Cross-Cultural Approaches to Understanding the Emotional Geographies of Climate Change

by

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ABSTRACT

Climate change poses a threat to the emotional well-being and livelihood strategies of individuals in biophysically vulnerable communities. While the biophysical effects and possibilities of climate change are well-documented, understanding the emotional impacts on individuals in these communities is an avenue of research that requires more exploration. Using an ethnographic approach, this study analyzes the emotional responses of individuals, first in three biophysically vulnerable communities in the United States, and second, in island communities. Study sites in the United States include Mobile, Alabama; Kodiak, Alaska; and Phoenix, Arizona, each of which have different vulnerabilities to the effects of climate change. Internationally, we conducted research in Viti Levu, Fiji; Nicosia, Cyprus; Wellington, New Zealand; and London, England. Using the 2014 Global Ethnohydrology Study Protocol respondents were asked about their emotional responses to the current effects of climate change, the effects of climate change on livelihoods in their area, and the effects of climate change on the younger generation. Using cross-cultural data allows for a broader understanding of emotional distress and wellbeing in response to climate change in areas with similar expected climate change outcomes, although with different levels of biophysical vulnerability, as well as understanding emotional distress and wellbeing in areas with different expected climate change outcomes, and similar levels of biophysical vulnerability. Results from this research can be used to understand possible mental health outcomes, the possibilities for political activism, and how to create mitigation strategies that resonate with local community members.

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CHAPTER ONE

INTRODUCTION

Biophysical scientists have extensively described the potential effects of climate change under a range of possible circumstances (IPCC 2013). In spite of the knowledge of the biophysical effects, little research has explored the emotional component of climate change, especially for biophysically vulnerable communities. Emotional geographies became a notable area of focus in the early 2000s, when feminist geographers Anderson and Smith (2001) argued that without an understanding of the way that people develop emotional responses *in situ*, we have a less than complete understanding of the way that people live in and on the environment. Following this call for an increased attention to the emotional dimension of space and place, anthropologists and other social scientists (Wutich and Ragsdale 2008, Sultana 2011, Cunsolo-Willox et al. 2013, Nightingale 2013, Crewe et al. 2014, Goldin 2015, Ryan 2016) have begun to research the way that places are emotionally significant.

While emotion has often been trivialized, both in scholarly research and in the popular imagination, emotion is a key component of understanding the motivations and perceptions of individuals and communities (Smith and Leiserowitx 2014). Extensive research on the role of extreme events (such as drought) indicates that emotional responses to these extreme events may result in severe mental health outcomes. Farmers in Australia faced with drought and dying crops began experiencing anxiety and depression, and the prevalence of male suicide increased dramatically (Sartore et al. 2007, Sartore et al. 2008, Sartore et al. 2008b, Alston 2012). Other, less severe

environmental changes have provoked a phenomenon known as "solastalgia" (Albrecht et al. 2007, Higginbotham et al. 2007). Solastalgia is the longing for an environment as it used to be. Thus, in addition to its importance as an indicator of mental health outcomes, emotion is a key component to understanding the way people experience the world around them. As local environments change as a result of climate change, examining the emotional responses of individuals within biophysically vulnerable communities is necessary for predicting (and potentially, preventing) mental health outcomes, understanding the possibility of strategic, community-based interventions, and finally, increasing the holism of our understandings of the personal, as well as the biophysical effects of climate change.

Thus, the goal of this dissertation is to advance the understanding of emotional responses to climate change through cross-cultural comparisons of 1) men's and women's emotional responses to climate change within the United States, although in three communities with different climate outcomes, 2) the inequitable distribution of emotional responses to climate change in four island nations and the environmental justice implications and 3) men's and women's emotional responses to climate change in four island nations. Previous research on emotional geographies has largely been place-based (Wutich and Ragsdale 2008, Sultana 2011, Cunsolo-Willox et al. 2013, Goldin 2015, Ryan 2016). While place is a necessary component of emotional geographies, using a cross-cultural approach allows us to understand the similarities and differences in the way communities with similar or different biophysical vulnerabilities are responding to the current and future effects of climate change. Using interdisciplinary theory from anthropology, geography, and gender studies, this dissertation explores the way that

similarities or differences in biophysical vulnerability to climate change effects the emotional responses of community members using data collected as a part of the Global Ethnohydrology Study at Arizona State University's School of Human Evolution and Social Change.

Global Ethnohydrology Study

The Global Ethnohydrology Study (GES) is an international, multi-year, transdisciplinary study that addresses local ecological knowledge of water issues, including water access and fairness in access, perceptions of wastewater treatment and reuse, and concerns about water security as a result of climate change. The term "ethnohydrology" was initially used by Back (1981) when exploring cultural understandings of water among Native American communities. Ethnohydrology was largely an outgrowth of other studies focusing on local ecological knowledge of certain resources, including ethnobotany (Turner and Bell 1971), ethnobiology (Berlin 1992), and ethnozoology (Boster and Johnson 1989, Sillitoe 2002). As with these other studies, ethnohydrology examines shared cultural knowledge around water. While many of these other domains have specifically examined shared cultural knowledge among traditional communities, shared cultural knowledge about local ecology develops as early as six months into dwelling in a place. Because urban areas are also at risk for water insecurity, we use ethnohydrology to study the shared cultural knowledge of water and water management (Sherbondy 1992; Gelles 1998, 2000) in both urban and rural areas, and in both modern and traditional communities.

Using the precise definition that ethnohydrology studies technical knowledge of water and water management, the Global Ethnohydrology Study started in 2007 at Arizona State to understand water quality issues in different neighborhoods in Phoenix. With funding from the National Science Foundation's DMUU Decision Center for a Desert City (DCDC) and the Central Arizona-Phoenix Long-Term Ecological Research project (CAP-LTER), researchers conducted surveys in four Phoenix neighborhoods. After the success of the initial year, the project expanded into its current international scope to better understand water quality, fairness, and access cross-culturally. While GES addresses a different topic each year, local ecological knowledge (LEK) is the guiding theoretical influence of the research.

GES uses LEK as its principal theoretical driver in order to understand local residents' knowledge and perceptions of the local environment and any changes to it. In addition to scientific knowledge of the area, LEK also includes experiential and lay knowledge, as well as information from the popular media (Folke et al. 2003). LEK is important in its capacity to indicate the motivations and values of local residents when it comes to their surrounding environment (Niemyznowicz 1999, Larson et al. 2011, Smith and Leiserowitz 2014). In order to target an appropriate range of respondents, GES uses a non-probabilistic, purposive sampling strategy (Handwerker and Wozniak 1997). In order to attain a range of cultural data, we collect a minimum of thirty interviews in each location to reach thematic saturation (Guest et al. 2006, Guest 2014, Hagaman and Wutich 2016) and encourage researchers to interview a diverse group of respondents in order to target a demographically representative sample. Respondents are interviewed in public, and must be permanent residents of the area (Bernard and Ryan 2009).

Data for the GES is collected using a range of mixed methods from anthropology. GES 2014 data (Theme: Climate Change and Emotional Distress) used in-person semi-structured interview questions followed by close-ended survey questions. Field sites for this year's research were selected based on biophysical vulnerability to climate change and the similarities and differences therein. Additional field sites were selected based on presence of ethnographic experts to assist with the data collection. The protocol was tested using cognitive interviews in Phoenix, Arizona prior to being deployed in the other field sites. Using this data, this dissertation addresses the way respondents talk about their emotional responses to climate change in a range of biophysically vulnerable communities.

Research Objectives

Using ethnographic interviews and the combination of qualitative and quantitative approaches, this study addresses the following objectives:

1. To analyze the dimensions of emotional expression between genders and to recognize patterns in the ways that men and women express emotions during open-ended interviews
2. To explain the environmental justice implications of emotional distress in four island nations
3. To understand the way that emotions are expressed cross-culturally in areas that are biophysically vulnerable to the effects of climate change

Objective One

Chapter Three utilizes data from the 2014 GES to understand the way that men and women, within and across biophysically vulnerable sites in the United States, are experiencing an emotional response to climate change. Data were elicited in Mobile, Alabama; Kodiak, Alaska; and Phoenix, Arizona. These three sites within the United States were selected based on their vulnerability to a range of effects from climate change, as well as based on the availability of ethnographic experts who could advise and assist with data collection. Within the next eighty years, the IPCC (2007) indicates that respondents in the greater Mobile region are likely to experience rising sea levels, increasing intensity and frequency of coastal storms, coastal erosion, and changes to species composition. Respondents in Kodiak are likely to face rising sea levels, increasing ocean temperatures, changing ocean salinity and pH, and subsequently, changes to species composition. Phoenix, Arizona is likely to experience decreased freshwater availability and drought, along with increasing intensity and frequency of heat waves and higher temperatures in this already very warm climate.

In examining the way that men and women respond to the current and future effects of climate change, we found that men across the three sites were less likely to express emotion in general, but more frequently expressed worry, particularly about their ability to continue working in the ways that they have been. Women across the three sites regularly expressed their sadness in the context of the younger generation, but also expressed hope that the younger generation would be able to rise to the challenges that climate change presents for them. While researchers have argued that these feelings might be less than rational, considering that communities may not yet be experiencing the immediate effects of climate change, these responses nevertheless reveal that respondents

are thinking about these issues, and that, regardless of their belief in anthropogenic climate change, they are experiencing emotional responses as a result of the possible current and future effects. As Smith and Leiserowitz (2014) argue, understanding the emotional component of climate change is necessary to understand decision-making practices and motivations as a result of these concerns.

Chapter Three indicates that negative emotions are prominent when respondents are asked to describe how they feel when they think about the way climate change is affecting them, their family, or their community, both now and in the future. This segues into Chapter Four and Five, which explore similar issues in a cross-cultural context among island nations. Chapter Four specifically examines the environmental justice implications of the inequitable distribution of these emotional effects among differentially vulnerable island nations.

Objective Two

Chapter Four uses data from the GES 2014 in Viti Levu, Fiji; Nicosia, Cyprus; Wellington, New Zealand; and London, England. The IPCC (2007) has suggested that island nations are particularly vulnerable to the effects of climate change, in part because there is little ability for residents to move around and avoid the effects of climate change. Island nations are likely to experience rising sea levels, coastal erosion, increasing intensity and frequency of coastal storms, and variation in rainfall, leading to changes in freshwater availability.

While the IPCC indicates that island nations in general are biophysically vulnerable to similar effects as a result of climate change, environmental ethicists (Jamieson 2005) have argued that not only are these effects not equitably distributed,

many countries that have produced less in the way of greenhouse emissions are in fact more vulnerable to the current and future effects of climate change (Stratford et al. 2013). While environmental justice began as movement and a discipline to study the way that hazards are more likely to impact communities of color (United Church of Christ's Commission for Racial Justice 1987, Bullard 1990, Cutter 1995, Bullard 1996, Bolin et al. 2005, Bolin et al. 2013), it is a useful lens for examining the way that climate change inequitably effects communities that are, at least on the surface, likely to experience similar effects.

Our study sites in Fiji, Cyprus, New Zealand, and the United Kingdom range in their biophysical vulnerability insofar as they have different levels of sensitivity to the effects of climate change, and different adaptive capacities. For example, our respondents in Fiji live in a small, coastal village in western Fiji. Due to their proximity to the ocean, they are very immediately sensitive to sea level rise, coastal erosion, and the possibility of increasing intensity of coastal storms. Their adaptive capacity is largely the result of social networks, rather than infrastructural or financial adaptive capacity, as is found in New Zealand and the United Kingdom. Cyprus, meanwhile, is particularly vulnerable to changes in freshwater access. Nicosia is located in a semi-arid climate, and water access is already a serious concern for residents in the Republic of Cyprus, as well as in the Turkish Republic of Northern Cyprus (TRNC) (Nicosia is the shared capital). Their adaptive capacity in this regard is relatively low and relies on technical solutions, such as pumping water from Turkey (TRNC) and reusing wastewater (Republic of Cyprus). The infrastructural and financial adaptive capacity in New Zealand and the United Kingdom is much greater; nevertheless, Wellington, as a coastal city, is vulnerable to rising sea

levels and coastal erosion, and London is vulnerable to flooding, particularly in the likelihood that their rainfall increases (IPCC 2007).

In examining the way that these sensitivities and adaptive capacities vary between these four coastal communities, our research sought to understand the way that emotional responses might also vary and point to inequitable emotional outcomes. Our results indicate that worry is a common emotion across all four sites; however, we also found that in communities with greater sensitivity, respondents are disproportionately likely to experience emotional distress as a result of the inequities in climate change exposure. Fijians, who are the most immediately physically and economically vulnerable to the effects of climate change, and who are also the most emotionally connected to their environment, are the most emotionally distressed group of respondents. Londoners, by contrast, are the least sensitive and have the greatest adaptive capacity, often expressed neutrality, indicating that they experience less emotional distress. Given that emotional distress may be an indicator for mental health outcomes, as well as activism opportunities, these findings are useful to understanding how to harness emotional responses and mitigate poor mental health outcomes.

Objective Three

Chapter Five also uses GES 2014 data collected in Viti Levu, Fiji; Nicosia, Cyprus; Wellington, New Zealand; and London, England. Where Chapter Four focused on the inequitable distribution of emotional distress among these four countries, and the environmental justice implications of these inequities, Chapter Five focuses on the way that men and women across and between these sites express emotions in response to climate change, and the role that biophysical vulnerability (specifically, sensitivity and

adaptive capacity) may contribute to these responses. As noted previously, island nations are particularly vulnerable to the effects of coastal erosion, sea level rise, increasing intensity and frequency of coastal storms, and changes in freshwater access (IPCC 2007). However, these effects are not equally felt across all island nations, nor across all residents of these areas. We specifically focus on gender here because while women are typically considered to be more vulnerable to environmental changes, men are often still at the center of land- or sea-based livelihoods in these areas, and therefore might be more prone to experiencing emotional distress as a result of current or future changes.

Previous research into the emotional responses of men who make a living off the land during extreme weather events indicates that men are very emotionally distressed by environmental changes that make it hard for them to continue their work and their role as providers (Sartore et al. 2007, Sartore et al. 2008a, Sartore et al. 2008b, Alston 2012). However, as other research has demonstrated, women provide a great deal of knowledge and labor in communities that depend on the land (McKune et al. 2015, Bee 2016), and it is therefore necessary to consider the way the contributions of women may provoke emotional distress.

This analysis is particularly necessary not only in its cross-cultural scope (few researchers have thus far compared emotional reactions to climate change across different communities), but also because it challenges the idea of women as a singular, marginalized group across diverse contexts. As Arora-Jonsson (2011) and Resurrección (2013) argue, continuing to argue that all women are equally vulnerable is not only disingenuous, it prevents a complete understanding of the ways that climate change, and

other weather and climate phenomena, affect different women, both in the same place, and in different places.

Our research in this regard indicates that men and women are both equally likely to express an emotional response to climate change. While psychologists working with men have found that they are more likely to suppress emotions (a condition known as alexithymia), our research demonstrates that men are experiencing emotions as a result of the current and future effects of climate change. Men were more likely to express anger as a result of climate change, while women were more likely to express sadness. In less sensitive sites, men were more likely to express anger that climate change was threatening them personally, and could lead to their inability to continue to do work as usual. Men in more sensitive sites were more likely to indicate that they felt anger on behalf of the younger generation, and their lost opportunities. Similarly, women in more sensitive sites were more likely to express sadness in the context of lost opportunities for the younger generation, particularly as it pertained to the local environment. Women in less sensitive sites expressed sadness about the younger generation as well, but this sadness was more frequently in the context of having a more difficult future.

Dissertation Organization

This dissertation is composed of six chapters. Chapter One contains introductory information, including a brief synopsis of data collection methods, information on each of the three body chapters, and the dissertation organization. Chapter Two consists of an in-depth literature review, which compiles previous research on the subjects related to this dissertation, and illustrates the gaps that this dissertation seeks to fill. Chapters Three,

Four, and Five are the main body chapters, and are under review at peer-reviewed journals. Chapter Six consists of a synopsis of the results, and includes a discussion of the three body chapters, including future directions.

Table 1-1. Dissertation Organization

Objective 1 *Analyze the dimensions of emotional expression between genders and to recognize patterns in the ways that men and women express emotions during open-ended interviews* • Dissertation Chapter Three • Under review at *Weather, Climate, and Society*: du Bray, M.V., Wutich, A., Brewis A. • The data in this paper were collected as part of the 2014 GES protocol designed by Drs. Amber Wutich and Alexandra Brewis. The data for this paper were collected in Mobile, AL; Kodiak, AK; and Phoenix, AZ. I conducted the cognitive interviews to test this protocol, and was solely responsible for data collection in Mobile, AL and Kodiak, AK. I also helped collected data in Phoenix, AZ. The data were analyzed using a keywords-in-context (Ryan and Weisner 1998, Saldaña 2009, Taylor et al. 2015) analysis. Emotion words were identified from pre-established lists of emotions. I subsequently autocoded these words in MAXQDA, and analyzed the context in which they were used. In order to assess the difference between the difference in emotion word usage between the three sites, I used Mann-Whitney U tests to test for significant differences. I have served as the first author on presentation of this data at the 114th Annual Meeting of the American Anthropological Association, the 76th Annual Meeting of the Society of Applied Anthropology, and the CAP-LTER 18th Annual All Scientists Meeting. I authored the original draft of the article, including providing original text in the introduction, methods and site selection, results, and discussion. A. Wutich and A. Brewis contributed original text as well as contributing to the editing process.
Objective 2 *Explain the environmental justice implications of emotional distress in four island nations* • Dissertation Chapter Four • Under review at *Environmental Justice*: du Bray, M.V., Wutich A., Larson, K.L., White, D., Brewis, A. • The data in this chapter were collected as part of the 2014 GES protocol designed by Drs. Amber Wutich and Alexandra Brewis. The data for this paper was collected in Viti Levu, Fiji; Nicosia, Cyprus; Wellington, New Zealand; and London, England. As in the former paper, the data were analyzed using a keywords-in-context analysis. I autocoded the emotion words in MAXQDA, and subsequently analyzed the context in which they were used. Because this was a more qualitative paper, no statistical findings are reported. I worked with Dr.

Rhian Stotts for more insight into context in Cyprus, and relied on other ethnographic experts for the other three sites. I authored the original draft of this article, including providing original text in the introduction, methods and site selection, discussion, and conclusion. A. Wutich, K.L Larson, and A. Brewis contributed original text, and all authors, including D.D. White, contributed to the editing process.
Objective 3 *Understand the way that emotions are expressed cross-culturally in areas that are biophysically vulnerable to the effects of climate change* Dissertation Chapter Five In preparation for peer-reviewed submission to *Geoforum*: du Bray, M.V., Wutich, A., Larson, K.L., White, D., and Brewis A. This paper also uses data collecting using the 2014 GES protocol. As with the former two papers, undergraduate students completed the data entry and quality checks, and I oversaw this process as the manager of the Culture, Health, and Environment Lab. Once the data were entered and checked, I conducted a keywords-in-context analysis of the data, including autocoding emotion words and identifying the context in which the words were used. I used Mann-Whitney U tests to determine statistical differences in emotion word usage between men and women in the four sites. I contributed the original writing of the introduction, methods and site selection, results, and discussion. Co-authors have contributed to the writing and editing process.

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CHAPTER TWO

LITERATURE REVIEW

Bringing emotion back into anthropology

Climate scientists have extensively explored and enumerated the effects and possible futures of areas that are biophysically vulnerable to the effects of climate change. The Intergovernmental Panel on Climate Change (IPCC) has released a number of reports explaining the ways that the climate may change in various areas depending on various carbon release situations; in all of the situations the IPCC suggests, most landscapes, and the human communities reliant upon them face large scale changes, both meteorologically and ecologically (IPCC 2013). Depending on their location and the biophysical vulnerability that locations already experience as a result of fresh water access, frequency of storms, etc., locations may experience more or less severe outcomes in the next eighty years as a result of climate change (IPCC 2007).

The biophysical science exploring the effects and possible outcomes of climate change has explained the ecological possibilities as a result of climate change, and social scientists have begun to explore the way that these local communities perceive these impacts (Larson et al. 2011, McCright and Dunlap 2011, McCright and Sundström 2013). While there has been excellent research examining the way that human communities are beginning to be affected by climate change, there has been relatively little engagement by social scientists with the way that these communities emotionally respond to the effects of climate change. While many psychologists and mental health researchers have explored the way that climate change affects the mental health outcomes of communities (Albrecht et al. 2007, Sartore et al. 2007, Fritze et al. 2008, Sartore et al. 2008a, Sartore

et al. 2008b, Berry et al. 2011, McMichael 2011, Swim et al. 2011, Alston 2012, Cunsolo-Willox et al. 2013), few researchers have examined the way that emotional expression may change as local residents are affected by the current and future effects of climate change.

Existing mental health and psychology literature focusing on the way that climate change (and environmental degradation more broadly) impacts the mental health of local residents indicates the importance of understanding emotional responses to climate change. Exploring these emotional reactions may prevent further emotional devastation and minimize social vulnerability. Much of this research has explored the way that climate change and environmental degradation leads to higher suicide rates (Sartore et al. 2007, Sartore et al. 2008a, Sartore et al. 2008b); additional literature (Albrecht et al. 2007, Berry et al. 2011) indicates that climate change and environmental degradation leads to a loss of connection to environment, and a longing for what used to be, known as "solastalgia". While the engagement in understanding how environmental change leads to mental health decline has been extensive, it is important to understand how emotional expression may influence these outcomes. Additionally, understanding emotional reactions to climate change may allow communities to bridge emotional and political divides and help policy makers develop initiatives that resonate with local communities.

Geography and anthropology have an extensive history of engaging with emotions; it is only relatively recently, however, that scholars in these fields have begun exploring how emotions may be related to local landscapes and environments. In the mid-1980s, Ulrich (1983:85) describes affect as "the central conscious experience and behavior in any environment, whether natural or built". This early articulation of the

inter-relation between environment and emotions set the stage for further engagement in this domain at later dates. Russell and Lanius (1984) elaborated on Ulrich's idea, exploring the way people engage in their environments and categorize their emotional responses. These scholars began working with emotional valence scales early; later scholars returned to these ideas and built upon them.

