# Place and Proximity: A Spatial Analysis of Visitors' Place Attachment at Kenai Fjords National Park, Alaska

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## Introduction

CLIMATE CHANGE IS IMPORTANT TO EVERY HUMAN BEING as it has the potential to drastically affect places that are important to us, including national parks. In 2011, over 280 million people visited America's national parks to experience these places to see some of the greatest swaths of preserved area in the world as well as historic and natural landscapes that can be found nowhere else on our planet (National Park Service 2012). We continually observe changes in natural processes as the climate shifts and understanding how our beloved parks are changing can deliver a powerful message to national park visitors everywhere. Through front-line interpreters or online webinars, avenues can be created through which visitors are engaged and empowered to help protect the places they love.

The data used in this study comes from the Place-Based Climate Change Education Partnership (CCEP); a National Science Foundation-funded project. The purpose of this nationwide, collaborative effort was to scope out the communication challenges, opportunities, and needs among national park and national wildlife refuge staff when discussing climate change impacts on America's public lands (Schweizer, Davis, and Thompson 2013). This study focuses on Kenai Fjords National Park because of its iconic landscapes and visible impacts of climate change.

The environmental effects of global climate change can be observed in polar regions through changing snow and ice packs, altered seasonal changes, changing wildlife and vegetation patterns, and the depletion of permafrost (IPCC 2007). These environmental changes are influencing people that inhabit these places, impacting their social and cultural identities. Research has shown that people in these areas feel that the place and the wilderness it can represent are important to who they are and should be protected for future generations (Kaltenborn 1998).

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Place attachment is an integral part of how people define themselves (Hess, Malilay, and Parkinson 2008). Where people live, work, and recreate creates a foundation for who they perceive themselves to be and can have profound influence on behavior (Raymond and Brown 2011). In previous research, Alaskans have identified their communities as "relatively distinct spatial areas that reflect local values, attitudes and lifestyles" (Brown et al. 2002).

The use of Geographic Information Systems (GIS) to display social science research is a relatively new field (although cybercartography is making great strides in this area; Taylor 2003); thus, little has been published relating place attachment and spatial representation. Maps are important tools that can help us understand large-scale social patterns and how they relate with the greater landscape (Longley et al. 2005). Several studies have assessed the connection of place with climate change and spatial analyses (Brown, Reed, and Harris 2002; Raymond and Brown 2011), however, most of this research has focused primarily on how to measure and include values and place attachment in landscape planning processes (Brown 2007).

This study further explores how emotional response to national parks can be mapped across the United States. Building upon Norton and Hannon's (1997) theory of geographic discounting—the further a person lives from a place, the less likely they are to have a strong attachment to it—the purpose of this study is to (1) test the relationship between proximity of visitors' homes to the park and their level of place attachment to the park; and (2) measure the related influence of place attachment on visitors' perceptions of climate change impacts. This research is valuable for national park employees, including interpretive rangers and visitor program managers in providing support for the creation and implementation of educational materials on climate change for visitors who desire the information.

## Literature review

**Climate change communication.** Citizens are exposed to many messages about climate change on a daily basis, yet studies show a declining trend in public understanding of human-caused climate change (Vitousek et al. 1997; Stern 2007; Maibach, Roser-Renouf, and Leiserowitz 2009; Leiserowitz, Maibach, and Roser-Renouf 2010; Leiserowitz, Smith, and Marlon 2010; Leiserowitz et al. 2011). Global climate change can be an intimidating topic for park visitors to think about, particularly for the majority of visitors who are on a vacation and simply want to enjoy the beauty of the place. When creating educational materials for this demographic, a fine line must be walked between pessimism and reality so the positive experience of being in the park is what is remembered (O'Neill and Nicholson-Cole 2009).

People are more likely to accept information regarding climate change from messengers who they perceive to be trustworthy, such as well-known scientists or friends and family (Leiserowitz et al. 2010). Environmental organizations and governmental operations such as the National Park Service are another source of trustworthy scientific information (Michaud 2007; Leiserowitz et al. 2010). National parks are a venue in which visitors can be engaged in a climate change discussion with rangers and others whom they perceive as trustworthy sources of information.

