NW Italy), examining the integration of culturally significant sites into conservation and promotion strategies. To achieve a successful integration, we adapted a methodology used for the identification and assessment of geosites, incorporating the criteria of cultural significance, to assess the value of 10 cultural sites within the geopark and compare the results with the assessment values of 10 geosites. Moreover, we submitted survey questionnaires to geopark tourists to understand their interest in visiting both geosites and cultural sites. The findings reveal the remarkable scientific, educational, and touristic values of these cultural sites, which constitute an important resource for the geopark, to be enhanced and protected together with the geosites. Interestingly, the higher scientific value of cultural sites corresponds to increased visitor interest, which is in contrast to the trend observed for geosites. Through this unified approach, the monitoring of cultural heritage within the geopark is simplified and improved, enabling a comprehensive inventory and efficient administration. Moreover, by aligning visitor interests with scientific value, the Sesia Val Grande Geopark can enhance conservation and sustainable tourism efforts.

Keywords: geoheritage; geosites; geosite assessment; comparative analysis; tourist interest



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1. Introduction

UNESCO Global Geoparks (UGGps) are territories with significant geological features and other natural and cultural assets [1]. Within a UGGp, in which the high geological heritage of international importance is characterised by “sites and landscapes of international geological significance” [2], the main goals are the promotion of geotourism, geoconservation, and education finalised to the sustainable development of the area [3–5]. A key location of a geopark is a geosite, which can be defined as “a site location area or territory in which it is possible to identify a geological or geomorphological interest for conservation” [6].

Moreover, geosites represent several values that are collected in lists that are possible to find in the literature, included in works by different authors [7–9]. These lists are not completely aligned, and only four values are shared by all the authors, i.e., scientific, educational, cultural, and aesthetic values. Other values, for example, recreational or economic values are cited only in some of the lists [8].

In recent years, numerous studies have focused on geosite assessment, aiming to quantify these values, and different techniques for quantitative geosite assessment have therefore been developed [7,10–19]. These techniques primarily aim to emphasise the scientific values of the sites by including several criteria such as representativeness, integrity,

uniqueness, and scientific knowledge. Then, in order to identify which types of geosites are the most valuable and can be used as tourist attractions or for geoelectoral activities, the educational, tourist, and other values of geosites are assessed. It is essential to know the value of the geosites to contribute to the development of geology-based tourism, which is aimed at educating the non-specialist public on geological issues, increasing the educational potential of geoparks and fostering geoconservation [7,10,15,20–27]. However, there is no perfect evaluation model because the subjectivity included in each method prevents the criteria from being quantified in a completely objective way, leading to differences in the results [28–35]. In addition, these methods pay little attention to the interests of geotourists for whom the various geotourism products are presented and offered; without knowledge of the data on visitor interest, the results of the geosite assessment cannot be used effectively to foster best practices in geotourism management [24]. Nevertheless, if only general-purpose methods are considered, it can be seen that they have similar criteria and, as a matter of fact, they provide similar results [36,37].

Furthermore, although the cultural value of geosites is highly recognised by the scientific community [11,12,38–40], the cultural heritage of geoparks and other cultural sites are underestimated in the context of the management, protection, and promotion of UGGps. In fact, many geosites (landforms rather than outcrops) also show extraordinary cultural value, and many cultural sites present important connections with geological features [41–44]. Despite this strong linkage between geosites and cultural sites, with some geoheritage sites inserted in the UNESCO World Heritage List [43], there are not any methodologies that allow for a comparable qualitative assessment of the two types of sites.

Due to both the high presence of cultural sites within UGGps and to the holistic concept of the protection and sustainable development of geoparks [2], it is necessary to solve the gap of the enhancement and promotion between geosites and cultural sites in the area. This gap can be resolved through an assessment that is specific to cultural sites, which has parameters that are comparable with those adopted for geosite assessments.

Starting from a literature review about assessment methodologies, a new approach for monitoring and assessing geosites and cultural sites has been adopted. It consists of the application of the methodology suggested by Brilha [7] not only to geosites, but also to cultural sites. This new approach makes it possible to link together geology, landscape, culture, and history; these factors represent a great potential for social and sustainable economic development and awareness-raising in the Sesia Val Grande UNESCO Global Geopark (SVUGGp).

Because of the potentiality offered by the SVUGGp territory, few geosites and cultural sites of high significance have been selected for the application of the new assessment methodology. To our knowledge, this is the first attempt in which both geosites and cultural sites have been equally considered in the assessment process. Thus, it is possible to promote a comprehensive approach to conservation that not only preserves natural resources, but also safeguards and celebrates the unique cultural heritage of the area by successfully incorporating cultural sites into the geopark management framework. Furthermore, increased awareness and appreciation of geosites and cultural sites can lead to greater awareness of the sustainable exploitation of the territory from a geotouristic perspective.

The purpose of this research is to contribute to an understanding of how cultural heritage might be effectively safeguarded, preserved, and promoted within the setting of a UGGp. By highlighting successful methodologies and sharing actions taken from the SVUGGp, this study seeks to inspire other geoparks and protected areas worldwide to adopt similar approaches, fostering sustainable development and cultural conservation for the benefit of both present and future generations.

2. Study Area

The SVUGGp is in the NW of Italy, in the Piemonte Region. It is an appropriate area in which the integration of cultural sites into protected areas and geoparks has become an essential aspect of conservation efforts. In fact, the SVUGGp includes several national

and regional parks such as the Val Grande National Park, the Monte Fenera Natural Park, the Alta Valsesia and Alta Valle Strona Natural Park (Figure 1), other natural areas with high levels of geodiversity and biodiversity, and some sites on the UNESCO World Heritage List (WHL), such as the “Sacri Monti of Piemonte and Lombardia regions”, with historical–cultural importance.

