Environment, Place, Risk, and Migration:

Investigating the Intersection of Environmental Perceptions & Movement Intentions

Within the US Gulf Coast.

by

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A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Approved November 2022 by the
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ARIZONA STATE UNIVERSITY

December 2022

ABSTRACT

In the United States, some 94 million people (29% of the US population) live in areas immediately adjacent to a coast. The global phenomenon of climate-induced environmental change is largely framed as a one-way cause-and-effect relationship, where individuals, communities, and populations inhabiting at-risk locations are either forced to relocate or do so of their own accord. Yet residents of such at-risk areas are increasingly actively choosing to remain, even as risk intensifies. Using a mixed-methods approach, this dissertation examines environmental perceptions, the internalization of risk, the influence of information sources, and how individuals residing in coastal locations process their migration decisions. Established migration and hazard frameworks and theory are poorly positioned to understand the environments' role in migration decisions. From these perspectives, environmental factors are near exclusively framed as negative affective biophysical push factors. Migration frameworks also fail to adequately incorporate reasons for non-migration. This dissertation directly addresses both these gaps in understanding. This research utilizes data from across the Gulf Coast, with a focus on fieldwork from Terrebonne Parish, Louisiana, and a dataset of 123 surveys and 63 interviews across a diverse group of coastal residents. Residents perceive of their environment in much more robust terms than just the biophysical. A majority of terms incorporated social and cultural aspects of environment, and environmental meaning was expressed across a continuum of proximal (most important/close) to more distal (less important/distant) scales. Little support is found for the traditional idea that economic or natural-environmental factors are more influential in decisions to migrate away from ones' home. In predicting migration intention, socially and environmentally derived

variables improved migration model performance. This dissertation demonstrates that internalization of risk by coastal residents is not a straightforward relationship, but rather one mediated by; social-environmental factors, personal experience, sense of place, and trust, which in turn influences intention to migrate, move locally, or remain in place. Residents perceive of their environment far more broadly than current risk-management planning allows. Results provide coastal residents, as well as community leaders and emergency managers who perceive environment differently, new tools for productive engagement and future policy development within coastal landscapes.

DEDICATION

To all those who have dared to go beyond their comfort zone.

You will never know your limits until you truly test them.

To the encouraging and everlasting memory of Mary Craven – the most inspiring teacher I ever had who cancer saw fit to take from this world too soon. You saw the eagerness in my heart for knowledge, investigation, and learning and fostered its growth rather than focusing on the awkward high schooler trying to find her place in the world. Without you I may never have accepted that I did not need to 'fit-in'.

To the loving memory of my grandmother, Elizabeth. You left this world as I was undertaking the final weeks of my field work in Louisiana in 2019 and thus I was not able to share with you the final steps in the journey you had asked me so many questions about the last time we had talked. But you were always in my heart, and I hope looking down on me now, you are proud of how far I have come.

Your granddaughter is now a Dr!

To Eric and Sparrow, who kept me going and supported me through the long months of writing. Through the trials and tribulations that were 2020 and 2021. We made it!

To myself. You really did it!

Obtaining my PhD was the dream I aspired to, it was the dream that scared me, so I knew it must have been big enough. Now it is time dream once again.

ACKNOWLEDGMENTS

This dissertation has seemed at times an insurmountable challenge. Seeing it through to completion would not have been possible without input from so many people. I am, and will be forever, eternally grateful to all who have helped me see this chapter of my life through to its conclusion.

Here at Arizona State University, my committee chair and mentor Dr Shauna BurnSilver has persevered through thick and thin, always pushing me to make progress, to think more critically, and to develop the niche into which my interests fit. Her unwavering support has been a corner stone of strength throughout my graduate journey.

My committee members Dr Takeuki (Gaku) Tsuda and Dr Dave White have contributed immensely to my development as a researcher, a scholar, and aspiring academic. Their guidance and support in the planning of my dissertation field work as well as their mentorship over the years has been an incredible source of strength.

I acknowledge the contributions countless professors at ASU, and beyond, but especially those who have helped guide my academic path over the years, shape my interests, explore ideas, make mistakes, and come out the other side all the more emboldened by the experience: Dr Anne Stone, Dr Wei Li, Dr Laura Bidner, Dr Monica Gaughan, Dr Cindi SturtzSreetharan, Dr Abby York, Dr Joan Silk, and Dr Brenda Baker. And also, the mentorship of Dr Devin White - Sandia National Laboratories NM.

I likely would not have continued in an academic direction after my undergraduate years if it were not for the wonderful, supportive, and encouraging mentorship of my Otago University honors thesis advisers Dr Martyn Kennedy (Genetics) and Dr Glenn Summerhayes (Anthropology) as well as the incredible

conversations, tips, and tricks learned along the way from Dr Richard Walter, Dr Peter Dearden, Dr Lisa Matisoo-Smith, Dr Ian Barber, Dr Charles Higham, and Phil Latham.

I acknowledge and thank the wonderful residents of Terrebonne Parish, and other US Gulf Coast locations, who gave their time and expertise to be a part of the research studies that have contributed to this dissertation. No matter if you were a formal research participant or someone who just sat with me and told me stories, or bombarded me with questions, your input has been invaluable in shaping the trajectory of my work.

Finally, as the saying goes 'it takes a village to raise a child' - well it took an army of personal cheerleaders, who span the globe, to support me and provide jokes, baked goods, and sanity throughout my US graduate school journey, especially in the final years. To my US friends and colleagues: Julia, Rachel, Saul, Irene, Lily, Krista, Andrew, Sarah, Chris, Liza, Tashi, and especially the Chase Family - You were more help than you may ever know. To my International and New Zealand friends and colleagues; Naomi, Tanya, Anthony, Catherine, Braden, Claire, Jesse, Louise, Ray, Areej, Ivet, Saba, Francis, Stacey, Lance, and Gabrielle – the same goes for you. Last, but not least, my mother Penelope, my father Douglas, and my brother Hamish for the unconditional support shown to your slightly crazy daughter/sister who flew halfway around the world to chase a dream and spent nine and a half years obtaining a dopey hat, a shiny piece of paper, and more life changes experiences than I can count. 'Thank you' does not even begin to cover my appreciation for all you have done.

Special acknowledgement must be made to those who have provided funding: The Fulbright Program - Science and Innovation Scholarship, The National Science Foundation, Sigma Xi, The Explorers Club, the ASU Graduate College, & SHESC.

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INTRODUCTION

In at least the last 10,000 years, humans have been both lived in environments and experienced challenges because of these environments. Through engagement with their surroundings, landscapes are modified through culture to become places. These are places humans live, for which attachment is built, dependence is fostered, surroundings utilized, and meaning grows. Such places do not exist without challenges for humans. Challenges from nature may be naturally occurring, and challenges may be brought about by the actions [or inaction] of the very individuals who utilize and inhabit places.

In the 21st century, global environmental change has intensified to such an extent that humans are making active decision on whether certain environments are too dangerous or risky to remain in. In recent decades across multiple disciplines, studies of climate change or environmental change are rising, as are studies of migration. However, it is really only within the last 20 years has the combined investigation of these two research areas gained acceptance. Prior to this time these topics were investigated separately and in isolation, migration from the dominant perspectives of economic and international movements and climate change from the perspective of investigating global or regional datasets of qualitative metrics such as temperature or precipitation. However, it is only though looking at these subject areas together that both academic arenas can move forward, learn from each other, and contribute to a more meaningful and socially actionable outcome. As more research is produced that integrates these two subject areas, the myriad of ways in which climate change is impacting migration, or has the potential

to impact migration, is coming into clearer focus. Analysis can also move beyond "well-educated guesswork" when scientific approaches incorporate empirical evidence of the impacts of climate change on human population distributions (Brown 2008, p.8).

Migration is far more involved than moving from point A to point B. Across many social disciplines; anthropology, geography, history, sociology, and economics, scholars have studied diverse features of migration, e.g., who moves, when they move, why they move, who makes the decision(s), what (if anything) spurs movement, and is that movement temporary, permanent, or in-between? The factors that contribute to pushing people from, or pulling people toward, point A to/from point B are relatively extensively studied, but only through a limited number of lenses, primarily economic and kinship. International migration is extensively studied, as are economic and/or labor migration movements and motivations, the impact of kinship networks, and any form of migration that is politically entangled, such as refugee movements.

Migration scholarship by its very premise is interested in reasons for migration, causes of migration, and factors that initiate migration. Very few existing migration typologies currently incorporate environmental factors in an explicit or direct way. Due to the large economic focus of many migration theories, the current theoretical literature is under-prepared for a discussion of environmental migrants and their place within the broad spectrum of migration typologies. Migration literature is also poorly prepared to account for those who do not migrate, especially within a setting beset by environmentally risk and change. This represents a growth area for migration scholarship

and has significant implications for understanding immobility (Farbotko 2018; Schewel 2020; Blondin 2021; Mallick & Mallick 2021; Mallick et al 2022), and movement as a-last-resort (Penning-Rowsell et al 2013), which are becoming increasingly observed decisions in areas facing challenges from environmental and climate change.

The role of environment in migration decisions is also understudied. What work there is views "environment" through one of two lenses; First, environment is defined in biophysical terms (landscape, climate, geography etc.) as either a driver of movement (e.g. movement way from drought), or a pull based on preferred set of characteristics (e.g. seasonal movement of human 'snowbirds' to warmer climates during winter). Second, biophysical environmental hazards are portrayed as catalysts for temporary (evacuation) or permanent resettlement away from a hazard impacted area.

This dissertation takes a different approach and in doing so helps to address three main shortcomings in existing migration scholarship. First, its focus is on migration within a domestic national context rather than movement across an international border. Second, it questions the very idea of how environment is incorporated into migration decisions by conceptualizing environment more holistically. This framing includes social and cultural components, as well as more traditional biophysical/natural manifestations. Last, this work actively incorporates the perceptions and input of those whose migration decision intention is NOT to move.

This is a lot to disentangle. The dissertation covers knowledge from multiple literatures including; decision making under uncertainty, risk/hazard/disaster research, environmental anthropology, sense of place, and migration. The following sections will provide the necessary framework upon which the three data chapters of this dissertation expand. Pertinent information from each literature domain above are then contextualized in relation to the overarching research questions of this dissertation.

Literature Domains

Decision Making

Decision Theory as a literature involves a storied progress of approaches, largely stemming from psychology and economics perspectives, all with the end goal of understanding how we (as individuals, groups, or organizations) arrive at decisions. Making decisions is something people do on a daily basis. Needs are accessed, options evaluated, potential outcomes typically weighed against each other, and a decision is made. While decisions can appear be simple – what to eat for lunch – the reality of their process is more complex – are there dietary restrictions, what is in the fridge, what did I eat recently, who will be there, what am I doing after eating? For the research presented in this dissertation, decision making is considered through the lens of migration – to move away or to stay in place. The decision to move from one location to another might be temporary or permanent. This is a more involved decision, often with higher stakes and important information to consider regarding safety and sociocultural and economic the consequences for those who stay and those who go. Information is assumed to be vitally important for making a ‘good’ decision. One assumption about the role of

information is that public apathy over climate change is the result of poor public scientific literacy (Pidgeon & Fischhoff 2011). However, the relationship between a deficit in perceived understanding of information and a deficit in comprehension of risk or consequences is not straightforward. Kahan et al. showed that public divisions over climate change information "do not stem from an incomprehension of science, but rather from an internal conflict of interest when forming beliefs" (2012 p732), Similarly, Morss *et al* have demonstrated that an individuals' worldview can impact how they perceive and respond to near-term threats and internalize risk information pertaining to such events when it is presented (2020 p1643). This body of work emphasizes that perceptions of risk are important in decision-making.

