

# The influence of home: Place attachment

and its role in environmental concern and behavior in the Great Lakes region.

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Program in the Environment Honors Thesis

Winter 2014 -- Spring 2015

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## **ABSTRACT**

The influence of place attachment on environmental concerns, attitudes, and behavior is not yet well defined. Identity helps to drive decision-making, and as part of one's history, attachment to place may play a role in informing one's attitudes and actions. Understanding the strength of this influence on issues of both global and local scales is of particular interest to this study. Great Lakes residents' opinions and self-reported behavior were measured via survey ( $n=133$ ). A series of hierarchical multiple regressions were used to explore whether place attachment was a significant predictor of climate change attitudes, conservation behavior, and concerns about local environmental issues. Findings from these analyses reveal that place attachment exerts a much stronger influence on concerns about local environmental issues, while political orientation arose as a stronger influence of broader, more global environmental issues. Further study of place attachment in relation to these issues at the local level may help deepen our understanding of how to encourage pro-environmental behavior.

## **INTRODUCTION**

With the intensifying effects of climate change becoming more apparent in many parts of the world (IPCC, 2014), understanding the role place attachment plays in the perception of environmental threats and in motivating conservation behavior is paramount. There is a growing appreciation for the role identity plays in influencing behavior (Devine-Wright & Clayton, 2010). While there are many social, demographic, and cultural factors that contribute to identity, some research suggests that our connections to place also shapes our sense of ‘self’ and these feelings of place attachment can influence how people evaluate certain environmental problems (Kellstedt et al., 2008). Given this work, further study on the connections between place attachment and environmental concern and behavior seems warranted. This research could also offer insights about how to craft environmental communication efforts and frame environmental issues so that they resonate more strongly with the public (Brody et al., 2014).

Personal connection is a prime human motivator. ‘Home’ will be better defended than ‘someone else’s property’ (Gifford, 2011), close friends will be given more attention over acquaintances; that which brings individuals a sense of ‘belonging’ is more likely to earn their sympathies, and incredible effort may be put forth to protect one’s own (Devine-Wright & Clayton, 2010). This instinct falls into line with rational and evolutionarily adaptive responses in that it is less costly to hold familiar territory than to invest in a wholly new location. Familiar land means familiar sources of food, shelter, and basic necessities, as well as possibly established social connections. Such lines of thinking stem from Enlightenment theories as well as evolutionary, each of which claim

humankind to be ‘rational’, or capable of choosing a course of action that best serves the individuals’ needs or goals based on how that individual perceives the world (Simon, 1957).

This concept of ‘home’ or ownership carries both practical and emotional meanings in the human experience. As humans developed greater capacity for understanding the environment, so too did their emotional attachment for that particular environment grow (Kaplan & Kaplan, 1982). More than just a shelter space, ‘home’ came to mean safety, predictability, access to food and survival necessities, perhaps political positioning – but also important social connections and familiar constructs, and a ‘mental comfort zone’ (Vorkinn & Riese, 2014). As a result, humans seem to have strong feelings about familiar places, feelings that inform components of our self-identity and our values.

### ***What is Place Attachment?***

Past studies have debated the factors that contribute to place attachment. This work suggests that place attachment is a multi-dimensional and dynamic construct. Stedman (2014) proposes a three-part measure of place attachment that acknowledges the physical environment, human activities in the space and human social connections, and psychological processes that occur as a result of the nature of the setting. Because meaning is attributed symbolically, via personal memories tied to certain places or objects, place attachment is a component of an individual’s identity and thus their reactions to any issue at hand.

Other studies that proposed multi-dimensional measures of place attachment have investigated two or more components. The two most common elements are referred to as ‘place identity’ and ‘place dependence’, an emotional and functional response to place,

respectively (Vaske & Kobrin, 2001; Williams & Vaske, 2003), but other potential models (such as those proposed by Raymond et al., 2010 and Scannell & Gifford, 2010 and Williams & Vaske, 2003), have explored: ‘sociocultural’ or community attachment, ‘biophysical’ or the natural setting/environment, and an integration of the two aforementioned components. Alternatively, ‘place attachment’ could also be measured through analyses of: ‘self’ or self-identification, emotions, personal life path and activities, as well as ‘other’ or the characteristics (personality, background) of an individual, and the natural/physical environment and its role in a person’s life. Raymond et al. (2010) proposed a four-dimensional assessment, consisting of ‘place identity’, ‘place dependence’, ‘nature bonding’ and ‘social bonding’, with the overarching measure ‘place attachment’ set in the context of the personal, community, and natural environments. The variety of definitions among studies have lead to some inconsistencies, but it is general agreed that that more components used in the measure of ‘place attachment’, the more specific and generalizable the overall account may be.

This study attempts to incorporate both ‘place dependence’ and ‘place identity’ as components. The former will be defined as an individual’s attachment to a place based on physical resources (Vaske & Kobrin, 2001; Scannel & Gifford, 2010; Williams & Vaske, 2003). These may be related to career-oriented goals, health issues, recreational opportunities, financial limitations, familial obligations, etc. For instance, the Great Lakes provide certain recreational experiences that are unique to the area; water-oriented options alone, such as freshwater sailing and boating, diving, and fishing, draw tourists from around the world. Another example of place dependence involves familial obligation, which results from generations residing in the same place over time, creating

a support structure in which an individual is depended upon. Often people will remain located in a certain place due to these functional responsibilities.

‘Place identity’, comparatively, can be characterized as a nostalgic, emotional, or psychological attachment to a place based on a history or built through experiences (Vaske & Kobrin, 2001; Scannel & Gifford, 2010; Williams & Vaske, 2003). For instance, a member of a community may have established friendships, partnerships, and relationships with other individuals, and may have a positive reputation or place in the social structure that keeps them living in the area. They may have grown up in the area, developed a history that may be very strongly integrated with a specific piece of land, plants, animals, or another aspect of the natural or social landscapes. In this case, an individual’s identity is partly built from the emotional, personal, and symbolic bonds they find by living in the area. For them, living in the place contributes to the way they see themselves.

This study investigated ‘place attachment’ through the functional and emotional attachment components as previously described. For example, measures of difficulty being/moving away from the region were included. Those that indicated they would have more difficulty were deemed to have greater attachment to the area, speaking both functionally and emotionally. Other items asked about a sense of responsibility for the natural landscape, the idea being that those who felt more personally or morally responsible for its health should have more personal attachment to the place. An image of place attachment was recreated through these questions and used in analysis.

### ***How does Place Attachment influence Environmental Attitudes?***

The study of place and its relationship to human experience, identity, and behavior, while explored in an array of disciplines ranging from sociology to anthropology to biology, is nebulously defined (Vaske & Kobrin, 2001). As discussed above, no conclusive definition of place attachment exists among researchers (Raymond et al., 2010). As such, the influence of place attachment on environmental attitudes and behavior has received limited attention, with much of the resulting research revolving around determining a definition for the measure, rather than focusing on practical applications. Lewicka (2011) declares outright that much more work is needed to understand the relationship between place, place attachment, and individuals' identities, experiences, attitudes, and perceptions.