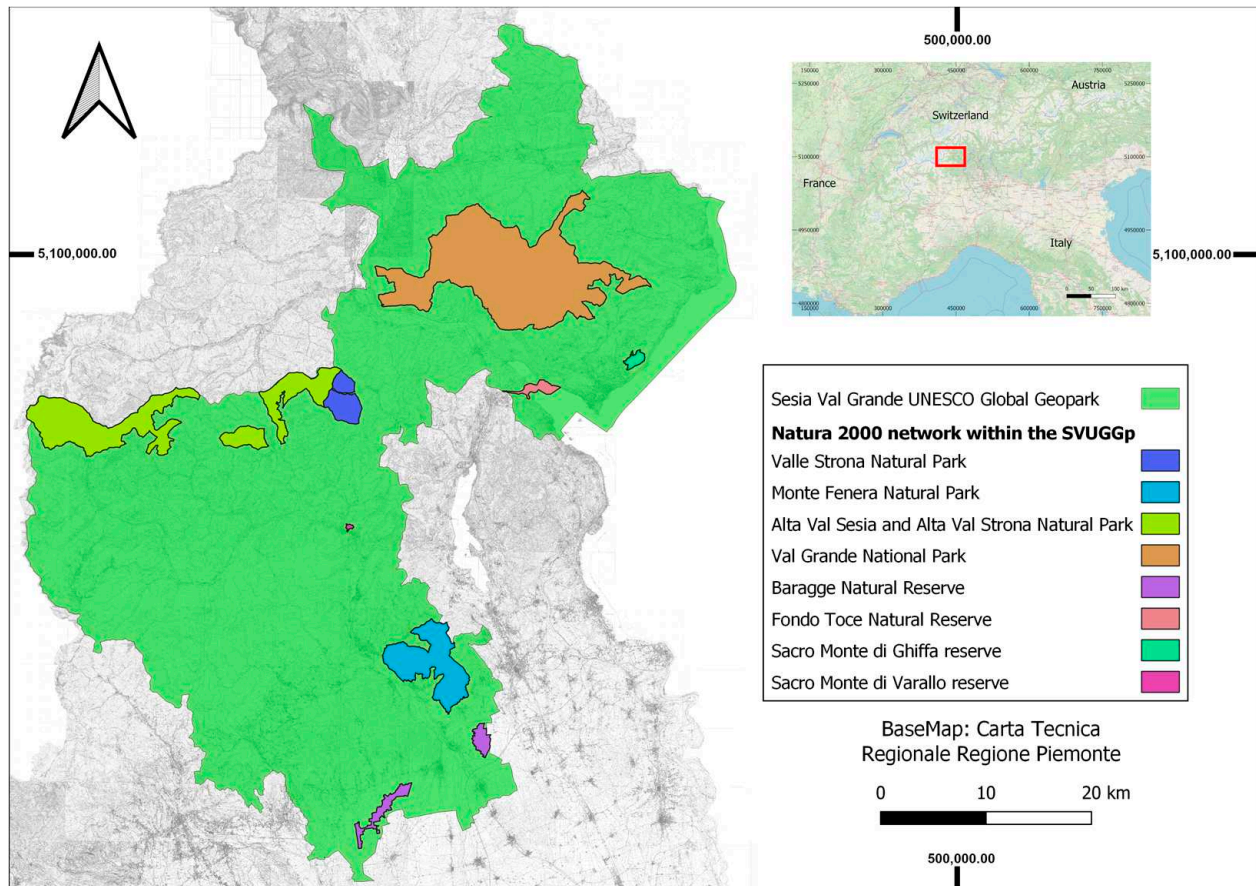


Figure 1. Details of the geographical location of the Sesia Val Grande UNESCO Global Geopark within the Piemonte Region. In grey, the Piemonte Region’s administrative borders are represented. In green, the Sesia Val Grande UNESCO Global Geopark area is indicated. Inside the borders of the geopark, the areas belonging to the Natura 2000 network are indicated with different colours.

Furthermore, the territory of the SVUGGp contains an extraordinary geodiversity, such as a great variety of rocks and landscape features that derive from different geological processes [45]. The great geodiversity of this geopark shows all the processes of the Alpine orogenesis, including sections of the Earth and associated rocks from the deep, middle, and upper crust [46], which are exposed at the surface of the Earth by the collision between the continents of Africa and Europe. In the same area, the Supervolcano of the Sesia [47], which is a fossil volcano system that erupted approximately 280 million years ago, formed a huge caldera, the remains of which are clearly visible today, including its magmatic system. The geomorphological witnesses of past and present glacial, periglacial, and water processes and features, karst processes, and a variety of different environments from the Monte Rosa Massif (4634 m a.s.l.) to the Po Plain and to the bottom of the Maggiore Lake (179 m b.s.l.) are also present in the SVUGGp.

Within the SVUGGp, several sites of international historical–cultural interest or archaeological importance are also located, even though they are not inserted in the WHL, and at the moment, they are not promoted in the context of the geopark [48–51]. By consciously merging all the territory’s strengths in commerce, community, culture, environment, and politics, the SVUGGp serves as a management tool for sustainable regional development [5,52].

3. Materials and Methods

UGGps are efficient and increasingly popular tools for managing the territory and favouring sustainable development in the area [5]. By applying a bottom-up approach, UGGps aim to operate with a holistic point of view to protect and celebrate both the natural and cultural heritage [2]. Nonetheless, in the scientific literature, it is possible to find many studies concerning the recognition and assessment of sites with geological importance [7,10–19], while insufficient efforts have been made to assess and protect the cultural sites within geoparks. We carried out several analyses to achieve the purpose of this paper, which is to improve the protection and enhancement of cultural sites within the SVUGGp. We first assessed 10 selected geosites according to the Brilha method for the quantitative assessment of geosites and geodiversity sites [7]; then, we adapted the method and assessed 10 selected sites of cultural importance within the same area and compared the results. A number of selection criteria were applied to the selection of the geosites and cultural sites. In order to have a representative sample of the whole area and to include all forms of heritage, the geosites were selected according to their geographical distribution and type of geological importance, while the cultural sites were selected according to their geographical distribution, their object of conservation, and the types of cultural and landscape protection restrictions. Particularly, to qualify as a cultural site, a site had to meet at least one of the following criteria:

- Inclusion in the MiBACT catalogue (Ministry of Cultural Heritage and Activities and Tourism) [53];
- Inclusion in the UNESCO World Heritage List [54];
- Inclusion in the FAI catalogue (Fondo Ambiente Italiano) [55];
- Recognition in the “Bandiera Arancione TCI” (Italian Touring Club) [56];
- Inclusion in state or regional catalogues as protected assets [57];
- Inclusion in protected areas catalogue (e.g., regional or national park) and therefore recognised and protected by park authorities.

Subsequently, we collected data on the touristic interests of the same 10 geosites and cultural sites by submitting questionnaires to tourists within the geopark area. In fact, geosite assessment methods are often too scientific and hardly meet touristic interest [24]. Hence, we compared the results of the touristic interest questionnaires with the results of the scientific assessment.

Formerly, we selected 10 geosites using the geosite inventory of the SVUGGp, which was referred from a previous study [58]. The geosites were chosen based on their geographical locations and their primary interests; the selected geosites are distributed over the entire geopark area and ensure a significant representation of the many geological features of the SVUGGp (Figure 2, Table 1). Then, we assessed the geosites according to the Brilha method [7]. For brevity, the explanation of the method is not included in this paper.

By using the Brilha method [7] we were able to separately assess the scientific, educational, touristic, and degradation risk values of the selected geosites. To minimise the subjectivity in the process, the authors performed the assessments for each geosite individually, and the average of all values was considered as the final value (the model used for the assessment is given in the Supporting Materials, Table S3).



Figure 2. The 10 geosites that are considered in this paper: (a) Balmuccia Peridotite along the Sesia River (photo by Ilaria Selvaggio); (b) view of Cimalegna plateau (photo by Marco Giardino); (c) Albo church (photo from Francoerbi Wikimedia Commons); (d) the marbles from Candoglia quarry (photo by Giorgio Pallavicini); (e) view of Mount Rosa glaciers; (f) kinzigitic rocks near the Varallo Sacred Mountain; (g) Kreas gold mines of Mount Rosa; (h) Otro Valley (photo from BelPatty86 Wikimedia Commons); (i) outcrop of mylonite in Val Pogallo (photo by Lorenzo Rasini); and (j) example of soapstone (photo by Gian Mario Navillod).

Table 1. List of the 10 selected geosites within the Sesia Val Grande UNESCO Global Geopark. In the columns are the primary interests and the importance levels for each geosite. The inventory with the complete information of the geosites is available in [58].

Geosite Name	Primary Interest	Importance Level
Monte Rosa Glacier	Geomorphology	International
Candoglia Quarry	Georesources	International
Otro Valley	Geomorphology	Local
Pogallo Valley	Structural geology	International
Cimalegna Plateau	Geomorphology	National
Gold Mines of Monte Rosa	Georesources	International
Varallo Sacred Mountain	Geomorphology	Regional
Balmuccia Peridotite	Petrography	International
Albo Church	Petrography	International
Soapstone of the Loana Valley	Georesources	Regional

Later on, based on the geosite evaluation approach utilised in this study, we enhanced and adapted the criteria to ensure their applicability to cultural sites. In order to keep an essentially identical procedure to the method already used, the relevant criteria for assessing the cultural significance and value of these sites were identified and integrated in the geosite assessment method.