Risk

Since Starr's 1969 article exploring what society is willing to pay for safety, the idea emerged that there is "a definable (i.e. measurable) phenomenon called risk" and that "societal management of risk seeks to minimize the probability and/or magnitude of undesirable consequences" (Rayner & Cantor 1987 p3). In this perspective, Risk = (Probability x Magnitude) / Time (Rayner & Cantor 1987 p4). That the potential or probable exposure to risk can be calculated and represented though data, numbers, or figures has been criticized as reifying risk. It loses sight of the multifaceted phenomenon that is risk, for example ignoring the role of social relations in mitigating the experience of risk (Rayner & Cantor 1987 p3). Risk perception and thresholds of risk acceptance and tolerance are individual level phenomena. However, formalized risk assessments are commonly carried out at larger scales (county, region, state, nation) to help

decisionmakers and leaders at higher jurisdictional levels evaluate, and message risk and mitigation for areas identified as threatened or vulnerable. At managerial or governmental levels, risk assessments usually designate areas by scale of risk, typically calculated in terms of probabilities of economic impact/loss or human loss of life. There is also an assumption that people with a more extensive understanding of risk, and awareness of its potential impacts to them, will in turn have higher levels of preparedness for those risks. This is demonstrably not the case in many contexts. The phenomenon of the 'Risk Perception Paradox' describes a fallacy whereby degree of risk exposure and degree of risk preparation are positively correlated (Wachinger et al 2013). Studies have also shown that individuals living in areas determined to be of high, or low, assessed risk do have a general understanding of the risks associated with living in such locations. However, it is not uncommon for residents in high-risk areas to under-estimate risk and vice versa (Siegrist and Gutscher 2006).

The idea of risk is also inherently tied to the notion of trust. Cultural cognition theory (see Kahan 2012) states that individuals form perceptions of risk that reflect and reinforce their "cultural way of life" (Newman et al 2018 p989). [Dis]Trust in information can also have a hierarchical impact when power dynamics are involved and can be especially tense in situations where lack of trust characterizes relationships between organizations and minorities. Within the hazard-evacuation setting, individuals in evacuation scenarios put more trust in information from local sources – sources that they are more personally familiar with – than those from sources they have less or no familiarity (Wray et al 2006). Similar investigations have identified a general psychology

of trust (Castelfranchi et al 2003), which highlights connections between trust and proximity (Choi and Wehde 2020), trust and event experience (Scammell et al 2009), and additionally how breaks in trust can occur or be avoided (Cordasco et al 2007; Leiserowitz et al 2013; Schmidt et al 2014).

Environment, Place and Identity

Within anthropological theory there has been significant effort to understand the directional relationship between humans and the physical landscapes they reside in. Julian Steward's Cultural Ecology from the 1930's theorized that human-technology-environment interactions led to unique combinations of cultural practices. The focus there and in much early work emphasized climate as the ultimate driver of human behavior on and engagement with landscapes. Since this time, culture-environment discussions have diverged and expanded to look at iterative and bi-directional relationships between people and environments (Medin et al 2014), exemplified by a social-ecological systems framing (Cumming et al 2006; Masterson et al 2017) and conceptualizing households, groups or populations as vulnerable to environmental hazards. Another strand of human-environmental theory focuses on meaning and experience within places (Convery et al 2014; Cresswell 2014; Masterson et al 2017). In this dissertation, I consider coastal residents to be exposed to environmental threats (Cutter & Emrich 2006; Colten et al 2018) but theorize human-environmental perceptions and meaning as emerging from human-place experiences and relationships. This grounding in meaning links my work to ideas around Sense of Place (SOP) (Convery et al 2014; Cresswell 2014; Lin & Lockwood 2014). Sense of Place conceptualizes the role of non-economic and social

factors as foundational in people-place relationships. SOP is a social phenomenon linked to place identity (Low & Altman 1992; Rodaway 2002; Tuan 1977) and assumes that social and biophysical reality are interconnected (Masterson et al 2017:48). SOP highlights the phenomenological linkages between the physical, social, and cognitive meanings people attribute to places, the reasons behind the development of these connections, and how Sense of Place can be maintained, or developed, through generations (Hillier & Rooksby 2005).

This dissertation builds connections between three SOP constructs and environment. *Dependence* – A cognitive belief about a place's functional ability to meet desired needs through engagement in preferred activities (Stokols & Shumaker, 1981) with additional stress upon behavioral commitments (Jorgensen and Stedman 2006); *Identity* – A set of cognitions about the physical world that contributes to a broader self-identity (Proshansky, et al., 1983), also considered as a multidimensional summary evaluation of place-specific beliefs (Jorgensen and Stedman 2006). And lastly, Attachment – An "affect toward a location" (Low & Altman, 1992) with a focus on emotions (Jorgensen and Stedman 2006). Through the lens of these three constructs I explore how connection to place, despite risk, molds perceptions, and can enable residents to navigate environmental precarity, while still experiencing a life of worth and meaning within their environment.

Migration

Migration is the nexus where the previous four literatures meet for this dissertation. Migration decisions on the US Gulf Coast occur within a backdrop of risk, intersect with identity and place, and are integrated with local experiences and understanding of *environment*. Disaster research has tended to situate environmental migration within a pre-established narrative (environment as a cause of hazard, negative affect, then evacuation and/or migration). This intersection is the foundational starting point for the work presented here. Additionally, disaster scholarship is firmly situated (in the majority of cases), within the (neglected) setting of domestic migration. This further strengthens this as the starting point to more critically investigate the role of *environment* in migration decisions. A main point worth noting about almost all disaster focused migration research is that the term *migration* is typically not used to talk about these population movements. The terms *movement, evacuation, relocation,* and *displacement* are commonly utilized – but direct discussion of *migration* as a decision or process is lacking, despite this being exactly what is occurring.

A second common (and commonly incorrect) assumption in migration scholarship is that internal migrants (those not crossing a national or border) face fewer challenges than international migrants. Other research suggests this is demonstrably false (Gonzalez 1989). Projected climate change scenarios could become catalysts for conflict that, in turn, could worsen security risks both nationally and internationally. This concern is discussed in both academic (Reuveny 2007) and military writings (Kern et al 2014). Lee (2001) and Shelley (1992) discuss tensions in Bangladesh caused by internal migrants

that eventually lead to violence and insurgency in the 1980's and 1990's. Historically, hostility was also witnessed domestically in the US when Great Plains migrants faced beatings and discrimination when trying to enter California or saw their entry to California blocked by policemen during the dust bowl years (Gregory 1989; Worster 2004; McLeman et al 2014). Presently, domestic migrants within the US face challenges of deciding where to go, not entirely sure if they will be welcomed into a different area, while those who remain (in hazard prone locations) face backlash for 'staying in danger' or 'wasting emergency resources'.

> To directly quote a conversation with a respondent of this project after Hurricane Ida hit Terrebonne Parish*: When asked "Why would you live here", "Why rebuild in a place where your town just got crushed by the elements?"* The reply came *"Why? Because South Louisiana is more than just a place. It's who you are. It's where you will find a helping hand during a time like this, and an even more needed hug with a smile. … We have God, each other, and the heart of a Cajun. We got this!"*

Goals of the Dissertation:

The goals of this dissertation are to:

1) Understand how residents of landscapes experiencing environmental challenges perceive of their environment, and
2) Explain the contexts and mechanisms by which environmental factors influence a movement decision – inclusive of both those whose intention is to remain and those who intend to leave.

In **Chapter 2** I explore general ideas of environmental perception across three US Gulf Coast areas: Baldwin County Alabama, Harrison County Mississippi, and Terrebonne Parish Louisiana. I contextualize the topic space across migration and sense

of place literatures while addressing two research questions: 1) What does environment mean, i.e. how is it perceived by those who live in at-risk areas? and 2) How does environment act within movement plans, i.e. as either a push, an anchor, or both? Findings illustrate that the environment, as perceived by coastal residents, extends beyond typical biophysical and climatological phenomena and settings, to encompass lived experience, attachment to home, and meanings connecting people to place. Such social elements of environment are under-represented, or completely absent, in discussions of the environment's role and impact on migration decisions. Discussion of findings further highlights the juxtaposition of perspectives and conflicting conceptualization of environment within hazard prone, yet meaning-rich, coastal places currently facing serious threats from climate change.

Terrebonne Parish was selected as the field location to expand upon the work presented in Chapter 2.

In **Chapter 3** I investigate environmental perceptions of Terrebonne Parish residents in greater detail, and the potential reasons for respondents holding such perceptions are explored. The implicit bias of environment as solely physical and climatological is the starting point to this chapter. During fieldwork respondents were able to openly express themselves about components that made up 'their environment' and identify how risk is perceived and internalized. While respondents did describe environment as biophysical, material landscape, climatological, and hazard based, these characteristics only made up approximately 1/3 of total responses. Results clearly demonstrated a far broader and

holistic understanding of '*the environment'* that includes diverse social and infrastructure components. Chapter 3 also explores ideas of scale. This is done in three ways, 1) the scale at which residents perceive risk from coastal erosion, 2) the scale at which key aspects of environment are experienced, and 3) the scale at which respondents express Sense of Place constructs of *Dependence, Identity* and *Attachment* (either Home, Bayou or Community). Findings illustrate that while there is general appreciation and acceptance of broader environmental components and impacts, respondents are most concerned at the scale of their own personal experience, and frame environment within their immediate proximal (close/important) personal connections to place, family and/or home.

Traditional models of migration do not consistently incorporate environmental components outside of a hazard event or other biophysically classified environmental element. In **Chapter 4**, I first explore different sources of influence upon migration decisions; ranging from personal experience, to family, to leadership and the media. The movement options are stay, migrate out of the parish, and a third – unique – movement category that emerged from this research; move locally within the parish. This builds upon the idea of scale investigated in Chapter 3, but also integrates the research with the decision making literature and how individuals process trust of information. In line with existing literature the most influential sources of information are personal, i.e. local friends and family. Second, I predict movement intention of respondents based on logistic regression using a combination of socio-demographic, economic and three environmentally derived variables as predictors. No support is found for economic

influences (a dominant force in traditional migration scholarship), while social-environmental and life-stage variables were significant. Environmental variables are shown to improve not only the variance explained by the model, but also the model's ability to correctly predict migration intention outcome.

Chapter 5 consists of a summary and synthesis of main findings across the three data chapters, their collective theoretical and research implications, and a direct assessment of findings as they relate to the original research goals outlined for this dissertation. Lastly, I present a brief discussion of limitations and potential future research directions to be explored.

