

## RESEARCH ARTICLE

# Assessing the epistemic dimension of people–place relationships for inclusive ecosystem governance

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## Abstract

1. Senses of place scholarship have rarely addressed the epistemic dimension that influences how people perceive, interpret and interact with places through their knowledges. This limits our understanding of subjective stances and possible contestations within ecosystem governance.
2. We develop the concept of epistemic bonding and conceptualise it as the subjective connection to a place that is created through (perceived) knowledge and the process of knowing about a place. We explore its relationship to the established five dimensions of place attachment by using survey data from 306 residents of the High Coast/Kvarken Archipelago UNESCO Natural World Heritage Site in Sweden and Finland. We also assess the relationship between epistemic bonding and views on management practices in each country.
3. The results show that epistemic bonding is strongly correlated with place dependence and identity and is consistently associated with long-term residency and having family history in the area. Higher epistemic bonding indicated a more negative stance towards official nature protection in Finland.
4. By foregrounding epistemic bonding, we emphasise the role of knowledge in forming place bonds. Epistemic bonding can be a useful lens for understanding how individuals respond to environmental decision-making.
5. Focusing on epistemic bonds highlights crucial questions about whose knowledge is recognised and shapes the management of places, as well as how diverse ways of knowing and relating to place influence the perceived inclusivity of ecosystem governance.

## KEYWORDS

ecosystem governance, epistemic bonding, epistemic justice, knowledges, place attachment, senses of place

## 1 | INTRODUCTION

Rapid biodiversity loss, climate change and shifting ecological patterns affect the social and physical contexts of places as well as how

people perceive social–ecological systems (Marshall et al., 2019; Raymond et al., 2021; Stedman, 2016). To address the human and subjective dimensions of these environmental crises, calls have been made for a more contextualised, or 'place-based', approach

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to sustainability science (Balvanera, Daw, et al., 2017; Grenni et al., 2020; Horlings et al., 2020; Martín-López et al., 2020; Moriggi et al., 2020). Researchers are concerned about the underrepresentation of local value and knowledge systems and associated practices specific to a particular place and cultural context (Berbés-Blázquez et al., 2016; Merçon et al., 2019). Recognising and unpacking the connections between knowledges and people-place relationships across spatial and institutional scales of governance is part of the challenge (Balvanera, Calderón-Contreras, et al., 2017), as is building inclusive processes that consider the plurality of knowledges, values and worldviews held by diverse actors (Pascual et al., 2021, 2023; Raymond et al., 2022).

'Places' can be understood as meaningful locations that can be interpreted, narrated, understood, felt and imagined (Creswell, 2004). Sense of place refers to the emotional, cognitive and symbolic connections people form with these locations (Stedman, 2008) and can be broadly defined as an individual's or group's attachment to and interpretation of a geographic locale (Tuan, 1977). This concept is used in various ways across different fields, such as human geography, environmental psychology and increasingly in sustainability science and social-ecological systems research.

In social-ecological systems research concerning management processes of places, it is common to distinguish between place meanings (descriptive attributes of a place, symbolic meanings or place characters) and attachment (strength and type of emotional bond to a place) (Masterson et al., 2017; Stedman, 2016). In this paper, our primary focus is on place attachment as part of sense of place. Place attachment focuses on the strength of individuals or groups' emotional bond to a particular place (Lewicka, 2011a; Low & Altman, 1992) and is often considered to be the evaluative dimension of one's sense of place (Stedman, 2016). While the positive bonds between individuals and geographic locales are commonly considered in place attachment research (e.g. Raymond et al., 2010; Williams & Vaske, 2003), attachments can also be negative. For example, the concept of 'home' can be associated with domestic violence (Manzo, 2005). In sustainability-related research, the concept has the potential to explain how people are embedded in local contexts and structures and are part of larger environmental processes (Raymond et al., 2021).

The contested and political nature of places (Ingalls et al., 2019; Turnhout et al., 2020) and the growing concern regarding epistemic justice (e.g. Arango-Quiroga et al., 2023) necessitate the development of analytical approaches to understand the complexities of the bonds between people, knowledges and places, and their implications for environmental decision-making. This is crucial to avoid the exclusion of certain groups and their knowledge from decision-making processes, thereby amplifying epistemic injustices (Giladi, 2018; Fricker, 2018). Therefore, knowledge and place are both crucial to understand the subjective and evolving stances and possible contestations related to perceptions of inclusion or exclusion that arise when decisions about places and their management are made.

While place attachment emphasises the emotional bond people have with their surroundings, a comprehensive understanding of sense of place requires attention to be paid to local knowledges in addition to values, norms and identities (Williams, 2014). It has been noted that bonds to place are formed through a combination of emotional and cognitive aspects, including knowledge, place memory, understanding and meaning (Scannell & Gifford, 2010). Therefore, knowledge and familiarity are integral to understanding sense of place (Felder, 2021; Fullilove, 1996). Notions of place-based, local and Indigenous knowledges particularly emphasise the interlinked nature of knowledges and place as well as the deep relationality between humans and nature (Basso, 1996; Gould et al., 2023). This dimension of people-place relationships has recently been conceptualised as an epistemic bond, that is, how knowledge of/in a locale weaves bonds to place (Castro, 2021).

A growing body of evidence suggests that linking sense of place and knowledge processes can reveal underlying tensions in how knowledge is represented. Castro (2021) qualitatively explores people's epistemic bonds to a place within the context of their perceptions of international environmental law. Hakkarainen et al. (2022) demonstrate the interconnection between place belonging and local knowledges and their influence on perceptions of the credibility and importance of local knowledges as well as on individuals' right to represent a place. Haywood et al. (2024) show how participating in citizen science (i.e. co-producing knowledge about a place) shapes participants' attachment to that place. While these studies all highlight the critical importance of the epistemic dimension of people-place relationships, this dimension remains largely unassessed quantitatively. Such research is essential for finding patterns and relationships between variables that shape knowledge underpinning people-place relationships.

When the concept of a sense of place is applied to a social-ecological context, one of the challenges is to make the phenomenon more 'tangible and measurable' (Masterson et al., 2017). Using self-assessments of individuals' epistemic bonds, our aim is to advance theoretical and methodological perspectives that prioritise epistemic inclusion and recognise knowledge as locally situated. This approach counters the universalist modes of knowledge (Raymond et al., 2021) and emphasises the necessity of navigating epistemic plurality in environmental decision-making (Manzo et al., 2021). In quantitative place attachment research, such self-assessments are typically used to capture individuals' perceptions of their bonds to a place (Williams, 2014). We hypothesise that epistemic bonding can explain attitudes towards management practices in ecosystem governance, whereby the inclusion of local inhabitants and their knowledges leads to more legitimate outcomes (Raymond et al., 2022).

Using an online survey, we compare results obtained in the cross-boundary area of the High Coast and Kvarken Archipelago UNESCO natural World Heritage Site. Situated in Sweden and Finland, respectively, the High Coast and Kvarken Archipelago illustrate how a shared World Heritage designation interacts with local realities and identities in two distinct regional contexts. The two sites are

separated by the Gulf of Bothnia in the northern part of the Baltic Sea. The article has two objectives:

- (i) To quantitatively examine the epistemic dimension of people–place relationships in the form of epistemic bonding;
- (ii) To explore dynamics of epistemic bonding in relation to views on ecosystem management practices in a cross-boundary management case.

We argue that an understanding of the nature and strength of epistemic bonds could inform processes of knowledge co-creation and collaborative governance. This sheds light on the question of whose knowledge and relationships with place count in environmental decision-making. Therefore, this approach can further help identify and acknowledge the complex webs of relationships in knowledge processes (Reed et al., 2014; van Kerkhoff & Lebel, 2015), expanding to include the personal relationships of diverse societal and policy actors with a place. This line of enquiry also has the potential to deepen our theoretical understanding of the concept of ‘sense of place’ and how we harbour, create and know a place and ground questions of epistemic (in)justice in place.

## 2 | THEORETICAL BACKGROUND

### 2.1 | Essential, progressive and plural views on sense(s) of place

Sense of place scholarship has two main theoretical underpinnings: the essentialist and progressive perspectives (Lewicka et al., 2019). According to the essentialist theory, the strength of one's connection to a given place is inferred from its physical qualities and historical continuity and distinctiveness. It is also dependent on one's experience of ‘insideness’ or ‘outsideness’ of a place (Lewicka, 2011b; Lewicka et al., 2019; Relph, 1976). This theory views place attachments as slow to evolve and resistant to change (Masterson et al., 2017; Raymond, Kyttä, & Stedman, 2017). In contrast, the progressive theory emphasises mobility and fluidity (Di Masso et al., 2019; Urry, 2000) as well as the dynamic relations between the mind, body, culture and environment (e.g. Massey, 1991, 1993; Raymond, Giusti, & Barthel, 2017). Lewicka et al. (2019) argue that it is important to consider these theories as complementary rather than contradictory.