Regarding the scientific value, the criteria were determined based on a comprehensive review of the existing literature [59–62] and consultations with experts in the field. The newly selected criteria are the following:

- **Historical and cultural significance:** This criterion evaluates how important the site is for the historical and cultural contexts, and takes into consideration elements including age, historical events connected to it, and the contribution of the site to the cultural identity and traditions of the local community.
- **Key locality:** This criterion evaluates the social influence of the cultural site as a key locality of the immediate area, including its contribution to the local economy and community engagement, as well as the recognition of international institutions such as UNESCO.
- **Scientific knowledge:** This criterion evaluates the acknowledgement and importance of the cultural site by considering its presence in the scientific literature.
- **Authenticity and integrity:** This criterion evaluates the integrity and authenticity of the cultural site by taking into account the originality and the preservation grade of the historical and cultural elements.
- **Rarity:** This criterion evaluates the rarity of the cultural site, considering how many examples of similar sites are present in the immediate area.

These selected criteria replaced the criteria used for the geosite assessment but maintained the same structure in the evaluation process; for each criterion, there are 4 possible responses with assigned scores of 4 points, 3 points, 2 points, or 1 point in accordance with the parameters of each criterion (the table with the criteria used during the assessment is given in Supporting Materials, Table S4). Following this, the weights were redistributed for the new criteria in order to have comparable results between the two assessments. Regarding the educational use, the touristic use, and the degradation risk assessment, the criteria already considered in the geosite assessment are also excellent and satisfactory for evaluating the same features for the cultural sites; for that, the same structure was maintained.

In due course, as soon as we defined the assessment method and the criteria mentioned above, we selected 10 cultural sites within the SVUGGp (Table 2, Figure 3). In order to select the most significant cultural sites in the area that are also evenly distributed across the entire territory of the geopark, we consulted expert members of local institutions (SVUGGp, Val Grande National Park, and Alta Val Sesia Regional Park). This selection permitted us to

obtain 10 cultural sites to assess according to the method described above, and to compare these results with the results from the geosite assessment.

Table 2. List of the 10 selected cultural sites within the Sesia Val Grande UNESCO Global Geopark. In the columns are the primary and secondary interests for each cultural site. The inventory with the complete information on the cultural sites is available in Table S1.

Cultural Site Name	Primary Interest	Secondary Interests
Candoglia Quarry	Culture	History, Architecture
Varallo Sacred Mountain	Religion	Art, Culture
Mount Fenera Caves	Archaeology	History
Villa Taranto	Architecture	Botany
Walser Villages	History	Culture, Architecture
Val Grande Petroglyphs	Archaeology	History
Villa Caccia	Architecture	History
Vogogna Castle	History	Architecture, Art
Capanna Margherita Hut	Alpinism	Landscape
Ghiffa Sacred Mountain	Religion	Culture, Landscape



Figure 3. The 10 cultural sites that are considered in this paper: (a) church of the Ghiffa sacred mountain (photo by Raffaele Pagani); (b) view of Varallo Sacred Mountain; (c) mountaineers climbing to Capanna Margherita Hut (photo by Carlo Zanetta); (d) Walser villages near Alagna Valsesia (photo from BelPatty86 Wikimedia Commons); (e) view of Vogogna Castle (photo by Rmenzaghi); (f) botanical gardens of Villa Taranto; (g) Mount Fenera Ciota Ciara cave (photo by Claudio Berto); (h) Candoglia quarry (photo by Giulia Varetto); (i) Villa Caccia in Romagnano Sesia; (j) Val Grande petroglyphs from which the logo of the park is inspired (photo by Carlo Zanetta).

Since a questionnaire was prepared in Italian and in English, rigorous translation and re-translation processes were carried out to ensure the items' understandability and clarity. After finalising the survey questionnaire, two methods were employed to collect the data from participants through an online survey and an on-site questionnaire [63]. For the online survey, the Survio online platform was used, and for the on-site questionnaire, geopark visitors were targeted. Table 3 shows the response rate for the online and on-site questionnaires.

Table 3. Questionnaire response rates. Full questionnaire is available in Supplementary Materials, Table S2.

Distribution	Valid	Invalid
Online questionnaires collected	92	39
On-site questionnaires collected	45	10
Total	137	49

Out of 186 respondents, only 74% of the questionnaires could be considered valid because 26% of the questionnaires were incomplete, with one or more answers left blank.

Eventually, the evaluation questionnaires were submitted to the tourists within the SVUGGp. Specifically, through these questionnaires, tourists were asked to rate, from 0 to 5, what their interest was in visiting each cultural site and each geosite we had previously assessed. The options reflected varying degrees of interest in visiting a particular site, ranging from no interest to strong interest, with a "do not know" option included as well. The possible answers with which the visitors could indicate their level of interest were the following:

- 0: I do not know it and am not interested in visiting it;
- 1: I do know it, but I am slightly interested in visiting it;
- 2: I am somewhat interested in visiting it;
- 3: I am moderately interested in visiting it;
- 4: I am very interested in visiting it;
- 5: I am strongly interested in visiting it.

Thus, the anonymous questionnaires comprised twenty-one questions: one question for each cultural site, one question for each geosite, and a final question. In the final question, tourists were asked to provide a rating from −5 to 5 whether they felt it was more important to promote and protect either geosites or cultural sites within the geopark, where −5 meant "it is more important to promote and protect geosites" and 5 meant "it is more important to promote and protect cultural sites".

Finally, questionnaires were submitted to better understand the needs of the tourists and to compare them with the scientific value of geosites and cultural sites. For this reason, the completeness of the questionnaire was a minimum requirement for its validity so that different sites could be compared.

Considering the valid questionnaires, the age of most of the respondents was between 27 and 39 (29%), followed by respondents aged between 53 and 65 (26%) and 14–26 (19%). A total of 15% of the respondents were aged between 66 and 78, and finally, we had the age groups 40–52 and 79–91 (7% and 4%, respectively). As for origin, the majority of tourists were local: 70% of respondents came from the Piedmont region, 11% were from Lombardy, and 15% were from other Italian regions. In total, 96% of the responding tourists were Italian and only 4% were foreign. Then, Microsoft Excel was used to perform a brief descriptive statistical analysis, and explicative graphs were made comparing the values of scientific assessment with the average values of tourist interest. This made it possible to understand the awareness of the tourists about the importance of geosites and cultural sites within the SVUGGp in order to develop new geotourism and cultural tourism strategies that show the scientific importance of these tourist sites.

4. Results

Geosite recognition and assessment permit us to affirm the role of geoheritage within geoparks, helping the comparison of different geosites and their suitability either to conservation or geotourism development [21]. Although there is not a perfect model to assess geosites, because of the subjectivity included in each method, several valuable methods were developed [7,10–19]. Moreover, research has indicated that methods applicable to any geosite utilise similar criteria and generate similar results when analysing geosites [36,37]. In our study, we selected 10 geosites and 10 cultural sites within the SVUGGp.