Emotion moved to the back burner once again until the early 2000s, when feminist geographers Anderson and Smith (2001) made the call for a greater inclusion of emotion in research; they argued that without a clearer understanding of emotional responses to environments, public and private, scholars were not successfully understanding the way individuals and communities live on and experience the world. While emotions had long been considered a feminine domain, and had been relegated to the home and other private spheres, Anderson and Smith (2001) argued that emotions are often experienced and expressed in public places, and were integral in determining how these spaces were developed. Importantly, Pile (2010) argued that, since the body is the site and source of emotion, it is important to explore the way that emotions are made in space as a result of interactions on the land. As Akerlof and colleagues (2013) demonstrate, people are affected by events, places and things, thus making their emotional responses simultaneously situated in their bodies, specifically, but also in the place that evokes the emotional response.

Researchers have suggested that, while exploring individual responses may be unnecessarily navel-gazing, others have argued that emotional responses of individuals are rarely unique, and are often shared across community members (Thien 2005, Morales and Harris 2014). When community members engage in similar livelihoods, live in

similar ways, or share similar values, the very terrain of their communities, their resources, and their everyday scenery becomes a source and sink of emotions; thus, the emotions that are produced out of these experiences are highly indicative of their relationship to the land, and to each other. This builds on Anderson and Smith's idea of emotion being experienced in the public sphere; by virtue of living in a society, emotions are often the result of connections, emotional and physical to spaces, many of which are lived in communally (Bondi 1998). Due to the public nature of space, it is important to acknowledge the emotions that color experiences in society, and bring emotion back into the narrative of society, including how it may shape cultural beliefs and attitudes (Goldin 2015, Sultana 2015).

Places become "emotionally heightened" and imbued with certain emotions (Anderson and Smith 2001, Geoghegan 2013). While space and place have historically been decoupled from emotional experiences, the public nature of space often results in them becoming emotionally charged. As Daya and Wilkins (2012) note, places need not be constantly inhabited in order to become emotionally charged; for their respondents, the homeless shelters they lived and slept in became very emotionally significant. While geographers and anthropologists have traditionally explored landscapes that are continuously inhabited, studies of emotion challenge this, arguing that emotions become imbued in a variety of spaces, including areas of physical or emotional labor. Elaborating on this idea, Gorman-Murray (2010:64) argues that "emotions are understood not as interior mental states, but relational achievements that provide connective tissue between individuals and place". Studies of emotional ties to the land, therefore, specifically

examine the ways in which people experience space and place, and the emotional ties they develop as a result of these experiences.

These emotional ties may vary regionally, and between groups. As Stratford et al. (2013) demonstrate, for communities in Tuvalu, the landscape is not just a place where they live; it is integral to their cosmology, and changes to the landscape and their lives as a result (including relocation) threaten not just emotional well-being, but the worldview of these communities and individuals. While it may seem easy to trivialize this connection as the hallmark of "traditional" communities, the authors explain that emotional geographies hinge on the way societies, traditional and modern alike, understand the world and relate to the world through the lens of their immediate environment (Anderson and Smith 2001, Ingold 2011, Stratford et al. 2013). Landscapes and environments become "important cultural and ontological marker[s] and central material component[s] of daily life" (Stratford et al. 2013:69). The ways in which people understand the world around them, and the attachments people form are partially mediated by their own emotional geographies (Escobar 2001).

Indeed, as Goldin (2015) notes, once emotions are formed in a place, they tend to "stick" to people. Harris (2014) argues that, even when people leave their local landscapes due to environmental or economic changes, they do not necessarily leave their emotional geographies, or their emotional connection to place, behind. There is often a continued sense of longing and melancholy (Albrecht et al. 2007) for spaces of the past, particularly when they are valued intergenerationally. These emotions have social value in and among themselves; they allow people to form communities with others who feel similarly. When these emotions are tied to a landscape, they may cause misrecognition

and recognition alike among people of a similar mindset; thus, emotions are integral in understanding the similarities and differences in emotion and perception that create and define communities (Goldin 2015).

It is important to note, and perhaps to reiterate, that emotional geographies are specific to an extent that perhaps personal identities and affiliation with place are not. While sense of place lends itself to understanding the extent to which people identify with a place (a city, state, country, etcetera), emotional geographies include some of the components of sense of place, including the feeling of identity and identification with place, and move beyond sense of place in that they may be specific to the particular landscape on which people experience daily life, which become imbued with emotional experiences above and beyond personal affiliation and identity (Daya and Wilkins 2012, Nightingale 2013). While both theories deal with the iterative nature of living in a place, the role of constant habitus, presence, and emotional and physical labor in place, often among nonhuman species of value, becomes a fundamental component of emotional geography.

As Harris (2014) notes, regional differences (e.g., variations in east-west, rural-urban) make a particular difference not only in the way people identify with the area (as they might when one studies sense of place), but these landscapes shape, and are shaped by, the emotional experiences of those who live on them, becoming imbued with importance beyond that of personal identity. Where sense of place deals with the experience of being physically located in a place, emotional geographies take the social and political processes that make sense of place, and add the emotional embodiment of the land, which is often produced through labor on the land (Pierce et al. 2011). While

emotional responses may be similar across different landscapes in that people evoke the same emotions and the same words to describe their experiences with their landscape, space becomes particularly imbued with qualities to the extent that people are invested in the lived and emotional experiences of those places, particularly where they live, work, or regularly recreate.

Sultana (2011, 2015) notes that places and resources become inextricably tangled with individual and community emotions, particularly when times are challenging. For the Bangladeshi community in which she works, water becomes imbued with emotions through labor and scarcity; because access is often difficult, or fraught with trade-offs (including whether to access arsenic-contaminated water in order to ensure personal safety, or to access "clean" drinking water but put oneself at risk), water becomes imbued with senses of suffering, of concern and fear. Sultana notes that these emotions are largely the result of lived experiences; emotional geographies, she suggests, are the result of the personal experiences individuals and communities have with their landscape, and in particular, their resources. Thus, she demonstrates the distinction between sense of place and emotional geographies by emphasizing the role of resource access and valuation, in addition to the ongoing lived experiences that allow the development of emotional relationships with place.

Valence: Positivity and Negativity in Emotional Geographies

Examining the role of valence of emotions, including the way that emotions considered "positive" and emotions considered "negative" persuade and influence perceptions of events has long been used in marketing research (Dillard and Seo 2011). While there are different ways to consider and group emotions, scholars often use bipolar

or categorical valence, or discrete emotions to better understand outcomes of marketing and visuals. Valence may be an important tool in analyzing the ways in which certain portions of a community experience emotional responses differently, and thus may offer insight into the different emotional responses, and how to build bridges between divided community members (Larson et al. 2011).

In this research, we focus on specific, or discrete emotional words. Discrete emotions assume that while one may feel more or less of a certain emotion (e.g., happiness), each emotional response is unique from any other, and is therefore categorically different (Dillard and Seo 2013). Increasingly, emotional geographers are selecting qualitative analysis tools that focus on discrete emotions and the circumstances in which it is acceptable to express these emotions. Goldin's (2015) work focuses on hope among farmers, while Geoghegan (2013) explores the dynamic of enthusiasm, particularly as it can be expressed in a group setting. In both of these instances, positive emotions are largely evoked in a group setting; this is counter to the experiences Sultana (2011) notes, where anger is one of the key emotions expressed publicly.

While the circumstances during which these three researchers observed these public reactions vary, it is important to note that these are all potent emotions. In the case of both hope and enthusiasm, these are not strictly positive valence emotions; enthusiasm has historically been affiliated with religious zealotry (Geoghegan 2013), and hope is often associated with the potential for disappointment. Similarly, researchers have noted that while people can accurately describe their feelings in place, they may not be feeling only one emotion; for the women of Panelli et al.'s (2004) study, fear and safety were often evoked on the same terrain. Thus, it may be important to consider the valence of

emotions not solely in what is expressed, but where and how emotions are physically expressed to gain a better understanding of how emotions stick to certain landscapes.

Gender and emotion

Emotion is often considered the domain of women; because women have long been relegated to the private sphere (Lee and DeVore 1969), emotions have, perhaps in tandem, been relegated to the private sphere, and to women specifically. Extensive literature focuses on the role of affective labor among women: women are tasked consistently with emotional performances (nurturing, caring, demonstrating interest) in order to succeed in the workplace (Hardt 1999). While it is necessary to explore the ways in in which women experience emotion, as this has long been ignored in the scholarly literature, it is equally important to ensure that emotional geographies explores the ways in which all genders contribute to and experience emotion in response to the local environment. Assuming that all men in space and time are less likely to experience emotion or concern in relation to the environment feeds into ongoing gender biases and ignores the capacity for all genders to have emotional experiences and connections to the landscape, many of which are differentiated by gender as a result of labor and spatial organization (Bondi 1998, Sultana 2011, Crewe et al. 2014, Goldin 2015). It is also necessary to understand the ways in which gendered experiences vary across landscapes; it is not enough to assume that all women or all men have similar emotional geographies. It is critical that emotional geographies consider the role of individual and collective environments in the shaping of environmentally-produced emotional geographies. Thus, emotional geographies as a discipline can both contribute to understandings of the way

emotion is acted in space, and criticize the gender normative assumptions that emotions are solely the domain of women.

Research on environmental concern (Larson et al. 2011 McCright and Dunlap 2011, McCright and Sundström 2013) indicates that there is indeed a perceived difference in the emotional response of men and women to environmental issues, particularly where concern is high. While there is often little difference in environmental concern among women and men when consulted about general environmental issues, there is nevertheless a marked difference in the emotional responses among men and women when discussing local environmental concerns (Blocker and Eckberg 1989, Larson et al. 2011, McCright and Sundström 2013). When it comes to local environmental issues, women expressed a much higher level of concern than men did (Blocker and Eckberg 1989, McCright and Dunlap 2011, Akerlof et al. 2013, McCright and Sundström 2013).

Sultana (2015) demonstrates that gender also becomes a central component of understanding emotional geographies and the terrain it builds within a community; because women are usually responsible for collecting water, the emotional geographies within the community are often highly gendered. Feelings of suffering, concern, even anger become primarily the female domain, as does the emotional geography itself. While it is important to identify the ways in which emotional terrain may be gendered due to differential experiences across the landscape between genders, it is also imperative, as Sultana (2015) suggests, that emotional geographies do not fall into the tired role of putting emotions solely in the female (and therefore, private) domain.

Additionally, as Wutich and Ragdsale (2008) Sultana (2011, 2015), Nightingale (2013), and Goldin (2015), have noted, the labor people perform in a location often changes their emotional geography within the landscape. Because labor is so often gendered, people interact with their landscapes in particular ways. Similar to the women in Wutich and Ragsdale's (2008) study, for Sultana's Bangladeshi women, the role of water provider for women makes them, rather than men, the bearer of suffering for and suffering from water scarcity. Because men do not collect water, their emotional geographies do not necessarily include the type of suffering and emotional experience that becomes imbued in the landscape as it does for women (Wutich and Ragsdale 2008, Sultana 2011). As Nightingale suggests, communities, landscapes, and the nonhuman species on the landscape are not only relational, the boundaries between the categories often blur. Thus, for her primarily male fishermen, the sea is not only the provider for them, the source of a livelihood, it is considered to be unpredictable and dangerous, but also key in making someone a fisherman (Nightingale 2013). These experiences are often unique across genders; while the men in Sultana's research do not experience the landscape of suffering that the women do, the women in Nightingale's study are not subjected to the process of becoming that her male fishermen are, and they are not at the mercy of a dangerous landscape, however much it is valued. Labor differences as a result of gender are often key in explaining the differential emotional geographies of men and women within the same community.

It is important to note that when labor is gendered, so too are the emotional geographies, which are the lived and embodied experiences that are highly contextualized (Morales and Harris 2014, Pile 2010, Pini et al. 2010, Sultana 2011). If labor is a large

part of the embodied context, and if women are kept out of labor, or if men and women are relegated to different types of labor on the land, they almost intrinsically will have highly varying relationships to the landscape, and therefore have different emotional geographies. This is not to suggest that men and women cannot feel similar emotions toward their surrounding landscapes; however, they may experience different emotional geographies by virtue of encountering different parts of the landscape, or they may express their emotions in gendered ways, leading to apparent gender differentiation (Panelli et al. 2004). This is particularly noticeable in Sultana's (2011, 2015), Nightingale's (2013), and Pini et al.'s (2010) work, which focuses on the ways in which women and men, respectively, experience emotions as a result of their work and environment. For Sultana's Bangladeshi community, water is almost entirely the province of women; as a result, these women are the ones who experience suffering, frustration, and anger as a result of changing water access.

Outside of labor and resource management, men and women experience and enact different emotional geographies in different contexts. Where certain community and labor experiences are specifically engendered toward women, it's important to recognize that men also experience emotional geographies, and may have spaces that encourage or discourage expressions of hypermasculinity or emotion. As Crewe et al. (2014) discuss in their study of the emotional geographies of prisons, there is not a singular emotional geography for the prison system; while prisons are often seen as a site of hypermasculinity and alexithymia, the authors suggest that male prisoners also experience public and private domains, and certain emotions are allowed in each. Indeed, in the public sphere, men are aware of the necessity of public performance. In the private

sphere, male prisoners are more likely to allow themselves to experience a fuller range of emotions.

For men, the apparent absence of emotion may in and of itself act as a coping mechanism. Where Sultana (2011) notes that outpourings of emotion were necessary for women to cope with the stress and suffering they experienced as a result of water scarcity, Crewe et al. (2014) indicate that the absence of emotion among male prisoners was necessary not only for self-preservation and protection, but because the men they interacted with were aware that they were all troubled or suffering in some context, and to add to another's burden was unacceptable. While these two studies occur in different communities, they nevertheless indicate that men and women may have very different emotional geographies as a result of cultural understandings of gender and emotional expression. Like Sultana, Crewe et al. (2014) demonstrate that there are different realms in which certain emotions are acceptable. Among men and women, perhaps across contexts, anger is an acceptable public emotion. For the prisoners of Crewe et al.'s study, anger and some degree of aggressive masculinity are necessary for self-protection; for Sultana's respondents, anger is one of the few apparently public emotions women express. Suffering seems largely to be a private emotion, one only evoked in private, thus indicating that different emotional terrains map onto different physical landscapes.

Emotional geographies and climate change

While the still nascent body of literature examining the role of emotional geographies has explored a wide range of community and individuals' emotional geographies, few studies have explored the emotional geographies of individuals impacted by climate change. Akerlorf et al. (2013) note that, thus far, researchers have

largely ignored the value of understanding people's perceptions and experiences with climate change. While there is a large volume of research documenting the ecological effects of climate change, scientists have argued that individuals and communities cannot distinguish the effects of climate change from normal seasonal and yearly variability unless the changes are truly drastic (Stratford et al. 2013). Nevertheless, individuals and communities may experience and perceive the effects of climate change in ways unrelated to weather patterns; changes in species distribution, migration patterns, and shifts in cultivation seasons may indicate the effects of climate change to individuals who have a temporal familiarity with their landscapes.

It is imperative that scholars continue to study the role of emotion in everyday life; as Goldin (2015:27) notes, "emotions [are one]of the essential components of human wellbeing". As with Sultana (2011, 2015), Goldin demonstrates the ways in which resource access, landscapes, and emotions become intertwined; in discussing the role of emotional geography, she demonstrates that emotions are power. When women in the community have hope, they have "power for" something. Goldin argues that without this central understanding of human emotion, we have a less nuanced understanding of the ways in which communities work together; she suggests that emotions influence the types of communities that form (including the way, in her study, hope motivates women to work together, in spite of the challenges that might otherwise divide them). These emotional terrains are specific to the context of particular places; without the geographical component, the emotional experiences of communities would be entirely different.

As landscapes are central to emotional states, and vice versa, people become uniquely qualified to detect and perceive possible changes. While scholars have begun to analyze this particularly in the context of climate change (Akerlof et al. 2013, Farbotko and McGregor 2010) this is still a relatively unexplored domain. Emotional geographies, therefore, hinge closely on the ability to recognize that emotion, experience, and landscape are also closely intertwined. As Akerlof et al. note, "What we will term the experiential system automatically registers information from the environment…and tags it with overtones of negative or positive affect, and emotion" (2013:82). The ability to link place and emotion becomes particularly important when one begins to consider the role of emotion in changing landscapes and climates. While an emotional connection to the landscape, and landscapes that are imbued with emotions and experiences can cause emotional distress as they begin to change, this also leads to a particular ability to recognize not only the changes, but the possibilities of risk to the landscapes, and therefore to the people living on them. Thus, while risk perception may be generated outside the realm of affective geographies, and may be produced independently of the emotional landscape that people co-produce with their environment, risk perceptions may be heightened when people experience strong affective geographical ties to the landscape.

Vulnerability and climate change

Vulnerability research emerged in the late 1980s out of the domains of political ecology and hazards and disasters research. O'Keefe and colleagues' (1976) article argued for taking the "naturalness" out of natural disasters and understanding how social factors exacerbate existing biophysical hazards. For example, Bolin and Stanford (1998) examined the way that race, lack of knowledge of entitlements, and economic status

intersected with the 1994 Northridge earthquake to produce a true disaster. While earthquakes are not uncommon in California, and indeed, are somewhat predictable in their timing and scope, the hazard itself interacted with societal components to produce a disastrous outcome.

Social factors including race, class, ethnicity, gender, age, and nationality are all components that, on their own, may make members of various communities unequal in the eyes of society; when these factors are paired with a hazardous environment, these inequities result in vulnerability to hazards and disasters (Bolin and Stanford 1998). These factors may also prevent individuals, households, and communities from being able to respond to, or cope with the effects of disasters. There is an important distinction that must be made here, between social vulnerability and biophysical vulnerability. These two types of vulnerability may affect people at multiple scales (individual, household, community, etc), and often do intersect with each other. Social vulnerability, however, addresses the ways in which different people are differentially at risk (Susman et al. 1984, Cutter et al. 2003). The characteristics listed above, including race, class, and gender, are the factors that make people vulnerable in society, and may exacerbate their vulnerability to hazards and disasters. Biophysical vulnerability, in contrast, refers to the vulnerability of the ecosystem. These vulnerabilities include the types of hazards the place experiences (e.g., earthquakes in Northridge, California; hurricanes in the Gulf Coast of Alabama). Together, social and biophysical vulnerability result in the differential impacts on different groups of people.

Vulnerability itself is composed of three different components: exposure, sensitivity, and adaptive capacity (Adger 2006, Watts and Bohle 1993). Exposure here

refers to the type of hazard or disaster an individual, household, or community is likely to experience. In the case of climate change, and in the case of this study, for example, island nations are exposed to things like coastal storms and coastal erosion already; in the future, predictions indicate that they will be exposed to ocean acidification, continued and accelerated coastal erosion, and sea level rise. Sensitivity is the degree to which these effects are likely do harm to local community members. Sensitivity, therefore, is heavily impacted by social factors, and the way social vulnerability may interact with biophysical vulnerability. Finally, adaptive capacity is the ability of an individual, household, or community to respond to the impacts of a hazard or disaster. This does not necessarily mean their ability to "bounce back" (Aldunce et al. 2014); it rather refers to the ability to absorb a shock and recover from it, even if "recover" does not meaning returning to a previous state. Adaptive capacity can encompass a range of features and components; this study focuses on the way social networks, and the ability to share information, food, and housing, as well as infrastructure and economy, work to provide the ability to recover from climate change.

Vulnerability and climate change intersect in some very prominent ways; certainly, as described below, different types of vulnerabilities and different climate change predictions results in justice implications between emitters and those who are immediately affected. Additionally, climate change stands to exacerbate existing vulnerabilities to hazards and disasters, and may lead to increases in frequency and severity of hazards. As a result of the changing landscape of biophysical vulnerability, it is important to understand how vulnerability as a whole is changing. It is especially important to understand how sensitivity and adaptive capacity will shape the responses of

individuals and community members to the biophysical effects of climate change. While the type and degree of changes in exposure have been predicted (IPCC 2013), sensitivity and adaptive capacity in part must be deduced from local community members.

Climate change, emotional geographies, and environmental justice

Environmental justice has a long tradition of exploring the ways that hazards and vulnerability are inequitably distributed among communities. Traditionally, environmental justice studies have focused on the ways that communities of color are significantly more likely to experience environmental hazards and contaminants; as environmental justice studies demonstrate, toxic waste sites (Geiser and Waneck 1983, Bullard 1990), Superfund sites (Greenberg 1994), petrochemical facilities, and other hazards including toxic air and water releases from industrial facilities, smelters, and other heavy industries (Cutter 1995, Bullard 1996). Along with the United Church of Christ's Commission for Racial Justice (1987), these studies indicated that people of color throughout the United States were disproportionately exposed to the health and psychological effects of living in areas close to environmental hazards. These studies also demonstrated that industrial facilities that produce these hazards are much more likely to be situated in communities of color.

While there has been extensive exploration of environmental justice issues in the U.S., environmental justice issues abroad are more often couched in the context of vulnerability and hazards, rather than justice. In the context of climate change, however, there are very tangible justice issues at stake. As Adger and colleagues (2006) demonstrate, there are inequities not only in the anticipated outcomes of climate change, and in the way these effects impact local communities in terms of infrastructure, health

outcomes, and emotional distress, but in terms of who is most at fault for the effects of climate change. Environmental ethicists (Jamieson 2005) have argued that less developed countries are significantly less at fault for the accumulation of greenhouse gases that has led to climate change, but are also more likely to be affected by the outcomes of climate change.

As the Johannesburg Declaration (2003) argued, the evident effects of climate change are more threatening to less developed countries, which are likely to be more socially and biophysically vulnerable to these effects. Without existing infrastructure, or the financial and social networks necessary to handle extreme events, less developed countries are more likely to experience the extreme effects of climate change, and be less able to respond. Indeed, for some countries, this is already leading to drastic changes; Pacific island nations are already looking at the possibility of relocation, since mitigation and adaptation are not options to deal with dramatic changes to sea level (Farbotko and McGregor 2010, Stratford et al. 2013). Meanwhile, more developed countries have the financial means and the legal infrastructure and support to begin preparing for the effects of climate change, indicating a significant disparity in the way the effects of climate change are distributed.

