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Wetland and Lake Destruction, Development and Mental/Emotional Distress Among Residents of Tampa Bay, Florida

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Wetland and Lake Destruction, Development and Mental/Emotional Distress
Among Residents of Tampa Bay, Florida

by

Gina Marie Larsen

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts
Department of Anthropology
College of Arts and Sciences
University of South Florida

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Abstract

The purpose of this research project is to understand how local environmental destruction in Tampa Bay, Florida, including changes in water resources and development activities, affects local Tampa Bay residents mentally and emotionally. The study also examines residents' personal connections with their landscape and documents the degree of stress that may be caused by experiencing environmental destruction through the use of interviews, freelists, and two psychometric stress scales (Hopkins Symptom Checklist-10 and the Environmental Distress Scale). The topic of emotional distress and environmental change has rarely been studied in social science research, particularly in the United States and with regards to changing water ecosystems. The residents sampled for the study are members of five different environmental organizations in the Tampa Bay area, purposively sampled in order to better understand the unexplored topic of environmental change and emotional distress. The 21 research participants completed a semi-structured interview, freelist, and stress scales. The qualitative results show that the residents sampled have longstanding and cherished relationships with their natural environment, stemming from childhood. Participants also report experiencing emotional/mental distress due to local environmental change, particularly from habitat destruction, development, and changing water resources. Also, the stress scale results, particularly the results from the Environmental Distress Scale, complement the qualitative interview results by quantitatively highlighting areas of high distress, including distress experienced due to unwelcomed development, sprawl, and

stress associated with changing wetlands and lakes. Many of the research participants cope with the environmental stressors they experience by participating in environmental activities and groups. Although focusing on these participants limits the extent to which the results can be generalized to the general public, the results signal that the unexplored topic of emotional and mental distress tied to local environmental change is an important one that needs to be explored further by anthropologists and other social scientists. The results from this exploratory study show that residents are in fact being emotionally affected by environmental change in their local environment. The results presented here may help to create a much-needed dialogue between residents and policy makers over planning for development. These exploratory findings, especially if demonstrated on a larger scale through further research, should be taken into consideration by policy makers when making decisions about development and water management activities that may harm ecosystems in Tampa Bay, Florida, and affect residents mentally and emotionally.

Chapter 1: Introduction and Research Aims

Introduction

The goal of this research study is to understand if Tampa Bay residents, particularly members of environmental groups, experience emotional or mental distress¹ due to the destruction of wetlands and other local ecosystems due to groundwater pumping and urban sprawl. Along with documenting perceived and self-defined feelings of stress and emotional well-being, stress literature and stress scales were used to measure the degree to which participants experience stress related to local water and environment changes. Also, the relatively new concept of “solastalgia,” which is distress produced by environmental change to home environments, was measured through the stress scales (Albrecht et al., 2007).

Data were collected through 21 in-depth semi-structured interviews with Tampa Bay residents, who were also members of environmental organizations or civic associations with an environmental focus. The goal of the sampling was to interview Tampa Bay residents already invested in environmental issues in order to understand the extent to which emotional distress and environmental change may be experienced by local residents. All 21 participants also completed the Environmental Distress Scale (EDS), a new indicator of the bio-psycho-social cost of ecosystem destruction (Higginbotham et al., 2007). The scale content was tailored to the Tampa Bay area

¹ The concepts related to how humans mentally and emotionally feel about the natural environment have rarely been studied in the United States and are lacking in the literature. Thus, definitions for mental and emotional distress are created and explained through a grounded approach based off participant responses.

through preliminary fieldwork (which will be expanded on in Chapter 2) and seeks to measure emotional distress tied to local environmental change. The Hopkins Symptom Checklist 10 (HSCL-10) scale was also completed by the participants to serve as a baseline measure against the EDS. The HSCL-10 measures general psychological distress in participants (Nguyen et al., 1983).

The qualitative interviews and the quantitative stress scale allowed for residents to share their perceptions of environmental change, and measured the extent of the emotions participants experience surrounding wetland and lake destruction and development in Tampa Bay. The results of the study provide insight into the ways changes in the local environment may be affecting certain Tampa Bay residents' stress levels and emotional well-being. The current study also adds to the virtually non-existent body of literature that suggests a connection between human emotion and stress and the destruction or disappearance of ecosystems.

The thesis consists of six chapters, which are outlined here. Chapter 1 serves as the introductory piece to the topic of mental/emotional distress and environmental change. The research aims and purpose of the research study will also be presented in Chapter 1. Chapter 2 consists of the background for the study and a review of the current literature on water, culture, stress, and the environment. Chapter 2 also includes preliminary results on the topic of mental/emotional distress and environmental change gained from recent anthropological research in the Tampa Bay area². Chapter 3 outlines

² The preliminary data come from the USF National Science Foundation-funded "ULTRA-Ex" study (Urban Long Term Research Area-Exploratory project), which will be explained more in chapter 2.

the methods that were utilized during the research project, including a freelist, interviews, and two psychometric stress scales.

Chapter 4 is the main results chapter, documenting findings from the freelist and the qualitative interview questions. The major themes identified through utilizing grounded theory include personal connections to the environment, childhood memories, changing environments, changes in water resources, emotions surrounding environmental change, mental and emotional distress, and stress/well-being. Chapter 5 presents the quantitative stress scale results, from both the Environmental Distress Scale and the Hopkins Symptom Checklist 10. The final chapter, Chapter 6, encompasses the overall discussion of the various results along with a conclusion linking the results of the study back to the research questions. Chapter 6 provides explanations for how the results compliment previous research and literature and highlights the important addition the current study adds to the discipline of anthropology.

Understanding Wetland/Lake Degradation, Development, and Mental/Emotional Health

When one hears the term water scarcity, they probably do not think of Florida. Florida is touted as being a luxurious paradise surrounded by water. How could water shortage be a problem for Floridians? The truth is that water scarcity has been and still is a problem in many parts of Florida, particularly the Tampa Bay area (Rand, 2003). Legal battles and environmental movements surrounding water have been prominent in the Tampa Bay area for decades. Issues such as groundwater pumping, wetland and lake degradation, drought, and pollution of rivers and the ocean are only a few of the ways in which water scarcity is manifested in the Tampa Bay area.

One concrete and observable way that water scarcity can be experienced in the Tampa Bay region of Florida is through the destruction of wetlands and lakes due to groundwater pumping. Groundwater pumping accounts for approximately 80% of the public water systems in the United States. However, the rate of groundwater extraction exceeds long-term rates of recharge from precipitation and other sources (Levin, 2002). The massive prevalence of hydraulic infrastructure in the United States (and around the globe) is literally killing the aquatic world (Postel, 2000). Groundwater pumping from rural communities to urban centers has had tremendous effects on wetlands and lakes because it reduces the available water in the Floridan Aquifer (Dedekorkut, 2005). Cypress trees found in wetlands are collapsing, lakes are disappearing, and the historical ecological landscape is dramatically changing.

Because of the environmental degradation occurring in Tampa Bay, anthropologists and other social scientists can uncover how environmental change is affecting residents. The current research study contributes to the literature that supports a link between mental well-being, emotions, and the environment, and addresses a gap in our understanding of how people are emotionally affected by local wetland and lake change, along with another environmental concern in Tampa Bay; development.

Another type of environmental change that is heavily documented throughout this study is development in Tampa Bay, primarily sprawl and rampant, poorly-planned roads, building complexes, and neighborhoods, which can often cause negative changes to wetlands and lakes along with groundwater pumping. Though I have more experience talking with local residents about changes in water systems in Tampa Bay and how those changes make them feel, development is another important topic that will be explored

further in this paper with regards to mental and emotional distress. The general theme of development emerged from the qualitative and quantitative data as a prominent concern among residents and remained salient throughout the data, which was not expected when I first set out to conduct the research.

Research Aims and Questions

The main objectives of this study were to gain an understanding of how Tampa Bay residents involved in environmental groups attach meaning to their environment and water resources, such as wetlands and lakes, and how changes in environments due to water redistribution and other factors, such as development, affect the mental health and emotional well-being of residents living in those areas. The ways that humans interact with the environment are widely perceived both as the source of environmental problems and as a key to their solution (Milton, 1993). By understanding how residents feel about the destruction of local environments and how that affects them emotionally and mentally, this research can help to inform policy makers about the potentially devastating mental and emotional effects environmental change and destruction may have on local residents through tangible qualitative and quantitative research.

In the following chapter (2), I discuss prominent literature on water, culture, stress, and human emotions tied to a specific landscape. I also present information on how ecosystems that humans interact with and cherish can affect mental and emotional health. Understanding the emotional and mental connections that humans ascribe to the environment in which they live (particularly with regards to water) has rarely been studied anthropologically in the United States. In fact, one of the prominent scholars (and

one of the only) researching emotional and mental health related to water insecurity has noted that, “very little research has examined the effects of water insecurity on mental well-being (Wutich, 2009;436).” This gap in the literature shows a critical need for an understanding of how human beings value water and water-based ecosystems in the United States, and how changes in water availability (specifically in this case diminishing and changing wetlands and lakes) may be tied to mental and emotional distress. Though water insecurity in Tampa Bay is not defined in terms of lack of water for human consumption and daily use (though those types of research studies will be addressed throughout the paper), it is important to note that water insecurity does occur in Tampa Bay as it relates to the degradation of local water ecosystems. The negative impacts to wetlands, lakes, and the ocean in the Tampa Bay area are direct manifestations of water scarcity, and very much affect human populations. Ethnography is well suited for highlighting the social context of water-related health issues that have not been well studied in medical anthropology (Ennis-McMillan, 2001). With this in mind, the current research focuses on the following questions.

RQ1: How do members of environmental groups in Tampa Bay view/define mental or emotional distress, specifically related to their feelings about local environmental change?

RQ2: Do residents experience emotional distress or stress related to changes in their local and regional landscape, and if so how does this affect their well-being?

RQ3: What types of changes in wetlands and lakes cause the most distress and why?

RQ4: How do residents active in environmental organizations respond to the destruction of wetlands and other ecosystems in the Tampa Bay region due to water redistribution and groundwater pumping?

The results of this thesis will be shared with various stakeholders in the community, such as Southwest Florida Water Management District (SWFWMD), Sierra Club, Tampa Bay Watch, and other interested organizations, and could potentially help policy makers to make better informed decisions with regards to development and water redistribution that may create positive changes in how groundwater pumping, water redistribution, and development activities affect local communities and ecosystems. Since this topic is not well-understood and the current research is exploratory, I chose to focus in at the micro-level by documenting the stress and experiences of Tampa Bay members of environmental groups, who already have a personal connection to the environment. Though the results of the current study are not applicable to Tampa Bay residents as a whole, the current research is a case study that adds to the literature on emotion, stress, and environmental degradation.

Chapter 2: Background and Literature Review

Background for the Current Study

Since the year 1900, one-half of the world's wetlands have disappeared (WWAP, 2011). It is also estimated that by the year 2025 approximately 1,800 million people will experience "absolute" water scarcity, meaning there will be less than 500m³ of available water per year per capita, and two thirds of the world's population could be under "stress" conditions, meaning there may only be between 500-1000 m³ of available water per year per capita (FAO, 2011). This is alarming, as water is a vital life source, common to all living creatures, and crucial to the survival of any ecological system (Strang, 2005). For human beings, water is essential to daily life and is connected to bodily experiences and practice through a wide range of activities, such as drinking, cooking, cleaning, bathing, and healing (Ennis-McMillan, 2001). Food production for human consumption alone requires an enormous amount of water. Approximately 1,000 metric tons of water are required to produce one metric ton of grain, and irrigated agriculture accounts for two-thirds of all the water removed from rivers, lakes, and aquifers for human activities (Postel, 2000).

Water is essential for the physical survival of any human being on the planet. However, can water scarcity and the destruction of water-based ecosystems, such as wetlands and lakes, create a deeper, emotional void that affects a person's mental well-being? This is one of the questions I seek to address through the current research study. Water is both an economic resource for human life and something that has meaning from

its connections to our place as conscious social beings who live in a natural and cultural world (Orlove & Caton, 2010).

I became interested in this topic through working as a research assistant with Dr. Rebecca Zarger on a research project focusing on the social and ecological impacts of water redistribution decision making and policy in the Tampa Bay region (ULTRA project- "Urban Development, Power Relations, and Water Redistribution as Drivers of Wetland Change in the Tampa Bay Region Ecosystem," [NSF#0948986, PI, Lewis]). The research team is focusing on how the redistribution of water from rural ecosystems to urban areas affects both humans and the environment. The researchers also hope to uncover how resident's perceptions of the water system are shaped by the duration and geography of their environmental experiences, and how these perceptions relate to behaviors, such as participation in public meetings or activism, that directly influence water redistribution policy. In addition to surveying and interviewing local residents, which is being carried out by the social scientists on the project, faculty from biology and other departments are investigating hydroecological responses to water policy. In particular, they are measuring specific changes in regional wetlands in response to extensive groundwater pumping over the last three decades.

History and Context of Regional Water Conflict in Tampa Bay

Groundwater pumping occurs in rural regions of the Tampa Bay area that are situated on top of natural aquifers. The water that comes from the pumping is used to supply urban areas of the Tampa Bay region, including the cities of Tampa and St. Petersburg. However, groundwater pumping can lead to diminished water table levels and can negatively affect the natural ecosystems that occur in Florida, particularly

wetlands and lakes. Many residents who live in these groundwater pumping areas claim that wetlands are being destroyed, Cypress trees are falling over, and lakes are disappearing in front of their eyes due to groundwater pumping. There are multiple environmental justice groups in the Tampa Bay area that have been vocal and active with regards to water issues in their communities (KCA, 2011; Citizens for Sanity, 2011). For example, one group that has been active and passionate about the negative effects of groundwater pumping in the area is the Keystone Civic Association, which is devoted to protecting wetlands and other local environments in the Tampa Bay area. “Nature over commercialism, star-filled skies over urban lights, and the sound of crickets and frogs over traffic noise” is their vision (KCA, 2011). Members have been politically active and vocal with regards to water issues in their community and have stood up to major water facilities in Southwest Florida.



Figure 1. Map of Tampa Bay Water Sources. The map shows the three counties encompassing the Tampa Bay area (Hillsborough, Pinellas, and Pasco counties). Map Courtesy of Pinellas County Utilities.

Another environmental group in the area whose members are passionate about protecting water resources is Citizens for Sanity, located in Land O' Lakes, Florida. Founded in 1999, Citizens for Sanity is a non-profit corporation comprised of people from all walks of life who believe in improving quality of life through preserving local environments (Citizens for Sanity, 2011). This group has been extremely vocal about the political issues surrounding the over-pumping of groundwater and development, both of which are destroying precious environments in Pasco County. The overarching mission of the group is to preserve the natural landscape and protect local ecosystems.

There is no doubt that the members of these environmental organizations have a passion for their land and the place where they call home. Though these two environmental organizations in particular were not sampled for the study, working with many environmental organizations was a good way to document how changes in local environments affect human emotions, and adds to the limited body of literature that looks at how the destruction of local environments can affect human emotion and stress levels. As will be seen in the chapters on study results, members of environmental groups have had many experiences with local ecosystem destruction. Tampa Bay has been notorious over the past few decades for its "water wars," and this topic has been and continues to be a "hot button" issue for many residents of Tampa Bay. For more than 40 years, various actors including concerned citizens, environmental organizations, local water facilities, and governments have been engaged in "water wars" throughout the Tampa Bay region. The legal and political battles surrounding water in the area have left behind a legacy of suspicion, competition, and negative environmental consequences.

Between the years 1970-1990, Florida's population grew by approximately 48% (Rand, 2003). This population surge coincided with a demand for water, especially in the area of St. Petersburg, Florida. To "fix" this demand for water, Pinellas County and St. Petersburg created water wellfields in mostly uninhabited areas of northwest Hillsborough county and central Pasco county. However, as the counties grew and more residents began living in the areas surrounding the wellfields, residents began complaining of lake water levels dropping. Citizen complaints were largely ignored until the mid-1990's, when the peak of the political "water wars" occurred. This explosion of policy and legal action resulted from a seven year study conducted in environmentally-affected areas by SWFWMD in the year 1987. The study showed that the environmental problems that were occurring in the areas surrounding the wellfields were the result of wellfield pumping, not drought or lack of rainfall as had been presented for decades by both SWFWMD and the water wholesaler West Coast Region Water Supply Authority (Rand, 2003). At that time, residents living in affected areas said that they felt violated and angry that lakes, ponds, wetlands, and wildlife were disappearing and that no one was taking responsibility. Residents also complained of tremors occurring underneath the ground, because of the pumping, that were slowly swallowing up their homes (Rand, 2003). The depletion of the aquifer due to groundwater pumping that was causing wetlands and lakes to dry up resulted in increased sinkholes, a problem that continues to plague the Tampa Bay area to this day. For example, during the 2010 freeze in the Tampa Bay area, strawberry farmers in the area pumped over one billion gallons of water to protect their crops over an 11 day period, resulting in over 85 sinkholes (Pittman, 2010). After a series of legal battles during the water wars, policy was enacted that limited

pumping in certain counties, but environmental damage still continues to occur in many Tampa Bay regions and residents are continuing to feel stress, worry, and anger according to both preliminary findings uncovered before the current research study began and the results seen throughout this paper.

