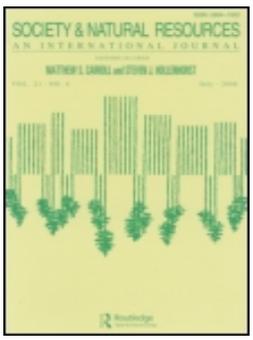

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Environmental Concern: Examining the Role of Place Meaning and Place Attachment

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As landscapes change, it is important to understand how attachments and meanings attributed to place may affect environmental quality and social well-being. To understand and apply sociological insights to policy and management efforts it is not sufficient to simply demonstrate that individuals or groups have strong emotional connections with a particular geographical locale. Rather, it is imperative to understand the implications of attachments, and meanings related to them. We focus our attention in this area on watershed management. Quantitative data are used to conduct an analysis of the interactions between place attachment, place meanings, and environmental concerns in a high-natural-amenity watershed in New Hampshire. Results from quantitative analyses important for understanding the dynamics between place attachment, place meanings, and various dimensions environmental concerns are presented. We find a strong role for place meanings, rather than place attachment, in predicting environmental concern, as well as an independent effect of place-transcendent fundamental values.

Keywords environmental concern, place attachment, place meaning

Recent research has examined the attachment people develop with physical places and the implications of such attachments for natural resource and ecosystem management (Brandenburg and Carroll 1995; Cheng et al. 2003; Kaltenborn 1998; Eisenhauer et al. 2000; Kruger et al. 2008; Williams and Stewart 1998). Some work (e.g., Amsden et al. 2011; Stedman 2006; Van Patten and Williams 2008), has begun to incorporate place meanings in this nexus as well.

The relationship between place meaning, attachment, and environmental concern/behavior has been examined within the context of opposition to energy

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development. Devine-Wright (2009) examined the role of place attachment and place identity in fostering place-protective behavior via a theoretical framework for understanding psychological aspects of place change. Devine-Wright and Howes (2010) applied this framework to examine opposition to an off-shore wind farm in North Wales and found significant between-community differences in response to the project. Although this work has advanced the application of place concepts within the realm of environmental concern as opposition behavior, we note that little research to date has analyzed the relationships between place attachment, place meanings, and environmental concern within the context of watershed issues. Such is our charge here.

Place Attachment and Place Meanings

Our research engages the relationship among place meanings, place attachment, and environmental concern. Because definitions of place meanings and attachment have proliferated in recent years, it is crucial that we provide our definitions at the outset, and place them in the context of the larger corpus of work in this area. Readers are encouraged to seek out excellent stand-alone reviews of the field (e.g., Beckley 2003; Farnum et al. 2005; Trentelman 2009; Williams 2008) as supplements to our engagement. Early studies argue that positive sentiments tied to a specific physical setting allow people to acquire a sense of belonging to important places. Human geographers have used the term *sense of place* to describe and explore this attachment and associated meanings (Relph 1976; Tuan 1974). Many researchers assert that sense of place is a combination of two concepts: place attachment and place meaning (Farnum et al. 2005; Smaldone et al. 2008; Trentelman 2009; Van Patten and Williams 2008). Stedman (2008) suggests that place meanings are crucial foundations of place attachment, and that each is necessary to understand the range of place-related behaviors.

Fundamentally, place attachment entails an emotional—usually positive—bond between a person and setting (Brandenburg and Carroll 1995; Low and Altman 1992; Manzo 2005). Some research has made the distinction—theoretically and empirically—between place dependence and place identity (Arnberger and Eder 2008; Halpenny 2006; Vaske and Kobrin 2001). Place dependence refers to the ability of a setting to meet instrumental needs (Farnum et al. 2005; Stokols and Shumaker 1981; Vaske and Kobrin 2001). Place identity is the extent to which a place becomes a crucial symbolic component of one's definition of self (Cuba and Hummon 1993; Manzo and Perkins 2006; Proshansky et al. 1983; Trentelman 2009).