In recent years, there have been calls to consider plural, dynamic and rapidly changing senses of place in the face of global challenges, rather than a static and singular sense of place (Raymond et al., 2021). This requires an ‘epistemic attitude’ that is ‘sensitive to the multiple knowledge-production strategies and conceptualisations that try to account for how senses of place are forged nowadays’ (Raymond et al., 2021, p. 4). From this perspective, place provides a framework for comparing diverse views on knowledge and meaning (Williams, 2014). It also addresses place attachment and how people adapt to changes in social–ecological systems (Williams & Miller, 2021). A plural view of

senses of place also points towards more democratic and place-based approaches to knowledge application (Carrozza, 2015), which can account for the dynamic nature of knowledges and their interactions across different ecosystem governance scales (Castro, 2021). In this way, an understanding of the epistemic dimension of senses of place and its interaction with the management of places adds to the pluralised view on how people create bonds to place and whose knowledge is presented in decision-making of these places.

### 2.2 | Place attachment in personal, community and environmental contexts

Place attachment has been approached in various ways as both physical and social features of a place form emotional bonds (Lewicka, 2011b; Stedman, 2003a). These include meanings; the psychological processes of cognitive, affective and behavioural components; and the spatial, social and environmental characteristics of a place (Ramkissoon et al., 2013; Ramkissoon & Mavondo, 2017; Scannell & Gifford, 2010). In the context of a residential community, an interconnection is created between the natural environment and the personal dimensions of place attachment (Mihaylov & Perkins, 2014).

In this research, we base our conceptualisation on the work of Raymond et al. (2010), who touched upon the many features of place. They divide place attachment into five measurable dimensions that encompass personal, environmental and social contexts of place bonds: place identity, place dependence, nature bonding, family bonding and friend bonding (Raymond et al., 2010). Other psychometric scales tend to focus only on the personal and social contexts separately. As previous work on knowledge co-production has emphasised the importance of the social–ecological context of place, we argue that it is important to draw on such a holistic operational framework of place attachment. Ultimately, the variety of approaches to measuring place attachment reflects the complexity of the concept and of people–place relationships. Pretty et al. (2003) demonstrate that, despite the difficulty of defining the various dimensions, it is useful to assess them as separate yet related concepts to reveal community dynamics and the sentiments of individuals. Following this notion, below we define and discuss the five dimensions of place attachment used in this study.

#### 2.2.1 | Place identity and place dependence

Place identity refers to the cognitive mechanism and personal identity that is formed in relation to a place one belongs to or as an emotional or symbolic attachment (Hernández Bernardo et al., 2010). In this way, both physical and social attributes contribute to a sense of identity, which is shaped by factors such as beliefs, ideals, values, goals and skills (Proshansky et al., 1983).

According to Stokols and Shumaker (1981), place dependence can be determined through functional reasons which make an individual

to attach to a place, such as the possibility to achieve one's activities and goals in a given place. The physical domain serves as a set of alternatives for individuals to use a place (Jorgensen & Stedman, 2001), and place dependence is often referred to as a functional attachment, contributing to the realisation of goals (Scannell & Gifford, 2010).

Place dependence and identity have been measured using different scales with a varying number of items (e.g. Brown & C Raymond, 2007; Kyle et al., 2005; Williams & Vaske, 2003). Recently, Boley et al. (2021) introduced a three-item scale for both constructs that work in cross-cultural settings. Another overlapping aspect is place affect, which is sometimes understood as a separate construct to place identity and measured with similar items to those used in this study to measure place identity (Ramkissoon et al., 2013).

Place identity and place dependence are both related to environmentally responsible behaviour, with research showing that place dependence plays a role in shaping place identity (Halpenny, 2010; Vaske & Kobrin, 2001). Place dependence often develops through repeated visits to a specific location (Williams & Vaske, 2003) but can also form more broadly by using different locations that support similar types of activities (Stokols & Shumaker, 1981). Although studies confirm the interrelation between place identity and place dependence (Rajala et al., 2020), the two can influence management preferences in opposing ways due to their distinct psychological properties (Kyle et al., 2004). There is interesting empirical evidence of characteristics and interrelations of these two components: for example, rural residents generally show stronger place identity and dependence than urban residents (Soini et al., 2012), and living in high-risk areas, such as bushfire zones, can increase place dependence as going through hard times and loss can strengthen this type of attachment (Anton & Lawrence, 2014). Furthermore, types of activities indicate the geographic scale of attachment of recreational users of an area (i.e. is a park or a trail used) (Moore & Scott, 2003). More recent work shows that place dependence also differs from place identity with respect to the pursuit and management of different recreation activities (Kainzinger et al., 2018; Wynveen et al., 2020).

### 2.2.2 | Nature bonding

Raymond et al. (2010) trace nature bonding to the rich scholarship relating to environmental identity, emotional affinity towards nature and connectedness to nature. Connectedness to nature refers to the emotional connections to the natural world (Mayer & Frantz, 2004) and it should be studied as a place-based phenomenon (Beery & Wolf-Watz, 2014). Nature bonding consequently implies a connection to the non-human natural environment and relates thus to the environmental context of place attachment (Raymond et al., 2010). There are multiple tools and scales to measure human connection to nature, which is often connected to pro-environmental behaviour (Salazar et al., 2021). Raymond et al. (2011) show that the connections that rural landholders in South Australia have for nature are not dependent on the time lived in an area and farming experience but

on the time spent in nature. Furthermore, nature bonding has been shown to be a moderate predictor of self-reported planting of native vegetation as part of a wider chain including biospheric values and concerns (Raymond et al., 2011).

## 2.3 | Friends and family bonding as social bonding

The social aspect of place attachment underlines the importance of communal bonds to one's neighbourhood or a place in forming place attachment. Mesch and Manor (1998) proposed that 'social bonding' is developed through social ties to a setting among individuals with shared experience there. These social bonds include belongingness, rootedness and attachment to a community, forming a sense of community (Mihaylov & Perkins, 2014). The social dimension has been found to predict attitudes in environmental issues that relate to representativeness of community culture and health whereas nature bonding predicts concern towards the local environment (Brehm et al., 2006). Kyle et al. (2005) included a social bonding dimension of place attachment that was theoretically discussed in previous work (Hidalgo & Hernández, 2001; Low & Altman, 1992). Other empirical works support the addition of this dimension of place attachment (Hammitt et al., 2004; Ramkissoon et al., 2013; Wynveen et al., 2012).

Raymond et al. (2010) adapted these scale items and found that social bonding divides into two subdimensions of family bonding (connections to place based on family relationships) and friend bonding (connections to place based on friendships). The social bonding concept has been further developed in relation to both community and place attachment in neighbourhoods (Barcus & Shugatai, 2022; Kim & Park, 2018; Ma, 2021).

## 2.4 | Epistemic bonding to bridge knowledge processes and place attachment

While the importance of the epistemic dimension of people-place relationships is increasingly recognised, how it shapes these relationships and ecosystem management preferences remains less known. Similarly, the relationship of the epistemic dimension to senses of place remains unclear. According to Scannell and Gifford (2010), knowledge of senses of place relates to the process approach to place attachment, in which the cognitive processes involved in knowing and organizing details in the environment create links to a place. In their framework, this dimension is connected to place meanings (Scannell & Gifford, 2010). However, Castro (2021) argues that the epistemic dimension should be considered as a separate construct from place attachment and place meanings because 'Neither concept is thus directly oriented towards the theorisation and study of how knowledge of/in a locale weaves bonds to place (i.e. epistemic bonds) and their consequences' (p. 260). In this study, we depart from this notion that the epistemic dimension is interrelated yet separate from place meanings and attachment.

