



Connections among Puget Sound Residents' Psychological Restoration from Natural Environments, Place Attachment, and Beliefs about Environmental Governance

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Abstract

Psychological restoration and place attachment may be related to beliefs about environmental governance, with place attachment a likely mediator. We analyze data from a public survey in the Puget Sound area of Washington state ($n = 2323$) regarding beliefs about environmental governance, place attachment to the Puget Sound area, and psychological restoration related to this area. On average, individuals felt neutral in their beliefs about environmental governance, had high place attachment, and had high frequency of psychological restoration in natural environments. Structural equation modeling indicated that those who more frequently experienced psychological restoration from natural environments had stronger place attachment and more positive beliefs about environmental governance. Place attachment was significantly associated with governance perceptions, but explained only a small portion of variance ($R^2 = 0.02$), while psychological restoration was significantly associated with place attachment and explained a moderate portion of its variance ($R^2 = 0.37$). Place attachment fully mediated the effects of frequency of psychological restoration on beliefs about governance. Promoting psychological restoration and place attachment without attending to the process factors associated with good governance would not likely be a viable strategy for environmental managers to substantially increase positive beliefs about environmental governance.

Keywords Psychological restoration · Place attachment · Structural equation modeling · Governance · Environmental management

Introduction

Principles of governance have been identified as important for assessing environmental management and decision making (Lankford et al. 2010; Foo et al. 2015). Individual beliefs around environmental governance represent individual consent or dissent with how the natural environment is managed. These beliefs, if measured, can act as "... social indicators [that] can help managers track patterns in public perceptions of environmental conditions as well as shifts in the social forces shaping support for different

types of policies" (Safford et al. 2014). They can provide a driving force for change when individuals believe strongly one way or the other, and governance systems act to align with beliefs (Safford et al. 2014). Favorable beliefs can lead to support for environmental governance. Bennett et al. (2019) found that when surveyed on subjective perceptions of support for a fisheries conservation initiative, locals' support connected most highly to perceptions of good governance and social impacts. Whether the initiative was ecologically effective held less importance in terms of positive perceptions. Similarly, Gross-Camp et al. (2012) found the effectiveness of an environmental management policy, in this case payments for ecosystem services, was predicated on beliefs about legitimacy and fairness of the system. Without governance systems understanding the thoughts of citizens, they are unable to meet the will of the people.

Beliefs are cognitive responses that are comprised of an individual's knowledge, opinions, or inferences about things they believe to be true (Eagly and Chaiken 1993).

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Individuals indicate supportive beliefs for governance when the outcomes are what they favor (Esaiasson et al. 2019). Many psychological factors relate to beliefs such as values, emotion, or attitudes (Dahlstrand and Biel 1997; Devine-Wright and Howes 2010; Hagger et al. 2020). This article seeks to understand if two cognitive factors, place attachment and psychological restoration, are related to beliefs about environmental governance. Connection to a place, or place attachment, represents a person's bond with the environment (Stedman 2002). Individuals may form these bonds to nature because natural environments can provide cognitive benefits in the form of psychological restoration (Hartig et al. 2007). Because of these perceived benefits, place attachment to specific environments and the experience of psychological restoration from those environments may influence the beliefs individuals carry about the way those environments are managed.

Conceptual Foundations

Beliefs about Governance

Governance does not have one clear definition but rather several meanings depending on whether the theoretical lens used is public administration, policy, or good governance (Pierre 2000; Rhodes 2007; Kjær 2008). In general, governance includes the set of systems and institutions that allow collaboration for policy, management, and decision making in society (Forrer et al. 2014) and is dependent on networks including non-state actors (Kjær 2008). Data on governance systems, their users, and the interactions between them helps to understand costs and benefits that can lead to improved policy (Ostrom 2009). Environmental governance specifically can be defined as “the use of institutionalized power to shape environmental processes and outcomes” (Delmas and Young 2009). It is the process by which ecosystem services are managed for people and natural conservation (Natural Resource Governance Framework 2016). Environmental governance systems are currently trending to more inclusive and collaborative forms which involve many non-state actors in decision making (Koontz and Thomas 2006; Ansell and Gash 2018).

The theoretical framework in which governance beliefs are measured is based on the concept of good governance, which considers the qualities that most impact the quality of life of an institution's citizens (World Bank 2005; OECD 2017). These qualities include accountability, transparency, and lack of corruption and are frequently measured using existing social indicators and expert opinion. For example, the World Bank Governance indicators measure items such as political freedom and government corruption using already available indices (World Bank 2005). Good governance can

also be measured by the beliefs of those affected by governance processes.

Beliefs about environmental governance represent citizens' favorable or unfavorable opinions about the way natural resources are managed. Beliefs about general governance have been measured as support for governance, trust in governance, or beliefs in the legitimacy of governance actors (Dellmuth and Schlipphak 2020). Analyses by Verhaegen et al. (2021) showed that overall satisfaction with international governance organizations “...most consistently related to legitimacy beliefs.” And Doherty and Wolak (2012) found people's beliefs about the fairness of governance decisions were not only an indicator of favorable beliefs toward governance, but actually correlated with the objective characteristics of policies. Finally, Turner et al. (2016) found that beliefs about governance legitimacy were based most highly on trust in information from governing bodies, equity of outcomes, and confidence in the performance of institutions. Environmental governance specifically has been measured with similar variables for legitimacy, inclusivity, transparency, and accountability (Lockwood et al. 2010; Biedenweg et al. 2017). For example, Biedenweg et al. (2017) found that trust and representation were important indicators of good environmental governance to a variety of local citizens in three regions of the Puget Sound of Washington State.

Place Attachment

People's attachment to place can influence how individuals perceive the environment, its management, and “...how responses by governments and other agencies are deemed to be appropriate, legitimate, or fair” (Quinn et al. 2015). Place attachment is one component of the broader idea of sense of place, which comes from studies in human geography, where scholars define it as the relationship between an individual and the meaningful relationship they have with places (Relph 1976; Tuan 1977; Buttner and Seamon 2015). Place attachment, although defined in many ways over the past few decades, can be summarized using the person-process-place framework, where the person is defined as personal meanings associated with place, the process is the affective and cognitive processes that influence attachment, and the place is defined by its relevant characteristics (Lewicka 2011; Scannell and Gifford 2010). In contexts concerning both people and the environment, place attachment is made up of at least two dimensions: place identity and place dependence (Williams and Vaske 2003; Masterson et al. 2017). Place identity refers to the extent to which a place contributes to an individual's identity related to a physical setting, and place dependence is the extent to which a place satisfies the needs and helps an individual meet their goals (Masterson et al. 2017).

Previous research has shown connections between aspects of governance and place attachment. Mehnen et al. (2013) found in a study about the governance of a German nature park that stronger place attachment of individuals participating in collaborative governance enhanced the effectiveness of governance functioning. Conversely, individuals' connections to specific natural places may be strong enough to incite conflicts in resource management (Williams and Vaske 2003). For example, a study measuring place attachment and trust in managers in Sherburne National Wildlife Refuge indicated that an individual's attachment to place affected their civic action including time and effort they dedicated to governance proceedings (Payton et al. 2005). Edge and McAllister (2009) showed that in Canadian nature reserves, governance strategies based on promoting sense of place and place attachment fostered shared interest between governance entities to create shared goals. The connection, however, between beliefs about environmental governance and place attachment is unclear in terms of whether they are positively or negatively associated. It may be that they positively correlate—because as in one study—in areas of high place attachment, governance structures are better able to organize people (Van Marissing et al. 2006). In addition, Carrus et al. (2005) find that regional identity predicts support for policies related to protecting natural areas. Conversely, individuals' attachment to a natural area may decrease due to greater government regulations (Davenport and Anderson 2005). Yet another study found that individuals had highest place attachment in areas where they perceived governance to be poor (Clarke et al. 2018).