In contrast, place meanings are often distinguished from emotions (Davenport and Anderson 2005; Smaldone et al. 2008; Williams et al. 1992), with Stedman (2008) suggesting that meanings comprise the "descriptive" elements of the setting: *what* it is, rather than how attached one is to it. From this common foundation, however, there has been a great deal of divergence over the conceptualization of meanings and measurement protocols. Some researchers have emphasized the individually held nature of meanings, conceptualizing them as cognitive, descriptive elements of overall attitude toward locations (see especially Jorgensen and Stedman 2001, 2006). These authors (Stedman 2002; Stedman et al. 2007) used Likert-scale surveys to assess dimensions of place meaning among lakeside residents. The survey asked participants to rate their level of agreement with belief statements related to the setting, which emerged through interviews with local residents and reviews of local documents, such

as ''My lake is a place to escape from civilization,'' ''My lake is a community of neighbors,'' and ''My lake is a pristine wilderness.'' Similarly, Young (1999b) asked people to use a 5-point scale to rate how well a place can be described by 30 place meaning items such as ''ancient,'' ''pristine,'' ''overdeveloped,'' and ''crowded.'' Such approaches emphasize the possibility of comparative analyses.

Other researchers (e.g., Stokowski 2008; Van Patten and Williams 2008) suggest that the multifaceted nature of places—and their origins in social intercourse—renders potentially problematic the individualistic approaches just described. Part of this critique is based in a discomfort with agreement/disagreement with statements such as ''my lake is a pristine wilderness'' as not representing the potential depth of symbolic meaning that we hold for places dear to us; identical responses to such statements really do not convey identical meanings. Accordingly, some researchers advocate for the use of qualitative methods to deeply explore the spectrum of place meanings that participants assign to places, as well as experiences through which these meanings are created. Scholars have used open-ended conversations, asking participants to describe memorable places and ''explain what these places mean to them'' (Schroeder 1996), semistructured interviews with questions such as ''How would you characterize this place?'' (Jacobs and Buijs 2011), or combined open-ended surveys with in-depth interviews (Smaldone et al. 2008) or discursive methods (VanPatten and Williams 2008). To capture descriptive and nuanced place meanings as well as to elicit experiences defining place meanings, some scholars have used variations of the narrative approach (Burley et al. 2004; Worster and Abrams 2005), relied on photonarratives (Stedman et al. 2004), or involved participants in drawing maps combined with informal conversations (Sampson and Goodrich 2009) or storytelling to provide rich metaphors and detailed imagery (Davenport and Anderson 2005).

Our work in this article, while recognizing the considerable merits of the qualitative approaches just outlined, is grounded in the cognitive (belief–attitude–behaviors) approach. These approaches can provide useful insights (see Stedman and Beckley 2007; Williams and Patterson 2007; Trentelman 2009) for an encapsulation of this discussion on the relative merits of multiple approaches. The utility of such an approach is especially strong when trying to predict the likelihood of a variety of environmental concerns in a systematic way; such predictive ability is enhanced with the standardized operationalization afforded by such an approach. Further, such approaches allow us to see the relative contribution of multiple variable domains to local environmental concern, and how this relationship may vary across population segments. Finally, such approaches provide a direct methodological intersection with the environmental attitude/behavioral intention nexus that we engage along with the place attachment and meanings-based framework.

Attachment, Meanings, and Environmental Behavior

Scholars have suggested that sense of place fosters pro-environmental attitude and behavior. Relph (1976, 37) proposed that place rootedness leads to ''a sense of deep care and concern for that place.'' Walker and Chapman (2003, 74) propose that ''a positive relationship may exist between a person's sense of place and pro-environmental intentions.'' Research in this vein has demonstrated empirical relationships between place attachment and pro-environmental behavior (Kaltenborn 1998; Stedman 2002; Walker and Chapman 2003; Vorkinn and Riese 2001; Ryan 2005; Rioux 2011).

In a review of the extant environmental and community psychology literature, Manzo and Perkins (2006) concluded that people are motivated to protect places that are meaningful to them. Vaske and Kobrin (2001) surveyed youth engaged in a conservation work program and found that place attachment predicted general and specific environmentally responsible behaviors. Halpenny (2006, 2010) and Payton et al. (2005) used structural equation modeling to find that place attachment contributes to a variety of place protective behaviors. Brehm et al. (2006) found that rural Utahns' nature-based place meanings strongly predicted concerns about environmental protection (see also Cheng et al. 2003). In sum, these studies suggest that place meanings may be related to behaviors that protect these elements.