Dissertation Organization

This dissertation contains five distinct chapters. In this first introductory chapter, I provided subject framing to the topics addressed within this dissertation, my overall. The research objectives, and brief accounts of the three data chapters. Chapters 2, 3 and 4 are each independent articles investigating a distinct aspect of the broader problem space. Chapter 2 is currently under review at a peer-reviewed academic journal (*Human Organization*), and Chapters 3 and 4 are targeted for eventual peer-reviewed journal publication in *Regional Environmental Change* and *Population and Environment* respectively. As the main body of this dissertation is in the form of three independent research articles, each data chapter contains its own discussion of relevant literature, methodologies, synthesis of results, and ends with a reference section. A compiled

reference section containing a full bibliography of the complete dissertation document can be found starting on page 242.

The rest of this introduction section starts with a positionality statement and then presents a brief account of the overall fieldwork experience of the author, with a focus on the 2019-2020 Terrebonne Parish field work period. The content of this section does not fit within the confines of the research chapters presented yet provides important contextual and reflexive information pertaining to work. If readers wish to skip ahead, the first research chapter of the dissertation starts on page 30.

Research Positionality and Fieldwork Experience

All research presented in this dissertation was conducted solely by the author. There was no research team or undergraduate assistants at any stage of the research process. While planning, and eventual writing of results, did involve support and guidance of all members of the PhD advisory committee, the on-the-ground observation, data collection, and all associated activities that took place in the field were solely under my responsibility and direction. Interview transcription, analysis, and coding involved in the projects presented in this document were also solely completed by me. While time consuming, the process was rewarding and provided grounding for me when events in the wider world proved challenging. This likely resulted in richer qualitative codes, and an overall stronger understanding of the data by the author.

The research presented in Chapter 2 stemmed from six weeks of field research spanning three US Gulf Coast areas: Baldwin County Alabama, Harrison County Mississippi, and Terrebonne Parish Louisiana, which was conducted during the summer of 2017. The research presented in Chapters 3 and 4 is based upon seven months of field research within Terrebonne Parish, Louisiana; spanning from April 2019 – Oct 2019, and Feb 2020. The 2017 field research played a pivotal role in exploration of the topic. Significantly this smaller project allowed the PI to get a feel for each location which in turn helped in selecting the one location that would become the main field site. Selection of field location for the 2019-2020 field season was based upon participant observation, tone of overall engagement, if I could see myself in the area for an extended period of time, the ease of navigating the area (geographically), the ease of engaging with locals, as well as elements connected to the areas risk exposure, hazard planning, and an overall feeling of safety of the PI. The two main turning point criteria for selecting Terrebonne Parish were 1) the overall engagement of locals with the PI in terms of openness and also willingness to engage with the project, and 2) the high level of risk and challenge both being presently experienced as well as future predictions of the same. The following section outlines select self-reflective positional observations largely pertaining to the main seven-month field season.

As a non-citizen of the USA it is important to openly acknowledge that I was an outsider during all field work that contributed to this dissertation. Not only am I a non-US citizen, but until the pilot project, I had not spent any time in the US South, the US Gulf Coast, or coastal Louisiana. While I had been trained in anthropological field methods,

and ethically responsible ways of engaging with individuals, due to the limited time available for the research I was always going to be an outsider. I am eternally grateful to the individuals whom I interacted with during my time in the field, and in large part for their openness and acceptance of me and the work I proposed to do. The majority of those whom I interacted with, observed, and/or engaged with were very welcoming and willing to share stories and insights about the local area, especially of areas that held significance to them. It is both a testament to their hospitality and my openness to experience as a researcher that field work across both pilot and dissertation projects was as successful as it was.

I do have personal experience with movement/migration decisions, though not in the context of physical environmental threats. I grew up in a rural area of New Zealand and subsequently traveled to boarding school in the early 2000's. During this time my parents sold the family farm and relocated toward a local urban center. Up close, I had my first taste of the reasons movement can occur, and the process by which that decision is made. Included in this was experience of the emotional/social/cultural upheaval that takes place when established connections to place are severed, and attachments develop for a new location. After boarding school, it was my turn to make a movement decision – where to attend university. This decision outcome found me living at the bottom of New Zealand for six and a half years, 1,136km (705miles) away from my family, and across four different residences – each move building new networks and attachments, and growing independence from family ties. I have also moved internationally in both a temporary (to Australia for 2.5 months) and semi-permanent (to the USA for 9.5 years)

capacity, adding to personal experience of the decision making. This type of movement decision is different from the movement context investigated within this dissertation. There was no (direct assessment of) environmental risk involved. However, it did prove to be grounding when engaging with participants in discussions of migration decision making.

On a personal level, I was/am a young white female, and unless I was actively talking with someone, I am largely able to pass as a US citizen. However, when living down-the-bayou I was emersed in some very tightly knit communities; everyone knows everyone, family ties run deep, and changes to the 'order of things' travel across the communities like ripples radiating out from a stone dropped into water. As such, first impressions/interactions can be critical (the ripples that radiate cannot be controlled once the stone has been cast). It did not take long for word of the arrival of a new person in the area to travel, especially after establishing contacts with several prominent and well-connected residents. In the early stages of participant observation and community engagement word of 'a newcomer'/'an anthropologist'/'a scientist'/'an out-of-towner' would often reach an area before I had physically arrived. This, coupled with being the 'one person that was not familiar' often meant people knew who I was before I had even introduced myself. In the more coastal/isolated bayou areas this would often times result in individuals approaching me as asking "if I was that anthropologist they had heard about", or "if I was that researcher that was going around talking to folks". While these types of experiences did lessen over time as locals became more familiar with me and the work I was doing, the sense of local gossip traveling faster than I was able, did not go

away. Even after moving further inland to the city of Houma in the latter half of the field season, I would still be occasionally met with individuals introducing themselves who had heard about me or connected me to a newspaper article they had seen months before. Overall, I would state that this type of recognition had positive outcomes for the project as a whole, there were those who likely shied away from interacting with me as well. There were people who had no interest in talking with me, or engaging with the research. Due to the restricted timeframe of the research project, I could not use too much time trying to seek engagement from those who were 'not interested'.

A consistent interaction throughout the main field work period was talking with locals about what an anthropologist was. During initial introductions I would state that I was conducting research within the area and locals would automatically assume I meant sampling something or measuring something in a laboratory setting, or out on a boat 'somewhere'. Sometimes they would assume I was connected with Louisiana State University (LSU), Nicholls State University, or The Louisiana Universities Marine Consortium (LUMCON) whose main research site is located in Cocodrie - the 'end of the world' as far south as south goes (by road) within the parish. It was also critical for me to establish that I was not affiliated with any local group or organization, area emergency management, or council department.

Some residents were wary of my intentions, especially given the topics I was asking questions about. It was imperative for me to first establish that I was working on my own, and secondly, that all data and answers they would provide me would be

confidential and anonymous. This was a critical step in rapport-building with local residents, and one that could not be rushed. With the exception of a small handful of individuals, no one I interacted with knew what anthropology was, what an anthropologist was, or that research was something that could be done without the use of a white coat and a test tube. Informing individuals about what I was aiming to achieve, why I was doing this, and that I was genuinely interested their thoughts/perceptions/ideas was a critical. However, it was also vital for informing locals that there is power in words and that meant my research was asking people questions and recorded their answers. This was not merely conversation, it was research. The whole idea that 'asking questions and recording answers' could be a type of research was a new concept for almost all individuals who I interacted with. So if nothing else, I helped expose hundreds of individuals to a small sliver of anthropology, and was a living example that research was something that did not always need a laboratory, a boat, or chemical reactions. An individual's perceptions, experiences, views, and expressions could be captured, analyzed, and result in meaningful and actionable outcomes. In doing so, I tried to contribute toward a broader scientific literacy to a cross-section of the Parish populace.

I was constantly reminded during my time in the field that social science research is about as far removed from a laboratory research setting as you can possibly get. In a lab setting the researcher tries to control all variables, keeping all but one constant to obtain a clean, reliable, and repeatable outcome. The field experience was the exact opposite. While I had my training, my survey instrument, and an interview protocol to implement, I was working within a dynamic and ever-changing landscape of individuals

and organizations with their own roles, agendas, timetables, and practices. Such is the nature of ethnographic field research. You become a part of the background into which their everyday activities are taking place. While I was able to control many aspects of my field season, such as where I went on a particular day, who I set meetings with, how I spent my observation periods, where surveys were undertaken or interviews conducted, I was not able to control wider local events which impacted my ability to conduct my field season. Nor was I able to control the impact these events would have on my participants and thus the data I would collect from them.

There were many local events and happenings during my field season that aided in observations, contact building, participant recruitment, and the overall success of the research; Birthdays, various Bayou Boat Blessings, fishing contests and rodeos, church lunches, civic meetings, Rotary Club meetings, school events, and Mardi Gras to name but a few. There were also events that had more unforeseen, and more negative impacts on the field season. Three such events featured prominently; two involved deaths, and the third was Hurricane Barry. Given the timing of the project it was a known risk that there may be a hurricane during my time in the field. This was an expected risk and I planned for it by moving my place of residence further inland, to higher elevation, in the latter half of the field season, recognizing that this was a flexibility and luxury not all of Terrebonne Parish enjoyed. While there was some disruption to data collection during Barry and the immediate aftermath this event mostly just postponed planned interviews and bumped my overall research schedule back by a few days. The deaths, however, had

a far greater impact both on the research project, and on me as both a researcher, and personally as a human being.

The first death was a murder. I had met the deceased only the week before and had arranged to meet with them again to talk more about my project and learn from them. They were an amazing person, someone who I hoped to get to know much better. They had all the makings to become a key informant due to the wide range of local organizations they were a part of. Sadly, that second meeting never happened. Their death was a tragedy, and it was violent. As I have mentioned previously, the families and communities down-the-bayou are very close knit and this event tore through one of my study areas like a blunt chainsaw, sending splinters far and wide. Not only did this event impact the individuals I was talking with immediately and in the weeks that followed, but it also impacted the responses I received. Some survey questions now highlighted dangers that because more salient in locals' minds than they had been prior to the incident. I was invited to, and attended, the memorial as well as other commemorative events that were organized for the deceased. While this first seemed very surprising – as I had only recently arrived in the parish – it later proved to be a testament to the accepting nature of the people of the area. I was there during this event, and as such I was welcome to be a part of the responses to that event. Locals, and even family members of the deceased accepted me, and I openly grieved alongside.

The second death was the sudden and unexpected passing of a participant. This individual was someone who I had interacted with many times and had first met after

visiting a local Houma church. They were a wonderfully insightful individual who I greatly enjoyed talking with. They were an official participant who had already taken part in the survey component of the research project (Chapters 3 and 4 of this dissertation) and had been selected for a follow-up interview. I found out about their passing soon after it happened while I was attending a church service and was asked by another contact if I had heard about them. The loss of this individual rippled through the immediate community members, and church congregation, but not in the same ways as the earlier death had. There was no loose end and no anger (the passing was likely related to an underlying medical condition). Yet there were still some noticeable impacts on the data obtained during this time. Respondents seemed a little more directly cognizant of the impermanence of life.

In both these situations I had very little official training on how to deal with and work through the immediate circumstances nor the impact upon the research process. This was not something I had prepared for, and it is likely that no amount of classroom training would have adequately prepared me. On the one hand I was there as a researcher fulfilling a research project of my own design, with my own goals, and these events were having a direct impact on the data that were being collected. However, on the other hand I was an invited member of these communities and groups, a human, a friendly face who shared stories and listened to others in return. I had been welcomed into these spaces and had a responsibility to the other individuals within these spaces to engage with the tone of the moment, to be allowed to just be. Those who knew them had far deeper connections and histories than I could ever have.