The geosites were selected from the SVUGGp geosite database [58]. Out of a total of 68 geosites, 10 were selected in order to have a small but representative sample of the entire area; thus, their geographical location and primary interest were taken into account. Therefore, the geosites, in order to better represent all the geological environments of the geopark, had to be sufficiently distanced from each other and distributed over the entire area of the SVUGGp. Furthermore, they had to represent all the types of primary interests present in the geopark. Although geosites 1, 2, 3, and 4 are close to each other (Figure 4), they are located in an area where the altitude is the highest. In fact, they are at different elevations, thus representing very different environments from each other.

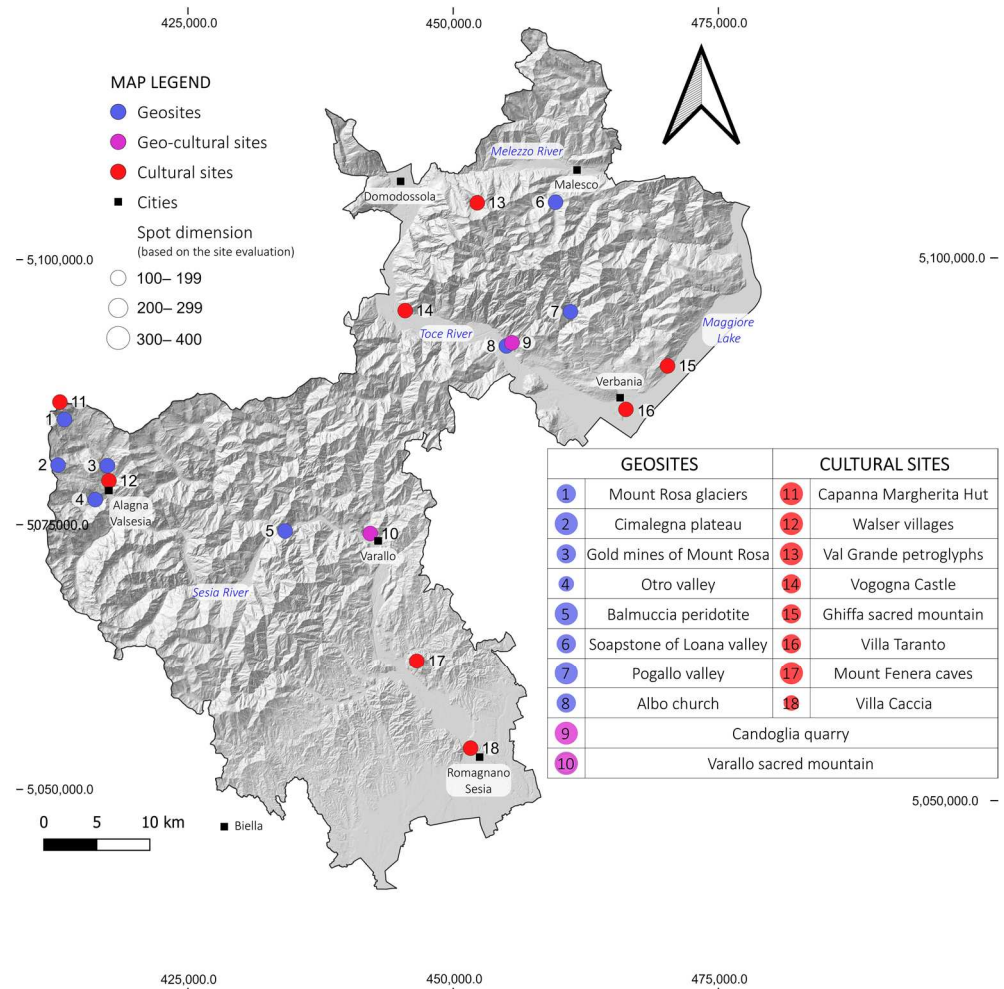


Figure 4. Map of the geographical locations of the geosites and cultural sites within the Sesia Val Grande UNESCO Global Geopark. Blue dots represent the geosites. Red dots represent the cultural sites. Purple dots indicate the sites in which it is possible to consider both geosites and cultural sites. The dimension of the spot in the table indicates the scientific value assessed for each site.

Cultural sites, like geosites, were selected within the SVUGGp to be distributed throughout the territory. In addition, they were selected by considering their object of

importance and the type of legislative constraint to which they are subjected; we selected 10 sites in order to have a representative sample of the different situations.

For assessing the 10 selected geosites within the SVUGGp, we used the method proposed by Brilha [7], i.e., the method that is most previously adopted in areas comparable to our study area such as Italian UGGps [64,65]. Then, the same method was adapted to be suitable for the assessment of the 10 selected cultural sites in the same area. Finally, through questionnaire submission, we collected data regarding the interests of tourists of the SVUGGp on visiting the same geosites and cultural sites.

4.1. Geosites Assessment

Figure 4 illustrates the geographical distribution of the 10 selected geosites (blue points). These geosites are adequately distributed all over the SVUGGp, representing an acceptable sample of the geoheritage in the area. Indeed, the selected geosites cover all the types of importance and various primary interests. Two sites were considered, both geosites and cultural sites: the Varallo Sacred Mountain and the Candoglia quarry. Although the name and location are the same, different characteristics were considered; for the evaluation of the geosites, the value of their geological elements was taken into account, while the evaluation of the cultural sites only took into account the value of their cultural elements (such as history, art, etc.).

We carried out the geosites assessment according to the Brilha method [7]. Importantly, in order to reduce the subjectivity during the assessment process, every author assessed each geosite individually, and the average of all the assessments was considered as the final result. The results of the assessment are summarised in Figure 5 and lead us to several considerations:

- The values of the assessment and the ranking of the geosites change considerably depending on the evaluator, testifying an important role played by subjectivity during the assessment.
- Although the average from different evaluator assessments was obtained, there are still considerable differences in the scientific, educational, and tourism values among the geosites.
- The scientific value was assessed for each geosite, and the “Otro Valley” geosite was rated as the least scientifically valuable, and the “Balmuccia Peridotite” geosite was rated as the most scientifically valuable (Table 4).
- Interestingly, in good agreement with the results found in previous studies in comparable areas [64–68], there is no presence of a strict correlation among the scientific value and other values of the geosites; a geosite with a high scientific value could have low educational and touristic values, and vice versa.

Table 4. Results of the scientific value (SV) of the geosites for each evaluator (Ev = evaluator). The results in the last column are the averages of all the values for each geosite.

Geosite Name	Ev 1	Ev 2	Ev 3	Ev 4	Ev 5	Result (Average)
Monte Rosa Glacier	195	285	228	285	280	254
Candoglia Quarry	310	315	220	315	340	300
Otro Valley	180	185	160	205	190	184
Pogallo Valley	345	330	340	360	360	347
Cimalegna Plateau	220	320	265	360	340	301
Gold Mines of Monte Rosa	290	235	185	290	290	258
Varallo Sacred Mountain	125	240	130	400	370	253
Balmuccia Peridotite	400	345	345	345	370	361
Albo Church	155	225	215	235	235	213
Soapstone of the Loana Valley	320	230	220	360	355	297