Psychological Restoration

In addition to place attachment, psychological restoration from natural environments has implications for environmental governance (Van Den Berg et al. 2007). Psychological restoration refers to a reduction in stress or mental fatigue (Kaplan 1995; Kaplan and Kaplan 1989). Research has indicated that natural environments have greater restorative capacity (i.e., stress reduction) compared to urban environments (Hartig and Staats 2006). As environmental governance can influence access to natural environments and outdoor recreation opportunities, this has implications for human health (Pretty et al. 2007; Weng and Chiang 2014). For example, restorative capacity of a forest was inspired more by thinned forests compared to unmanaged crowded forests (Takayama et al. 2017). For environmental governance, these connections between people's preferences for natural settings, want for outdoor recreation space, and distinction in management practices have implications for urban and sustainable growth policy over time to promote both human and environmental health (Berg et al. 2007).

Psychological restoration also has implications for place attachment. Research has indicated that areas in which individuals experience psychological restoration may be related to place attachment. Proshansky et al. (1983) first indicated that place identity, a component of place attachment, develops from positive experiences in places. Sarbin (1983) commented on this work to suggest a model of how an individual creates “emplotments” in their personal narratives, and call for methodology to study this phenomenon. Korpela (1989) based their work in part on this model to show how place identity is a product of environmental self-regulation. Other studies by Korpela related to psychological restoration and place attachment have shown individuals rating greater restoration in favorite places, and more temporal consistency in rating restorativeness in natural favorite places compared to non-natural environments (Korpela and Hartig 1996; Korpela et al. 2009). The restorativeness of an environment stems from Attention Restoration Theory that theorizes exposure to nature improves stress relief or renewed mental attentiveness (Korpela et al. 2009). Raymond et al. (2010) also found that when examining place attachment as a complex multidimensional construct, including place identity and place dependence, that nature bonding and time spent in nature as dependent variables significantly associated with place attachment.

One study indicated that future research should explore place attachment's role as a mediator (Gifford and Nilsson 2014). For example, Gosling and Williams (2010) defined and treated place attachment as environmental concern and found it fully mediated the relationship between connectedness to nature and pro-environmental behavior. Others have found connections to antecedents of behavior. Kil et al. (2012) found it to mediate the relationship between experience-based benefits from nature and behavioral intentions. In looking at why people engage in civic behaviors related to the environment, Payton et al. (2005) found using structural equation modeling (SEM) that place attachment influenced beliefs about governance, which in turn influenced the civic behaviors. Moreover, Raymond et al. (2011) found that place attachment had a stronger impact on specific beliefs than on actual behaviors using the value-belief-norm model. This study follows on the theory that place attachment is linked to consent and dissent related to specific environmental management actions (Devine-Wright, 2009; Devine-Wright and Howes 2010). Psychological restoration may relate to both place attachment and beliefs about environmental governance, but there is a lack of research on how these specific constructs connect, and if these connections exist. This article proposes to test connections between psychological restoration and place attachment as a mediator of beliefs about environmental governance.

Objectives and Hypotheses

The objective of this article is to examine relationships among place attachment psychological restoration, and beliefs about environmental governance. Two hypotheses, based on the literature, are proposed:

H₁: There will be a positive relationship between place attachment and psychological restoration related to the natural environment.

H₂: There will be a positive relationship between place attachment and beliefs about environmental governance.

We also pose the following question:

To what extent, if any, does place attachment mediate any possible effect of psychological restoration on beliefs about governance?

Methods

Study Context

The Puget Sound region, in the northwest of Washington State, has many different kinds of habitats, from marine coastlines to temperate rain forests. Ecosystem services in this region are valued at billions of dollars to the regional economy every year (Bagstad et al. 2014). The Puget Sound, though, is threatened from high levels of pollution and land use change (Georgiadis 2015). Obtaining public support for environmental intervention strategies is considered crucial to address threats to Puget Sound's environment (Ruckelshaus and McClure 2007; Puget Sound Partnership 2018). One study found a large majority of citizens support various environmental interventions to protect Puget Sound's environment (Safford et al. 2014).

The Puget Sound has complex environmental governance with federal, state, regional, and local institutions, organizations, and stakeholders all interacting. The Puget Sound Partnership is a government organization tasked with leading ecosystem restoration in the Puget Sound that measures and monitors aspects of human dimensions related to ecological restoration, including perceptions of good governance, place attachment, and psychological wellbeing related to the environment in its restoration agenda (Stinchfield et al. 2009). The complexity of this governance system is reflected by the fact that when asked who they think about when evaluating environmental governance, citizens commonly respond with large institutions such as the Washington Department of Natural Resources, the Washington Department of Ecology, the Washington Department of Fisheries and Wildlife or the Environmental Protection Agency, but also many regional and local actors such as county or city commissions (Fleming et al. 2020).

Data Collection

Data for governance beliefs, place attachment, and psychological restoration were extracted from a larger dataset used to monitor healthy human populations and a vibrant quality of life in the Puget Sound region. The Puget Sound Partnership commissioned the study as part of an ongoing environmental monitoring project in the Puget Sound. The six-page questionnaire was administered in spring 2018 by two of the authors on behalf of the agency. As the Puget Sound Partnership is a public agency, data were subsequently made available with all personally identifiable information removed. The publicly available data were used in this study.

To collect the data a random sample of 9000 general public mailing addresses was stratified across 12 counties (with 750 records per county). The sample population received a questionnaire with questions pertaining to subjective wellbeing related to natural resources including the data used in this study as well as other questions important for the Puget Sound Partnership's monitoring efforts (Appendix 1). Distribution of the questionnaire utilized a modified Tailored Design Method (Dillman et al. 2014). Postcards were sent to individuals notifying them they would receive a questionnaire in the mail. Two weeks after receiving the postcard, a packet was mailed out. Packets were not mailed to 677 addresses determined to be undeliverable after the first mailing. Packets included a letter of introduction—which provided an URL where participants could opt to fill out the questionnaire online—the paper questionnaire, a pre-paid return envelope, and a \$2 incentive. One week after packets were delivered, a second postcard was sent as a reminder.

The total number of responses was 2323. Fourteen questionnaires were started online, but no answers were recorded, and these were excluded. There were 36 individuals who called or e-mailed to voluntarily opt out and 62 of the original 9000 were found to be outside of Washington State. Excluding 709 (677 + 62), the final response rate was 28% (2323/(9000 – 709)). A nonresponse bias check was not conducted due to limited capacity and funding. As the questionnaire had such a low response rates, results should not be generalized to the region, but rather are representative of the sample.