Anthropological work in the domain of emotions has examined the ways that access to resources may be inequitably distributed, particularly within developing countries. Wutich and Ragsdale (2008) demonstrated that inequitable access to drinking water often results in frustration, anger, and concern for the Bolivian community members who navigate accessing this vital resource. Similarly, Sultana (2011) argues that inequitable access to drinking water among Bangladeshi communities results in suffering,

both *for* water and the challenges of access, and *from* water, including the often poor quality of the drinking water community members ultimately access. While studies of emotion have explored the ways in which inequitable situations become fraught with emotional value, this research has been justice-oriented, rather than taking an environmental justice approach, specifically.

While environmental justice scholars have made tremendous gains in understanding the way that harms and accesses are inequitably distributed among and between communities, there has been little work focusing on the role of emotion in these communities. Proximity to contaminated landscapes, such as Cancer Alley in Louisiana (Allen 2003) or Superfund sites (Struglia 1993, Bolin et al. 2005, Bolin et al. 2013) almost certainly leads to environmental distress and other strong emotional responses.

While there are many uncertainties in the era of climate change, what is certain is that vulnerability to climate change impacts is not evenly distributed. Small island nations are grappling with the early impacts of climate change and some face the prospect of relocation due to rising sea levels. The ecological effects of climate change are widely recognized as an environmental justice issue (Adger et al. 2006), but the costs of these uneven vulnerabilities extend well beyond the ecological. Climate change exposes uneven vulnerabilities in economic, psychological and political dimensions as well (Cunsolo-Willox et al. 2013).

The current study

Emotional geographies as a theoretical framework demands further consideration of how changing ecological and environmental systems affect the emotional responses of community members in biophysically vulnerable communities. While previous research

has explored the way that people experience emotions in charged landscapes, both as a result of fraught social situations and social vulnerability, and as a result of changing resource access and needs, little research has thus far explored the way that emotions change results from current or future environmental change.

Using data collected in the three sites in the United States (Mobile, Alabama; Kodiak, Alaska; and Phoenix, Arizona) and four international island sites (Fiji, Cyprus, New Zealand, and the United Kingdom), our study uses a mixed media research protocol (Appendix A) to understand how people feel about the current and future changes to their local environment as a result of climate change. Specifically, these studies explore the way that men and women experience emotions differently in the United States, and the way that men and women in sites that are differentially sensitive to the effects of climate change experience emotions similarly or differently across and between sites. Additionally, this study explores the value of an environmental justice framework to understand the way that the effects of climate change are inequitably distributed. While previous research has demonstrated that the biophysical effects are inequitably distributed, we explore the way that emotional effects are inequitably distributed, and argue that the inequitable distribution, in addition to the differences in the way that men and women experience emotion, are concerns in terms of mental health outcomes (for women and communities experiencing greater effects of climate change) and in terms of increased or decreased likelihood of action (particularly as a result of anger from men in these communities).

Research in emotional geographies is necessary to understand the way that people live on, and experience the world around them. Emotion is a fundamental part of the

human experience, and without considering the way that environmental change affects emotional responses, particularly in biophysically vulnerable communities, we have a less-than-complete understanding of how different people, men and women, and people across a range of communities, experience the world. Emotion also gives us a lens to understand the motivations and perceptions of people in these communities; with this understanding, researchers and policymakers have a better opportunity to provide relevant outreach opportunities, as well as designing better policy and infrastructural interventions to help mitigate the effects of climate change. Anthropology is particularly suited to addressing these concerns because of its focus on local ecological knowledge; this allows researchers to explore the knowledge and beliefs of local community members and the range of cultural knowledge and emotion within and between biophysically vulnerable communities. This is the knowledge, in turn, that can drive locally relevant discussions and mitigation strategies.

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CHAPTER THREE

HOPE AND WORRY: GENDERED EMOTIONAL GEOGRAPHIES OF CLIMATE CHANGE IN THREE VULNERABLE US COMMUNITIES

*This chapter has been accepted for publication *Weather, Climate, Society* in collaboration with Amber Wutich and Alexandra Brewis.

Abstract Climate scientists have proposed that many people have not yet felt the results of climate change. This explains, at least in part, why some people are so unmotivated to make changes to mitigate climate change. Yet, a range of studies focused on other types of weather-related anticipated and experienced disasters, such as drought, clearly demonstrate that climate-related phenomena can elicit strong emotional reactions. Using a combination of open-ended interview questions and close-ended survey questions, we conducted semi-structured interviews in three biophysically vulnerable communities (Mobile, Alabama; Kodiak, Alaska; and Phoenix, Arizona). The relatively high number of respondents who expressed sadness and worry at the possible outcomes of climate change indicates emotional awareness, even among climate change skeptics. The patterns were significantly gendered, with men across the three sites less likely to indicate hope. Results suggest that emotional aspects of climate change might provide an entry point for rallying vulnerable US communities to consider mitigation efforts.

Keywords: climate change, culture, emotion, emotional distress, gender, hope

Introduction

Climate scientists argue that individuals and communities do not yet feel the results of climate change (Akerlof et al. 2013), explaining why rallying people to engage in mitigation efforts and investments is so difficult. Yet, a range of studies focused on

other types of weather-related anticipated and experienced disasters, such as drought, clearly demonstrate that climate related phenomena can elicit strong emotional reactions (Sartore et al. 2007, Sartore et al. 2008, Bell et al. 2010, Farbotko and McGregor 2010, Gorman-Murray 2010, McMichael 2011, Stratford et al. 2013), and can activate energetic community action (Ryan 2016).

In an effort to connect the study of local emotion to the challenge of addressing climate change, here we ask: do people's perceived climate change futures elicit any strong (positive or negative) emotions? In using interview data collected across biophysically diverse, climate-vulnerable places across the United States, we are applying the construct of *emotional geographies* (Anderson and Smith 2001) to understand how these responses might vary by place. A further central analytic lens is gender, as a key marker of social difference, plays into those perceptions and their emotional impacts.

Literature Review

Emotional Geographies, Place, and Change

The concept of "emotional geographies" addresses the role of emotion and affect in people's place-specific everyday lives. Prior to the mid-1980s, social science had largely neglected to incorporate the study of emotion in research, preferring to focus on rational thought and behavior. Formative research (Ulrich 1983, Russell and Lanius 1984, Lutz and White 1986, Anderson and Smith 2001) argued that without the inclusion of emotion, researchers could not effectively study how people live on and experience the world. Recent research on emotion demonstrates that the inclusion of emotion, even when it might be less rational, is critical to understand how individuals and communities respond to risk and to the threat of climate change (Smith and Leiserowitz 2014, Ryan

2016). These studies also show how emotion is *made* in specific contexts, and how geographic place is integral to the emotions that people experience (Woodward and Lea 2010, Morales and Harris 2014, Goldin 2015).

The concept of emotional geography has emerged as a means to interrogate these connections. For example, water scarcity and changes in water access impact the emotional expressions of community members in water-scarce Bolivia. The hardships associated with water access often result in feelings of fear, worry, bother, and anger, and researchers found that these experiences were not equitably distributed among community members (Wutich and Ragsdale 2008). Similarly ethnographic interviews with women in Bangladesh reveal that respondents suffer emotionally because they both have difficulty attaining water (suffering *for* water) and often experience ill health as a result of the quality of their water (suffering *from* water) (Sultana 2011, Sultana 2015).

Exploring the emotional dimension of resource access and management is a prime dimension of this growing field. Recent scholarship has explored the way that fishermen in Scotland build an emotional connection to their landscape through the act of fishing itself (Nightingale 2013). Additional studies in forestry management in India (Singh 2013), and changing agricultural values among farmers in South Africa (Goldin 2015) illustrate the ways that landscapes are integral in positively and negatively shaping the emotions of the people living and working on them. Shifts in these landscapes and their management can have the effect of widening social divisions and causing frustration among certain social groups, or it can have an empowering effect and introduce hope to a context where it had previously been absent (Morales and Harris 2014, Goldin (2015).

Other researchers have explored the ways that emotion becomes entrenched in where people live, including in urban spaces (Munt 2012, Harris 2014), rural villages (Pini et al. 2010, Rigby et al. 2011), and homeless shelters (Daya and Wilkins 2013). Such studies all show how place can create strong emotional ties and elicit emotional expressions. While emotional geography has been used to understand how people experience and relate to place, these analyses have not much considered what happens as places change or are anticipated to change -- such as with climate change. Because a broader environmental psychology literature (Connor et al. 2004, Higginbotham et al. 2006, Albrecht et al. 2007, Sartore et al. 2007, Sartore et al. 2008, Sartore et al. 2008b) has documented how actual landscape changes can lead to emotional devastation, we could expect that *anticipated* changes also will elicit emotional distress

Environmental Geographies and Gender

Emotional geographies related to climate change could vary markedly across sites, but also within sites by key social differentiators, like gender. The literature focusing on environmental concern suggests that women will have increased emotional response to climate change compared to men. Several studies have suggested that women show a higher level of concern for the environment (Larson et al. 2011, McCright and Dunlap 2011, McCright and Sundström 2013). Much of this research has also explored the ways that men and women perceive environmental risks; as Stern and colleagues (1993) note, women are more likely to believe that environmental quality directly affects their well-being. As the review from Momsen (2000) demonstrates, however, the differences in environmental concern between men and women may not be particularly significant.

In contexts where there are clear differences between men and women in environmental concern, as in McCright and Dunlap's (2011) research, it seems that men, and particularly the group of white, conservative men interviewed by McCright and Dunlap, feel that they are less vulnerable in general, and in particular, are less vulnerable to the effects of environmental change. As Marshall and colleagues (2006) demonstrate, because white men are relatively immune to systemic injustice and harms, they, unlike their female and minority counterparts, are more willing to accept a certain amount of environmental risk. Given the minimal knowledge about emotional responses to anticipated landscape changes and the way this might impact men and women differently, we pose the following questions.

Research Questions and Design

Drawing on research in emotional geographies, we ask how emotional responses to climate change vary across sites with different experiences and projected outcomes as a result of climate change. Second, drawing on previous scholarship exploring differences in environmental concern between men and women, we ask whether men or women were more likely to express emotions across these three sites. This study employs a comparative analysis of interview data collected with respondents across the three sites, differentiated by gender. We identified three biophysically diverse, climate-vulnerable places within the United States as the sites for this ethnographic study. Each represents a distinct kind of vulnerability to climate change risk within the continental U.S. (see Table 1). For Mobile, Alabama, this is hurricanes and tropical storms; in Kodiak, Alaska, this is sea level rise and the effects of ice melt; in Phoenix, Arizona, this is drought. Data collection sites within each area were identified based on availability of ethnographic

experts and other knowledgeable insiders to assist with tool development and interpretation.

Study Sites

Alabama

Mobile, Alabama is located in the southeastern United States directly along the Gulf of Mexico. A medium-sized coastal city, Mobile itself has a population of approximately 195,000 people (see Tables 1, 2). There are many smaller towns and fishing villages within a one hundred mile radius of Mobile that utilize the services of Mobile itself. The Gulf Coast region of Alabama has a long history of commercial fishing; the area serves as a hatchery for many species of fish (Barbier 2011, Sumaila et al. 2012) and is well-known for producing a large volume of oysters and shrimp. The area has also traditionally been composed of agricultural land; while this is changing as more people move the area and it urbanizes, there are still farmers involved in cultivating produce and other crops.

The area is susceptible to hurricanes, and certain hurricanes (Hurricane Camille in 1969, Hurricane Ivan in 2004, and Hurricane Katrina in 2005) are considered by local residents to be particularly devastating (de Vries 2011). In the next eighty years, the southeastern coast of the United States is expected to see a 2-2.5°C temperature increase and a 5% decrease in overall precipitation (IPCC 2007). Because this is a coastal area that is already biophysically vulnerable to the effects of tropical storms and hurricanes, it is expected that climate change will intensify this vulnerability, and increases the likelihood of coastal erosion, changes in ocean acidification, and sea level rise (IPCC 2007).

Alaska

Kodiak Island is in southern Alaska, and separated from mainland Alaska by the Shelikof Strait. The town of Kodiak is the main town of seven rural villages on the island. The town itself has a population of just over 6,000 people, many employed in the local fishing or wilderness guiding industries (see Tables 1, 3). Salmon and halibut provides the livelihood for commercial fishermen, and also provides subsistence for both Alaska Natives and Anglo community members (Carothers 2008, Carothers et al. 2010). The island has been inhabited for over 7,000 years by Alaska Natives; while there are several groups that trace their ancestry on Kodiak Island, the most prominent nation is the Sugpiaq Alutiiq group, who continue to live and work on the island (Carothers 2010).

The IPCC (2007) reports that Alaska has already seen some of the most dramatic warming. From 1970 to 2004, average temperatures in much of Alaska have risen 2-3.5°C, and scientists report that there have already been wide scale changes in marine and freshwater biological systems in the Polar regions. In the next eighty years, the IPCC (2007) suggests that the southern region of Alaska will experience a temperature increase of 2.5-4°C. Similarly, while the area currently receives an average of 75" of precipitation annually, the IPCC (2007) suggests that precipitation in this area will become much more variable; winter precipitation may increase by 10%, while summer precipitation may increase by up to 5%. Unlike much of the Arctic, however, as an island Kodiak is buffered from many of the more extreme outcomes that are likely to affect other parts of Alaska. While indigenous lifeways are expected to be vulnerable to climatic changes in Kodiak as in other regions of Alaska, the precipitation and temperature changes are likely to be less severe, with lower overall meteorological changes as a result of being buffered by the surrounding ocean. Additionally, because Kodiak is more temperate than many of

the towns and villages in the further north regions of Alaska, permafrost melt and the associated infrastructure damages are less likely to impact residents in Kodiak.

Arizona

Phoenix, Arizona is in the southwestern United States, and has a population of 4.3 million people, making it the sixth largest city in the U.S. There are multiple sources of income for those living in the area; among the most profitable industries are the airline industry, various upcoming tech companies, and Arizona State University (see Tables 1, 4). Traditionally, the Phoenix metropolitan area was a center for agriculture and animal husbandry, although mining was also profitable. In spite of high heat (Phoenix averages $\geq$37.8°C between June and September), dairy farming and the raising of beef cattle was quite common in the area until the 1960s. Additionally, many farmers successfully grew and exported crops. While the urbanization of the valley has displaced many of these historical activities, agriculture still remains a core value in the area.

Many residents of the Phoenix area are already biophysically vulnerable in the summers; the National Weather Service issues a heat warning at 37.8°C, which is the average daily high in Phoenix for three months of the year. During the summer months, however, average temperatures regularly exceed 38°C (Baker et al. 2002) for at least six hours a day. While many residents of Phoenix have air conditioning, the most socio-economically vulnerable may not, and all residents are nevertheless vulnerable to the pre-existing climatic conditions of Phoenix (Harlan et al. 2006, ADHS 2014). Climate change in the next eighty years is predicted to produce a 3.5-4.0°C increase in temperature for the Phoenix area. Changes in precipitation over the next 80 years will likely result in an overall warmer and drier climate, which may severely hinder access to freshwater

resources (IPCC 2007). As a result of its already arid climate, Phoenix is expected to see increased intensity and duration of heat waves with considerable concerns for human health outcomes (IPCC 2007).

Methods

Participant Observation

Early participant observation at each site provided information about local community concerns and livelihood strategies, and provided context for subsequent keyword analysis (DeWalt and DeWalt 2002). In Mobile, this included spending time in the local fishermen's Baptist church and talking informally with local residents in the greater Mobile area. In Kodiak, an ongoing research project (Donkersloot and Carothers 2016) was the point of community entry. Additional participant observation included volunteering with local community members and building rapport with local families. In Phoenix, participant observation activities included talking with a variety of local stakeholders, such as water managers and land owners. Data from participant-observation, captured in field notes, provide a context for characterizing the field sites and interpreting larger themes.

Questionnaire design and data collection

We developed a combined interview and survey instrument composed of sixteen open-ended interview questions with pre-determined probes, as well as twenty-one survey questions (see Appendix 1). To ensure content validity, we used previously tested survey questions and extensively tested the protocol using cognitive interviewing strategies (DeMaio and Rothgeb 1996) in one of the sites (Phoenix).

Data was collected using a non-probabilistic, purposive sampling strategy in each of the three communities described above (Bernard and Ryan 2009). In order to develop an in-depth understanding of the range of experiences and views on climate change in each of these three locations beyond gender, we sampled within the populations of each of the three cities to capture a range of professions, race/ethnicities, and political views. Because the gender comparison is a central component of this research, we also attempted to interview an equal number of men and women in each location. While the sample was not stratified, we attempted to gain insight from as many groups as possible in each location (Guest 2014).

In accordance with Guest and colleague's (2006) research indicating that 6-12 interviews would allow researchers to reach thematic saturation, we conducted at least thirty interviews in each location. We purposefully oversampled due to the range of experiences and concerns between these sites per Hagaman and Wutich's (2016) recommendation regarding meta-theme saturation in multi-sited research. Respondents were sampled in public places, including coffee shops, libraries, and parks, as well as work locations. Sampling in public locations allows researchers to capture a sample that has shared understandings of environmental and cultural beliefs and practices (Handwerker and Wozniak 1997). In some instances, sampling at work places was necessary in order to increase the diversity and representativeness of the sample (Guest 2014).

Data Analysis

To analyze the interview data, we used a keywords-in-context (KWIC) approach to explore the emotional responses to climate change experienced by respondents. Using

lists of pre-established emotion words and using guidance from other KWIC studies (Ryan and Weisner 1998, Seale et al. 2006, Saldaña 2009, Taylor et al. 2015), we used an automated coding procedure to identify emotion words in each interview. The coding unit for this study was at the word level; thus, within each question, and therefore, within each interview, emotion words could occur multiple times, leading to total counts by respondent. Emotion word codes were not mutually exclusive to ensure that we understood the full context of the emotional response.

Once the coding was complete, we examined each interview to explore how each emotion word was used; common themes emerged deductively as a result of the pattern of questioning. The most common themes that emerged from these interviews include emotional responses to the current effects of climate change, the anticipated effects on livelihoods, and the way climate change will affect the younger generation. In order to run statistical tests, we dichotomized emotion words into presence and absence by interview. Additionally, emotion words were grouped into positive, negative, and neutral categories to understand if men and women were more likely to fall into one end of the emotional spectrum or the other. Exemplar quotes were selected using strategies from Ryan and Bernard (2003), including looking for similarities and differences and patterns of repetition.

After the initial coding phase, we performed further quantitative analyses to explore the way emotion word usage varied within and between the sites. First, using both ANOVA and Mann-Whitney U tests, we explored the way that emotion word usage varied between the sites to assess the degree to which emotional expression might be the result of local ecological variability. We used chi-square tests to examine how emotion

word use varied across the sites by gender. Using t-tests, we looked at how emotional expression differed by gender and site. Finally, t-tests and Mann-Whitney U tests analyzed the valence of emotions expressed by men and women by site.

Results

Cross-site Differences in Emotion Words in Context

Across the three sites, the two most commonly used emotion words were "worry" and "sad". These words occur with relatively equal frequency across the sites (see Figure 1). While these words were used in different contexts, respondents regularly indicated that they felt sad for the younger generation because they wouldn't have the same opportunities, or worried for them because their lives would be so much different than their own. Respondents with children often said they felt sad that their children wouldn't be able to see the same wildlife and resources that they had. As one Alabama resident noted, "I don't really know that I could say I'm worried, because it doesn't really affect me…I think you just hope it won't affect your grandchildren down the road."

Respondents also used "worry" and "sad" to describe changes to the landscape in their area; for some respondents this included a change in their resource access (see Figure 1). For this Alaska resident, this was certainly the case: "It makes me sad…I love that fishing is a way of life here, and I think it produces the unique and valuable mentality that the people and resources of the earth are constantly at a delicate balance". Several respondents in each site identified changes to local seasonality, which meant that they might not be able to continue in their current work. Respondents who engage in living off the land evoked sadness and worry in the context of losing their livelihoods, or in not being able to give their children the same livelihood opportunities in the future.

Emotion Words in Context: Results from Alabama, Alaska, and Arizona

Alabama

Although fishing and seafood handling is still a common profession among people in smaller villages around Mobile, Mobile itself is a community built on diverse industries. It is a major shipping port along the Gulf Coast, and also houses a major university. Respondents in the area are fairly politically conservative; while there are small pockets where this is not the case, many of the respondents identified as conservatives or as Republicans (see Table 1). Perhaps as a result, a large volume of responses that indicated that respondents did not believe in anthropogenic climate change. Because the area has its roots in the fishing and farming industries, most of the respondents interviewed indicated that they had a strong connection to their local environment. Although 43% of respondents did not believe that climate change was anthropogenic, these respondents still showed a level of concern for the future of their area as the landscape changed.

Respondents in Alabama were significantly more likely ($\chi^2 = 8.84$, $p = 0.012$, *phi* = 0.293) to use the word "prepared" compared to other sites; these respondents indicated that they felt prepared for the possibilities of climate change in their area (see Table 4) However, while these respondents did indicate a feeling of preparedness, no respondents used the word "safe", suggesting that while respondents feel they can handle the future possibilities of climate change, they do not feel immune to those possibilities. This feeling is typified by the following quote: "It concerns me- I have deep feelings for people whose lives are torn up, but in reality, my feelings in that direction an not as intense as they are in relation and hurricanes and storm water runoff, which are only

going to get worse by climate change. There are so many things that we don't know. We adapt. We've always adapted. If we have climate change, we're going to do things to slow it down. We're going to adapt. The majority of the people are going to figure out how to survive." This respondent indicates a feeling that, while they are not going to be immune to the effects of climate change, they will find ways to deal with the effects. However, while this respondent indicated an ability to adapt, it is with resignation; no respondents in Alabama indicated that they were optimistic, either about the current or future prospects of climate change.