During a focus group I assisted with before the current research study began, one participant became very emotional while talking about his connection with the local landscape. The participant talked about a lake called Tarpon Lake, and how the lake was destroyed because of groundwater pumping. He said the area around Tarpon Lake, before development, used to be prairie-like and covered with farms. Now, it is managed by the water district. He emotionally stated, “Tarpon Lake was a beautiful lake. When we got rain, it cleaned the water. There were times during the rainy seasons you would walk out into those pastures around the lake in six inches of water, but the grass was still growing because that was how it worked. I’ve lived here all my life. I’m a native...” At this point the interviewee started to become very emotional and tears welled up in his eyes. The other interviewee had to finish for him by stating, “They over-pumped it. They destroyed it. You can see this stuff bothers him.” The emotional man just shook his head and quietly said, “It was a beautiful place.” This particular interaction with the research participant was a key moment for me. I felt emotionally invested in his experience and found myself wanting to know more about how other people in Tampa Bay have been emotionally affected by environmental change.

Preliminary Results from Larger Study

Before the current research study commenced, I saw strong emotional reactions in other residents interviewed for the larger water project when asked about their feelings and emotions regarding local environmental change, which further sparked my interest in pursuing a thesis on this topic. One man, when asked what emotions he felt when he saw wetlands changing said, “I think it’s sad. I feel like we’re not doing our job that’s been entrusted to us to protect our planet for future generations.” Other interviewees talked about emotions such as “upset” and “anger.” One participant, a woman in her late 40’s, when asked about the emotions she felt regarding a dried-up lake she used to visit as a kid responded with, “Sick, I loved that lake. You know I still have dreams of going out to that lake and diving off of that thing and swimming and missing it, really missing it.” Another woman, when asked how she feels when she sees wetlands and lakes changing claimed, “Horrible. It affects me immensely. It hurts my heart, because this is where I was born and raised (Larsen & Zarger, 2012).” These last two stories are examples of solastalgia, the distress that is produced by environmental change that has an impact on people who are directly connected to the destroyed or suffering environment (Albrecht et al., 2007).

Preliminary data also suggested that residents who live in more rural areas or closer to wetlands and lakes seem to have more of an emotional attachment to water-based ecosystems and therefore feel more strongly about their disappearance due to groundwater pumping and development (Larsen & Zarger, 2012). The preliminary data further show that there is a positive emotional attachment between some residents and local environments. The preliminary results will be published elsewhere.

Literature Review

Water Scarcity on a Global Level

Water scarcity is quickly becoming one of the most pressing health issues in our world today (Postel, 2000). Without access to clean water, it is nearly impossible to maintain a healthy body and promote a healthy, thriving community. While water availability/scarcity in Florida is usually not a matter of life or death, it is still a very real issue and affects residents in multiple ways, which will be discussed throughout this paper. Studies have shown a link between water scarcity and negative mental and emotional outcomes (Wutich and Ragsdale, 2008; Ennis-McMillan, 2001). Wutich & Ragsdale (2008) examined patterns of water insecurity in the urban setting of Villa Israel, a squatter settlement of Cochabamba, Bolivia. The researchers were specifically interested in water-related emotional distress seen in residents resulting from three dimensions of water insecurity: inadequate water supply, insufficient access to water distribution systems, and dependence on seasonal water resources. The researchers collected data from a random sample of 72 households. A questionnaire was distributed to each of the households that was designed from participant-observation and key informant interviews. The results showed that drought in the area caused negative psychological effects in community members. Participants repeatedly mentioned fear, worry, anger, and bother with regards to water scarcity in their region (Wutich & Ragsdale, 2008).

The effects of drought on emotional health have also been documented by Coelho et al. (2004). The study focused on two areas in Northeast Brazil: the drought-prone city of Queimadas, and the drought-free city of Areia. The research consisted of 204 (102 in

each area) face-to-face interviews with participants, as well as psychological measures to understand the stress associated with drought (Post-Traumatic Stress Disorder scale, etc.). The results showed that participants in the drought-prone area showed significantly higher levels of emotional distress and anxiety than participants in the drought-free area. In addition, women in general were significantly more anxious and emotionally distressed because of drought than their male counterparts (Coelho et al., 2004). The studies mentioned are some of the few studies that seek to document the emotional effects of physical water insecurity on human populations. These studies, though on a different scale than the water insecurity problem in Tampa Bay (physical insecurity for human consumption and use compared with water insecurity in the form of degraded water ecosystems), helped me to critically think about how to address the possibility of emotional distress and changing water ecosystems in Tampa Bay.

Water scarcity has also caused political conflict and inequality based on who receives clean water and who is left out. Michael Ennis-McMillan (2001) conducted research over a period of 21 months in a foothill community in the valley of Mexico in order to understand how residents experienced bodily distress from water scarcity in their region. Ennis-McMillan used a critical medical anthropology approach to explore how inadequate supplies and distribution of water can lead to various forms of bodily distress including negative physical, emotional, psychological, and social experiences (Ennis-McMillan, 2001). He used both participant-observation and semi-structured interviews with 41 local residents to understand residents' feelings about the management of drinking water. Ennis-McMillan was also interested in understanding the phrase

“suffering from water” through the interviews, which was a phrase that was used often in the foothill community.

The qualitative results showed that residents felt distress because they had to constantly “run around” in order to find water for their necessities. Economically poor residents also admitted that they felt anger towards programs that restricted the development of piped drinking water systems to their communities. These programs focused on providing water to wealthier individuals in urban neighborhoods, the industrial sector, and for irrigation projects (Ennis-McMillan, 2001). Interviewees revealed that they “suffered” when they saw other, wealthier individuals with more water for drinking and other purposes such as washing cars and cleaning sidewalks, and that they felt frustration, anguish, bother, worry, and anger due to the unequal circumstances regarding water scarcity (Ennis-McMillan, 2001). These examples show how water scarcity can affect the mental and physical health of individuals and communities at local levels, but water scarcity is also becoming an enormous problem for the health and well-being of our ecosystems and most of the world’s population.

According to Postel (2000), there are three major dimensions that will be affected by the water scarcity challenge now and in the future. First, maintaining food security in the face of water constraints on agriculture is a major problem. Second, there is a need for preventing a downward spiral in the health of aquatic environments. Lastly, averting political instability in international river basins will be a complicated dilemma (Postel, 2000). In this study I focus mostly on the second dimension affected by water scarcity, which involves the downward spiral in the health of aquatic environments due to water scarcity, often caused by urbanization, sprawl, and concentration of resources and wealth

among small sectors of the world's population. These factors affect the health of the people who live in or near the affected ecosystems, and are seen throughout the world (Ennis-McMillan, 2001; UNESCO, 2009). In Tampa Bay, water scarcity can result from seasonal drought and over-pumping of groundwater, which can lower the water table level and allow for saltwater intrusion, threatening local freshwater systems.

Development

Though water scarcity and measuring mental and emotional distress in local residents with regards to changing water resources is one of the primary goals of the current research study, another topic that is closely related and that is explored throughout the thesis is how development activities in Tampa Bay mentally and emotionally affect residents. A brief discussion of growth and development, primarily rampant sprawl, in the United States and Florida from the 1960's on will be presented below, focused primarily on Florida and its trouble with balancing environmental responsibility with development activities.

In the 1960's, the environmental movement began sweeping the United States and local/state governments were heavily criticized for the destructive nature of development activities on pristine lands. Florida in particular was one of the states that had the most growth acceleration, jumping from 2.7 million residents in 1950 to 9.5 million residents in 1980. In particular, environmental organizations criticized the state's unmanaged growth, negative impacts of development and growth on wetlands and beaches, and saltwater intrusion into the aquifer (Ben-Zadok, 2009).. Though various comprehensive plans and environmental protection acts have been passed in the 1990's, 2000's, and beyond in the state of Florida, there is still concern over rampant development, the loss of

wetlands, and a disregard for precious ecosystems in Florida, including Tampa Bay, which will be apparent in the results chapters of the current research study. Florida needs more aggressive and comprehensive legislation that promotes dense and mixed-use urban development, controls sprawl, and protects the environment (Ben-Zadok, 2009).

Development activities in Tampa Bay can negatively impact precious ecosystems, including water resources mentioned above and other local ecosystems. The impacts of the destruction of water ecosystems and other environments due to groundwater pumping, development activities, and other factors will be addressed throughout the body of this paper. In our current, post-industrial age, nature is no longer an external entity. Nature is something that is seen as a resource for large-scale companies but is also a personal and cherished resource to individual human beings. The current dichotomy of nature as a resource, but also as something that has value on a personal level, has sparked discussions of nature's integrity at many sectors of politics and economics (Sivaramakrishnana & Vaccaro, 2006).

The Role of Stress

Before going into the current literature on the relationship between emotional well-being and connections with the natural environment, it is important to understand the role of stress in emotional health. As mentioned, I utilized the Environmental Distress Scale (EDS) to determine the degree of distress participants experience due to local ecosystem destruction. Though I was not able to measure the amount of stress seen in Tampa Bay residents in a completely representative way, I was able to measure stress in a

sub-group of the Tampa Bay population, in order to gain some insight into this extremely unexplored topic.

The word stress is linked to particular aspects of negative emotions, including fear, anxiety, and anger, which can be taxing on the body and mind (D'Andrade, 1992). The ultimate goal in stress research is to be able to determine the relationship between stress and health, as well as stress and adaptation (Ice & James, 2007). Stressors can be divided into three different types of stressors: physical, environmental, and psychosocial. Within the category of stressors, there are two different types of stressors: those that have a long-term impact on the person experiencing the stress which are called "chronic stressors," and others that are relatively limited in time, but still impact the individual, called "acute stressors" (Dressler, 2007). If a stressor has an impact on an individual for an extended period of time, this can cause a constant burden and increase an individual's allostatic load, which is the price the body pays over long periods of time for adapting to challenges (stressors) (Ice & James, 2007). Increased allostatic load due to chronic stress can lead to impaired immunity, atherosclerosis, obesity, major depressive illness, and anxiety disorders (McEwen, 2006). Few studies have examined the interplay of pervasive environmental stressors and psychosocial stressors (Ice & James, 2007). The new concept of solastalgia is the most applicable term to use for the current research, and is the type of distress I measured, as it describes the distress a person feels when their local landscape is destroyed.

I also explored the extent to which participants cope with potential stress due to environmental change once they experience the change. Coping is defined as constantly changing cognitive and behavioral efforts to manage specific external and/or internal

resources of the individual (Ice & James, 2007). I utilized qualitative interviews and questions on the EDS to determine how participants respond to such stressors. The ways that individuals cope with stress are determined by their appraisal (perception of the balance between demands and resources) of the situation (Ice & James, 2007). Different people will experience reactions based off their perceived meaning and importance of the situation at hand. The stressors that an individual experiences and the way they are able to cope with the situation may be determined by their previous life experiences. For example, as is demonstrated in this study, stress and coping may be determined by previous associations with nature and reactions to nature on a personal level. The ways in which the EDS is used in this research will be explained more in the methods chapter. This background on stress provides a transition to the following review of literature related to emotional connections between people and the environment, as well as how the lack of natural environments can create stress in research populations.

Connecting Water, Culture, and Mental/Emotional Health

Emotions and pain are interconnected to the feeling of homeostasis, occurring when there is a departure from homeostasis (Burbank, 2011). The extent to which we as humans experience deviation from homeostasis (emotion) can either be good or bad, depending on our previous experiences, our biases, and the way we see the world. There can be strong emotional ties between a person and a particular location, and environments can engender positive and satisfying human experiences (Windsor & Mcvey, 2005). For example, the existence of sacred groves may be one of the oldest forms of protecting biodiversity in the world. There are sacred groves in Thailand that have been/are

protected by Buddhist monks who feel spiritual/emotional connections with their landscape. Monks have even been known to ordain trees to protect them from being demolished in deforestation (Townsend, 2009).

Water and Culture

In terms of water, water-based environments are places of memory, spirituality, and culture to specific communities. The Mitchell River in Australia has been and continues to be valued as a vital life source. Indigenous cosmology presents water as the substance through which all aspects of life were generated. To residents, water sources are the most powerful places in landscape and crucial to the survival of any ecological system (Strang, 2005). Water is associated with survival, sanitation, production, pleasure, and other aspects of social life (Orlove & Caton, 2010).

Any inland aquatic system has its own biodiversity and endemic features, which contribute to a person's attachment to that place. The aquatic system becomes part of the person's identity and thus supports the individual's psychological well-being (Malpas, 1999). However, the emotional tie between an individual and the environment can also create distress, as is seen in the anthropological studies presented in this paper (Hadley & Wutich, 2009; Wutich & Ragsdale, 2008; Ennis-McMillan, 2001). When environments are destroyed, by either natural or human impacts, people are both emotionally and mentally affected and their health is compromised. Measures of physical well-being with regards to water scarcity are likely to underestimate the impact of insecurity on mental health and well-being (Hadley & Wutich, 2009). Health does not only refer to the physical well-being of the body. Bodily distress also includes people's negative emotional, psychological, and social experiences (Ennis-McMillan, 2001). For the

current study, I will be sharing the results of the measurement of bodily distress in the research population through the use of the Environmental Distress Scale (EDS), as well as the results from the freelist participants completed and the qualitative interviews, which will be explained more in the methods chapter (Chapter 3).

Some non-anthropological studies have also looked at the relationship between the environment and the mental health of human beings (Mitchell & Popham, 2008; Ulrich, 1981). However, there continues to be limited anthropological or health-related research on the link between mental health and water resources. Though there is a gap with regards to understanding the link between water resources and mental/emotional health, a look at the non-anthropological literature that has addressed the link between mental and emotional health outcomes and external environments is helpful.

Some people claim that time in nature and their connections to gardens or wild spaces have both important physical health effects and positive mental health effects. These people feel more serene and at peace while engaging with the natural environment and feel more “at one” with the earth (Barlett, 2008). As human beings, the argument goes, we are adapted to live in a green environment. When green spaces begin to disappear or humans are removed from natural settings, it is possible that negative outcomes, such as stress, will occur in human populations. Most of the research associated with the way mental and emotional health is affected by environmental experiences has been focused on the positive mental and emotional outcomes of associating with green spaces. Little attention has been paid to negative outcomes associated with green spaces becoming more scarce (Grinde & Grindal-Patil, 2009). Green spaces are open, undeveloped land areas that include natural vegetation, such as

parks, wetlands, lakes, etc. (Mitchell & Popham, 2008). One of the few studies focused on the lack of natural surroundings and subsequently negative health outcomes of humans, was conducted by Mitchell and Popham (2008). The researchers analyzed large-scale data sets looking for demographic information related to income, housing, access to green space, etc. in England, and found that people with lower exposure to green space had higher mortality than those who had more exposure to green space (Mitchell & Popham, 2008).

Overall, the majority of research on mental/emotional health and the environment has focused on the positive associations between nature and mental health. An early study by Ulrich (1981) was one of the first to measure stress/health outcomes in response to environmental stimuli. Ulrich believed that visual contact with outdoor environments could influence human well-being. The purpose of his study was to examine the psychophysiological effects of viewing three different categories of outdoor environments including nature environments with water, nature environments dominated by vegetation, and urban environments lacking any water or vegetation. Ulrich used 60 colored slides to compare the effects each scene had on the heart rate and stress of each of the 56 participants. The results showed that nature slides (particularly slides that included water) significantly improved the emotional states of stressed individuals (wakefulness, attentiveness/interest, stability, dominance), whereas exposure to urban scene slides worked against emotional well-being (resulted in a higher heart rate) (Ulrich, 1981). When people are exposed to green environments, their concentration improves and this reduces their stress level (Abkar et al., 2010).

Another quantitative study that measured the associations between physical and mental health and green spaces was conducted by Sugiyama et al. (2008) in Adelaide, Australia. A twelve item health survey was distributed to 1,833 adults in order to understand residents' perceptions of greenness in their local environment, their physical activity (walking for recreation and transportation), social interactions, and socio-demographics, and how those factors affected their physical and mental health. The results showed that residents who perceived their neighborhood as having a high number of green spaces had better self-reported physical and mental health and were more likely to walk around their neighborhood. Mental health in particular had a stronger association with the presence of green spaces (Sugiyama et al., 2008). Though briefly mentioned as a variable within the research, the particular study did not go into detail about the effects of socioeconomic status on perceived green space and activity levels. The link between socioeconomic status and green space is not thoroughly documented in the academic literature (Lachowycz & Jones, 2011). One study that was conducted in an Australian city in 2002 does effectively address this gap in the literature, showing a link between low socioeconomic status neighborhoods, decreased activity levels, increased traffic, unattractive scenery, and a non-supportive environment for walking (Giles-Corti & Donovan, 2002). The interesting point made in this particular study was that residents in low socioeconomic neighborhoods actually had greater access to recreational facilities, but utilized them less resulting in lower overall health. This point may be an important topic that needs to be explored in the future, as it shows the importance of access to green space and health and well-being. Other areas that may affect overall health aside from access to green space include access to health care, safety within a community, education,

and other structural factors. Anthropology can further extend the conversation regarding the relationship between the environment and mental/emotional health through grounded and applied research and solutions.