Despite this lack of research, there are some general demographics trends that inform the contexts in which place attachment is studied. Hamilton et al. (2010) assert that both the social/physical environment and individuals' histories/personalities are key players in determining environmental attitudes and behavior. As such, identity lies within the realm of an individual's personal history, and, as discussed previously, place identity can be a contributing factor. A study by Scannell and Gifford (2010) further found that in home and neighborhood level residencies, socially-based place attachment was stronger than physically based place attachment, but that an opposite trend arose in cities. These findings suggested that while place attachment was indeed positively associated with pro-environmental behavior, individuals were less likely to grow attached to an environment of poor quality than to one of good quality, in the first place. Further, in good quality environments, there was less reported pro-environmental behavior than was found in

residencies of poorer environmental quality (presumably because the space was seen as already healthy). Clearly, many of these previous studies have focused on urban, rather than natural environments (Devine-Wright & Clayton, 2010). Traditional demographics scores such as education and political-orientation are often measured alongside place attachment. Hamilton et al. (2010) describe that politically speaking, environmental ‘concern’ increases with education among Democrats, while alternatively the situation is reversed among Republicans. A study by Kellstedt et al. (2008) shows correlations between increased levels of informedness and increased personal feelings of responsibility, but also decreased concern for global warming. Longer-term threats (such as sea-level rise) tend to be more threatening to the young because these events lie within their personal futures. While education and political orientation have been the most reliable predictors of environmental concern, plenty of questions remain regarding the possible role of measures such as place attachment. Individual case studies have been suggested for further study.

A study by Brody et al. (2014) investigated the relationship between location and risk perception with regard to climate change. Alongside the use of demographics, attitudinal, and social contextual variables, the study concluded that those with a higher perception of risk tended to live in areas in which the risk was most visible on a daily basis. For instance, residents living closer to a coast were more inclined to acknowledge the risk of sea level rise due to climate change, even when the respondents were less informed or educated on the matter. This suggests that personal perceptions of risk based on demographics and the surrounding social environment are more predictive of an individual’s attitudes than ‘environmental knowledge’. That study also indicated that

higher socioeconomic status and lower risk perception are correlated, and that more stable financial and social status is associated with greater concern for the environment and/or awareness of environmental issues. This is especially interesting in comparison to findings that show lower educational levels and income, and lower general environmental knowledge, correlating with greater environmental concern. This may be a reflection of these respondents finding themselves in a more clearly vulnerable situation. Overall, these findings suggest that measures of place may hold weaker explanatory power over risk perception in comparison to socioeconomic, demographic, and attitudinal measures.

***Great Lakes region.***

This study sought to examine the influence of place attachment on both environmental concerns and behavior. Investigating whether the strength of this influence differs for broader, global issues, such as climate change, and more local issues, such as water quality, was particularly important. As such, this research focused on place attachment to the Great Lakes region.

The North American Great Lakes freshwater system is the largest source of surface freshwater in the world, providing about 21% of the world's supply. North America alone draws about 84% of its freshwater from this resource. Water quality and quantity is quickly becoming one of the most salient concerns for populations around the globe. Invasive species, industrial fracking, and agricultural fertilizer runoff also threaten the security of the water and other resources (timber, crops), residents' health, and the economy (IPCC, 2014). Investigating this region is of particular interest due in part to the concentration of these resources in this area.



***Research Objectives.***

This study draws from past research to investigate the impact that place attachment has on environmental awareness, concern, and action within the Great Lakes region. In doing so, it aims to establish a better understanding of the current attitudinal climate within the region that is home to one of the world's most precious resources, freshwater.

In order to understand the unique role of 'place attachment', this research sought to examine the impact place attachment has in relation to demographic factors and political orientation. Accounting for political orientation was particularly important given that it has been shown in past studies to have a significant influence on environmental attitudes (Hamilton et al, 2010; Kellstedt et al., 2008).

The environmental issues and topics under investigation are both local and global in nature. Should it prove reasonably powerful, place attachment might be useful in targeting areas for policy focus, as discussed by Brody et al. (2014). Areas with higher levels of motivation, action, and concern, may be prime areas in which to initiate civil organization and test plausible mitigation techniques. Such work, if successful, may then be implemented in other, encouraged communities (Scannell & Gifford, 2015).

While this study assesses multi-dimensional 'place attachment' through a single factored category rather than through multiple pieces, it is an attempt, if nothing else, at bringing more attention to the subject within the region for further study. As the growing challenges of climate change are exacerbated, it's increasingly salient to observe and study regional environmental activity, awareness, and opinions from alternate angles.

## **METHODS**

### ***Participants.***

One hundred and thirty-three (N=133) adults residing in or visiting the Great Lakes Region were recruited in two different ways. The first involved distributing paper surveys to individuals attending three outdoor festivals held in and around Traverse City, Michigan during the summer of 2014. The National Cherry Festival draws an international crowd of an estimated 128,000 over the course of a week and celebrates the local cherry harvest, while the Traverse City Film Festival's international crowd is estimated around 500,000 over the course of a week, and celebrates culture through film. Finally, the Suttons Bay Art Festival's crowd, estimated at around 6-8,000 over the course of a weekend, tends to be the most local.

The second approach involved the use of an online survey and snowball sampling. The online survey was distributed to a convenience sample of Michigan residents through Facebook and word of mouth. Respondents were encouraged to share this survey with other friends and family members.

In total, thirty-six (n=36) individuals completed the paper version of the survey in-person, and ninety-seven (n=97) individuals completed it online.

Survey respondents have a median age of 40-49, tend to be female, well-educated, and more liberal in political orientation (see Table 1). As shown in Table 2, survey respondents also tend to agree that climate change is occurring, is caused mainly by humans with some natural influences, and that it has already impacted the Great Lakes region.

This study was submitted to a university-affiliated Institutional Review Board and was deemed exempt from IRB oversight.

