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Sense of place and identity in peri-urban landscapes: a multimethod exploration

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ABSTRACT

This study examines the sense of place (SOP) and identity in peri-urban landscapes, which serve as borderscapes between urban and rural areas. It applies SOP both as a cultural ecosystem service and a phenomenological construct to explore how residents and visitors connect with these landscapes. Using a mixed-methods approach with over seven hundred participants from Ljubljana, Koper, and Kranj, Slovenia, the study maps and evaluates how residents and visitors perceive their environment. The results show that residents have a stronger SOP, but the importance of places for SOP and other cultural services is similar for both residents and visitors. Participatory mapping effectively identified areas of high SOP value, revealing strong connections to hills, bodies of water, biodiverse areas, and small settlements. Conflicts between land-use planning and local values were identified, emphasising the need for flexible, participatory spatial planning to reflect diverse, locally specific perspectives in decision-making.

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Introduction

The concept of a sense of place (SOP) – the emotional and psychological bonds people form with their environments – has gained increasing recognition as an important dimension of relationships between people and the environment (Stedman, 2016). SOP is increasingly recognised as part of the cultural ecosystem services (CES) framework. CES include the non-material benefits people derive from ecosystems, such as spiritual enrichment, cultural identity, and recreation (MEA, 2005). However, the integration of SOP within CES assessments has been inconsistent. The Millennium Ecosystem Assessment (MEA, 2005) treats SOP as a unique category of CES, contrary to some frameworks developed later, such as the Common International Classification of Ecosystem Services (CICES, Haines-Young, 2023) or The Economics of Ecosystems and Biodiversity (TEEB, Sukhdev & Kumar, 2008), which group SOP under broader concepts, such as cultural identity, heritage, or social relations – an approach that has been criticised before (Ryfield et al., 2019). This inconsistency is particularly problematic in transitional landscapes such as peri-urban areas, in which interactions between people and the environment are uniquely complex.

Peri-urban landscapes, as hybrid spaces where urban and rural worlds intersect, function as borderscapes whose vulnerabilities and lived realities demand careful attention in planning and

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management. These dynamic areas, shaped by pressures and influences from both urban and rural environments, embody both potential and vulnerability: they serve as multifunctional spaces supporting diverse CES, but they are also increasingly exposed to developmental pressures that threaten their ecological and socio-cultural fabric (Žlender & Gemin, 2020). Their hybrid status, being neither fully urban nor entirely rural, means that they are often overlooked by planning regulations, making them especially susceptible to landscape fragmentation, loss of identity, and erosion of SOP (Žlender & Gemin, 2020). Accordingly, understanding SOP is crucial because it influences place-based attachments, place-protective behaviours, and people's willingness to engage in landscape management and planning (Kaltenborn & Williams, 2002; Manzo & Perkins, 2006; Ryan, 2011). These attachments can guide planners and decision makers in identifying culturally and emotionally significant areas, resolving potential conflict, and designing landscapes that balance development with the preservation of valued places (Gottwald, 2022).

The ecosystem services (ES) framework seeks to incorporate both biophysical elements and subjective, individual perceptions into landscape planning. Despite their increasingly wider adoption, CES categories, particularly SOP, spirituality, and identity, remain underrepresented. This gap stems from definitional ambiguity, conceptual complexity, and methodological challenges in quantifying CES because these aspects often resist standard assessment methods (Cheng & Wu, 2015; Feld et al., 2010; Plieninger et al., 2013). Nonetheless, a growing body of research has attempted to address these challenges by mapping and quantifying CES, including SOP, to render these intangible values more concrete and applicable in social-ecological research and spatial planning (Gottwald, 2022; Hernández-Morcillo et al., 2013; Stedman, 2016).

Participatory methods, such as mapping combined with surveys, interviews, and ethnographic narration, have been proposed to capture the nuances of CES that are difficult to represent spatially. However, many studies rely on single-method approaches, potentially missing the multifaceted nature of SOP and its relationship with landscapes (Romanazzi et al., 2023). Addressing SOP within the CES framework offers a systematic way to assess and spatially present intangible values, helping planners identify the landscape elements that are most valued by communities and why. This effort aligns with EU policies and supporting documents, such as the EU Green Infrastructure Strategy (European Commission, 2013), the EU Biodiversity Strategy for 2030 (2020), and the Spatial Analysis of Green Infrastructure in Europe (European Environmental Agency, 2014), which promote the integration of CES into spatial planning.

This study explores the role of SOP within the CES framework, focusing on its significance in peri-urban landscapes. Specifically, it examines the experiences of residents and visitors in three Slovenian cities: Ljubljana, Koper, and Kranj. It focuses on residents and visitors, presuming that there are specific differences between them in how they engage with the peri-urban landscape. Accordingly, the research addresses two key questions:

1. Within the CES framework, how do people perceive the importance of SOP in shaping their interactions with and perceptions of the peri-urban landscape? What are the key differences between residents and visitors in these perceptions and interactions?
2. Which landscape types and characteristics within peri-urban areas contribute most to SOP? How do preferences and values differ between residents and visitors?

Through a mixed-methods approach combining free listing, participatory mapping, and measurement scale techniques, the study assesses how SOP is expressed in residents' and visitors' conceptions of peri-urban landscapes; explores the potential for mapping SOP and identity perceptions to visualise and incorporate these values into spatial planning; and identifies spatial planning actions that influence perceptions and interactions in peri-urban landscapes.

Conceptual and methodological approaches to SOP

SOP is a complex and multifaceted concept explored through diverse disciplinary lenses, including phenomenology, environmental psychology, and ecology. Broadly, it encompasses individuals' emotional, social, and cultural connections to a place, which in turn shape their identities and sense of belonging (Relph, 1976; Tuan, 1977). The phenomenological approach, grounded in humanistic geography, emphasises the subjective, embodied experience of a place. It highlights context, historical continuity, and personal attachment as essential for personal and communal meaning-making. This approach focuses on qualitative aspects, such as memories, feelings, and narratives unique to individuals or communities (Seamon, 2022). In contrast, the CES framework treats SOP as a cultural benefit derived from interactions between people and the ecosystem, often measured alongside other benefits such as recreation and aesthetic value (Chan et al., 2011; MEA, 2005). This approach uses both quantitative and qualitative data to link people's attachment and identity to specific environmental or landscape features. As such, SOP is framed as a service that can be quantified and spatially analysed. This pragmatism makes it particularly valuable for policymaking and planning by offering empirical data on the "place value" of landscapes to inform sustainable land-use decisions (Stedman, 2016). Methodologically, the CES framework aligns with what Seamon (2022) describes as empiricist-analytic research, prevalent in ecological and environmental planning fields. It identifies generalisable patterns in place attachment and identity by isolating specific variables and examining their influence on SOP. Tools such as interviews, surveys, and observational studies are often employed to quantify SOP, connecting it with factors such as social status, community ties, and length of residence. However, this approach risks oversimplifying the subjective nuances of SOP, potentially reducing it to a functional attribute rather than a lived experience (Hernández et al., 2021).