There are many barriers to effectively communicating about climate change, one of which is that the changes we will see are not easily predicted. Uncertainty leads to doubt and mistrust among people who do not fully understand the impacts or the mechanisms by which these changes are occurring (Budesco, Broomell, and Por 2009; Fischoff 2011). It is difficult to attribute isolated events to climate change because of the interconnected nature of other changes such as seasonal events and natural cycles in our larger global system. Due to its northern latitude and exaggerated warming effects, Kenai Fjords National Park gives a representation of landscape-based changes which are clearly visible in our lifetime.

Researchers have recently uncovered essential aspects of effective climate change communication on public lands such as national parks. Schweizer and colleagues (2009) developed nine key messages and ten key principles for communicating about climate change, including themes of adaptation and human impact on the land, relevance to the audience's lives, and the proposition that each person can make a difference. Additionally, they advise messages be tailored to the audience, delivered by a credible messenger, and be empowering, site-specific, and connected to the audience's core values (Schweizer et al. 2009). Supporting these recommendations, national parks can deliver messages from credible messengers such as experts in climate science or interpretive rangers using the surrounding landscape, which can make the messages more accessible and relevant to the audience.

Recent studies have examined peoples' perceptions of climate change based on their education, political affiliation, ethnicity, age, gender and where they live (Leiserowitz and Akerlof 2010; Leiserowitz et al. 2011; McCright et al. 2010). Several studies have come from researchers at Yale and George Mason universities using survey data to assess US citizens' knowledge of climate change and classify them into the "Six Americas," a segmentation model that is gaining popularity among those looking to communicate more effectively about climate change (Maibach et al. 2009).

Researchers have also investigated the level of concern regarding climate change around the globe and peoples' willingness to make personal changes to support sustainability (Bord et al. 1998; Botzen and van den Bergh 2009). Among the regions studied, Canada, Europe, and South America were most concerned about climate change; however the research showed that most people, including US citizens, would only make small changes toward mitigating climate change. A change in lifestyle cannot be expected based on current perceptions of climate change causes and effects (Bord et al. 1998).

Studies on effective methods of communicating climate change have revealed unexpected responses to practices the media typically use. O'Neill and Nicholson-Cole (2009) explain how the media's use of sensational language may actually elicit ambivalent behavior toward climate change. In their study participants were asked to select photographs they perceived would be effective in communicating climate change: first to others in a large-scale advertisement, followed by images that they themselves would respond to. The results showed that although people chose fearful images such as natural disasters to portray climate change in a media campaign, they personally stated those images would not be effective in convincing them to change their behavior to be more sustainable. Instead, pictures of riding a bike, gardening, composting, and turning off the lights when not in use resonated with the majority of the individuals (O'Neill and Nicholson-Cole 2009).

**Place attachment.** In Tuan's (1977) *Space and Place: The Perspective of Experience*, he differentiates between "space" and "place"; "space" is simply a location, devoid of personal meaning, whereas "place" has a special significance to an individual because that person has had a meaningful experience there. Place attachment is defined in environmental psychology as an emotional or cognitive connection between a person and a particular place (Altman and Low 1992).

The concept of place attachment and the impacts of climate change are not isolated and have been shown to profoundly influence the behavior of tourists (Dawson, Havitz, and Scott 2011) and others. For example, the collision of these two forces was witnessed in the people who were displaced after Hurricane Katrina made landfall in New Orleans, Louisiana. The heart of New Orleans was flooded and destroyed by this natural disaster. However, as soon as they could, residents moved back to their homes, despite knowing that another hurricane, as large as or larger than Katrina, is likely to strike at some point (Burby 2006). These people knowingly returned to danger and destruction because it is their home, a part of who they are and where they feel they belong. "People's ties to a place are deep, as is their fealty to traditions that facilitate survival there. Historically, for many societies, this adherence to tradition has complicated adaptation to environmental change" (Hess et al. 2008: 468).

The concept of vulnerability is an inherent part of planning for future climate changes. Vulnerability has been defined by the IPCC as "the extent to which climate change may damage or harm a system; it depends not only on a system's sensitivity but also on its ability to adapt to new climatic conditions" (Watson et al. 1996: 3). In a study by Hess et al. (2008), health risks from potential climate change events were compared with their influence on social and mental consequences in affected communities. Place attachment is an integral aspect of creating a feeling of community which leads to good mental health:

... the sense of belonging, which is necessary for psychological well-being, depends on strong, well-developed relationships with nurturing places. A major corollary of this proposition is that disturbance in these essential place relationships leads to psychological disorder (Fullilove 1996: 1518).