I had only just arrived in the area yet was still invited into these spaces. These invitations are true testament to the inclusive tone of togetherness embodied by these communities. These experiences were somewhat a microcosm for the sense of togetherness expressed by the wider parish community during recovery from a major hurricane event. While outside of the scope of this dissertation, I do plan to further detail the processing of these losses from a methodological standpoint in a future publication.

IRB and Funding Acknowledgement

The research presented in this dissertation received institutional review board approval through Arizona State University; study numbers STUDY00006338 (Appendix B) and STUDY00009200 (Appendix C). It adhered to all ethics requirements and guidelines surrounding research involving human subjects. Unless otherwise stated in text, due to the express wishes of the individual participant, any participant names used throughout this dissertation are pseudonyms. The research work presented in this dissertation would not have been possible without the funding support of those institutions credited at the end of the acknowledgements section, page iv. The NSF proposal and award specifically relating to the work presented in Chapters 3 and 4 is award #1851571.

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CHAPTER 2

ENVIRONMENT: MORE THAN AN ECOLOGICAL NICHE. INVESTIGATING THE MEANING OF *ENVIRONMENT* FOR THOSE LIVING IN AT-RISK LOCATIONS ALONG THE US GULF COAST

Abstract

Investigations targeting the role of environment in relocation decisions typically focus attention on combinations of biogeographic and climatic conditions, or physical threats. In this paper we argue that the established natural/physical environmental focus is inadequate for capturing the social roles of environment within migration decision making. We address this shortcoming by drawing from Sense of Place literature, a perspective that grounds people culturally in places. Data from three USA Gulf Coast locations was collected during the summer of 2017 to address the questions: What does environment mean, i.e. how is it perceived by those who live in at-risk areas? And, How does environment figure into movement plans, i.e. as either push, anchor, or both? Findings illustrate that the environment, as perceived by coastal residents, extends beyond typical biophysical and climatological phenomena and settings, to encompass lived experience, attachment to home, and meanings connecting people to place. Such social elements of environment are currently underrepresented, or completely absent, in discussions of the environment's role and impact on migration decisions. We highlight the juxtaposition of perspectives and conflicting conceptualization of environment within hazard prone, yet meaning-rich, coastal places currently facing serious threats from climate change.

Introduction

Environmental changes are being felt globally. Though the form these changes take ranges widely; from climatic shifts, flooding, sea level rise, to changing seasonality, the experience of change is growing. One avenue of adaptation humans utilize to respond to environmental change is relocation, usually to somewhere perceived to be more stable or of lower risk. Alternatively, people may decide to remain in place despite exposure to elevated risks.

Investigations targeting the role of environment in relocation decisions typically, and firmly, focus attention on environment as combinations of biogeographic or climatic conditions by which one is surrounded, ultimately determining/directing survival. Environmental conceptualizations within the relocation decision are often framed as a hazard, threat, or otherwise negative influence which push people away from their place of residence. This framing of environment excludes social and cultural conditions that influence the life of an individual or community. This understanding of *environment,* inclusive of linkages to *identity, culture, and well-being* is more in line with environmental and socio-cultural anthropology applications and is the approach this paper considers. We aim to expand "environment" beyond its typically considered physical characteristics to include social meaning, an approach increasingly important as change irreparably transforms environments that people call *home*.

Coastal populations are the equivalent of the canary in a coal mine when it comes to experiencing environmental changes. Globally more than 600 million people live in coastal areas that are less than 10 meters above sea level, and nearly 2.4 billion people (about 40% of the world's population) live within 60 miles (100 km) of a coast (Neumann 2015; UN 2017). Some 94 million people live in coastal adjacent areas in the USA alone and predictions for coastal America are grim. Recent US data from the National Oceanic and Atmospheric Administration (NOAA) predict that "There is a 1-in-20 chance that by the end of this century more than $1 trillion worth of coastal property will be below mean sea level, or at risk of it during high tide" (NOAA 2021:4). Hurricanes pose a serious risk to coastal infrastructure, business, and inhabitants. In 2019 alone, specifically in relation to hurricanes, "2019 marked the ninth consecutive year with eight or more billion-dollar disasters" (NOAA 2020).

With change guaranteed, and predictions about the future of coastal landscapes pointing toward severe physical environmental impacts on the habitability of large sections of the US coast, attention is turning to movement decisions. Policy decisions made at the federal, state, and local levels could impact settlement patterns for millions of Americans as people weigh their options – move to locations deemed to be more stable/habitable, or stay?

The US Gulf Coast, especially coastal Louisiana is "on the front lines of a battle against land loss common to river deltas around the world" (Berg 2018:1). "*Saltwater*

intrusion, the result of subsidence, sea-level rise and erosion, has killed off the live oaks and bald cypress… A relentless succession of hurricanes and tropical storms … has accelerated the decay. In all, more than 2,000 square miles, an expanse larger than the state of Delaware, have disappeared since 1932" (Sack & Schwartz 2018:1). Since the early 1900's some parish areas have already lost more than 90% of their land (Burley 2010). And yet despite these risks and the ever-present danger of flooding and hurricanes, millions of coastal residents express sentiments of steadfast resistance to the idea of leaving. "*People that don't understand it say, 'Why don't you just move away? The people who are connected to these communities don't think that way. It's a whole culture that's connected to the earth and the water. You can't replicate it*" (Sack & Schwartz 2018:1).

When faced with unquestionable risk, and with change the only certainty, why are some residents reluctant to relocate? Beyond the biophysical, what cultural elements of environment are important to people when deciding to leave, or stay? The US Gulf Coast provides a real illustration of migration motivations and active decision-making within a context of heightened environmental risk. The land loss across this area, and responses, to it have made headlines across major media outlets, including *The Washington Post*, *Time*, and *The New York Times.* Surprisingly, there is comparatively little research addressing migration decision-making due to environmental change, particularly when population movements occur domestically, i.e. within the borders of the same country. A better understanding of the role of *environment* in migration decision-making, inclusive of people both intending to move, and to stay in place, is critical.

We draw on two literatures - migration and sense of place - to first define "environment" and then expand beyond its physical characteristics to include social meaning. Based on fieldwork across three US Gulf coast locations, this paper seeks to address the following questions: 1) What does *environment* mean, i.e. how is it perceived by those who live in at-risk areas? And, 2) How does *environment* figure into movement plans, i.e. as either a push, an anchor, or both?

Migration

While many excellent reviews of migration theory and scholarship are available (Arango 2000; Brettell & Hollifield, eds 2014; Cohen 1996; King 2012; Massey et al 1993; Shaw 1975; Zolberg 1989), three observations are important in the wider theoretical context of this literature. First, migration theory has had a primary focus on international movement rather than internal/domestic movements. King & Skeldon (2010:1620) suggest however, that there is considerable potential to better integrate the study of internal and international migration, at both theoretical and empirical levels. A second observation is that almost by definition, the migration literature focuses on those who move, not the many reasons for staying. Investigations of immobility, irrespective of cause, are limited. This bias is discussed by Schewel (2020:346), who states, "Because of a mobility bias in migration research, migration theories share a focus on migration's "drivers" — the forces that lead to the initiation and perpetuation of migration flows — often overlooking the countervailing structural and personal forces that restrict or resist it". These forces are referred to as anchor factors in this paper. A third observation is that

the role of *the environm*ent in migration decisions has focused on either economic responses to physical conditions, or environment as physical hazard. In the first case 'environment' can exert an economic push (from origin, such as people responding to crop failure) or a pull (to a destination, such as annual movements of human 'snowbirds' to warmer wintering grounds). In the second case, observed movement describes evacuation from an environmental disaster, sometimes followed by return movements after recovery. Social or cultural components of the environment are not included within either of these perspectives.

In the early and mid-1900's, anthropologists regularly incorporated aspects of environment as drivers of migration. After the 1950's, with the rise of processual anthropology (Erickson & Murphy 2013; Haenn & Wilk 2006) and a corresponding decline in cultural historical approaches (Erickson & Murphy 2013; Lyman et al 1997), the environment was dropped as a primary feature of migration scholarship. Over the past 60 years or so, the disciplines of anthropology, geography, sociology and economics have all engaged with the investigation of migration. However, much of this scholarship incorporates a strong economic lens, with little attention paid to other environmental components; i.e. people migrate to escape poor economic conditions or access better conditions, or both. Environment, as physical manifestation, came sharply back to the forefront of discussions in the early 1990's with rising world-wide awareness of environmental change (Haenn & Wilk 2006). The original 1990 Intergovernmental Panel on Climate Change [IPCC] report, and all successive reports [1995, 2001, 2007, 2014],

have contributed to a refreshed focus on the environment spanning biophysical, cultural, and humanitarian domains.

The hazards and disaster literatures provide alternative examples for migration framing (Abramson *et al* 2015; Fass & Barrios 2015; Myers et al 2008; Warner *et al* 2010). This work documents the hazard event primarily from physical perspectives, focusing on duration, severity, and frequency. Exposure is conceived as a catalyst for movement, highlighting the *effects of that movement for people*. This makes sense as hazard research is rooted in an understanding of disaster as an external event, to which people react (Gilbert 1998). The physical dimensions of environment in this work as natural, physical, or climatological, and short-versus long-term onset of risks are typically evaluated in terms of thresholds (Bardsley and Hugo 2010). Studies investigating evacuation patterns (Li et al 2010), or evaluating risks endemic to a particular area (Hunter 2005; Patwardhan et al 2007) are examples of overlap between disaster and migration research. The hazard-focused literature highlights environment, as an event, and the primary cause of migration from a place.

In contrast, migration research emphasizes the *process of decision-making to move* for individuals, households, or groups. Numerous conceptual frameworks of migration drivers exist, many stemming from seminal work by Richard Black and colleagues (Black et al 2011a:448, Black et al 2011b:S5). Macro-level political, economic, and demographic factors driving migration are examined, as well as micro-

and meso-level factors, such as household socio-demographic characteristics and the strength of social networks. This work includes environmental elements, however, *environment* is conceptualized narrowly, as either system-or landscape-level 'exposure to a hazard'. The implication is that environmental change influences all other drivers, but there is little emphasis on macro-micro interactions.

While inclusion of environmental factors in migration research has increased overall, the mechanisms by which environment affects decisions to move is currently under-theorized. Physical and climatological characteristics of environment dominate and there is little to no incorporation of locally defined understandings of environment prior to the movement decision. One exception is work conducted by Koubi and colleagues (Koubi et al 2016a; Koubi et al 2016b), who measured environmental perceptions at the micro (individual) level of slow and fast on-set physical environmental events linked to migration within Vietnam. Their focus was "whether and how individual perceptions of different types of environmental stressors induce internal migration" (Koubi et al 2016b:197). Here, however, the perception is focused on the stressor only, without space for wider elaboration of other environmental components. As stated by Ionesco et al. "the environment is just one factor of migration among others. Yet, neglecting its role amounts to providing an incomplete panorama of contemporary migration" (2017:64). In this paper we argue that the established natural/physical environmental focus is inadequate for capturing social roles of environment within migration decision making. One way to address this shortcoming is to draw upon Sense of Place literature, where people are grounded culturally in places.