**TABLE 1.** General demographics.

| <b>Characteristics (%)</b>               |                                  |      |
|--|----------------------------------|------|
| <b>Gender</b>                            | Male                             | 21.8 |
|  | Female                           | 64.7 |
| <b>Age</b>                               | <18                              | 2.3  |
|  | 18-29                            | 30.1 |
|  | 30-39                            | 9.8  |
|  | 40-49                            | 8.3  |
|  | 50-59                            | 19.5 |
|  | 60-69                            | 12.8 |
|  | 70-79                            | 3.8  |
| <b>Education</b>                         | High School                      | 8.3  |
|  | Some College                     | 19.5 |
|  | 2-yr Degree                      | 3.8  |
|  | 4-yr Degree                      | 36.1 |
|  | Post-Grad                        | 17.3 |
| <b>Income (annual, \$)</b>               | <25 k                            | 13.5 |
|  | 25 k – 49.9 k                    | 27.1 |
|  | 50 k – 74.9 k                    | 15.8 |
|  | 75 k – 99.9 k                    | 12.0 |
|  | 100 k – 149.9 k                  | 9.8  |
|  | 150 k +                          | 6.8  |
| <b>Political Orientation (composite)</b> | Very Liberal & Liberal           | 48.6 |
|  | Moderate                         | 35.5 |
|  | Conservative & Very Conservative | 15.9 |

**TABLE 2.** General climate change opinions (%).

|  |      |
|--|------|
| <i>Climate change will mainly impact people in other countries---</i>  |      |
| <i>Strongly Disagree</i>   | 31.0 |
| <i>Disagree</i>  | 37.1 |
| <i>Not Sure</i>  | 21.6 |
| <i>Agree</i>   | 0.1  |
| <i>Strongly Agree</i>  | 0.1  |
| <i>Which of the following is closest to your view? Climate change:</i> |      |
| <i>isn't happening</i>   | 0.8  |
| <i>is caused by natural environmental changes</i>                      | 6.7  |
| <i>is caused by human activity and natural environmental changes</i>   | 42.9 |
| <i>is mainly caused by human activity</i>                              | 49.6 |
| <i>When will climate change start to impact the Great Lakes?</i>       |      |
| <i>it's already impacted</i>   | 91.4 |
| <i>in 10 years</i>   | 3.5  |
| <i>in 25 years</i>   | 0.8  |
| <i>in 100 years</i>  | 1.7  |
| <i>never</i>   | 2.6  |
| <i>Scientists are unsure whether climate change is occurring---</i>    |      |
| <i>Strongly Disagree</i>   | 52.2 |
| <i>Disagree</i>  | 19.1 |
| <i>Not sure</i>  | 16.5 |
| <i>Agree</i>   | 7.8  |
| <i>Strongly Agree</i>  | 4.4  |

### ***Survey Instrument.***

In order to investigate the relationship between place attachment and pro-environmental attitudes and behavior, a survey instrument was developed. The 2-page survey consisted of fifteen mixed multiple-choice and rating scale questions.

Demographics were measured for use in the primary step of regression analysis as a base study from which to draw significance; items such as ‘education’ and ‘income level’ have in other studies been significant, and measuring them first and foremost helped to distinguish their influence from that of political orientation and place attachment itself.

Further questions related to connection to the Great Lakes region, concern about specific environmental issues, views on immediacy of global climate change and its relation to

humans and the Great Lakes Region, as well as the potential and current impact of climate change. In addition, measures investigated frequency of individual action regarding environmental issues and perspectives on whether state and local government should be more active in dealing with environmental problems.

## **MEASURES**

### ***Place Attachment.***

Drawing from several previously established and validated survey instruments (Scannell & Gifford, 2010; Vaske & Kobrin, 2001; Raymond et al., 2010; Kellstedt et al., 2008; Williams & Vaske, 2003), this study assessed ‘place attachment’ through a bank of 11 questions on a 5-point scale (*strongly disagree to strongly agree*). These questions attempted to evaluate both emotional and functional attachment to the Great Lakes region. Items included feelings of connection to the Great Lakes, pride as a resident, difficulty imagining moving away, attachment to the natural landscape, plants, and animals of the region, sense of identity with the Great Lakes, enjoyment of the outdoors, personal social connection, sense of responsibility for the natural landscape, missing the region while traveling away, and a connection to other residents.

### ***Climate Change Attitudes.***

Views on climate change were measured through a series of 7 items on a 5-point scale (*strongly disagree to strongly agree*). Questions investigated both potential negative emotional and physical impacts of climate change on the Great Lakes Region, including the impact on human health and the economy. Other questions measured agreement among scientists about climate change, and thoughts about the role of citizens and the

government with regard to environmental action. Items were either drawn from previously established and validated survey instruments (Scannell & Gifford, 2010; Vaske & Kobrin, 2001; Raymond et al., 2010; Kellstedt et al., 2008; Williams & Vaske, 2003) or else generated because no other existing surveys addressed the issues of interest.

Attitudes were also measured through several single-item questions, including individuals' thoughts on climate change cause(s) and when climate change might be expected to impact the Great Lakes Region.

### ***Environmental Behavior.***

Pro-environmental behavior survey questions were explored through a series of 7 questions on a 5-point scale (*never to very often*), investigating how often individuals took certain actions to reduce their environmental impact on the planet, including: following news on climate change, talking about climate change with friends/family, recycling/reducing waste and household water/energy use, and personal car use.

### ***Local Environmental Concern.***

Local environmental concern was measured through a series of questions on a 5-point scale (*not at all to extremely*) regarding particular environmental issues, including: overall impact on the Great Lakes, the spread of invasive plants and animals, water quality, hydraulic fracking, and agricultural fertilizer runoff.

### ***Political Orientation.***

Political orientation was measured alongside other demographics questions, broken into two individual response prompts. Participants were asked to rate their general liberal (left-wing) or conservative (right-wing) tendencies on both social issues and

economic issues on a 5-point scale (*very liberal to very conservative*). Responses were then compiled into a composite measure in order to assess general political leanings.

### ***Demographics & Background.***

Demographics on the population were collected – exact questions were influenced by previously established surveys (Scannell & Gifford, 2010), and included: current place of residence, length of residency, town size, gender, age, education, and annual household income. These measures were used not only to gather a general report of the population but also for the purpose of use as covariates in the regression analysis.

## **STATISTICAL ANALYSES**

### ***Demographics Analysis.***

Basic demographics information was analyzed to identify means and general trends, as reported in Tables 1 & 2.

### ***Factor Analysis.***

In order to assess construct validity and identify common themes, separate factor analyses, using principle-component factoring with Varimax rotation, were conducted on measures related to place attachment, climate change attitudes, and conservation behavior. Factor structures for place attachment and conservation behavior were based on item loadings of at least .45, Eigenvalues greater than 1.0, and alpha coefficients of at least .55. Items loading on more than one factor were excluded. In the case of climate change attitudes, a forced three-factor solution based on item loadings of at least .45 and alpha coefficients of at least .55 provided the most easily interpretable factor structure. In all cases, items loadings on more than one factor were excluded.

### ***Regression Analysis.***

Hierarchical multiple regression was used to examine whether feelings of place attachment were a significant predictor of climate change attitudes, conservation behavior, and attitudes about four different local environmental issues, after controlling for demographics variables (e.g. age, gender, income, education, town size) and political orientation. Preliminary analyses indicated that all relevant statistical assumptions were met. A sample of 133 was deemed acceptable given the seven independent variables included in the analysis. Multicollinearity was deemed not to be an issue since no predictor variables were highly correlated (.01 to .29) and collinearity statistics (i.e. Tolerance and VIF) were all within accepted limits. In addition, residual and scatter plots indicated no violation of the assumptions of normality, linearity, and homoscedasticity.