However, despite these findings, concerns about environmental quality have been more commonly based in frameworks that emphasize general environmental concern, rather than those that emerge from place-based models (Bedrous 2008; Huddart-Kennedy et al. 2009; Mohai 2003; Theodori and Luloff 2002). Given the importance of environmental concern to policy support and other conservation efforts and the potential importance of place-based factors, the relationships between place attachment and environmental concern need to be further examined. Research on the linkages between place meanings, attachment, and environmental concerns is especially relevant in a watershed environment with a noteworthy lake where the pressures of growing and changing human communities can drastically alter the health and beauty of the lake and its associated watershed, including water quality/ecological habitat, and perceptions of them.

The primary objective of this article is to explore the relationships between place meanings, place attachment and environmental concern within a rural watershed experiencing population growth and related changes in land use. Specifically, we ask: (1) How do place meanings and place attachment predict levels of environmental concern in the watershed? (2) How do general (non-place-based) measures of ideological environmental concern compare to and interact with place meanings and place attachment to predict perceived watershed health?

The nature of the material setting that is the object of attachment and meanings is important to consider. Studies of place often focus on attachments to specific or special physical places (Cheng et al. 2003; Eisenhauer et al. 2000; Kruger 1996; Williams et al. 1992). For example, Hidalgo and Hernandez (2001) examined the variation among physical and social dimensions of attachment across a spatial scale. In a critique of the strict constructionist (Best 1993; Greider and Garkovich 1994) approach to sense of place, Stedman (2003) examines how elements in the physical environment represent key building blocks for sense of place among residents of northern Wisconsin. He concluded that certain landscape attributes (water quality, shoreline development) are associated with certain place meanings, which underpin place attachment. In combination, these works establish place attachment and meanings as social–psychological constructs influenced by a wide number of factors including socially constructed understandings of the physical attributes of landscapes that in turn influence environmental attitudes and beliefs.

Understanding Environmental Concern

According to Fransson and Garling (1999, 370), environmental concern refers to "both a specific attitude directly determining intentions or more broadly to a general attitude or value orientation." Research on social correlates of environmental

concern has a long (Van Liere and Dunlap 1980; Jones and Dunlap 1992; Catton and Dunlap 1978; Dietz et al. 1998; Norlund and Garvill 2002). Environmental concern consists of two dimensions: cognitive and behavioral. Stern (2000) elaborates on these two dimensions, identifying the cognitive dimension as that which focuses on basic values, worldviews, and attitudes. In contrast, the behavioral dimension focuses on an individual's direct involvement in environment-enhancing actions. More specifically, the value–belief–norm (VBN) theory articulates that values engender concern for environmental issues (Stern and Dietz 1994). Building on the VBN theory, Shultz (2001) provides evidence to support a more refined distinction between egoistic, altruistic, and biospheric environmental concern. Schultz argues that the three clusters of environmental concern identified in their work are the "direct result of values—valuing self, other people, or the biosphere" (335).

Environmental concern is often conceptualized as a "worldview," referring to deeply held beliefs regarding the world in which one lives (Dake 1991). The New Environmental Paradigm (NEP) scale is commonly used to measure an "environmental worldview" by examining the degree to which an individual views interconnectedness between human beings and the natural world (Dunlap et al. 2000). Research has shown that there is a relationship between cognitive and behavioral dimensions, demonstrating that those with pro-environmental worldviews are more likely to be involved in environmentally significant behavior (Stern et al. 1995, 1999; Dietz et al. 1998).