Sense of Place

The Sense of Place literature within anthropology and cultural geography conceptualizes the role of non-economic and social factors as foundational in people-place relationships. Sense of Place is a social phenomenon linked to place identity (Low & Altman 1992; Rodaway 2002; Tuan 1977) and assumes that social and biophysical reality are interconnected (Masterson et al 2017:48). Sense of Place studies highlight the phenomenological linkages between the physical, social, and cognitive meanings people attribute to places, the reasons behind the development of these connections, and how Sense of Place can be maintained, or developed, through generations (Hillier & Rooksby 2005). Two sub-constructs of Sense of Place are *Place Attachment* and *Place Meaning.* Place Dependence is a critical component of Place Attachment, describing the "ability of a setting to facilitate goal achievement and to satisfy important needs" of an individual (Masterson et al 2017:49).

Coastal and shoreline communities are of particular interest when investigating Sense of Place dynamics (Jorgensen and Stedman 2006) due to near constant changes occurring in physical environmental spaces - either through human development, residential compositional changes, or natural landform/ecological processes. Sense of Place research has shown that "patterned relationships with place help to predict specific types of behavior" (Masterson et al 2017:49). The seminal work of Basso (1996) provides a detailed example of people-place connections for Arizona Cibecue Apache, emphasizing that landscapes allow people to reach through time and social relationships to ground themselves in a place. "Sense of Place has been shown to be a powerful

predictor of attitudes towards potential changes and behavioural intentions, both reactive and proactive" (Masterson et al 2017:49). Nature, conceptualized in these contexts is as much a social entity as a physical one (Evernden & Evernden 1992).

Landry et al. (2007) incorporated Sense of Place elements and migration concepts when examining evacuation decisions in response to hurricane Katrina, using proxy measures of birthplace and length of residence to indicate connection to "place". We expand this approach and suggest that the sense of place concepts of *attachment* and *meaning* offer a qualitative framework to build specific social components of *environment* to provide meaning and connect coastal residents to their places. This approach can then identify aspects of environment as more/less significant, and facilitates a more robust understanding of decisions to move or stay – despite risks.

Study location and research design.

Field work for this paper occurred across three locations; Baldwin County Alabama, Harrison County Mississippi, and Terrebonne Parish Louisiana (Figure 2.1).

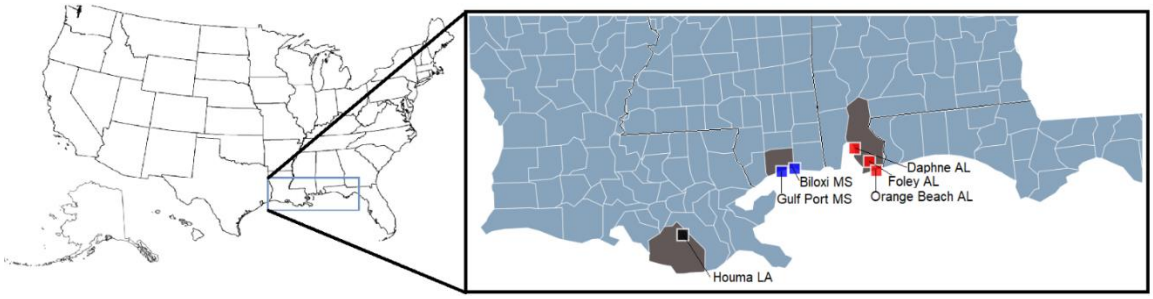

Figure 2.1. Map of county/parish areas visited during data collection. Areas visited shown in grey, with urban areas of data collection illustrated.

Site selection criteria were threefold; 1) historical evidence of elevated environmental risk, 2) exposure to ongoing risks, and 3) predictions of elevated future risk (Robinson et

al 2020; Strauss et al 2012; Weiss et al 2011). All locations are adjacent to the Gulf of Mexico, experience hurricanes, and to varying degrees flooding, salt intrusion, and land subsidence. Any location adjacent to the US Gulf Coast would meet these criteria, however, established contacts with emergency managers and community stakeholders within these sites during planning stages led to their inclusion. Data collection occurred during the summer of 2017 by the primary author.

Each location was visited for a period of two weeks. Participant recruitment occurred through opportunistic engagement at local farmers markets, cafes, churches, businesses, libraries, club events, and restaurants. An opportunistic sampling frame was employed, stratified by; gender, age, and length of occupation within the area to capture a diversity of responses. Data was collected through an administered survey and concurrent semi-formal interview discussion with participants (IRB # STUDY00006338 – Appendix B). Questions asked respondents about their knowledge of local physical environmental conditions, future predictions of change and environmental meaning; i.e. how participants defined 'environment', and their movement intentions. A suite of basic demographic questions identified age, gender, occupation, family size, and residential status. Interviews lasted between 30 and 60 minutes.

Fifty-four individuals were interviewed in total. Data represents individuals across a range of ages, living situations, family histories (Table 2.1) and movement intentions. The survey asked participants to list up to 10 terms/answers to the following

question: *What is your environment*? Additional probing questions were asked after the participant finished generating terms. All but nine of the 54 participants provided a full set of 10 answers (eight providing nine responses and one individual eight). Each answer provided was assigned an affect: positive, neutral, or negative, depending upon the tone of expression in follow up questions (Figure 2.2). Where plurals or very closely related terms were provided, these were combined for analysis purposes e.g. hurricanes and hurricane. Probing questions identified the main factors contributing to participants' movement decisions in terms of the decision to leave or to remain. Interview notes were screened for exemplar statements (Table 2.2), participant consistency, and outlier perspectives. As all locations visited face similar environmental threats, responses are pooled across sites.

Seven “environmental” themes were extracted from the survey data using keyword analysis (MaxQDA software). These themes were overlaid onto participant movement intentions to investigate potential connections between environmental perceptions and migration decision making both generally, and through comparison of the affect corresponding to the environmental theme. Four movement intention categories were identified: “Never leave”, “intend to leave - move within the parish/county”, “move outside of parish/county soon/in the near future”, and “intend to leave the parish/county eventually/in the more distant future”. The latter two categories were combined into a ‘Move’ category. Notes were screened and coded for migration decision factors with all responses falling into two categories; factors linked to the environment (either physical or cultural/social), and economic factors. Responses within these two categories were

further classified based upon their effect - as either push or anchor. These decision factors were then overlaid onto movement categories (Figure 2.3).

Results

Fifty-four participants were recruited across the study locations: 12 individuals in Baldwin County, AL; 18 in Harrison County, MS; and 24 in Terrebonne Parish, LA. Respondents ranged in age from 20 to 87 years. A summary breakdown of socio-demographic characteristics is available in Table 1. On average, participants had lived in their county/parish for over 30 years, with 26 [48.1%] having spent their entire lives in the immediate area. Nine [16.7%] had immigrated into the county/parish within the last five years, four of which had moved for retirement. The remaining 19 [35.2%] moved to the county/parish more than six years prior to the study. Six participants were living in the same family home in which one grandparent had grown up. Respondents often shared information and stories allowing the PI to better understand the histories of place held by respondents.

Table 2.1.

Summary of select characteristics of the 54 study participants. Variables are displayed in the left side column, including data descriptions, and total aggregated data is in the far-right column. As data collected across the three study locations is broadly similar, data was aggregated for investigation and analysis.

Variable Classifications	Baldwin County, AL	Harrison County, MS	Terrebonne Parish, LA	TOTAL
Number of Survey Participants	12	18	24	54
Gender – No. of Participants	Male - 5 Female - 7	Male - 11 Female - 7	Male - 13 Female - 11	Male - 29 [53.7%] Female - 25 [46.3%]
[Age Range in Years] – No. of Participants	[20-39] - 3 [40-59] - 2 [60+] - 7	[20-39] - 9 [40-59] - 5 [60+] - 4	[20-39] - 7 [40-59] - 9 [60+] - 8	[20-39] - 19 [40-59] - 16 [60+] - 19
[3 Age Ranges] Minimum, maximum no. of years living in the area	[20-39] 20, 27 [40-59] 4, 43 [60+] 6, 72	[20-39] 6, 37 [40-59] 29, 56 [60+] 10, 67	[20-39] 10, 38 [40-59] 30, 40 [60+] 3, 87	[20-39] 6, 38 [40-59] 4, 56 [60+] 3, 87
Have at least one parent who grew up in the same local area. No. of Participants [%]	10 [83.3%]	16 [88.9%]	20 [83.3%]	44 [81.5%]
Have at least three generations of family connection to local area. No. of Participants [%]	4 [33.3%]	3 [16.7%]	11 [45.8%]	18 [33.3%]
Living Situation – No. of Participants	Rent - 3 Mortgage - 6 Own - 3	Rent - 2 Mortgage - 13 Own - 3	Rent - 7 Mortgage - 11 Own - 6	Rent - 12 Mortgage - 30 Own - 12

Environment

The question "*What is your environment*" generated 530 total responses, and 53 unique terms. Thematic coding identified seven themes: *Attachment, Dynamic, Geography, Hazard, Infrastructure, Nature,* and *Personal*. The *Geography, Hazard, Infrastructure, Nature and Personal* themes were straightforward to identify. The *Attachment* and *Dynamic* themes were created after reviewing associated contextual notes. For example, responses such as 'trust' or 'belonging' were always contextualized

by participants as related to a feeling of attachment to a place, space, or event. The two responses that make up the *Dynamic* theme were ‘loss’ and ‘change’, and speak to a lived experience that is not static, and the repercussions associated with change.

Terms are grouped by theme, term frequencies, and affect (negative, positive, neutral) (Figure 2.2 and Supp Table 2.1). In combination, these attributes represent how Gulf Coast respondents define their environment and how they feel about it. First, looking at the 53 unique terms generated by respondents across all themes, it is clear that *environment* encompasses characteristics across both social and physical dimensions, highlighting that both of these elements are key components of the environment. Of the top ten most frequently named terms, four are physical (Nature [n=26], Hurricane [n=24], Natural [n=24], and Wildlife [n=20]), but six were social (Home [n=28], Family [n=26], and Community [n=23], Belonging [n=21], Memory [n=18], and Connected [n=18]).

Looking at themes, two of the four most frequently identified themes on aggregate (*Personal* and *Attachment*) relate to social and cultural needs (Figure 2.2). The other two (*Nature* and *Hazard)* describe more typically identified physical characteristics of environment. Common terms in the *Personal* theme (count = 164) were ‘home’, ‘family’, ‘community’, and ‘memory’, while frequent terms in the *Nature* theme (count = 150) included ‘environment’, ‘nature’, ‘natural’, and ‘weather’. Terms within the *Personal* and *Nature* themes were largely positive (78.7% and 82.0% respectively). The third most frequently expressed theme was *Hazard* (count = 65). Terms within this theme

are all physical or event oriented, e.g. ‘hurricanes’, ‘floods’ and ‘damage’ and terms were universally negative across all responses. The terms most frequently expressed within the *Attachment* theme (count = 62) were ‘belonging’ (21/62 terms*)* and ‘connected’ (18/62 terms) and reflected relationships to places. Affect associated with these individual terms diverged, belonging was 90.5% positive, 9.5% neutral, and connected was 55.5% positive and 33.3% neutral, demonstrating that while participants related to a sense of belonging positively, perspectives on connectedness to these places or people were more mixed.