In general, the word epistemic relates to the sphere in which humans make the judgement of what counts as knowledge and how it is validated (Hazlett, 2016). Knowledge creation can be conceptualised as a dialogical process, which operates through dynamic interactions among individuals, the organization and the institutions (Nonaka & Toyama, 2003). Castro (2021) relates the idea of epistemic bonds to the view of knowledge as a process, building on Ingold's (2011) proposition of seeing knowledge as a product of 'perception, action and being with others' (p. 159). We conceptualise epistemic bonding as the subjective connection to a place that is created through (perceived) knowledge and the process of knowing about a place. This bond is formulated in relation to the personal, social and environmental aspects of place which in turn influence knowledge creation and application.

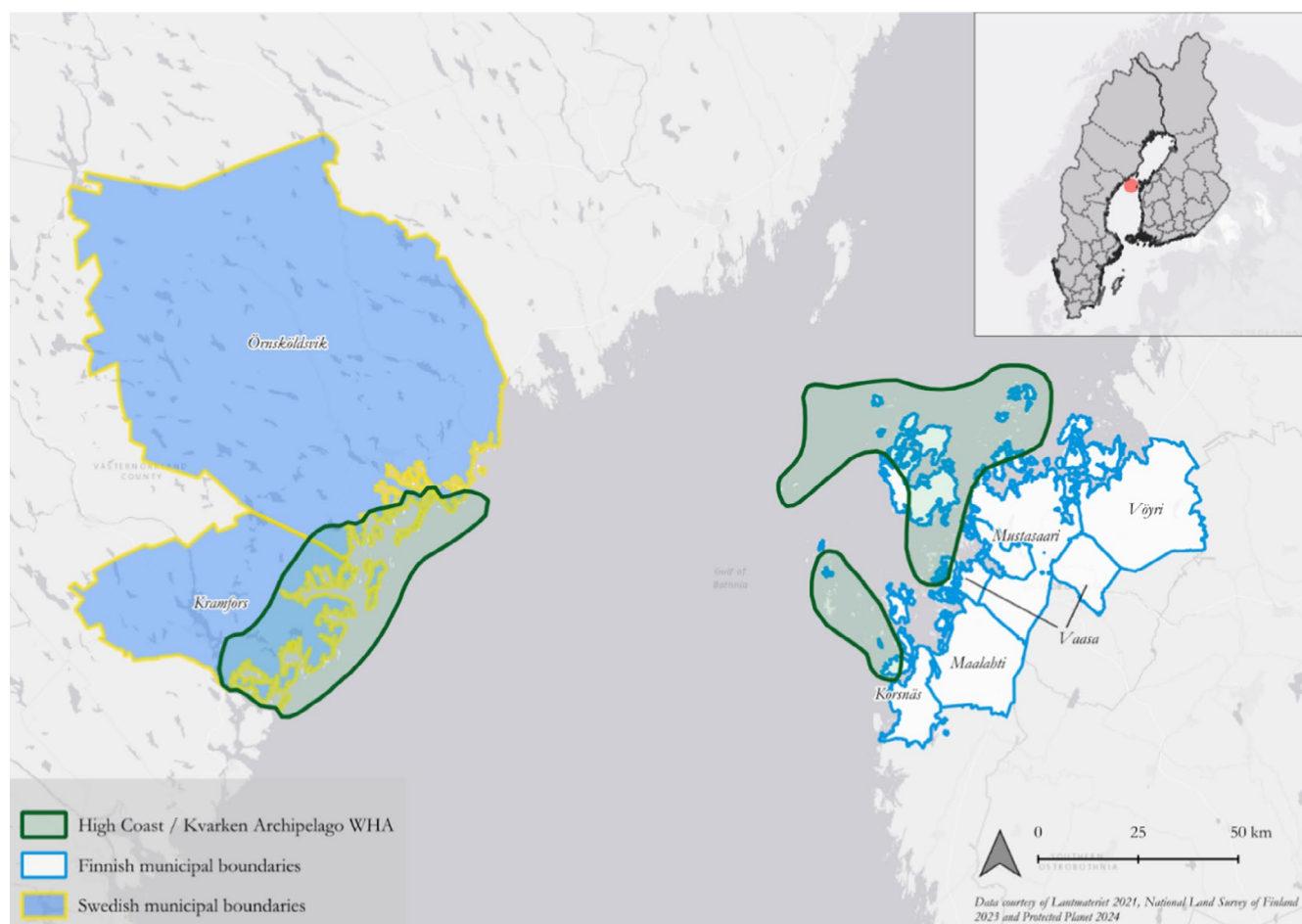
### 3 | MATERIALS AND METHODS

#### 3.1 | Research approach

Place serves as a foundational lens through which to understand and analyse the diverse factors that shape attachment, knowledge and meaning (Williams, 2014). Our quantitative research

strategy stems from the analytical phenomenological research tradition, which often uses psychometric measures to understand interlinkages between place constructs (Seamon, 2018). A survey as a method is suited to subjective self-assessment and studying links and relations between different constructs (Bryman, 2012). We acknowledge that no single methodological position is privileged for producing knowledge; rather, each epistemological and methodological stance reveals different aspects of the phenomenon, which is highlighted in the current views on plural senses of place (Manzo and Pinto de Carvalho, 2021; Williams, 2014).

The survey data were collected in the Kvarken Archipelago (Finland) and the High Coast (Sweden) located in the Gulf of Bothnia in the northern extension of the Baltic Sea (Map 1). The areas form a transnational UNESCO World Heritage Site due to the highest rate of isostatic uplift (land rise) in the world. The High Coast was designated a World Heritage Site in 2000, followed by the Kvarken Archipelago in 2006. In both places, traditional livelihoods, including fishing and agriculture, are being replaced by tourism and nature conservation. Additionally, outmigration is occurring as education and employment often necessitate commuting (Svels, 2015). The High Coast area spans two municipalities: Kramfors and Örnsköldsvik.



MAP 1 Map of the case study area High Coast Kvarken Archipelago World Heritage Site located in Sweden and Finland (Credits: Rory Taylor, 2024).

The Kvarken Archipelago spans five municipalities: Mustasaari, Maalahti, Korsnäs, Vaasa and Vöyri.

The World Heritage Site shared by Finland and Sweden illustrates transboundary governance with differing histories of community engagement. In Sweden, the High Coast was already a well-known tourist destination before receiving World Heritage status, and the High Coast and World Heritage brands have generally been used together. In Finland, the top-down implementation of Natura 2000 in the late 1990s created mistrust particularly among private landowners (Björkell, 2008). This, in turn, is reflected in how some residents view the World Heritage status, which they perceive as yet another management measure that restricts their use of the area. However, World Heritage status does not itself provide nature protection. Instead, the natural conditions required for the designation are maintained through other legal measures. Until recently, community participation in both countries has largely depended on the individual approaches of World Heritage coordinators (Svels, 2017). The first joint management plan for the site was published in 2023 in which one of the four key focus areas includes participation and engagement to improve relationships between the local society and the authorities of the site (Bylund & Henriksson, 2023), highlighting the increased openness and new, more inclusive approach to the management of the site.

## 3.2 | Data collection

### 3.2.1 | Survey development and distribution

The study follows the ethical procedures of the Natural Resources Institute Finland. The ethics review was approved by the unit leader of the institute and by the RECOMS MSC\_ITN project ethics committee. This study collected data using a survey based on different dimensions of place attachment and epistemic bonding. Participants were asked to provide their consent to participate on the first page of the survey, after being provided with information about the project. Items measuring the different dimensions of place attachment were adapted from the validated measures of place identity, place dependence, nature bonding and friends and family bonding by Raymond et al. (2010) (Table 1), which include personal, social and environmental contexts. In addition, the survey included a set of statements focusing on epistemic bonding as Raymond et al. (2010) did not capture this dimension.