Stedman suggests that if a place particularly important to a person is threatened, they will participate in actions to protect it (2003). Regardless of perception of anthropogenic climate change, people are inextricably connected to the places they are familiar with, identify with, and of which they have fond memories (Portier et al. 2010). As illustrated in Kaltenborn's (1998) study, people who find the places they love affected by climate change want to help mitigate the impacts that are causing those changes.

**Hypotheses.** Black and Liljeblad state that "of social ecology, we need to understand the creation and dynamics of human relationships to physical space—place—at multiple spatial and temporal scales from the individual to greater society" (2006: 1). As noted above, the purpose of the present study is to (1) test the relationship between proximity of visitors' homes to the park and their level of place attachment to the park; and (2) measure the related

influence of place attachment on visitors' perceptions of climate change impacts. Based on previous research, we developed the following hypotheses:

- **H1.** As distance between the park and visitors' homes increases, place attachment will decrease.
- **H2.** As visitor place attachment increases, propensity to notice changes in the land-scape caused by climate change will also increase.
- **H3.** As visitor place attachment increases, desire to learn about changes in the landscape caused by climate change will also increase.
- **H4.** As visitor place attachment increases, belief that climate change will harm the park will also increase.

# Methods

Using survey data collected in the summer of 2011 by the Place-Based CCEP, the researchers identified by zip codes where Kenai Fjords National Park visitors live. Locations were paired with their responses to questions asking how attached to the park they felt and if they had noticed any effects of climate change at the park during their visits. By comparing visitor responses to the survey with their spatial distribution across the United States, visitors' proximity to the park and level of place attachment were mapped. Data were entered into the Statistical Package for Social Science 19 (SPSS) and ArcMap10 to visualize where visitors live in relation to the park. Using a distance function, the researchers determined how far away from the park visitors live then compared this information with their responses to questions about sense of place on the survey. From these results, we were able to show how proximity to the park is related to visitors' attachment to it.

**Surveys.** In June 2011, the Place-Based CCEP research team administered a total of 493 on-site surveys at Kenai Fjords National Park. Survey sites included the Exit Glacier trailheads and the Exit Glacier Nature Center. The surveys were administered via Apple iPads using the iSURVEY app (for a complete description of this methodology see Davis, Thompson, and Schweizer 2012). The survey contained questions regarding visitors' perceptions of climate change, specific climate change impacts, and attachment to the park. The response rate for the sample was 68% and reflects the total population of visitors at a 95% confidence level with a ±4% margin of error using a 50/50 split.

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age brackets of 26–35 (20%) and 46–55 (20%). Of the visitors surveyed, there was a nearly equal number of males and females (approximately 50% each). Many respondents had completed a graduate or professional degree (40%). Most visitors surveyed self-identified as white or Caucasian (82%) as well as Republican (24%; Table 1). On average, visitors surveyed have visited the park one time (70%). No statistical differences were found between any of the demographic variables and distances or place attachment data.

Three place-specific, visitor-self-reported climate change variables were included in this study. These variables consisted of (1) "I would like to learn more about climate change in

Table 1. Demographic characteristics of participants.						
Characteristic	N	%				
Age in years at time of survey (N=466)						
10-17	35	8				
18-25	43	9				
26-35	94	20				
36-45	71	15				
46-55	94	20				
56-65	86	19				
66-75	37	8				
76-85	5	1				
86-95	1	1				
Gender (N=493)						
Male	231	50				
Female	236	50				
Highest education level completed (N=471)						
Less than high school	16	3				
Some high school	17	4				
High school graduate	30	6				
Some college	58	12				
Two-year college degree	27	6				
Four-year college degree	134	29				
Graduate or professional degree	189	40				
Ethnicity (N=469)						
American Indian or Alaska Native	7	2				
Asian	25	5				
Black or African American	4	1				
White or Caucasian	384	82				
Other	28	6				
Political Affiliation						
Republican	108	24				
Democrat	104	23				
Independent	77	17				
No affiliation	97	21				
Other	72	16				

this park"; (2) "I believe that some of the effects of climate change can be seen at this park"; and (3) "I believe that climate change will harm this park a great deal." Visitors were asked to indicate how much they agreed with each statement on a five-point scale where 1 = strongly agree and 5 = strongly disagree. A correlation analysis was conducted with these variables and the place attachment concept.