Analysis Variables

Questionnaire items for good governance were chosen based on previously validated indicators of beliefs around good governance (Kaufmann et al. 2009; Langbein and Knack 2010; Lockwood et al. 2010; Debnath and Shankar 2014; OECD 2017). Seven questions were asked pertaining to governance of natural resources focused on trust, representation, freedom, influencing the process, and access to information (see Table 1). The questions were asked as statements

Table 1 Reliability analyses of perceptions of environmental governance and place attachment metrics toward natural resources in the Puget Sound ($n = 2323$)

Variables	Item coded	Mean (M)	Std. dev. (SD)	CFA factor loading	Item total correlation	Alpha (α) if deleted	Cronbach alpha (α)
<i>Beliefs about environmental governance^a</i>							
I have plenty of opportunities to influence environmental decisions in the Puget Sound region if I want to	V1	3.91	1.53	0.52	0.69	0.85	0.86 ^b
I have the freedom to make personal decisions about how natural resources are managed on my property ^c	V2	4.50	1.75	0.33	0.57	0.88	
I feel well represented by the leaders of Puget Sound environmental management processes	V3	4.00	1.40	0.56	0.79	0.84	
I trust regional policymakers to protect Puget Sound's natural resources	V4	3.90	1.59	0.57	0.74	0.84	
I have access to enough information regarding the social and economic consequences of how natural resources are managed in the Puget Sound	V5	4.25	1.52	0.84	0.80	0.83	
I have access to enough information regarding the environmental consequences of how natural resources are managed in the Puget Sound	V6	4.26	1.54	0.88	0.82	0.83	
I have access to enough information regarding the regulatory aspects of how natural resources are managed in the Puget Sound	V7	3.94	1.52	0.90	0.81	0.83	
<i>Place attachment^d</i>							
I am very attached to the natural environment in the Puget Sound region	V10	6.14	1.13	0.77	0.69	0.72	0.75 ^d
I am proud to live in the Puget Sound region	V11	6.27	1.11	0.67	0.73	0.71	
Living in the Puget Sound region says a lot about who I am	V12	5.47	1.44	0.73	0.78	0.70	
Being able to engage in outdoor activities or cultural practices is important to my connection to the Puget Sound	V13	5.87	1.26	0.71	0.74	0.71	
I am mostly attached to parts of Puget Sound that are nearest to me ^e	V14	5.47	1.39	0.32	0.49	0.78	
I could be satisfied living in other places outside the Puget Sound ^e	V15	3.70	1.71	0.31	0.53	0.80	
<i>Psychological restoration^f</i>							
In the past year, about how often have you felt inspiration when spending time in the outdoors of the Puget Sound Region?	V8	3.86	1.12	0.87	0.82	0.77	0.87
In the past year, about how often has spending time in the outdoors of the Puget Sound Region helped you reduce stress?	V9	3.93	1.08	0.88	0.82	0.59	

^aVariables measured on a 7-point scale from 1 “strongly disagree” to 7 “strongly agree”

^bCronbach alpha increased to 0.88 after removal of V2

^cRemoved due to poor reliability and low factor loading

^dCronbach alpha increased to 0.80 after removal of V14 and V15

^eItem total correlation and alpha if deleted are calculated with item being reverse coded

^fVariables measured on a 5-point scale from 1 “Never” to 5 “Frequently (Almost every day)”

on a bipolar scale from Strongly Disagree (1) to Strongly Agree (7) and included an option for “don’t know.” “Don’t know” answers were treated as missing (~8% of responses).

Similarly, questionnaire items for psychological restoration matched psychological variables known to be influenced by nature contact (Hartig et al. 2007). Two questions were asked pertaining to psychological restoration focused on attention restoration and stress reduction (see Table 1). The questions asked about frequency of experience from Never (1) to Frequently (almost every day) (5) without an option for “don’t know.”

Place attachment measures mirrored a validated scale (Stedman 2003; Trimbach et al. 2020). Six questions were asked pertaining to place attachment focused on attachment to environments, place identity, and place dependence (see Table 1). The questions were asked as statements on a bipolar scale from Strongly Disagree (1) to Strongly Agree (7) and included an option for “don’t know.” “Don’t know” answers were treated as missing (~1% of responses). The last question on place attachment, asked individuals whether they could be satisfied living outside the Puget Sound, and was phrased in an opposite manner to the preceding questions where agreement would imply lower attachment.

These metrics also were informed by previous studies in the area that identified regionally relevant metrics of human well-being related to the environment (Biedenweg et al. 2014, 2016; Biedenweg 2017) and input from the Social Science Advisory Committee to the state recovery coordinating agency.

Analysis

Excluding demographic variables, approximately 33% of respondents returned questionnaires with missing data (nonresponse rose to near 50% including demographics mostly due to individuals not specifying their income). To deal with nonresponse, multiple imputation was performed using the Hmisc package in R (Harrell et al. 2019, function `aregImpute`). This method of multiple imputation uses bootstrapping, along with additive regression and predictive mean matching. A total of 10 imputations were performed. The predicted values were averaged across the 10 imputations, and the average values were substituted for missing values in the original data.

Internal consistency for each multiple-item latent factor (environmental governance, place attachment, and psychological restoration) was examined with Cronbach alpha reliability coefficients. Reliability coefficients of 0.65 are generally considered acceptable (Vaske 2019).

Confirmatory factor analysis (CFA) was used to examine whether variables measuring these three latent factors provided a good fit and demonstrated construct validity. SEM was then applied to: (a) test the hypotheses, (b) examine predictive validity among these three latent factors, and (c)

assess whether place attachment mediates any relationships between psychological restoration and beliefs about environmental governance.

A variable may function as a mediator to the extent that it accounts for the relationship between the predictor (i.e., psychological restoration) and criterion (i.e., governance beliefs) (Baron and Kenny 1986). Three separate models are required to demonstrate mediation (Hayduk 1987). In a full mediation model, the predictor is only related to the criterion indirectly through its effect on the mediator (i.e., place attachment). In a partial mediation model, the predictor is related to the criterion both directly and indirectly through its effect on the mediator. In a direct effects model, the predictor is directly related to both the criterion and mediator, but the mediator does not relate to the criterion (Baron and Kenny 1986; Vaske and Donnelly 1999).

To confirm full mediation, several conditions must be true in the models. First, the predictor must be significantly related to the mediator and the criterion (i.e., direct effects model). Second, paths between the predictor and mediator and between the mediator and criterion must be significant in both the full and partial mediation models. Full mediation is evident when the direct path from the predictor to the criterion is not significant in the partial mediation model. Third, a comparison of the models using the change in χ^2 statistic ($\Delta\chi^2$) indicates that the full mediation model is better than the direct effects model, and the partial mediation model is no better than the full mediation model (Baron and Kenny 1986).

EQS version 6.3 software and its Satorra–Bentler Robust estimation procedure to correct for multivariate non-normality were used for these CFA and SEM analyses because multivariate skewness, kurtosis, and Mardia’s coefficient of 57.17 indicated some violations of the normal distribution assumption required for these types of analyses. CFA and SEM analysis typically assume multivariate normality, which is when variables are not only normally distributed individually, but also with respect to the other variables and latent factors being examined (Bollen and Long 1993). Mardia’s coefficient offers one test for multivariate normality and should be close to zero and generally less than three or four to assume normality and allow the default maximum likelihood estimation procedure to be used for model evaluation (Maruyama 1998). When these parameters are not met, the Satorra–Bentler Robust estimation procedure is one approach for correcting potential bias introduced when data are not multivariate normal in distribution (Byrne 1994). Model evaluation, therefore, was based on the Robust corrected comparative fit index (CFI), non-normed fit index (NNFI), incremental fit index (IFI), and root mean square error of approximation (RMSEA). Model fit indices provide a descriptive interpretation of how well the model reproduces, or fits, the data based on comparing the modeled covariance matrix with the actual

covariance matrix (Schermelleh-Engel et al. 2003). CFI, NNFI, and IFI values ≥ 0.90 and RMSEA values ≤ 0.08 generally suggest acceptable model fit (Browne and Cudeck 1992; Byrne 1994). Consistent with this approach, Robust corrected standard errors were used for test statistics and errors were not correlated (Byrne 1994)

Results

Reliability coefficients showed high internal consistency for beliefs about environmental governance (0.86) (Vaske 2019). Deletion of the item “I have the freedom to make personal decisions about how natural resources are managed on my property” increased the reliability coefficient from 0.86 to 0.88, and so was deleted for further analyses (Table 1). Place attachment also showed high internal consistency (0.75). Deletion of the items “I am mostly attached to parts of Puget Sound that are nearest to me,” and “I could be satisfied living in other places outside the Puget Sound (reverse coded for analyses)” increased the reliability coefficient from 0.75 to 0.80. Psychological restoration showed high internal consistency (0.87). Items that increased reliability if removed were removed for analyses.