The inspection of peri-urban landscapes necessitates frameworks that balance subjective insights with practical planning tools (Masterson et al., 2017). Phenomenology highlights intangible connections that residents feel to these evolving landscapes, and the CES framework translates such connections into measurable factors that inform conservation and planning. This study combines the two approaches, integrating phenomenological and empirical-analytical perspectives to analyse SOP in peri-urban landscapes holistically, capturing both subjective richness and practical relevance.

The formation of a sense of place in peri-urban landscapes

This study conceptualises SOP as an affective bond between individuals and a location. The strength and type of this bond depends on a range of factors, including environmental or physical aspects (e.g., landscape features and visual aesthetics), social and cultural factors (e.g., community ties), and socio-demographic characteristics (e.g., age and length of residence; (Gottwald et al., 2022; Goudriaan et al., 2023; Masterson et al., 2017). In peri-urban landscapes, characterised by their dynamic and transitional nature, these bonds are often disrupted by rapid urbanisation and land-use changes, which can diminish or alter individuals' attachment to place (Goudriaan et al., 2023; Žlender & Gemin, 2020).

Environmental features, such as green spaces, biodiversity, and visual aesthetics, are significant in shaping emotional and cultural attachments. However, in peri-urban landscapes these features are often under pressure from urban expansion, threatening their ability to foster positive SOP (Žlender, 2021). Social and cultural factors also play a crucial role, but shifting demographics and reduced stability in peri-urban settings can weaken these bonds (Plieninger et al., 2015). Among sociodemographic characteristics, length of residence emerges as a key determinant of SOP, with long-term residents typically forming deeper attachments due to accumulated experiences, historical continuity, and established community bonds (Csurgó & Smith, 2022; Lewicka, 2011).

Research comparing SOP between residents and visitors reveals nuanced distinctions influenced by cultural, emotional, and functional connections. For instance, two studies from different parts of the world show that both groups value similar landscape characteristics, but that residents ascribe deeper cultural meanings, whereas visitors emphasise culture, aesthetics, and recreational aspects (Kianicka et al., 2006; Rouillard et al., 2022). Findings from Japan's Ishigaki Island and a national park in Norway further reveal that residents often perceive greater spatial diversity and prioritise cultural and subsistence activities, contrasting with visitors' focus on recreational and aesthetic values, with overlapping but distinct spatial preferences supporting tailored management strategies (Muñoz et al., 2019; Tajima et al., 2023). These and most other studies focus predominantly on protected areas as a spatial setting, but no study has been found focusing specifically on peri-urban landscapes.

Given these gaps, it is crucial to investigate how SOP evolves in peri-urban landscapes, where residents and visitors may engage with it differently. The European Landscape Convention underscores the significance of people's interactions with their environments in shaping cultural identity (Council of Europe, 2000). Yet, these interactions remain underrepresented in planning frameworks (Stenseke, 2016). This study addresses this void by exploring SOP in peri-urban landscapes, emphasising differences between residents and visitors, with a particular focus on how length of residence and landscape perceptions shape these connections. Understanding these dynamics can inform more inclusive planning practices and enrich peri-urban development strategies.

Materials and methods

Description of the three cities studied

This study examines three Slovenian cities, Ljubljana, Koper, and Kranj, each dealing with the dynamics of peri-urbanisation. They provide distinct yet comparable contexts to explore the interactions between residents and visitors using and perceiving peri-urban landscapes. Despite their shared challenges of managing urban–rural interfaces, the cities exhibit notable differences in landscape characteristics, development pressures, and the roles of residents and visitors. Figure 1 illustrates the study areas and their main land use types.

As Slovenia's capital and largest city, Ljubljana has been experiencing the influx of people moving there from other parts of Slovenia or abroad. It is also characterised by a high level of daily commuting (Statistični urad Republike Slovenije, 2023a). The city benefits from two hilly green wedges connecting its urban core to the surrounding hilly areas, and the proximity of the Ljubljana Marsh. They serve both ecological and recreational purposes, making the peri-urban landscape highly accessible for the urban dwellers of Ljubljana and other towns in the area including the municipal centres that share the Ljubljana Marsh area (Hansen et al., 2021; Žlender & Ward Thompson, 2017). Residents primarily use these spaces for activities such as hiking and cycling, whereas tourists are drawn to both the urban attractions and the surrounding landscapes with great natural and cultural values. The need for shared use of open space is increasing due to the mixture of old use (farming, forestry, etc.) and new use (recreation, leisure, etc.; Gantar & Šuklje Erjavec, 2019; Ljubljana, 2021).

In contrast, Kranj, a smaller city, is distinguished by its proximity to mountainous areas and the agricultural zones near the Sava and Kokra rivers. Peri-urban areas here are being developed for recreational purposes, including viewpoints, rest areas, and hiking trails (MOK (Odlok o Strateškem Prostorskem Načrtu Mestne Občine Kranj), 2014). Residents utilise these spaces for leisure and maintaining a connection to the rural environment, whereas visitors are primarily attracted to micro-locations that emphasise the interplay of historical urban structures and the green countryside.