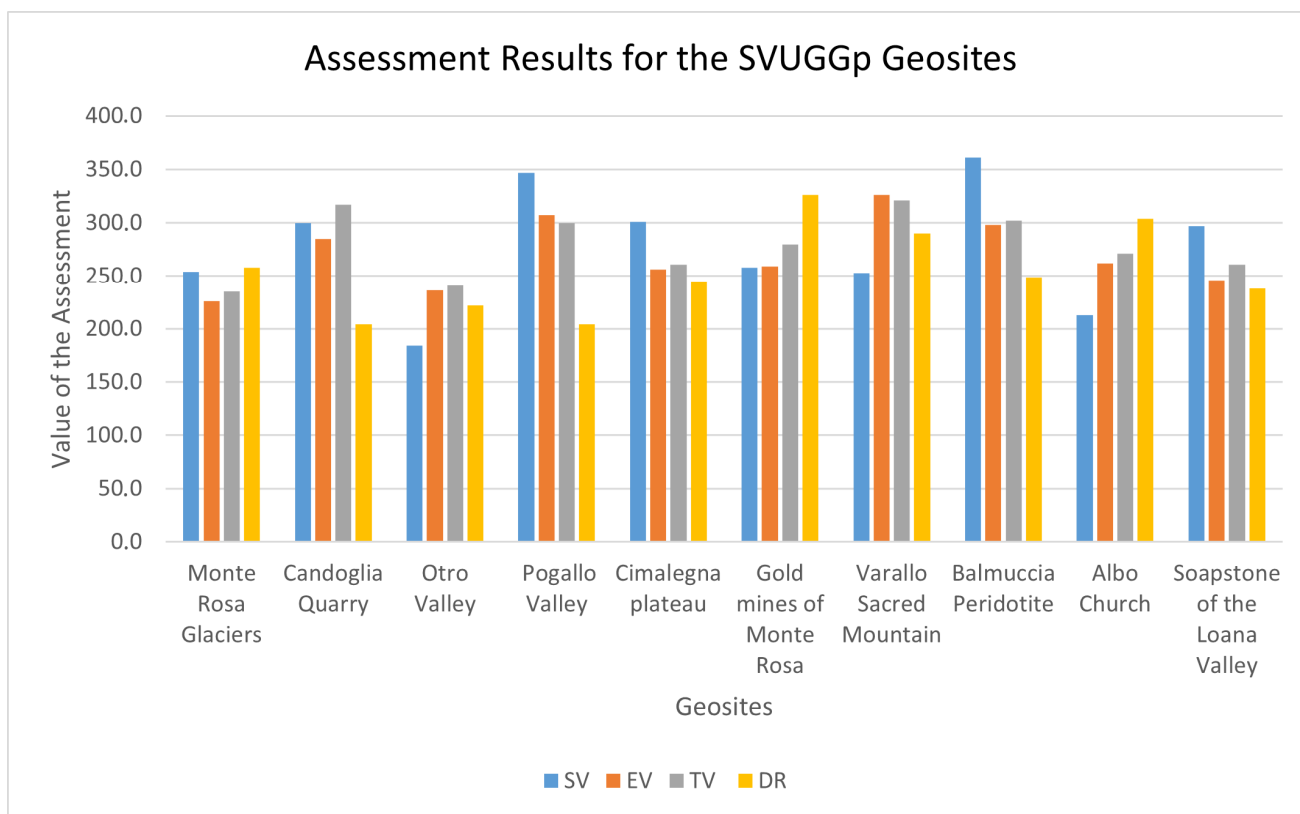


Figure 5. Average scores for the selected geosites. SV: scientific value; EV: potential educational use; TV: potential touristic use; DR: degradation risk. The description of the geosites is reported in Table 1. An extensive table containing information on geosites is reported in Supplementary Material (Table S1).

4.2. Cultural Sites Assessment

Figure 4 illustrates the geographical distribution of the 10 selected cultural sites within the geopark (red points). As shown, the cultural sites are adequately distributed across the SVUGGp, representing an acceptable sample of the cultural heritage in the area. Moreover, the selected cultural sites represent a wide range of cultural interests, e.g., historical interest, archaeological interest, or artistic interest.

As already performed for the assessment of the geosites, in order to reduce subjectivity during the assessment process, every author assessed each cultural site individually, and the average of all the assessments was considered as the final result.

The criteria used in the method proposed in this study have proven to be successful in appropriately emphasising the scientific, educational, and touristic values and the degradation risk for each cultural site (Figure 6). Particularly, it is noteworthy that as many as six sites were classified with a scientific value greater than 300, corroborating the high potential of the cultural value within the SVUGGp. These data appear to confirm the need to promote and protect it within the UGGps framework to achieve the holistic concept of protection and sustainable development that is distinctive of the geoparks. Specifically, the “Mount Fenera caves” cultural site is the most scientifically valuable, while “Villa Caccia” has the lowest scientific value (Table 5).

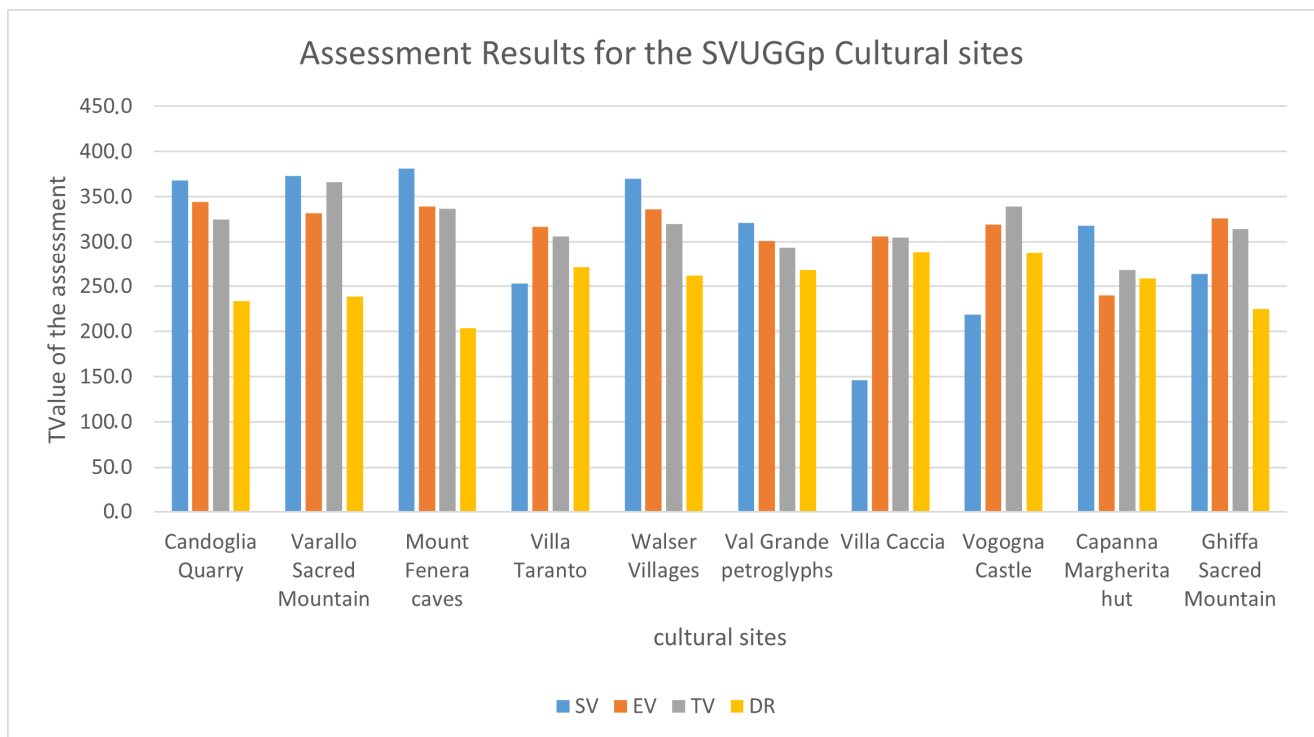


Figure 6. Average scores for the selected cultural sites. SV: scientific value; EV: potential educational use; TV: potential touristic use; DR: degradation risk. An extensive table containing information on cultural sites is reported in Supplementary Material (Table S1).