Of the three less frequent themes, two focus on environment as physical (*Geography* and *Infrastructure*), and one on its more *Dynamic* nature. Terms within the *Geography* theme (count = 45) commonly emphasized the spatial nature of the environment, i.e. it is ‘anywhere’, ‘near’, and ‘local’. The affect of responses was more split, with 55.5% positive and 40% neutral, and two isolated mentions of ‘local’ were identified in a negative context. The *Infrastructure* theme (count = 24) emphasized physical resources, e.g. ‘buildings’ and built ‘greenspaces’. Affect within the *Infrastructure* theme terms ranged between positive (50%), neutral (33.3%) and negative (16.7%). This potentially demonstrates more mixed feelings about human-altered environments, or that while common infrastructure features such as roads or buildings are important for daily life, such features inspire equal parts indifference and/or negative feelings. The *Dynamic* theme was infrequent (count = 20), however, terms exemplified the fragility and impermanence of the coastal environment. Affect associated with these terms was predominantly negative (60%). For example, ‘change’ and ‘loss’ were expressed in relation to feelings of sadness and anger about losing environmental

elements – both geographic (a specific location) and social (swimming with family or friends), and about the pace of change. Some responses (30%) were neutral, and agnostic about change, seeing it as neither positive or negative, just something to be accepted as a part of life.

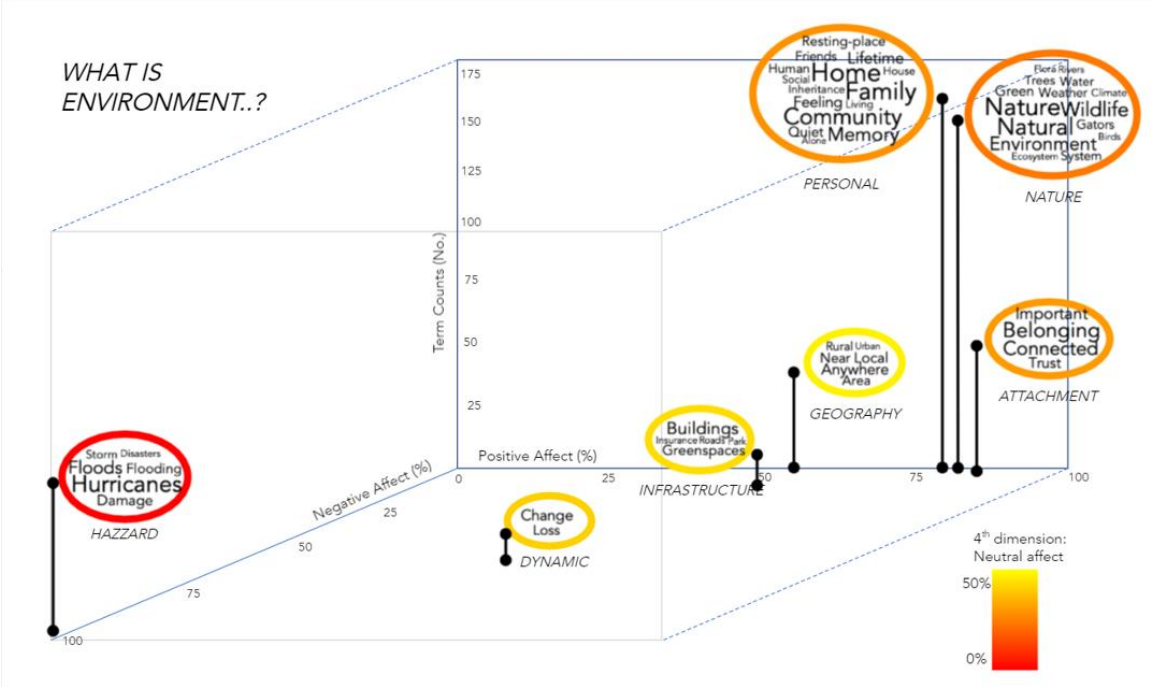

Figure 2.2. Seven emergent environmental themes displayed by frequency and affect (n=54). Each term is scaled by size, with larger terms mentioned most frequently across themes. The most frequently mentioned term was 'Home' (n=28), while eleven terms were mentioned three times or less (e.g. Roads, or Birds). The Y axis represents total frequency of all terms by themes. The X and Z axes represent the percentage of responses, within each theme, that were positive/favorable and negative/unfavorable. A 4th dimension (color) represents the percentage of neutral/indifferent responses within each theme. A breakdown of the data used to create this graph is available in supplemental table S1.

Migration and Environmental Perception

Figure 2.3 illustrates respondent movement intentions and the frequencies of environmental and economic factors cited as reasons to stay (anchoring factors) or

contributing to a decision to leave (push factors). Thirty-two respondents (59%) indicated that they do not plan to ever leave their current home – their place of residence at the time of the research (labelled "Never Leave"). Fourteen (26%) indicated they intended to leave the county/parish (labelled "Move"), 10 in the near future and 4 after a longer time, with the remaining 8 individuals (15%) indicating they might move dwellings but would resettle within the same county/parish (labelled "Move [Local])".

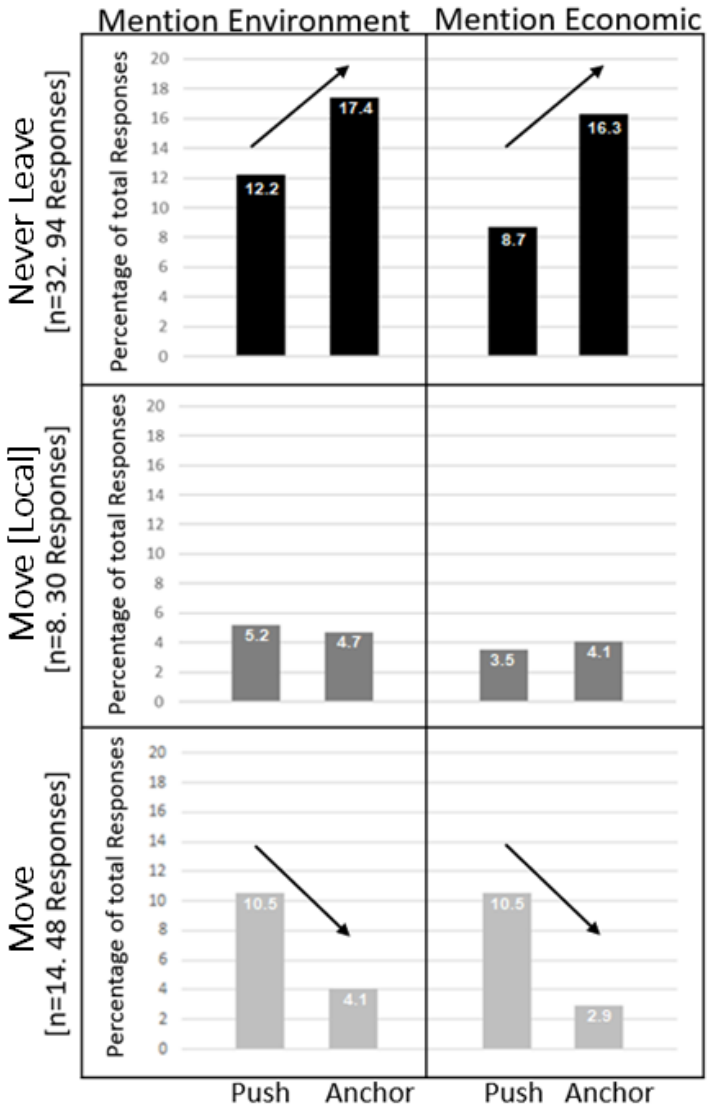

Figure 2.3. Percentage of coded counts of environmental and economic factors as push and/or anchor by movement category. Fifty-four participants (n) provided 172 statements (responses). Responses are organized by respondents' movement intentions (Never Leave, Move [Locally], & Move). Bars within groups represent the percentage of total statements mentioned as either push or anchoring factors, and linked to environmental (left column - social and physical) or economic (right column - income, job security, savings, and assets) factors.

All participants provided multiple reasons for their movement decision, with responses across all 54 participants resulting in 172 statements. Ninety-three [54.1%] statements related to *environment*, across both physical and social dimensions. Eighty statements [45.9%] highlighted economic factors (income, job security/choice, savings, and assets). Across the three movement categories, slightly more environmental statements were coded than economic. Both environmental and economic reasons were mentioned as pushes and anchors by respondents in each movement category. However, the directionality of effects was the opposite for the "never leave" and "move" groups. For those in the "never leave" group, some statements described environment and economic factors as pushes to leave (12.2% and 8.7%), however, both factors were more frequently mentioned as *anchoring* forces (17.4% and 16.3%). This relationship is inverted for those in the 'move' category, where environment and economic factors were cited more frequently as *push* forces. Despite a plan to leave, a few respondents' statements described both elements as anchors (4.1% and 2.9%). Particularly for those intending to stay in place, results suggest that respondents are aware of economic and environmental challenges, yet elect to remain despite risks or uncertainties. Respondents in the "move, but stay local" category cited both environmental and economic reasons as push or anchor factors with similar frequencies, possibly signaling indifference to either factor given their intention and ability to adjust their living situation locally.

Table 2.2.

Exemplar quotes corresponding to environmental or economic features acting as push forces or anchor forces. No two statements come from the same participant

	Feature	as ANCHOR factor	as PUSH factor
Environmental	**Storm / Hurricane**	She's [the house] weathered many a storm, been damaged many a time, but she's mine, and she's not going anywhere, so neither am I.	I don't want to have to recover from another storm, it's just all too much.
	Rising Seas / Sinking Coastlines	The water is a part of me, it's a part of everyone who lives here. You learn to live with it. You can't always fight it. Some days there is flooding to deal with, but it's worth it. Even if one day we all end up living on boats, I'm still going to be living right here.	My mother would look out this window and see land. I look out this same window and all I see is water. I'm not a good swimmer [laughs], so I guess I will have to leave even though I don't want to.
	Family	Generations of my family have lived in this area, it's not just the land, it's a living memory to the work of every generation that has come before. That connection is important to me, no one else has what I have.	We are thinking of starting a family, but we don't want to raise our children here.
	Community	The connection folks here have to this place, to this community, cannot be found anywhere else. Outsiders just don't understand. You can't replicate it, you can't define it, and you definitely can't replace it.	The feeling is different you know, I look around the town and I see things I didn't before. I just don't feel the same way about the folks here anymore.
Economic	**Income**	Right now things are good. I'm working, my wife is working, and our kids are all independent. We are comfortable with the money we make and are both in jobs we love.	Some weeks are tight. I am always looking to see if I can find a better, more well paying job. And if that job is away from here, well, I have no issues with that. I am sick of worrying if I'll have enough to cover the next power bill.
	Job Security	I love what I do. I'm good at it, and in this area there are few who can say that. Folks come looking for me, I'll always have a job here, that kind of reputation stays with a person.	There are plenty of places I could be working, but that's the service industry for you. I'd like something better, and maybe some day that will happen. There is not much to look forward to in my job, and if I slack there are plenty of others waiting to take my spot.