There is a wide range of literature on the link between the environment and mental/emotional health. However, the anthropological literature on the destruction or disappearance of natural environments, and the negative effects that may have on mental and emotional health is scarce. For the current study, I looked at how environmental degradation in the form of wetland/lake degradation and other types of destruction affects the mental and emotional health of residents in Tampa Bay and how residents attach meaning and emotion (positive and negative) to local environments and the disappearance of water-based ecosystems and other ecosystems.

Chapter 3: Methods

Research Population

As described earlier, the current research population consists of members of environmental groups and civic associations with an environmental focus in the Tampa Bay area. There are a number reasons for purposively sampling residents for this study, or choosing participants based on a particular trait (Bernard, 2006;187). One of the main reasons for purposively sampling residents is because the topic of emotional/mental distress and environmental change is such an unexplored topic that in order to determine if this topic is even something that is worth pursuing in further research studies, I wanted to speak with residents already invested in environmental events. If people who already have a vested interest in the environment did not display distress tied with environmental change it would be unlikely that the general population in Tampa Bay would be experiencing distress. I recruited participants from five different environmental groups and organizations with an environmental focus all throughout the Tampa Bay area, including parts of Hillsborough, Pasco, and Pinellas counties. I had initially contacted approximately ten environmental organizations throughout the Tampa Bay area, representing almost all of the large-scale environmental organizations present in the region. Out of the ten organizations contacted, five responded to my study request and agreed to help with the project. The environmental organizations sampled included Learning Gate Community School, Sierra Club, Tampa Bay Estuary Program, Tampa

Bay Conservancy, and Tampa Bay Watch. I specifically targeted environmental organizations that tended to be larger organizations in terms of members and community outreach. The reason for this targeted sampling of larger environmental groups was because larger groups usually attract an impressive number of members, increasing the chances of participation in the study. A short description of each environmental group is provided below.

1. **Learning Gate Community School**, located in Lutz, Florida is a charter school that integrates sustainability education into every aspect of its curriculum, often through a “hands-on” learning approach. I had the privilege of visiting Learning Gate a few months before the current study began and was impressed and inspired by the sustainability-oriented and environmentally-conscious mission of the school and its teachers. I was able to gain permission and access to teachers and staff for the current study through the school’s administrators, and many teachers and staff were happy and excited to participate in the research, as the environment is something most of them connect with on a personal level.

2. The mission of the **Sierra Club** of Tampa Bay is to “provide access, education and community support for citizens' concerns of the environment in the Tampa Bay area (Sierra Club, 2005).” The Sierra Club group in Tampa Bay hosts various meetings concerning the environment and plans a variety of nature-oriented activities for members. Many members of the Sierra Club are also heavily invested in activities to protect natural

ecosystems, both locally and around the globe. I presented at and attended multiple meetings and outings with the group and was able to recruit members for the study.

3. Created by Congress in 1991, the mission of the **Tampa Bay Estuary Program** is to build partnerships and restore Tampa Bay through scientific management plans (TBEP, 2011). Volunteers also participate in the program by removing invasive species from waterways and installing native plants. With the help of the Tampa Bay Estuary Program staff members, I was able to identify volunteers who then agreed to participate in an interview with me.

4. The overarching goal of **Tampa Bay Conservancy** is to protect the Tampa Bay region's natural, agricultural, and scenic heritage through protection initiatives (TBC, 2012). After contacting various staff members from the organization, the leaders sent out an email to a selection of members regarding the study. In the end only one participant was recruited from this particular sample.

5. The largest group that was contacted for the current research study was **Tampa Bay Watch**. Tampa Bay Watch is a non-profit stewardship organization dedicated to protecting and restoring both wetland and marine environments in the Tampa Bay estuary (TBW, 2012). Tens of thousands of dedicated volunteers work with Tampa Bay Watch to help with a variety of programs, including building oyster domes and bars, planting seagrass, removing invasive species, and cleaning up derelict crab traps in the Bay. I was invited by staff members to spend a day touring the organization's beautiful facility,

situated on the ocean in Tierra Verde, Pinellas County, and was able to interview both staff members and volunteers who were happy to participate in the research.

I asked the leaders of the organizations if I could come speak to the various groups about my research or if they could forward my research interests and contact information to their members (either through email, meetings, or word of mouth). Interested members voluntarily contacted me by either phone or email to set up an interview date and time. I did not purposively sample for gender, race/ethnicity, age, or any other demographic variables aside from being members of environmental organizations. Each participant signed a University of South Florida-approved Informed Consent Form designed for the current research study.

Data Collection: Phase 1

The data collection for the research consisted of three phases. Phase 1 consisted of preliminary research conducted with a research team, which started in May 2011, and involved structured interviews with Tampa Bay residents, as part of the larger National Science Foundation-funded project, focusing on Tampa Bay residents' perceptions of water policy, knowledge of the water system, observations of environmental change, and perceptions of the impacts of water scarcity. The sampling strategy for the larger project was based on randomly generated parcel data (resident addresses) using the program ArcGIS. The sample includes urban, rural, and suburban Tampa Bay residents who live in close proximity to well fields (.5 km), further from well fields, and residents who use public water supplies and private wells. The parcel data was used to generate 981 mailing

addresses that fall within the listed parameters. Postcards were sent out to all 981 addresses requesting an interview.

I added to the NSF interview protocol several supplemental questions asking about the relationships residents have with their local environment, which served as pilot interview questions relevant to my thesis study. The questions that were added included “How does seeing change in the local environment make you feel” and “What emotions do you experience when you see wetlands changing? Do these changes affect you? If so, how? If not, why not?” The answers to these questions helped me to gain an understanding of the types of feelings interviewees describe and in which geographic areas residents feel most strongly about their relationship with the local environment. The responses that the research team received from each resident are based on their personal experiences and motivations. It is important to understand why people personally feel a certain way about a subject and what experiences have led them to their motivations. From this data, I created an informed interview protocol and tailored Environmental Distress Scale (EDS) for the main bulk of the thesis research.

Data Collection: Phase 2 (Interviews and Freelist)

Phase two of the research built off of the exploratory data collected during the first phase of research. I developed an interview protocol that addressed resident perceptions of local environmental change (particularly wetland/lake change and sprawl/rampant development) to understand if these changes affect their mental and emotional state. I conducted 21 in-depth semi-structured interviews with residents, collecting qualitative and quantitative data beginning in January of 2012. The interviews

took place at a variety of locations that the interviewees chose, including homes, workplaces, coffee shops, and restaurants. All but one of the interviews were audio-recorded and the interviews lasted anywhere from 17 minutes to 104 minutes.

The interview protocol is semi-structured, and the questions allowed for the participants to talk about their experiences with local environmental change openly. In order to spark the interview conversation, and to gain some quantitative knowledge at the beginning of the interview, I asked the participants to freelist (Bernard, 2006) words or emotions that came to mind when I asked, “Please list all of the emotions you have felt seeing your local environment change over time.” By using this technique I was able to see how the participants paired feelings and emotions with changes in local environments, and how that association developed over the course of the interview.

Data Collection: Phase 3 (EDS and HSCL-10)

After the introductory freelisting, I asked the participants several other questions pertaining to the emotions and stress they felt (or did not feel) due to local wetland/lake change and development and how they came to feel that way. After the interviews were completed with each of the 21 participants, I utilized the Environmental Distress Scale (EDS) to determine distress experienced by participants due to local environmental change. The EDS was tailored to Tampa Bay based on preliminary research conducted in the Tampa Bay community (Appendix B). The EDS for Tampa Bay was modeled after a scale developed by Connor et al. (2004) in the Upper Hunter Valley in Australia. Over the past two centuries large-scale open-cut coal mining and associated power generation have produced massive landscape change in the region, and have also created pollution,

negative emotions, and resulted in the demolition of local ecosystems (Connor et al., 2004). The EDS was designed to appraise environmental degradation produced by these coal-mining activities, and measure emotional distress created by the environmental destruction (Higginbotham, 2007). The EDS can be adapted to measure other forms of environmental degradation, including drought, hurricanes, and war. In the current research study, the EDS was utilized to measure if the destruction of wetlands, lakes, and other ecosystems in the Tampa Bay region creates distress in local residents, particularly members of environmental groups and organizations. Based off preliminary data from the ULTRA-Ex study, I was able to better understand which environmental and water issues were most important to Tampa Bay residents, and included events such as groundwater pumping, contamination of freshwater sources, and overdevelopment in the scale questions. Additionally, the scale was adapted to Tampa Bay through various forms of participant observation (public meetings and environmental events), input from one of the developers of the scale (Dr. Nick Higginbotham), and guidance from my committee.

I tried to match the adapted Tampa Bay EDS to the original EDS layout and the environmental topics covered in the original EDS as much as possible, since many dimensions of the EDS, including focusing on pollution and general unwanted environmental change, were also concerns among Tampa Bay residents (based on preliminary research and participant observation). Many of the questions posed on the original EDS, such as the section centering on solastalgia (emotional attachment to the environment and subsequent distress when it is destroyed or degraded), participation in environmental activities, and questions pertaining to feelings about local environmental change (anger, upset, worried, frustrated, etc.) remained constant between the original

EDS and the adapted EDS. The main alterations made to the Tampa Bay EDS from the original EDS were made on questions pertaining to open-cut mining activities, including visual air pollution, foul-smelling air, fireplace pollution, heavy vehicle movement, etc. These questions were replaced with more locally-tailored environmental concerns identified through preliminary fieldwork, which included concerns over groundwater pumping, changes in water resources (lakes and wetlands), and rampant development activities. When adapting the original EDS to another location, whether in Tampa Bay or elsewhere, it is important to first conduct preliminary research centered on identifying major environmental concerns among the study population before adapting the EDS to that particular location. Once the researcher has identified areas of environmental concern, it is possible to alter the original EDS by substituting the open-cut mining questions with locally-determined environmental concerns, in order to determine if participants are experiencing local environmentally-caused distress.

The EDS combines dimensions of hazard perception, threat appraisal, felt impact of changes, solastalgia, and environmental action (Higginbotham, 2007). In particular, there are six sections involved in the creation of the scale containing yes/no and likert scale questions, resulting in an 81-item scale. As mentioned before, the EDS was tailored to fit the current research study, based on preliminary findings, which resulted in an 88-item scale. In general, the EDS consists of the following sections:

1. Frequency of hazard events
2. Observation of hazard events
3. Threat to self/family hazards

4. Felt impact of environmental changes regarding physical symptoms, emotional, and psychological symptoms, social and economic dysfunction, and economic loss
5. Feelings of solastalgia
6. Performance of environmental actions

It should be noted that the EDS offers the first measurement of solastalgia, which is the distress people experience when their valued environments undergo unwanted transformation (Higginbotham, 2007). The idea of solastalgia is similar to nostalgia (homesickness and longing), but the home is still present, except the home (environment) is being dramatically changed, which can affect a person's emotional well-being (Albrecht, 2007). As explained earlier, solastalgia is a relatively new term, but fits extremely well with my research interests.

In order to test the validity of the ability of the EDS to measure emotional distress tied to local environmental change, I used the Hopkins Symptom Checklist-10, developed by Nguyen et al., in 1983 to serve as a shorter version of the original HSCL-90. All versions of the HSCL seek to measure stress and a broad range of psychological problems. The goal of using the HSCL-10 was to measure general stress against the experienced distress displayed by each of the residents on the EDS in order to quantify and qualify how much stress and distress in the population is due solely to local environmental change. The results of the EDS, the HSCL-10, and the interviews are presented and discussed in the following chapters.

Data Analysis

The results from the freelists helped me to determine which emotions/feelings were typical/atypical of the population with regards to seeing local environmental change. The statistical software program SPSS (version 20) was used to measure the quantitative components of the protocol, such as the freelist rankings and the two quantitative stress scales (Bernard, 2006). The EDS was scored for each participant and resulted in individual and total distress scores for each of the six themes present in the scale. Using SPSS, Cronbach's alpha and Pearson correlation tests were also run on the EDS and the HSCL-10 to test for scale validity, and to measure the relationship between the various components of the scales.

Data analysis also consisted of transcribing and coding the qualitative interviews with the use of Atlas.ti (version 7), a qualitative software program that allows for coding, sorting, and organizing data (Bernard, 2006). The purpose of analyzing the transcripts was to allow for using direct quotes regarding emotions and personal stories surrounding attachments to local ecosystems. I used a grounded theory approach to identify and analyze the codes found within the interview transcripts (Bernard, 2006). The quantitative components of the research and the transcribed and coded data allowed for themes to emerge that address the study research questions and helped me to gain insight into the relationship between mental/emotional health and environmental change in affected Tampa Bay residents. The main themes present in the interview portion of the research study, as determined through careful coding of the interview transcripts consist of: personal connections to the environment, childhood memories, changing

environments, changes in water resources, emotions surrounding environmental change, mental and emotional distress, and stress/well-being.

Chapter 4: Emotional Responses to Seeing Change in Environments: Freelist and Qualitative Interview Results

The results that follow are broken down into three separate categories. Each category was carefully and uniquely analyzed to reflect both the qualitative and quantitative components of the research study. The first category represents the results of the freelist that was completed by all 21 participants pertaining to the emotions they have felt seeing their local environment change over time (included in chapter 4). The second category, and the most comprehensive category, is the qualitative interview component (included in chapter 4). The third and final category represents the results of the two quantitative stress scales that each of the 21 participants completed (included in chapter 5). Before the results of each category are addressed, an overview of the demographics encompassing the research population is discussed.

Demographics

Demographic information was collected from all of the 21 participants at the end of each semi-structured interview along with the completion of the scales. Two-thirds of the sample (14/21) self-identified as female and one-third self-identified as male. The average age of the research participants was 51 years, and the average time each participant has spent living in Tampa Bay was 26.6 years (standard deviation:13; median: 32 years). The majority of the research participants were either born or grew up in the Tampa Bay area. The sample was extremely homogenous in terms of race/ethnicity,

which will be addressed in the discussion section, with 20 of the participants self-identifying as “White” or “Caucasian.” One participated self-identified as Arabic. The research population was also highly educated, with 20 participants completing at least a Bachelor’s Degree and 8 completing a graduate degree (Master’s, JD, Ph.D). Finally, the average annual household income bracket for the participants was \$70,000-\$90,000.

Freelist Results

Before the semi-structured interview portion of data collection was conducted, each research participant was asked to complete a freelist based on a statement given. The statement posed to each participant was, “Please list all of the emotions you have felt seeing your local environment change over time.” All of the 21 research participants completed the freelist exercise. The results of the freelist were extremely varied, representing both positive and negatively-associated words and emotions pertaining to local environmental change. However, the majority of the emotions used to describe feelings toward local environmental change over time were negative. Overall, 109 words and phrases were written down by the research participants culminating in 158 total responses including repeat words.

Table 1. Most Common Words Mentioned Among Participants

Most Popular Freelist Words	Frequency (number of times listed by participants during freelist)
Anger/Angry	13
Sad/Sadness	12
Happy/Happiness	9
Disappointed/Disappointment	6
Frustrated/Frustration	5
Helpless/Helplessness	4
Hope/Hopeful	4
Fear	3

I carefully coded the interview transcripts, which resulted in 23 repetitive codes, seen in Table 2. After the initial 23 codes were analyzed, I narrowed down and/or combined the codes/themes that emerged from the interview transcripts into the seven categories, explained below, which serve as the seven major topics to be discussed.

Table 2. Emergent Codes from Interview Transcripts

Code	Meaning
WisE	Water is Everything
WC	Water Changes
WB	Well-Being
STRESS	Stress
SH	Sink Holes
POS _n NEG	Positive and Negative Changes
POS	Positive Changes and Emotions
PERCONN	Personal Connection
NEG	Negative Changes and Emotions
MOT	Motivation
MODIS	What Changes Cause the Most Distress?
MEN _n EMO	Mental and Emotional Distress Similarities
MENDEF	Mental Distress Definition
HOPLS	Hopelessness
FUGEN	Future Generations
FAWC	Feelings about Water Changes
EMED?	Experienced Mental or Emotional Distress Due to Environmental Change?
EDEF	Emotional Distress Definition
DEV	Development
COP	Children Outside, Playing
ANIM	Animals

The results showed that in general the research participants have strong personal connections with their local environment, often stemming from childhood. The most commonly discussed changes that participants noticed in their local environment include development and changes in water resources, and these changes often cause distress. After personally defining both mental and emotional distress, the participants discussed the ways in which they experienced mental and emotional distress tied to environmental change, and also admitted that changes to the environment caused stress (both in negative and motivating ways), and that their well-being was impacted by environmental change, primarily through air and water pollution.

The results below outline the prominent themes of: personal connections to the environment, childhood memories, changing environments, changes in water resources, emotions surrounding environmental change, mental and emotional distress, and stress/well-being. The themes were developed from codes out of a grounded approach through careful examination of the interview transcripts.

Personal Connections to the Environment

“Personal connection? Would it be wrong to say it’s my church?...The connection to nature is how I get through life, which is not always easy. It helps me think, it helps me feel”-58 year old female research participant talking about her personal connection with the environment

When asked if they had a personal connection with the natural environment, all 21 participants said yes. The most commonly given answer was “absolutely.” Participants described their personal connection with the environment in terms of both their literal and tangible physical association with nature, such as participating in outdoor extracurricular activities and exploring the landscape, as well as spiritual and mental connections with

the environment. It was also apparent through analyzing the interview transcripts, that childhood for many of the participants was a time for outdoor exploration and an important factor in influencing environmental connections in adulthood.