Table 5. Results of the scientific value (SV) of the cultural site for each evaluator (Ev = evaluator). The results in the last column are the averages of all the values for each cultural site.

Geosite Name	Ev 1	Ev 2	Ev 3	Ev 4	Ev 5	Result (Average)
Candoglia Quarry	360	360	400	320	400	368
Varallo Sacred Mountain	400	400	275	400	390	373
Mount Fenera Caves	400	400	305	400	400	381
Villa Taranto	180	185	180	400	320	253
Walser Villages	350	350	350	400	400	370
Val Grande Petroglyphs	320	320	285	280	400	321
Villa Caccia	135	100	275	100	120	146
Vogogna Castle	235	220	180	230	230	219
Capanna Margherita Hut	280	280	350	360	320	318
Ghiffa Sacred Mountain	255	240	345	240	240	264

In line with the geosites assessment, the educational and touristic values are not related to the scientific value.

4.3. Tourist Data and Comparison with Assessment Data

As a means to know the expectations of visitors to integrate them with the assessment data with the aim of helping future geosite and cultural site development and management, we collected the data from the participants through an online survey and an on-site questionnaire. Figure 7 shows the results of the participants' interest in visiting geosites, while Figure 8 shows the results of the participants' interest in visiting cultural sites.

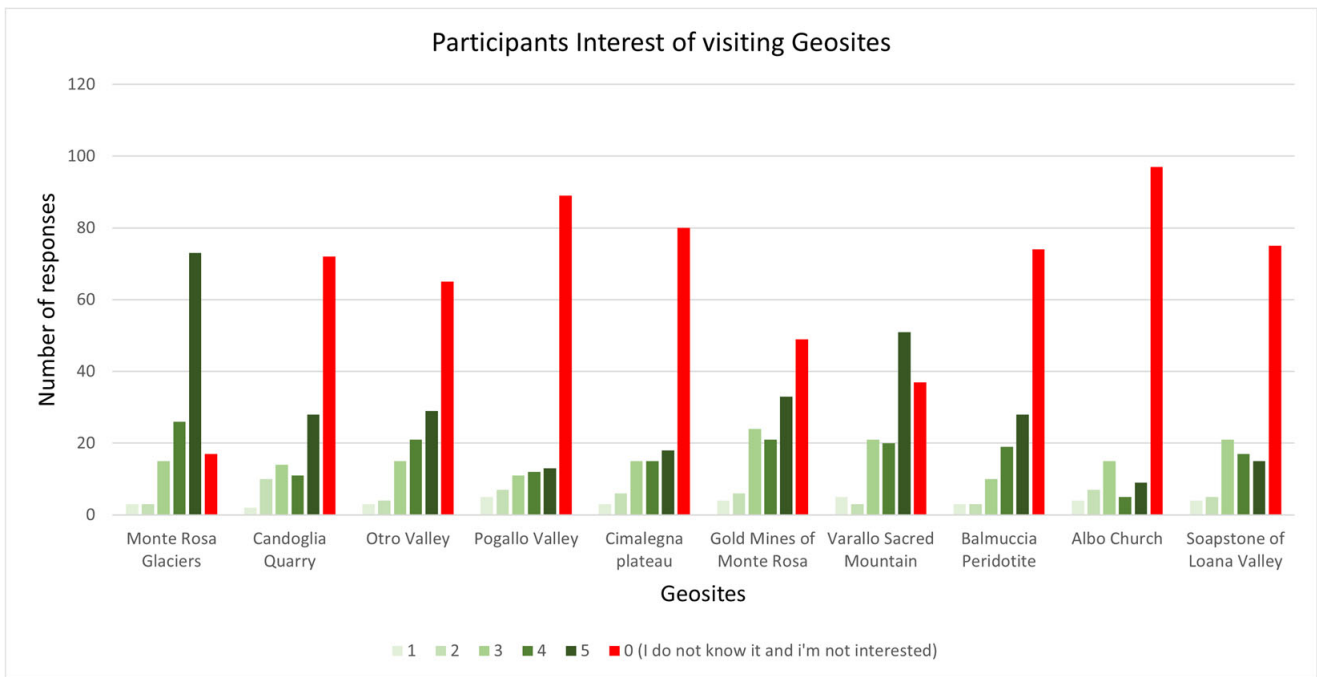


Figure 7. Participants’ level of interest in geopark geosites. In green are the values from 1 to 5, where 1 means “I do know it, but I am slightly interested in visit the geosite”, and 5 means “I am strongly interested in visiting the geosite”. In red is the 0 value that corresponds to “I do not know the geosite and I am not interested in visiting it”.

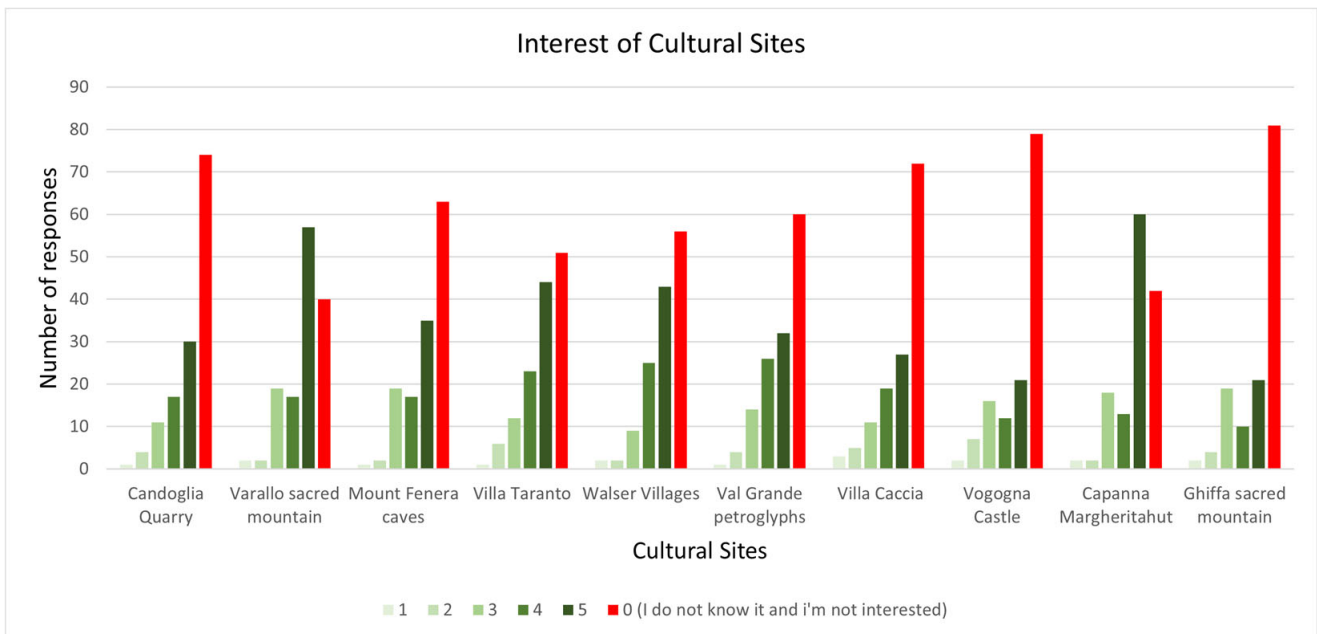


Figure 8. Participants’ level of interest in geopark cultural sites. In green are the values from 1 to 5, where 1 means “I do know it, but I am slightly interested in visit the site” and 5 means “I am very interested in visiting the site”. In red is the 0 value that corresponds to “I do not know the site and I am not interested in visiting it”.