The scale items for epistemic bonding were informed by the thematic analyses of semi-structured interviews conducted in the region (see Hakkarainen et al., 2022), which indicated the importance of focusing on interconnections between knowledge and place through multiple dimensions, including personal, social and environmental aspects. This study hence follows an exploratory sequel design, in which qualitative findings informed the implementation of quantitative data collection. The data were collected and analysed in separate phases, which is a suitable strategy due to the recent emergence of this research topic (Creswell & Plano

**TABLE 1** The used survey scales for each place attachment dimension (based on Raymond et al., 2010) and the developed scale items for measuring epistemic bonding in this study.

| Dimension         | Scale item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Place identity    | <ol style="list-style-type: none"> <li>1. The area is very special to me.</li> <li>2. The area means lot for me.</li> <li>3. I am very attached to the area.</li> <li>4. I identify strongly with the area.</li> <li>5. Living in/close to the area says a lot about who I am.</li> <li>6. I feel that the area is part of me.</li> </ol>                                                                                                                                                                                                                                                                          |
| Place dependence  | <ol style="list-style-type: none"> <li>1. No other place can compare to the area.</li> <li>2. The area is the best place for activities I like to do.</li> <li>3. Doing my activities in the area is more important to me than doing them in any other place.</li> <li>4. I would not substitute any other area for the activities I do in this area.</li> </ol>                                                                                                                                                                                                                                                   |
| Nature bonding    | <ol style="list-style-type: none"> <li>1. When I spend time in the natural environment of the area, I feel a deep feeling of oneness with the natural environment.</li> <li>2. I learn a lot about myself when spending time in the natural environment of the area.</li> <li>3. I am very attached to the natural environment in the area.</li> <li>4. I would feel less attached to the area if native plants and animals that lived here disappeared.</li> </ol>                                                                                                                                                |
| Friend bonding    | <ol style="list-style-type: none"> <li>1. Belonging to volunteer groups/associations/organizations in the area is very important to me.</li> <li>2. The friendships developed by doing various community activities strongly connect me to the area.</li> </ol>                                                                                                                                                                                                                                                                                                                                                    |
| Family bonding    | <ol style="list-style-type: none"> <li>1. I live in/close to the area because my family is here.</li> <li>2. My relationships with my family in the area are very special to me.</li> <li>3. Without my relationships with family in the area, I would probably move.</li> </ol>                                                                                                                                                                                                                                                                                                                                   |
| Epistemic bonding | <ol style="list-style-type: none"> <li>1. My knowledge about the area is an important part of my connection to it.</li> <li>2. I have more knowledge about the area than other places in the world.</li> <li>3. The knowledge I obtain through my connection with others in the area helps to define who I am.</li> <li>4. I have knowledge about the natural environment of the area.</li> <li>5. My knowledge of the area is created through interaction with the local environment and community.</li> <li>6. It would be difficult to gain as deep knowledge of other places as I have of the area.</li> </ol> |

Clark, 2011). The previous work illustrated the phenomenon of the *intersection* of place and knowledge as a subjective experience, which intrigued further questions of more specific dynamics of this intersection which is further assessed in this study. Informed by

the notion of the intersection, the individual scale items (Table 1) were then developed in relation to the knowledge scholarship (i) indicating the definition of local ecological knowledge, as a body of knowledge created in a relationship with local ecosystems and creates a tight link between place and knowing (statements 4, 5; Berkes, 2008); (ii) the importance of the social relations and physical context in the knowledge formulation (statements 3, 5; Nonaka & Toyama, 2003); and (iii) the deep personal cognitive aspects of knowledge about a place contributing to familiarity (statements 1, 2, 5, 6; Fullilove, 1996).

The survey also included questions about respondents' demographics and their views on different management focuses in the area, which were explored in relation to the developed epistemic bonding scale. All items were measured on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

The survey was distributed in October 2020 to a random sample of 3000 people in the World Heritage municipalities. The addresses were obtained from public registers in each country. Because the World Heritage Site does not follow the boundaries of the municipalities, the sample also included people who do not live within the actual boundaries of the site (Map 1). We asked about first home and second home ownership within the boundaries of the site in the survey which made it possible to create a subsample used in comparing strength of place attachment (see Section 4.2.4). A total of 1500 survey invitations were sent each to the Kvarken Archipelago area in Finland and the High Coast in Sweden. The language options of the survey were Swedish, Finnish and English. The translations of survey items were created and cross-checked by the co-authors of this article and by an external person, who is fluent in all three languages. The survey included a map of the transnational World Heritage Site to clarify the boundaries of the site. The wording of the survey asked respondents to relate their answers to the area of the World Heritage Site and its immediate surroundings with respect to national sides of the site. The age group targeted was 18–80 years old. The sent invitation was a physical postcard that included a link to an online survey. A reminder was sent in November 2020 in the form of a letter and a possibility to request a paper copy of a survey was offered. Five additional responses were gained through mailing paper copies of the survey.

### 3.3 | Data analysis

The survey data were analysed by using SPSS version 25. The responses to negatively worded statements were reversed, and item means were normalised.

#### 3.3.1 | Internal consistency and reliability of place attachment measures

The validity and reliability of all the scales (place identity, place dependence, nature bonding, family bonding, friends bonding,

epistemic bonding) were tested individually using exploratory factor analysis (EFA) with maximum likelihood extraction and oblique rotation. Instead of confirmatory factor analysis (CFA), EFA was used for the place attachment scales to ensure that the established constructs applied to the study population (Fabrigar et al., 1999). Each dimension was treated as a separate factor. Raymond et al. (2010) tested and validated the scales of statements for the other five dimensions of place attachment, and therefore, EFA was conducted individually for each scale to check their fit to the data while maintaining the theoretical structure of the instrument. Construct-specific, item-level analysis enhanced scale refinement by revealing items with weak loadings, thereby improving the dimensionality, internal consistency and reliability of each factor. The minimum accepted factor loading was set at 0.7 to ensure construct validity and the maximum cross-loading was 0.25 (Hair et al., 2010). The internal consistency and reliability of scales were tested with reliability analysis aiming at Cronbach's alphas higher than 0.7 indicating acceptable internal consistency (Nunnally & Bernstein, 1994). The dimensions of place attachment were examined separately for subsequent analyses to provide an analysis of the relationships between the dimensions and other tested variables such as age, length of residency and management preferences for the World Heritage Site.

#### 3.3.2 | Construct validity and mean differences

Factor scores obtained from the factor analyses were used to test for construct validity of place dimensions. Pearson correlations were run between the five existing dimensions to epistemic bonding for the whole data set and for each country. To determine if the epistemic bonding construct differed from the other five dimensions, paired *t*-tests were run for the normalised item means of paired constructs (epistemic bonding and place attachment dimensions).

#### 3.3.3 | Convergent validity between epistemic bonding and other respondent variables

Factor scores of place attachment dimensions were correlated with other respondent variables (length of residency, age and family history in the area) for each country separately. For the first two variables, Pearson correlation was used, while the impact of family history was measured with Spearman's rho.

#### 3.3.4 | Comparisons of place attachment between countries

Independent *t*-tests were run for normalised item means of place attachment dimensions to examine differences between countries. The comparison was conducted for the whole data set and as

a subsample of respondents who live and/or have a second home within the actual borders of the World Heritage Site to consider the distance from the area.

### 3.3.5 | Epistemic bonding in relation to views on management

Six statements were used to investigate views on management either focusing on the preference of nature protection or human activity in the area. Responses indicating negative stance (response options 1=strongly disagree, 2=disagree) and responses indicating positive stance (4=agree, 5=strongly agree) were combined. Responses were cross-tabulated and descriptively explored between countries. The three groups (negative, neutral and positive) were tested against epistemic bonding with one-way ANOVA tests. Identified differences were further studied with independent sample t-tests between negative and positive groups.

## 4 | RESULTS

### 4.1 | Respondent characteristics

The total number of usable responses was 306 with 126 Finnish and 180 Swedish respondents, which equals to a total of 10.2% response rate. The response rate was lower than aimed (circa 400 respondents in each site would have ensured generalisability with a 5% margin of error). The sample is not fully representative (Table 2). In both samples, there is an overrepresentation of highly educated respondents compared to the whole population (higher education

in Finland: sample 52.4%, whole population 26.6%; Sweden: sample 69.4%, whole population 29.3%). Also, older people (Finland sample over 60 years old 41.3%; Sweden sample 63.3%) and a higher proportion of men answered the survey in both regions (Finland 55.6% men; Sweden 56.1% men). The Swedish respondents could not be compared to the demographics of the postal code sample because these data were not publicly available. The demographics of the region presented in Table 2 include population from the bigger cities in the area, which most likely have younger age structures than the actual sample population.

### 4.2 | The relationship of epistemic bonding to place attachment dimensions

#### 4.2.1 | Survey scales

The EFA was run for the combined Finnish and Swedish data due to the low number of respondents per country (<200, see Knekta et al., 2019). The EFA revealed that the epistemic bonding scale had internal consistency and reliability. All the item factor loadings were >0.7 and Cronbach's alpha >0.7 (Table 3). This was also the case with applied place identity, place dependence and friends bonding scales. One item ('I would feel less attached to the area if native plants and animals that lived here disappeared.') was removed from the nature bonding scale due to lower factor loading (0.624), which also increased Cronbach's alpha of the scale ( $\alpha=0.785$ ). Also, one item ('Without my relationships with family in the area, I would probably move.') was excluded from the family bonding scale due to low factor loading (factor loading=0.172), yet the reliability of the scale remained low ( $\alpha<0.7$ ).