Alaska

The fishing industry in Kodiak has attracted a somewhat diverse pool of residents; while many of the commercial fishermen are white Anglo-Americans, there is a large Asian (predominantly Filipino) population that crews fishing vessels and works in the local canneries. Additionally, approximately 10% of the population in Kodiak and the outlying villages is composed of Alaska Natives, primarily Alutiiq members. Respondents in the area are of mixed opinions on climate changes; while there are a number of deniers of anthropogenic climate change (31% of respondents), many respondents believe that climate change is anthropogenic. Like the respondents in the Mobile region, and regardless of opinion on anthropogenic climate change, Kodiak respondents evidenced a high level of concern for the environment and a great deal of emotion at the thought of landscape changes.

Respondents in Alaska were significantly more likely ($\chi^2 = 7.18$, $p = 0.036$, *phi* = 0.264) to use the word "hope". While residents in Alabama and Arizona also said "hope," they often used it in the context of hoping that climate change wouldn't make the climate

worse (see Table 5; Figure 1). Respondents in Alaska used hope both in a positive and negative context; while several people indicated that they hope that climate change doesn't make it worse, or that they hope they can stay in business, many of them indicated that they have hope for the future. Perhaps because of the already cool climate in Kodiak, many of these residents feel that they have a greater chance of successfully weathering the effects of climate change.

Additionally, the only group of respondents in this study to use the word "interested" was in Kodiak; this may also reflect a mindset of resilience to the effects of climate change as a result of being an island (see Figure 1). One respondent indicated that climate change could bring more opportunities to the area: "I'm not an alarmist, I don't consider myself a pessimist, so I don't have any grave concerns, and right now, I'm just enjoying the benefits. A disaster for some may mean prosperity for others-as polar ice melts, we might benefit as more shipping traffic comes through this area." Unlike respondents in other locations, several respondents in Kodiak said they were optimistic, or indicated that they felt safe. These respondents, though representing only a subsample of the respondent group, indicate that Kodiak may be somewhat anomalous, both in Alaska and in the United States for its potential resilience to the impacts of climate change.

It is important to note, however, that while the use of these terms was more prominent in Alaska than the other two sites, respondents in Kodiak were also the most likely to use "negative" ($\chi^2 = 9.8$, $p = 0.006$, $phi = 0.308$). While negative occurred with a relatively low frequency in the data (only nine respondents used negative), this nevertheless indicates that, while some respondents feel that they will be okay, or are

interested in the possibilities presented by climate change, there are still other who feel that there will be negative consequences, particularly on resource access and therefore, the local economy.

Arizona

The diverse economic opportunities in the Phoenix metropolitan area has attracted a similarly diverse population. While 73% of the population is white, up to 30% are Hispanic citizens, and smaller groups of other populations are present. Perhaps because of the conservative political climate of the area, 26% of respondents in the Phoenix area indicated that they did not believe in anthropogenic climate change, and while there were some respondents who indicated concern and other feelings as a result of the possibilities of climate change, overall, respondents appeared to be less emotional about the current state of climate change, and the way it could affect them or their community (see Figure 1).

Overall, respondents in Phoenix were the least likely of the three groups of respondents to indicate an emotional reaction to the effects and possibilities of climate change (Table 6; Figure 1). While respondents did indicate that they felt sadness, or were worried about the possible outcomes of climate change with an equal frequency to the other sites, they had fewer overall emotional responses, positive or negative, to the realities and future of climate change in their area (see Figure 1). Several respondents indicated concern for the younger generation: "[I am] Sad and concerned that they won't have the same experience I had. They won't be aware of the polar bears and that it'll be like dinosaurs like 'what is that?'". However, for many respondents, while they indicated that they felt the climate would change, few of them used emotion words: "It is

inevitable, not very optimistic. The existing patterns of consumption are entrenched and ingrained. It will be hard to reuse politically. It will require a severe disruption to appear like the water supply and ocean levels." The lack of emotion word usage seems puzzling given that Phoenix already has an extreme climate; however, perhaps because of that, people express resignation, or are unconcerned about living in an area that will get warmer and drier because of their experiences in an already warm and dry climate. Additionally, because many respondents in the Phoenix area are buffered from the local ecology by the surrounding city, there may be less awareness of changing conditions, resulting in less emotional distress.

Gendered Differences in Emotion Words in Context

Data were analyzed by gender, both across the United States, and within each site to check for variance in responses (see Figures 2 and 3). Across the United States, men and women were equally likely to use "worry" and "sad"; although fewer men than women were likely to evoke sadness, they were more likely to indicate worry (see Figure 2). Women commonly indicated that they were sad for the future generation; this was often expressed as sadness that their children wouldn't have the same opportunities, or wouldn't be able to experience the world as they did as children.

For men, the use of worry was often related to financial survival. Men were also worried about outcomes for the future generation, but they often indicated their worries in the context of their livelihood and the local economy, particularly as it related to changes in local ecology. As this one male respondent noted, "I feel uncertainty-not trepidation, but in one way or another, our society and civilization will adapt in a way that's positive, at least in the short term, over the next 500 years or so. Not fear, trepidation, not total

pessimism. Some changes, depending on where you live, there might be positive changes, especially with resources-fish populations--we can capitalize on; some new populations will be useful, others will no longer be available. No doomsday scenario--changes subtle and prolonged enough--adaptation will be by happenstance long-term changes--hard for people to comprehend." His concern occurs alongside a belief that his location and community will be okay, even as the changes occur.

Across the three United States sites, women were significantly more likely to use "hope" ($\chi^2 = 4.042$, $p = 0.044$, $phi = -0.22$). Because women were also more likely than men to indicate that they were sad, this indicates an interesting schism in the way women may think about the effects of climate change. Women were sad for the younger generation, but many of them also indicated that they had hope for the younger generation, or hoped that the younger generation would be able to find a way to mitigate the effects of climate change. Sadness for the younger generation was a theme repeated among female respondents, as exemplified by this response: "It makes me feel sad for them because they will have to be the ones to put in the effort." While this particular respondent did not use "hope" directly, she nevertheless indicates a sense that the younger generation may be equipped to handle the effects of climate change, even while indicating a sorrow at leaving challenging circumstances to them. 13% of female respondents evoked these emotions simultaneously (in contrast, only one male respondent used these emotions together) indicating that there may be a tension in the way women feel about the effects and future possibilities of climate change.

When the data were analyzed by site and by gender, no statistically significant results were found, indicating that while patterns differ in the way women and men

experience emotions across the United States, within sites, gender was not a strong factor in the way emotions were expressed.

Discussion

While the context in which respondents used these words varied across three very different US sites, responses from each site indicate negative emotional reactions to the current effects and future possibilities of climate change. 65% of respondents indicated that they felt "worried" or "sad" about climate change. While these responses may not be rational considering that communities may not yet be experiencing the effects of climate change, these responses are nevertheless both justified and important to take into consideration to understand how people are experiencing the current and future effects of climate change, and to understand how they make decisions based on these emotions (Smith and Leiserowitz 2014, Ryan 2016).

In Alaska and Alabama, which have more moderate climates and a more recent history of resource exploitation through fishing and other economic opportunities, "sad" and "worry" were used more in the context of worrying about the loss of income from traditional economic activities, or sadness about the ability to pass on traditional livelihoods to children. In Alaska, in particular, respondents indicated a level of sadness as a result of watching their local ecology change. Because these two areas have climates that allow respondents to work and recreate outside year-round, it is possible that respondents in these locations are more aware of the changes already occurring on their landscapes. In contrast, while many respondents in Arizona indicated worry or sadness for the younger generation, few respondents used negative emotional terms to describe changes to the landscape. Because Phoenix has an inhospitable climate from the months

of May to September, it may be that respondents spend less time outside, and may be less aware of changes to their local ecology. The large urban environment in Phoenix may also insulate people from local environmental changes. Additionally, because this is a climate that does already present so many challenges to living and working comfortably, it's possible that respondents in Phoenix are less concerned about the possibilities of climate change, many of which they already deal with on a daily basis, even if they do so to a lesser extent than they will in eighty years (IPCC 2007). Previous research on the effects of worry (Wutich and Ragsdale 2008, Sultana 2011) indicates that this emotional response to uncertain and difficult circumstances increases the likelihood of other negative emotional responses. Attempting to address worries of local community members earlier rather than later may allow policy makers to intervene and prevent additional concerns regarding climate change.

The results by gender offer an interesting insight into differences in how men and women may feel about the current effects and future possibilities of climate change. While researchers have already explored the way men and women express environmental concern differently (Larson et al. 2011, McCright and Dunlap 2011, McCright and Sundström 2013), our results indicate that men and women express negativity about climate change relatively equally. However, different words reflect associated emotions. While men were more likely to indicate their worry, and to be worried particularly in the context of resource access and livelihood strategies in their area, women were more likely to express sadness, particularly for the younger generation.

Not all emotions respondents expressed were negative, but differences in positive and negative emotions were often associated with differences in gender. In terms of

positivity, while only male respondents indicated that they felt "safe", women were more likely to indicate that they had hope. While the indication by men that they felt safe fits with the existing literature (Marshall et al. 2006, McCright and Dunlap 2011) suggesting that men are less likely to feel vulnerable to the effects of climate change as a result of their generally higher societal status, it is not clear why women were more likely to indicate that they had hope. While Goldin (2015) explored the way women express hope in the context of new farming opportunities, the women in our study largely indicated that they had hope for the younger generation, which does not fit with Goldin's established idea of hope serving as a mechanism of "power for". Hope for the younger generation, while allowing female respondents to continue to live as they have, and to have hope for an acceptable future for the younger generation, does not give them any power to do anything. Nevertheless, hope also indicates the opportunity for policy makers and community members to intervene and attempt to make constructive changes to mitigate the effects of climate change.

Indeed, the tension in women's responses that indicates that they both have hope, but are more likely to indicate sadness than men, resonates well with the environmental psychology literature on solastalgia (Connor et al. 2004, Higginbotham et al. 2006, Albrecht et al. 2007). It suggests that women in this study feel that their landscape is already changing to the extent that what they recognized from their childhood will not be available for their children, or for other youths in the younger generation. Nevertheless, they are optimistic that the younger generation might be able to make changes that allow them to continue forward and have a good life, as they did. These women express solastalgia specifically in the context of the younger generation, so they indicate that,

while it may be possible for the younger generation to live good lives, the lives that they lead may be unrecognizable to the women thinking about them now, and this results in their sadness. Indeed, these women are suffering *for* the consequences of climate change, although they are doing it long before the outcomes are clear (Sultana 2011).

The lack of anger expressed by respondents indicates that, unlike previous studies exploring the emotional dimensions of changing landscapes, or shortages of resources, anger and fear are not commonplace emotions in discussions of climate change futures in the US. These respondents are by and large better off than those in many of the studies exploring difficulties with resource access in developing countries (Wutich and Ragsdale 2008, Sultana 2011), and fiscal resilience can assist with emotional resilience. Additionally, few of these respondents are immediately threatened by the effects of climate change; while changing local ecology may lead to necessary changes in housing and location, these effects may not yet be salient to these respondents as they are in other locations (Farbotko and McGregor 2010, Gorman-Murray 2010, Stratford et al. 2013).

Conclusion

This research found that, while there are differences in the way that respondents in these three sites expressed their emotions as a result of climate change, there many similarities. While each of these three sites have very different predicted outcomes as a result of climate change (increased frequency and intensity of tropical storms and sea level rise in Alabama, sea level rise and increased precipitation in Alaska, and worsening heat and drought conditions in Arizona). Perhaps because all three sites face some significant level of biophysical vulnerability, respondents in each of these three sites indicated similar responses to the current realities and future effects of climate change.

Gender comparisons indicated that women may be more optimistic about the future than men. The relatively high number of respondents who expressed sadness and worry at the possible outcomes of climate change indicates that there is an undercurrent of climate change awareness and concern in these sites that may allow policy makers to work with community members to create policies that may mitigate the effects of climate change while also resonating with local community members. The expression of sadness and hope in these communities indicates the possibility for change and intervention that might help prevent future disasters and bolster the adaptive capacity of these communities. Charged emotional spaces offer a route for individuals and communities to work together; if respondents, and others like them in their communities, can find common ground, there may be room for changes that reflect their interests and concerns regarding climate change.

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Figures and Tables

Table 3-1. Site Characteristics			
	Mobile, AL	**Kodiak, AK**	**Phoenix, AZ**
Average temperature	77.4/57	46.8/40.8	86.8/63.4
Average Annual Precipitation	66.12"	75.35"	8.03"
Natural Disaster	Hurricanes, tropical storms, tornadoes	Earthquakes, tsunamis	Wildfire, drought
Environmental issues	Coastal erosion, flooding, water pollution (sewage leakage, oil spills)	Coastal erosion, ocean acidification, species decline	Soil erosion, dust storms, urban heat island, flash floods,
Climate	Subtropical	Subpolar oceanic	Subtropical desert

Table 3-2. Respondent characteristics Alabama n = 31

Demographics		
Gender	*Frequency*	*Percentage (%)*
Female	13	41.9
Male	18	58.1
Race/Ethnicity		
White	31	100
Political Affiliation		
Democrat	1	3.2
Republican	12	38.7
Independent/none	18	58
Belief in Climate Change		
Yes	22	71
No	9	29
Belief in Anthropogenic Climate Change		
Yes	17	55
No	13	42
Religion		
Christian	23	74.2
None	6	19.4
Other	2	6.5
Employment		
Off the land (e.g., fisherman)	5	16.1
Not off the land (e.g., teacher)	18	58.1
Other/none (e.g., stay at home mom)	8	25.8
Hope		
Present	4	12.9
Absent	27	87.1
Worry		
Present	14	45.2
Absent	17	54.8
Sad		
Present	14	45.2

Absent	17	54.8
Prepared		
Present	5	83.9
Absent	26	16.1
Negative		
Present	2	6.5
Absent	29	93.5

Table 3-3. Respondent characteristics - Alaska n = 36

Demographics		
Gender	*Frequency*	*Percentage (%)*
Female	23	63.9
Male	13	36.1
Race/Ethnicity		
White	25	69.4
Alaska Native	5	13.9
Hispanic	1	2.8
Asian	1	2.8
Political Affiliation		
Democrat	7	19.4
Republican	6	16.7
Independent/none	23	63.9
Belief in Climate Change		
Yes	31	88
No	4	11
Belief in Anthropogenic Climate Change		
Yes	24	69
No	11	31
Religion		
Christian	10	27.8
None	21	58.4
Other	5	13.9
Employment		
Off the land (e.g., fisherman)	8	22.2
Not off the land (e.g., teacher)	26	72.2
Other/none (e.g., stay at home mom)	2	5.6
Hope		
Present	13	36.1
Absent	23	63.9
Worry		
Present	16	44.4
Absent	20	55.6

Sad		
Present	14	38.9
Absent	22	61.1
Prepared		
Present	0	0
Absent	36	100
Negative		
Present	9	25
Absent	27	75

Table 3-4. Respondent characteristics - Arizona n = 36

Demographics		
Gender	*Frequency*	*Percentage (%)*
Female	17	47.2
Male	19	52.8
Race/Ethnicity		
White	23	63.9
Black	3	8.3
American Indian/Native American	2	5.6
Hispanic	5	13.9
Asian	1	2.6
Mixed/multiple	2	5.6
Political Affiliation		
Democrat	11	30.6
Republican	6	16.7
Independent/none	19	52.8
Belief in Climate Change		
Yes	32	88
No	4	11
Belief in Anthropogenic Climate Change		
Yes	26	74
No	9	25
Religion		
Christian	17	47.2
None	15	41.6
Other	4	11.1
Employment		
Off the land (e.g., dairyman)	3	8.3
Not off the land (e.g., teacher)	27	75
Other/none (e.g., stay at home mom)	6	16.7
Hope		
Present	5	13.9
Absent	31	86.1
Worry		

Present	11	30.6
Absent	25	69.4
Sad		
Present	12	33.3
Absent	24	66.7
Prepared		
Present	1	2.8
Absent	35	97.2
Negative		
Present	1	2.8
Absent	35	97.2

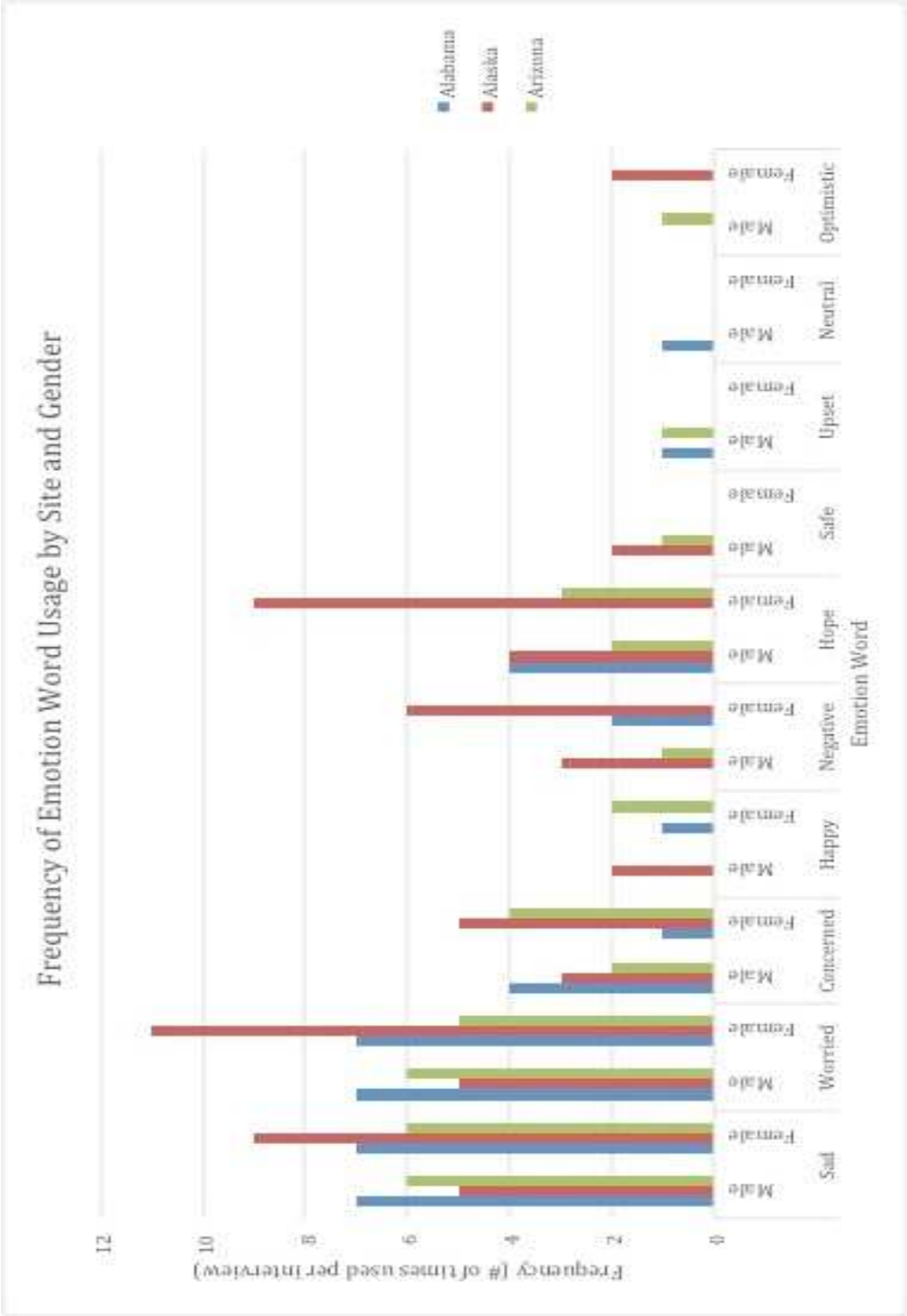

Figure 3-1.

Graph showing emotion word usage by site and gender.

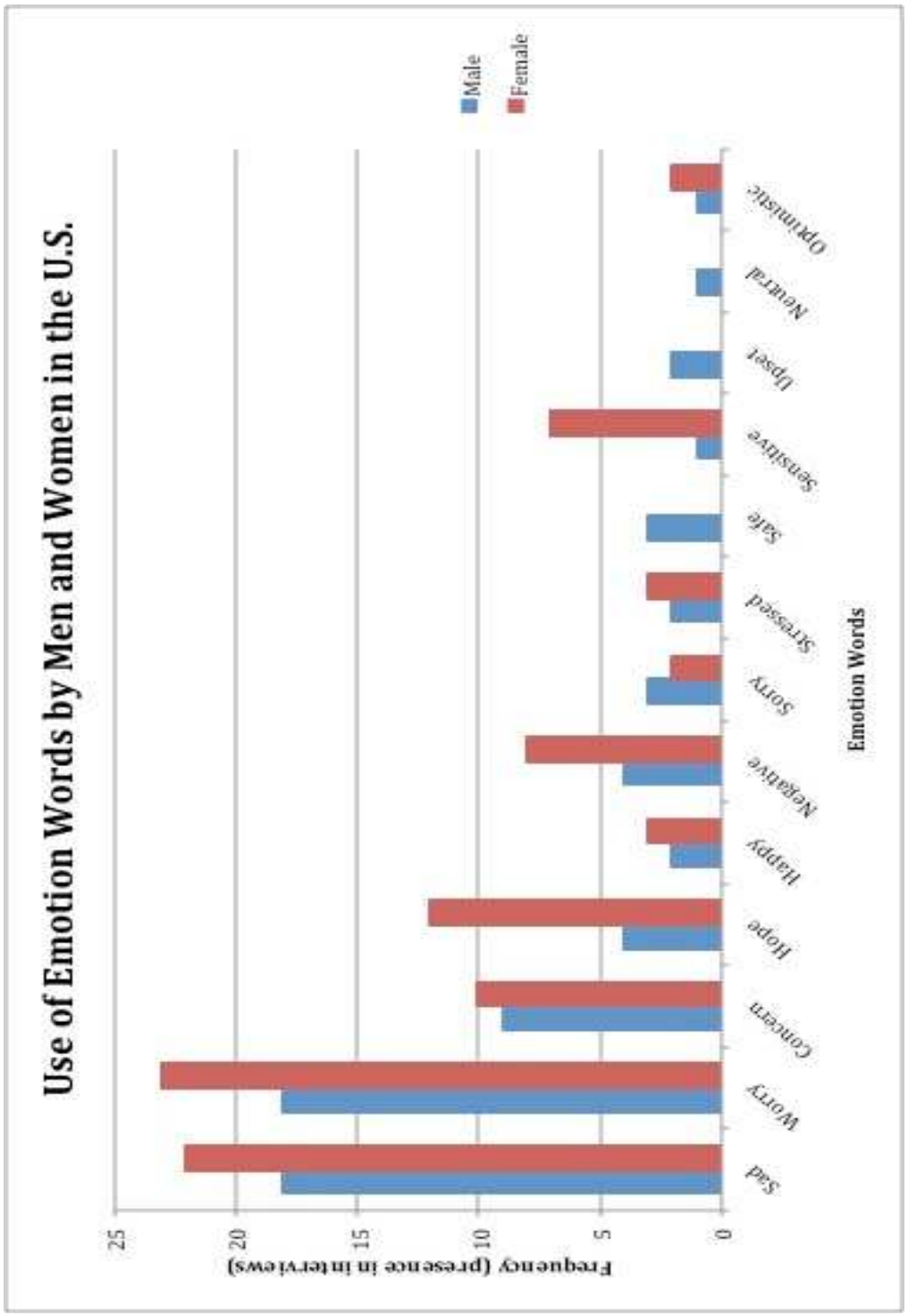

Figure 3-2.