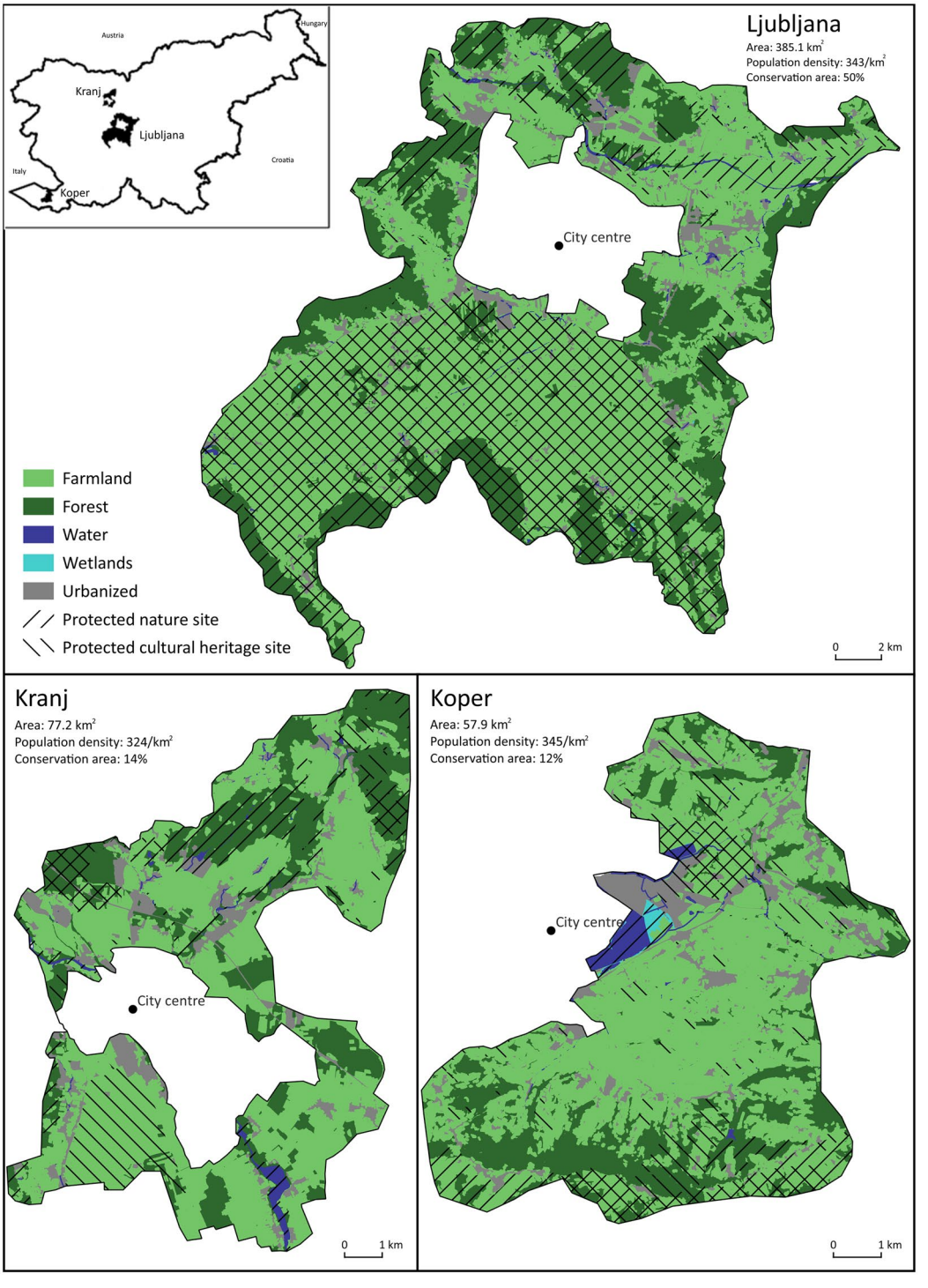

Figure 1. The three study areas and their main land uses (source: own elaboration based on government and open-source databases).

The peri-urban landscape of Koper, Slovenia's largest coastal city, is characterised by vineyards, olive groves, and the Karst Rim, which provide scenic views and recreational opportunities for both residents and tourists. Koper is under pressure to expand and the attractiveness of the coastal area leads to a high number of tourist visits. Of these, 70% are international guests and 30% are domestic visitors. There is noticeable seasonal fluctuation (Statistični urad Republike Slovenije, 2023b). Visitors are primarily attracted to the coast and the old town, but the peri-urban landscape is also gaining importance, mostly for recreation. In addition to natural attractions, cultural events have gained greater prominence in recent years in cooperation with around 130 cultural societies across various municipalities (Ravnikar, 2017).

The mixed-methods approach rationale

Strategic planning and formal documents often emphasise spatial explicitness in documenting CES because spatial data are crucial for zoning, land-use planning, and resource management. (Participatory) mapping has therefore become an important aspect of CES assessment as a good way to capture non-quantitative information about stakeholder valuation (Nahuelhual et al., 2014). However, some CES values, such as personal memories, spiritual significance, or cultural identity, resist spatial quantification due to their deeply subjective and context-specific nature. Maps can lead to oversimplifying qualitative information (Ryfield et al., 2019). This highlights a gap in strategies reliant solely on spatial data, which may overlook these intangible, yet equally important, dimensions of CES. Planners must thus balance the spatial explicitness demanded by regulatory frameworks with methodologies capable of capturing and valuing non-spatial aspects. Incorporating narrative sources of information about CES through questionnaires and interviews focusing on place-based values has proven effective in capturing emotional connections to landscapes, as well as perceptions relating to wellbeing, heritage, and identity (Ryfield et al., 2019). These approaches offer a deeper understanding of how people relate to their environments beyond just physical or ecological attributes and thus help foster more inclusive and culturally sensitive landscape management.

Accordingly, we adopt a mixed-methods approach to collect, analyse, and triangulate qualitative and quantitative respondents' insights about the role of SOP within the CES framework, SOP formation, and the role of landscape characteristics (Figure 2). The semi-open questionnaire used included free listing, measurement scale questions, and participatory mapping. For the last, we prepared a map of a selected area for each case study, on which participants drew their answers in the form of points, shapes, or lines.