TABLE 2 Respondent characteristics in comparison to the demographics of the study region.

| Country                 | Finland                                                      |                                                                                                     | Sweden                                                      |                                                                                                        |
|-------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Population              | Survey respondents                                           | Region (based on demographic information from the postal code areas used in sampling <sup>a</sup> ) | Survey respondents                                          | Region (based on demographic information across Örnköldsvik and Kramfors municipalities <sup>b</sup> ) |
| Age                     | 18–34 years: 11.1%<br>35–59 years: 43.7%<br>60+ years: 41.3% | 18–34 years: 20.1%*<br>35–59 years: 44.6%*<br>60+ years: 35.3%*                                     | 18–34 years: 5.6%<br>35–59 years: 29.4%<br>60+ years: 63.3% | 18–34 years: 23.9%***<br>35–59 years: 41.8%***<br>60+ years: 35.5%***                                  |
| Gender                  | 43.7% Women<br>55.6% Men                                     | 49% Women<br>51% Men                                                                                | 41% Women<br>56.1% Men                                      | 50% Women***<br>50% Men***                                                                             |
| Highest education level | 43.6% Secondary degree<br>52.4% Higher education             | 54.0% Secondary degree<br>26.6% Higher education                                                    | 17.8% Secondary degree<br>69.4% Higher education            | 52.2%****<br>Secondary degree<br>29.3%****<br>Higher education                                         |
| Current life situation  | 62.7% Employed<br>30.9% Pensioned<br>2.4% Student            | 60.6%** Employed<br>30.8%** Pensioned<br>7.8%** Student                                             | 38.9% Employed<br>51.7% Pensioned<br>3.3% Student           | 62.80%*****<br>Employed                                                                                |

Note: \* of the population over 18 years; \*\* of the population over 14 years old; \*\*\* of the population 18–80 years old; \*\*\*\* of the population 16–74 years old; \*\*\*\*\* of the population of Västernorrlands county, 15–74 years old.

<sup>a</sup>Source: Statistics Finland, 2021.

<sup>b</sup>Source: Statistics Sweden, 2021.

TABLE 3 Epistemic bonding scale and the dimensions of place attachment.

| Survey item                                                                                                             | Cronbach's alpha | Factor loading | Item mean | Standard deviation | n   |
|-------------------------------------------------------------------------------------------------------------------------|------------------|----------------|-----------|--------------------|-----|
| <i>Epistemic bonding</i>                                                                                                | 0.86             |                |           |                    |     |
| My knowledge about the area <sup>a</sup> is an important part of my connection to it                                    |                  | 0.761          | 3.50      | 1.075              | 304 |
| I have more knowledge about the area than other places in the world                                                     |                  | 0.789          | 3.57      | 1.147              | 304 |
| The knowledge I obtain through my connection with others in the area helps to define who I am                           |                  | 0.793          | 2.91      | 1.104              | 303 |
| I have knowledge about the natural environment of the area                                                              |                  | 0.711          | 3.79      | 0.871              | 305 |
| My knowledge of the area is created through interaction with the local environment and community                        |                  | 0.792          | 3.55      | 1.005              | 303 |
| It would be difficult to gain as deep knowledge of other places as I have of the area                                   |                  | 0.771          | 2.99      | 1.130              | 305 |
| <i>Place identity</i>                                                                                                   | 0.92             |                |           |                    |     |
| The area is very special to me                                                                                          |                  | 0.745          | 4.38      | 0.869              | 305 |
| The area means a lot for me                                                                                             |                  | 0.887          | 4.27      | 0.861              | 303 |
| I am very attached to the area                                                                                          |                  | 0.884          | 4.09      | 0.948              | 305 |
| I identify strongly with the area                                                                                       |                  | 0.884          | 3.56      | 1.134              | 301 |
| Living in/close to the area says a lot about who I am                                                                   |                  | 0.810          | 3.64      | 1.068              | 305 |
| I feel that the area is part of me                                                                                      |                  | 0.745          | 3.80      | 1.111              | 303 |
| <i>Place dependence</i>                                                                                                 | 0.86             |                |           |                    |     |
| No other place can compare to the area                                                                                  |                  | 0.734          | 3.39      | 1.208              | 304 |
| The area is the best place for activities I like to do                                                                  |                  | 0.891          | 3.4       | 1.086              | 302 |
| Doing my activities in the area is more important to me than doing them in any other place                              |                  | 0.863          | 3.47      | 1.004              | 302 |
| I would not substitute any other area for the activities I do in this area                                              |                  | 0.880          | 3.03      | 1.174              | 302 |
| <i>Nature bonding</i>                                                                                                   | 0.79             |                |           |                    |     |
| When I spend time in the natural environment of the area, I feel a deep feeling of oneness with the natural environment |                  | 0.836          | 4.03      | 0.876              | 303 |
| I learn a lot about myself when spending time in the natural environment of the area                                    |                  | 0.831          | 3.43      | 0.880              | 304 |
| I am very attached to the natural environment in the area                                                               |                  | 0.841          | 4.27      | 0.869              | 303 |
| <i>Friend bonding</i>                                                                                                   | 0.75             |                |           |                    |     |
| Belonging to volunteer groups/associations/organisations in the area is very important to me                            |                  | 0.895          | 2.70      | 1.089              | 303 |
| The friendships developed by doing various community activities strongly connect me to the area                         |                  | 0.895          | 3.04      | 1.163              | 303 |
| <i>Family bonding</i>                                                                                                   | 0.62             |                |           |                    |     |
| I live in/close to the area because my family is here.                                                                  |                  | 0.852          | 3.61      | 1.331              | 305 |
| My relationships with my family in the area are very special to me.                                                     |                  | 0.852          | 3.83      | 1.096              | 304 |

<sup>a</sup>The word 'area' was replaced with the world heritage site 'Kvarken Archipelago' in the survey sent to Finland and with 'High Coast' in the survey sent to Sweden.

#### 4.2.2 | Construct validity and mean differences

Bivariate correlations were run between epistemic bonding and the other five place attachment dimensions using factor scores (Table 4, Supporting Information). The epistemic bonding dimension was found to positively correlate with the other place attachment items ( $r=0.57$ – $0.68$ ). The highest correlation among all the responses was found between place identity and epistemic bonding, and place dependence and epistemic bonding (both  $r=0.68$ ). Yet, in Finland, place dependence and epistemic bonding had the highest correlation ( $r=0.77$ ). The paired *t*-test run for normalised item means between epistemic bonding and the other place attachment dimensions showed statistically significant mean differences between the responses of epistemic bonding and all the other place attachment dimensions ( $p<0.05$ ). The smallest mean difference was between place dependence and epistemic bonding (0.013). This indicates that epistemic bonding is not captured by the other place attachment dimensions.

#### 4.2.3 | Epistemic bonding and other respondent variables

Correlations were calculated between respondent variables (length of residency, age, family history) and factor scores for each place attachment dimension (Table 5) to explore how these variables relate to epistemic bonding and other dimensions of place attachment. These variables were chosen because they are often associated with higher place attachment. Significant positive correlations were found between length of residency and epistemic bonding (Finland  $r=0.428$ , Sweden  $r=0.270$ ,  $p<0.01$ ) as well as with family bonding (Finland  $r=0.302$ , Sweden  $r=0.912$ ,  $p<0.05$ ) in both countries. In Finland, length of residency positively correlated with place identity and place dependence, too. Respondents' age had a significant but weak positive correlation with epistemic bonding and family bonding in Finland (Epistemic bonding  $r=0.220$ , Family bonding  $r=0.183$ ,  $p<0.05$ ), and with friends bonding in Sweden ( $r=0.167$ ,  $p<0.05$ ). Having family history in the area (measured as a perception) was found to have significant, moderate positive correlation with all the dimensions in both countries ( $p<0.01$ ) except with friends bonding in Sweden. The positive correlation was systematically higher in relation to all items in Finland than in Sweden (Table 4).