Table 2.2 provides exemplar statements coded as environmental or economic factors, partitioned as either anchoring or pushing respondents to/from their places. Statements like these are the data source for Figure 3. Sentiments expressed in the anchoring statements demonstrate an overall contentedness with, and attachment to, environmental and economic characteristics of place. Statements acknowledge challenges, yet they can be overcome, and connection to places, through meaning, is stronger than any forces that could disrupt those connections. Respondents described the environment as bonding residents together and to their place, their homes, and surroundings, and steeling their resolve not to leave despite environmental hazards. Economic factors were also anchors. Respondents expressed a love for their jobs/current employment, positive business/work connections for themselves or others within the area, and a level of economic comfort. Within the push statements, two categories of responses emerged; 1) people expressing that locally observed environmental changes (such as erosion, increased flood frequency, or the proliferation of crime) would inevitably result in a move, and 2) those making a proactive choice to leave before being left with no other option. Environmental push sentiments revolved around notions of no longer wanting to fight against changing physical environmental conditions or avoidance of more hardship, either personally or for future generations. Economic push factors centered on income aspirations not currently being met, lack of job security, or overall uncertainty about the long-term economic stability of the area.

Discussion and Conclusion

The US Gulf Coast is now a region with over 94 million people at heightened risk from flooding, hurricanes, and land subsidence. Typically, when environmental factors are considered in migration or evacuation frameworks, the focus has been to understand how "physical" environmental factors act as hazards that push individuals from place. This is the position taken by many emergency management agencies in across the Gulf Coast region whose role is to evaluate risk and mitigate against, prepare for, respond to, and facilitate recovery from natural, technological, and man-made emergencies or disasters (Baldwin County 2021; Harrison County 2021; Terrebonne Parish 2021). More broadly, migration literature has tended to emphasize economic factors that either push people to leave or pull them toward new locations, while largely ignoring groups who make the decision not to move, despite risk. In the context of a changing US Gulf environment, we aimed to address some of these assumptions about environment-migration linkages.

Results emphasize that a significant proportion of respondents planned to remain in place even as environmental changes continue, and that under-appreciated social and cultural elements of *environment* play a significant, and positive, role in anchoring people to place. Results do not tell a simple story that the physical environment acts as a push to leave, with counteracting social environmental factors acting as anchors. In contrast, results highlight that economic *and* social/physical environmental factors are equally important as both anchoring and push factors, yet appear to act in opposite directions for

groups intending to stay in place versus migrate. This work highlights a juxtaposition of perspectives and contradictory conceptualizations of environment within hazard prone, yet meaning rich, coastal places. In doing so this work also shows how sense of place concepts can be applied within an area facing an uncertain future.

This research posed two research questions. In addressing the first research question: *How is the environment perceived by those who live in at-risk areas*, Figure 2.2 clearly demonstrated a local conceptualization of "environment" that goes beyond a set of physical attributes for coastal residents. The environment was conceptualized as both hazard and infrastructure, however, family and place-based social ties were expressed far more frequently. Environmental conceptualizations also ranged from positive to negative. Respondents identified physical hazards as universally negative, environmental infrastructure and *Dynamics* sparked ambivalence, but environment described in *Personal, Nature, or Attachment* terms were expressed largely positively. The environment thus represents a matrix of physical, social, and cultural characteristics that reflect both family histories of place and present-day connectedness, held and nurtured by residents. This matrix is not static; Hurricanes come, are experienced, and are overcome. A bayou waterway facilitates intangible/impermanent experiences, such as boating or leisure fishing with family members. Changes to that water way (either through human engineering and/or climate change) can in turn alter the experience of environment (van Putten et al 2018), such as areas becoming inaccessible, or secret fishing spots no longer home to preferred species. Such brief vignettes showcase the overlapping of physical

environmental features and sense of place concept laden social environmental features within the same geographic space.

Clearly, the environment for participants is not simply the physical location where they reside, work, or navigate. Its meaning is imbued with layers of cultural and social significance unique to each person's lived experience (Masterson et al 2017; Simms 2017; Stedman 2003). In addition to home as places, scholars are investigating the range of emotional experiences individuals face in ecological situations of climate change-related loss, including hazard mobility situations such as place experience, anger, anxiety, growth, and grief (Cuncolo and Ellis 2018; Moser 2022). This work for example, links leaving one's home in an urban metropolitan US setting to the five-stages of grief (Dundon and Abkowitz 2021; Plastrik and Cleveland 2019). This is a testament to the level of place attachment some residents have, and highlights the challenge faced by governments, councils, and planners when communicating risk to constituents. In tight communities these challenges are magnified. One widely publicized example are the Native American communities of Isle de Jean Charles (Ferguson-Bohnee 2015), where residents are grappling with change and how to 'say goodbye, yet maintain identity' not only to a physical space, but to all the generational meanings and experiences that their landscape has provided. Diane Austin's (2006) work in coastal Louisiana, explores the area's rich history, changes resulting from hurricanes (Katrina and Rita), and the negative effects of the petroleum industry on people. Her focus on effects of community change and degradation, including relocation, evacuation, lack of return, and lack of room for local engagement in planning decisions underscores the critical need to more critically

understand personal experiences of environment as people encounter, and engage with, change. Our results also emphasize this point. The Gulf "environment" encompasses far more than just physical attributes across space. What humans include in their perceived environments is far more nuanced than a physically focused, and narrowly defined ecological niche. As people make decisions as individuals and families to stay or go, it is increasingly important for policy makers at the levels of council, parish, state and region to apply a more robust understanding of environment that goes beyond physical attributes.

The second research question asked: *How does environment figure into movement plans, i.e. as either a push, an anchor, or both*? Many respondents had no intention of leaving. Findings summarized by Figure 2.3, and Table 2.2 showcase that economic and environmental factors were both important for those staying in place or intending to go. This result emphasizes that migration policy highlighting economic opportunities associated with moving cannot ignore substantial social and place-based costs for residents. Environmental features may push some residents to move, or consider moving, while others latch onto that same feature as a point of pride anchoring them to remain (Table 2.2). Researchers are starting to investigate the reasons for non-migration (Cubie 2017; Mallick and Schanze 2020) in areas like Bangladesh (Mallick 2019), the Maldives (Kelma et al 2019), Peru (Adams 2016), and Zambia (Nawrotzki and DeWaard 2018). But, there is comparatively little investigation occurring in Global North contexts such as the USA. The environment has more traditionally been classified as a Push (e.g. a hazard event, or generalized degradation). Environmental factors are significant, and play an

important role as a push to leave for some. We found that many respondents who did not plan to leave still mentioned environmental factors as a push. Yet, Gulf respondents strongly identified social and physical environmental factors (e.g. weathering a storm, their heritage, family) as a point of pride and resilience that anchored some individuals even more strongly to place.

Applying a physical lens to the environment narrows environment to "risk and a threat" and solely as a push factor within the movement decision. A location may face intermittent or seasonal hazards, but a continued focus on environment exclusively as a push factor neglects broader environmental factors that anchor people to places the rest of the time, through life experiences, goal attainment (Masterson et al 2017), personal activities (Simms 2017; Fiske 2020), or cultural/ancestral roots (Basso 1996; Ferguson-Bohnee 2015; Maldonado 2019). At present the question of 'why don't people move' is critically important, yet is under-researched and under-theorized (Schewel 2020). We provide an example how incorporating sense of place constructs brings social meaning into understanding the role of environment in migration decisions, expanding the work of Dundon and Abkowitz (2021). Maldonado (2019), takes a broad political ecology focus in their investigation of localized change within coastal Louisiana, and provides a compelling argument for not viewing ecological changes in isolation, but rather as part of wider socio-political, economic, historical, and geographic contexts. Given climate change, the policy risks of maintaining the narrow view of 'environment = hazard' are growing. The environment is more than physical, and grounds people to places in multidimensional ways. Continuing to neglect the social and cultural aspects of

environment will only result in perpetuating an incomplete picture of environment within the landscape of migration research.

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SUPPLEMENTARY INFORMATION

Table S2.1

Affect of terms within themes. Themes are ordered top to bottom by total frequency of terms within themes (n=172). Data from this table generated Figure 2.2.

Theme	% Positive	% Indifferent, Neutral or Non consideration	% Negative	Total count
Personal	78.66	18.29	3.05	164
Nature	82.00	14.00	4.00	150
Hazzard	0.00	0.00	100.00	65
Attachment	75.81	19.35	4.84	62
Geography	55.56	40.00	4.44	45
Infrastructure	50.00	33.33	16.67	24
Acceptance	10.00	30.00	60.00	20

CHAPTER 3

A HOLISTIC EXPLORATION OF ENVIRONMENTAL PERCEPTION ACROSS SCALES IN TERREBONNE PARISH, LOUISIANA.

Abstract:

What does ‘environment’ mean? This deceptively simple question is at the very foundation of current struggles to combat environmental change. While explicit connections between humans and their environments have been investigated for over 70 years, many of these approaches perceive conceptualize biophysical environmental components as distinct and isolated from the more social or cultural components of environment. Within the coastal at-risk geography of Terrebonne Parish, Louisiana, this implicit assumption of social as separate from environmental is put to the test. I explore; how parish residents perceive risk, what environment means to Terrebonne residents, how important identifiable environmental components are to residents, and how established Sense of Place constructs can be utilized to identify connection to place across varying scales. Findings indicate that parish residents are well aware of and accepting of the biophysical risks present across their parish. In many instances these risks are accepted as “a given part of life”. Perceived components of an individual’s *environment* are found to be highly diverse and reflect near equal Biophysical/Natural and Social/Cultural characteristics. This implies that a more holistic conceptualization of environment is needed to fully engage with parish residents surrounding risk. Residents expressed their perceptions of environment across a continuum of proximal (most important) to more distal (less/least important). Scores for Sense of Place constructs of Dependence and Attachment generated the highest levels of agreement, and connection to

place was strong across all scales [Home, Bayou, & Community] tested. In aggregate, results indicate that residents perceive their environment far more broadly than current physical risk-management planning allows for. Environment is perceived of holistically, in terms of connections to people and identity. These social factors of environment need to be accounted for by planners, emergency managers, council representatives and governments from local to national levels to more cohesively work *with* residents as they plan their futures.

Introduction:

As the 21st century progresses, physical environmental changes are being experienced at an accelerating rate. Environmental shifts that used to take generations are now identified, experienced, and sometimes adapted to within one lifetime. High-profile examples include the pacific nations of Tuvalu and Kiribati who were propelled into the global spotlight for the devastating impacts of sea level rise and the associated significant implications for loss of identity and national sovereignty (Balesh 2015; Hirsch 2015; Smith & McNamara 2015; Stratford 2013; Willcox 2012). The Republic of the Maldives held an underwater cabinet meeting in 2009 calling international attention to the threat of global warming to its existence and future (Hirsch 2015). Villages in alpine areas face unprecedented challenges from Glacial Outburst Floods (GOF's) (Clague & O'Connor 2021; Sherry 2018), and in more general terms, weather (short term) and climatic (long term) changes are altering species distributions of everything from agricultural crops, to pollinators, to pests (Secretariat et al 2021). Coastal communities across Alaska are facing displacement and identity concerns similar to those of disappearing Pacific

Nations (Marino & Lazrus 2015; Colombi 2016; de Mesnard 2020). Across the US, Central America, and many Caribbean Nations, hurricane season brings fear of more storms, with greater frequency and intensity, stretching already strained emergency and recovery resources. These examples squarely situate people within global physical/natural environments, who are experiencing risks and hazards, and in doing so are often forced into making seemingly impossible decisions with ramifications not only for their personal futures but the futures of whole communities and regions, and generations to come.