Little empirical research has examined the effects of place meaning and place attachment on the cognitive dimension of environmental concern. Related contributions have explored links between place identity, environmental perceptions, and attitudes toward the environment. Bonaiuto et al. (2002) found significant negative correlations between regional identity, place attachment and attitudes toward general and specific national parks in Italy. Uzell et al. (2002) examined the relationships between social cohesion, social and place identity, and support for environmentally sustainable attitudes. They demonstrate that socially cohesive communities have a stronger social and place identity, in turn supporting environmentally sustainable attitudes. Vorkinn and Riese (2001), studied attitudes toward hydropower development among rural Norwegian residents and found that strength of place attachment explained more variance in attitudes about the project than did sociodemographic variables. Brehm et al. (2006) examined the link between socially based attachment, environmental attachment, and attitudes about local environmental issues; they found that the two dimensions of attachment are distinct, and relate differently to environmental concern. Research also supports the assertion that place attachment affects perceptions of social and environmental conditions in natural areas, concepts that may be closely related to environmental concern. Hikers' perceived degradation of Appalachian trail conditions was found to be related to two dimensions of place attachment, place dependence and place identity (Kyle et al. 2004). While these citations provide some empirical evidence of the relationships between attachment and environmental concern, little research to date has analyzed the relationships between place meanings and concern, a focus of the research reported here that can enhance understandings of these important issues.

Measures of environmental concern range from the global (Van Liere and Dunlap 1980; Jones and Dunlap 1992), to regional and local scales (Vorkinn and Riese 2001), to those addressing particular issues such as climate change (Finucane et al. 2000). In this study, we employ two types of measures of environmental

concern: a global measure (NEP scale) and localized concerns about watershed health. The focus on regional environmental concern within our current study represents a shift toward a landscape-based approach to assessing environmental concern, rather than relying solely on more global attributions. Elucidating how place meaning influences environmental concerns at multiple levels is especially important in watershed planning efforts, where communication with constituents is an important part of addressing critical issues such as nonpoint-source pollution, land use change, and others.

Study Site

The Newfound Lake watershed encompasses nine distinct towns in the Lakes Region of New Hampshire, a popular second-home and recreation-rich rural area valued for its beauty and as an essential economic resource in the state. Newfound Lake is the centerpiece of this watershed: It is the fifth largest lake in New Hampshire, encompassing approximately 4,100 acres with 22 miles of shoreline. The Newfound Lake watershed is experiencing many social changes affecting land use, including population growth and related impacts on water quality. Between 1970 and 2005 the watershed population nearly doubled in year-round population, and as of 2007 neared 15,000 persons with home ownership that includes an estimated 3,600 seasonal residents (Newfound Lake Region Association 2009). Related to these changes, research was undertaken in 2008 to ensure the long-term health and beauty of the watershed by developing a Watershed Master Plan for the Newfound Lake Region to create a shared vision and management goals across the multiple municipalities in the watershed. This work included 30 in-depth interviews to collect oral histories of life in the Newfound Watershed, surveys of watershed residents, public meetings, water quality analyses, geographic information system (GIS) tools, a facilitator working with planning boards, and extensive local cooperation.

Research Methods

Data were collected from property owners using a self-administered questionnaire mail survey administered using a modified version of the tailored design method (Dillman 2006). To develop the sampling frame in the Newfound Lake watershed, the research team worked with town offices to obtain lists of property owners from tax records to produce a random sample of 1,945 potential respondents from towns within the watershed. Of the 1,938 deliverable questionnaires sent, 794 were completed and returned for an overall response rate of 41%.

Variable Measurement

The oral histories conducted were an important part of the watershed plan development process, and provided an important foundation for this research. Although the interviews were not conducted with a specific focus on place meaning and attachment, such elements emerged as common themes across the oral histories and as such provided important insights. As stated in the final report on the oral histories (Newfound Lake Region Association 2009, 951), ''Many references within the interviews show the deep connections between the people in the region. They value and wish to preserve the personality of the lake region.'' There were common themes

among the rich descriptions of the "personality of the lake region" that were used to develop the measures used in this research. For example, almost without exception the interview respondents listed growth as the greatest challenge facing the watershed region. It seems that for many the condominiums that were built in the 1990s awakened them to the threat of losing the valued pristine beauty of the region. Interview results indicated that residents also worry about the loss of the rural nature of the area, fearing that the region will eventually be caught in the "Winnipesaukee effect" (a more developed lake in the region) with increased traffic, commercialization, and environmental degradation. At the same time, they do not want the area to suffer economically. Measures and indicators of place meaning and place attachment were adapted from previous studies (Brehm et al. 2006; Stedman 2002) for a number of reasons. First, the measures of attachment and meaning, previously published in *American Behavioral Scientist* (Stedman 2006), were developed for a locale with similar conditions to the site of this research. This conclusion was made based on