#### 4.2.4 | Differences in place attachment between countries

The differences between countries for the place attachment dimensions were tested for the whole sample and a subsample of respondents living or having a second home within the borders of the World Heritage site with the independent samples *t*-test using normalised item means. In the whole sample, Swedish respondents had statistically significantly higher place attachment and epistemic bonding throughout all the dimensions (all the dimensions  $p<0.01$ ; see

TABLE 4 Factor score correlation between epistemic bonding and other place attachment dimensions.

| Construct 1       | Construct 2      | Factor score correlation | Factor score correlation Sweden | Factor score correlation Finland | Paired mean difference (n) | Standard deviation | p          |
|-------------------|------------------|--------------------------|---------------------------------|----------------------------------|----------------------------|--------------------|------------|
| Epistemic bonding | Place identity   | 0.68                     | 0.60                            | 0.74                             | -0.07 (304)                | 0.09               | 7.122E-34  |
| Epistemic bonding | Place dependence | 0.68                     | 0.58                            | 0.77                             | 0.013 (304)                | 0.11               | 0.026      |
| Epistemic bonding | Nature bonding   | 0.61                     | 0.53                            | 0.64                             | -0.069 (304)               | 0.10               | 7.723E-29  |
| Epistemic bonding | Friends bonding  | 0.57                     | 0.52                            | 0.60                             | 0.09 (303)                 | 0.15               | 1.531E-22  |
| Epistemic bonding | Family bonding   | 0.49                     | 0.41                            | 0.54                             | -0.031 (304)               | 0.14               | 1.348E-004 |

TABLE 5 Correlations between respondent variables and place attachment dimensions in Finland and Sweden.

| Variable                                                                                                            | Epistemic bonding |         | Place identity |         | Place dependence |        | Nature bonding |        | Friends bonding |        | Family bonding |        |
|---------------------------------------------------------------------------------------------------------------------|-------------------|---------|----------------|---------|------------------|--------|----------------|--------|-----------------|--------|----------------|--------|
|                                                                                                                     | Finland           | Sweden  | Finland        | Sweden  | Finland          | Sweden | Finland        | Sweden | Finland         | Sweden | Finland        | Sweden |
| Country                                                                                                             |                   |         |                |         |                  |        |                |        |                 |        |                |        |
| Length of residency (years)                                                                                         | 0.428**           | 0.270** | 0.251**        | 0.139   | 0.292**          | 0.056  | 0.177          | 0.047  | 0.046           | 0.004  | 0.302**        | 0.192* |
| Pearson <i>r</i>                                                                                                    |                   |         |                |         |                  |        |                |        |                 |        |                |        |
| Age (years)                                                                                                         | 0.220*            | 0.103   | 0.041          | -0.060  | 0.021            | 0.046  | 0.036          | -0.55  | 0.033           | 0.167* | 0.183*         | -0.075 |
| Pearson <i>r</i>                                                                                                    |                   |         |                |         |                  |        |                |        |                 |        |                |        |
| 'In my family history there are connections to the area' (1 = strongly disagree, 5 = strongly agree) Spearman's rho | 0.516**           | 0.450** | 0.544**        | 0.361** | 0.534**          | 0.190* | 0.415**        | 0.232* | 0.339**         | 0.21   | 0.445**        | 0.277* |

\**p*-value < 0.05. \*\**p*-value < 0.01.

Supporting Information). In the subsample, the differences were not significant ( $p > 0.05$ ; see Supporting Information).

### 4.3 | Associations between ecosystem management options and epistemic bonding in each country

Management preferences were captured with statements that related broadly to preferences regarding official nature protection in the area (Figure 1). Statements 1–3 emphasised the role, experiences and rights of local inhabitants, and the statements 4–6 related to nature protection and maintaining nature values. Similar trends were detected in the statements 1 and 4 in which most respondents considered taking local inhabitants' needs better into account in the management but also emphasizing nature values in the management and development of the area as important. The differences in responses between Finland and Sweden appear in the statements 3, 5 and 6. Swedish respondents are more likely to agree with official nature protection and consider that nature values should be prioritised over local inhabitants' influence in the World Heritage Site (Figure 1).

One-way ANOVA tests were used to identify significant differences in the strength of epistemic bonding between three groupings of viewpoints (agreement, neutral, disagreement) regarding each statement. In the Swedish data, differences between groups were not significant. In the Finnish data, differences between groups were found regarding each statement.

In the Finnish data, independent-sample *t*-tests were used to compare respondents who agreed or disagreed with each statement in relation to epistemic bonding. Agreement with statements 1–3, which emphasised local inhabitants' influence, was associated with higher epistemic bonding. Higher agreement with statements 4–6, which focused on nature values and protection, was associated with lower epistemic bonding (Table 6). When tested across all place attachment dimensions, some of the dimensions indicated differences in relation to the statement as follows:

- Statement 1: place dependence, family bonding
- Statement 3: place identity, place dependence, friends and family bonding
- Statement 4: place dependence
- Statement 5: place identity, place dependence, friends and family bonding
- Statement 6: place identity, place dependence

These patterns mirrored the epistemic bonding results: agreement with statements 1 and 3 and disagreement with 4–6 corresponded to higher place attachment through the above-mentioned dimensions. However, epistemic bonding was the only dimension showing a significant difference for statement 2 ( $p = 0.002$ : 'The development of the area focused too much on natural sciences, forgetting the cultural history and lived experience') and the only measure consistently differentiating agreement and disagreement across all statements.

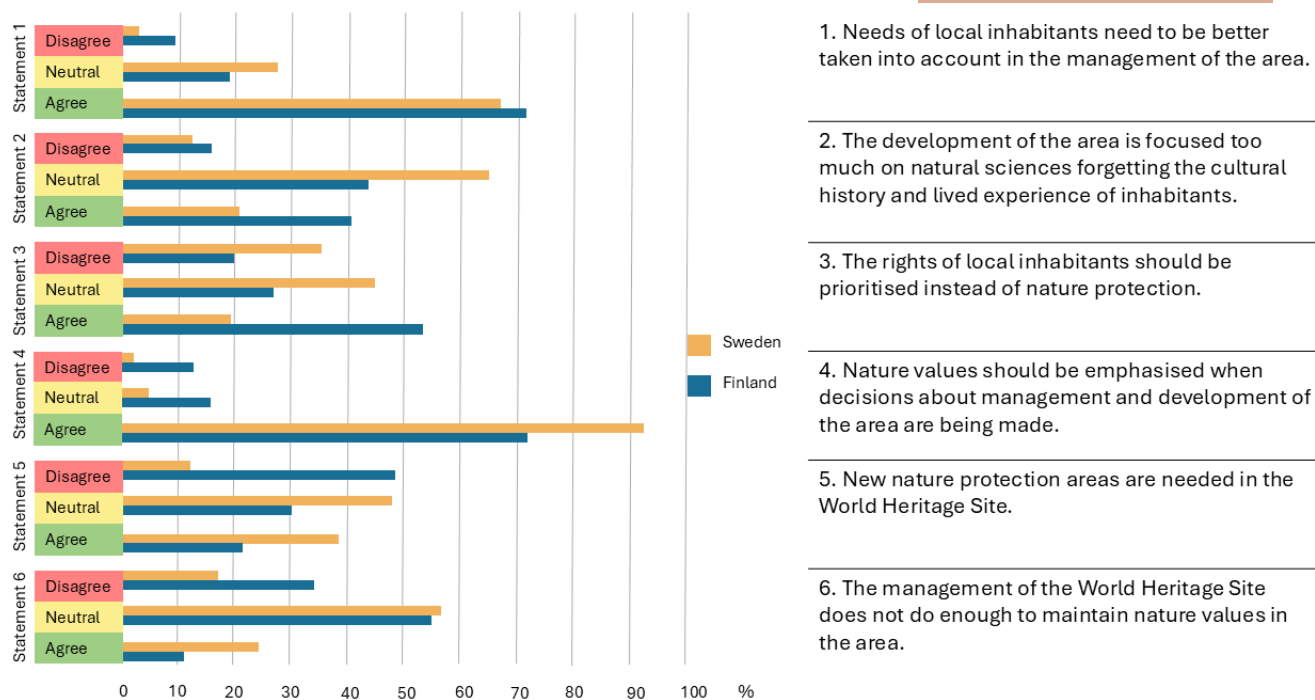


FIGURE 1 Proportional answers to the statements about views on management for each country.