Physical Connections

Participants often spoke of their personal connection with the natural environment in terms of “playing” or “exploring” outside, both in childhood and adulthood. One 56 year old participant discussed her personal connection with the environment by saying, *“I’m a third generation Floridian, and they all dig in the dirt and we’re all gardeners and farmers and planters and harvesters, so I was raised with that kind of mind-set.”*

Participants were also actively involved in bicycling, camping, canoeing/kayaking, and hiking, and mentioned these activities as important aspects of their personal connection with the local environment. Another participant, a 35 year old female, stated, *“All my life we’ve always gone out and done outdoor activities... we’d go boating a lot, go out to Honeymoon Island and all of those places, so since the time I was born it’s just like outside is what you do for recreation.”* Physical connections to the environment were not the only types of connections discussed by the participants. Mental and spiritual environmental connections were also important to participants.

Peaceful Places and Spirituality

Though not the most prominent category, mental and spiritual personal connections with the natural environment were important to some of the participants, and participants often spoke of those connections without being probed (I did not explicitly

ask questions pertaining to participants' mental and spiritual personal connections with the environment). Two main aspects of spiritual and mental connections with the environment were discussed among the research participants, including mental and peaceful connections influencing well-being and spiritual/religious connections.

Mental Connections

Some research participants talked about their connection with the environment in terms of mental health and well-being. Participants often viewed the environment as an important tool in shaping mental health and sanity. According to a 35 year old female participant, *"I just think that being outdoors and being connected to the natural world makes a healthy person. It just keeps us whole, keeps us sane."* This sentiment was shared by other research participants who believed in the ability of the environment to relieve stress and *"calm your mental state."* One 60 year old research participant felt so strongly about her personal connection with animals and the environment in general that she stated, *"Like I was telling you when we were walking, I've loved outdoor stuff and critters and plants ever since I was a little kid and I just, I can't imagine my life or my existence without things like that. I honestly don't think I would want to live if I couldn't do what I do."* This powerful connection between mental state and the environment shows a deep appreciation for nature, which is also seen in the sentiments of participants regarding the environment being a peaceful place for them to relax and gain happiness. Though many participants believed the environment could shape their mental state both positively and negatively, they also believed that their connection with the environment was often one of peace and happiness. One 37 year old female participant declared, *"I*

personally connect with it [the environment] just in every way...It makes me happy. That's where I get my peace is outside."

Spiritual/Religious Connections

Along with feelings of peace and happiness that were used to describe participants' personal connections with the environment, spirituality and religion were also briefly mentioned by some participants as important aspects of their connection to nature. One 53 year old participant described her connection to the environment as, "A *spiritual connection. I feel that it's a part of me and when something harms it I feel like its harming me.*" Another participant, a 54 year old female, shared her religious views on human connections with nature by stating...

"It's almost spiritual. It's like, and I'm a spiritually connected person with God. I'm a Christian so I believe in God and Jesus Christ, but in my travels around the world, Hindu people, the Islam people, the tribal peoples, there's this spiritual connection between the land and the air and the wind and the water and us."

These types of personal connections with the environment among research participants, including mental connections and spiritual connections with the environment, were commonly discussed throughout the research interviews. Many of the participants' personal connections with the environment stemmed from the same influential time period, childhood.

Early Beginnings: Childhood Memories of Environmental Experiences

For most of the research participants, their personal connection with the environment developed during childhood. Though I did pose a question to each of the participants regarding if the environment was important to them as a child or a young

person, many of the participants discussed childhood as an important time in their lives for environmental experiences before that question was asked, choosing to discuss their childhood connection to nature on their own. Both “playing” and “exploring” outside were mentioned multiple times by the research participants as important factors in the development of their personal connection with the environment. One 39 year old participant described her childhood environmental experiences as, “*We were always playing outside, playing in the dirt, playing in the mud pies in the street, running through the grass, climbing trees, going to the park...we were always outside.*” Another participant, a 35 year old female, stated, “*Growing up we always got to play outside and explore natural places. I kind of don’t understand videogames and kids that will just stay inside and watch TV. It makes me feel crazy.*”

Many participants cited their parents as important contributors to their interest and participation in environmental activities. One 56 year old participant even talked about environmental knowledge being passed down by her grandmother stating, “*My grandmother knew all the names of different plants, the flora and the fauna. My dad knew the names of the birds and so I was always learning the names of things around me, so that’s why I always felt like it [the environment] was mine.*” Many participants claimed that their parents’ connection with the environment and parent-child participation in outdoor activities was a major factor in determining their environmental experiences and connections as children, which was carried over to adulthood. Participants mentioned outdoor activities such as fishing and going to parks with their parents as influential events for developing a connection with the natural environment. Parents also influenced participants to care for and respect the environment as children. One 54 year old female

participant reminisced, “*Dad instilled it in us when we were really little...Dad always said ‘OK now not only are we going to pick up our stuff but we have to pick up something else, some other debris’, so everywhere we went Dad’s motto was always leave a place a little bit better than you found it.*”

Participants’ connections with the environment, including mental connections, spiritual connections, and the development of a connection with the environment during childhood, help to show the importance of the environment to the research participants. The results that follow will continue to shed light on the values that participants attach to the environment, their feeling towards local environmental change, and their experiences with mental and emotional distress tied to changing ecosystems.

Changing Environments

Development: When is Enough, Enough?

“The Field of Dreams was a movie that they made years ago...it’s about a man who fantasizes about having famous baseball players come to visit him, and somebody tells him that if he builds a stadium worthy enough, they’ll show up, their ghosts at any rate, and the phrase came into the language ‘if you build it they will come.’ Well we built it and they didn’t come.”- 72 year old male interview participant speaking about development in Florida

When asked if participants had noticed any changes occurring in their local environment, the number one answer given was increased development, primarily poorly planned sprawl and development that destroyed natural ecosystems, such as water ecosystems or forests. The majority of participants viewed the current state of development and construction in the Tampa Bay area as negative, primarily because increased development has destroyed or harmed natural ecosystems, such as wetlands, forests and beaches. Participants also claimed that animals are often negatively impacted

by the destruction of local ecosystems for the purpose of development, which is upsetting to them. Though many participants felt strongly about the negative impacts of development in Tampa Bay, most agreed that development was necessary, but that it should be done in a more smart and planned way, taking into account green building, sustainability, and re-development.

Development and the Destruction of Natural Ecosystems

Many participants felt strongly about the negative impacts of development on the environment, particularly environments that the participants had previous experiences with and had spent time visiting. One 52 year old participant described his frustration with development by stating, *“It’s really sad to see some of the developments around the Bay...I’ve worked so hard to protect these areas and then [you] lose them to development, and realize that you’ll never be able to get them back again.”* Another participant, a 40 year old female, shared...

“It’s heartbreaking. Even though I know it has to happen in some ways and there’s really no way to avoid it, it’s really heartbreaking to see a natural environment be destroyed and as I’ve worked here [environmental organization] I’ve learned so much more about what the natural environment is, what is a native plant, what’s not, and I was really shocked to see how little of the native stuff is actually left.”

Not only did participants feel strongly about the negative impacts of development to local ecosystems in general, but they often shared their fears regarding the health and safety of animals in developed areas.

Impacts to Wildlife

Many of the participants shared their interest and concern for animals during the course of the interview, even though no questions specifically addressing animals were asked. Participants shared that they enjoyed seeing and appreciating animals in their natural habitat. The research participants were particularly vocal about the negative impacts that occur to wildlife in developed areas of Tampa Bay. Participants feared for the safety and health of animals that faced ecosystem displacement due to increased development and also shared their feelings on seeing increased “road kill” near developed areas. A 35 year old female participant offered her opinions on development by saying, *“It makes me feel sad...we don’t need to keep building more and taking away habitats from animals, it’s the same thing with where you see they’ll build right by lakes and then there’s a lot of road kill there because they’re all [the animals] trying to move somewhere else, so it’s just sad, like they have no say in it.”* Participants also mentioned birds, bobcats, and foxes as animals that are heavily impacted by development in the Tampa Bay area. According a 39 year old male participant...

“One of the tough things for me is you start seeing animals hit on the road. You start seeing deer hit on the road, you start to see all these animals that are displaced from those areas and you hear about it all the time. You hear about people having alligators in their front yards, and pigs in their front yard, snakes in their garage. It’s because they keep on encroaching on these areas and the habitat has nowhere to go...at some point you kind of feel like you’re in despair because it’s like you don’t know how to change it, how to make it better, and how to make it stop.”

Though participants felt strongly about the negative impacts of development, often because of the effects of increased development on natural ecosystems and wildlife, participants stated that they understood that development is necessarily, but that it must be done in a smart way that takes pressure off of wildlife and natural places. Below,

participants offered their opinions on the failure of development in Tampa Bay in terms of smart growth, green building, and re-development, and provided general recommendations for how smart and well-planned development can benefit humans, animals, and ecosystems in Tampa Bay.

“Smart Development”

Though many research participants were not happy with the current state of development in Tampa Bay, most said they understood that development is a necessary reality in Tampa Bay, as one 39 year old female participant stated, *“As an adult, I understand the necessity and what happens with needing growth and all of the economic things that are tied to it.”* Participants were very quick to admit that not all development is negative for the community and ecosystems as a whole, however, they stressed the importance for development to be well-planned instead of *“scorched earth development”*, as one participant called it. Participants repeatedly mentioned their frustration with developers and local officials who promoted rampant development that lacked conscious and strategic planning. One 35 year old female claimed...

“I’m OK with right-place development, because like I said I’m not anti-all development, and obviously my career is based upon development so I have some vested interest in that, but I would say that people and developers in particular who insist on trying to develop places that shouldn’t be developed when there are plenty of other places that are appropriate to develop is very annoying to me, and I feel that our local government officials need to take a stand on that.”

The same participant went on to say that unfortunately in the Tampa Bay area, particularly in Hillsborough County, there is a long history of loose permitting laws, which hinders good growth and is not good for the county long-term.

Participants also offered their frustrations regarding the lack of infill development, or re-development in Tampa Bay, and suggested that smart and strategic development needs to include redevelopment strategies instead of new developments being built on natural or “pristine” lands. The participants listed many examples of their experiences seeing vacant lots, abandoned houses, and “half-built” properties that could be redeveloped, but instead are left to sit while new developments were ploughed over forests instead. One 56 year old female participant summarized this point saying, *“I personally think that we have plenty of buildings already existing that can be used and they are empty. And I don’t see any reason why we need to be tearing out more land at this point here in this area.”* A 42 year old female participant affirmed this point, offering her take on development in Tampa Bay saying...

“I don’t know why you have to deforest something in order to build apartment complexes. There’s plenty of established concrete that’s sitting vacant they could build on...it’s frustrating because there’s no long-term planning...it just causes more displacement of animals, destruction of the woodlands, unnecessarily.”

Research participants not only pointed out the flaws with current development policies in Tampa Bay, but also offered broad solutions to encourage both development and the protection of natural resources and ecosystems, while still promoting economic growth. Green development and green building, along with sustainability was mentioned by some participants as important strategies to consider for development in Tampa Bay. As one 58 year old female participant stated...

“I wish we had forward thinking leaders who could see ways to create communities that would certainly, if not restore, at least stop abusing and exploiting the natural environment, and I believe we have the technology and the innovation to do that, we just need the wealth...the other hat that I wear is green business development, so I’m totally on board with that, the ability to create jobs especially in the community.”

When asked if he was concerned about development in the region, one 67 year old male participant admitted that he was very concerned and said, *“It needs to be smart development, it needs to be green development. If we’re going to build something let’s build a zero energy complex, especially school complexes. The stuff our tax dollars are going for, county buildings, city buildings, federal buildings, why aren’t we making them zero energy buildings?”*

Overall, development was discussed by the research participants more than any other topic throughout the interviews, showing that this topic is one of incredible concern among the research participants. Another major concern among the research participants was changing water environments, including changes in rivers, lakes, and the quality of water in Tampa Bay.

Changes in Water Resources

The second most-discussed topic by the research participants as a whole throughout the interviews was changing water resources over time, particularly lakes, ponds, and the Hillsborough River, but also the Bay and wetlands in the Tampa Bay region. Participants frequently discussed their concerns seeing lakes and ponds dry up over the years, and their fears surrounding diminishing water table levels and the Floridan Aquifer. However, not all changes in water resources mentioned were negative, as participants also talked about the increased health of the Bay and the Hillsborough River over time. Much of the efforts to restore the Bay and the Hillsborough River were promoted by residents and environmental organizations, and the research participants

interviewed who were involved with those efforts are happy and grateful to see positive changes occurring in those water resources.

The Disappearance of Lakes and Ponds

When asked if participants had noticed changes in wetlands or lakes in particular in the Tampa Bay region, the most commonly given answers were changes in lake levels, increased vegetation in lakes, and a diminishing aquifer. According to a 39 year old female participant, *“Unfortunately close to where we live our water table has dropped, so we no longer have a small lake, or a small pond that was down from our property. It doesn’t fill up any more, but used to five years ago, ten years ago.”* Most, though not all, of the participants did not believe the changes in the lake levels were cyclical but were unsure what was causing lake levels and the water table in general to diminish. When asked to elaborate on her experience with changing water resources in her environment, the same 39 year old female participant shared her concern yet confusion about the dropping water levels of lakes and ponds by her home stating...

“Lake levels declining definitely. Definitely the ones by us, we no longer have water in them and we did seven to ten years ago. It just doesn’t fill. We can get a hard rain, it will pool for a little while but it soaks and then moves on, so those changes have caused, now I don’t know if its necessarily a lowering of the water table there, if it is the fact that...because it is a more rural area, I don’t know if it is because all of us have houses out there, more of us are tapping into that because we are not on city water. We’re on a well, so I don’t know if we’re the problem.”

Participants also mentioned the Water Wars that occurred in Tampa Bay and shared their memories on seeing and hearing about lakes completely drying up in certain areas of Tampa Bay. One 53 year old female participant even reminisced about a lake she visited as a child completely drying up by the time she was an adult saying...

“There was a girl scout camp I went to and there was a lake there, where I learned how to canoe when I was like 8 years old, and our daughter went there many years later and I kept on looking back at the brochures like where is the lake? Where is the canoeing? And so then when we went out there the lake wasn’t there anymore. It was just like this indentation with like growth, you know? That’s pretty dramatic.”

Along with talking about lakes and ponds drying up and diminishing water levels in general, many participants were also concerned about the Floridan Aquifer, particularly about the water level in the aquifer declining in many areas, and some participants mentioned they were concerned or had experienced sinkholes opening up in areas where they live, resulting from groundwater pumping.

Positive Changes in Water Resources

As mentioned earlier, not all of the changes in water resources cited by the research participants were negative. In particular, some residents mentioned the Bay becoming healthier after much work from residents since the 1970’s, as well as the health of the Hillsborough River ecosystem improving after minimum flows were established over a dam in the area. With regards to the Bay, one 54 year old female participant who has worked on improving the health of the Bay for decades stated...

“I have noticed that the water quality of Tampa Bay is getting better, that’s a lot to do with [environmental organizations], the sea grass plantings, the oyster domes, huge, huge, positive impact on the water quality. The fish coming back and whenever you see pelicans coming back, that’s a huge sign, I watch for stuff like that, and living here 15 years on the saltwater I can see the snook coming back, the redfish. That’s on the positive side.”

Another participant, A 67 year old male, echoed the positive aspects of the Bay becoming healthier and stressed the importance of keeping the Bay healthy by stating...

“It is encouraging knowing that what’s being done around Tampa Bay is making a difference. The sea grass is coming back to good levels and the water quality is improving dramatically, the fisheries are coming back and we need to keep that going by

OK let's not water our lawns, let's cut back on the fertilizer or don't even do that, talk to somebody who knows about a Florida friendly yard or xeriscaping."

In addition to the Bay becoming healthier over the past four decades, some research participants also shared that they are seeing the health of the Hillsborough River improve after years of uncertainty regarding the future of the lower part of the Hillsborough River, positioned underneath a dam near Rowlett Park. Multiple participants explained that the dam had previously cut off much of the oxygen to the lower part of the Hillsborough River and had also allowed for salinity from the Bay to creep up into the river ecosystem. Some of the interviewees explained that with hard work and persistence from key individuals and environmental organizations, a minimum flow was passed that allowed for *"at least 10 cubic feet per second to go past the dam, so you have that minimum flow to the lower Hillsborough River."* Whether participants noticed positive or negative changes in water resources in the Tampa Bay area, it was clear that they had very strong emotions and reactions to changing water systems in the area and offered their opinions on how changes to water resources made them feel.

Emotions Surrounding Changing Water Resources

When asked how seeing changes in wetlands and lakes in particular made them feel, research participants often used the word "sad" or "sadness," along with "worried," "powerless," and "angry." In general, participants used negative words to describe their feelings toward changes in water resources. According to a 39 year old male participant...