Graph showing the number of interviews where emotion words were used by men and women, respectively.

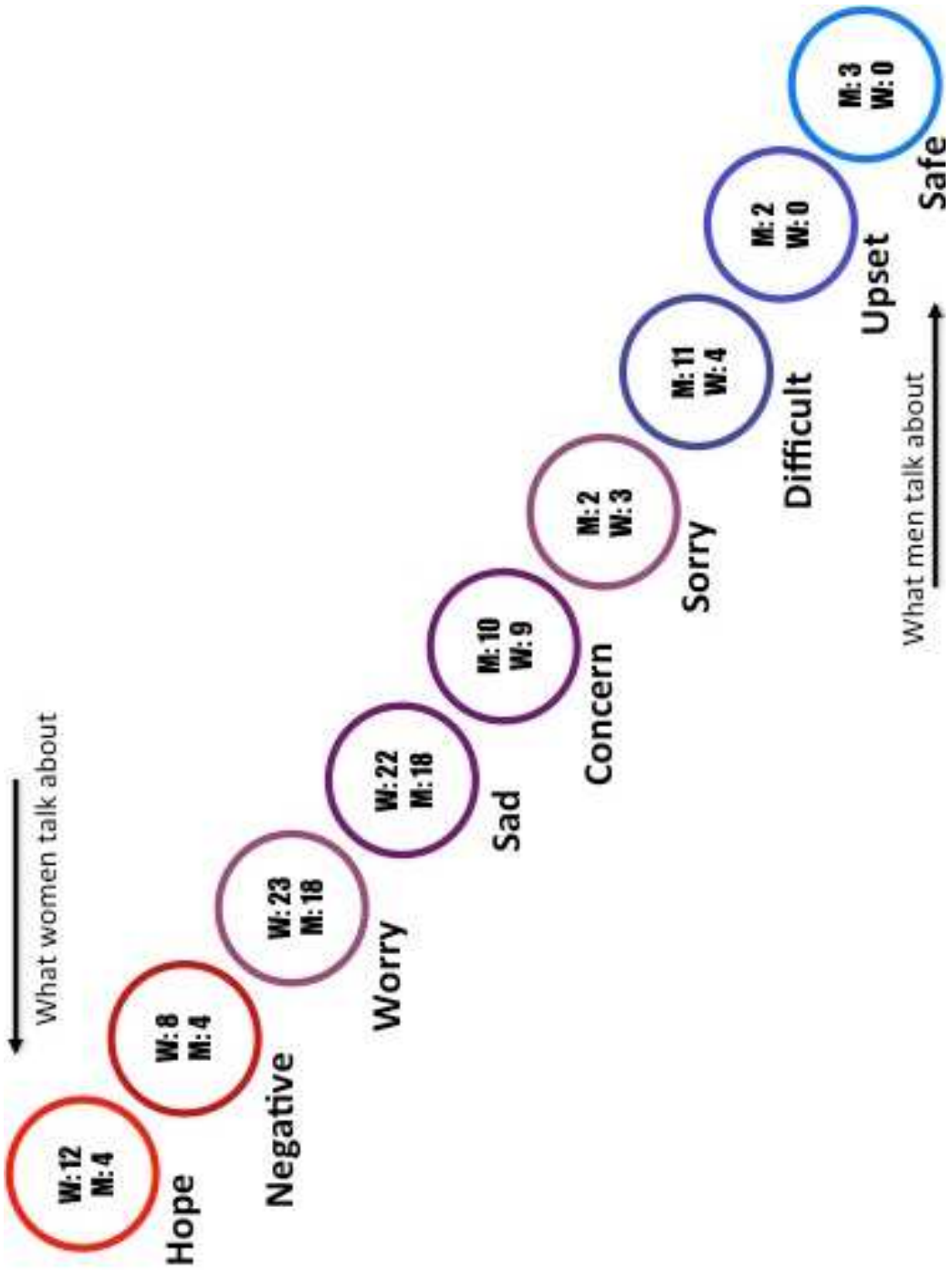

Figure 3-3.

We analyzed 103 interviews across the three sites by gender to show which emotion words were most commonly used by women, and which emotion words were most commonly used by men.

CHAPTER FOUR

EMOTION, COPING, AND CLIMATE CHANGE IN ISLAND NATIONS: IMPLICATIONS FOR ENVIRONMENTAL JUSTICE*

*This chapter has been submitted to *Environmental Justice* in collaboration with Amber Wutich, Kelli Larson, Dave White, and Alexandra Brewis

Abstract Island nations are particularly vulnerable to the effects of climate change, including changes in sea level, storms, coastal erosion, and freshwater availability. The purpose of this cross-cultural study is to understand how emotional responses to climate change are inequitably distributed across people living in island nations with varying climate change vulnerability. We consider how emotional responses (particularly sadness, worry, anger, happiness and hope) may be related to people's biophysical vulnerability, adaptive capacity, and likelihood of relocation in the face of climate change. Using data from 272 ethnographic interviews collected in local communities in Fiji, Cyprus, New Zealand, and England, we explore the emotional reactions of respondents to current and future effects of climate change. Our results demonstrate that respondents in island nations with greater biophysical vulnerability are more likely to be concerned about relocation as a result of climate change, and are also more likely to indicate their sadness or anger. Countries with higher adaptive capacity and lower biophysical vulnerability are more likely to suggest that, while they are sad about the effects of climate change, they feel neutral about its overall effect. This research demonstrates how focusing on emotional responses within communities affected by climate change brings important and under-explored dimensions of climate-related environmental injustice into sharp relief.

Introduction

While there are many uncertainties in the era of climate change, what is certain is that vulnerability to climate change impacts is not evenly distributed. Small island nations are grappling with the early impacts of climate change and some face the prospect of relocation due to rising sea levels. The ecological effects of climate change are widely recognized as an environmental justice issue[1], but the costs of these uneven vulnerabilities extend well beyond the ecological. Climate change exposes uneven vulnerabilities in economic, psychological and political dimensions as well[2.] In this paper, we use a comparative approach to consider emotion as an under-explored aspect of climate change and environmental justice.

Environmental injustice and emotion: new challenges

While environmental justice research has historically focused on the way that hazards and vulnerability are inequitably distributed among communities[3], recent scholarship has begun to focus on the ways that climate change inequitably impacts communities. As the Johannesburg Declaration[4] demonstrates, less developed countries are more likely to experience the harmful effects of climate change. While emotional vulnerabilities have not emerged as a focus of environmental justice research, early

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[1] W. Neil Adger, Jouni Paavola, Saleemul Huq, M.J. Mace. 2006. Fairness in Adaptation to Climate Change. Cambridge, MA: The MIT Press.

[2] Ashlee Cunsolo-Willox, Sherilee L. Harper, Victoria L. Edge, Karen Landman, Karen Houle, James D. Ford, the Rigolet Inuit Community Government. The land enriches the soul: On climatic and environmental change, affect, emotional health and well-being in Rigolet, Nunatsiavut, Canada. Emotion, Space, and Society 6:14-24.

[3] Susan L. Cutter. 1995. Race, class and environmental justice. Progress in Human Geography 19:111-122.

[4] World Summit on Sustainable Development. 2003. *Johannesburg Declaration on Sustainable Development and Plan of Implementation of the World Summit on Sustainable Development: the final text of agreements negotiated by governments at the World Summit on Sustainable Development, 26 August-4 September 2002, Johannesburg, South Africa*. [New York]: [United Nations Department of Public Information].

studies suggest that proximity to contaminated landscapes leads to fear, worry and other strong emotional responses among affected groups[5].

Beyond environmental justice scholarship, anthropological studies show that negative emotional responses can result from inequitable distribution of resources within developing countries. For example, Wutich and Ragsdale[6] demonstrated that inequitable access to drinking water often resulted in frustration, worry, anger, and concern for vulnerable Bolivian community members. Similarly, Sultana[7] argues that inequitable access to drinking water among Bangladeshi communities results in high levels of anxiety and frustration for community members.

Drawing from these studies, we propose that emotions have a key, and arguably underexplored, role to play in environmental justice research. First, emotions are central to how people experience, understand, and subsequently manage their environments[8]. Second, emotions are crucial for mobilizing protest and other forms of political response to environmental injustice[9]. Third, disadvantaged groups disproportionally suffer from

[5] Bob Bolin, Sara Grineski, and Timothy Collins. The Geography of Despair: Environmental Racism and the Making of South Phoenix, Arizona, USA. Research in Human Ecology 12(2):156-168.
[6] Amber Wutich and Kathleen Ragsdale. 2008. Water insecurity and emotional distress: Coping with supply, access, and seasonal variability of water in a Bolivian squatter settlement. Social Science and Medicine 67:2116-2125.
[7] Sultana, Farhana. 2011. Suffering for water, suffering from water: Emotional geographies of resource access, control, and conflict. Geoforum 42:163-172.
[8] Eugene N. Anderson. 1996. Ecologies of the heart: Emotion, belief, and the environment. Oxford: Oxford University Press.
[9] Jeff Goodwin, James M. Jasper, and Francesca Polletta. Passionate Politics: Emotions and Social Movements. Chicago: University of Chicago Press.

anxiety and depression related to environmental injustices and this is a serious health disparity, a point that public health experts are starting to take seriously[10].

Climate change: biophysical and social (in)justice

While there has been extensive exploration of environmental justice issues in the U.S., international environmental justice issues are often couched in the context of vulnerability and hazards, rather than justice. In the context of climate change, there are very tangible justice issues at stake. As Adger and colleagues[11] demonstrate, the anticipated effects of climate change inequitably impact local communities' infrastructure, health outcomes, and emotional distress. Additionally, environmental ethicists[12] have argued that less developed countries are less at fault for the accumulation of greenhouse gases that has led to climate change, but are more likely to be affected by the outcomes of climate change.

As the Johannesburg Declaration[13] argued, the evident effects of climate change are more threatening to less developed countries, which are likely to be more socially and biophysically exposed and sensitive, while often lacking in adaptive capacity to the effects of climate change[14]. Without critical infrastructure, or the financial and social networks necessary to handle extreme events, less developed countries are more likely to experience the extreme effects of climate change and be less able to respond. Indeed, for

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[10] Amber Wutich, Alexandra Brewis, Jose Rosales Chavez, Charu L. Jaiswal. 2015. Water, Worry, and Doña Paloma: Why Water Security is Fundamental to Global Mental Health. *In* Global Mental Health, Brandon Kohrt, and Emily Mendenhall (eds.) New York: Left Coast Press.
[11] *ibid.*
[12] Dale Jamieson. 2005. Adaptation, Mitigation, and Justice. *In* Perspectives on Climate Change Science, Economics, Politics, Ethics: Advances in the Economics of Environmental Resources 5:217-248.
[13] *ibid.*
[14] W. Neil Adger. 2006. Vulnerability. Global Environmental Change 16:268-281.

some countries, this is already leading to drastic changes; Pacific island nations are already looking at the possibility of relocation, since mitigation and adaptation are not options to deal with sea level rise[15, 16]. Meanwhile, more developed countries have the financial means and the legal and social infrastructure to begin preparing for the effects of climate change.

Methods

To understand the way climate change produces inequitable emotional distress, we compare community-based sites in four island nations (Fiji, Cyprus, New Zealand, and England). The IPCC[17] estimates that island nations are uniquely exposed to the effects of climate change; rising sea levels, coastal erosion, and increasing frequency of coastal storms, along with changes in temperature and precipitation are all likely outcomes for island nations. Additionally, many island nations, particularly those that are less developed, have less adaptive capacity to handle these changes. The four sites in this study range on a spectrum of exposure and adaptive capacity (see Figure 1).

The respondents in a coastal village in Viti Levu, Fiji are the most comparatively exposed and sensitive to the effects of climate change, including sea-level rise and coastal erosion based on physical location and economic circumstances. Because they reside in a small village in a less developed country, they also do not have resilient physical infrastructure. Respondents in Nicosia, Cyprus have a greater level of adaptive capacity

[15] Carol Farbotko and Helen V. McGregor. 2010. Copenhagen, Climate Science, and the Emotional Geographies of Climate Change. Australian Geographer 41(2):159-166.
[16] Elaine Stratford, Carol Farbotko, and Heather Lazrus. 2013. Tuvalu, Sovereignty, and Climate Change: Considering *Fenua*, the Archipelago, and Emigration. Island Studies Journal 8(1):67-83.
[17] Intergovernmental Panel on Climate Change (IPCC), Climate Change 2007: Synthesis Report. https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

as a result of living in the capital city, but they are also very exposed to the effects of climate change, including reduced freshwater access. Respondents in Wellington, New Zealand have a high adaptive capacity as a developed, water-rich city, but also experience a high level of sensitivity to the effects of coastal erosion and rising sea levels as a coastal city. Respondents in London face a different set of exposures than respondents in the other three sites. As a water rich environment and financial center set back from the coast, England has the highest adaptive capacity; however, due to its location on the Thames, London is sensitive to flooding risk. Additionally, the city may become a destination for climate refugees due to its temperate climate and robust economy.

In each site, we conducted ethnographic interviews addressing climate change and emotion with a purposive sample of 272 respondents. We conducted text analysis of the interview texts, focusing on positive and negative emotion words[18] (See Table 1, Figure 1).

Discussion

Sadness and worry were common emotions across the four sites (see Figure 1). Key themes derived from each of the sites related to that concern and worry are described in detail below.

What my ancestors had: Happiness and sorrow in a Fijian village

[18] Gery W. Ryan and Thomas Weisner. 1998. Content Analysis of Words in Brief Descriptions: How Fathers and Mothers Describe their Children. *In* Using Methods in the Field: a Practical Introduction and Casebook, Victor C. Munck and Elisa J. Sobo (eds.) Walnut Creek: Altamira Press 57-68.

Fijian respondents indicated that they had a great sense of pride in their cultural heritage, and in their continued traditions of fishing and farming even as they increasingly engage in the cash economy. Villagers connect fishing and farming traditions to their community and social histories and identities, and many respondents felt very sad at the possible loss of their livelihood traditions. Fijian respondents identified concerns related to how climate change was affecting their cosmology and cultural traditions, and frequently indicated that this saddened them (see Table 1).

While Fijian respondents indicated considerable concern at the way climate change was affecting them and their local ecology, Fijian respondents also frequently used the word "happy" (Figure 1). In most cases, Fijian respondents used this term in a negative way to indicate that they were not happy with changes like sea level rise. Some Fijian respondents indicated that the younger generation had already started leaving the village for economic opportunities elsewhere, and that they were happy and reassured that they would continue to have these opportunities in the future. Thus, while there was an abiding sense of sadness at losing heritage and traditions, and the fact that relocation within or beyond the island was becoming a necessity, some respondents did indicate that new economic opportunities this provided were positive developments (see Table 1).

We must be more conscious: Anger and frustration in Cyprus

Cyprus is already physically water scarce, and the specter of water shortages is one that concerns many respondents. While respondents infrequently mentioned relocation as a possible solution to their concerns, respondents clearly indicated that they were concerned and frustrated with the possible water shortages as a result of climate change (see Figure 1). Cypriot residents often expressed a general sense of anger at the

changes; many expressed a sense of helplessness along with their anger, particularly that they couldn't do anything to forestall the effects of climate change.

While these respondents, unlike those in Fiji, are not facing the imminent threat of rising sea levels, they are facing the threat of water scarcity, and indicated that this was a significant worry, and source of sensitivity for them. They also indicated that they felt sad about the changes to rainfall and other changes to local resources, particularly when it came to food production and the inability to trust in local agriculture (see Table 1).

Hope for the younger generation: Mixed emotions in New Zealand

Respondents from Wellington often indicated that they were worried about the effects of climate change (see Figure 1). Many respondents indicated that they had relatives living overseas, and that they worried about the rise of global disasters as a result of climate change. Respondents also indicated that they felt sad at the thought of changes to their local ecology.

While respondents in New Zealand expressed these negative emotions, they also said that they had hope, particularly for future generations. While respondents in other sites also said that their source of hope lay in the younger generation, respondents in Wellington regularly indicated that, in spite of the current circumstances, they felt that the younger generation had the knowledge to prevent some of the more dire effects of climate change (see Table 1). Perhaps because of its vulnerability coupled with its higher adaptive capacity, the emotional responses from respondents in New Zealand were more mixed, indicating concern as well as optimism.

Change always comes: Worry and neutrality in the United Kingdom

Like respondents in the other three sites, those in London also indicated their concern and worry for the future. They worried that the younger generation might not have the opportunities and benefits they did when they were young (see Table 1). Respondents also expressed worry about the population changes that climate change might bring to London. Several respondents indicated that they were worried about incoming refugees and how that could change their society (see Figure 1).

Many respondents, however, indicated that they felt neutral about the effects of climate change (see Figure 1). While some respondents in all four sites indicated that climate change might not affect them, respondents in London more often expressed that they felt neutral. For some respondents, their neutrality was connected to feeling that they wouldn't be impacted by climate change; others used neutral to suggest that they couldn't control whether the climate changed or not, and therefore they weren't going to get upset about it. Of the four sites, the United Kingdom has the lowest vulnerability to the effects of climate change and the highest adaptive capacity; because of this relative security in the face of climate change, it is not surprising that a number of respondents feel neutral about the outcomes of climate change.

Conclusion

Using ethnographic interview data to elicit data on emotional responses to climate change across four island nations indicates that worry is a consistent theme for most respondents. Our analysis illustrates that emotions are central to people's understanding, management, and knowledge of their environment in the face of climate change. Our research also demonstrates that climatically-disadvantaged groups are disproportionately

likely to experience emotional distress as a result of environmental injustice[19]. Of all the groups, the Fijians – most immediately physically and economically vulnerable to the effects of climate change – and most emotionally connected to the specific place in which they currently live, are also the most emotionally distressed. For London respondents, who have the highest adaptive capacity and lowest vulnerability, neutrality is a common expression. They may not be directly impacted by climate change, and therefore, experience less emotional distress, and are more likely to have positive mental health outcomes. For respondents in Fiji and Cyprus, in particular, the changes to the local ecology, their livelihoods, and their connection to the land are already resulting in clear emotional distress. Given that emotional distress may be associated with poor mental health outcomes[20], our findings are part of a growing body of research that suggests the public health community should address the interaction between environmental injustice and emotional well-being.

This research demonstrates the potential value of bringing more emotional analysis into environmental justice scholarship in general, and in understanding how emotional vulnerabilities to climate change pattern inequitably. Our results suggest that emotions could play a role in mobilizing political responses to environmental injustice[21]. For Cypriot residents, their anger and frustration at the thought of water shortages may be the catalyst for change and solutions. As several respondents indicated, they have to get used to these changes; they are also clear, however, that they are not resigned to using less water. For them, climate change and their frustration as a result of changing resource

[19] *ibid*.
[20] *ibid*.
[21] *ibid*.

access may be a motivating factor that provokes change and prevents further injustice in their community. The hope expressed by the respondents in New Zealand may also be a galvanizing force as they put their energy into ensuring that the younger generation can mitigate the effects of climate change. Figuring out how to understand and harness these emotional responses to assist with climate change mitigation is suggested as the next important step.

Less vulnerable ⟷ More vulnerable

	United Kingdom	New Zealand	Cyprus	Fiji
Sad	"It feels a little sad that people care less about what they are doing to the environment and focusing less on the future of the city/country."	"Pretty sad if tourism and other industries are affected and the town is emptier…. Farmers couldn't keep up with the demand due to growing season and weather."	"It is all our fault. It is pretty sad to think how our forefather's actions caused this without taking blame. It is up to our generation to improve this so future generations don't have to face consequences."	"Growing up in this village everything was green and we planted lots of things. Seeing the changes makes me feel sad because people are not engaged or involved in helping protect the village and community. I want to work to rebuild and bring back what my ancestors had."
Worried	"Worried. I don't want to think about how my grandchildren are going to live."	"Worried/concerned. With the increasing global temperatures and global disasters, can't help but worry about how things will turn out for friends and family. Things are changing so quickly."	"We are going to have to get used to it. Learn how to live with this weather. I am a mother of a 4 year old so I think about future, how climate will change, how our world will change. Cyprus is island- sea water level rise-worried about this."	"Same thing. We feel worried how it will affect the land, the people, the community. Before our ancestors grew well and were very wealthy. Maybe in the future our plants can't grow and we have to go buy them from the market."
Angry	"Less healthy society-anger."	"Upset, angry that it's [climate change] happening so fast"	"It makes me angry. I feel very depressed because I can't do anything about it. Even if I recycle, it means so little. I try to do my share but I don't think it will be enough. Afraid for the future, for my child."	"I will feel bad and angry because that's our future of young children."
Neutral	"I feel pretty neutral about it, change is something that comes whether we like it or not."	"I feel pretty neutral. I don't mind going environmentally friendly and adapting my lifestyle to it if there is a better way to do things."	"I'm not sure. It is neutral to negative. People need to adjust to your way of living and there are people who don't want to and this can cause problems."	N/A
Happy	"Happy that the environment is getting more help and that climate change is taken more seriously."	"Happy. [I'm] happier here, not depressed because of cleanliness."	"Because it is raining 24/7 in the UK they are miserable. Here it is sunny and people are happy, smiling more."	"I have 4 kids, so when they grow up they'll live somewhere else and they won't have to deal with the problems we face here. So it makes me happy that they have a choice to move somewhere else."
Hope	"Sadness! And hope for a brighter future for the younger generation. [I] would like the best for future generations."	"Sad that changes are happening as quickly as they have, [but I'm] hopeful that the younger generation will figure out what changes need to be made to improve or repair the environment"	"We need to figure out ways/solutions both on the heat and the drought. I hope it will be positive impact in that people will be more conscious of consumption or figure out alternative ways to live."	"I feel hopeful because I can help my family and my community. Most of us in the village who farm and fish will share what we harvest and fish so that's why I feel hopeful."