On average, individuals were about neutral on all aspects of beliefs about environmental governance (Fig. 1). Three of the questions had averages just slightly above neutral (having the freedom to make personal decisions about how natural resources are managed on their property, having access to enough information regarding the social and economic consequences, and having access to enough information regarding environmental consequences), while three had averages slightly below neutral (having plenty of opportunities to influence environmental decisions, trusting regional policymakers to protect Puget Sound’s natural resources, and having access to enough information regarding the regulatory aspects of how natural resources are managed in the Puget Sound), and one with an average at exactly neutral (feeling well represented by the leaders of environmental management processes) (Table 1).

On average, individuals were between somewhat agree and agree with the extent of their place attachment to the Puget Sound region (Fig. 2). The highest agreement was to the questions on whether individuals were very attached to the natural environment and if they were proud to live in the Puget Sound (Table 1). The final question on place attachment, asking individuals whether they could be satisfied living outside the Puget Sound, had the lowest score between neutral and slight agreement (Table 1).

On average individuals experienced psychological restoration once a week in the Puget Sound Region (Fig. 3). Answers to question on stress reduction and inspiration had very similar scores (Table 1).

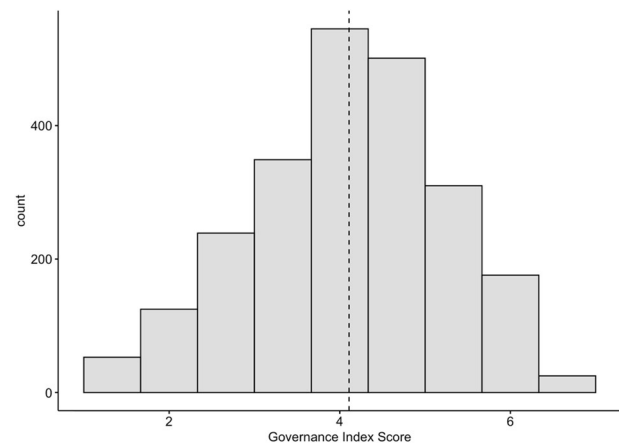


Fig. 1 Distribution of governance scores with mean of all scores indicated with dotted line

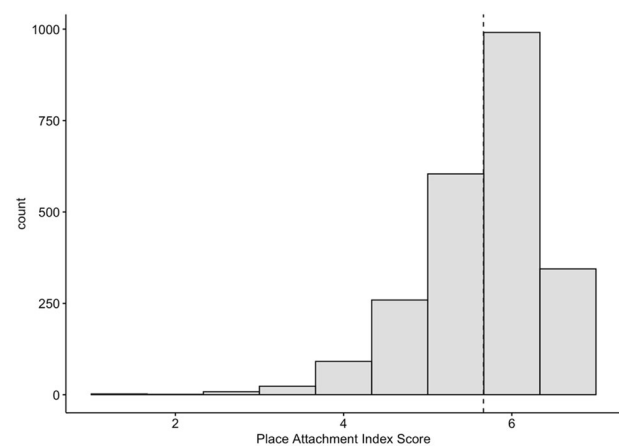


Fig. 2 Distribution of place attachment scores with mean of all scores indicated with dotted line

Measurement Models

CFA demonstrated that the data provided an acceptable fit for the three latent factors (i.e., psychological restoration, place attachment, beliefs about environmental governance).¹ Table 1 shows the standardized factor loadings associated with each multi-item factor.² All final factor loadings were

¹ Principal components exploratory factor analysis (EFA) with varimax rotation of all variables used in this article produced separate factors reflecting identical factors as the CFA with minimal cross-loadings, and all loadings were ≥ 0.40 . In addition, a single EFA without rotation with the number of factors fixed to one showed the factor explained less than 50% of the variance (35%). These approaches coupled with the CFA findings presented in this article represent Harman single factor tests (Podsakoff et al. 2003) and suggest that common method variance or bias was generally absent.

² Two items from the Place attachment index (“I am mostly attached to parts of Puget Sound that are nearest to me,” and “I could be satisfied living in other places outside the Puget Sound”) and one item from the governance beliefs index (“I have the freedom to make personal decisions about how natural resources are managed on my property”) were removed due to low factor loadings.

acceptable (i.e., ≥ 0.40) and ranged from 0.87 to 0.88 for variables measuring psychological restoration, 0.68 to 0.77 for place attachment, and 0.49 to 0.94 for variables measuring beliefs about environmental governance. All loadings were significant at $p < 0.05$. Fit indices indicated acceptable construct validity and measurement model fit ($CFI^* = 0.94$, $NNFI^* = 0.92$, $IFI^* = 0.94$, $RMSEA^* = 0.08$).

Structural Models

As predicted, a significant positive relationship was observed between psychological restoration and place attachment. Individuals who indicated more psychological restoration from outdoor environments reported stronger place attachment. The standardized coefficient of $\beta = 0.61$ was significant at $p < 0.05$, and psychological restoration explained 37.2% of the variance in place attachment (Fig. 4).

Also as predicted, there was a positive relationship between place attachment and beliefs about environmental governance. Individuals who reported stronger place attachment had more positive beliefs about environmental governance. The standardized coefficient of $\beta = 0.16$ was significant at $p < 0.05$. Place attachment, however, only

explained 2.4% of the variance in beliefs about environmental governance (Fig. 4).

The next step in the analysis was to examine whether place attachment mediated the relationship between psychological restoration and beliefs about environmental governance. In the direct effects model, psychological restoration had a significant positive effect on beliefs about environmental governance ($\beta = 0.07$, $p < 0.05$). In the partial mediation model, the path coefficient between psychological restoration and place attachment was positive and significant ($\beta = 0.61$, $p < 0.05$), and the path between place attachment and beliefs about environmental governance was also positive and significant ($\beta = 0.18$, $p < 0.05$). The direct path coefficient between psychological restoration and beliefs about environmental governance, however, was not statistically significant ($\beta = -0.04$, $p > 0.05$). These findings support the full mediation model.

Further support for the full mediation model was evident from the change in χ^2 statistics (i.e., χ^2 difference tests). The full mediation model had a significantly better fit than the direct effects model ($\Delta\chi^2 = 463.08$, $p < 0.001$), but was not statistically significantly different than the partial mediation model using typical measures for significance, yet did have a better fit ($\Delta\chi^2 = 1.66$, $p = 0.198$). Structural model fit for the full mediation model among the three latent factors was acceptable ($CFI^* = 0.93$, $NNFI^* = 0.91$, $IFI^* = 0.93$, $RMSEA^* = 0.08$).