Table 1. Evaluative place meaning indices

	Evaluative beliefs: Impacted ($\alpha = .85$)	Mean[a]	Std. dev.	Evaluative beliefs: Scenic family/ country getaway ($\alpha = .75$)	Mean[a]	Std. dev.
The lake has too many buildings on the shore.	.760	3.66	.969			
The lake has been damaged by local land uses.	.768	3.40	.933			
The lake has been harmed by overuse.	.802	3.21	.944			
The lake has too many people using it.	.782	3.23	.997			
The lake is very crowded.	.707	2.81	.996			
The lake has changed a lot over the years.	.645	3.80	.964			
Impacted Index (n = 696):		*3.35*	*.73*			
The lake is a scenic place.				.777	4.53	.639
The lake is family place				.703	4.25	.666
The lake is a place of high environmental quality.				.588	3.76	.789
The lake is very peaceful.				.576	3.68	.951
The lake is a community of neighbors.				.438	3.45	.872
Scenic Family Getaway Index (n = 710)					*3.93*	*.56*
Eigenvalue	5.16			2.33		

[a]Place meanings were measured using a 5-point Likert scale measuring agreement with statements made: 1 = "strongly disagree"; 5 = "strongly agree."

the analysis of our in-depth interviews ($n = 30$) conducted with residents of the watershed during the initial stage of the watershed planning project. Stedman (2006) focused on lakes and engaged landowners not adjacent to a lake by asking them to respond to questions with the body of water they most use and identify with. The same approach was applied in this work.

Table 2. Response distributions for selected variables

Variable	Response categories	*n*	Percentage of sample
Lakefront property owner	Yes	177	22.7%
	No	604	77.3%
Residency	Year-round	371	48.6%
	Seasonal	392	51.4%
Gender	Male	453	39.2%
	Female	292	60.8%
Household annual income	Less than $20,000	39	5.7%
	$20,000–$39,999	76	11.1%
	$40,000–$59,999	104	15.2%
	$60,000–$79,999	131	19.2%
	$80,000–$99,999	78	11.4%
	$100,000–$119,999	77	11.3%
	$120,000–$139,999	29	4.3%
	$140,000 or over	148	21.7%
Political orientation	Liberal	49	6.7%
	Moderately liberal	114	15.5%
	Moderate	183	24.9%
	Moderately conservative	195	26.5%
	Conservative	173	18.6%
	Other	21	2.9%
	Not sure	36	4.9%
Educational attainment	Less than 12 years, no high school diploma	10	1.3%
	High school/GED	85	11.1%
	Some college	153	19.9%
	Vocational/trade certificate	52	6.8%
	Bachelor's degree	220	28.6%
	Master's degree or higher	248	32.3%
Years respondent lived in or visited the Newfound Lake Region	Less than 1 year	5	.7%
	1–5 years	41	5.3%
	6–10 years	65	8.5%
	11–15 years	55	7.2%
	16–20 years	62	8.1%
	over 20 years	541	70.4%
Age of respondent (years)	21–40	39	4.9%
	41–60	342	43.1%
	61–80	321	40.4%
	81 and over	92	11.6%

Respondent place meanings were measured via their agreement/disagreement with a variety of descriptive statements about Newfound Lake. Reponses to these statements were analyzed via factor analysis to observe patterns of variation. This resulted in two distinct factors using an eigenfactor cutoff of 1.0. The first factor, which we label ''impacted,'' consisted of six indicators, such as ''the lake has too many buildings on the shore'' and ''the lake is very crowded'' ($\alpha = .85$). The second factor, ''scenic family getaway,'' consisted of five indicators, such as ''the lake is a family place'' and ''the lake is a community of neighbors'' ($\alpha = .75$). Table 1 presents the specific items that comprise each place meaning domain. A third measure of place meaning, ''pristine wilderness,'' did not load on either of these factors but is included as an individual item in subsequent analyses.