Table 4-1.

Respondents were questioned about climate change effects in semi-structured interviews, with probes exploring emotional responses to changes in local lifestyles, livelihoods, and future generations due to climate change. Interviews were coded for emotion words based on lists of previously identified emotion words based on (Ryan and Weisner 1998, Seale et al. 2006, Saldaña 2009, Taylor et al. 2015).

Figure 4-1.

Respondents were asked a series of open-ended interview questions regarding how climate change had already changed their local community, how it was changing livelihood patterns in the area, and how they expected climate change would affect the younger generation. For each theme (current changes, livelihood changes, and changes for the younger generation), respondents were asked how they felt when they thought about the way climate change was affecting this dimension of their lives. Interviews were autocoded in MAXQDA for emotion words. The data were dichotomized in SPSS such that if a respondent used an emotion word multiple times in the interview, the entire interview was coded as present or absent for that word (resulting in each interview having a 0/1 count for each emotion word).

CHAPTER FIVE

ANGER AND SADNESS: GENDERED EMOTIONAL RESPONSES TO CLIMATE THREATS IN FOUR ISLAND NATIONS*

*This chapter has been submitted to *Geoforum* in collaboration with Amber Wutich, Kelli Larson, Dave White, and Alexandra Brewis

Abstract The IPCC (2013) has demonstrated that climate change presents an important threat to community livelihoods and well-being around the world. Island nations are particularly biophysically vulnerable to the effects of climate change, including sea level rise, coastal erosion, and changes to freshwater access. Emotional geographers argue that landscapes are imbued with emotion, and that these emotions may become heightened during times of environmental change and or degradation. Because emotion and gender are closely linked, it is important to understand the way that gender contributes to variations in emotional geographies, particularly those affected by climate change. This study uses a cross-cultural analysis of four island countries (Fiji, Cyprus, New Zealand, and the United Kingdom) with different sensitivities to climate change to understand how gender and biophysical vulnerability produce different emotional responses to climate change both within and between the sites. Our results indicate that gender does impact the emotional response of respondents in these sites, as men are more likely to express anger, and women are more likely to express sadness.

Keywords: climate change, gender, emotion, island nations

Introduction

Currently, theories from geography, anthropology, and risk perception are being applied to understand how and why people perceive and react to climatic risks and disasters. Scholarship in this vein includes examining willingness to agree that climate change is a threat (Wachinger et al. 2013, Lee et al. 2015, Lujala et al. 2015, Hagen et al. 2016). These analyses, along with others (Franzen and Vogl 2013) indicate that, regardless of mode of inquiry, gender is a key variable in explaining risk perception and reactions to climatic risks. Studies of the U.S. public suggest statistically significant differences in the way men and women express concerns about environmental risks (Larson et al. 2011, McCright and Dunlap 2011). As Goldin and colleagues (in preparation) argue, there are cultural reasons for this, including that labor and other tasks are often organized along gendered lines. Similarly, previous scholarship (Wutich and Ragsdale 2008, Sultana 2011, Singh 2013, Goldin 2015) demonstrates that women experience different hardships and exposures as a result of their expected labor. The gendered division of labor, along with cultural norms regarding emotional expression between men and women, may lead to different emotional responses between men and women when faced with climatic risks.

Indeed, multiple studies have shown the ways in which work and labor produce specific climate change exposures, and that these produce emotional responses. These responses, in turn, often pattern alongside gender. In general, including in studies outside of the U.S. women are more likely to express a higher level of overall concern in relation to the environment, while men are more likely to indicate that they feel safe and resilient in the face of environmental threats (McCright and Dunlap 2011, McCright and

Sundström 2013). Similar findings of strong gender differences appear internationally. For instance, studies in Australia found that farming men had strong emotional reactions and severe mental health outcomes when faced with environmental change (drought) compared to women (Sartore et al. 2007, Sartore et al. 2008, Alston 2012). In areas of water insecurity (Bolivia and Bangladesh, respectively), women tend to bear the emotional burden of attaining water and experience strong emotional responses as a result of water insecurity (Wutich and Ragsdale 2008, Sultana 2011). As the effects of climate change, including water access, become increasingly severe, the findings of these studies on concern and emotions in environmentally risky circumstances may become the reality for a greater percentage of the population.

In addition to the literature examining the way gender impacts environmental concern, emerging literature considers how emotions are tied to environmental triggers like natural disasters and the threat of climate change. Recently, these theories have been incorporated into research on policy and risk communication (Roeser 2012, Smith and Leiserowitz 2014, Ryan 2016). Quantitative analyses of environmental concern predominate (Larson et al. 2011, McCright and Dunlap 2011). While these studies have contributed greatly to understanding of subjective views about risks, the lack of in-depth, culturally-specific understandings of emotional responses to climate change is a limitation to current theorizing. Foundational scholarship (Gorman-Murray 2010) demonstrated the value of using qualitative techniques to understand the intersection of emotion and climate change. When asked about their experiences with climate change, respondents in Australia indicated that the changing landscape provoked a number of emotional responses. As respondents discussed the changes to their local environment as

a result of climate change, many of them evoked sadness and frustration in response to the changes. Respondents also discussed their hope for the future, and for the changes people might make to mitigate the effects of climate change (Gorman-Murray 2010).

Emotion is closely intertwined with the considerations and motivations of different groups of people (Roeser 2012, Smith and Leiserowitz 2014). In the era of climate change, understanding emotions will allow researchers and community leaders to better understand the lived experiences of community members facing the direct threat and related impacts of climate change (Ryan 2016). As the influential editorial by Anderson and Smith (2001) on emotional geographies demonstrates, some times and landscapes are more emotionally charged than others. During these times in particular, it is necessary to consider the role of emotion, and the way that dramatic or imminent changes to the local landscape may produce important emotional responses. These emotional responses are perhaps the key to understanding how individuals and communities live in, on, and around each other and the shifting environment and social relations that result from these kinds of changes. Climate change as a whole and the individual effects that are likely to result from climate change are enacting dramatic environmental change on landscapes that are already imbued with tradition, history, and economic and emotional value. As a result of these changes, these landscapes are becoming increasingly emotionally charged; analyzing the way these emotions are expressed is necessary to understand the associated changes to communities and individuals.

These patterns are all likely to be highly gendered, although to date this has not been a focus on much empirical enquiry. Emotion was long considered the domain of

women and has been relegated to the private, personal sphere (Lee and DeVore 1969). Assuming that all men in space and time are less likely to experience emotion or concern in relation to the environment perpetuates historical gender assumptions and biases and potentially fails to recognize men's capacity to have emotional experiences and connections. These connections may be particularly tied to the natural world and surrounding landscape, which is often already gender-differentiated as a result of labor and spatial organization (Bondi 1998, Sultana 2011, Crewe et al. 2014, Goldin 2015). Better empirical data are needed to address this assumption. In relation to perceptions of climate risks, previous literature demonstrates that men and women both use emotions as a coping mechanism, but might do so very differently as a result of cultural norms. For example, women facing water insecurity in Bangladesh respond with outpourings of emotion, and these appear to help them cope with the stress and suffering they experienced (Sultana 2011).

By comparing systematic interview data from four culturally distinct, climate-threatened island communities, and using theories from emotional geographies (Anderson and Smith 2001, Wutich and Ragsdale 2008, Gorman-Murray 2010, Goldin 2015), our approach here addresses three questions related to gaps in our understanding of how environmental risk perceptions, gender, and emotions intersect. These are: are there consistent, observable gender differences in the degrees and forms of emotions expressed in relation to climate change threats? How do gendered emotional geographies and variable biophysical vulnerabilities intersect with each other? The use of open-ended interview data and qualitative analytic approaches provides novel evidentiary basis to explore these key relationships. Given the lack of existing theory in these intersecting

areas, the use of systematic cross-cultural comparison as applied here (Hagaman and Wutich 2016, Ember 2009) provides a novel means to detect broader patterns for generalized inductive theory building about the basic geography of human emotional responses.

Research Questions and Design

The IPCC (2013) report on projected climate change outcomes demonstrates that island nations are uniquely vulnerable to the biophysical effects of climate change, including coastal erosion, rising sea levels, coastal storms, changing freshwater access, and new disease threats. In order to understand the way men and women express emotions in biophysically vulnerable island nations, we selected four island sites in Fiji, Cyprus, New Zealand, and England. Each of these island sites faces similar types of exposure to the effects of climate change, including rising sea levels, coastal erosion, increased intensity and frequency of coastal storms, and changes to freshwater availability. However, the degree to which these sites are sensitive to these effects varies, as does their adaptive capacity (see Table 1). Fiji, for example, is highly sensitive to the immediate effects of sea level rise, and its adaptive capacity is specifically dependent on social networks. At the opposite end of the spectrum, England is sensitive to the possibility of increased rainfall and flooding, but it has infrastructure that may mitigate this particular exposure. To that end, this research examines the way that vulnerability, specifically adaptive capacity and sensitivity, affects the way that men and women express emotion different in the face of climate change. Each site of the four sites is described next, along with the details on how we conducted open-ended, ethnographic

interviews on the effects of climate change in each site to explain the way emotion words are used between men and women in these differently vulnerable sites.

Study Sites

Viti Levu, Fiji

Ethnographic data were collected in a remote coastal village in western Viti Levu, Fiji. The village has a population of about 300 people, of Fijian and Indo-Fijian descent (see Table 2). Most residents live close to the coast and make their living from tourism and fishing. As with most island nations, the IPCC (2013) indicates that Fiji is vulnerable to a number of climatic changes. By 2080, the area is likely to increase 1-3°C, and the region is expected to see a decrease in precipitation by 2%. While precipitation in monsoonal areas in lower latitudes is unreliable, fluctuations in precipitation are likely.

Viti Levu is also vulnerable to the same climate effects as other island sites; expected changes include coastal erosion and sea level rise, ocean acidification, and increased frequency and intensity of coastal storms. While most island nations and states are expected to see similar changes in climate, Viti Levu has less adaptive capacity than other island nations. Because it is a low-to-middle income country, Fiji lacks the ability to immediately rebuild and repair after a major storm. Because the area is remote, the immediacy of any response is not likely to be quick, leaving small local villages to fend for themselves in times of extreme weather. Sea level rise is already inundating the village and the surrounding landscape, and because Fiji is composed of smaller islands, there are few places for residents to move; while they may be able to relocate, research has already demonstrated the devastating emotional effects of relocation as a result of

climate change (Farbotko and McGregor 2010, Stratford et al. 2013) and other environmental changes (Sartore et al. 2008, Pini et al. 2010).

Nicosia, Cyprus

Nicosia is the shared capital of the Republic of Cyprus and the Turkish Republic of Northern Cyprus (TRNC). Nicosia has a population of approximately 110,000 between its Cypriot and Turkish Cypriot citizens (see Table 3). Unlike the other island sites in this study, Cyprus is already water scarce. Most of the freshwater sources in Cyprus are in the Republic of Cyprus, although much of the farming occurs in the TRNC. Because of political divides between the two sectors of the island of Cyprus, very little freshwater from the Republic of Cyprus is shared with the TRNC. Instead, the TRNC relies on freshwater pumped from mainland Turkey. In spite of the freshwater resources in the Republic of Cyprus, most Cypriot citizens engage in greywater reuse, and 100% of the wastewater from the Republic of Cyprus is reused to mitigate their vulnerability to water scarcity.

In spite of these reuse efforts, the climate change scenarios posited by the IPCC (2013) indicate a serious likelihood of increased water shortages by 2080. While the other island sites in this study see large amounts of precipitation, Cyprus does not, and they are likely to see a decrease of 5-10% by 2080. Additionally, they are likely to see an increase in temperature by 2-3.5°C. While Nicosia and the island of Cyprus are not impoverished, their industries (including farming and fishing) are likely to suffer as a result of climate change, and with increasing temperatures and decreasing water supply, the island is vulnerable to dramatic changes in infrastructure and adaptive capacity.

Wellington, New Zealand

Wellington is the capital of New Zealand, and is in the southwest portion of the northern island of New Zealand. As a port city, it is very industrialized and has a robust economy based on tourism. About 500,000 people of various descent and ethnicity live in and around the bay of Wellington (see Table 4). Because of its climate, Wellington has relatively low water scarcity; however, because it is directly on a bay, it is vulnerable to the effects of tropical storms. As with most island nations, the IPCC (2013) indicates that New Zealand is vulnerable to coastal erosion and changes in sea level.

By 2080, the IPCC (2013) estimates that Wellington will experience an increase in temperature by up to 4.0°C, accompanied by a decrease of 5-10% in precipitation. In addition, as coastal storms increase in frequency and intensity, it is likely that Wellington will be impacted by cyclones and typhoons with increasing frequency. Coastal erosion and sea level rise will likely be exacerbated by these changes to coastal storms. While Wellington has good adaptive capacity, a serious tropical storm could severely threaten the infrastructure and economy of the area.

London, United Kingdom

London is the capital of England in the United Kingdom. It is a city of up to 8 million people, of diverse ethnicity and religion (see Table 5). Like Wellington, London has little water scarcity as a result of its climate. As the capital of the United Kingdom, London is the center of a major world economy and includes a wide diversity of industries that contribute to the local and regional economy. Due to its location directly

on the Thames, London is already susceptible to flooding; while the city of London has made significant infrastructure alterations to prevent flooding becoming a major concern for the city, the effects of climate change mean that these infrastructural changes may not be sufficient.

The IPCC (2013) forecasts that, by 2080, London may see as much as a 5.5°C increase in temperature. Unlike the other three sites, precipitation in London is expected to increase by 5-10% by 2080, leading to concerns about the ability of the infrastructure along the Thames to handle sudden influxes of rainwater. While London itself is not directly vulnerable to coastal erosion and sea level rise, outlying coastal towns in England and the rest of the UK are likely to experience these effects, which may lead to population increases in London, and additional infrastructure challenges as climate change causes people to move away from more treacherous terrain.

Methods

Questionnaire design and data collection

We developed a semi-structured interview protocol that examined three parallel dimensions of climate change experiences. First, respondents were asked how climate change was already affecting them, and how they felt about that. Then, respondents were asked how climate change was affecting livelihoods in their area, and how they felt about that. Finally, respondents were asked how climate change would affect the younger generation, and how they felt about that. Subsequently, respondents answered thirty-one closed-ended questions to gauge their experience with their local environment, and how they perceived that climate change was affecting various aspects of their local ecology and their personal well-being (See Appendix 1). This protocol was extensively pre-tested

to ensure that questions were appropriate and comprehensible (DeMaio and Rothgeb 1996). In addition, ethnographic experts from each region reviewed the protocol and made site-appropriate changes before the research began.

In total, we interviewed 272 respondents at each study site, with a minimum sample of forty respondents (68 in the Fiji site; 40 in the Cyprus site; 86 in the New Zealand site; 78 in the London site). The per-site sample size exceeds the minimum recommended number of interviews to facilitate meta-thematic comparisons in cross-cultural and multi-sited research (Hagaman and Wutich 2016). Interviewers employed a non-probabilistic, purposive sampling strategy in each of the four communities (Bernard et al. 2016) with the goal of recruiting a diverse group of respondents in each location (Guest 2014). This included sampling equally among men and women, and also targeting respondents to recruit a range of ages, professions, and ethnicities. We collected data in public locations, which is appropriate for purposive cultural samples designed for research on shared cultural and environmental knowledge (Handwerker and Wozniak 1997).

Data Analysis

The purpose of the analysis is to understand the way emotion words were used by different groups of people in each site and across the four sites. Once data were entered, we used pre-established lists of emotion words (Ryan and Weisner 1998, Seale et al. 2006, Saldaña 2009, Taylor et al. 2015) to conduct a word-based analysis (known as "key-words-in-context" or KWIC) in MAXQDA software. Each interview was coded for emotion words; the coding segment was the word. When coding was complete, we

explored the context of emotion words used in each interview to understand how different emotion words were being used.

Within each question (and within each interview), a single emotion word could be used multiple times; to address this, the data were exported to SPSS and emotion words were dichotomized to indicate presence or absence of each emotion word within a single interview. Using both the count and dichotomized data, we ran a series of statistical tests to analyze the degree to which emotion word usage varied by gender across and within sites. We used Mann-Whitney U tests and t-tests to examine whether men or women were more likely to use emotion words across and within sites. Additionally, we used Mann-Whitney U tests to understand whether men or women (across and within sites) were more or less likely to use positive, neutral, and negative emotion words.

Results

Across the four sites, men and women both expressed emotion, and at similar rates While men and women both used positive emotion words like "hope", in general, both men and women were more likely to use negative words than positive words to express their emotional responses to climate change.

Across the four sites, women were significantly more likely to express sadness ($\chi^2 = 5.227$, $p = 0.032$, $phi = -0.145$; see Figures 1, 2). When women expressed their sadness, it usually occurred either in the context of their local ecology, or in the context of the younger generation. When women described their sadness at the changes to their local ecology, they often talked about the way the changes to their home and their landscape affected them or their family. For a woman in New Zealand, this included changes to local flora and fauna, as well as the weather: "[I'm] sad; this is my home. The trees are

going down; [I'm] sad to see hometown changing (weather)". Women also indicated that they had a deep attachment to their landscape, and were accustomed to seeing it a certain way; thus, changes to the landscape made them feel sad at the loss.

Additionally, some women expressed that the changes to the landscape affected their families and their traditions, and the changes therein also made them sad (see Table 3). As a woman from the United Kingdom noted, her family farmed and hunted, and she saw climate change altering those traditions and making them harder or less accessible. While she lived in London, she nevertheless expressed an attachment to those familial traditions, and felt sad at the possibility of changes or full-scale loss of those traditions. Women in Fiji often expressed concern for the local ecology in the context of the younger generation. As this respondent said, "[I feel] sad. Life will be hard for people in the future. [The] soil and fruit could be different." Her response demonstrates that people are accustomed to the current climatic regime, and the way they are able to provide for themselves is closely linked to that; a common view was that the changing local ecology will make that harder for the future generation. Similarly, a woman from Cyprus said, "It will be very sad because the situation of the island is really good now, and the animals will have problems here". The changing local ecology makes women feel sad not just because they appreciate nature, or because the current landscape evokes a sense of home; instead, these women demonstrate and evoke sadness in response to the loss of fundamental aspects of the local ecology that have provided for their families in the past.

Across the four sites, women also expressed their sadness in the context of the younger generation, and the possible loss of cultural values and economic opportunities as a result of climate change (see Table 3). A Fijian woman explained her sadness for the

younger generation: “It makes me feel sad. But in case they come back, we always push them to learn everything again, and we have protected water for them to fish in when we're gone”. She explained that many people in the younger generation have left the island to pursue economic opportunities elsewhere, and that they’ve lost cultural knowledge as a result. As woman’s response in England demonstrated, sadness about the younger generation was a common theme: “[I’m] sad because I want the same opportunities available for future children as well”. While some women thought about these opportunities in terms of jobs and other future prospects, while others expressed sadness for the younger generation by comparing their opportunities to their own. A Cypriot women illustrated, “I think it’s sad – they won’t be able to live how we live.” Women often expressed sadness that their children wouldn’t have the same experiences they had as a result of climate change. Additionally, women indicated that the future generation would have a more burdensome future, and that made them sad as well.

While men also expressed a great deal of sadness in the four sites, often in similar contexts, they were significantly more likely to express their anger as a result of climate change than women ($\chi^2 = 4.825$, $p = 0.028$, $phi = 0.139$; see Figures 1, 2). Men expressed anger in three broad but different ways. Some men explained that they were angry because of the way climate change was affecting the younger generation. Still others felt that climate change was affecting them personally, and felt angry about that. Several men also expressed anger in the context of governmental failure to do anything about climate change.

When men expressed anger about the effects of climate change on the younger generation, they talked not only about changes to the futures of the younger generation,

but also about the way that it would affect the wellbeing of the younger generation (see Table 3). As a Cypriot man explained, "It will affect them a lot. They will be negative. They won't be friendly any more. It will affect psychology. All chemicals, burning forests, heat; it makes people angry." Another Cypriot man felt angry because the weather might become so bad that members of the younger generation would leave the island for cooler climates, and that this would be upsetting and disturbing to those who left. Both men indicate that climate change will directly impact the emotional wellbeing of the younger generation; while the respondents weren't personally angry, they were concerned that climate change would affect the psyche of the younger generation. Men in other sites also indicated that they were angry on behalf of the younger generation. In London, men indicated that there would be more pollution for the younger generation, and this made them angry on their behalf. While anger was not a commonly-expressed emotion in Fiji, several men said, "I will feel bad and angry because that's [the] future of young children."

Men also expressed anger when they felt that climate change was threatening them personally. As a man in London indicated, "[It's] more personal, because I have a personal connection with agriculture. [I'm] very angry because the future is shortsighted." For these men, climate change, and the decisions that have led to the changes they are already observing feel deeply personal. While not all of the male respondents that expressed anger in this context made their living off the land, they nevertheless felt that climate change was a threat to their wellbeing, which provoked anger. A man in New Zealand typifies this response: "It makes me angry to think that people don't want me to succeed and be happy. I'm frustrated as well." Respondents also

noted that the rate at which climate change is happening, and the fact that climate change is already affecting their ability to be successful is angering and upsetting.