"I think that's where that word depression comes in or sadness, because you see those changes and over time you see that it never goes back to where it was before. Those changes are long-term...when you see them [lake and water levels] go down and they

never get back to that historic level that you saw before, I mean that's when you start thinking things are really changing and I think your mood changes, you're like what's going on? What's happening with the places that I knew? Everything's changing."

The sentiments expressed by the research participants when asked particularly about feelings toward changing water resources are only part of the collective results gathered regarding participants' feelings and emotions toward general local environmental change in the Tampa Bay area. The next section provides insight into how various changes in the local environment make the research participants feel, including negative emotions resulting from ecosystem destruction and widespread change, to positive emotions experienced when residents see the environment being protected and cherished.

Emotions Surrounding Environmental Change

When asked how participants felt when they saw local environmental change, they expressed both positive and negative feelings and emotions, depending on the type of change occurring in the local environment. Some participants were quick to distinguish that there were both positive and negative changes they saw occurring, and that each instance of environmental change evoked different, often polar reactions and emotions. Below, an overview of the negative feelings participants experience when they see their local environment changing is discussed, followed by an overview of the positive emotions they experience when they see people and organizations working to protect local Tampa Bay ecosystems and wildlife.

Negative Changes and Emotions

Many of the research participants tied negative feelings and emotions to environmental changes, primarily development activities and the destruction of local ecosystems. Common words used to describe negative feelings toward unwanted environmental change included “anger,” “frustration,” “sadness,” “helplessness,” and “depressing.” Sadness and depression were often mentioned and some participants offered their personal experiences with these emotions. As one 39 year old participant shared, as he spoke of his feelings toward development activities in the Tampa Bay area, *“I hate to keep using the word depressing but there was a period of my life that I was depressed about it, because it’s like everywhere you go they’re developing this piece of property...”* Though sadness, anger, and depression were often mentioned by research participants, hopelessness and helplessness were also negative emotions used to describe environmental change.

Some residents felt helpless in the face of environmental change and felt they lacked power to protect the environment. One 68 year old male participant stated, *“I feel powerless to affect change or to draw the attention to people who care about it.”*

Another research participant, a 56 year old female, shared her feelings toward changing Tampa Bay ecosystems, saying...

“I would say that anything that looks like it’s being destroyed or going away is definitely not a good feeling, a sad feeling, and I feel a little helpless. I don’t feel like I can do anything about that. I only feel like, you know, one small person, one small thing, I recycle my bottles and turn off the water when I brush my teeth, do one small thing, but on the big scale like you said, I feel helpless, like there’s nothing I can really do about that.”

The negative sentiments surrounding environmental change, including sadness and helplessness, begin to show the connection between mental and emotional health and

environmental change, which will be discussed further in another section. Below, research participants offered their positive feelings toward environmental change, including happiness and hope.

Positive Changes and Emotions

Some of the positive changes to the local environment participants mentioned included increased preservation of parks and improved health of the Bay and the Hillsborough River. The emotions used by participants to describe feelings toward positive changes to the environment included “happy,” “exhilarating,” “hopeful,” and “encouraging.” One 52 year old male participant shared his positive view of local environmental change by sharing, “*We lose some battles but the war continues to be positive. We’re one of the few estuaries in the country that is able to say that because of what we’ve done over the last 20 or 30 years. We’re seeing a net improvement and there’s a lot of places that cannot say that.*” Many participants also applauded the efforts of fellow citizens and organizations for working hard to protect the local environment, which gave them hope. As one 40 year old female participant explained, “*When I see improvements it makes me feel very hopeful, very grateful to humanity for being smart enough and evolved enough to know that it’s important.*” The feeling of hopefulness was echoed much more often than the feeling of hopelessness mentioned above, and was a significant positively-associated emotion tied to some changes in the local environment.

Though the feelings and emotions that participants tied to local environmental change tended to be negative throughout the interviews, many participants were adamant about talking about the positive changes that have happened to ecosystems in Tampa

Bay, and how those changes have promoted some optimism and hope for the future of environmental issues in Tampa Bay. I further extended the conversation concerning feelings toward local environmental change by inquiring about distress experienced by the research participants tied to environmental change. A discussion of participants' definitions of distress and experiences with distress stemming from local environmental change is discussed in the next section.

Mental and Emotional Distress

The research participants shared a wealth of information regarding their personal connection to the environment, the types of changes they have noticed in their local environment over time, and the feelings and emotions they experience seeing the environment change. The knowledge and opinions shared by each of the interviewees up to this point was instrumental in understanding how all of the above factors influence mental and emotional distress among the research participants. I posed a series of questions pertaining to mental and emotional distress to each of the participants, hoping to identify how the participants define mental and emotional distress, if they experience mental or emotional distress due to environmental change, and what changes to the environment cause them the most distress. Though the issue of emotional distress and environmental change is explored through the stress scales later on in the paper, the semi-structured interviews are also an appropriate and valuable forum for exploring the topic of mental and emotional distress linked with local environmental change.

Define Distress

Before I asked if participants had ever experienced mental or emotional distress due to environmental change, I asked participants to separately define both mental distress and emotional distress. Clinically, mental distress can be defined as when an individual is unable to cope with the normal stresses of life and has limited or impaired work productivity (WHO, 2012). A variety of mental disorders, general stress, and emotional distress stemming from a variety of causes can contribute to mental distress.

Over half of the participants had a very hard time separating mental and emotional distress, often stating that they could not separate the two or that they did not know the difference. A common explanation for the separation was summarized well by one participant who stated, “I can’t necessarily separate the two. If I’m distressed mentally I’m probably very distressed emotionally.” While the majority of participants tied mental and emotional distress together, many did eventually try to separate the two, presented below.

Mental Distress Definition

Though it was difficult for the research participants to separate definitions of mental and emotional distress, some general definitions of mental distress included words such as “cognitive,” “intellectually-driven” distress, “debilitating,” and various statements about literally not being able to understand something. In other words, participants generally believed that mental distress affects a person intellectually, and affects a person’s ability to function normally. For example, when asked what separates mental distress from emotional distress one 42 year old female participant stated, “I

would say when it's debilitating. When you're not able to function in your normal daily life because you're mentally thinking or combating some stress agent." Participants also defined mental distress as not being able to understand something or rationalize a situation. As one 58 year old female participant put it, "*Mental distress for me would be I guess not understanding something, and I mean that very literally, so not knowing enough, not having enough knowledge, not having the time to gain knowledge about an issue, so for me mental distress is very definitely about mental ability and capacity.*" The definitions that many residents gave for mental distress were much more technical when compared with definitions given for emotional distress, which residents seemed to identify with more.

Emotional Distress Definition

In general, the research participants seemed to identify more with emotional distress than mental distress and gave more confident definitions of emotional distress, often encompassing personal stories or personal feelings of emotional distress. One 56 year old female participant shared her definition of emotional distress saying, "*Emotional [distress] would be worried about something that means something to me.*" When asked to define emotional distress, the research participants often spoke of hopelessness, a sense of loss, or "feelings-oriented" distress. Some of the other words and emotions the participants used to define emotional distress included "worried," "sadness," "anger," and even "hormonal."

What Causes the Most Distress?

After each of the participants personally defined both mental distress and emotional distress, they were asked if local environmental change in Tampa Bay had ever caused them mental or emotional distress. The majority of the participants did believe that they had experienced mental or emotional distress due to local environmental change at some point during their residence in Tampa Bay, which will be discussed more in the next section along with the theme of stress caused by local environmental change. When asked which changes to the local environment cause them the most distress, the research participants most often cited habitat destruction and impacts to wildlife. One 37 year old female participant shared...

“The animals, like the habitat destruction really causes me stress, or just people not being considerate of what else is around them in this world besides themselves really frustrates me. So watching a boater speed by a manatee at 40 miles per hour with the engine running open when they know they’re not supposed to, that really makes me upset.”

Other prominent distressing changes that participants mentioned included development (lack of planning and lack of redevelopment), pollution of water resources, and air quality.

Stress and Well-Being

“Somebody once defined stress as being your body’s reaction when you see some asshole that desperately needs to be choked.” - 72 year old male interview participant semi-joking about his definition of distress

The research participants not only shared their experiences with mental and emotional distress stemming from local environmental change, but also discussed stress they experienced related to changes that occur in the environment. I first asked each

research participant if local environmental change was a source of stress for them personally, and then asked the participants to quantify the percentage of stress local environmental change caused them out of their total life stressors. The results showed that though many participants did experience self-diagnosed stress from the various forms of local environmental change discussed throughout the results, that stress was also a motivating factor for them that encouraged many of the participants to get more involved with environmental issues in the community.

The Effects of Stress and Motivation

In general, the participants were a very low-stressed population, determined by the Hopkins Symptom Checklist-10 that each of the 21 participants completed, which will be discussed in the next chapter centering on the two stress scales completed by the participants. When asked to quantify the amount of stress out of their total life stressors that local environmental change caused the participants, the results varied. One participant believed that only 1% of her total life stressors were due to local environmental change, while another participant claimed 90% of his total stress was due to local environmental change. There was a lot of variability in-between the two extreme numbers, with most percentages falling between 20% and 60%.

When asked to talk about their experiences with stress tied to local environmental change, many of the participants stated that they often thought of the stress they experienced seeing local environmental change as a motivating factor in their lives that pushed them to get involved in important issues in the community. This coping mechanism, though not experienced by all of the participants, was a prominent theme

seen throughout the interview transcripts. As one 58 year old participant stated when talking about the stress she experienced stemming from local environmental change...

“I’m always trying to figure out a way or work with friends to figure out a way to make it better, so I wouldn’t say it stresses me out, I actually enjoy working with people trying to find a positive solution to things, so I don’t know, it keeps me busy. I mean I wish it would go away but if it had to be here it’s nice to be able to work with a group of people who have like-minded ways.”

Another participant, a 35 year old female, echoed a similar sentiment regarding stress and environmental change in Tampa Bay saying...

“I don’t really think about it as stress, I think about it as motivation. I mean I think, because to me stress is something that you worry about that you don’t think you can do anything about...I think that when there’s something like that it’s an opportunity...a motivating opportunity to make a change in something that needs to be changed, but I would say that with that sometimes you don’t win everything and sometimes when you lose those fights that that can be very distressing but that’s also a motivation to try to reform things to make things better for the next go around.”

More results pertaining to stress will be examined in the next chapter covering the stress scales completed by the participants, but it is important to note the self-defining stress experienced by each of the participants, and how that stress can lead to positive motivation.

Well-Being

Though stress in general was not seen as particularly negative to the participants as a whole, many participants did believe that their well-being was negatively impacted by local environmental change. When the research participants were asked how environmental change in Tampa Bay affects their well-being (both mental/emotional welfare and physical welfare), the most common responses given were that it affects residents through increased pollution (primarily poor air quality and contamination of

water) and diminished water quantity. One 39 year old participant shared her feelings on how local environmental change affects her well-being by stating, *“Well of course it affects us every day... everything affects the environment from the air we breathe to the water we drink, so it definitely affects us, and I’m aware that it affects me.”* With regards to water quality and quantity one 72 year old male participant stated, *“We’re draining [the] aquifers and the water that comes out of them is very heavily mixed with calcium and low-grade iron, as a result you actually have rust in your bathroom, and so the quality of the water is none too great yet we continue pumping it down and what’s going to happen when that finally empties out?”* Participants often spoke about well-being in terms of how all of the local environmental problems in Tampa Bay can converge to produce harmful mental and physical effects to both humans and other animals and plant life.

Chapter 5: Quantitative Scale Results

In addition to the freelists and semi-structured interviews conducted with the 21 research participants, I utilized two different stress scales in order to fully document the emotions and the distress/stress the research participants were experiencing due to local environmental change. There is no doubt that the results and stories gained from the semi-structured interviews with participants were comprehensive, informative, and rich. However, utilizing scales and a mixed-methods approach has the potential to actually measure the phenomenon of emotional distress and environmental change in a complementary and holistic way (Bernard, 2006). The results of the two scales completed by each of the 21 participants enhanced and added more validity to the semi-structured interview results by quantitatively verifying what the qualitative interview results showed: that participants have a very deep connection to their local environment and generally experience distress when they experience changes occurring in their local natural environment. The two scales utilized in the research study included the Hopkins Symptom Checklist-10 (HSCL-10), which served as a general measurement of stress, and the Environmental Distress Scale (EDS), which was first developed in Australia to measure distress caused by local environmental change. As described in the methods chapter, I adapted the EDS to the Tampa Bay area through participant observation, collaboration with my committee, and suggestions given by one of the developers of the scale, Dr. Nick Higginbotham. The same 21 participants who completed interviews also

completed both the HSCL-10 and the EDS. A selected portion of the sample demographics are provided in Table 3.

Table 3. Demographic Information for Scale Respondents

Gender	Age (years)	Race, ethnicity, or ethnic group	Time in Tampa Bay (years)
F	39	White	36
F	41	White	33
F	37	White	5
F	56	Arabic	45
F	35	Caucasian	3
F	35	White	15
F	42	White	34
F	35	White/Caucasian	20
F	70	Caucasian	40
F	53	White	52
M	57	Caucasian	35
M	68	Caucasian	19
M	58	Mostly Caucasian	20
F	40	White	37
M	52	White	32
M	72	Caucasian	15
F	60	White	5
F	54	Caucasian	15
M	67	Caucasian	25
M	39	White	38
F	58	White	35

Hopkins Symptom Checklist (HSCL-10)

As mentioned in the methods section of the paper, the HSCL-10 was developed by Nguyen et al., (1983), to serve as a shorter version of the original HSCL-90. The HSCL in general was originally developed and designed by Parloff, Kelman, and Frank at Johns Hopkins University in the 1950's. The overarching goal of all forms of the HSCL is to measure stress and a broad range of psychological problems. All 21 research

participants were asked and agreed to complete the HSCL-10. The HSCL-10 asks the participants if in the past two weeks they have been troubled by feeling:

1. Sudden fear for no reason
2. Afraid or anxious
3. Faint or dizzy
4. Tense or harassed
5. Guilty
6. Sleeplessness
7. Dejected
8. Useless, of little worth
9. That everything is a burden
10. Hopelessness for the future

Each research participant was asked to respond to each emotion/feeling listed above with a likert scale response of either “No,” “Slightly,” “Much,” or “Very Much.” The purpose of the participants completing the HSCL-10 was so that general stress could be measured against the Environmental Distress Scale, to see if distress and stress caused by environmental change could be isolated. In general, the participants showed very low general stress/psychological distress through the HSCL-10. Almost every response given for the 10 items was either “No” or “Slightly.” The responses of “Much” or “Very Much” were only documented nine times throughout all 21 scales, in reference to the following items: afraid or anxious (n=3), sleeplessness (n=3), tense or harassed (n=3), and useless, of little worth (n=1) (Table 4).

Table 4. Hopkins Symptom Checklist-10 Results

	No	Slightly	Much	Very much	Total (n=21)
1. Sudden fear for no reason	18 (86%)	3 (14%)			21
2. Afraid or anxious	9 (43%)	9 (43%)	3 (14%)		21
3. Faint or dizzy	20 (95%)	1 (5%)			21
4. Tense or harassed	7 (33%)	11 (52%)	3 (14%)		21
5. Guilty	11 (52%)	9 (43%)	1 (5%)		21
6. Sleeplessness	5 (24%)	13 (62%)	2 (9%)	1 (5%)	21
7. Dejected	15 (71%)	6 (29%)			21
8. Useless, of little worth	17 (81%)	3 (14%)	1 (5%)		21
9. That everything is a burden	16 (76%)	5 (24%)			21
10. Hopelessness for the future	12 (57%)	8 (38%)	1 (5%)		21

***In the course of the past two weeks have you been troubled by feeling:**

It should be mentioned that the low stress results seen in the research population based off the HSCL-10 could have been influenced by the fact that I was present in the room while each participant completed the scale. Participants may have felt self-conscious or experienced reactivity, the act of changing one’s answer or behavior when they know they are being studied (Bernard, 2006), in order to fit a social “norm”, though I was careful to gain trust and rapport with the research participants and feel confident in the results of the HSCL-10 for each participant.

The overall low stress score determined by the HSCL-10 for all of the participants, both individually and collectively, was an important baseline to measure against the second and more comprehensive scale, the Environmental Distress Scale (EDS). The results of the EDS are presented below, followed by a discussion pertaining to the relationship between the two scales and concluding remarks on the meanings of the

scales and what the results mean for the participants and the topic of mental and emotional distress tied to environmental change.

Environmental Distress Scale

As described in the methods section, the Environmental Distress Scale (EDS) was originally developed in 2004 based off research conducted by Connor et al. in the Upper Hunter Valley in Australia, which is an area heavily impacted by open-cut coal mining resulting in widespread landscape change. The scale measures emotional distress by posing questions related to six different themes tied to environmental change and destruction including: frequency of hazard events in the environment, the observation of hazard events in the environment, threat to self/family with regards to hazards, felt impact of environmental change including physical, emotional, psychological, and social symptoms and economic loss, feelings of solastalgia (described earlier as distress experienced when valued environments are destroyed by unwelcomed change), and performance of environmental actions.