In all cases, a three-step hierarchical multiple regression was conducted with the same set of predictor variables. The five demographic variables were entered at step one of the regression to control for background factors. Political orientation was entered at step two and place attachment was entered at step three. This structure allows us to examine the degree to which place attachment predicts each of the dependent variables after controlling for demographic factors and political orientation.

## **RESULTS**

### ***Development of measures.***

#### ***Place Attachment.***

Factor analysis of the items related to place attachment identified one single category (see Table 3). All 11 items included on the survey loaded at or above the .73 level. Thematically, this category related to a sense of connection to the social and natural



landscapes of the Great Lakes region, as well as a feeling of responsibility and personal identity with the area. The items that composed this measure assessed personal attachment to the natural landscape, enjoyment of the outdoors, pride in residency, and how difficult respondents find it to be away from the area. Reliability analysis indicated this was a highly coherent category ( $\alpha = .94$ ). The mean score of this category ( $m = 4.22$ ) indicated strong place attachment among survey respondents.

#### *Climate Change Attitudes.*

Factor analysis of the items related to climate change attitudes and beliefs identified 2 distinct categories (see Table 3). The first, *Concern about Impacts*, related respondents' concerns regarding the potential negative impacts climate change may have on both the health of residents and on the economy in the Great Lakes region. This category was highly reliable ( $\alpha = .84$ ) and the mean score suggested relatively high levels of concern ( $m = 3.97$ ). The second category, *Desire for Action*, included items related to feelings that both citizens and local government should be doing more to address and prepare for climate change in the Great Lakes region. This category was also highly reliable ( $\alpha = .92$ ) and the mean score again indicated relatively strong endorsement ( $m = 4.16$ ).

#### *Conservation Behavior.*

Factor analysis of the items related to conservation behavior identified 2 distinct categories (see Table 3). The first, *Climate Change Engagement*, related respondents' behavior regarding the frequency with which they followed news on climate change and discussed it with family and friends. This category was highly reliable ( $\alpha = .84$ ) and the

mean score suggested relatively high levels of frequency of behavior ( $m = 3.99$ ). The second category, *Household Conservation Behavior*, included items related to taking actions to reduce waste, household energy and water use, personal car use, and actions taken to increase recycling. This category was also highly reliable ( $\alpha = .92$ ) and the mean score indicated relatively strong frequency of behavior ( $m = 3.36$ ).

*Local Environmental Concern.*

A consistent and coherent factor structure did not emerge for the 4 items related to local environmental concerns. Correlates among these items ranged from .35 to .60; given that each focused on a very specific and different local environmental issue, they were kept as separate measures. Overall, high levels of concern were expressed about each of the local environmental issues, with all means exceeding 4.00.

**TABLE 3.** Factor Analysis. (GLR = Great Lakes region)

| Category name and items included.                                       |                 | Mean | S.D. | Alpha |
|---|-----------------|------|------|-------|
| <b>PLACE ATTACHMENT</b>   |                 | 4.22 | .82  | .94   |
| <i>Items</i>  | <i>Loadings</i> |      |      |       |
| I feel a strong connection to the Great Lakes region.                   | .84             |      |      |       |
| I am proud to live in the Great Lakes region.                           | .85             |      |      |       |
| It is difficult for me to imagine moving away from the GLR.             | .73             |      |      |       |
| The natural landscape of the Great Lakes region is special to me.       | .89             |      |      |       |
| I feel a strong attachment to the plants and animals of the GLR.        | .79             |      |      |       |
| The Great Lakes region is part of who I am.                             | .86             |      |      |       |
| I enjoy spending time outdoors in the Great Lakes region.               | .80             |      |      |       |
| A lot of my friends and family live in the Great Lakes region.          | .66             |      |      |       |
| I feel a sense of responsibility to take care of nature in the GLR.     | .83             |      |      |       |
| When I am away I miss the Great Lakes region.                           | .80             |      |      |       |
| I feel a connection to other people who live in the Great Lakes region. | .73             |      |      |       |
| <b>CONCERN ABOUT IMPACTS</b>  |                 | 3.97 | .84  | .84   |
| <i>Items</i>  | <i>Loadings</i> |      |      |       |
| Climate change will negatively impact health of people in GLR.          | .84             |      |      |       |
| Climate change will negatively impact the economy of the GLR.           | .80             |      |      |       |
| <b>DESIRE FOR ACTION</b>  |                 | 4.16 | 1.03 | .92   |
| <i>Items</i>  | <i>Loadings</i> |      |      |       |
| Citizens of the GLR should be doing more to address climate change.     | .88             |      |      |       |
| State/local gov'ts in GLR should do more to prep. for climate change.   | .93             |      |      |       |
| <b>CLIMATE CHANGE ENGAGEMENT</b>  |                 | 3.99 | .75  | .84   |
| <i>Items</i>  | <i>Loadings</i> |      |      |       |
| Follow news.  | .90             |      |      |       |
| Talk w/ friends.  | .89             |      |      |       |
| <b>HOUSEHOLD CONSERVATION BEHAVIOR</b>                                  |                 | 3.36 | 1.00 | .92   |
| <i>Items</i>  | <i>Loadings</i> |      |      |       |
| Take action to recycle and reduce waste.                                | .86             |      |      |       |
| Take actions to reduce household energy use.                            | .83             |      |      |       |
| Take actions to limit personal car use.                                 | .62             |      |      |       |
| Take actions to reduce household water use.                             | .67             |      |      |       |

**Regression analyses.**

Hierarchical regression was used to examine whether feelings of place attachment were a significant predictor of the two climate change attitudes categories (i.e. *Concern about Impacts* and *Desire for Action*), the two conservation behavior categories (i.e. *Climate Change Engagement* and *Household Conservation Behavior*) and the 4 local environmental concerns.

*Place Attachment and Climate Change Attitudes.*

With regard to *Concern about Impacts* (see Table 4), the hierarchical regression revealed that at stage one, the five demographic factors contributed significantly to the model,  $F(5, 99) = 2.34, p = .047$  and accounted for 10.6% of the variation. Adding political orientation to the regression model explained an additional 7.1% of the variation in *Concern about Impacts* and this change in  $R^2$  was significant,  $F(1, 98) = 8.40, p = .005$ . Incorporating *Place Attachment* into the regression model only explained an additional .5% of the variation in *Concern about Impacts*. Not surprisingly, this change in  $R^2$  was not significant,  $F(1, 97) = .67, p = .426$ . This final model accounted for 18.2% of the overall variance and was significant,  $F(7, 97) = 3.07, p = .006$ . When all seven independent variables were included in stage three of the regression model, town size and political orientation emerged as the most important predictors. This indicates that as town size decreases and respondents become more politically conservative, concerns about climate change impacts diminish.