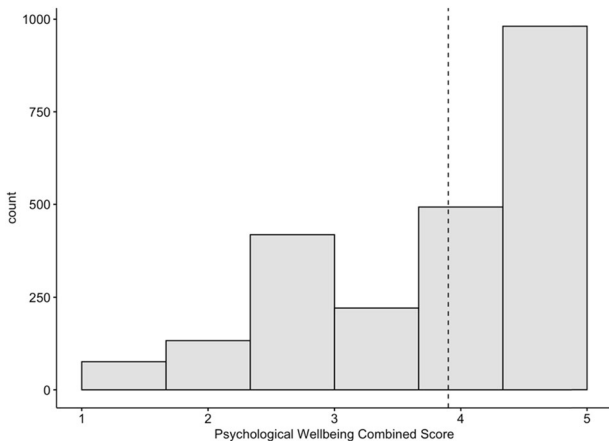
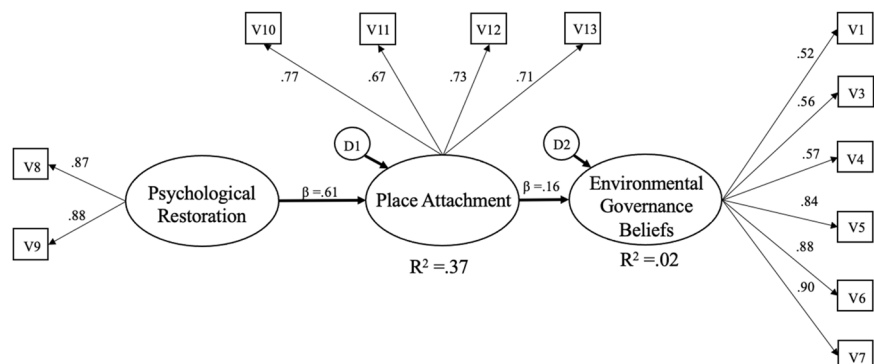


Fig. 3 Distribution of psychological restoration scores with mean of all scores indicated by dotted line

Discussion

Overall, individuals felt on average neutral on all aspects of their beliefs about environmental governance in the Puget Sound including opportunities to influence decisions, feeling represented by leaders, trusting managers, and access to information on social, economic, environmental consequences, and regulatory aspects. Individuals also exhibited high feelings of place attachment and indicated that they frequently experienced psychological restoration from

Fig. 4 Structural model of relationships among psychological restoration, place attachment, and beliefs about environmental governance. β represents path coefficients in the model and R^2 represents the variance explained with D1 and D2 as disturbance terms. Factor loadings are adjacent to arrows for corresponding variables. See Table 1 for and corresponding codes for variables



natural environments. Beliefs about environmental governance were significantly correlated with place attachment and psychological restoration, although the model described only 2% of the variation in governance beliefs. Mediation analyses showed that place attachment fully mediated the effect of psychological restoration on beliefs about environmental governance, indicating an indirect relationship between these constructs.

Our finding that psychological restoration explained 37% of place attachment variance is in-line with attention restoration theory and other research on the influence of restorative experience and connection to nature related to feelings of place attachment (Bow and Buys 2003; Raymond et al. 2010). This result indicates that experiencing nature more frequently with positive psychological impacts relates to the attachment individuals from this sample feel toward the Puget Sound region.

Only 2% of the variance, however, in beliefs about environmental governance was explained by place attachment in this model. Although place attachment was a significant predictor of beliefs about environmental governance, the overall effects imply it is not an incredibly important driver of beliefs when measured in this way. To the extent environmental condition can be considered the outcome of environmental governance (and the amount an individual bases their psychological restoration or place attachment on environmental condition), previous research has found that individual awareness of environmental outcomes is only a limited part of what explains beliefs about environmental governance, such as trust (Grimmelikhuijsen 2012). In fact, even when individuals believe governance performance is good, they do not necessarily exhibit higher trust in governance (Bovaird and Löffler 2003) or vice versa (Baniamin 2021). The latter study found, in some cases, that even when trust in governance was high, governance performance was weak. This low effect size may also be related to the inherent difficulty of measuring beliefs about governance. Beliefs about governance are generally based on very specific aspects of governance, yet researchers often measure overall beliefs, such as trust or representation, that are not clearly linked to specific outcomes, (Bouckaert and van de Walle 2003). A report to the Puget Sound Partnership in 2020 found a large amount of variation in what types of organizations, institutions, or leaders individuals were thinking about when expressing beliefs about environmental governance (Fleming et al. 2020). This variation may contribute to the noise of individual responses. Other research, such as Dellmuth and Tallberg (2015), found that the legitimacy individuals placed on governance organizations was based on their performance and the confidence citizens had in them. So, beliefs are not inherently nonpredictive of governance performance, and perhaps measuring more specific

aspects of governance would have higher predictive variance. This may also be true of the place attachment measures, and especially measures of place dependence that relate more concretely to environmental governance experienced by individuals.

These results indicate that, at least at a regional level, even if individuals feel strongly about the environment, they may not feel strongly about its governance overall. If environmental managers are searching for strategies to improve beliefs about environmental governance, whether as an indicator of success in social or environmental outcomes, strategies that focus on increasing attachment to place through more frequent natural exposure or otherwise will likely not indicate improvements. Protecting, stewarding, or expressing concern about a favored environment to an individual may look like personal actions rather than civic. A study by Wakefield et al. (2001) found that an individual's decisions related to environmental outcomes or civic actions are less related to place attachment to the environment, and more closely linked to social capital, including social norms and networks. So, while environmental managers may tend to think that enhancing environmental quality itself will result in important cultural and psychological ecosystem services (such as place attachment and psychological wellbeing), this is not supported by our findings.

Another potential implication of these results is that people may be relatively uninformed about environmental governance in the Puget Sound or at least how it impacts the natural places that they are attached to that allow psychological restoration for them. In a study by Safford et al. (2014) in the Puget Sound, they found even when individuals supported environmental policy measures, there was a disconnect between self-reported knowledge of environmental problems and actual knowledge. While the results do have a very small effect size, they are still significant and show a positive relationship. Environmental managers may be able to increase positive beliefs about environmental governance if they can show individuals how governance efforts are positively impacting places they care about.

While it might be difficult to capture procedural factors in a quantitative model, some research shows that environmental governance beliefs, such as trust, may be predicted with relational factors such as social identity and personal values. For example, in a study in the Puget Sound, political party affiliation was a better predictor of support for environmental policies than many other factors, including awareness of environmental problems (Safford et al. 2014). If the governance system is progressive (as is the case in the Puget Sound), more conservative minded individuals may believe governance structures are doing too much or have too much control over their favored places. A study by Manfredi et al. (2017) in the western United States

found that levels of trust in wildlife governance agencies differed by value orientation and residents with the more traditional domination value orientations were overall less supportive of inclusive models of governance. Conversely, more liberal-minded individuals may not think the system is doing enough. These perceptions may be entirely independent of one's personal experience with and attachment to nature. In addition, questions on beliefs about environmental governance in this study were asked in a very general sense, so in a more specific context such as locally relevant habitat restoration or environmental regulation, the results may indicate higher variance explanation. Other studies have shown how local context and priorities matter in environmental governance for both outcomes and engagement (Stringer et al. 2007; Blicharska et al. 2011; Ingram 2013; Reed et al. 2018)

Lastly, the scale of our research question may not match the scale at which people perceive the natural environment or its governance. The Puget Sound region is highly diverse geographically—with habitats ranging from pristine coastlines to urban ports. Part of why we may not see significant differences between our variables at this scale may be individuals' beliefs may be situated more locally. For example, urban settings are less restorative than natural settings (Nisbet and Zelenski 2011) and the quality and type of nature makes a difference to individuals (Wyles et al. 2019). Controlling for these constructs—and their subsequent effects on psychological restoration and place attachment—could provide additional insight into individual beliefs about environmental governance.