**Place attachment.** The researchers created a place attachment concept by analyzing the reliability of four separate place attachment variables in SPSS 19. These variables include (1) "This park is very special to me"; (2) "I identify strongly with this park"; (3) "I am very attached to this park"; and (4) "This park means a lot to me" (Williams and Vaske 2003). Visitors were asked to identify how much they agreed with these statements using a five-point scale where 1 = strongly agree and 5 = strongly disagree. The resulting Cronbach's alpha score was used to determine if the variables formed a reliable scale. The SPSS data table of visitor attributes was exported as a comma separated value (CSV) table and then imported into ArcMap10. Once the visitor attributes were given geographical reference points, (see "Distance," below) the place attachment variables could be spatially represented on a map of the United States. The place attachment scores were reclassified into five color-coded values ranging from green = strong attachment to red = weak attachment.

**Distance.** Distance was calculated within ArcMap10. National zip code data were retrieved from the US Census Bureau Tiger site and joined to a table of visitor attributes that also contained visitor zip codes. Cases with missing zip code data were removed from the analysis, greatly reducing the sample size (n = 242). The researchers followed a process similar to Brown's (2007) work in which respondent characteristics were combined with landscape values. By merging the two files, the researchers gave the visitor zip codes a geographic reference point which could then be displayed on a map of the United States. Latitude and longitude for the Exit Glacier Visitor Center in the park were extracted from Google Earth 6. These measures were converted into a table and imported into ArcMap10. After conversion into x and y coordinates, the data were placed on the United States map via a shapefile. The researchers used the point distance tool in ArcMap10 to calculate the distances between the visitor center and all zip code centroids (Theobald 2007). The resulting distances were joined to the table of visitor attributes. The distance variables were reclassified into five outwardly radiating distance bands using natural breaks.

Place attachment and distance. Distance measures along with other visitor attributes in the table were exported in a CSV table and imported back into SPSS 19. Average place attachment scores were calculated for each distance band. Researchers used a one-way ANOVA to calculate mean differences for each distance band. Additionally, the researchers employed a spatial regression model in ArcMap10 to test the influence of distance on place attachment.

#### Results

The reliability analysis indicates that the four place attachment variables combine to create a single concept of place attachment (Cronbach's alpha = .88, Table 2). The overall average response to the place attachment concept for the entire dataset was one of moderate place at-

<b>Table 2.</b> Reliability analysis of place attachment varaibles ( $n = 493$ ).								
Variables	Cronbach's alpha	Item total correlation	М	SD				
Place attachment variable	.88							
This park is very special to me		.72	1.76	.74				
I identify strongly with this park		.76	2.16	.84				
I am very attached to this park		.75	2.37	.80				
This park means a lot to me		.76	2.12	.81				
Note: Items were measured using a five-point scale where 1 = Strongly Agree and 5 = Strongly								
Disagree.								

tachment. (M = 2.09, SD = .69). The place attachment concept was measured on a five-point scale (1 = strong attachment, 5 = weak attachment).

The visitor place attachment data were combined with spatial zip code data allowing for spatial representation of the place attachment variables. No pattern in the data emerged visually (Figure 1) or via spatial regression modeling.

The researchers created five distance bands expanding out from the Exit Glacier Visitor Center in Kenai Fjords National Park using natural breaks in the visitor-reported zip code data (Figure 2).

The place attachment data were segmented using the distance bands to detect patterns in the place attachment data related to distance from Exit Glacier Visitor Center within Kenai Fjords National Park. All distance bands indicate a moderate amount of place attachment (M < 2.3, SD < .84 in all cases). A one-way ANOVA was conducted to test the mean differences in place attachment scores for each distance band. However, the results were not significant, indicating that there was no difference in place attachment between any of the five bands.

Three visitor-self-reported climate change variables were correlated with the place attachment concept. The variable "I believe that climate change will harm this park" had a statistically significant though minimal correlation with the place attachment concept (r =.13, p < .01; Table 3). The variables "I believe that some of the effects of climate change can already be seen at this park" and "I would like to learn about climate change at this park" had a significant minimal correlation with the place attachment concept (r > .20, p < .001 in both cases). All three visitor-self-reported climate change variables substantially correlated with each other (r > .46, p < .001 in all cases).