Frequency of Hazard Events (9 Questions)

The first theme to be analyzed within the Environmental Distress Scale was the section pertaining to frequency of hazard events. In this section, participants were asked to rank on a five-point scale (1 being strongly disagree and 5 being strongly agree) how much they experienced certain environmental events occurring in their community, including groundwater pumping, pollution of water resources, lake levels diminishing, wetlands drying up, development, etc. Using the statistical program SPSS (version 20),

descriptive statistics were generated to understand both individual and collective results and patterns within the frequency of hazard events theme. The mean score given from the participants as a whole was a 3.11, with standard deviations for each question ranging from .700 to 1.095. The median for each question ranged from 2 to 4, presented in Table 5 (page 72). The overall mean, median results, and standard deviations for each of the questions show that the average score for the section was slightly over “Neither agree nor disagree,” meaning that the events listed as a whole for that section were neither frequently experienced nor frequently absent in the communities where the participants live. However, some of the environmental occurrences the participants were asked to score generated more collective agreement within the group, showing that the environmental occurrence was more frequently noticed by participants, particularly the question pertaining to experiencing increased development on previously uninhabited areas, which scored a mean of 4.10 for the participants as a whole, slightly over “Agree.”

Observation of Hazard Events (6 Questions)

Questions with a “Yes/No” answer were posed to residents on the Environmental Distress Scale section on observation of hazard events in the Tampa Bay area, asking if residents had noticed certain environmental events occurring in Tampa Bay in general, including large scale changes such as lakes and wetlands drying up and increased development, loss of native vegetation, sinkholes, and soil erosion, among others. The three statements that generated the most significant agreement among the research participants included observing (continued on bottom of page 72):

Table 5. Descriptive Statistics for Frequency of Hazard Events

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Median	Skew
Experienced groundwater pumping in local areas.	21	1	5	2.95	1.024	3	-.206
Pollution of land (e.g., chemicals, pesticides, trash, heavy metals).	21	1	5	3.62	1.071	4	-.747
Pollution of rivers or streams (e.g., salinity, chemicals, trash, heavy metals).	21	2	5	3.67	1.017	4	-.187
Pollution of drinking water (wells)	21	1	4	2.10	1.044	2	.376
Contamination of piped city water.	21	1	5	2.00	1.095	2	1.261
Wetlands dying or drying up.	21	1	5	3.48	1.078	3	-.329
Lake levels decreasing.	21	1	5	3.71	1.007	4	-.980
Increased development on previously uninhabited areas.	21	3	5	4.10	.700	4	-.132
Falling cypress trees.	21	1	5	2.33	1.065	2	.621
Valid N (listwise)	21						

1. Large-scale change to the natural landscape (dried up lakes, wetlands, or local environmental degradation due to development. Approximately 95% of the participants (20/21) answered “Yes” to observing large-scale changes.

2. Loss of native vegetation and animals due to environmental change (e.g., development, changing or disappearing ecosystems). Again, 95% of the participants (20/21) answered “Yes” to observing loss of native vegetation and animals due to environmental change.

3. Soil erosion. With this environmental event, approximately 90% (19/21) of the research participants answered “Yes” to observing soil erosion in the Tampa Bay area.

Threat to Self/Family (12 Questions)

The research participants were also asked to score how threatening they thought certain environmental events in Tampa Bay were to both them personally and to their family. Questions posed included asking participants to score (on the same five-point likert scale described above except scoring from “No Threat” to “Extreme Threat”) how threatening events such as pollution of land, pollution of rivers, large-scale change to the environment, lake levels decreasing, loss of native plant species, and other environmental events were to themselves and their families. After descriptive statistics were run on the data, the total mean score given by the 21 participants as a whole was 3.34, with standard deviations for each question ranging from .805 to 1.338. The median for each question ranged from 2 to 4, presented in Table 5. One of the least threatening environmental events to the residents as a whole was contamination of piped city water, which averaged a mean score of 2.67 and a median score of 2. On the opposite end of the spectrum, the most threatening environmental event to residents as a whole was loss of native vegetation and animals due to environmental change (e.g., development, changing or

disappearing ecosystems), which averaged a mean and median score of 4.0 on a 5-point scale. The score for each environmental event can be seen in Table 6 (page 75).

Felt Impact of Environmental Change (Physical, Psychological, Social, and Economic)
(20 Questions)

The next theme that was present on the Environmental Distress Scale, and that is directly related to emotional distress tied to environmental change, was felt impacts of environmental change, both physical and emotional/psychological impacts as well as social and economic impacts of certain environmental events. This theme was one of the most pertinent and complementary to the interview results with regards to documenting and measuring emotional and mental distress due to local environmental change. The questions posed in this section of the Environmental Distress Scale correlated to a 5-point likert scale, explained above. The research participants were asked to score questions pertaining to physical impacts of local environmental events, such as concerns over the health impacts of pollution locally and emotional/mental impacts of environmental events, including feeling angry about environmental degradation and feeling depressed over development.

I generated descriptive statistics on this theme through SPSS after compiling all the scores for the participants. The overall average score for the theme of felt impacts of environmental change was slightly higher than most of the other sections of the Environmental Distress Scale, resulting in an average score of a 3.47 for the group of participants, with a standard deviation for each question ranging from .590 to 1.426.

Table 6. Descriptive Statistics for Threat to Self/Family

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Median	Skew
Groundwater pumping in local environments.	21	1	5	3.05	1.071	3	.167
Concerns about decrease in property value of home due to local environmental change.	21	1	5	3.10	1.338	3	-.052
Heritage destruction (historic buildings, villages, cemeteries or sacred sites).	21	1	5	2.76	.995	3	.529
Pollution of land (e.g., chemicals, pesticides, trash, heavy metals).	21	1	5	3.52	1.209	4	-.624
Large-scale change to the natural landscape (dried up lakes or wetlands, or developed local environments).	21	1	5	3.90	1.091	4	- 1.071
Pollution of rivers or streams (e.g., salinity, chemicals, pesticides, trash, heavy metals).	21	1	5	3.90	1.091	4	- 1.071
Pollution of drinking water (wells).	21	1	5	2.90	.995	3	.543
Loss of native vegetation and animals due to environmental change (e.g., due to groundwater pumping, dying ecosystems, development).	21	1	5	4.00	1.095	4	- 1.261
Contamination of piped city water.	21	1	5	2.67	1.354	2	.811
Lake levels decreasing.	21	2	5	3.71	1.007	4	-.007
Increased local development.	21	3	5	3.95	.805	4	.090
Falling cypress trees.	21	2	5	2.62	.865	2	1.389
Valid N (listwise)	21						

The median for each of the questions in this section ranged from 1 to 5, with most questions scoring a median score of 4 or 5. Though the average score for the section as a whole is under the “Agree” category, high average scoring (over 4.0) was seen in five questions out of ten, showing moderately high distress among the population in the areas of development, depression and anger towards local environmental change, concerns over pollution and human health, and worry for future generations. The questions that scored between a 4 and 5, showing moderately high scoring, include:

Table 7. Highly-Scored Felt Impact of Environmental Change Questions

	Mean	Standard Deviation	Median	Skewness
I am disturbed that decisions about development activity here do not give higher priority to long-term land use for future generations	4.62	.590	5	-1.319
I feel angry about degradation in my local environment	4.24	.889	4	-.989
I am worried about risks to human health from nearby environmental pollution	4.00	.949	4	-1.165
I am concerned that future generations will not be able to enjoy the natural environment	4.62	.921	5	-3.361
The overall impact of development in this area is depressing	4.19	.750	4	-1.319

The question asking about concern over future generations not being able to enjoy the natural environment was scored particularly high (both the mean and the median), along

with having a very high positively skewed distribution, showing high distress/concern among residents over that particular issue.

Feelings of Solastalgia (13 Questions)

Another theme that was tied to distress and emotional attachment to local ecosystems was the Environmental Distress Scale section on feelings of solastalgia, or the distress experienced seeing unwelcomed environmental change. Research participants were asked to score questions on a five-point likert scale from “Strongly Disagree” to “Strongly Agree” encompassing topics such as feeling sad about unwelcomed change, experiencing a sense of missing toward destroyed environments, shame, stress experienced due to local environmental change, etc. The goal of this section of the Environmental Distress Scale was to understand if research participants experienced the new topic of solastalgia with regards to environmental change in Tampa Bay.

After all 21 scales were analyzed, I generated descriptive statistics on the Environmental Distress Scale section of solastalgia, which averaged a total score of 3.77, with the standard deviations for each of the questions ranging from .507 to 1.317. The median scores for each question within this set ranged from 2 to 5, with 4 being the most common median. This section generated the highest scores for any section on the EDS. Out of the 13 questions in the section, seven of the questions scored an average total of 4.0 or over from the participants collectively, showing moderately high solastalgia-related distress. The seven questions that collectively scored above a 4.0 are presented in Table 8.

Table 8. Highly-Scored Feelings of Solastalgia Questions

	Mean	Standard Deviation	Median	Skewness
I am sad that familiar animals, plants and fish are disappearing from this place	4.10	.944	4	-.994
I am worried that aspects of this place that I value are being lost (e.g., clean air and water, beautiful scenery)	4.19	.928	4	-1.243
I am saddened when I look at degraded local landscapes and damaged wetlands and lakes	4.52	.512	5	-.103
It is stressful for me personally seeing species disappearing	4.38	.669	4	-.626
Seeing unwelcomed local environmental change makes me angry	4.57	.949	4	-.777
It is stressful for me personally seeing lake levels decrease	4.00	.910	4	-.745
It is stressful for me personally seeing wetlands dry up	4.14	.507	5	-.311

Performance of Environmental Actions (11 Questions)

The final section analyzed within the Environmental Distress Scale was performance of environmental actions by the research participants. The participants were asked to answer “Yes/No” questions pertaining to their participation in various forms of environmental action, including letter-writing to officials, joining community groups focusing on environmental issues, signing a petition, changing the way water is used in their home, protesting, etc. Overall, the research participants were very active, with the majority being involved in almost all environmental actions listed. The results for this section will not be discussed in-depth since the high participation in environmental

actions and activities among the research participants is probably the result of the overall sampling, which specifically targeted members of environmental groups and organizations.

Cronbach’s Alpha

After analyzing the overall scale results of the EDS and the HSCL-10, I used SPSS to run Cronbach’s alpha tests on the HSCL-10, the EDS, and each of the likert scale sections of the EDS, in order to assess the validity of the scales. A higher Cronbach’s alpha score is correlated with higher scale reliability. A generally accepted reliability coefficient is .7 or above (Nunnally, 1978). The Cronbach’s alpha results for both the EDS and HSCL-10 show very high reliability, seen in Table 9 and Table 10.

Table 9. Cronbach’s Alpha for HSCL-10

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.951	.957	10

Table 10. Cronbach’s Alpha for EDS

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.897	.903	54

Also, when Cronbach's alpha was run on each of the individual likert scale sections of the EDS (observation of environmental events, frequency of environmental events, felt impact of environmental events, threat of environmental events, and feelings of solastalgia), the reliability scores were high and most were well above the .7 reliability mark, seen in Table 11. The overall high Cronbach's alpha test results on the HSCL-10, the EDS, and each of the individual likert scale sections of the EDS show that both of the scales were valid in the context of the current research.

Table 11. Individual Cronbach's Alpha EDS Section Results

Reliability Statistics		
EDS Section	Cronbach's Alpha	N of Items
Frequency	.769	9
Felt Impact	.693	20
Threat	.894	12
Solastalgia	.793	12

Pearson's Correlation

To measure the relationship between the HSCL-10 and the EDS, I used SPSS to run a series of Pearson's correlations on both the relationship between the two full scales and the relationship between the HSCL-10 and each of the sections on the EDS. The Pearson's correlation for the HSCL-10/full EDS was not statistically significant when a 2-tailed correlation was run ($p=0.06$), but was statistically significant ($p=0.03$) when a 1-tailed Pearson's correlation was run. Also, when I ran Pearson's correlations on each of the sections of the EDS, two sections (observation of environmental events and felt impact of environmental events) did prove statistically significant at the $p=0.05$ level, seen in Table 12 and Table 13.

Table 12. Pearson's Correlation for Observation of Environmental Events/Hopkins

		HSCL	EDSObs
HSCL	Pearson Correlation	1	.436*
	Sig. (2-tailed)		.048
	N	21	21
EDSObs	Pearson Correlation	.436*	1
	Sig. (2-tailed)	.048	
	N	21	21

*. Correlation is significant at the $p=0.05$ level (2-tailed).

Table 13. Pearson's Correlation for Felt Impact of Environmental Events/Hopkins

		HSCL	EDSFelt
HSCL	Pearson Correlation	1	.506*
	Sig. (2-tailed)		.019
	N	21	21
EDSFelt	Pearson Correlation	.506*	1
	Sig. (2-tailed)	.019	
	N	21	21

*. Correlation is significant at the $p=0.05$ level (2-tailed).

Chapter 6: Discussion and Conclusion

Now that the results of both the interviews and stress scales have been presented, a discussion of the implications and validity of each research method (interviews and stress scales) along with the effectiveness of the mixed-methods approach to the research study is presented here. I also conclude by revisiting the research questions for the study and situating my work within current relevant literature.

Qualitative Discussion

Overall, the results of the interviews were extremely informative with regards to the exploratory topic of mental and emotional distress tied to local environmental change. It is clear that many of the themes that can be drawn from the interview transcripts are interrelated and affect each other. For example, environmental experiences as children affect the participants' value of natural environments and views of ecosystem destruction, and seeing and hearing about environmental destruction affects the participants' distress and stress levels, which may motivate them to go out and combat environmental destruction. The discussion that follows outlines what the various results mean for both the exploratory topic of distress and environmental change and for the research participants as a whole. The discussion focuses on how smart development (defined by the research participants as sustainable and well-planned development), re-development, and conscious planning that takes animals and wildlife into consideration can be beneficial for the mental and emotional health of participants, and according to the

interviewees, can be a smart business strategy for developers that will benefit residents in Tampa Bay.

What Do the Qualitative Results Mean?

As explained earlier in the thesis, there is a gap in the anthropological literature and other social scientific research with regard to measuring and understanding emotional and mental distress tied to environmental change and changing water ecosystems. The current study adds to the literature on human connections with nature and water resources, showing that individuals surveyed experienced emotional ties to local landscapes and also experienced both positive and negative physical and mental health effects depending on perceived optimistic and destructive environmental and water source changes (Windsor & Mcvey, 2005; Barlett, 2008). The results also add to literature documenting that children often learn environmental knowledge from parents. In some societies, environmental knowledge is taught or passed down to children by older generations, such as parents or grandparents (Zarger & Stepp, 2004). This phenomenon is seen throughout the interviews, as many participants reminisced fondly of learning environmental knowledge and sustainability from their parents or grandparents.

The current study adds to the limited body of stress literature on humans and the environment (Abkar et al., 2010; Mitchell & Popham, 2008; Sugiyama et al., 2008; Ulrich, 1981) by showing that the participants do experience mental/emotional distress and stress when they see destructive environmental changes. The participants were explicitly asked to define mental and emotional distress and then asked about their stress levels tied to environmental change, and many of the participants did believe that they

experienced distress on various levels because of changing local ecosystems. The current study is one of the first, if not the first, in anthropological research and other social scientific research to measure distress and stress in local populations tied to environmental change by asking the participants to define distress and assert whether or not they experience distress and stress when they see changes occurring in their local landscape. The Australian study conducted in the Upper Hunter Valley region (Higginbotham, 2007), where the Environmental Distress Scale was developed, did measure distress and stress in human populations due to local environmental change through quantitative means. However, the current study pushed the measurement of stress further by utilizing qualitative instruments to understand personal and self-defined stress and distress caused by changing ecosystems, in addition to employing the Environmental Distress Scale.

The results from the qualitative interviews also show us that stress in humans is not only about biological implications, including chronic stressors and acute stressors that may affect our physiology, but that stress can also be a more holistic and personal experience that can affect people in a variety of ways. The research participants in this particular study did not experience acute and chronic environmental stressors, as traditionally defined in the literature, but still admitted to experiencing self-defined stress and distress tied to widespread development and a lack of control of environmental destruction in Tampa Bay. Though the anger and frustration displayed by the current research participants may not be affecting their biology in terms of allostatic load, participants are experiencing stress and distress in their own personal ways, which are entirely valid and affect their lives. These results point to a need for a better

understanding of the dimensions of stress that should include a grounded approach to researching stress in various human populations. Through grounded research, focusing on extensive preliminary work with the research population, anthropologists and other researchers can begin to understand how stress is conceived in certain human groups, how stress affects daily life, and the means by which humans cope with stress.

Conceiving stress only in terms of acute and chronic stressors that affect biology limits the scope of stress research, and does not allow for a deep exploration of the meanings and implications of stress in humans.

The results from the interviews also show that getting involved with environmental issues when participants see local environmental change and destruction occurring can actually act as a protective measure, or coping mechanism (Ice & James, 2007). Before the interviews began I predicted that the stressors that an individual experiences and the way they are able to cope with the situation may be determined by their various life experiences, which was proven to be true in the content of the interviews. Research participants' level of involvement in environmental organizations and events significantly affected their ability to deal with stress and distress caused by environmental change. Many of the participants admitted that they experienced stress and mental/emotional distress from seeing environmental change over time, particularly changes in water resources and over-development, but that they combated that stress with going out and doing something with other community members to positively impact the environment, or to fight for an environmental cause through a variety of means including protests, attending local meetings, and getting out and enjoying nature. These results suggest that if other Tampa Bay residents are experiencing negative feelings towards

environmental change or feel stressed about the changes they see, that it would benefit them to get involved in environmental organizations or other events with other community members, to serve as both a motivating factor and coping mechanism for environmental change and distress.