Overall, there is a close similarity between participants' interest in the geosites and interest in the cultural sites, and in both cases, a significant number of participants declared to not know the geosites or cultural sites and to not be interested in visiting them. In particular, the participants frequently stated in the survey that they were not aware of the sites, not even those of international significance. For instance, over 70% of those responded that they do not know the internationally relevant geosite "Albo Church". This suggests that the promotion of geosites and cultural sites of high value is fundamental to the development of effective geotourism strategies to foster the sustainable development of the area, and that the SVUGGp effort may be insufficient at this time to achieve these goals.

Notwithstanding this, in an attempt to understand whether the average value of interest weighted by the number of respondents to each response and the results from the scientific assessment of each site were correlated (Figure 9), some interesting outcomes could be noted:

- Regarding cultural sites, tourist interest appears to rise with the scientific value of the site. The correlation coefficient r between the two variables is 0.483, indicating a moderate positive correlation. Consequently, the r^2 of the regression line is 0.2331.
- Regarding geosites, in contrast with the cultural sites, tourist interest does not appear to rise with the scientific value of the site. The correlation coefficient r between the two variables is -0.242 , indicating a weak or absent negative correlation. Consequently, the r^2 of the regression line is 0.0587.

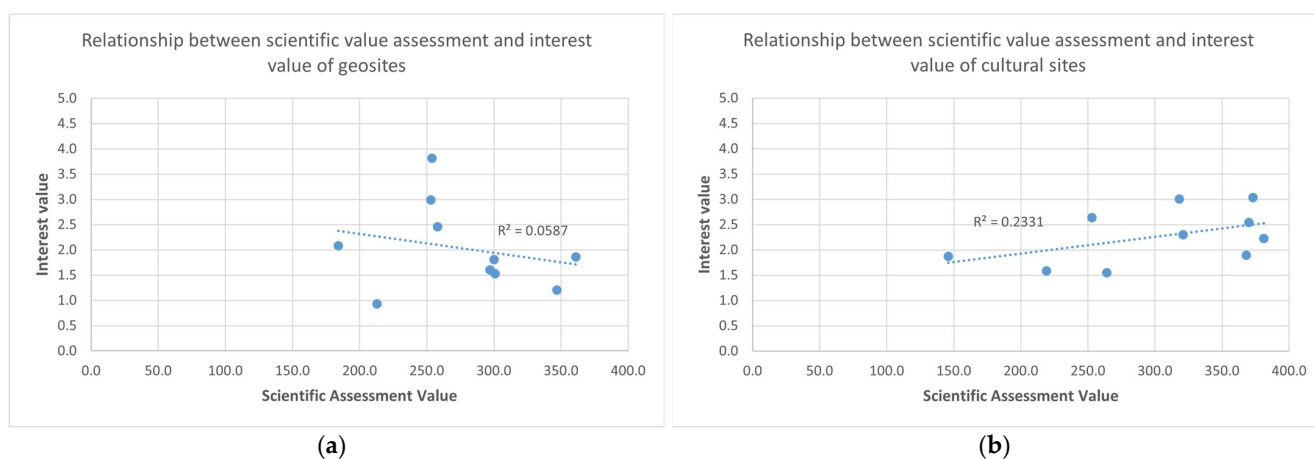


Figure 9. (a) Expert evaluation on the scientific value of geosites correlated with the average values of the touristic interest in geosites. (b) Expert evaluation on the scientific value of cultural sites correlated with the average values of the touristic interest in cultural sites. In both figures, the x -axis indicates the values of the scientific assessment, and the y -axis indicates the values of the touristic interest. According to the questionnaire (Table S2), the touristic interest ranges from 0 (I do not know it and I am not interested in visiting it) to 5 (I am strongly interested in visiting it).

Although many tourists are not aware of the heritage within the SVUGGp yet, this evidence suggests that the SVUGGp tourists are more informed and more interested in the cultural heritage value than the geological heritage in the area.

This result might be confirmed by the outcome from the last question of the questionnaire (Figure 10). Even though most participants noted that it is equally important to protect and promote cultural and geological heritage, a slight increase in the number of responses to the value of 5 can be seen, indicating that it is more important to protect cultural sites than geosites.

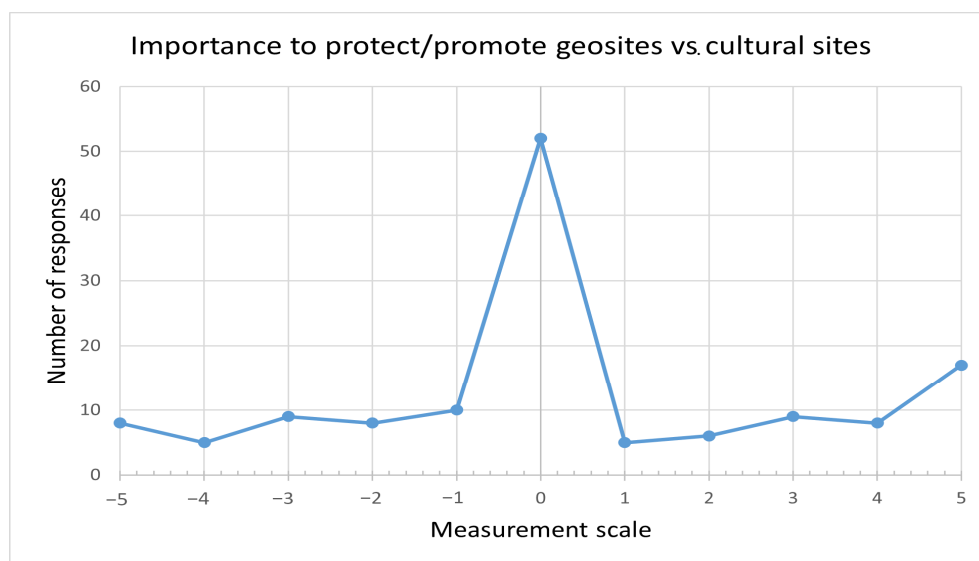


Figure 10. Participant preferences on the importance of protecting and promoting of geosites vs. cultural sites. Negative values indicate the protection or promotion of the geosites. Positive values indicate the promotion and protection of cultural sites. A value of 0 indicates the equal importance in protecting and promoting geosites and cultural sites.

5. Discussion

To the best of our knowledge, the study reported here is the first to equally consider both geosites and cultural sites within a UGGp in the assessment process. Accordingly, it may lead to a new comprehensive approach to conservation that not only preserves natural resources, but also protects and celebrates the unique cultural heritage of the area by successfully integrating cultural sites into the geopark management framework. In addition, every geopark management structure should work in order to protect, promote, and foster the economic development and progress of the geopark [69], and this new approach can enable the UGGps to better achieve the goal of holistic conservation of the area by considering both the natural and cultural heritage in conservation and promotion strategies that promote sustainable development [2,5].