While our results indicate a strong connection between psychological restoration from natural environments and place attachment, we found only a small connection between these variables and beliefs about environmental governance. As such, promoting psychological restoration and place attachment without attending to the process factors associated with good governance would not likely be a viable strategy for environmental managers to substantially increase positive beliefs about environmental governance. As discussed previously, increasing positive beliefs is important to environmental managers and decision makers because these beliefs are a representation of consent or dissent from the public, who managers, and especially elected officials, serve. Also, importantly, the public perception creates support or opposition for policies (Safford et al. 2014). That said, measuring beliefs about environmental governance may give managers an idea of support for the process of natural resource management, especially when collected at more local environmental contexts.

Data Availability

Data are publicly available from the Puget Sound Partnership.

Author Contributions WF was involved in every step of this manuscript. MN was heavily involved in analyses, writing, and editing. KB was heavily involved in editing.

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Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

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References

- Ansell C, Gash A (2018) Collaborative platforms as a governance strategy. *J Public Adm Res Theory* 28(1):16–32. <https://doi.org/10.1093/jopart/mux030>
- Bagstad K, Villa F, Batker D, Harrison-Cox J, Voigt B, Johnson G (2014) From theoretical to actual ecosystem services: mapping beneficiaries and spatial flows in ecosystem service assessments. *Ecol Soc* 19(2):64. <https://doi.org/10.5751/ES-06523-190264>
- Baniamin HM (2021) Linking trust, performance, and governance quality: What can explain the incongruity? *Commonw Comp Politics* 59(2):128–148. <https://doi.org/10.1080/14662043.2020.1863018>
- Baron RM, Kenny DA (1986) The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 51(6):1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Bennett NJ, Franco AD, Calò A, Nethery E, Niccolini F, Milazzo M, Guidetti P (2019) Local support for conservation is associated with perceptions of good governance, social impacts, and ecological effectiveness. *Conserv Lett* 12(4):e12640. <https://doi.org/10.1111/conl.12640>
- Berg AEVD, Hartig T, Staats H (2007) Preference for nature in urbanized societies: stress, restoration, and the pursuit of sustainability. *J Soc Issues* 63(1):79–96. <https://doi.org/10.1111/j.1540-4560.2007.00497.x>
- Biedenweg K (2017) A comparative study of human well-being indicators across three puget sound regions. *Soc Nat Resour* 30(3):362–376. <https://doi.org/10.1080/08941920.2016.1209606>
- Biedenweg K, Hanein A, Nelson K, Stiles K, Wellman K, Horowitz J, Vynne S (2014) Developing human wellbeing indicators in the Puget Sound: focusing on the watershed scale. *Coast Manage* 42:374–390. <https://doi.org/10.1080/08920753.2014.923136>
- Biedenweg K, Harguth H, Stiles K (2017) The science and politics of human well-being: a case study in cocreating indicators for Puget Sound restoration. *Ecol Soc* 22(3):11. <https://doi.org/10.5751/ES-09424-220311>
- Biedenweg K, Stiles K, Wellman K (2016) A holistic framework for identifying human wellbeing indicators for marine policy. *Mar Policy* 64:31–37. <https://doi.org/10.1016/j.marpol.2015.11.002>
- Blicharska M, Isaksson K, Richardson T, Wu C-J (2011) Context dependency and stakeholder involvement in EIA: the decisive role of practitioners. *J Environ Plan Manag* 54(3):337–354. <https://doi.org/10.1080/09640568.2010.506077>

- Bollen KA, Long JS (1993) *Testing Structural Equation Models*. SAGE
- Bouckaert G, van de Walle S (2003) Comparing measures of citizen trust and user satisfaction as indicators of ‘Good Governance’: difficulties in linking trust and satisfaction indicators. *Int Rev Adm Sci* 69(3):329–343. <https://doi.org/10.1177/0020852303693003>
- Bovaird T, Löffler E (2003) Evaluating the quality of public governance: indicators, models and methodologies. *Int Rev Adm Sci* 69(3):313–328. <https://doi.org/10.1177/0020852303693002>
- Bow V, Buys E (2003) Sense of community and place attachment: the natural environment plays a vital role in developing a sense of community. In Buys L, Lyddon J, Bradley R (eds) *Social change in the 21st century 2003 conference refereed proceedings*. Centre for Social Change Research, School of Humanities and Human Services QUT, pp. 1–18. <https://eprints.qut.edu.au/115/>
- Browne MW, Cudeck R (1992) Alternative Ways of Assessing Model Fit. *Sociol Methods Res* 21(2):230–258. <https://doi.org/10.1177/0049124192021002005>
- Buttimer A, Seamon D (2015) *The human experience of space and place*. Routledge
- Byrne BM (1994) *Structural Equation Modeling with EQS and EQS/WINDOWS: Basic Concepts, Applications, and Programming*. SAGE
- Carrus G, Bonaiuto M, Bonnes M (2005) Environmental concern, regional identity, and support for protected areas in Italy. *Environ Behav* 37(2):237–257. <https://doi.org/10.1177/0013916504269644>
- Clarke D, Murphy C, Lorenzoni I (2018) Place attachment, disruption and transformative adaptation. *J Environ Psychol* 55:81–89. <https://doi.org/10.1016/j.jenvp.2017.12.006>
- Dahlstrand U, Biel A (1997) Pro-environmental habits: propensity levels in behavioral change. *J Appl Soc Psychol* 27(7):588–601. <https://doi.org/10.1111/j.1559-1816.1997.tb00650.x>
- Davenport MA, Anderson DH (2005) Getting from sense of place to place-based management: an interpretive investigation of place meanings and perceptions of landscape change. *Soc Nat Resour* 18(7):625–641. <https://doi.org/10.1080/08941920590959613>
- Debnath RM, Shankar R (2014) Does good governance enhance happiness: a cross nation study. *Soc Indic Res* 116(1):235–253. <https://doi.org/10.1007/s11205-013-0275-1>
- Dellmuth LM, Tallberg J (2015) The social legitimacy of international organisations: Interest representation, institutional performance, and confidence extrapolation in the United Nations. *Rev Int Stud* 41(3):451–475
- Dellmuth L, Schlipphak B (2020) Legitimacy beliefs towards global governance institutions: a research agenda. *J Eur Public Policy* 27(6):931–943. <https://doi.org/10.1080/13501763.2019.1604788>
- Delmas MA, Young OR (2009) *Governance for the environment: new perspectives*. Cambridge University Press
- Devine-Wright P (2009) Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *J Community Appl Soc Psychol* 19(6):426–441. <https://doi.org/10.1002/casp.1004>
- Devine-Wright P, Howes Y (2010) Disruption to place attachment and the protection of restorative environments: a wind energy case study. *J Environ Psychol* 30(3):271–280. <https://doi.org/10.1016/j.jenvp.2010.01.008>
- Dillman DA, Smyth JD, Christian LM (2014) *Internet, phone, mail, and mixed-mode surveys: the tailored design method*. John Wiley & Sons
- Doherty D, Wolak J (2012) When do the ends justify the means? Evaluating procedural fairness. *Political Behav* 34(2):301–323. <https://doi.org/10.1007/s11109-011-9166-9>
- Eagly AH, Chaiken S (1993) *The psychology of attitudes*. Harcourt Brace Jovanovich College Publishers
- Edge S, McAllister ML (2009) Place-based local governance and sustainable communities: lessons from Canadian biosphere reserves. *J Environ Plan Manag* 52(3):279–295. <https://doi.org/10.1080/09640560802703058>
- Esaiasson P, Persson M, Gilljam M, Lindholm T (2019) Reconsidering the role of procedures for decision acceptance. *Br J Political Sci* 49(1):291–314. <https://doi.org/10.1017/S0007123416000508>
- Fleming W, Kehoe-Thommen H, Katz B, Hart J, Biedenweg K (2020) *Vital signs survey summary 2020: a report on subjective human wellbeing prepared for the puget sound partnership (No. 2)*. Puget Sound Partnership
- Foo K, Martin D, Polsky C, Wool C, Ziemer M (2015) Social wellbeing and environmental governance in urban neighbourhoods in Boston, MA. *Geographical J* 181(2):138–146. <https://doi.org/10.1111/geoj.12108>
- Forrer J, Edwin Kee J, Boyer E (2014) *Governing cross-sector collaboration*. Jossey-Bay
- Georgiadis N (2015) Ranking the greatest threats to Puget Sound: a summary of the 2014 Puget Sound Pressures Assessment. *Encyclopedia of Puget Sound*. <https://www.eopugetsound.org/articles/franking-greatest-threats-puget-sound-summary-2014-puget-sound-pressures-assessment>
- Gifford R, Nilsson A (2014) Personal and social factors that influence pro-environmental concern and behaviour: a review. *Int J Psychol* 49(3):141–157. <https://doi.org/10.1002/ijop.12034>
- Gosling E, Williams KJH (2010) Connectedness to nature, place attachment and conservation behaviour: testing connectedness theory among farmers. *J Environ Psychol* 30(3):298–304. <https://doi.org/10.1016/j.jenvp.2010.01.005>
- Grimmelikhuisen S (2012) Linking transparency, knowledge and citizen trust in government: an experiment. *Int Rev Adm Sci* 78(1):50–73. <https://doi.org/10.1177/0020852311429667>
- Gross-Camp ND, Martin A, McGuire S, Kebede B, Munyarukaza J (2012) Payments for ecosystem services in an African protected area: exploring issues of legitimacy, fairness, equity and effectiveness. *Oryx* 46(1):24–33. <https://doi.org/10.1017/S0030605311001372>
- Hagger MS, Cameron LD, Hamilton K, Hankonen N, Lintunen T (2020). *The handbook of behavior change*. Cambridge University Press
- Harrell F et al. (2019) *aregImpute* function | R Documentation (4.2-0) [R]. <https://www.rdocumentation.org/packages/Hmisc/versions/4.2-0/topics/aregImpute>
- Hartig T, Kaiser FG, Strumse E (2007) Psychological restoration in nature as a source of motivation for ecological behaviour. *Environ Conserv* 34(4):291–299. <https://doi.org/10.1017/S0376892907004250>
- Hartig T, Staats H (2006) The need for psychological restoration as a determinant of environmental preferences. *J Environ Psychol* 26(3):215–226. <https://doi.org/10.1016/j.jenvp.2006.07.007>
- Hayduk LA (1987) *Structural equation modeling with LISREL: Essentials and advances* (pp. xvii, 405). Johns Hopkins University Press
- Ingram H (2013) No universal remedies: design for contexts. *Water Int* 38(1):6–11. <https://doi.org/10.1080/02508060.2012.739076>
- Kaplan R, Kaplan S (1989) *The experience of nature: a psychological perspective*. CUP Archive
- Kaplan S (1995) The restorative benefits of nature: toward an integrative framework. *J Environ Psychol* 15(3):169–182. [https://doi.org/10.1016/0272-4944\(95\)90001-2](https://doi.org/10.1016/0272-4944(95)90001-2)
- Kaufmann D, Kraay A, Mastruzzi M (2009) *Governance matters VIII: aggregate and individual governance indicators 1996–2008*. The World Bank Development Research Group Macroeconomics and Growth Team
- Kil N, Holland SM, Stein TV, Ko YJ (2012) Place attachment as a mediator of the relationship between nature-based recreation benefits and future visit intentions. *J Sustain Tour* 20(4):603–626. <https://doi.org/10.1080/09669582.2011.610508>