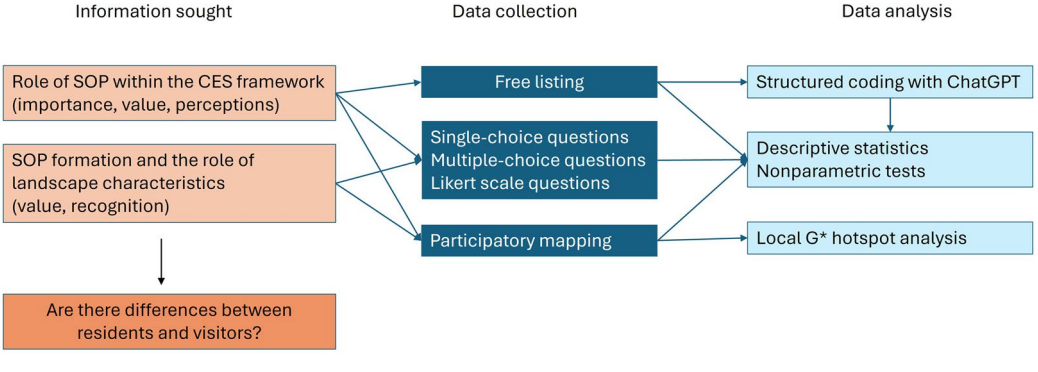

Figure 2. Research design.

Data collection

We used single- and multiple-choice questions for sociodemographic enquiries. To collect data on the role of SOP within the CES framework, we used free listing, measurement scale, and participatory mapping data. Free listing is a qualitative research technique that captures the range of terms associated with a particular concept. The questionnaire included one free listing question, for which we asked participants to mark anything that came to their mind when they thought about peri-urban landscapes. The goal was to explore and understand their values and opinions related to SOP and other CES. To examine SOP within the CES framework, the CES categories applied were based on the Millenium Ecosystem Assessment classification (MEA, 2005). We established nine CES categories (leisure and recreation activities; sense of place and identity; aesthetic value; source of inspiration; social relations; spiritual and religious services; educational resource; research resource; cultural significance) along three cultural ecosystem disservices (noise; danger; and unpleasantness). For more extensive explanation of the categories, see Žlender (2024). We further explored the role of SOP within the CES framework by assessing the importance of each CES category for participants on a scale, and through the participatory mapping of places where each CES category was important for them.

To assess SOP formation, we used Likert scale items as a standardised measure for the components of place attachment, identity, and dependence (three statements for each component; (Jorgensen & Stedman, 2006; Žlender & Gemin, 2020). To understand the influence of place characteristics, we used participatory mapping for places important for people to connect with the local area and for one place that was special or significant to participants (Knaps et al., 2022).

Data analysis techniques

We digitised the responses, and imported the individual attributes and geographical locations in SPSS (version 29.0) and QGIS (version 3.34.11), respectively. Data in both formats were linked with a common identifier.

We utilised generative artificial intelligence (GPT-3) for structural qualitative coding of a dataset consisting of free-text responses collected from users regarding their perceptions of the peri-urban landscape. The dataset, structured in JSON format, contained user IDs and their corresponding text responses to the question "What comes to your mind when you think about the peri-urban landscape?" Responses were categorised into CES and disservices (DES) based on predefined categories. Each concept was accompanied by a brief description to aid interpretation. The output was organised in tabular form, in which each row represented a unique user ID and each column corresponded to a CES/DES category, with values indicating the presence (1), absence (0), or lack of response (9999) for each user. If responses only mentioned natural elements without associating them with a specific concept (e.g., "nature", "hills", "river"), these were coded as 0. However, mentions of keywords such as "recreation" or "culture" were classified according to the corresponding CES. Responses that did not clearly match any predefined category were coded as 0. To ensure the reliability of findings, the results were manually reviewed. Based on the review, we refined the prompt by providing ChatGPT with clear instructions on which specific terms should be linked to more elusive concepts. This adjustment resulted in an AI error rate of approximately 5% compared to the tentative coding performed by two experts, a discrepancy we considered acceptable for further analysis. In addition, given that qualitative coding inherently involves subjectivity and variability among researchers, this error rate aligns with expectations in the field, for which different coders may interpret data in slightly different ways (Saldaña, 2021).

For the analysis of the measurement scale methods, we used descriptive statistics and non-parametric tests, because the data were not normally distributed (the Shapiro–Wilk test for normality at a significance level of 0.05). To analyse the mapping data, we performed hotspot

analyses. First, we tabulated the total number of spatial markers into grid cells in QGIS. The resulting grid was imported into GeoDA (Center for Spatial Data Science, 2021) to create frequency hotspot maps, identifying statistically significant clusters of high and low values using the Local G* analysis tool (also known as the Getis-Ord G* statistic; Getis & Ord, 1992).

Results

Questionnaire

The PPGIS survey engaged 703 participants over three months (September–December 2023) in the peri-urban landscapes of Ljubljana, Kranj, and Koper. Responses were distributed as follows: Ljubljana 303, Kranj 246, and Koper 154. Prior to the main data collection, a pilot test was performed with a smaller group to refine the questionnaire based on feedback, with an estimated completion time of thirty minutes. Data collection was conducted in situ by trained master's students at high-traffic locations such as grocery stores and events (579 responses), and it was complemented by 124 questionnaires completed by municipal representatives.

Sample characteristics

The demographic breakdown indicated that 53% of the respondents were female. Twenty-eight percent of the respondents were fifteen to twenty-nine years old, 52% were thirty to sixty-four years old, and 18% were sixty-five or older. In terms of education, they included 22% with undergraduate degrees and 38% that had completed vocational training or secondary school. Forty-six percent of the respondents were employed, 22% were retired, and 21% were students. Their place of residence was identified through their self-reported neighbourhoods. Fifty-one percent of the respondents in Ljubljana, 65% in Koper and 43% of the respondents in Kranj were residents of the study areas. Among the residents, 37% had lived there for over thirty years or their whole life, 16% for sixteen to thirty years, and 20% for under fifteen years. Most visitors resided near the study area (e.g., in the city centre, see Figure 3) and came there for leisure activities (62%), but also for work (20%) and school (16%).

Based on the Mann–Whitney *U* test, residents demonstrated significantly higher self-perceived knowledge of the peri-urban landscape ($z = -3.294$; $p < 0.001$) and their personally meaningful places. Specifically, they showed greater agreement with the statement "I know this place inside out" on a scale of 1 to 5 ($z = -3.093$, $p = 0.002$).