## Discussion

Although the place attachment variables formed a reliable scale for that concept, there was no evidence to support our hypothesis that visitors who live closer to Kenai Fjords National Park would have a stronger place attachment value. This finding is also seen in Brown et al.'s (2002) study. It is possible that Kenai Fjords, by nature of being geographically detached from the continental United States, may have skewed the data by being a particularly difficult



Figure 1. Visitor place attachment attributes.

park to reach. However, perhaps the type of place under study has a stronger influence to attachment than mere proximity. National parks possess some of the most iconic and pristine landscapes in the United States. Visitors find them unique and want them to be preserved for tangible or intrinsic reasons, regardless of their proximity to these places (Lockwood 1999). Thus, place of residence may not be a factor in visitor-reported place attachment variables.



Figure 2. Visitor distance bands from Exit Glacier Visitor Center.

Additionally, the surveys were administered on-site, which also has the potential to affect responses. Visitors completed the survey while in Kenai Fjords National Park and therefore were more likely to respond as feeling attached to the park while surrounded by ancient snow-capped peaks carved by the fingers of glaciers over millions of years. A social desirability bias could also have skewed results by visitors wanting to appear as if they care more deep-

Table 3. Means, standard deviations, and intercorrelations of place attachment with place-									
dependent climate change variables (n = 493).									
Variables	м	SD	1	2	3	4			
1. PA	2.09	.69	-						
2. LCCH	2.52	.89	.26**	_					
3. SCCH	1.94	.87	.20**	.50**	-				
4. CHHP	1.79	1.09	.13*	.46**	.50**	_			
Note: PA = Place Attachment Concept; LCCH = I would like to learn about climate change at this park; SCCH = I believe that some of the effects of climate change can already be seen at this park; CCHP = I believe that climate change will harm this park or refuge a great deal.									
* p < 0.1. ** p <	.001								

ly about the park while the researchers were present. Our results may have been different if we had used a mail survey and included respondents who had never visited the park before, the comparison of which may be an opportunity for future research.

Another consideration for the lack of continuity in geographic discounting is that it is a difficult concept to measure. "Complex cultural and physical variables" cloud a simple analysis of place attachment and geographic location (Brown et al. 2002: 70). Indeed, Norton and Hannon (1997) also concede that this type of research establishes the point that place attachment and geographic discounting are place-based in theory. The researchers suggest more qualitative means of assessing place attachment be used in the future, similar to the work by Kyle and Chick (2007). The work of Hammitt, Kyle, and Oh gives a more comprehensive view of future measures of place attachment (2009).

Hypotheses 2, 3, and 4 were supported by the data. Results from the correlation show that the stronger the place attachment to Kenai Fjords National Park that a visitor reports, the more likely they believe climate change will harm the park. There were also correlations in visitors with a strong place attachment noticing more changes in the landscape. Though beyond the scope of this particular study, a strong correlation was discovered between visitors' ability to see changes in the landscape and their desire to learn more about climate change. Additionally, there was a strong correlation with their belief that climate change would harm the park. This finding gives support to educating about climate change in places where the impacts are clearly visible. As more national parks witness noticeable changes in their landscape, they become increasingly important as climate change educational tools. The extent and reasoning behind these changes only need to be made explicit through proper interpretation via skilled rangers within the parks. Exploring the connection between these variables and the potential for further educational opportunities should be the subject of further research.

These results show that the majority of Kenai Fjords visitors care about the park and therefore want to learn about how climate change is affecting it. Furthermore, this attachment is exhibited by visitors regardless of distance. One often-overlooked facet of climate change is that impacts are globally diffuse; similarly, the mitigating solutions to this issue can be pursued worldwide. Due to the wide geographic range of visitors, education that shows how actions in other states or areas around the world can affect Exit Glacier in Kenai Fjords may be particularly well-suited to encourage climate change-mitigating behaviors in visitors. For example, interpretive rangers could provide education on how switching to sustainable energy options or turning the thermostat down in visitors' homes could contribute to preserving glaciers at Kenai Fjords. Opportunities abound for delivering conservation-minded messages to an audience that seems properly primed to receive them.

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