Although the cultural value of geosites and geoparks is mentioned in some geoheritage studies [42,44,66,70,71], quantitative assessment strategies have focused mostly on geosites and, to our knowledge, never on cultural sites. For this reason, we used the quantitative evaluation method proposed by Brilha to assess the geosites [7] and modified the criteria within the method to assess the cultural sites.

By quantitatively assessing 10 selected geosites and 10 selected cultural sites within the SVUGGp, we firstly found, in good accordance with previous studies [34,35], that the subjectivity involved in the assessment risks distorts the results if it is not properly taken into account. This is the reason why it is a valuable solution to consider the average value of the assessment made by several experts (Table 4). Thus, it is possible to smooth the differences and to minimise subjectivity.

Some important aspects for the management of the geological and cultural heritages of the SVUGGp are highlighted in this study. The results of the geosite evaluation highlight considerable scientific value, especially for four geosites (Candoglia quarry, Pogallo Valley, Balmuccia Peridotite, and Cimalegna plateau), three of which were listed as being of international importance, whereas the Otro Valley geosite is the least scientifically valuable site and is only of local importance. This means that the assessment is reliable and confirms the estimates made in previous studies [58]. Moreover, all the geosites considered, apart from the “Albo Church” and “Gold Mines of Monte Rosa” geosites, have significant touristic and/or educational values, as well as low to moderate vulnerabilities and degradation

risks. Therefore, the geosites offer valuable resources for the geopark in addition to a scientific geological heritage that needs to be maintained.

The results of the cultural site evaluation highlight an important scientific value. With the exception of the sites of “Villa Caccia”, “Villa Taranto”, and “Vogogna Castle”, the scientific value of all the sites exceeded 300, and were always associated with significant educational and/or touristic values as well as low to moderate degradation risks. This finding demonstrates that cultural sites in the SVUGGp may represent a valuable resource for the geopark in order to promote a comprehensive approach to conservation that not only preserves natural resources, but also safeguards unique cultural heritage to foster the sustainable development of the region and raise awareness among tourists. Indeed, not only is the cultural value of geoheritage important within geoparks, but the relationships between geoheritage and the cultural elements of the landscape external to the geosites are also of primary importance. These connections offer a variety of possibilities for enhancing the geotourist experience, fostering geoconservation, and advancing geoeducation within UGGps through activities that involve aesthetic and emotional experiences and the rediscovery of a sense of wonder regarding both the geological stories in the landscape and the interactions between people [42,44,72,73].

Furthermore, the method for assessing cultural sites proposed by this study, which follows the procedure of geosite assessment, provides all geoparks with a useful and easy tool for classifying and inventorying cultural sites, integrating them as a resource to be promoted and protected alongside geosites, and addressing the need for a holistic concept of protection.

Another important element emerging from our analysis is the significant value of the tourist interest in visiting both geosites and cultural sites compared with the scientific value of the sites. Indeed, Figure 9 shows that tourist interest in visiting sites increases as the scientific value of the cultural sites increases, while this trend does not hold true for geosites. A tentative explanation is that tourists within the SVUGGp are not aware of the geoheritage offered by the geopark and its importance, especially given the strikingly high number of tourists who stated that they were not familiar with many of the selected geosites (Figures 7 and 8). Although there are also many negative responses for cultural sites, the comparison between interest and scientific value demonstrates that visitors are more aware of the cultural heritage and are appreciative of the most valuable sites.

Several studies have proven that the use of questionnaires to understand visitor interest, preferences, and perceptions is necessary for the success of geopark administration and for the sustainability of geotourism development [74–77]. Indeed, understanding the interests of tourists is crucial as it helps managers to develop the best sustainable tourism practices that balance environmental protection, science education, and regional economic sustainability. In addition, combining tourist interest with the scientific value of geosites provides policy makers with useful data to pursue this balance and to decide which sites can be developed and promoted and which need to be protected and conserved. Furthermore, the inclusion of cultural sites in this framework is fundamental, as it allows for the linking of geology, landscape, culture, and history; these factors represent a great potential for social and sustainable economic development and for raising awareness in the SVUGGp. Celebrating, studying, and protecting the natural and cultural heritages of geoparks also highlights the need for legislative recognition for geoparks, enabling them to implement all necessary actions for the sustainable development of the area [78].

The limitations in this work include some subjectivity in the cultural site selection methods, a not perfect correlation between interest and scientific value in the results, and a lack of comparative sites. Although rather strict criteria were followed in the selection of the cultural sites, whereby only sites with a certain degree of legislative recognition and protection were considered, it is difficult to define the importance of a cultural site. In an attempt to select the most representative ones, we also relied on the valuable suggestions of a pool of experts from SVUGGp, including representatives of the area and experts in local culture. Regarding the correlation interest and scientific value of the cultural site,

even though the r^2 value is less than ideal, it can be considered acceptable in representing a moderate correlation between variables, given the many factors affecting it that are impossible to take into account.

Future work should implement the same methodology in different areas and in different UGGps in order to understand the validity of the method and whether the situation might be different in other geoparks and with tourists from different countries.

Finally, the study provides a further step towards the integration of cultural sites as useful resources within the UGGp strategies. By applying the approach proposed in this study, a similar method can be used to assess geosites and cultural sites in a manner that protects and enhances both equally. This should encourage UGGps to develop inventories of both geosites and cultural sites so that they can develop comprehensive strategies for the protection and enhancement of all the heritage.

6. Conclusions

This paper investigates the possibility of quantitatively assessing both geosites and cultural sites within UGGps, using and modifying the Brilha method for the quantitative assessment of geosites [7]. The integration of cultural heritage in the assessment procedure of the sites allows us to understand the value of cultural heritage, to create an inventory of cultural sites, and to integrate it with the inventory of geosites in order to be able to enhance and protect the entire heritage offered by the geopark. The UGGps aims at a holistic concept of protection and enhancement in the area [2]; for this reason, it is relevant to consider both geosites and cultural sites in the development strategies.

We selected 10 geosites and 10 cultural sites of high relevance within the SVUGGp and assessed them by implementing new criteria for the assessment of cultural sites. Then, we compared the results of the assessment with the results of the tourist interest questionnaires. Our findings demonstrate that the cultural heritage of the SVUGGp has remarkable scientific, educational, and touristic values, representing an important resource for the geopark that should be valorised and protected together with the geosites. Furthermore, tourist interest increases with the scientific value of the site, whereas this is not the case for geosites. Therefore, this finding makes it possible for SVUGGp administrators to understand which sites they need to enhance in order to raise awareness among visitors, but above all, indicates that tourist interest in cultural heritage is high.

The major limitations in this study include some subjectivity in the cultural site selection methods, the limits of following rigorous criteria in their selection, and a not perfect correlation between interest and scientific value in the cultural sites. Indeed, the r^2 value is less than ideal, but is considered acceptable in representing a moderate correlation between variables.

Future studies should use the same approach in various areas and UGGps to determine the suitability of the technique and whether conditions in other geoparks and with visitors from various nations may change.

Finally, this study offers a different approach for understanding how cultural heritage might be effectively safeguarded, preserved, and promoted within the setting of a UGGp. By highlighting a successful methodology and sharing actions taken from the SVUGGp, this study seeks to inspire other geoparks to adopt similar approaches, fostering sustainable development and cultural conservation for the benefit of both present and future generations.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/heritage6090322/s1>, Table S1: Cultural Site Inventory; Table S2: Questionnaire for tourists; Table S3: Assessment table for geosites; Table S4: Assessment table for cultural sites.

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