Finally, men expressed anger in the context of inaction. For this Cypriot man, the lack of political action on the part of his government in relation to climate change is particularly angering to him:

> I have no emotional reaction. I'm not standing in the way of change. We need a political system that allows us to invest and make changes in a timely manner, and we don't have that right now. We need forward thinking. I get angry that we don't have forward-thinking people in power. We only respond to a crisis and put people through unnecessary stress. Go to Dubai, they have less water but can turn on the tap because they are forward-thinking and have come up with solutions.

While most men expressed anger in the way that climate change was affecting them or others, this response shows a different type of emotional expression; this response indicates that there is a level of frustration that goes beyond the personal to a different scale, and that there is a level of interaction between the personal experience and the more global experience of climate change. Indeed, the lack of action on the part of the government, and the comparison to another government, indicates a broader anger. This man from London expressed a similar type of anger: "Safety is the most important in protecting family, and more preparedness. [I'm] angry for not changing the status quo." For these men, the status quo is stymieing and angering; they feel that the lack of action is perhaps worsening the long-term effects of climate change, which could no doubt feed into anger and concern for the younger generation and their personal wellbeing.

Discussion

Previous research indicates that men and women may not experience the same type of vulnerability to climate change (Goldin et al., in preparation). Our study asked respondents a series of questions about how they felt about the effects of climate change on themselves, their families, and their local communities (see Appendix 1). In their responses, men and women both express emotions in response to climate change and their vulnerability to the current and future effects of climate change. However, because of they experience different vulnerabilities, men and women within the sites use different emotion words. Similarly, because vulnerability to the effects of climate change varies across the four sites, men and women across these four sites are experiencing the effects of climate change differently. While men tend to use one type of emotion word (anger) and women another (sad), the way these emotion words are used in context differs across the four sites, often in relation to the degree of vulnerability in each place.

The responses by men and women across the four island sites indicate first that men express emotion slightly more frequently than women, and second, that men are more likely to express anger in response to climate change, while women are more likely to express sadness. Previous research indicates that women will be likely to express emotion in a range of circumstances, while men will be more likely to express hypermasculinity or alexithymia in response to these challenging circumstances (Sultana 2011, Crewe et al. 2014). Our study finds that men are likely to express emotion, although anger is still the most common emotion expressed among male respondents. While that fits with general societal expectations of the emotions men (and women, in their sadness) would be likely to express, it nevertheless indicates that men will freely

express emotions when faced with the changes to their landscapes and economic success (Sartore et al. 2007, Sartore et al. 2008, Alston 2012). Most interestingly, our research suggests that while men and women each clearly express emotions, they do so in very different contexts, which often varies by site.

For women, sadness occurs in response to two different domains: sadness about changes to the local landscape, and changes for the younger generation. While women in all four sites indicated that they felt sad about these outcomes, women in the more biophysically sensitive sites (Fiji and Cyprus) were more likely to express sadness and frustration at the changes to the landscape. These respondents also often tied changes to the landscape to the loss of opportunities for the younger generation. While these respondents indicated sadness for the younger generation, they simultaneously highlight changes to the local ecology, and the sadness that evokes. Women in the sites with greater adaptive capacity (New Zealand and the United Kingdom) tended to indicate that they felt sad more for the younger generation, particularly in their inability to live the way that they (the respondent) had. Respondents often said this in the context of economic opportunities, but also made these remarks in the context of not having the same life experiences, indicating a sense of nostalgia for the "good times".

Men in this study similarly expressed emotion, although they were more likely to indicate that they were angry, rather than sad. In general, anger is considered a less vulnerable emotion than sadness, which implies that men might express it more often (Crewe et al. 2014). While this is not an unexpected response, given the research on the context in which men feel safe expressing emotion (Pini et al. 2010, Crewe et al. 2014), it does indicate that, unlike research on suppression of emotion (Levant et al. 2006, Fantini-

Hauwel 2015), men are willing and able to express emotion, particularly in the context of loss and frustration. For men in the more sensitive sites of Fiji and Cyprus, anger was commonly expressed in terms of changes for the younger generation, and the possibility that the younger generation wouldn't have the same resources and opportunities. In the United Kingdom and New Zealand, however, men were more likely to indicate anger at the way that political inaction was leading to personal difficulties, including feeling that they couldn't succeed in the face of climate change. This feeling that climate change is a very personal concern did not come up in the same way with female respondents, and indicates a potentially stark contrast in the way that men and women are experiencing climate change. Additionally, the personal sense of climate change in the less sensitive sites is noticeably different from the way men expressed anger in the more sensitive sites.

The differences in the way men and women express emotion in the more and less sensitive sites is an important insight; while Arora-Jonsson (2011) and Resurrección (2013) argued that women should not be treated as a homogenous category by virtue of their more vulnerable status, our research clearly indicates that biophysical vulnerability plays an important role in expressions of emotion. Even when women use the same emotion words in response to climate change, the degree of vulnerability is linked to the context in which women use emotion words. Our findings indicate that the same is true for men; while men frequently expressed anger, the degree of adaptive capacity and sensitivity changes the context in which men express that anger. What is notable is that men and women aren't expressing emotion in the same contexts in the same sites; for example, while women in Fiji and Cyprus tend to express sadness for the changes to the landscape, in these same sites, men are expressing anger on behalf of the younger

generation. Thus, biophysical vulnerability, and more particularly, biophysical sensitivity and adaptive capacity, may not be good predictors for the context in which men and women in the same site will express emotion.

While the differences in the emotional responses between men and women, particularly within each site require further exploration, our findings demonstrate that climate change will likely have different consequences for men and women. Anger has traditionally been a motivating force and may lead political action for men who expressed this emotion (Sultana 2011). While anger may be a difficult emotion for political organizers to negotiate, if men's anger can be harnessed, it may be a valuable resource for enacting change regarding climate change. For women, however, the degree of sadness expressed indicates that climate change may produce significant mental health consequences. While previous studies (Sartore et al. 2007, Sartore et al. 2008, Alston 2012, Alston 2014) found dire mental health consequences among men who had lost their livelihoods due to climate change, these effects could be equally profound for women and lead to serious mental health outcomes. The understanding of emotion as it pertains to climate change offers an important perspective into the way that emotion is fundamental to the everyday experiences of individuals. This perspective also emphasizes the way that emotion is co-constitutive with experiences with climate change; thus, to understand the way that climate change affects individuals and community members, it is necessary to understand the fundamental role of emotion.

Conclusion

Scholars have long considered that gender and the environmental responsiveness are connected. Lee and DeVore (1969) argued that women were more intrinsically

connected to nature, while men were more connected to culture. Indeed, the belief that women are closer to nature and are therefore better advocates for nature emerged as a fundamental tenet of the eco-feminist movement (Merchant 1992). But empirical evidence is needed for adequate theory building, and the findings here emphasize that men – in an array of cultural settings – express environmental emotion – especially anger.

As emotional geographers have argued, emotions are central to understanding the experiences of people; emotion is often embodied in place, and as places change, it is important to recognize and understand the emotional responses of community members that experience these changes. Without research that explores the emotional dimensions of climate change, we have an incomplete understanding of how climate change affects communities with different levels of vulnerability. Recognizing that men's emotional vulnerabilities to climate change exist, even if they pattern differently than women's and their actual environmental risks are generally lower, is an important theoretical point.

Overall, we show through this analysis that living in locations that are biophysically vulnerable to the effects of climate change produces significant emotional responses for *everyone*, even if it is displayed more as sadness among women and anger among men. Both genders are expressing strong emotional responses to negatively perceived changes in local ecology, related loss of economic opportunity, and the implications for the younger generation. Different sensitivities to the effects of climate change may result in very real differences in the way that the genders then experience and react to climate change across sites. Future research could explore the way that specific climate-related events evoke different emotional responses, and the way that emotional responses are differentiated within communities along intersecting lines like of

vulnerability, race, and poverty. Moreover, since men are key power brokers in climate change policy formulation and implementation in most places, understanding how gender feeds into reaction and perceptions of risks should help in creating pathways to sustainable mitigation of those climate risks.

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Table 1 Site Characteristics				
	Viti Levu, Fiji	**Wellington, New Zealand**	**London, England**	**Nicosia, Cyprus**
Population (approx. rounded)	1,000 (2010 est.)	393,000 (2012 est.)	8,170,000 (2011 est.)	110,000 (2011 est.)
Regional water scarcity	Little/none	Little/none	Little/none	Physical
Research site rurality	Semi-rural	Urban	Urban	Urban
Avg annual high/low temp (in °F (upper), in °C (lower))	83°/71°F 28.3°C/21.7°C	60.6°/49.8°F 15.9°/9.9°C	58.5°/42.4°F 14.7°/5.8°C	79.2°/55.8°F 26.2°/13.2°C
Avg annual precipitation	117.1"	48.4"	29.7"	13.4"
Projected future temperature change (2080 range, in °C)	+.99-3.11	+.3-4	+1-5.5	+2-3.5
Natural Disaster Risk	Cyclones, tropical storms, flooding	Earthquake	Flooding	Drought, wildfire
Environmental Issues	Coastal erosion, ocean acidification, species decline, rising sea levels	Coastal erosion, rising sea levels, flooding	Urban heat island, air pollution, coastal erosion	Soil erosion, freshwater access
Climate	Tropical monsoon	Temperate marine	Temperate oceanic	Subtropical semi-arid

Table 5-2 Respondent characteristics - Fiji	n = 68	
Demographics		
Gender	*Frequency*	*Percentage (%)*
Female	34	50.0
Male	32	47.1
Race/Ethnicity		
Fijian	56	82.4
Indo-Fijian	2	2.9
Melanesian	3	4.4
White	1	1.5
Sad		
Present	24	35.3
Absent	44	64.7
Angry		
Present	1	1.5%
Absent	65	98%

Table 5-3 Respondent characteristics - Cyprus	n = 40	
Demographics		
Gender	*Frequency*	*Percentage (%)*
Female	19	47.5
Male	21	52.5
Race/Ethnicity		
Cypriot	32	80.0
White	6	15.0
Other	1	2.5
Sad		
Present	11	27.5
Absent	29	72.5
Angry		
Present	5	12.5%
Absent	35	87.5%

Table 5-4 Respondent characteristics – New Zealand	n = 86	
Demographics		
Gender	*Frequency*	*Percentage (%)*
Female	37	43.0
Male	44	51.2
Race/Ethnicity		
White New Zealander	47	54.7
Asian	7	8.1
European Maori	9	10.5
Pacific Islander	5	5.8
Other	5	5.8
Sad		
Present	27	31.4
Absent	59	68.6
Angry		
Present	2	2.5%
Absent	79	97.5%

Table 5-5 Respondent characteristics - London	n = 78	
Demographics		
Gender	*Frequency*	*Percentage (%)*
Female	27	34.6
Male	35	44.9
Race/Ethnicity		
White British	39	50.0
Black African	4	5.1
Middle Eastern	2	2.6
Asian	3	3.8
Mixed	5	6.4
Other	2	2.6
Sad		
Present	16	20.5
Absent	62	79.5

Angry		
Present	1	1.6%
Absent	61	98.4%

Table 5-6. Sadness and anger in four cross-cultural sites; themes from interviews based on respondent sex (subthemes in italics)

	Viti Levu, Fiji		Nicosia, Cyprus		Wellington, New Zealand		London, United Kingdom	
	Women	Men	Women	Men	Women	Men	Women	Men
Sad	For the younger generation *Changes to local environment will affect younger generation* Changes to local environment *Loss of tradition; potential hardship at loss of plants and animals*	For the younger generation *Nostalgia; sadness at how younger generation won't have the same experiences* Changes to local environment	For the younger generation *Nostalgia; sadness at how younger generation won't have the same experiences* Changes to local environment *Anticipated hardships*	Changes to local environment *Changes to local environment will make it hard for anyone to make a living*	Changes to local environment *Sad to see changes to local environment and home*	Changes to local environment *Might cause hardship for people making a living off the land*	Changes to local environment *Changing traditions in countryside* For the younger generation *Nostalgia; sadness at how younger generation won't have the same experiences or opportunities*	
Angry		For the younger generation *Loss of a good future*	At inability to cause change *For the future, for children*	At inability to cause change (for younger generation) *Sense of anger at political structure's failings*	At others *Others are not taking responsibility for actions*	At others *Other people do not care enough to ensure that they succeed*	At others *Others are not taking responsibility for actions*	At inability cause chan *For family a young generati*

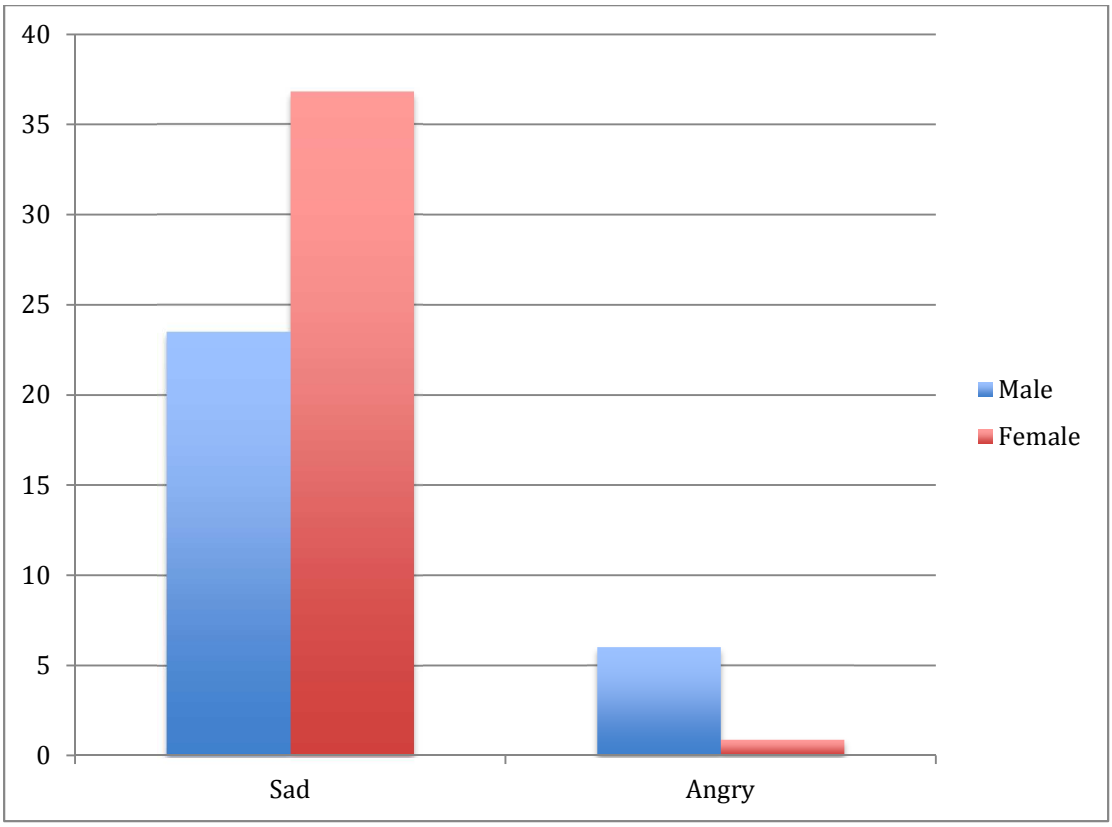

Figure 5-1.

Showing the use of “sad” and “angry” between men and women.

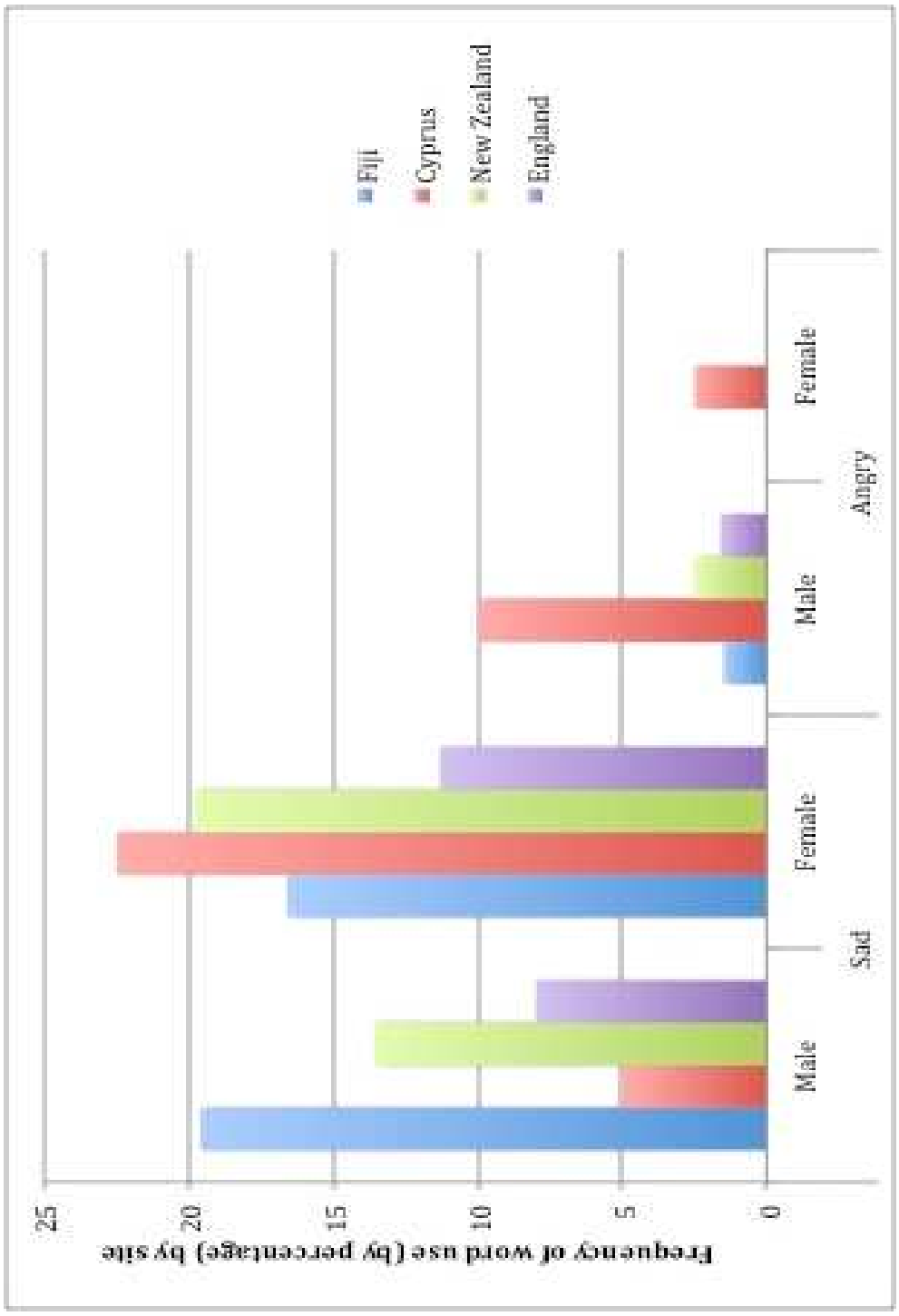

Figure 5-2.

Showing the use of “sad” and “angry” by gender and site.

CHAPTER SIX

SUMMARY, CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

The goal of this research was to add to the discussion of the way that climate change produces emotional responses, and the way these emotional responses vary across different sites in terms of their sensitivity and adaptive capacity. Additionally, this research aimed to increase understandings of the way that men and women respond to climate change differently, within and between the study sites. The specific objectives of this dissertation were to:

4. To analyze the dimensions of emotional expression between genders and to recognize patterns in the ways that men and women express emotions during open-ended interviews
5. To explain the environmental justice implications of emotional distress in four island nations
6. To understand the way that emotions are expressed cross-culturally in areas that are biophysically vulnerable to the effects of climate change

Each of the main body chapters in this dissertation (Chapters Three, Four, and Five) was designed to address each of these objectives. A summary of the findings is discussed below.

Summary of Findings

Chapter Three: Hope and Worry: Gendered emotional geographies of climate change in three vulnerable US communities.

Accepted for publication: du Bray M.V., Wutich, A., Brewis, A.

Hope and Worry: Gendered emotional geographies of climate change in three vulnerable US communities. *Weather, Climate, and Society*. DOI: 10.1175/WCAS-D-16-0077.1.

- Across all three sites (Mobile, AL; Kodiak, AK; and Phoenix, AZ), the most commonly used emotion words were "worry" and "sad"
- Respondents in Alabama, were significantly more like to use the word "prepared" compared to other sites, particularly in the context of being prepared for the possibilities of climate change
    - Respondents in Alabama do not feel immune to the possibilities of climate change, in spite of using "prepared" more than the other sites; respondents said that they've always been able to adapt and will find ways to deal with the effects
- Respondents in Alaska were significantly more likely to use "hope", although it was often used in a negative context (e.g., respondents hoped they would survive the changes)
- Respondents in Arizona expressed emotion at the lowest rate of the three sites; while they expressed sadness and worry, they had fewer overall emotional responses
- By gender, men were more likely to express worry, particularly in the context of their ability to pass their livelihood on to their children, or to continue in their profession

- Women were more likely to say that they were sad, but also that they had hope. These two emotion words often co-occurred, particularly in the context of the younger generation

Chapter Four: Emotion, Coping, and Climate Change in Island Nations: Implications for Environmental Justice.

Accepted for Publication: du Bray, M.V., Wutich, A., Larson, K.L., White, D., Brewis, A.

Emotion, Coping, and Climate Change in Island Nations: Implications for Environmental Justice. *Environmental Justice.*

- Sadness and worry were commonly used emotion words across all four sites (Viti Levu, Fiji; Nicosia, Cyprus; Wellington, New Zealand; and London, England)
- Fijian respondents expressed a great deal of pride in their cultural heritage, and sad they felt sad that climate change was threatening their cosmology related to their livelihood traditions
    - Fijians often used the phrase "not happy" to indicate they were concerned about changes like sea level rise
- Anger and frustration were key emotions in Cyprus, particularly in the context of water shortages and ineffectiveness of change
- In New Zealand, respondents indicated that they had mixed feelings; they were hopeful for the younger generation, but indicated that they were worried about increasing frequency of disasters

- Respondents in London expressed worry for the future, but also used "neutral" frequently, indicating that they are the least concerned. This parallels their low sensitivity and high adaptive capacity
- Communities with higher sensitivity to the effects of climate change, paired with lower adaptive capacity are more likely to experience emotional distress, and demonstrates that emotional responses to climate change are inequitably distributed along with the biophysical effects of climate change

Chapter Five: Anger and Sadness: Emotional Responses to Climate Threats in Four Island Nations.