The hierarchical regression examining *Desire for Action* (see Table 5) indicated that at stage one, the five demographic factors contributed significantly to the model,  $F(5, 99) = 2.59, p = .030$  and accounted for 11.6% of the variation. Adding political orientation to the regression model explained an additional 17.6% of the variation in *Desire for Action* and this change in  $R^2$  was significant,  $F(1, 98) = 24.34, p < .001$ . Incorporating *Place Attachment* into the regression model only explained an additional .6% of the variation in *Desire for Action* and the change in  $R^2$  was not significant  $F(1, 97) = .80, p = .373$ . This final model accounted for 29.7% of the overall variance and was

significant,  $F(7, 97) = 5.87, p < .001$ . When all seven independent variables were included in stage three of the regression model, gender and political orientation emerged as the most important predictors, indicating that males and more conservative individuals expressed less desire for action from citizens or local government.

#### *Place Attachment & Conservation Behavior.*

The hierarchical regression investigating *Household Conservation Behavior* (see Table 6) revealed that at stage one, the five demographic factors did not contribute significantly to the model,  $F(5, 99) = 1.17, p = .329$ , accounting for 5.6% of the variation. Including political orientation into the regression explained an additional 4% of the variation in *Household Conservation Behavior* and this change in  $R^2$  was not significant,  $F(1, 98) = 4.32, p = .040$ . Adding *Place Attachment* into the regression at stage three explained an additional 3.4% of the variation and the change in  $R^2$  was not significant,  $F(1, 97) = 3.75, p = .056$ . This final model accounted for 12.9% of the overall variance and was not significant,  $F(7, 97) = 2.06, p = .055$ . When all seven independent variables were included in stage three of the regression model, none of the predictors emerged as significant.

With respect to *Climate Change Engagement* (see Table 7), the hierarchical regression indicated that at stage one, the five demographic factors did not contribute significantly to the model,  $F(5, 99) = 2.18, p = .063$ , accounting for 9.9% of the variation. Adding political orientation to the regression model explained an additional 14.8% of the variation in *Climate Change Engagement* and this change in  $R^2$  was significant,  $F(1, 98) = 19.24, p < .001$ . Incorporating *Place Attachment* into the regression model only

explained an additional 1.8% of the variation and the change in  $R^2$  was not significant,  $F(1, 97) = 2.33, p=.130$ . The final model accounted for 26.5% of the overall variance and was significant,  $F(7, 97) = 4.99, p<.001$ . When all seven independent variables were included in stage three of the regression model, age and political orientation emerged as the most important predictors, indicating that younger and more politically conservative respondents were less engaged in relation to climate change.

#### *Place Attachment & Local Environmental Concern.*

With respect to *Concern about Invasive Species* (see Table 8), the hierarchical regression indicated that at stage one, the five demographic factors contributed significantly to the model,  $F(5, 99) = 3.13, p=.012$  and accounted for 13.6% of the variation. Adding political orientation to the regression model explained an additional 4.3% of the variation in *Concern about Invasive Species*, and this change in  $R^2$  was significant,  $F(1, 98) = 4.38, p=.039$ . Incorporating *Place Attachment* into the regression model explained an additional 12.8% of the variation and the change in  $R^2$  was significant,  $F(1, 97) = 17.70, p<.001$ . The final model accounted for 30.1% of the overall variance and was significant,  $F(7, 97) = 5.97, p<.001$ . When all seven independent variables were included in stage three of the regression model, place attachment emerged as the most important predictor, indicating that respondents with higher place attachment scores tended to be more concerned about invasive species.

With respect to *Concern about Water Quality* (see Table 9), the hierarchical regression indicated that at stage one, the five demographic factors contributed significantly to the model,  $F(5, 99) = 2.38, p=.044$  and accounted for 10.7% of the

variation. Adding political orientation to the regression model explained an additional 3.2% of the variation in *Concern about Water Quality*, and this change in  $R^2$  was not significant,  $F(1, 98) = 3.62, p=.060$ . Incorporating *Place Attachment* into the regression model explained an additional 9.6% of the variation and the change in  $R^2$  was significant,  $F(1, 97) = 12.23, p=.001$ . The final model accounted for 23.5% of the overall variance and was significant,  $F(7, 97) = 4.27, p<.001$ . When all seven independent variables were included in stage three of the regression model, place attachment emerged as the most important predictor, indicating that respondents with higher place attachment scores tended to be more concerned about water quality.

With respect to *Concern about Fracking* (see Table 10), the hierarchical regression indicated that at stage one, the five demographic factors contributed significantly to the model,  $F(5, 99) = 1.47, p=.208$  and accounted for 6.9% of the variation. Adding political orientation to the regression model explained an additional 14.2% of the variation in *Concern about Fracking*, and this change in  $R^2$  was significant,  $F(1, 98) = 17.68, p<.001$ . Incorporating *Place Attachment* into the regression model explained an additional 4% of the variation and the change in  $R^2$  was significant,  $F(1, 97) = 5.18, p=.025$ . The final model accounted for 25.1% of the overall variance and was significant,  $F(7, 97) = 4.65, p<.001$ . When all seven independent variables were included in stage three of the regression model, political orientation and place attachment emerged as the most important predictors. This indicates that more politically conservative respondents tended to be less concerned about fracking, and that those with higher place attachment scores tended to be more concerned about fracking.

With respect to *Concern about Agricultural Fertilizer Runoff* (see Table 11), the hierarchical regression indicated that at stage one, the five demographic factors contributed significantly to the model,  $F(5, 99) = 2.87, p = .018$  and accounted for 12.7% of the variation. Adding political orientation to the regression model explained an additional 11.5% of the variation in *Concern about Agricultural Fertilizer Runoff*, and this change in  $R^2$  was significant,  $F(1, 98) = 14.88, p < .001$ . Incorporating *Place Attachment* into the regression model explained an additional 10.0% of the variation and the change in  $R^2$  was significant,  $F(1, 97) = 14.86, p < .001$ . The final model accounted for 34.2% of the overall variance and was significant,  $F(7, 97) = 7.21, p < .001$ . When all seven independent variables were included in stage three of the regression model, political orientation and place attachment emerged as the most important predictors. This indicates that more politically conservative respondents tended to be less concerned about agricultural fertilizer runoff, and that those with higher place attachment scores tended to be more concerned about agricultural fertilizer runoff.