TABLE 6 Mean differences in epistemic bonding between agreement and disagreement with management preferences in Finland.

| Mean difference in epistemic bonding between agree/disagree                                                              | Std. error difference | p-value  | CI lower/upper | N (disagree/agree) |
|--------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|----------------|--------------------|
| <b>Statements emphasising on locals' role and rights</b>                                                                 |                       |          |                |                    |
| 1. Needs of local inhabitants need to be better taken into account in the management of the area.                        |                       |          |                |                    |
| -0.121                                                                                                                   | 0.040                 | 0.003    | -0.199/-0.042  | 12/90              |
| 2. The development of the area focused too much on natural sciences forgetting the culture history and lived experience. |                       |          |                |                    |
| -0.092                                                                                                                   | 0.029                 | 0.002    | -0.150/-0.034  | 20/51              |
| 3. The rights of local inhabitants should be prioritised instead of nature protection.                                   |                       |          |                |                    |
| -0.123                                                                                                                   | 0.028                 | 3.466E-5 | -0.179/-0.067  | 25/67              |
| <b>Statements emphasising nature protection and restrictions</b>                                                         |                       |          |                |                    |
| 4. Nature values should be emphasised when decisions about the development of the area are made.                         |                       |          |                |                    |
| 0.085                                                                                                                    | 0.036                 | 0.021    | 0.0131/0.158   | 16/90              |
| 5. New nature protection areas are needed in the World Heritage Site.                                                    |                       |          |                |                    |
| 0.143                                                                                                                    | 0.032                 | 7.374E-5 | 0.078/0.207    | 61/27              |
| 6. The management of World Heritage does not do enough to maintain nature values in the area.                            |                       |          |                |                    |
| 0.125                                                                                                                    | 0.046                 | 0.015    | 0.028/0.221    | 43/14              |

## 5 | DISCUSSION

### 5.1 | Epistemic bonding and place attachment

This study contributes to identifying and quantitatively assessing how individuals create bonds to place through their knowledge. Furthermore, it builds quantitative understanding of the epistemic dimension of people-place relationships in relation to the

established dimensions of place attachment. The created scale of six statements for epistemic bonding had high reliability and internal consistency (see Table 3). Similarly, the scales for place identity, place dependency, nature and friend bonding had high reliability and internal consistency. However, the family bonding scale had low reliability; therefore, this dimension is excluded from the following discussion. Below, we present the key findings of our comparison of epistemic bonding and place attachment dimensions.

### 5.1.1 | Epistemic bonding in relation to place attachment dimensions

Epistemic bonding showed the strongest relationship with place identity and place dependence (Table 4). This suggests that the cognitive and emotional processes that form place identity (Proshansky et al., 1983) and the functional attachment created through activities, as seen in place dependence (Stokols & Shumaker, 1981), both contribute to our knowing and knowledge of places and vice versa.

The observed link between epistemic bonding and place dependence demonstrates how knowledge and action are closely intertwined (Ingold, 2011). Not only does knowledge enable action but it also emerges from it (Funke, 2017). Therefore, participating in activities within a place can help establish a functional connection, which in turn strengthens epistemic bonding. Similarly, the association between epistemic bonding and place identity highlights how knowledge acquisition and identity formation are intertwined in our relationship with place. Knowledge is closely linked to identity and the sense of self (Gao & Riley, 2010). Importantly, the creation of knowledge is a subjective process, shaped by personal beliefs, interests, attitudes and values (Abson et al., 2017; Horcea-Milcu et al., 2019; Ives et al., 2018). For example, developing ecological knowledge has been shown to foster identity and enhance place attachment among fishers and farmers (Worster & Abrams, 2005).

The correlation between nature bonding and epistemic bonding, although weaker, may reflect a similar dynamics in relation to ecological knowledge: spending time in nature fosters emotional and cognitive connections that contribute to epistemic bonds. This idea is supported by Raymond et al. (2011), who found that nature bonding often develops through repeated, meaningful experiences in natural settings, which presumably also build knowledge of and in place.

Friend bonding had a weak positive correlation with epistemic bonds. Societal knowledge related to social networks, for example, can form part of local knowledge in the study region (Hakkarainen et al., 2022). However, local knowledge was found to be more commonly perceived as relating to physical or action-based components (e.g. livelihoods) (Hakkarainen et al., 2022), which may explain the weaker correlation between these two constructs. However, Castro (2021) discusses how the social dimension of knowledge processes where epistemic bonds are created through learning and exchange with locals but also external experts such as scientists highlights the dynamic and socially embedded nature of creating such bonds.

### 5.1.2 | Epistemic bonding in relation to the length of residency, family history and age

There were differences in the relationship between epistemic bonds and length of residency when compared with the findings on place identity and dependence (Table 5). While epistemic bonding was consistently positively correlated with length of residency across

the study sites, place dependence and identity were only positively associated with length of residency in Finland. This finding highlights the distinct nature of epistemic bonding compared to place identity and dependence, adding nuance to our understanding of their interdependence. While the evidence is mixed, it is generally considered that the longer the length of residency, the stronger the place attachment. However, this may vary between place attachment dimensions (Lewicka, 2011b). For example, Raymond et al. (2011) found that nature bonding was not related to length of residency in the area. However, in terms of knowledge processes, local and traditional ecological knowledge particularly accumulate over longer periods of time (Berkes, 2008), so time is important in forming deep epistemic bonds to a place.

Having a family history in the area was associated with all the place attachment dimensions in both countries, except friend bonding in Sweden (see Table 5). It was a particularly strong indicator of epistemic bonding in Sweden compared to the other dimensions of place attachment. Interest in place history has been shown to indicate stronger place attachment (Lewicka, 2014; Stefaniak et al., 2017). Therefore, having family history in an area may stimulate this interest, thereby contributing to place attachment. Furthermore, family history can contribute to the formation of stronger epistemic bonds because local knowledge is transmitted through oral stories and the intergenerational sharing of knowledge about past experiences (Brook & McLachlan, 2008). Similarly, Castro (2021) emphasises 'the voices from the past' that play into the integration of multiple sources of knowledge and weaving bonds to a place. The epistemic dimension therefore has the potential to be formed beyond individual experience of a place through the collective sharing of stories, memories and knowledge. Additionally, age did not emerge as a strong predictor of epistemic bonding in our results. This aligns with previous findings that the relationship between age and place attachment is inconsistent and varies depending on the type of bond examined (Lewicka, 2011b).

Together, these findings relating to length of residence and family history emphasise the distinctive nature of epistemic bonding compared to other dimensions of place attachment. Knowledge of a place is acquired through routines and shared, collective practices over time (Felder, 2021) and has an intergenerational element that is not always present in other dimensions of place attachment.

### 5.1.3 | Comparing epistemic bonding and the dimensions of place attachment across countries

When considering only the subsample of respondents who owned homes or second homes within the boundaries of the World Heritage Site, no significant differences were found in terms of the strength of place attachment or epistemic bonding between Finland and Sweden (see Supporting Information B). However, within the full sample, Swedish respondents reported higher levels of epistemic bonding, which can be explained by more first and second homeowners within the actual boundaries of the World Heritage

site in our sample. This difference may be explained by the role of home ownership in fostering place attachment (Lewicka, 2011b). Additionally, the geographic context may influence bonding; the Finnish side of the site is located on remote islands, whereas the Swedish side is on the mainland and more easily accessible (see Map 1). If epistemic bonds are formed through direct, place-based experiences such as, for example, nature bonding that increases with time spent in nature (Raymond et al., 2011), limited access to the site may prevent Finnish respondents living outside the area from engaging with it meaningfully and developing strong bonds compared to their Swedish counterparts. In the context of the emerging field of studying the sense of place and mobility nexus (Gottwald et al., 2024), this finding provides space for future exploration of how different types of mobilities shape epistemic bonding.

#### 5.1.4 | Epistemic bonding as a part of senses of place

It is important to critically consider how epistemic bonding can improve our understanding of the people-place relations. The results demonstrate some distinct characteristics of epistemic bonding that differ from those of place attachment. This follows the reasoning of Castro (2021), who proposed that epistemic bonds should be considered an additional layer of place attachment and place meanings within the field of senses of place scholarship. Building on previous research, our results show that epistemic bonding is a property of people-place relationships, emerging not only from cognitive processes (Scannell & Gifford, 2010) but also from embodied connections within the local environment and community (Felder, 2021). Furthermore, this study demonstrates that epistemic bonds are strengthened through intergenerational connection to a place through family history.

We consider that epistemic bonding has a special nature which is not captured by place meanings and the emotional connections forming place attachment in the senses of place literature. It has been constituted that meanings turn information into knowledge (Tàbara & Chabay, 2013), in which place has a profound significance as anchoring the interpretation of information (adding meaning to information and turning it into knowledge) in the beliefs of individuals (Nonaka et al., 2000). If place attachment in turn 'rests on symbolic meanings' of place (Stedman, 2002, p. 563), epistemic bonding rests on the ways in which knowledge is structured by these meanings.