Under review: du Bray, M.V., Wutich, A., Larson, K.L., White, D., Brewis, A. Anger and Sadness: Emotional Responses to Climate Threats in Four Island Nations. *Geoforum*.

- Across the four sites, men were most likely to express anger in response to the effects of climate change
- Women were more likely to express sadness in response to the effects of climate change
- In more biophysically vulnerable sites, men expressed anger in the context of the younger generation, particularly in the way that climate change would affect their success and happiness
- In less biophysically vulnerable sites, men expressed anger on a more personal level, and indicated that they were angry that people who didn't believe in climate change, or who didn't contribute to fighting climate change were personally affecting them

- In more biophysically vulnerable sites, women expressed sadness for the younger generation in terms of changes to the local environment, and how this was destroying the future livelihoods of the younger generation
- In less biophysically vulnerable sites, women expressed sadness that the younger generation wouldn't have as many options for success in the future.

Synthesis

Each of the three main body paragraphs addresses the role of climate change in shaping emotional responses and emotional distress in a range of environments. While the extant literature on climate change and concern, and climate change and emotion has demonstrated that emotional responses in trying environmental contexts are often negative (including worry, anger, and frustration) (Sartore et al. 2007, Sartore et al. 2008, Wutich and Ragsdale 2008, Sultana 2011), our research explores the dimensions of these emotional responses across and between sites, and builds a baseline context for understanding emotional geographies of climate change cross-culturally.

Each of these papers takes a slightly different approach to understanding the emotional geographies of climate change. In Chapter Three, our research explores the ways that men and women, across very different environments in the United States, share similar emotional responses. While the environment and the climate outcomes in the three sites vary considerably, and while men expressed different emotions than women, men across the three sites shared similar emotional responses to climate change, and women also shared similar emotional responses to climate change across the three sites.

Chapters Four and Five use data collected in four island nations to understand the effects of climate change on emotional distress. Chapter Four takes a qualitative

perspective to understand how, considering the inequitable distribution of the effects of climate change, emotional responses are similarly inequitably distributed. While much of the literature that examines the effects of climate change on island nations has been framed in the contexts of hazards, our research argues that the inequitable distribution of emotional distress, and therefore the potential for poor mental health outcomes, should be considered an environmental justice issue, and treated as such by researchers in emotion, climate change, and mental health.

Finally, Chapter Five builds upon the arguments presented in Chapter Four to demonstrate that not only are the emotional effects of climate change inequitably distributed, but women and men in these locations are experiencing different emotional geographies, largely related to the level of biophysical vulnerability. The degree of biophysical vulnerability varies in these four sites; on one end of the spectrum, Fiji is particularly sensitive to the effects of climate change, while on the other end of the spectrum, London is less sensitive, and has a much better financial and infrastructural adaptive capacity. Emotional responses are often aligned with these vulnerabilities. Men in all sites were more likely to express anger, while women in all sites were more likely to express sadness. The context in which these words varied, however, with men using anger in the context of losses for the younger generation in more sensitive sites, and men expressing anger in a personal sense in less sensitive sites. Similarly, women in more sensitive sites were more likely to express sadness about changes in the local environment, and what that mean for the younger generation's prospects, while women in less sensitive sites were more likely to express sadness for the hardships the younger generation are likely to face.

Conclusions

Our research demonstrates that emotion is a key component to understanding how people in various communities are experiencing the effects of climate change, and how they think about the future effects of climate change. As other scholars have noted, emotion is important to understand the motivations and decisions that people make in challenging circumstances (Smith and Leiserowitz 2014); our research takes this one step further by looking at how this varies cross-culturally, and how different types of biophysical vulnerability may alter emotional responses.

All three of our studies indicate that, regardless of whether people are already experiencing the effects of climate change (Akerlof et al. 2013), the possibility of these effects is generating an emotional response. It is important to understand these responses, as emotion is a fundamental part of how people experience the world (Anderson and Smith 2001). Without this perspective, we as researchers, as decision-makers, and as policy-makers do not have a complete understanding of how people think about and respond to the environment around them. That emotional responses are common across multiple sites, particularly across sites with very different climate outcomes, as Chapter Three indicates, demonstrates not only the importance of studying emotion, but also the value of including this in climate change research. As Chapters Four and Five demonstrate, there are mental health and activism outcomes that are likely the direct result of these emotional responses. The sadness expressed by women, and by respondents in more sensitive sites may lead to severe mental health outcomes, as has been found in research on the mental health effects of extreme weather events (Sartore et al. 2007, Sartore et al. 2008a, Alston 2012). Activism and political efforts may the

outcome of the anger felt by men in many of these island nations; as many of the men expressed frustration at the lack of civil action, it is possible that their anger could become a driving force for change (Anderson 1996, Goodwin et al. 2001). Thus, emotion is key to understanding a range of possible outcomes for many people as climate change continues to affect their local communities. Understanding cross-cultural emotional responses to climate change is particularly important given that these effects are not the same, even across similar landscapes.

Limitations

There are several limitations to this research worth noting. The data from three of the four international sites (Fiji, New Zealand, and the United Kingdom) were collected by undergraduate students on their study abroad program. While these students were appropriately trained in data collection methods, they nevertheless had a very brief amount of time in which to collect this data, and have not had the opportunity to develop the skills necessary to accessing in-depth data from respondents. Thus, the richness of these data are lacking, and therefore, the analysis could not be as comprehensive. Additionally, because these undergraduate students were not collecting this data to use in their own analyses, their level of investment in the quality of the data was likely not as great as my personal investment in collecting the data in the United States.

Because much of the data were collected by undergraduate students, the open-ended interview portion of the data collection instrument had to be very structured. While structured open-ended interviews can certainly elicit data that is good in quality and in depth, it does not allow the interviewer to pursue subjects that the respondent brings up. A less structured interview protocol may have allowed me, and other researchers, to elicit

more in-depth information about emotional responses to climate change, or to other extreme weather events. This type of structured interview can also be frustrating to the respondent and ultimately lead to less respondent investment, because they may feel that they are being asked to repeat things that they've already mentioned.

Finally, the sample size of this protocol limited the types of analyses that were possible. While gender is a fundamental component that shapes the way people experience the world, it is certainly not the only demographic characteristic that influences people's perceptions and experiences with their local environment. Race, class, ethnicity, and religion also fundamentally shape the experiences people have with the world. With the sample size as small as it was, however, it was not possible to conduct analyses that examined the intersection of gender and class, or gender and race. Given the opportunity to conduct this research again, conducting interviews with a more diverse sample of respondents would be an important change that would allow for a more rich and holistic analysis of this topic.

Future Directions

Future research regarding emotion and climate change should continue to pursue understanding how emotional responses vary within communities. While our cross-cultural findings indicate the many similarities between communities with common climate outcomes, it is equally important to understand how emotional responses vary within communities, particularly by race and economic status, and to continue examining how gender plays a key role in determining emotional responses. As it becomes more clear which extreme events are truly the outcome of climate change, it will be important

for researchers to understand if and how emotional responses vary between extreme events and climate change-related extreme events, to discern if there are emotional responses that might motivate community members to make infrastructural or social changes that could mitigate the felt effects of climate change.

Additional research should explore the relationship between emotion, mental health, and climate change. While there are studies that indicate a strong correlation between emotional responses and mental health concerns like anxiety and depression, it is worth pursuing additional studies to understand the connection between emotional responses and mental health outcomes. As it becomes more likely that some communities will have to relocate, negative emotions, and subsequent negative mental health outcomes seem more likely. Further research can explore if there are ways to mitigate these responses and mental health outcomes, particularly given that climate change effects are only likely to worsen in the coming years.

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APPENDIX A

2014 GLOBAL ETHNOHYDROLOGY STUDY PROTOCOL

Informed Consent

INTERVIEW ON CLIMATE CHANGE, DISASTER, AND LOCAL EXPERIENCES

INFORMATION LETTER

Study of Global Climate Change and Concern

Dear Potential Participant:

Arizona State University is conducting a study of public perceptions of climate change in different countries. The research objective is to understand peoples' opinions of concerns with weather and climatic experiences.

You are being asked to participate in this study to help us understand public perceptions of climate change in your community. Your participation would involve answering questions about your environment and some background information, such as the neighborhood you live in and the number of years you've lived there. Also, you must be 18 or older to participate and so we will ask for your age. However, we will not ask for your name, address, or any other personal identity information. No one will be able to identify you based on the responses you give. 480 or more people are being invited to participate in this study in many locations around the world, and each will be asked to answer the same questions about a climate change and related concerns based on their own experiences. You are being invited to participate. Your involvement should take about 25 minutes.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there is no penalty. The results of the research study may be published, but your name and other uniquely identifying information will never be published or associated with your answers in any way.

Although there may be no direct benefit to you, the possible benefit of your participation is an improved understanding of how the public understands and is affected by climate change and associated concerns.

If you have any questions concerning the research study, please call us at (480) 965-0499 or email me on amber.wutich@asu.edu.

Sincerely,

Amber Wutich, Ph.D.
Associate Professor
School of Human Evolution and Social Change
Arizona State University

Alexandra Brewis, PhD
Professor
School of Human Evolution and Social Change
Arizona State University

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Research Compliance Office, at (480) 965-6788 or email research.compliance@asu.edu.

Information about the Survey Itself

This page has information and questions devoted to how the survey was administered.

2. Did this person consent to taking the survey? (If YES, proceed)

- [ ] Yes
- [ ] No

3. Has this person lived in this location for at least six months? (If YES, proceed)

- [ ] Yes
- [ ] No

4. Survey Number
(Country Code Your Initials Number, e.g. USRS01)

5. Place of Interview

6. Date of Interview (MM/DD/YY)

7. Interviewer's Name

8. Time of Interview

9. Is the respondent:

- ( ) Male
- ( ) Female

PROBING
In open-ended interviewing, you may need to probe the interviewee in order to get a response. Probing is different than prompting in that prompting will put word's into your respondent's mouth. Because this is a difficult balance, we have provided you with a list of acceptable probes. You do not have to use these probes on each interview. Use them selectively as needed.

DO NOT probe using probes that are not listed, and DO NOT go off the script.

Acceptable probes for all questions:
If a person says "I don't know" you can respond with, "It's ok if you don't know, we are just interested in what you think." then repeat question adding "think" into the question.

If a person gives you a short response, you can respond with:
"Can you tell me more?"
"What else do I need to know?"
"Is there anything else you'd like to add?"

There are also question specific probes included within this survey.

10. I am going to begin by asking you a series of questions about how you think and feel and I will be writing down your answer. This first part will go a little bit more slowly because it will be a conversation between us. The second part will go more quickly because I will give you the rest of the survey to complete.

Thinking about your town/local community/neighborhood, what do you like most about living here?

11. What do you like least about living here?

12. Please list the top three climate change challenges that are affecting or will affect this place. (INTERVIEWER: keep encouraging them until they have listed AT LEAST three concerns, or until they cannot think of any others).

1
2
3
4
5

Lives

13. Now, I'm going to ask some questions about people's lives here.

First, how has climate change already affected the way people live here?

14. How might climate change affect the way people here live in the future?

15. Thinking about people's lives here, how do you FEEL when you think about the way these changes might affect you, your family, and community?

PROBE: Can you tell me more about how you feel?
PROBE: We're interested in your emotional response.

Livelihoods

16. Now, I'm going to ask some questions about how people make a living here.

How do you make a living?

17. How do people around here make a living off the land?

18. How has climate change already affected how people make a living around here?

(If asked, you can tell the respondent: "We're interested in whatever you think, whether it relates to people who make a living off the land or not.")

19. How might climate change affect how people make a living around here in the future?

(If asked, you can tell the respondent: "We're interested in whatever you think, whether it relates to people who make a living off the land or not.")

20. Thinking about making a living, how do you FEEL when you think about the way these changes might affect you, your family, and community?

PROBE: Can you tell me more about how you feel?
PROBE: We're interested in your emotional response.

Younger Generation

21. Now, I'm going to ask you some questions about the younger generation.

Thinking of the younger generation, what do you think life will be like for them in the future?

PROBE: Do you think life will be better or worse than life now? Why?

22. How has climate change already affected the younger generation?

23. How might climate change affect the younger generation in the future?

24. Thinking about the younger generation, how do you FEEL when you think about the way these changes might affect people you know in the younger generation?

PROBE: Can you tell me more about how you feel?
PROBE: We're interested in your emotional response.

Men and Women

25. Do you think climate change in this place affects men or women more?

PROBE: Why?

26. Do you think that men or women are more distressed by climate change?

PROBE: Why?

You can now give the survey to the respondent to complete the remainder.

27. Please rate your sense of belonging to the place where you live using a scale of 1 to 10 where 1 means you have no sense of belonging and 10 means you have a very strong sense of belonging.

1 - No sense of belonging	2	3	4	5	6	7	8	9	10 - Very strong sense of belonging
○	○	○	○	○	○	○	○	○	○

28. Is the environment that you and your family live in better or worse than it was ten years ago?

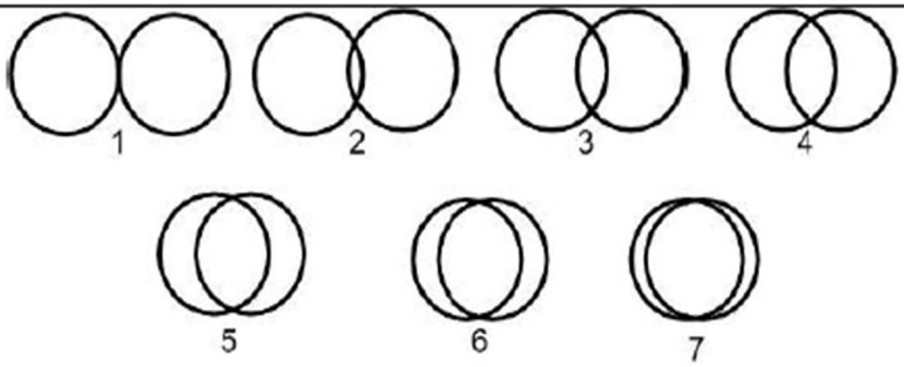
- ○ It is better than 10 years ago
- ○ The same as 10 years ago
- ○ A little worse than 10 years ago
- ○ Considerably worse than 10 years ago
- ○ Extremely worse than 10 years ago

29. Thinking of the environment in which you and your family currently live, how would you rate its general environmental quality?

- ○ Excellent
- ○ Very Good
- ○ Good
- ○ Fair
- ○ Poor

30. Overall, how much of an impact do you think that you or people similar to you can have in making yours a better place to live?

- ○ No impact at all
- ○ A small impact
- ○ A moderate impact
- ○ A big impact



31. Identify the number of the set of circles (above) that best describes the attachment (where 1 is no feeling of home or attachment and 7 is a deep and complete identity with the place), between yourself and your...

	1	2	3	4	5	6	7
Local community/village/neighborhood	○	○	○	○	○	○	○
The region you live in	○	○	○	○	○	○	○
Your country (_____)	○	○	○	○	○	○	○

32. Climate change refers to the idea that the earth's average temperature has been increasing over the past 150 years, may increase more in the future, and that the earth's climate may change as a result. Do you agree or disagree that the effects of climate change are already occurring?

- ○ Strongly agree
- ○ Somewhat agree
- ○ Somewhat disagree
- ○ Strongly disagree

33. Thinking of the environment in which you or your family are living, what level of negative impact is climate change having on the following?

	No effect	A minor effect	A moderate effect	A significant effect	An extreme effect
Fresh water availability	○	○	○	○	○
Drinking water quality	○	○	○	○	○
Air Quality	○	○	○	○	○
Biodiversity	○	○	○	○	○
Amount of Vegetation	○	○	○	○	○
Scenic landscape/ pleasant vistas	○	○	○	○	○
Fish or animal life	○	○	○	○	○
Food crops or household gardens	○	○	○	○	○
Weather, storms	○	○	○	○	○
Recreation (swimming, hiking, walking or other pleasurable activities)	○	○	○	○	○
Your physical health	○	○	○	○	○
Your mental health	○	○	○	○	○
Your financial situation or employment	○	○	○	○	○

34. Which of these statements best describes your household water in the last 12 months?

- ○ We always have enough water and it is good in quality
- ○ We have enough water but it is not always good in quality
- ○ Sometimes we don't have enough water
- ○ Often we don't have enough water

35. Which of these statements best describes the food eaten in your household in the last 12 months?

- ○ We always have enough to eat and the kinds of food we want
- ○ We have enough to eat but not always the kinds of food we want
- ○ Sometimes we don't have enough to eat
- ○ Often we don't have enough to eat

36. Do you strongly agree, agree, disagree, or strongly disagree with the following statements?

	Strongly Agree	Agree	Disagree	Strongly Disagree
Climate change will have a noticeably negative impact on my physical health in the next 25 years.				
Climate change will have a noticeably negative impact on my mental health in the next 25 years.				
Climate change will have a noticeably negative impact on my economic and financial situation in the next 25 years.				
Climate change will have a noticeably negative impact on the environment in which my family and I live.				
I believe my actions have an influence on climate change.				
My actions to reduce the effects of climate change in my community will encourage others to reduce the effects of climate change through their own actions.				
Human beings are responsible for climate change.				

37. Do you strongly agree, agree, disagree, or strongly disagree with each of the following?

	Strongly Agree	Agree	Disagree	Strongly Disagree
Climate change is exerting a significant impact on public health in my state.				
Climate change is exerting a significant impact on economic development in my state.				
Climate change is exerting a significant impact on the environment in my state.				

38. To what degree have you been personally affected by any of the following disasters?

	I have been majorly and seriously affected by this type of disaster	I have been somewhat affected by this type of disaster	I have been a little affected by this type of disaster	I have not been affected by this type of disaster
Earthquake				
Volcano				
Flood				
Monsoon				
Drought				
Tsunami				
Heat Wave				
Cyclone/Hurricane				
Tornado				
Wildfire				
Blizzard				
Avalanche				
Mudslide/Landslide				
Ice melt				

39. If you answered you were "seriously affected" by any of the above, can you explain?

40. Please tell me how likely you think it is that each of the following will occur during the next 50 years due to climate change:

	Not at all likely	A little likely	Somewhat likely	Very likely
Worldwide, many people's standard of living will decrease				
Worldwide, water shortages are likely to occur				
Rates of serious disease are likely to increase worldwide				
My standard of living is likely to decrease				
Water shortages will occur where I live				
My chance of getting a serious disease will increase				

41. The following questions are about how you have been feeling during the past 30 days.

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
About how often during the past 30 days did you feel nervous?	○	○	○	○	○
During the past 30 days, about how often did you feel hopeless?	○	○	○	○	○
During the past 30 days, about how often did you feel restless or fidgety?	○	○	○	○	○
How often did you feel so depressed that nothing could cheer you up?	○	○	○	○	○
During the past 30 days, about how often did you feel that everything was an effort?	○	○	○	○	○
During the past 30 days, about how often did you feel worthless?	○	○	○	○	○

42. In general, compared to other people your age, would you say your health is...

- ○ Poor
- ○ Fair
- ○ Good
- ○ Excellent

Section E: About you

43. Were you born in this country?

- Yes
- No
- Refused/Don't know

44. In what year were you born?

Enter Year

45. How long have you lived in YOUR CURRENT town/village/suburb/city? Please enter the number of years, if less than a year; please enter the number of months.

Years

Months

46. What is your marital status?

- Single
- Married
- Divorced
- Widowed

Other (please specify)

47. What is the highest level of school you have had a chance to complete?

- Primary school
- Secondary school
- High school
- University or technical training (e.g. nurse)
- Graduate/professional school (master's degree, Ph.D., M.D., J.D., etc.)

48. Please list your current occupation or how you earn money. If you are an administrative assistant, student, lab technician, or similar position, please indicate what industry you work for. For example, if you are a student, specify your field of study. If you are an office assistant, specify what type of office (e.g. dentist, marketing company).

49. Ethnic Group

50. Political Party

51. Religious affiliation

52. How often do you attend religious services?

- More than once a week
- Once a week
- Monthly
- Several times a year
- Never

53. Are you:

- Male
- Female

54. How many people live in your current household (including yourself)?
('Living in your household" means anyone who slept and ate meals there for at least two weeks of the previous month)

Enter Number

55. Does your household have any of the following items?

- TV
- Cell Phone
- Car
- Computer
- Air Conditioner

56. In deciding how much of their (family) income to save or spend, people are likely to think about different financial planning periods. In planning your (family's) saving and spending, which of the following time periods is most important to you?

- ○ Day to day
- ○ The next few weeks
- ○ The next few months
- ○ The next year
- ○ The next few years
- ○ The next 5 to 10 years
- ○ More than 10 years
- ○ I/we don't plan

Please divide this line into your past, present, and future and label it

57. Length of sections (in centimeters)

Past _____

Present _____

Future _____

Please think of this ladder (below) as representing where people stand in your country.

At the top of the ladder are the people in your country who are best off - they have the most respect, the most money, or the best jobs. At the bottom are the people who are worst off - they have the least respect, the least money, or the worst jobs.

The higher up you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to the people at the very bottom.

Where would you place yourself on this ladder?

58. Ladder placement

Interviewer Feedback

59. Did you have any trouble establishing rapport (i.e., good communication) with this respondent?

- Yes
- No

60. If yes, please explain.

61. Were there questions that you thought the respondent was confused about or answered without fully understanding?

- Yes
- No

62. If yes, please explain.

63. Did you ever think the respondent was lying?

- Yes
- No

64. If yes, please explain.

65. Do you have any other concerns about the quality of the data in this interview?

- Yes
- No

66. If yes, please explain.

67. Additional notes?

APPENDIX B

STATEMENT OF PERMISSION

STATEMENT OF PERMISSION

All co-authors have granted permission to the use of these articles as chapters in this dissertation.