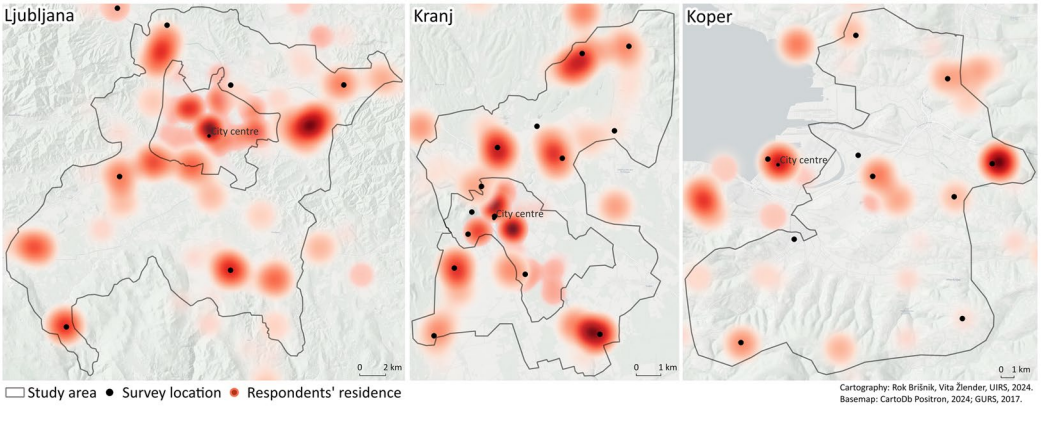

Figure 3. Maps showing the distribution of respondents' residences and survey locations.

Role of SOP within the CES framework

We investigated the role of SOP in relation to other CES categories using a combination of measurement scale questions, free listing, and participatory mapping methods. Analysis of Likert scale responses provided insights into the relative importance of SOP within the CES framework, allowing CES category ranking. Peri-urban landscapes were deemed the most significant for fostering social connections, recreational activities, and aesthetic experiences, with SOP and identity ranking fourth. Figure 4 compares residents' and visitors' perspectives on CES importance. A chi-squared test revealed that residents attributed significantly higher importance to peri-urban landscapes for SOP and identity, research resources, and spiritual services compared to visitors (Online Appendix A). No significant associations were found between length of residence (residents) or purpose of visiting (visitors) and CES category importance.

Free listing results (Online Appendix B) showed that leisure and recreation were the most frequently mentioned CES, followed by spiritual and religious services and aesthetic value. The prominence of leisure and aesthetic value aligned with measurement scale findings, but the high ranking of spiritual services requires further interpretation. Respondents frequently described "silence", "peace", and "relaxation", which were coded as spiritual services. These associations may align with the conceptual scope of spiritual services, but this classification introduces subjectivity and highlights the methodological challenge of coding deeply personal and context-dependent CES categories.

Abstract CES, such as SOP and inspiration, were mentioned less frequently and ranked lower compared to the measurement scale responses. Inspiration was rarely explicit, with indirect references such as "natural treasures" and "gardens, forests, and streams" (Online Appendix B), requiring interpretive coding. Similarly, SOP and identity were mentioned infrequently, reflecting their intangible nature in unprompted responses. Disservices, including unpleasantness, danger, and noise, were often noted (Online Appendix B). Chi-squared tests showed significant differences in residents' and visitors' associations with the peri-urban landscape. Visitors emphasised leisure and recreation ($\chi^2 = 5.457$, df = 1, $n = 657$, $p = 0.019$), whereas residents more often identified unpleasant aspects ($\chi^2 = 4.685$, df = 1, $n = 657$, $p = 0.030$).

Participatory mapping revealed an average of 0.91 markers per person for nine CES. The leisure and recreation (1.82) and social relations (1.19) categories stood out. The average standard deviation was 1.42, with leisure and recreation markers being more dispersed (2.306) and cultural significance less dispersed (0.990). Residents ($n = 353$) marked 1,573 CES locations and visitors ($n = 326$) marked 1,475. Figure in Appendix C shows the split between residents and

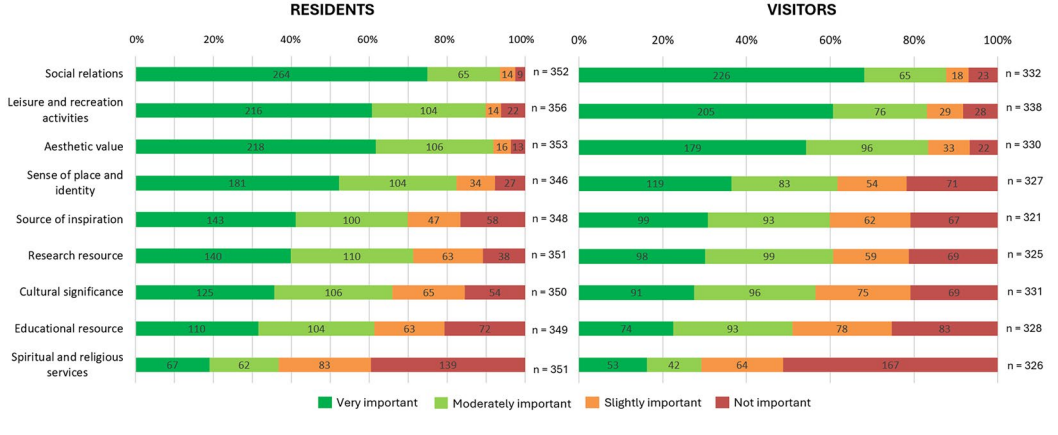

Figure 4. The importance of each CES category as rated by residents and visitors. The numbers on the right of each column indicate the total number of respondents for each CES scoring.

visitors for individual CES categories. Based on respondents' inputs, we performed hotspots analyses (Online Appendix D).

Leisure and recreation activities showed dispersed hotspots across the study areas. For example, in Ljubljana, there was no significant cluster in the western part of the Ljubljana Marsh for this CES, but educational, research, and cultural resources were emphasised there. In all three study areas, SOP and identity overlapped with aesthetic value, showing broad coverage. Visitors concentrated on well-known areas, whereas residents valued natural retreats and tranquil locations. Aesthetic value highlighted agricultural flatlands near the Koper Hills. Social relations overlapped with SOP but had fewer visitor hotspots. Spiritual and religious services and research resources were more localised than leisure and aesthetic value. Hotspots for educational and research resources were scattered, whereas spiritual services featured large, localised areas, such as the settlement of Želimlje with its monastery and Catholic school in the case of Ljubljana. Cultural significance hotspots were settlement-based, uniquely omitting southeastern Kranj, where Lake Trboje is located.