Table 3. Indices measuring environmental concerns in the watershed[a]

	Mean	Std. dev.
Economic concerns, $\alpha = .66$, n = 668	3.52	.90
The impacts on landowners from regulations to protect water quality.	3.49	1.22
Economic costs of complying with land-use regulations.	3.56	1.16
Presence of economic opportunities.	3.53	1.11
Development concerns, $\alpha = .86$, n = 652	4.36	.73
Loss of open space due to residential development in the Newfound Lake Watershed.	4.42	.91
The impact of building practices on lake shorelines.	4.58	.74
The impact of building practices on stream and river banks.	4.44	.85
Development on hillsides and steep slopes.	4.35	.91
New road development.	4.00	1.07
Water quality concerns, $\alpha = .89$, n = 634	4.48	.64
A decrease in water clarity in Newfound Lake.	4.51	.86
Poor water quality.	4.47	.92
The discharge of septic waste.	4.72	.67
Runoff from lawn care fertilizer.	4.48	.81
Runoff from insecticides and/or pesticide used for lawn care.	4.51	.80
Runoff from automobiles and/or other fluids left on paved surfaces.	4.34	.88
Increased sediments in water bodies throughout the watershed.	4.36	.85
Drinking water quality.	4.46	.89
Ecological concerns, $\alpha = .71$, n = 703	4.48	.64
Invasive plant growth.	4.57	.72
Loss of wildlife.	4.42	.87
Loss of forested or wooded areas.	4.45	.82

[a]Environmental concerns were measured using a 5-point Likert type scale measuring respondents level of concern with each issue identified: 1 = ''not at all concerned''; 5 = ''very concerned.''

Place attachment was measured via a 7-point Likert scale as described earlier. The resulting summated index of 9 items showed a Cronbach's alpha of .89 (mean = 5.04, standard deviation = 1.34). A measure of general environmental concern was employed by using the New Environmental Paradigm (NEP) index, a 15-item measure of respondents' environmental values (Dunlap et al. 2000). Our analysis produced a reliable scale ($\alpha = .88$, mean = 3.63, standard deviation = .73). Including the NEP in analyses helped control for the influence of general environmental concern on place-specific concerns.

We included two additional control variables in each model to represent landscape experience: lakefront property ownership versus not, and permanent versus seasonal residence. Finally, sociodemographic variables (age, sex, gender, education, income, length of residence, and political orientation) were included as additional independent variables in each model. Table 2 presents the response distributions for selected independent variables in the regression model.

The dependent variable, local environmental concern, was created via four distinct indices measuring dimensions of watershed health. These dimensions are based on in-depth interviews that focused on respondents' concerns about future watershed conditions. The first factor, "economic concerns," consisted of three indicators ($\alpha = .66$, mean = 3.52). "Development concerns" consisted of five indicators ($\alpha = .86$, mean = 4.36). "Water quality concerns" consisted of eight indicators ($\alpha = .89$, mean = 4.48). "Ecological concerns," consisted of three indicators ($\alpha = .71$, mean = 4.48). Table 3 presents the factor loadings and specific items that comprise each index of concern.

Results

Table 4 summarizes the ordinary least squares (OLS) regression analysis of the influence of place attachment, place meanings, environmental values, and sociodemographic variables on the four dimensions of local environmental concern. Economic concern was driven by respondent income ($B = -.16$; $p < .01$), environmental values ($B = -.19$; $p < .001$), and place meaning: "pristine wilderness" ($B = .14$; $p < .05$). The negative effect of income indicates that as income increased concerns about economic impacts from watershed regulations decreased. Environmental values also had a negative relationship, indicating that those less generally concerned about the environment had greater concerns about economic impacts from watershed regulations. However, the place meaning "pristine wilderness" had a positive relationship to economic concerns ($B = .14$; $p < .05$), indicating that the more respondents believed that the lake environment has pristine wilderness meanings, the greater were their concerns about economic issues in the watershed. Overall, the model explained a modest 13% of the variance.

Development concerns were affected by length of residence ($B = -.08$; $p < .05$), gender ($B = -.08$; $p < .05$), environmental values ($B = .30$; $p < .001$), and the place meanings "impacted" ($B = .50$; $p < .001$), and "scenic family getaway" ($B = .18$; $p < .001$). Substantively, long-term residents were less concerned about negative impacts from development. Regarding meanings, residents who perceived their place as "impacted" or a "scenic family getaway" were more concerned. This model showed greater explanatory power (46% of variance explained).