“Smart Development”

As noted in the results section, one of the primary concerns of the research participants was development, which also caused stress and distress. The topic of development proved to be the most-discussed topic out of everything covered in the interviews and EDS, and most participants were much more concerned and distressed over development than water issues in Tampa Bay (though changing water resources were also distressing to residents, coming in as the second most-discussed topic). Participants’ primary focus on development, particularly the negative effects of rampant development and development that destroys ecosystems, was highlighted throughout the results. I was sure to include all of the rich stories and opinions the participants provided that were focused on development. Though I was not expecting to receive so much information regarding rampant development and distress in Tampa Bay, this topic is clearly a major concern for many residents, and one that can cause mental and emotional distress.

Participants also voiced their frustration with the mindsets of developers and politicians who lacked long-term planning and conscious development skills in Tampa Bay. The research participants called for smart development, green development, sustainability, and re-development as positive steps in fighting rampant development and

destruction of natural ecosystems. If green development was utilized more in Tampa Bay by developers or pushed/required by local and state officials, the expected results would be tremendously positive, both for the environment in Tampa Bay, the economy in the Bay area, and developers. If rampant development slowed and local officials and developers adopted a more environmentally-friendly mindset, I predict that the levels of distress experienced by local residents upon seeing local environmental change would decrease significantly.

The Benefits of Green Building

The core of green building involves sustainability and a concern for our planet. Green buildings have been shown to produce lower CO₂ emissions and improve the energy efficiency of a building. According to the United States Environmental Protection Agency (EPA), “Green, or sustainable, building is the practice of creating and using healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition (EPA, 2011).” There are many benefits of green building practices, including benefits to the environment, to the people who live in or occupy those buildings, and for the developers who plan and build or re-develop the buildings. Buildings that are built in a green or sustainable way consume less energy than traditional buildings, require fewer maintenance costs over the lifetime of a building, and result in increases in property and rent values for developers. Building in a sustainable or green way can also improve the lives, health, and well-being of people who occupy those buildings. Green buildings can improve air quality (a major concern of many of the participants) and can connect people to their natural environment through long-term

planning and building in a way that works to protect and value adjacent natural ecosystems, with benefits to humans and the environment (USGBC, 2011). A full discussion of the positive effects of green building for humans, communities, the environment, and developers is beyond the scope of this paper. However it is important to note that this is a major concern among the research participants that could be resolved in a way that benefits all parties in a healthy, environmentally-friendly, and economically-beneficial way.

Quantitative Discussion

Overall, the results of both the HSCL-10 and the EDS were informative and complementary to the interview results gathered from the research participants. Since quantitative research on the topic of mental/emotional distress and environmental change has rarely been conducted in academic and research sectors, the current study, though very exploratory, is a useful and an informative addition to the field of anthropology and related disciplines. The EDS provided me with interesting results that echoed sentiments discussed in the qualitative interviews. The discussion that follows will first present how distress tied to environmental change is experienced in the research population as determined by the EDS. The discussion will continue with a brief synopsis of why each scale was chosen and whether or not I would use those scales again, and will end with a section on suggestions for future research.

After taking into account all of the six sections of the EDS that were discussed in the results section, it is clear that the research participants showed the highest scores on questions pertaining to noticing increased development, large-scale changes to the local

environment, and loss of native vegetation and animals. Participants also scored high on questions pertaining to the new concept of solastalgia, adding support and validity to the relatively new term. In terms of distress, the research participants showed the highest scores on questions concerning increased development and the loss of animals and plants to development. The topics of development and impacts to wildlife were also heavily discussed in the interviews, showing that concerns and distress over local development and the impacts of environmental change on wildlife are two of the most important topics to the research participants. This occurrence is a great example of the benefits of a mixed-methods approach to research, showing that qualitative results from interviews can be further validated through quantitative measures, which will be discussed more in the last chapter of the paper. The research participants also collectively felt angry, worried, and depressed over local environmental degradation and were concerned that future generations will not be able to enjoy the environment, which was determined by the moderately high collective scores on the EDS for certain environmental events that signaled distress.

The results of the scales, particularly the EDS, show that the research participants as a whole are concerned about many environmental events and changes that occur in the Tampa Bay region, with quite a few topics displaying moderately high distress scores. The results of the EDS for this research study were similar to results seen in the only other research study to use the EDS as a measurement of distress tied to environmental change, the Upper Hunter Valley region of Australia. In the Upper Hunter Valley, the EDS determined that local environmental change was associated with feelings of personal distress regarding the destruction of the landscape, which was also seen in the

results of the EDS for Tampa Bay (solastalgia), as the residents showed collectively moderately high scores for questions focused on distress and negative feelings toward local environmental change. One of the most prominent similarities between the EDS in the Australian context compared with the Tampa Bay context was the negative feelings regarding carelessness of local officials and industries concerning environmental destruction. Residents in the Upper Hunter Valley of Australia were particularly upset at the perceived indifference of environmental losses by government agencies and various industries (Connor et al., 2004), while the research participants for the Tampa Bay study were upset that there was no long-term planning for development in the region, seen in the high scores of questions such as, “I am disturbed that decisions about development activity here do not give higher priority to long-term land use for future generations (mean score: 4.62 (standard deviation: .590, median: 5). Tampa Bay research participants also shared their negative feelings toward money influencing local officials to allow rampant development and their dissatisfaction for the actions of some local and state officials in their disregard for the environment, though these sentiments were stated in the interviews and not the EDS. The findings regarding negative feelings toward local officials and industries are extremely important and should be explored further in additional research on the human dimensions of environmental destruction

The high participation in environmental activities and organizations that characterizes the research population may serve as a both a trigger for distress and a coping mechanism for distress. Coping was defined earlier in the paper as constantly changing cognitive and behavioral efforts to manage specific external and/or internal resources of the individual (Ice & James, 2007). Some of the questions on the EDS ask

participants to provide how often they observe certain environmental events, such as sinkholes and soil erosion (both of these particular events were highly observed by participants). The participants are also asked a series of questions centered on measuring if any of the changes listed cause depression, anger, or sadness. Since most of the research population is probably more in-tune with the environment and focused on outdoor recreation and environmental change than other residents in the area, they probably have more experience seeing negative environmental changes than the average Tampa Bay resident, and thus may be more distressed seeing those changes happen firsthand. However, as discussed in the interview results, distressing changes also serve as a coping mechanism and as a motivating factor for residents to get involved and participate in environmental actions such as protests, contacting city and state officials, and writing letters to the editor. These actions may serve as a mitigating factor for distress for some participants, which will be discussed in the next chapter.

The Validity of Two Stress Scales

Before discussing the validity of each of the stress scales separately, it is important to note the Pearson correlation results between the HSCL-10 and the EDS. Though not statistically significant, there was a slight positive correlation between the HSCL-10 and the overall EDS for the 2-tail Pearson correlation ($p=.06$). However, it should be mentioned that a 1-tail Pearson correlation test resulted in a statistically significant positive association ($p=.03$) between the HSCL-10 and the overall EDS. Also, two sections of the EDS (observation of environmental events and felt impact of environmental events) did show statistically significant positive correlations at both the

1-tail and 2-tail levels when correlated with the HSCL-10, as discussed in the quantitative results section. These statistical results show that there is an association between scores on the HSCL-10 and the EDS. Though further discussion on this relationship is beyond the scope of the current paper, the association between general stress and stress caused by environmental change is an important area for researchers to look at, especially since this exploratory study is showing a positive correlation between certain aspects of the EDS scale and scores on the HSCL-10 general stress measurement scale.

The Validity of the HSCL-10

The HSCL-10 showed low stress/psychological distress in the research population and was an effective measure to compare as a baseline against another stress scale (EDS). The Cronbach's alpha test that was run on the HSCL-10 also quantitatively showed high reliability within the scale (.951), further strengthening the validity of the scale for this research study. I am confident in the results gathered from the HSCL-10 and recommend this scale as a baseline scale for other researchers interested in measuring general stress/anxiety against another stress scale.

The Validity of the Environmental Distress Scale (EDS)

Overall, the EDS resulted in moderate to moderately high overall scores in several of the six sections discussed, particularly the sections on felt impact of environmental change and solastalgia. The results and scores for each question on the EDS were valid, as determined by measuring the mean, median, standard deviation, and skewness for each question and section, but the overall results for some of the sections on the EDS may

have been skewed based on the questions that were asked within each section. For example, some questions seemed out of place when compared to the rest of the questions in a section, and resulted in a lower collective score, which in turn affected the overall score for that section. For example, in the section on threat to self/family, one of the questions posed to the research participants asked how threatening the participants perceived falling cypress trees to be. The overall score was much lower than the scores for the other questions in the section, averaging only a 2.62 (standard deviation: .865, median: 2). This question, along with a few others throughout the EDS that may have been out of place, may have skewed the results and resulted in a lower overall score for each section. One reason that some questions seemed out of place when scored could have been the result of trying to cover too many topics at once with regards to environmental change and trying to fit in too many unrelated environmental events into the same section, resulting in lower, though still moderately high, scores for each section. However, even though there are some problems with the scale, the Cronbach's alpha test did show that there was high reliability within the scale (.897), adding validity to the use of the scale.

In general, the EDS was extremely informative and easy to use, but was probably not appropriate for the current research study, as the breadth of environmental topics covered in the EDS was too expansive for the current project. If other researchers wanted to use the EDS, I suggest tailoring the EDS to focus in more narrowly on primary research interests. Also, using two research groups, as was done with the EDS in Australia (an affected group versus a control group) would have been more beneficial to

the research study, as I could have compared the effects of environmental change on a random population versus a group of people concerned with environmental change.

Benefits of a Mixed-Methods Approach

Overall, the combination of using qualitative interviews and quantitative stress scales showed complementary research results, particularly related to the topics of development, impacts to animals and wildlife, and overall environmental distress. The process of utilizing and analyzing two different research instruments was also an invaluable learning process for me, which has helped me to gain familiarity with a variety of data collection and analyzing strategies that will benefit me in my research-oriented career path.

Personal stories and qualitative data are necessary when trying to understand exploratory topics such as emotional distress stemming from environmental change. The opinions given by the research participants in this study can stand alone as convincing and interesting data showing the deep connection between the participants and their local environmental, as well as the distress they feel seeing changes like over-development and water resources changing for the worse. The addition of questions within the interview protocol that asked participants to quantify the amount of stress they experienced as a direct result of local environmental change, along with asking them to define mental and emotional distress were also vital to the success of the qualitative component of the study. Mixed method research strategies are often employed to validate one form of data with the other form. In many instances the same participants are used to complete both

the qualitative and quantitative components of the research so the data can be more easily compared (Creswell & Plano Clark, 2007).

Though the interview results themselves would have been adequate and persuasive, the addition of quantitative measures significantly validated the qualitative experiences of residents. The quantitative stress scales were able to measure both overall distress in the population and also emotional distress tied to environmental change that echoed sentiments being shared in the interviews, particularly with regards to feelings about development in Tampa Bay, distress tied to seeing animals and wildlife negatively impacted by local environmental change, and negative feelings towards seeing changes in water resources.

Similarities between the Interviews and Scales

It is interesting to note that the strongest themes present in the interviews were also tied to the highest scored questions on the Environmental Distress Scale, showing that the qualitative and quantitative research methods complemented each other and strengthened the overall results of the study. The major similarities that were seen in both the interviews and the stress scales (particularly the Environmental Distress Scale) included negative feelings toward rampant sprawl and poorly planned development in Tampa Bay, distress experienced due to animals and wildlife being impacted, and negative feelings towards seeing changes in local water resources. These results help to assure accuracy in assessing major themes within the interview transcripts, as the major themes presented were also the major themes present within the Environmental Distress Scale. It is clear that development, primarily over-development and poorly planned

development, is the primary change that causes distress in the research population, followed closely by seeing animals and wildlife negatively impacted by environmental change. As presented in the discussion section for the interviews, the negative feelings that the participants feel toward these events could be dramatically changed through more long-term development planning that respects and values natural spaces in Tampa Bay, and works with nature, not against it, to create sustainable places to live and work.

Benefits to the Researcher

The final benefit that was experienced by the utilization of a mixed-methods approach within the research study was the benefit to me. Spending over 18 months studying the topic of emotional distress and environmental change in Tampa Bay through both a qualitative and quantitative lens helped me to develop a holistic approach to research and was a valuable learning process. Though the Environmental Distress Scale used may have been slightly too expansive for the research topic and study population, the information gained from the scale, particularly the major themes of distress due to development and impacts to wildlife, showed me the value of using quantitative measures as a way to strengthen already powerful qualitative data. I will continue to utilize a mixed methods approach to research as I embark on a career path dedicated to applied research.

Limitations

The biggest limitations to the research study as a whole include: a homogenous sample and the shifting focus from water to development throughout the research study. The homogenous sample of individuals that participated in the research sample was one

of the biggest limitations. Not only were the research participants homogenous in terms of their participation in environmental activities, but they were also predominantly female and White/Caucasian, which made it difficult for me to run statistical associations between demographic variables and scores on the EDS. This gendered and ethnic phenomenon in environmental research has been documented in the literature. Research conducted over the past few decades has shown that women express slightly greater environmental concern than their male counterparts (Xiao & McCright, 2012). Hypotheses for this phenomenon include gender socialization (women are socialized to be caring and compassionate, while men are socialized to be unemotional). Other research suggests that gendered risk perception affects degree of environmental concern in men and women because women judge a wider array of environmental risks as problematic than men do (Xiao & McCright, 2012). Though I am not fully aware of the reasons behind the female-dominated sample for the current research study, these hypotheses may be key insights.

The limitation of a homogenous sample with regards to race/ethnicity is obviously problematic in terms of gaining a representative sample for the study. Also, literature on environmental concern and participation in environmental actions among racial and ethnic minorities is scarce, affirming the broader problem of sampling racial and ethnic minorities in both clinical and social scientific research. Future studies that seek to incorporate racial and ethnic minorities must build trust and rapport with potential research populations and should also advocate for open communication, collaboration, and participatory research with identified groups to effectively engage minority populations (Corbie-Smith et al., 2007). Future work on the topic of environmental

destruction and emotional distress should focus on increasing minority group participation, as I was unable to broaden the demographics of my research sample due to time constraints.

The other major limitation (though not truly a limitation, more of a transition in the research topic) was the fact that much of the discussion of water resources changing and emotional distress seemed less of a concern to participants than issues of development. Though changes in water resources, such as the drying up of lakes/wetlands and pollution were prominent concerns for many residents, much of the discussion centered on how development causes distress in the population. This focus on development by the participants was an emergent theme that was not anticipated, and the results guided the research in a different direction that focused more on how large-scale development that destroys ecosystems causes emotional and mental distress in the research participants. The reason for this focus on development may be because development is something that all of the participants see on almost a daily basis. It is often extremely apparent when development activities are negatively affecting ecosystems and this may create wide-spread distress in people who see that happening so often, whereas issues with water resources are much less of a visible problem, as many people do not live on or near lakes or wetlands, and may not see those changes on a regular basis.

In spite of the limitations of this study, this research study helps to show that the occurrence of environmental change can be extremely diverse in the minds of participants and can span a wide array of changes, including changes in the environment due to development activities, and negative changes to water resources. This study also helps to

show that what a researcher anticipates will be of environmental concern to participants may not break down into easily divided categories, even when preliminary research is conducted on the topic. Through grounded approaches to research, unanticipated themes and environmental concerns can emerge within a group of participants, and these environmental concerns have the potential to affect participants mentally and emotionally.

Conclusion

In conclusion, the four research questions that guided the research project were addressed through both the interviews and the stress scales. Research question one (How do members of environmental groups in Tampa Bay view/define mental or emotional distress, specifically related to their feelings about local environmental change?), research question two (Do residents experience emotional distress or stress related to changes in their local and regional landscape, and if so how does this affect their well-being?), research question three (What types of changes in wetlands and lakes cause the most distress and why?), and research question four (How do residents active in environmental organizations respond to the destruction of wetlands and other ecosystems in the Tampa Bay region due to water redistribution and groundwater pumping?) were addressed through the qualitative interviews, as each of the participants defined mental and emotional distress and then discussed their personal experiences with distress tied to local environmental change. The majority of the participants admitted that they often do experience mental/emotional distress when they see local ecosystems being destroyed or degraded. The Environmental Distress Scale complemented the qualitative interview

results, echoing findings regarding participants' environmental concerns and distress levels.