SOP formation and the role of landscape characteristics

We used measurement scale statements and participatory mapping for additional, more detailed measurement of the SOP dimension. The Mann–Whitney *U* test was used to compare responses between residents and visitors for various measurement scale statements, inspecting their connection with the place they selected as being their special or valued one (Online Appendix E). Residents reported deeper emotional and identity-based ties, considering these places integral

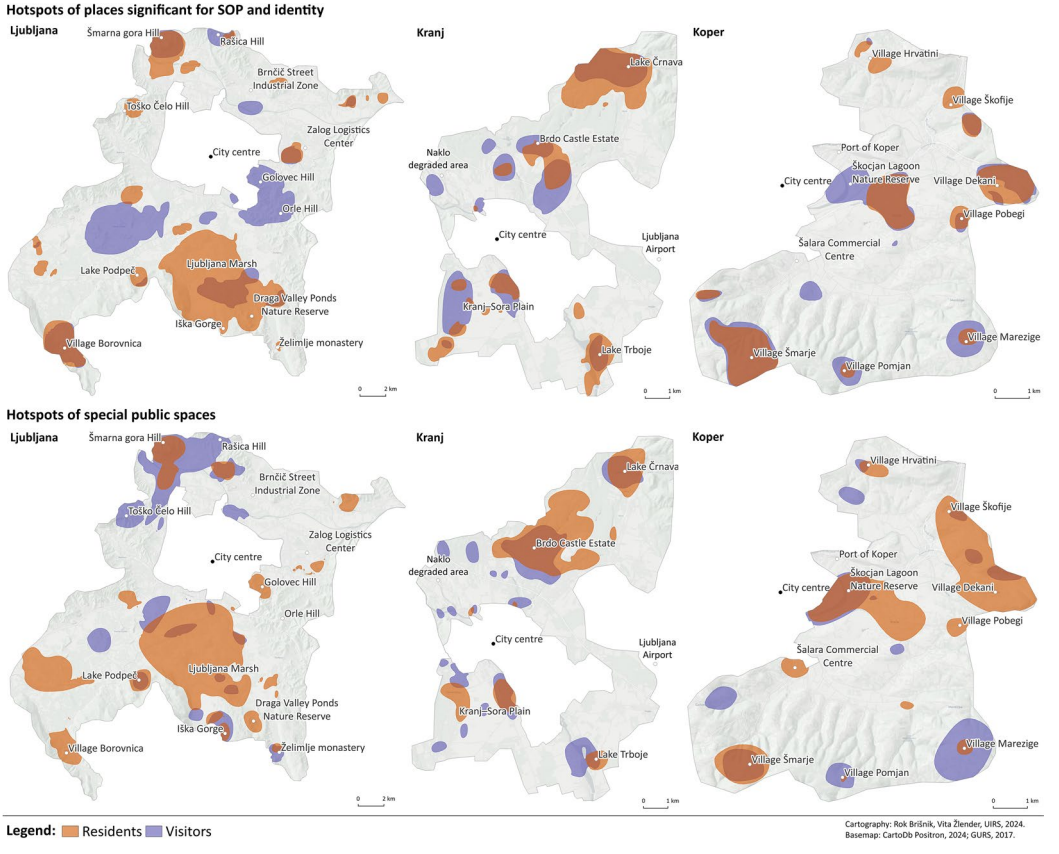

Figure 5. Hotspots of locations significant to respondents for fostering a sense of connection to the local area (top); hotspots of publicly accessible places considered special by respondents (bottom).

to their identity, favourite, and missed when away. In contrast, visitors were more likely to perceive better alternatives to peri-urban landscapes. No significant differences were observed for feelings of happiness, self-expression, or enjoyment.

We analysed SOP's spatial distribution to identify the contributing landscape characteristics. This analysis was based on identifying SOP hotspots – areas considered highly significant for respondents' SOP and identity, and as special, meaningful places mapped by participants. Using the Local G* analysis, we identified 38% of hotspot areas important to both groups, whereas the rest showed no overlap. Hotspots were associated with bodies of water, hills, biodiverse areas, and settlements (Figure 5). Residents' hotspots covered 14% more area and had 15%

Figure 6. Some of the locations that emerged as shared hotspots for both residents and visitors in response to both surveys; (1) view from Šmarna gora hill (Mount Saint Mary), (2) a local market in the centre of Ig, (3) the Kranj–Sora Plain, (4) the lake Črnava in Preddvor, (5) village Šmarje in the Koper's hinterland, (6) Škocjan Lagoon Nature Reserve (photos: Rok Brišnik, Aljaž Dvoršak, Google Street View).

higher coverage by protection regimes. Visitors focused on well-known locations with trails, protected heritage and nature sites, and excursion points. While marking these areas, residents also emphasised large natural and semi-natural areas such as forests and farmland.

Several locations emerged as shared hotspots for both residents and visitors in response to both surveys (Figure 6). In Ljubljana, these included Šmarna gora (Mount Saint Mary), a hill offering recreational opportunities and views of the Ljubljana Basin, and parts of the Ljubljana Marsh, a protected nature park. In Kranj, the Brdo castle estate with its extensive landscaped park and the lake Črnava near Preddvor were prominent. In Koper, hotspot areas were centred around village cores on the hilly outskirts of the city.

SOP and planned development

In the final step, we analysed the overlap between the hotspots of locations valued by residents and visitors and areas zoned for housing, industry, logistics, and other development that could impact the peri-urban SOP. Municipal spatial plans revealed seventy-nine areas zoned for construction (>0.5 hectares) intersecting with the SOP hotspots. These overlaps included fifty areas in Ljubljana, twenty-one in Kranj, and eight in Koper, covering a total of 495 hectares, or 16% of all the areas planned for construction in the study area. Specifically, in Ljubljana, the area of overlap is 153 hectares, or 11% of the total area, in Kranj it is 46 hectares (3%), and in Koper it is 24 hectares (2%; Figure 7).