Water quality concern showed the same general patterns as development concerns. All of the same predictors already described were significant, with the exception of length of residence. Women were more concerned than were men about water quality, as were those showing greater general environmental concern ($B = .36$;

Table 4. OLS analysis of the influence of place attachment, place meaning, environmental values, and select sociodemographic variables on indices measuring dimensions of environmental concern

	Economic concerns ($n = 425$)		Development concerns ($n = 436$)		Water quality concerns ($n = 420$)		Ecological concerns ($n = 435$)	
Independent variables	b	*B*	b	*B*	b	*B*	b	*B*
Constant***	11.47		3.528		16.521		4.729	
Lakefront property owner[a]	.023	.004	.095	.011	.020	.002	.097	.022
Watershed residency[b]	.192	.036	.056	.008	.305	.030	.153	.040
Number of years respondent lived in or visited the Newfound Lake Region	−.145	−.070	−.227*	−.078*	−.014	−.003	−.056	−.037
Household annual income[c]	−.189**	−.155**	.008	.004	−.025	−.011	.019	.021
Political orientation[d]	.153	.082	−.026	−.010	.140	.040	.077	.059
Sex[e]	−.482	−.086	−.594*	−.077*	−1.119*	−.106*	−.212	−.053
Educational attainment[f]	−.177	−.096	−.067	−.026	.024	.007	−.068	−.051
Age	−.010	−.045	.018	.056	−.010	−.022	.007	.043
NEP environmental values index	−.046***	−.191***	.101***	.303***	.168***	.361***	.069***	.399***
Strength of attachment index	−.022	−.098	.013	.043	.006	.013	.011	.068
Place meaning index: Impacted	.107**	.180	.413***	.495***	.313***	.273***	.113***	.260***
Place meaning index: Scenic family getaway	.090	.098	.243***	.182***	.214*	.119*	.097**	.145**
Lake is a pristine wilderness	.337*	.138*	−.229	−.068	.034	.007	−.022	−.012
R^2	.128***		.457***		.308***		.311***	

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

[a] 0 = Yes; 1 = no.

[b] 0 = Year round; 1 = not year round.

[c] 0 = Less than $20,000; 1 = $20,000–$39,999; 2 = $40,000–$59,999; 3 = $60,000–$79,999; 4 = $80,000–$99,999; 5 = $100,000–$119,999; 6 = $120,000–$139,999; 7 = $140,000+.

[d] 0 = Liberal; 1 = moderately liberal; 2 = moderate; 3 = moderately conservative; 4 = conservative.

[e] 0 = Female; 1 = male.

[f] 0 = Less than 12 years, no high school diploma; 1 = high school/GED; 2 = some college; 3 = vocational/trade certificate; 4 = bachelor's degree; 5 = master's degree or higher.

$p < .001$), and those who agreed that their place was "impacted" ($B = .27$; $p < .001$) and a "scenic family getaway" ($B = .12$; $p < .05$). The model explained about 31% of the total variance. In the final model addressing ecological concern, general environmental concern ($B = .40$; $p < .001$), and place meanings of both "impacted" ($B = .26$; $p < .001$), and "scenic family getaway" ($B = .15$; $p < .01$), remained significant predictors of ecological concerns. The model explained 31% of the total variance.

It is noteworthy that the experiential "lakefront property ownership" and the "length of watershed residency" measures used as control variables were not significant in any of the models, nor were respondents' educational attainment, political orientation, or age. In combination, these results support previous findings that sociodemographic variables have little explanatory power for understanding local environmental concerns (Van Lierre and Dunlap 1980; Jones and Dunlap 1992).

Discussion

Overall, place meanings are linked to local environmental concerns. In contrast, place attachment never emerges as a statistically significant independent variable, net of meanings. In previous research where only place attachment measurements were employed, place attachment was a consistent predictor of environmental behaviors (Brehm et al. 2006; Vorkinn and Reese 2001). In a study examining the influence of place attachment, values, beliefs, and personal norms about environmental action on the conservation of native vegetation, place attachment also emerged as having statistically significant direct and indirect effects (Raymond et al. 2011). This contrast implies that the importance of place attachment for predicting environmental concerns may be tempered when we have place meanings included in the analysis, an important point for furthering understanding of the place–environmental concerns linkages studied previously in various settings. These findings support the assertions of Stedman (2006), who suggests that place meanings are crucial foundations of place attachment, and that each is necessary to understand the range of place-related behaviors.