- Kjær A (2008) Governance and the urban bureaucracy. In Davies JS, Imbroscio DL (eds) *Theories of urban politics*. SAGE
- Koontz TM, Thomas CW (2006) What do we know and need to know about the environmental outcomes of collaborative management? *Public Adm Rev* 66:111–121. JSTOR
- Korpela KM (1989) Place-identity as a product of environmental self-regulation. *J Environ Psychol* 9(3):241–256. [https://doi.org/10.1016/S0272-4944\(89\)80038-6](https://doi.org/10.1016/S0272-4944(89)80038-6)
- Korpela K, Hartig T (1996) Restorative qualities of favorite places. *J Environ Psychol* 16(3):221–233. <https://doi.org/10.1006/jenvp.1996.0018>
- Korpela KM, Ylén M, Tyrväinen L, Silvennoinen H (2009) Stability of self-reported favourite places and place attachment over a 10-month period. *J Environ Psychol* 29(1):95–100. <https://doi.org/10.1016/j.jenvp.2008.05.008>
- Langbein L, Knack S (2010) The worldwide governance indicators: Six, one, or none? *J Dev Stud* 46(2):350–370. <https://doi.org/10.1080/00220380902952399>
- Lankford B, Pringle C, Lewis F, Chhotray V, Mander M, Goulden M, Nxele Z, Quayle L (2010) The impacts of ecosystem services and environmental governance on human well-being in the Pongola region, South Africa | Ecosystems Services for Poverty Alleviation (ESPA). <http://inr.org.za/wp-content/uploads/2014/06/The-impacts-of-ecosystem-services-and-environmental-governance-on-human-well-being-in-the-Pongola-region-South-Africa.pdf>
- Lewicka M (2011) Place attachment: how far have we come in the last 40 years? *J Environ Psychol* 31(3):207–230. <https://doi.org/10.1016/j.jenvp.2010.10.001>
- Lockwood M, Davidson J, Curtis A, Stratford E, Griffith R (2010) Governance principles for natural resource management. *Soc Nat Resour* 23(10):986–1001. <https://doi.org/10.1080/08941920802178214>
- Manfredo MJ, Teel TL, Sullivan L, Dietsch AM (2017) Values, trust, and cultural backlash in conservation governance: the case of wildlife management in the United States. *Biol Conserv* 214:303–311. <https://doi.org/10.1016/j.biocon.2017.07.032>
- Maryama GM (1998) *Basics of structural equation modeling* (pp. xvi, 311). Sage Publications, Inc. <https://doi.org/10.4135/9781483345109>
- Masterson VA, Stedman RC, Enqvist J, Tengö M, Giusti M, Wahl D, Svedin U (2017) The contribution of sense of place to social-ecological systems research: a review and research agenda. *Ecol Soc* 22(1):49. <https://www.jstor.org/stable/26270120>
- Mehnen N, Mose I, Strijker D (2013) Governance and sense of place: half a century of a German Nature Park. *Environ Policy Gov* 23(1):46–62. <https://doi.org/10.1002/eet.1592>
- Natural Resource Governance Framework (2016) IUCN. <https://www.iucn.org/commissions/commission-environmental-economic-and-social-policy/our-work/knowledge-baskets/natural-resource-governance>
- Nisbet EK, Zelenski JM (2011) Underestimating nearby nature: affective forecasting errors obscure the happy path to sustainability. *Psychological Sci* 22(9):1101–1106. <https://doi.org/10.1177/0956797611418527>
- OECD (2017) “Governance and well-being”, in *How’s Life? 2017: measuring Well-being*. OECD Publishing. https://www.oecd-ilibrary.org/economics/how-s-life-2017_how_life-2017-en
- Ostrom E (2009) A general framework for analyzing sustainability of social-ecological systems. *Science* 325(5939):419–422.
- Payton MA, Fulton DC, Anderson DH (2005) Influence of place attachment and trust on civic action: a study at sherburne national wildlife refuge. *Soc Nat Resour* 18(6):511–528. <https://doi.org/10.1080/08941920590947940>
- Pierre J (ed) (2000) *Debating governance: authority, steering, and democracy*. Oxford University Press
- Podsakoff PM, MacKenzie SB, Lee J-Y, Podsakoff NP (2003) Common method biases in behavioral research: A critical review of the literature and recommended remedies. *J Appl Psychol* 88(5):879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Pretty PJ, Peacock J, Hine R, Sellens M, South N, Griffin M (2007) Green exercise in the UK countryside: effects on health and psychological well-being, and implications for policy and planning. *J Environ Plan Manag* 50(2):211–231. <https://doi.org/10.1080/09640560601156466>
- Proshansky HM, Fabian AK, Kaminoff R (1983) Place-identity: physical world socialization of the self. *J Environ Psychol* 3(1):57–83. [https://doi.org/10.1016/S0272-4944\(83\)80021-8](https://doi.org/10.1016/S0272-4944(83)80021-8)
- Puget Sound Partnership (2018) The 2018–2022 action agenda for the Puget Sound Partnership. https://psp.wa.gov/action_agenda_center.php
- Quinn T, Lorenzoni I, Adger W (2015) Place attachment, identity, and adaptation. In: O’Brien K & Selboe E (Eds.), *The adaptive challenge of climate change* (pp. 160–170). Cambridge University Press. <https://doi.org/10.1017/CBO9781139149389.010>
- Raymond CM, Brown G, Robinson GM (2011) The influence of place attachment, and moral and normative concerns on the conservation of native vegetation: a test of two behavioural models. *J Environ Psychol* 31(4):323–335. <https://doi.org/10.1016/j.jenvp.2011.08.006>
- Raymond CM, Brown G, Weber D (2010) The measurement of place attachment: personal, community, and environmental connections. *J Environ Psychol* 30(4):422–434. <https://doi.org/10.1016/j.jenvp.2010.08.002>
- Reed MS, Vella S, Challies E, Vente J, de, Frewer L, Hohenwallner-Ries D, Huber T, Neumann RK, Oughton EA, Ceno JSdel, Delden Hvan (2018) A theory of participation: what makes stakeholder and public engagement in environmental management work? *Restor Ecol* 26(S1):S7–S17. <https://doi.org/10.1111/rec.12541>
- Relph EC (1976) *Place and placelessness*. Pion Limited
- Rhodes RAW (2007) Understanding governance: ten years on. *Organ Stud* 28(8):1243–1264. <https://doi.org/10.1177/0170840607076586>
- Ruckelshaus MH, McClure MM (2007) *Sound science: synthesizing ecological and socioeconomic information about the Puget Sound ecosystem*. U.S. Department of Commerce, National & Oceanic Atmospheric Administration (NMFS), Northwest Fisheries Science Center. <https://www.eopugetsound.org/articles/sound-science-2007>
- Safford TG, Norman KC, Henly M, Mills KE, Levin PS (2014) Environmental awareness and public support for protecting and restoring Puget Sound. *Environ Manag* 53(4):757–768. <https://doi.org/10.1007/s00267-014-0236-8>
- Sarbin TR (1983) Place identity as a component of self: an addendum. *J Environ Psychol* 3(4):337–342. [https://doi.org/10.1016/S0272-4944\(83\)80036-X](https://doi.org/10.1016/S0272-4944(83)80036-X)
- Scannell L, Gifford R (2010) Defining place attachment: a tripartite organizing framework. *J Environ Psychol* 30(1):1–10. <https://doi.org/10.1016/j.jenvp.2009.09.006>
- Schermelleh-Engel K, Moosbrugger H, Müller H (2003) Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures. *Methods Psychological Res* 8(2):23–74
- Stedman RC (2002) Toward a social psychology of place: predicting behavior from place-based cognitions, attitude, and identity. *Environ Behav* 34(5):561–581. <https://doi.org/10.1177/0013916502034005001>
- Stedman RC (2003) Sense of place and forest science: toward a program of quantitative research. *For Sci* 49(6):822–829. <https://doi.org/10.1093/forestscience/49.6.822>
- Stinchfield H, Koontz L, Sexton NR (2009) Social and economic considerations for coastal and watershed restoration in the Puget Sound, Washington: a Literature review. USGS