Ljubljana showed a slightly greater overlap than the other two study areas, primarily due to the residential construction around Šmarna gora hill (Mount Saint Mary), Ig, Jezero, and Želimlje settlements. In addition, in the northern part of the Ljubljana Marsh conflicts arise from the planned expansion of the regional waste management centre. In Kranj, areas zoned for construction intersect with the SOP hotspots in three key locations. The first is in the Municipality of Preddvor, where residential, commercial, business, and transport infrastructure development is planned. The second is in the culturally protected landscape of Bitnje on the Kranj–Sora Plain, where a commercial zone is planned. The third area of concern is in the northern part of Kranj, where an urban connecting road is planned that will encroach upon agricultural areas adjacent to the city and sever connections between the SOP hotspots and the nearby settlements, reducing accessibility for residents. In Koper, three areas showed overlap with the SOP hotspots. The first is in Šmarje, where construction of a residential building is planned. The second is along the Škocjan Lagoon Nature Reserve, where the expansion of the Sermin commercial zone could have an impact. Finally, in Zgornje Škofije, a second railway track is being constructed as outlined in the national detailed plan.

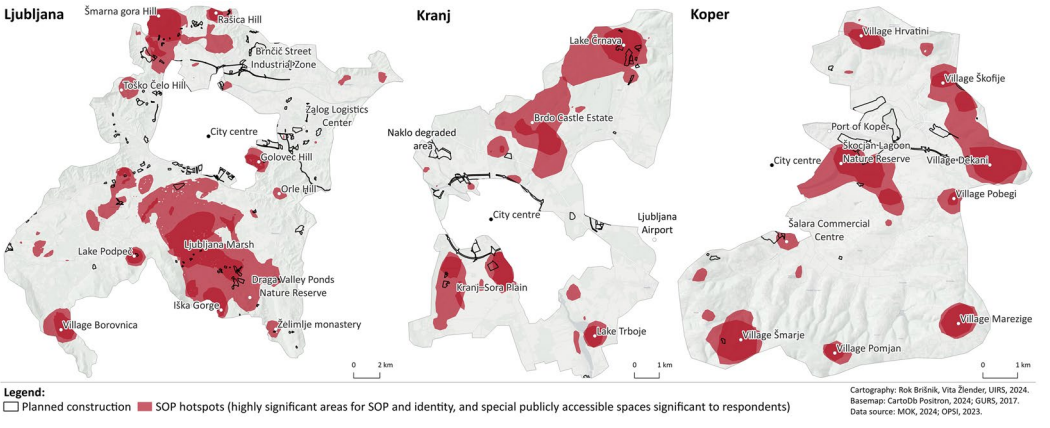

Figure 7. Overlapping of SOP hotspots with areas planned for construction.

Discussion

This study employs peri-urban landscapes as borderscapes to foreground the need for planning approaches that are sensitive to borderscape dynamics – particularly their vulnerabilities and the lived realities within these spaces. Some of the findings are discussed below. They can help in both advancing the theoretical discourse on peri-urban landscapes through a borderscape lens and responding to the practical challenges of maintaining the landscape character and SOP amid change.

Elucidating different perceptions of peri-urban landscapes

This study highlights the complex interplay between residents' and visitors' perceptions of peri-urban landscapes, focusing on their SOP and identity, and the spatial patterns of valued areas. Several key findings merit discussion.

The analysis revealed comparable perceptions of CES importance between residents and visitors, with recreation and leisure activities consistently emphasised across both groups. However, concerns about disservices, such as unpleasantness, danger, and noise, emerged alongside the valued CES categories, underlining the complex interplay between positive and negative experiences in peri-urban environments. The significance of recreational, aesthetic, and social relations CES in various landscapes agrees with the findings from previous research (Gottwald et al., 2022; Plieninger et al., 2013).

Notably, residents and visitors differed in their prioritisation of specific CES categories. Residents attributed greater importance to SOP and identity, research resources, and spiritual and religious services, suggesting a deeper emotional and cognitive connection with the local landscape. This aligns with earlier studies emphasising residents' appreciation of intangible landscape values (Brown et al., 2015). In contrast, visitors prioritised more tangible, recreational aspects of the environment. Interestingly, neither length of residence nor visiting purpose significantly influenced CES importance, which contrasts with previous findings (Tajima et al., 2023). This suggests that universal attributes of (peri-urban) landscapes, such as aesthetic appeal and social interaction opportunities, may play a more prominent role than individual engagement duration.

Residents exhibited a stronger, more emotionally rooted connection to their selected peri-urban open space, viewing it as integral to their personal and community identity. Statements like "I know this place inside out" reflected this profound connection. The correlation between length of residence and SOP was inconsistent, cautioning against equating longer residence with stronger SOP, a point supported by Kaltenborn and Williams (2002). Using psychometric scales to analyse SOP components offered valuable insights into these nuanced connections (Brown & Raymond, 2007; Stedman, 2006).

As borderscapes, peri-urban areas reveal distinct spatial patterns of valuation that reflect their hybrid nature. Spatial mapping revealed differences in how residents and visitors valued peri-urban areas. Visitors gravitated towards well-known, accessible and visually prominent locations with natural or cultural significance, such as Šmarna gora hill (Mount Saint Mary) and the Ljubljana Marsh. This aligns with prior studies indicating visitors' preference for accessible and recognisable sites (Tajima et al., 2023). In contrast, residents identified a broader range of meaningful spaces, including lesser-known natural retreats, settlements, and semi-natural landscapes such as forests and fields. These patterns underscore how peri-urban landscapes function as pluralistic spaces, accommodating both shared and distinct forms of engagement. Despite differences in spatial preferences, 38% of the areas were significant to both groups, reflecting shared appreciation for multifunctional sites. These overlaps underscore the holistic nature of CES, where areas often support multiple ecosystem services (Bieling &

Plieninger, 2013; Gottwald et al., 2022; Plieninger et al., 2013). For example, the Ljubljana Marsh, valued for its natural and cultural heritage, illustrates how diverse CES converge in key peri-urban spaces.

Both residents and visitors showed a preference for areas with natural and semi-natural features, indicating their shared importance in fostering landscape attachment. This finding aligns with studies linking natural elements to place attachment and emotional connection (Kaltenborn & Bjerke, 2002). Urbanised areas, particularly peri-urban settlements such as those in Koper, also emerged as significant, reflecting the interplay between physical and social attributes. However, it was not possible to establish whether these areas are the result of physical or social attributes.