**Table 4.** Hierarchical regression model for *concerns about impacts of climate change on Great Lakes*

|                       | <i>R</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | <i>B</i> | <i>SE</i> | $\beta$ | <i>t</i> |
|-----------------------|----------|-----------------------|--------------|----------|-----------|---------|----------|
| <b>Step 1</b>         | .33      | .11                   | --           |          |           |         |          |
| Age                   |          |                       |              | -.06     | .05       | -.15    | -1.44    |
| Gender                |          |                       |              | .28      | .20       | .14     | 1.43     |
| Education             |          |                       |              | -.01     | .07       | -.01    | -.07     |
| Income                |          |                       |              | -.07     | .06       | -.12    | -1.24    |
| Town size             |          |                       |              | .18      | .06       | .31**   | 3.06     |
| <b>Step 2</b>         | .42      | .18**                 | .07          |          |           |         |          |
| Age                   |          |                       |              | -.04     | .05       | -.08    | -.84     |
| Gender                |          |                       |              | .36      | .19       | .18     | 1.87     |
| Education             |          |                       |              | -.07     | .07       | -.11    | -1.03    |
| Income                |          |                       |              | -.04     | .06       | 0.25    | 2.54     |
| Town size             |          |                       |              | .02      | .05       | .04*    | .36      |
| Political Orientation |          |                       |              | -.25     | .09       | -.29**  | -2.90    |
| <b>Step 3</b>         | .43      | .18                   | .00          |          |           |         |          |
| Age                   |          |                       |              | -.05     | .05       | -.10    | -1.00    |
| Gender                |          |                       |              | .35      | .19       | .17     | 1.82     |
| Education             |          |                       |              | -.07     | .07       | -.11    | -1.02    |
| Income                |          |                       |              | -.04     | .06       | -.07    | -.68     |
| Town size             |          |                       |              | .14      | .06       | .25*    | 2.53     |
| Political Orientation |          |                       |              | -.24     | .09       | -.28**  | -2.79    |
| Place Attachment      |          |                       |              | .08      | .10       | .08     | .80      |

Note: Statistical significance: \*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 5.** Hierarchical regression model for *desire for action*

|                       | <i>R</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | <i>B</i> | <i>SE</i> | $\beta$ | <i>t</i> |
|-----------------------|----------|-----------------------|--------------|----------|-----------|---------|----------|
| <b>Step 1</b>         | .34      | .12                   | --           |          |           |         |          |
| Age                   |          |                       |              | -.15     | .06       | -.24*   | -2.43    |
| Gender                |          |                       |              | .29      | .23       | .12     | 1.24     |
| Education             |          |                       |              | .15      | .08       | .18     | 1.85     |
| Income                |          |                       |              | -.08     | .07       | -.12    | -1.19    |
| Town size             |          |                       |              | .14      | .07       | .21*    | 2.10     |
| <b>Step 2</b>         | .54      | .29***                | .17          |          |           |         |          |
| Age                   |          |                       |              | -.09     | .06       | -.15    | -1.57    |
| Gender                |          |                       |              | .43      | .21       | .18*    | 2.04     |
| Education             |          |                       |              | .02      | .08       | .03     | .29      |
| Income                |          |                       |              | -.03     | .06       | -.04    | -.44     |
| Town size             |          |                       |              | .08      | .06       | .12     | 1.32     |
| Political Orientation |          |                       |              | -.46     | .09       | -.46*** | -4.93    |
| <b>Step 3</b>         | .55      | .30                   | .01          |          |           |         |          |
| Age                   |          |                       |              | -.10     | .06       | -.17    | -1.73    |
| Gender                |          |                       |              | .42      | .21       | .18*    | 1.99     |
| Education             |          |                       |              | .02      | .08       | .03     | .30      |
| Income                |          |                       |              | -.02     | .06       | -.03    | -.35     |
| Town size             |          |                       |              | .08      | .06       | .12     | 1.30     |
| Political Orientation |          |                       |              | -.45     | .09       | -.45*** | -4.80    |
| Place Attachment      |          |                       |              | .10      | .11       | .08     | .90      |

Note: Statistical significance: \*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 6.** Hierarchical regression model for *frequency of household conservation behavior*

|                       | <i>R</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | <i>B</i> | <i>SE</i> | $\beta$ | <i>t</i> |
|-----------------------|----------|-----------------------|--------------|----------|-----------|---------|----------|
| <b>Step 1</b>         | .24      | .06                   | --           |          |           |         |          |
| Age                   |          |                       |              | .04      | .04       | .08     | 0.80     |
| Gender                |          |                       |              | .02      | .17       | .01     | 0.09     |
| Education             |          |                       |              | .11      | .06       | .19     | 1.80     |
| Income                |          |                       |              | -.03     | .05       | -.06    | -.56     |
| Town size             |          |                       |              | .04      | .05       | .08     | .78      |
| <b>Step 2</b>         | .31      | .10*                  | .04          |          |           |         |          |
| Age                   |          |                       |              | .06      | .05       | .13     | 1.24     |
| Gender                |          |                       |              | .06      | .17       | .04     | .38      |
| Education             |          |                       |              | .06      | .06       | .11     | 1.03     |
| Income                |          |                       |              | -.01     | .05       | -.02    | .85      |
| Town size             |          |                       |              | .02      | .05       | .04     | .36      |
| Political Orientation |          |                       |              | -.16     | .08       | -.22*   | -2.08    |
| <b>Step 3</b>         | .36      | .13                   | .03          |          |           |         |          |
| Age                   |          |                       |              | .04      | .05       | .08     | .79      |
| Gender                |          |                       |              | .05      | .17       | .03     | .27      |
| Education             |          |                       |              | .07      | .06       | .11     | 1.07     |
| Income                |          |                       |              | .00      | .05       | .00     | .01      |
| Town size             |          |                       |              | .01      | .05       | .04     | .34      |
| Political Orientation |          |                       |              | -.14     | .08       | -.20    | -1.89    |
| Place Attachment      |          |                       |              | .18      | .09       | .19     | 1.94     |

Note: Statistical significance: \*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 7.** Hierarchical regression model for *frequency of climate change engagement*

|                       | <i>R</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | <i>B</i> | <i>SE</i> | $\beta$ | <i>t</i> |
|-----------------------|----------|-----------------------|--------------|----------|-----------|---------|----------|
| <b>Step 1</b>         | .32      | .10                   | --           |          |           |         |          |
| Age                   |          |                       |              | .10      | .06       | .17     | 1.68     |
| Gender                |          |                       |              | -.25     | .23       | -.11    | -1.13    |
| Education             |          |                       |              | .15      | .08       | .19     | 1.90     |
| Income                |          |                       |              | -.03     | .07       | -.04    | -.41     |
| Town size             |          |                       |              | .06      | .07       | .09     | .85      |
| <b>Step 2</b>         | .50      | .25***                | .15          |          |           |         |          |
| Age                   |          |                       |              | .15      | .06       | .26**   | 2.74     |
| Gender                |          |                       |              | -.13     | .21       | -.06    | -.61     |
| Education             |          |                       |              | .04      | .08       | .05     | .48      |
| Income                |          |                       |              | .02      | .06       | .03     | .33      |
| Town size             |          |                       |              | .00      | .06       | .00     | .04      |
| Political Orientation |          |                       |              | -.41     | .09       | -.42*** | -4.39    |
| <b>Step 3</b>         | .51      | .27                   | .02          |          |           |         |          |
| Age                   |          |                       |              | .13      | .06       | .23*    | 2.34     |
| Gender                |          |                       |              | -.15     | .21       | -.06    | -.70     |
| Education             |          |                       |              | .04      | .08       | .05     | .51      |
| Income                |          |                       |              | .03      | .06       | .05     | .49      |
| Town size             |          |                       |              | .00      | .06       | .00     | .02      |
| Political Orientation |          |                       |              | -.40     | .09       | -.41*** | -4.23    |
| Place Attachment      |          |                       |              | .17      | .11       | .14     | 1.53     |