In this sense, the epistemic dimension of people-place relationships complements and extends the divide of senses of place into place meanings and attachment. It emphasises the role of knowledge not just as a product of experience, but also as a foundational component of forming place bonds. This broader perspective fosters a more relational, dynamic and interconnected view of senses of place, where knowledge is co-constructed through individuals' immersion in personal, social and environmental contexts (Berroeta et al., 2021; Cooke et al., 2016). Consequently, knowledge about and

of a place is formed through the interaction of the mind, body and environment over time (Cooke et al., 2016).

## 5.2 | Epistemic bonding and views on management

This study operationalised the concept of epistemic bonding by linking it to respondents' views of management options for the World Heritage Site. In the Finnish data, clear patterns emerged between epistemic bonding and management preferences (see Table 6). Epistemic bonding was the only construct that consistently showed significant differences between those who agreed and those who disagreed with all the statements. Notably, the statement regarding the dominance of natural sciences over cultural history and lived experience ('The development of the area focused too much on natural sciences, forgetting cultural history and lived experience') was only associated with epistemic bonding. Overall, stronger epistemic bonds were associated with a preference for less official nature regulation in the World Heritage Site. These findings suggest that epistemic bonding plays a key role in shaping perspectives on knowledge interfaces and governance processes as these are domains that fundamentally operate within the epistemic sphere (Molen, 2018). These findings also align with previous research that has emphasised the importance of local knowledge and the conflict between local and top-down management and governance approaches in the study area. Studies from the Finnish side of the site, in particular, report on the strong narrative among local inhabitants of the importance of including local knowledge in site management and the still ongoing contestations stemming from the implementation of the Natura 2000 sites in the late 1990s (Hakkarainen et al., 2022; Svells, 2017). In the Swedish site, instead, the status of World Heritage site has not been connected to similar recognition issues and contestations between top-down management and lived local experience—rather the High Coast area was already an active tourist destination before gaining the World Heritage status. The current concerns relate to the potential impact of increased tourism on nature, which indicates partly differing management concerns between the sites.

The findings of the Finnish site discussed above are consistent with Castro's (2021) qualitative research on epistemic bonds, which showed similar findings in the context of the acceptance of new legislation. Different regulations and laws present new types of knowledge that are interpreted through bonds to a place, based on knowledge of that place (Castro, 2021). Epistemic bonding thus provides a bridge between senses of place in social-ecological systems (Masterson et al., 2017, 2019) and the growing body of knowledge-related research in sustainability science (Apetrei et al., 2021). This study advances the notion of epistemic bonds methodologically by operationalising the concept as an evaluative construct and makes the rather abstract notion of the epistemic dimension of people-place relationships tangible and even measurable.

### 5.2.1 | Implications of epistemic bonding for ecosystem governance

Because management decisions draw on multiple forms of knowledge, epistemic bonding can serve as a valuable indicator of how people respond to management options, especially those tied to knowledge processes. It offers a way to assess concerns related to recognition in environmental decision-making. In doing so, it helps clarify how dynamic, place-based knowledge systems interact with formal management and governance structures. The context-dependent nature of knowledge formation further underscores the importance of understanding people's relationships to place to reveal how differing perceptions of knowledge influence ecosystem governance. This highlights an embedded relationship between knowledge, place and participation, where agency in decision-making is shaped by how people come to know and relate to their places (Hakkarainen et al., 2022). As knowledge is grounded in place (Basso, 1996; Williams, 2014), how we know a place fundamentally influences our relationship to its personal, social and environmental dimensions—and vice versa. The construct of epistemic bonding provides a way to explore how different place-related experiences of knowledge shape responses to management practices. In this way, it contributes to a more plural, relational understanding of place, reflecting diverse ways of knowing as a basis for experiencing a place and informing more inclusive ecosystem governance.

Returning to the question of *how we manage places?*—this study suggests that measuring epistemic bonding helps to clarify the importance of relationships between people and places that are rooted in diverse knowledge systems and assess how management decisions are perceived through diverse knowledge–place relations. Building on previous research into senses of place (Masterson et al., 2019), which indicates that widely accepted management strategies can benefit from an understanding of people's attachment to places, our study extends this work. It suggests that addressing issues of recognition, particularly in contested spaces, requires deeper consideration of the complexities of knowledge and how individuals perceive their own knowledge and the related bonds they have formed in these places.

Management processes that fail to recognise epistemic plurality risk perpetuating epistemic injustice, as certain ways of knowing may be marginalised or dismissed, further contributing to the contested nature of particular places. Additionally, this study shows that questions of recognition and epistemic (in)justice are highly place-based. Overall, understanding the complexities of people–place–knowledge relationships can enhance the legitimacy of environmental decision-making. This, however, needs to be supported by collaborative approaches in which management strategies are shaped through the inclusion of diverse actors, values and epistemologies (McPhearson et al., 2021; Pascual et al., 2021; Wyborn et al., 2020).

### 5.3 | Limitations and future directions

Our survey data were not fully representative, making it difficult to compare the countries. The overrepresentation of highly educated

people, older age groups and men affects how 'plural' our sample was. The representativeness of the data could have been improved by increasing the number of responses, particularly from residents with less formal education. The relatively low response rate may be due to the survey distribution method: the random sample received a paper invitation, but the questionnaire was conducted online. While this did not affect the creation and testing of the epistemic bonding scale in relation to other place attachment dimensions, it limited our ability to confirm and validate the six-dimensional model using confirmatory factor analysis. As we developed a new construct, further evidence is required regarding the scale used and the epistemic dimension of senses of place in various contexts, necessitating additional cross-cultural comparisons and confirmatory and external validation studies. Furthermore, the items used to measure epistemic bonding contained more elements of dependence and identity than social and environmental elements (Section 3.2.1), which could explain why the construct is closely related to place identity and dependence. However, according to Scannell and Gifford's (2010) framework, place dependence, identity and cognition (under which knowledge can be situated) fall under the process category. Therefore, epistemic bonding is likely to be closely related to these dimensions. This suggests that senses of place are deeply tied to the ways in which people know, are and do things in their relationships with places.

The scale we developed to assess epistemic bonding is designed for personal, subjective evaluations of one's own knowledge of and connection to a place. It does not fully capture the complex, shared, practice-based processes of knowledge creation and exchange. To better understand how the different dimensions of place attachment and knowledge formation are interrelated, future research should therefore adopt qualitative methods to explore these relationships in greater depth. We also acknowledge that the study approach of psychometric measures represents a more essentialist position on senses of place that emphasizes fixity and stability over fluidity in people–place bonds. Future longitudinal research could seek to assess dynamism in epistemic bonds over different subgroups, environmental changes, cultures and/or lifestyles. Furthermore, the interconnections between place meanings and epistemic bonding create an interesting opening to understand the connections between knowledges, meanings and place.

## 6 | CONCLUSIONS

This study examined the notion of epistemic bonding, people's bonds to a place through knowledge, with a quantitative approach in a cross-boundary management context of a natural World Heritage Site in Finland and Sweden. We created and assessed the construct of epistemic bonding in relation to five place attachment dimensions. The results demonstrate that epistemic bonding can surface the interconnections between knowledges and perceptions about places and their management. Epistemic bonding can particularly inform the response of local inhabitants towards regulations and

other knowledge sources used in management decisions concerning a place. It contributes to understanding concerns of epistemic justice in the form of recognition in ecosystem governance, which should be further explored in future studies. Epistemic bonding creates a new lens to people–place relationships, which adds to the senses of place literature and complements the division of place attachment and place meanings in social–ecological systems literature.

## AUTHOR CONTRIBUTIONS

Viola Hakkarainen, Katriina Soini and Christopher M. Raymond conceived the ideas and designed methodology; Viola Hakkarainen collected the data, analysed the data and led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

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## CONFLICT OF INTEREST STATEMENT

The authors have no competing interests to declare that are relevant to the content of this article.

## DATA AVAILABILITY STATEMENT

High Coast/Kvarken (SWE/FIN) World Heritage Site Survey Dataset on Place Attachment [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.5243244> (Hakkarainen, 2021).

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**Supporting Information A.** Factor score correlations between epistemic bonding and place attachment dimensions within the whole sample and in each country.

**Supporting Information B.** Differences in the strength of place attachment.

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