Embedding SOP within the CES framework

Effective planning in peri-urban areas needs to consider the different attachments of residents to their specific places, while also considering the inevitable changes brought about by the transformation of the landscape. By recognising SOP as a CES category, planners can address the emotional and cognitive connections people form with landscapes, thus fostering a sense of belonging among residents. This perspective encourages strategies that not only protect physical spaces, but also nurture the emotional connections that people have with them (Žlender & Gemin, 2020).

The use of participatory GIS and psychometric tools to identify meaningful places, such as "special sites" or "sites of personal connection," underscores the significance of locality in shaping SOP (Kaltenborn & Bjerke, 2002; Knaps et al., 2022). These methods are essential for understanding where these locations are, which facilitates the integration of SOP into the CES framework and enhances its applicability in spatial planning and ES assessment.

However, though SOP can be analysed as a standalone CES category, this may not be applicable everywhere. Some studies have shown that SOP can act as an umbrella category encompassing diverse cultural and environmental values (Csurgó & Smith, 2022; Quinn et al., 2019). Accordingly, we suggest that a phenomenological perspective and multiple methods be integrated to explore SOP, which would help in understanding the reasons behind the shaping of SOP in specific places.

From conflict to co-creation: aligning SOP hotspots with spatial planning

Conflicting spatial claims over SOP hotspots revealed the limitations of conventional planning in capturing community-based values and lived experiences. The overlap of SOP hotspots with areas planned for construction highlights tensions between bottom-up meanings and top-down development goals. For instance, significant areas such as the Ljubljana Marsh and village cores near Koper face potential disruption from residential, commercial, and infrastructure development projects. Notably, 16% of planned construction overlaps with high-SOP areas, with Ljubljana alone accounting for 11% of these conflicts.

Transportation and utility infrastructure expansions pose additional challenges. Projects like the proposed urban road in Kranj risk severing connections between hotspots and nearby settlements, diminishing accessibility and perceived value. Similarly, business zone expansions near Škocjan Lagoon Nature Reserve in Koper threaten ecological balance and aesthetic appeal. All three cities studied have already recognised the importance of ES and their conservation in their municipal spatial plans, which enhances both ecological integrity and social cohesion. Yet these acknowledgements often remain abstract if not supported by a grounded understanding of who values what, and why.

Here, the integration of qualitative insights becomes essential not only to expose conflicts, but also to examine whose "sense of place" is prioritised by the current planning frameworks. For example, the SOP data in this study revealed substantial divergence between residents' emotional attachments to village cores or everyday landscapes and planning strategies favouring accessibility for tourism or regional infrastructure. These divergences point to underlying socio-political frictions embedded in spatial planning practices (Phelps, 2025).

To enhance the benefits of SOP and other CES, spatial planning should focus on accessibility, site protection, and bridging the gap between actual and potential CES use. Public access to green spaces and culturally significant areas in peri-urban regions must be safeguarded (Fagerholm et al., 2020; Ridding et al., 2018). Protected peri-urban areas, often CES hotspots, require careful management to balance conservation goals with land-sharing demands (Smrekar et al., 2020). In addition, underutilised areas with high CES potential should be identified and developed to optimise their benefits. This is particularly relevant in green space planning, where peri-urban landscapes serve not only as green infrastructure for recreation but as everyday landscapes important for people's routines, memories, and identities.

Qualitative data thus provide more than just an illustrative context; they serve as a diagnostic tool in spatial planning, revealing friction points, emotional attachments, and symbolic meanings that are often invisible in quantitative assessments. Future planning should adopt inclusive frameworks that engage diverse stakeholders in meaningful dialogue. This should be supported by incorporating a phenomenological approach to better understand how people live, feel, and relate to landscape. In this way, lived experiences would be embedded into policy formation, assessment, and implementation, especially in borderscapes where plural spatial meanings coexist. This might involve qualitative methods such as long-form interviews, walking ethnographies, focus groups or geo-design workshops that have proved to be effective in integrating community values into decision-making processes (Ducci et al., 2023; Yang et al., 2025). ; These methods allow planners to not only map where values are located, but also understand why they matter, which facilitates more responsive and just spatial decisions. By embracing adaptive, co-creative approaches, spatial planners can move from conflict management to value integration, creating environments that reflect diverse place attachments while also fulfilling broader social needs.

Methodological evaluation, limitations, and future directions

The mixed-methods approach employed in this study, combining free listing, participatory mapping, and measurement scale methods, proved effective in capturing the multidimensional nature of SOP and landscape identity. The integration of multiple methods, as emphasised by Gottwald et al. (2022), ensures a robust and holistic understanding of the complex human-nature relationships.

Participatory mapping facilitated a spatially explicit visualisation of valued areas, offering actionable insights for spatial planning. However, this method could be complemented by phenomenological methods to elucidate not only where the places important for people's SOP are, but also why these places are important. This would support a more grounded integration of phenomenological knowledge into planning and designing places (Lowery & Morse, 2013). To some extent, free listing uncovered qualitative nuances in how respondents perceived and articulated their connection to landscape. This method facilitated efficient qualitative coding for large-scale analysis, but it relied on an automated process that may not fully grasp contextual subtleties, leading to potential oversights. The lower prominence of SOP in unprompted free listing responses reflects the challenges of capturing intangible values without specific prompts, a difficulty noted in prior research (Gottwald et al., 2022). This highlights the need for data validation and refinement to enhance the method's efficacy in identifying elusive CES categories. Despite these challenges, free listing contributed meaningfully to the understanding

of how individuals conceptualise and articulate SOP and other CES categories through their associations with peri-urban landscapes.

Measurement scale methods, using an established set of questions, proved particularly effective for elucidating SOP and abstract CES, such as inspiration and spiritual values. In contrast, free listing might require different framing or prompts to achieve comparable depth. Future studies should explore these possibilities, refining free listing methods to better capture intangible concepts. Addressing these limitations in future research could involve expanding the methodological framework to include longitudinal approaches, incorporating advanced geospatial tools for participatory mapping, and developing more nuanced prompts for qualitative exploration. Finally, the inclusion of qualitative phenomenological methods, which make it possible to collect and analyse narrative data, would be necessary to understand people's social and cultural values and why some places are integral to SOP and others not.

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Research ethics and consent

Participants provided informed consent before completing the survey. They were assured that their data would be treated confidentially and used solely for research purposes. No personally identifiable information is published, and all data are reported in aggregate form.

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