These findings are also supportive of the tripartite classification of environmental concerns organized around concern for self, other people or the biosphere (Schultz 2001). Place meanings may emerge as a strong predictor because they represent respondents' perceived interconnection between themselves and nature (biospheric) rooted in a contextual element of the specific place. Accordingly, one could argue that in this study, the object (lake as a scenic getaway; pristine wilderness) is valued due to its inclusion within a respondent's cognitive representation of self. Therefore, these place meanings emerge as stronger predictors of environmental concern due to their inclusion of self and nature, rather than just an emotional response indicative of attachment.

Finally, there are strong relationships between multifaceted local environmental concerns and broad environmental values (NEP) even when controlling for place meanings, suggesting a "nested effect" on concern. The findings indicate that watershed-level environmental concerns are influenced by both place-specific and more general place-transcendent environmental values. These findings support the assertion that the approach used here incorporating both value-based and place-based factors to understand environmental concerns is important for better understanding the social dynamics of environmental concern. It should be noted that as with most efforts to understand environmental concerns, only a moderate amount of variance is explained by the statistical models used. Further, because all place-based research

is rooted in context, the findings are not "generalizable" to other settings. However, researchers seeking broader implications can look for key attributes of the setting that may provide clues about the meanings that may be held for other similar settings, as well as considering key setting elements as important potential contributors to meanings that may be compared across settings.

This study provides important insights for environmental planning and management that seek to address environmental concern dynamics at a place-based level. The cognitive element of environmental concern has been shown to influence behaviors, leading to opposition to place-threatening environmental change (Devine-Wright and Howe 2010). In this study, it is apparent that place meanings, more than place attachment, have an influence on the cognitive formation of environmental concern about watershed issues, which may lead to eventual behavioral actions based on that concern.

These findings have already been employed as part of the watershed plan process, and offer useful tools for planners and others involved in environmental planning and management. Place meanings were used as an integral part of the public involvement processes in many ways, including the creation of a vision statement for the watershed plan that embodies its goals. In another example of the application of place meanings, regional nonprofit organizations have designed outreach campaigns linking problems such as stormwater management to threatened place meanings in an effort to motivate environmentally responsible behaviors. As such, although our methods emphasized quantitative measurement of researcher-defined place meanings, these meanings were derived in part through local participation and are clearly relevant to local people, as indicated both by their use as described earlier, and by their consistent ability to predict watershed-specific environmental concerns. Understanding place meanings can help managers to communicate more effectively with audiences by helping to illuminate connections between meanings, issues of concern, and ameliorative actions. As land use pressures mount in high-amenity areas such as the Newfound Lake Watershed, threats to local ecological health may increase. The meanings that residents ascribe to a particular place have been found to influence their level of environmental concern. Therefore, these meanings need to be understood, accounted for, and valued if watershed planning is to be effective. It should be noted that at least one reviewer asserted that the focus of this applied research on developing a watershed plan may have introduced bias into the place meanings shared by respondents. To address this concern, additional less applied research could help ensure that our findings have not been unduly affected by our involvement in the planning process. We were gratified, however, that communications encouraged both participation in the watershed planning process itself and homeowner implementation of best management practices to address the impacts of nonpoint-source pollution.

In conclusion, our findings support the idea that place-based variables are important components of efforts to understand environmental concerns and, in particular, provide insights into the importance of place meanings in such analyses: measuring attachment without understanding the underlying meanings—whether supplied by local residents or queried by researchers—supporting such attachment gives little guidance to those who would seek to foster attachment and/or facilitate pro-environmental behavior that may result from it. More research is needed to better understand the complex factors affecting environmental concern—but by focusing on place-based as well as place transcendent value-based factors, researchers and practitioners can better understand the elements underlying environmental concern and place-protective behavior.

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