Note: Statistical significance: \*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 8.** Hierarchical regression model for *concern: invasive species*

|                       | <i>R</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | <i>B</i> | <i>SE</i> | $\beta$ | <i>t</i> |
|-----------------------|----------|-----------------------|--------------|----------|-----------|---------|----------|
| <b>Step 1</b>         | .37      | .14                   | --           |          |           |         |          |
| Age                   |          |                       |              | .14      | .05       | .25*    | 2.53     |
| Gender                |          |                       |              | .04      | .21       | .02     | .20      |
| Education             |          |                       |              | .04      | .07       | .06     | .58      |
| Income                |          |                       |              | -.03     | .06       | -.05    | -.53     |
| Town size             |          |                       |              | .12      | .06       | .20*    | 2.02     |
| <b>Step 2</b>         | .42      | .17*                  | .04          |          |           |         |          |
| Age                   |          |                       |              | .16      | .06       | .30**   | 2.96     |
| Gender                |          |                       |              | .10      | .21       | .05     | .49      |
| Education             |          |                       |              | -.01     | .07       | -.02    | -.14     |
| Income                |          |                       |              | -.01     | .06       | -.02    | -.17     |
| Town size             |          |                       |              | .10      | .06       | .16     | 1.60     |
| Political Orientation |          |                       |              | -.19     | .09       | -.21    | -2.09    |
| <b>Step 3</b>         | .55      | .30***                | .13          |          |           |         |          |
| Age                   |          |                       |              | .11      | .05       | .21*    | 2.17     |
| Gender                |          |                       |              | .06      | .19       | .03     | .29      |
| Education             |          |                       |              | -.01     | .07       | -.01    | -.09     |
| Income                |          |                       |              | .01      | .06       | .02     | .25      |
| Town size             |          |                       |              | .09      | .06       | .15     | 1.67     |
| Political Orientation |          |                       |              | -.15     | .09       | -.17    | -1.80    |
| Place Attachment      |          |                       |              | .43      | .10       | .37***  | 4.21     |

Note: Statistical significance: \*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 9.** Hierarchical regression model for *concern: water quality*

|                       | <i>R</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | <i>B</i> | <i>SE</i> | $\beta$ | <i>t</i> |
|-----------------------|----------|-----------------------|--------------|----------|-----------|---------|----------|
| <b>Step 1</b>         | .33      | .11                   | --           |          |           |         |          |
| Age                   |          |                       |              | .08      | .04       | .19     | 1.89     |
| Gender                |          |                       |              | .01      | .15       | .01     | .07      |
| Education             |          |                       |              | .08      | .05       | .15     | 1.52     |
| Income                |          |                       |              | -.11     | .04       | -.24*   | -2.47    |
| Town size             |          |                       |              | .02      | .04       | .05     | .53      |
| <b>Step 2</b>         | .37      | .14                   | .03          |          |           |         |          |
| Age                   |          |                       |              | .09      | .04       | .23*    | 2.28     |
| Gender                |          |                       |              | .05      | .15       | .03     | .33      |
| Education             |          |                       |              | .04      | .05       | .09     | .82      |
| Income                |          |                       |              | -.09     | .04       | -.21    | -2.13    |
| Town size             |          |                       |              | .01      | .04       | .02     | .15      |
| Political Orientation |          |                       |              | -.13     | .07       | -.20    | -1.90    |
| <b>Step 3</b>         | .49      | .24**                 | .10          |          |           |         |          |
| Age                   |          |                       |              | .06      | .04       | .15     | 1.55     |
| Gender                |          |                       |              | .02      | .14       | .01     | .16      |
| Education             |          |                       |              | .05      | .05       | .09     | .92      |
| Income                |          |                       |              | -.08     | .04       | -.18    | -1.89    |
| Town size             |          |                       |              | .01      | .04       | .01     | .01      |
| Political Orientation |          |                       |              | -.01     | .06       | -.16    | -1.62    |
| Place Attachment      |          |                       |              | .27      | .08       | .32***  | 3.50     |

Note: Statistical significance: \*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 10.** Hierarchical regression model for *concern: fracking*

|                       | <i>R</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | <i>B</i> | <i>SE</i> | $\beta$ | <i>t</i> |
|-----------------------|----------|-----------------------|--------------|----------|-----------|---------|----------|
| <b>Step 1</b>         | .26      | .07                   | --           |          |           |         |          |
| Age                   |          |                       |              | .03      | .07       | .04     | .36      |
| Gender                |          |                       |              | .09      | .28       | .03     | .34      |
| Education             |          |                       |              | .17      | .10       | .18     | 1.75     |
| Income                |          |                       |              | -.13     | .08       | -.17    | -1.67    |
| Town size             |          |                       |              | .12      | .08       | .14     | 1.34     |
| <b>Step 2</b>         | .46      | .21***                | .14          |          |           |         |          |
| Age                   |          |                       |              | .09      | .07       | .13     | 1.29     |
| Gender                |          |                       |              | .24      | .26       | .09     | .93      |
| Education             |          |                       |              | .04      | .09       | .04     | .38      |
| Income                |          |                       |              | -.08     | .08       | -.10    | -1.04    |
| Town size             |          |                       |              | .05      | .08       | .06     | .56      |
| Political Orientation |          |                       |              | -.49     | .12       | -.41*** | -4.20    |
| <b>Step 3</b>         | .50      | .25*                  | .04          |          |           |         |          |
| Age                   |          |                       |              | .05      | .07       | .08     | .77      |
| Gender                |          |                       |              | .21      | .25       | .08     | .83      |
| Education             |          |                       |              | .04      | .09       | .04     | .42      |
| Income                |          |                       |              | -.06     | .07       | -.08    | -.82     |
| Town size             |          |                       |              | .04      | .08       | .05     | .57      |
| Political Orientation |          |                       |              | -.46     | .11       | -.39*** | -4.02    |
| Place Attachment      |          |                       |              | .31      | .14       | .21*    | 2.28     |