- Stringer LC, Twyman C, Thomas DSG (2007) Combating land degradation through participatory means: the case of Swaziland. *Ambio* 36(5):387–393. [https://doi.org/10.1579/0044-7447\(2007\)36\[387:CLDTPM\]2.0.CO;2](https://doi.org/10.1579/0044-7447(2007)36[387:CLDTPM]2.0.CO;2)
- Takayama N, Fujiwara A, Saito H, Horiuchi M (2017) Management effectiveness of a secondary coniferous forest for landscape appreciation and psychological restoration. *Int J Environ Res Public Health* 14(7):800. <https://doi.org/10.3390/ijerph14070800>
- Trimbach DJ, Fleming W, Biedenweg K (2020) Whose Puget Sound?: Examining Place Attachment, Residency, and Stewardship in the Puget Sound Region. *Geogr Rev* 0(0):1–20. <https://doi.org/10.1080/00167428.2020.1798763>
- Tuan Y (1977) *Space and place: the perspective of experience*. University of Minnesota Press
- Turner RA, Addison J, Arias A, Bergseth BJ, Marshall NA, Morrison TH, Tobin RC (2016) Trust, confidence, and equity affect the legitimacy of natural resource governance. *Ecol Soc* 21(3):18. <http://www.jstor.org/stable/26269961>
- Van Den Berg AE, Hartig T, Staats H (2007) Preference for nature in urbanized societies: stress, restoration, and the pursuit of sustainability. *J Soc Issues* 63(1):79–96. <https://doi.org/10.1111/j.1540-4560.2007.00497.x>
- Van Marissing E, Bolt G, Van Kempen R (2006) Urban governance and social cohesion: effects of urban restructuring policies in two Dutch cities. *Cities* 23(4):279–290. <https://doi.org/10.1016/j.cities.2005.11.001>
- Vaske JJ (2019) *Survey research and analysis*, 2nd edn. In: Sagamore-Venture. Sagamore-Venture
- Vaske JJ, Donnelly M (1999) A value-attitude-behavior model predicting wildland preservation voting intentions. *Soc Nat Resour* 12(6):523–537. <https://doi.org/10.1080/089419299279425>
- Verhaegen S, Scholte JA, Tallberg J (2021) Explaining elite perceptions of legitimacy in global governance. *Eur J Int Relat* 27(2):622–650. <https://doi.org/10.1177/1354066121994320>
- Wakefield SEL, Elliott SJ, Cole DC, Eyles JD (2001) Environmental risk and (re)action: air quality, health, and civic involvement in an urban industrial neighbourhood. *Health Place* 7(3):163–177. [https://doi.org/10.1016/S1353-8292\(01\)00006-5](https://doi.org/10.1016/S1353-8292(01)00006-5)
- Weng P-Y, Chiang Y-C (2014) Psychological restoration through indoor and outdoor leisure activities. *J Leis Res* 46(2):203–217. <https://doi.org/10.1080/00222216.2014.11950320>
- Williams DR, Vaske JJ (2003) The measurement of place attachment: validity and generalizability of a psychometric approach. *For Sci* 49(6):830–840. <https://doi.org/10.1093/forestscience/49.6.830>
- World Bank (2005) *Public services delivery*. World Bank Publications
- Wyles KJ, White MP, Hattam C, Pahl S, King H, Austen M (2019) Are some natural environments more psychologically beneficial than others? The importance of type and quality on connectedness to nature and psychological restoration. *Environ Behav* 51(2):111–143. <https://doi.org/10.1177/0013916517738312>