The overall results show that the research participants have a very strong connection to the environment, on both a large-scale level associated with the larger world environment and also with local ecosystems they see on a regular basis. Childhood is an important time for many of the participants where their connection to nature is developed, though playing outside and exploring their environments and learning about the environment from their parents. The connection to nature that participants express is carried through to adulthood, where participants continue to participate in outdoor activities. When the environment is destroyed, through rampant development, poor planning, or over-pumping of groundwater that leads to a diminished water table level and results in the drying up of lakes and wetlands, participants feel anger and depression. Participants also experience self-defined stress and distress because of these changes, also reinforced through the Environmental Distress Scale. On the opposite side of the spectrum, when positive changes occur in the environment, such as improvements in the Bay and the Hillsborough River, participants feel hopeful and happy. Also, many participants channel the stress they feel upon seeing environmental destruction and turn it into motivation that helps them cope with local change by working with other community members to solve problems related to environmental change and destruction.

It would be beneficial for the local and state government, developers, and community members for development activities to take on a more planned and conscious framework centered on protecting the environment and working with the environment to create sustainable green buildings and green design. The benefits of "greener"

development in Tampa Bay, meaning more sustainable building practices, along with more community-based, comprehensive development plans, would positively affect the mental and physical health of local residents through increased proximity to nature (while protecting vital habitats), re-development strategies, increased air quality and better circulation in green buildings, revenue for developers, and more jobs for the state of Florida. The results of this study show the devastating effects of environmental change on the mental and emotional health of certain Tampa Bay residents, but the results also show that there are solutions that can be enacted that benefit multiple parties, including sustainability oriented development that takes the environment into consideration, which can positively affect the mental and physical health for many residents in Tampa Bay, Florida.

Contribution to the Literature

The current research study adds to the very limited body of literature focusing on a link between environmental change and stress, and even fills in some gaps left behind by older research studies that have been ignored in recent years. For example, an environmental psychology paper was published in 1988 that stated that environmental changes provoke both positive and negative experiences, but was mostly determined through a literature review on the study of rats and only a few human populations from the 1900's (Aldwin & Stokols, 1988). The current study helps to strengthen this hypothesis, using a more relevant and current research population and solid qualitative and quantitative research methods, by showing that environmental changes can cause negative feelings of distress but also positive coping in many participants. The current

study also adds to the anthropological and other social science literature that explores the link between humans and water resources, showing that water scarcity in the form of disappearing or degraded wetlands, lakes, and other water bodies contribute to negative psychological feelings in the research population ((Ennis-McMillan, 2001; Hadley & Wutich, 2009; Orlove & Caton, 2010; Strang, 2005; Wutich & Ragsdale, 2008)

The discipline of applied anthropology is an ideal stage for tackling issues of environmental change and human emotion. Humans are linked to nature in a very intimate way, and the current focus on infrastructure and economics is tearing that link apart. Only by conducting qualitative research on the depth of emotions that are affected by environmental change, can we understand the extent to which we are killing ourselves by killing the environment. In a local context, here in Tampa Bay, this research begins to explore that link. It would be beneficial for large water facilities (who control groundwater pumping), developers and the local and state government, to hear the voices, opinions, and suggestions of residents who live daily with environmental degradation. This is crucial in order to really understand how changes in ecosystems are not only destroying beautiful lakes and wetlands, but how these changes are negatively impacting the mental and emotional health of local residents.

The current study encompasses research design and execution that has not been previously seen in anthropological research. Some psychological, public health, and environmental research studies have focused on how green space and spending time in the environment affects health and well-being (Mitchell and Popham, 2008; Ulrich, 1981; Sugiyama et al., 2008). However, virtually no studies exist in anthropology or related

fields that measure emotional distress caused directly by environmental change in the United States through both qualitative interviews and quantitative stress scales.

A recent edited volume by Barbara Rose Johnston shows the important connection between water and culture via interdisciplinary research articles that discuss water scarcity throughout various communities around the globe (Barbara Rose Johnston, 2012). In terms of water and emotional distress, anthropologists such as Michael Ennis-McMillan and Amber Wutich have utilized research methods to measure distress caused by water scarcity in various parts of the world, but that discussion does not extend to other environmental resources. The overall topic of mental and emotional distress/stress and environmental change in the United States is an unexplored and ripe area for anthropologists to discover, with the devastating effects of climate change becoming apparent, the increase in world population, the destruction of the rainforests, and widespread development and destruction. As planet Earth becomes more populated and developed, and our environments change, it is naïve to think that our relationship with our natural surroundings and the effects of a rapidly changing environment will not affect the mental and emotional health of human beings.

Applied anthropology is the perfect discipline to take the lead on understanding the human dimension of environmental change, as one of our primary goals is to identify and help solve problems that plague human beings through culturally sensitive, bottom-up, and community-oriented approaches. By understanding how environmental change, in the United States and globally, affects people mentally and emotionally, anthropologists and other social scientists can begin to understand whether and how populations are emotionally affected by environmental change, and how solutions to

environmental change can be reached that benefit multiple parties. The current study is a step towards understanding the emotional and mental effects of environmental change on humans. The study serves as an exploratory base for other anthropologists and researchers interested in the topic of environmental change and human emotions. The results (both qualitative and quantitative) show that environmental change can cause emotional and mental distress in a population. Future research should focus on expanding the populations studied for this topic and on additional ways to measure stress caused by environmental change.

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Appendix A: Hopkins Symptom Checklist-10

Hopkins Symptom Checklist-10

	No	Slightly	Much	Very much
1. Sudden fear for no reason				
2. Afraid or anxious				
3. Faint or dizzy				
4. Tense or harassed				
5. Guilty				
6. Sleeplessness				
7. Dejected				
8. Useless, of little worth				
9. That everything is a burden				
10. Hopelessness for the future				

***In the course of the past two weeks have you been troubled by feeling:**

Appendix B: Environmental Distress Scale

Environmental Distress Scale

ENVIRONMENTAL ISSUES: LOCAL ECOSYSTEM CHANGE IN THE TAMPA BAY AREA

I. Feelings about Living in the Tampa Bay Area

Below are statements about living in the Tampa Bay area. Please indicate whether you agree or disagree with each.

Please tick the appropriate box.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. I am proud of the heritage of this place.					
2. I would continue to live in this place even if I were given the opportunity to leave.					
3. My sense of who I am is linked to the environment where I live.					
4. I get comfort or peace of mind from this place.					

5.	I feel I know the local environment like the back of my hand.					
6.	I feel a deep connection to this place.					
7.	I would rather live somewhere different; this is not the place for me.					
8.	I feel a sense of responsibility to the people of this place.					
9.	I feel I have a duty to maintain the land for future generations.					
10.	Because of the changes to this place, I would leave if I could.					

II. Environmental Issues - Frequency

Below are environmental issues that you may have experienced in the Tampa Bay area. Please indicate how often, if at all, you have experienced the following issues.

	Never	Rarely	Sometimes	Often	Nearly always
11. Experienced groundwater pumping in local areas					
12. Pollution of land (e.g., chemicals, pesticides, trash, heavy metals).					
13. Pollution of rivers or					

	streams (e.g., salinity, chemicals, trash, heavy metals).					
14.	Pollution of drinking water (wells).					
15.	Contamination of piped city water					
16.	Wetlands dying or drying up					
17.	Lake levels decreasing					
18.	Increased development on previously uninhabited areas					
19.	Falling cypress trees.					

III. Environmental Issues - Observations

Have you ever personally observed or experienced the following environmental issues in the Tampa Bay area?

	No	Yes
20. Heritage destruction (historic buildings, villages, cemeteries or sacred sites).		
21. Concerns about decrease in property value of home due to local environmental change.		
22. Large-scale change to the natural landscape (dried up lakes, wetlands, or local environmental degradation due to development).		
23. Loss of native vegetation and animals due to environmental change (e.g., development, changing or disappearing ecosystems).		
24. Soil erosion.		
25. Sinkholes.		

IV. Environmental Issues - Threat

In the Tampa Bay area, please indicate how threatening each of the following

	No threat	Low threat	Moderate threat	Strong threat	Extreme threat	Unsure	Not Apply
26. Groundwater pumping in local environments.							
27. Concerns about decrease in property value of home due to local environmental change.							
28. Heritage destruction (historic buildings, villages, cemeteries or sacred sites).							
29. Pollution of land (e.g., chemicals, pesticide)							

	es, trash, heavy metals).						
30.	Large-scale change to the natural landscape (dried up lakes or wetlands, or developed local environments).						
31.	Pollution of rivers or streams · (e.g., salinity, chemicals, pesticides, trash, heavy metals).						
32.	Pollution of drinking water (wells).						
33.	Loss of native vegetation and animals due to environmental change (e.g., due to ground water pumping,						

	dying ecosystems, development).							
34.	Contamination of piped city water.							
35.	Lake levels decreasing.							
36.	Increased local development.							
37.	Falling cypress trees.							

V. Felt Impact

Below are statements about the possible impacts of environmental change in the Tampa Bay area. Please indicate whether you agree or disagree with each statement.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	N/A
38. Economic benefits of development (e.g., jobs) are more important than any concerns I might have about the						

	local environment.						
39.	I am unable to enjoy life as much as I'd like because of local environmental problems.						
40.	I feel positive about local environmental changes.						
41.	My community is divided by disagreements about environmental issues.						
42.	People I know have become physically ill because of pollution in						

	the local environment .						
43.	I am upset at the destruction of heritage sites and landmarks due to development .						

		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	N/A
44.	I am disturbed that decisions about development activity here do not give higher priority to long-term land use for future generations.						
45.	My community is divided by disagreements about environmental						

issues.						
46. People I know have become physically ill because of pollution in the local environment.						
47. I am upset at the destruction of heritage sites and landmarks due to development.						
48. My ability to make a living has been negatively affected by environmental problems.						
49. I feel angry about degradation in my local environment.						
50. I am worried about						

risks to human health from nearby environmental pollution.						
51. I am concerned that future generations will not be able to enjoy the natural environment.						
52. I am frustrated because I can't influence decisions about the environment.						

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	N/A
53. I am concerned environmental problems will cause illness to myself or my family.						
54. I am satisfied with the local government's efforts (and the efforts of SWFW MD and TBW) to monitor environmental impacts from local development and ground water pumping.						
55. Environmental changes in my locality are decreasing the value of my home/property.						
56. People in this area feel frustrate						

<p>d because neighbo rhoo d associati ons and environ mental groups have limited power to influen ce environ mental decision s.</p>						
<p>57. People I know have given up trying to preserve the environ ment because they feel powerles s.</p>						
<p>58. The overall impact of ground water pumpin g in this area is depressi ng.</p>						
<p>59. The overall impact of develop ment in this area is depressi ng.</p>						
<p>60. People I know have become</p>						

disillusio ned trying to negotiat e their rights in relation to the impact of develop ment.						
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VI. Feelings About Changes in the Tampa Bay Area

Do you agree or disagree with the following statements relating to change in your local environment in the Tampa Bay area?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	N/A
61. My sense of belonging to this place has been undermined by unwelcome change.					
62. I am sad that familiar animals, plants and fish are disappearing from this place.					
63. I am worried that aspects of this place that I value are being lost (e.g., clean air and water, beautiful scenery).					
64. I miss having the sense of peace and quiet I once enjoyed in this place.					
65. I am ashamed of the way this area looks now.					
66. Unique aspects of nature that made this place special are being lost forever.					
67. I am saddened when I look at degraded local landscapes and damaged wetlands and lakes.					
68. I feel good about the restoration of the environment (e.g., wetland mitigation).					

69.	The majority of the stress I experience in my daily life is due to local environmental change.					
70.	It is stressful for me personally seeing species disappearing.					
71.	It is stressful for me personally seeing lake levels decrease.					
72.	It is stressful for me personally seeing wetlands dry up.					
73.	Seeing unwelcomed local environmental change makes me angry.					

VII. Activities

Please indicate whether or not you have done any of the following activities in response to environmental concerns in the Tampa Bay area.

	Yes	No
74. Written "letters to the editor" of a newspaper.		
75. Talked to neighbours, friends or relatives about environmental concerns.		
76. Attended a community or public meeting discussing environmental concerns.		
77. Attended a community or public meeting discussing water issues.		
78. Contacted local government representatives about the environment.		
79. Contacted water authorities about environmental problems (e.g., Southwest Florida Water Management District (SWFWMD), Tampa Bay		

	Water (TBW), or other municipal utilities).		
80.	Contacted the Environmental Protection Authority (EPA) about a problem in the environment.		
81.	Signed a petition opposing developments which you felt would harm the environment.		
82.	Sought information on environmental issues (e.g., from the internet, a library or databases).		
83.	Joined a community group focussing on environmental concerns.		
84.	Changed the way you've used water in your home (e.g., conservation, low-flow fixtures, rain barrels).		

VIII. Reliability of Environmental Information from Various Sources

In your opinion, how trustworthy are the following sources of information about environmental issues?

	Never trustworthy	Sometimes trustworthy	Usually trustworthy	Always trustworthy	Don't know
85. Environmental Protection Agency (EPA).					
86. State Government Departments responsible for the environment.					
87. Southwest Florida Water Management District (SWFWMD)					
88. Tampa Bay Water (TBW)					
89. Local council officers.					
90. University researchers.					
91. Local, community-based environmental and conservation organisations.					

BACKGROUND

Please tick the appropriate box or write in your answers in the space provided.

1. What is your physical address?.....

2. I am: male female

3. What is your age?years

4. What is your race, ethnicity, or ethnic group?

5. What is your highest level of education attained?

6. Please list your main occupation:.....

7. Religious practice(s)/beliefs? Circle Yes or No. If Yes, list:.....

8. Would you mind sharing a rough estimate of your annual combined household income?:

\$10-\$30,000/yr
\$30-50,000/yr
\$50-70,000/yr
\$70-90,000/yr
\$90-110,000/yr
\$110-150,000/yr
\$150-200,000/yr
\$200-250,000/yr

\$250-275,000/yr
\$275-300,000/yr
> \$300,000/yr

6. How long have you personally lived in the Tampa Bay area?.....(years)

7. When did earlier generations of your family come to the Tampa Bay area (including extended family, parents, grandparents, etc.)?

- Not applicable
- Before 1900
- 1901-1950
- 1951- present

8. Are you living in a residence (or on a property) that was occupied by earlier generations of your family?

- No
- Yes
- Other (Please explain)
.....
.....

8.1 If yes, approximately what year did your family first occupy the residence or property?

.....

9. Which of the following applies to you?

- I own/am purchasing my residence
- I am renting my residence
- Other

10. Do you have children living in the Tampa Bay area?

No Yes

11. Do you have grandchildren living in the Tampa Bay area?

No Yes

Appendix C: Semi-Structured Interview Protocol

Semi-Structured Interview Protocol

1. Are you originally from the Tampa Bay area? How long have you lived in this area?

2. What are some of your favorite outdoor places you enjoy visiting?

2.1 Are these places located in Florida?

3. Do you have a personal connection with the natural environment? Can you tell me a little bit more about that?

3.1. Have you always had a connection to the environment? Was it important to you as a child or young person?

4. Have you noticed changes occurring in your local landscape? What are those changes?

5. Have you noticed changes in wetlands and lakes in particular (i.e. falling cypress trees, dying wetlands, lake levels declining)?

5.1. How did/does seeing those particular changes make you feel?

6. How do you feel when you see changes occurring in your local natural environment?

7. How concerned are you about development in the region? Can you share your thoughts on the impacts of development, like when trees are bulldozed to make room for housing, etc.?

8. How would you define mental distress?

9. How would you define emotional distress?

10. Do you think changes that occur/have occurred in local Tampa Bay ecosystems cause or have caused you mental or emotional distress? Can you tell me a little bit more about that?

11. Is local environmental change a source of stress for you personally? Why or why not?

11.1 Is the stress caused by local environmental change a major percentage of your total life stressors? If you were to estimate, what percent?

12. How do you think environmental change in Tampa Bay affects your well-being? Tell me a little more about that.

13. Which changes to the environment cause you the most distress? Why?

14. Are you involved in any environmental organizations?

14.1 Have you or members of your organization been active players in responding to environmental change in the region? How?

14.2 How active would you say you are in the organization? (participate once a week, once a month, daily, etc.)?

15. Have you been to public meetings, protests, or other events concerning local environmental change, environmental destruction, water issues, or development? Tell me a little more about that.

Appendix D: IRB Approval Letter



DIVISION OF RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
13901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-5618

December 20, 2011

Gina Larsen
Anthropology

RE: **Expedited Approval** for Initial Review
IRB#: Pro00006302
Title: Wetland and Lake Destruction and Mental/Emotional Distress among Residents of Tampa Bay

Dear Gina Larsen:

On 12/20/2011 the Institutional Review Board (IRB) reviewed and APPROVED the above referenced protocol. Please note that your approval for this study will expire on 12-20-12.

Approved Items:
Protocol Document(s):

Wetland and Lake Destruction and Mental/Emotional Distress among Residents of Tampa Bay	12/7/2011 0.01 3:03 PM
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Consent/Assent Documents:

Name	Modified
Informed Consent, Gina Larsen.docx.pdf 0.01	12/20/2011 9:50 AM

(Please use the watermarked consent form found under the Attachment Tab).

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Please note, the informed consent/assent documents are valid during the period indicated by the official, IRB-Approval stamp located on the form. Valid consent must be documented on a copy of the most recently IRB-approved consent form. As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in black ink that reads "John A. Schinka, Ph.D." The signature is written in a cursive style.

John Schinka, PhD, Chairperson
USF Institutional Review Board

Cc: Various Menzel, CCRP USF IRB
Professional Staff