Note: Statistical significance: \*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 11.** Hierarchical regression model for *concern: fertilizer agricultural runoff*

|                       | <i>R</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | <i>B</i> | <i>SE</i> | $\beta$ | <i>t</i> |
|-----------------------|----------|-----------------------|--------------|----------|-----------|---------|----------|
| <b>Step 1</b>         | .36      | .13*                  | --           |          |           |         |          |
| Age                   |          |                       |              | .09      | .06       | .14     | 1.43     |
| Gender                |          |                       |              | .26      | .23       | .11     | 1.43     |
| Education             |          |                       |              | .18      | .08       | .24*    | 2.37     |
| Income                |          |                       |              | -.06     | .07       | -.09    | -.96     |
| Town size             |          |                       |              | .08      | .07       | .13     | 1.26     |
| <b>Step 2</b>         | .49      | .24***                | .12          |          |           |         |          |
| Age                   |          |                       |              | .13      | .06       | .22*    | 2.32     |
| Gender                |          |                       |              | .37      | .22       | .16     | 1.72     |
| Education             |          |                       |              | .09      | .08       | .11     | 1.10     |
| Income                |          |                       |              | -.02     | .06       | -.05    | -.33     |
| Town size             |          |                       |              | .04      | .06       | .05     | .58      |
| Political Orientation |          |                       |              | -.37     | .10       | -.37*** | -3.86    |
| <b>Step 3</b>         | .59      | .34***                | .10          |          |           |         |          |
| Age                   |          |                       |              | .09      | .06       | .14     | 1.54     |
| Gender                |          |                       |              | .33      | .20       | .14     | 1.62     |
| Education             |          |                       |              | .09      | .07       | .04     | 1.23     |
| Income                |          |                       |              | .01      | .06       | .01     | .05      |
| Town size             |          |                       |              | .03      | .06       | .05     | .53      |
| Political Orientation |          |                       |              | -.33     | .09       | -.33*** | -3.68    |
| Place Attachment      |          |                       |              | .41      | .11       | .33***  | 3.85     |

Note: Statistical significance: \*p<.05; \*\*p<.01; \*\*\*p<.001

## DISCUSSION

This study aimed to explore the influence of place attachment on both environmental concerns and behavior. Understanding whether the strength of this influence differs from broader, more global issues (e.g. climate change) to specific, more local issues, was of special interest. Findings of this study suggest that place attachment tends to exert a stronger influence on concerns about local environmental issues.

The results from regression analyses indicate that place attachment was not a significant predictor of either climate change attitudes or conservation behavior. In each case, and as in many other studies (Hamilton et al, 2010; Kellstedt et al., 2008; Brody et al., 2014), demographic factors and political orientation seemed to play much more important roles, with political orientation being the most common and consistently powerful predictor.

Upon reflection, this conclusion may not seem so surprising with regard to global issues such as climate change. Not only do such issues tend to be more politically charged, but they are also broader, less directly observable issues, and thus may hold less immediate salience for individuals. In the case of *Household Conservation Behavior*, none of the predictors emerged as significant; it seems that actions taken to recycle and reduce waste, household energy and water usage, and to limit personal car usage must have other explanatory factors beyond the scope of this study. If not demographics, political orientation, nor place, perhaps social or familial pressures would be stronger predictors. Of the other demographics that did briefly arise as significant predictors in this study, none were consistent and none were nearly as powerful as political orientation.

The regression analysis results indicated that place attachment was, in contrast to more globally-related issues, a significant predictor of all four measures of local environmental concern. It arose as the single most significant predictor in both concern about invasive species and concern about water quality, and also shared predictive power with political orientation when it came to fracking and concern about agricultural fertilizer runoff. Only in the case of fracking was it less significant in power than was political orientation.

These results suggest that such local issues might tend to be less politically charged than are the more global issues; in such cases, it would seem that even topics with political charge are localized to the point where individuals are noting a direct and visible effect these issues might have for them, personally. Comparatively, as custodians of such an important resource, it follows that the threats of invasive species and to water quality should be major concerns among Great Lakes residents, in particular. Many individuals' livelihoods depend upon the water and the ecosystem services it provides, so the state of its health plays a direct role in the health and economy of its residents.

These results are supported by studies by Scannell and Gifford (2010, 2015), and by Gifford (2011), in that they suggest place attachment may not only be connected to pro-environmental behavior, but also that it tends to be stronger at the local level. While this study did not find any consistently strong predictors in demographics other than political orientation, Scannell and Gifford (2015) found women to be another target group to approach while framing environmental issues.

These conclusions suggest that when an issue at the local level becomes personal, an individual's attachment to that setting can serve as a powerful predictor of their

attitudes towards the issue. When issues become broader and less contextualized from a specific setting, political orientation becomes more important, as it functions to summarize issues that are more immediately conceptual than concrete in their visible effects upon the individual.

### ***Limitations.***

It is important to note that the findings of this study are limited in terms of generalizability. The small number of survey respondents and the convenience sampling strategy clearly resulted in some skewed data, including a more politically liberal sample population. It is possible that data from a more politically representative sample would cause political orientation to take on even greater importance. Despite these shortcomings, we are still able to draw significant conclusions for this select population, particularly as it relates to the Great Lakes region.

In addition, the impact of ‘place attachment’ is somewhat limited by how the measure was constructed. An expanded measure with an increased number of dimensions would likely (based on previous literature) improve the specificity of its influence on attitudes and behavior.

### ***Implications.***

The role and nature of place attachment in helping shape environmental concerns and behaviors continues to elude a precise definition, and remains less powerful as a predictor than does political orientation. It may be that its effects are subtler, rather than unimportant; we have seen that it can in some circumstances be more significant than certain demographics variables, such as age or gender, and that it is particularly

influential at the local level of concern. This in turn may mean that place attachment is an important item to consider when crafting communication about climate change, in that it may help representatives speak more directly to local, more personal, and therefore more self-motivated, concerns (Devine-Wright, 2013).

It seems clear that place attachment cannot stand alone in such communications, however, and should also be framed alongside important predictors such as political orientation. By finding ways to appeal to conservatives, statistically the less-concerned overall of the two major political leanings, place attachment may help in creating an argument that de-politicizes and de-polarizes the issues of climate change (Scannell & Gifford, 2015). Though it may be more limited at a global scale, emphasizing place attachment could help draw in support for local environmental issues. For instance, approaching an environmental issue such as water quality from the perspective of small business and tourist economy may help individuals tie the importance of such issues into their own lives. Further, if global-scale issues were also able to achieve such personal connections, they too might become less politicized, and place attachment may arise as a more effective predictor.

In this study, *Household Conservation Behavior*, considered in this case to be a ‘global’ issue, was the only measure for which neither place attachment nor political orientation arose as significant (no significant predictors). This suggests that it may not be highly dependent on place context or political beliefs, and that other measures might hold more explanatory power. As such, there is greater room for across-the-aisle cooperation and organization.



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### **ACKNOWLEDGEMENTS**

I would like to express my gratitude towards my advisor Jason Duvall for his exceptional patience, guidance, and help; I learned so much about the process of completing a research project and about research as an endeavor itself. I'd also like to thank my reader Michaela Zint for her invaluable feedback and time, as well as all of those who willingly participated in my survey.