Spurred on since the early 1990's with each successive Intergovernmental Panel on Climate Change (IPCC) climate report, there is little space to escape discussions that touch on 'the environment', 'change', and its impacts on people both individually and collectively. However, almost exclusively within these contexts, it is the biophysical environment, often presented through the lens of risk to human populations, that is front and center. There is an implicit, and near fundamental, assumption that environmental parameters are biophysical, climatological, or natural[1]. There are rarely definitions of environment provided in framing change, nor prefix terms used to specify the 'natural environment' as opposed to alternative classifications e.g., 'social environment'. This

[1] There is emerging scientific consensus that there is little 'natural' nature left on planet earth, due to long histories of human-environment interactions and ongoing changes brought about by humans (Boivin et al 2016; Broglio 2014; Ellis et al 2013; Stephens et al 2019; Vellend et al 2017; Vince 2011). However, in this paper I use the word natural to reference the environment because study respondents, as well as policy makers, continue to do so. Our use of the term 'natural' in the context of 'the natural environment' is neutral and does not imply that the natural environment is good, bad, or superior/inferior to other possible terminological distinctions. This neutrality also applies to 'natural' phenomena, such as hurricanes, that are the result of interconnecting biophysical cycles and conditions that have been and are impacted by human activity both historically and in the present day.

lack of clarification leads to situations wherein the term 'environment' becomes synonymous with biophysical conditions. This framing focuses negative attention on environmental conditions – and frames then as hazard due to the actual or potential experience of loss or harm such an event can cause. Freudenburg et al. (1995) describes the challenge here as: "Without progress in achieving conjoint constitution of the physical and the social, we run the risk of having our vision distorted by the very 'taken-for-grantedness' of our socially agreed-upon definitions" (p388). So, a question emerges: Do individuals, in places, also define, perceive of, and experience 'environment' in narrowly physical terms? More importantly for this work; How do individuals residing within a coastal area characterized by physical environmental risks and dangers [e.g. erosion, sea level rise, land subsidence, flooding, storms, and hurricanes] define, perceive, and experience 'their environment'? This is the research space this paper is situated within. Terrebonne Parish, Louisiana, is an example of a US Gulf Coast geography dominated by risks whose population is presently grappling with just these questions making it an ideal field site. The multi-dimensional components of environment and perceptions of risk permit its investigation both at a personal scale of impact as well as more broadly inclusive of bayou and community scales, as well as parish and state considerations. Similarly, how locals perceive of their environment not only personally, but also across different scales, and across different dimensions of dependence, identity, and attachment can also be addressed.

Conceptualizing Environment

The role of the environment in migration decisions is largely understudied outside of a hazard or disaster context (Till Dissertation Chapters 2 and 4). An exception here are

the seasonal and short-term return migration patterns of ‘Sunbirds’ and ‘Snowbirds’ (e.g. Hogan & Steinnes 1996; Northcott & Petruik 2011; Smith & House 2006). In both these contexts, physical environmental conditions are the dominant (and often only) environmental consideration, for example, as US Midwesterners escape winter in sunny Arizona. Research targeting those whose migration decision or intention is to remain in place despite environmental risk (e.g. storms, droughts, and flooding) is rare. While this is beginning to change (see Schewel 2020) more work is needed. US Gulf Coast residents take natural and social environmental elements into consideration, in conjunction with more traditionally utilized economic issues when they decide to move or remain (Till Dissertation Chapters 2 and 4). For those considering how to respond to changes to their environment, there is a continuum of agency; from “trapped populations” at one end; those with little to no active choice but to remain (Black et al 2011; Black & Collyer 2014; Humble 2014), and at the other end those expressing “voluntary immobility”; those who are able to relocate, yet are actively making the choice to remain (Adams 2016; Farbotko & McMichael 2019; Blondin 2021).

Coastal areas of the US are currently grappling with a duality of risk and identity. Louisiana has developed a very specific Coastal Master Plan (CPRA 2022), which lays out future predictions, as well as resiliency strategies, and area improvements to be developed over the coming years and decades. The initial plan (2012) has been updated once (2017) and is currently undergoing redevelopment for 2023. Changes and additions to the plan reflect developments to the conditions of the area, the needs of residents, and completion of earlier mitigation projects. The plan has been described as “a moonshot

bet, the state's last best chance to slow the self-destruction caused by three centuries of human intervention in the environment" (Nobel 2022). Combatting and managing coastal erosion across the area is a major component of the plan, with some of the most significant and daring initiatives spanning parish and state boundaries. The tone and focus of the plan is squarely situated in the 'natural-environment as hazard' space, with only indirect mention of social or cultural environmental contexts. When non-physical elements are mentioned, the focus is predicting economic changes and impact associated with short-and-long-term environmental events. This points to an incomplete understanding of the interactions between social and biophysical components of the environment.

Investigations of culture-environment interactions are not new. Neither are explicit linkages between social or cultural aspects and 'environment'. Julian Steward's Cultural Ecology from the 1930's theorized that human-technology-environment interactions led to unique combinations of cultural practices. Since this time, culture-environment discussions have diverged and expanded to include; ecologically focused assessments of culture (Turner et al 2003; Pfeiffer & Butz 2005; Medin et al. 2014), discussions around culturally informed environmental perspectives resulting in culturally

[Space left black to accommodate footnote]

biased[2] responses to climate change (Price et al 2014), extensive research into the intersections of environment, vulnerability, and adaptation – particularly within the context of environmental hazards/risks (Cutter 1996; Kelly & Adger 2000; Adger 2006; Borden et al 2007; Nelson et al 2007), and importantly for this work; human-environment relationships grounded in Sense of Place (SOP) (Convery et al 2014; Cresswell 2014; Lin & Lockwood 2014). Core concepts in SOP are *place meaning* – the "symbolic content of experience" in place (Tafarodi, 2008, p. 29) and *place attachment* (Manzo & Devine-Wright 2013; Masterson et al 2017), with a key sub element within attachment of *place identity* – A set of cognitions about the physical world that help contribute to a broader self-identity (Proshansky, et al., 1983; Raymond et al 2010). The SOP literature emphasizes that people do not just exist within a physical space or landscape. They dwell in places collectively imbued with meaning, history, connection, and collective assessments of perceived features, which impact their existence (individually and collectively) in positive, neutral, and negative ways. Within the research undertaken in this chapter I implement the SOP constructs of Dependence, Identity, and Attachment. These constructs are defined as follows: *Dependence* – A cognitive belief about a place's functional ability to meet desired needs through engagement in preferred activities (Stokols & Shumaker, 1981) with additional stress upon behavioral commitments

[2] Bias in this situation refers to an outcome being too closely connected to the culturally informed practices that produced it – similar to when unknown samples are compared to a reference group and the distribution of the sample comes out to reflect the same distributions as that of the referent. Price et al frames bias in instances where "cultural biases about society and the environment are thought to legitimize four ways of life, which have been termed worldviews" [hierarchical, egalitarian, individualistic and fatalistic](2014 p9). Thus, perceptions connected to one worldview will (either unconsciously or deliberately) self-reinforce the principles of that worldview when assessing a situation or phenomena. While mapping of cultural biases about the environment into the four worldviews was achieved in a post-hoc fashion and has been challenged by empirical work (Price et al 2014 p9), this does not refute the existence of culturally biased perceptions in relation to climate change or the environment.

(Jorgensen and Stedman 2006); *Identity* – A set of cognitions about the physical world that help contribute to a broader self-identity (Proshansky, et al., 1983), also considered as a multidimensional summary evaluation of place-specific beliefs (Jorgensen and Stedman 2006). In this research identity metrics focus on the use of a specific place. And lastly, *Attachment* – An "affect toward a location" (Low & Altman, 1992) with a focus on emotions (Jorgensen and Stedman 2006). Using the same operationalization as Jorgensen and Stedman (2006), the constructs of *Dependence*, *Identity*, and *Attachment* are thus viewed as "primarily conative, cognitive, and affective" expressions of place.

Scholars frame the boundary between humans and environment as 'the nature/culture divide'; a foundational ontological component of Western science and philosophy (Freudenburg et al 1995; Giblett 2011; Inglis & Bone 2006; Kronfeldner 2017; Morell 1993; Uggla 2010). Recent discussions of climate change, for example those stemming from the IPCC climate reports, illustrate this ongoing separation. The focus is either 'human impacts' on external/physical ecosystems (nature) and the (cultural) role of humans in managing and mitigating those impacts, or nature is conceived as a hazard that negatively affects humans and their well-being. This paper takes a different approach. I build on prior work that conceives of environment holistically – as containing both natural and cultural elements that interact, inform, and influence each other (Ingold 2000, Stedman 2003). Considering 'the environment' as co-interacting within lives/livelihoods on (and within) landscapes, brings unconscious and heretofore taken-for-granted aspects of environment back into focus. Morton (2007:1) acknowledges this process as potentially uncomfortable and unconscious. In this case an

environment that is “out there”, is moving into the cognitive foreground of “right here”. The environment is transformed from just a physical context/background that surrounds and sustains to become a conscious and essential part of our social milieu.

Connecting to Scale

Starting from this perspective of environment that includes both social and natural elements (Freudenburg et al 1995; Giblett 2011; Inglis & Bone 2006; Kronfeldner 2017; Morell 1993; Uggla 2010; Stedman 2003), this paper explores additional questions about how people frame their attachment to places, and subsequent risks associated with that place. At the nexus of risk designation and individual experience of place and environmental change are also questions of scale. I explore at what scale connections to ‘environments’ are experienced and expressed, e.g. home, personal network, region, or beyond? Similarly, as *environment* changes, these changes may be framed regionally, nationally, or globally, but how are these changes experienced? Are they experienced individually (as risk to personal lives or homes/property), regionally (as risk to the bayou, parish/county, or state), or nationally (as risk to an entire country’s population)? Additionally, are all scales of risk experienced equally? And finally, given differing scales of attachment and perceived risk, how do residents connect perceptions of risk regarding causality and responsibility?

I conceptualize scale as a proximity variable. To borrow terminology from anatomy, proximal is closer to the center of the body, whereas distal is further away from the center of the body. For example, on a human arm, a shoulder is proximal while

fingers are distal. In a similar sense, the more proximal a factor or element is to an individual, the more importance an individual may place upon it (Boschma 2005; Broekel & Boschma 2012). The counterbalance to proximal importance is then distal importance, where something is less important and thus at a greater distance, (either physically, socially, or emotionally) and therefore carries less weight/less significance for the individual for a given topic. This proximal-to-distal gradient can exist across geographic space, social network ties, family or personal relationships, or other measures of connection. Functional space is also an important consideration, relating to something scholars have termed 'mental distance' (Knoben & Oerlemans 2006; Ashton & Bain 2012; Velenturf & Jensen 2016). In this sense, the shorter the mental distance, the more significant a feature may be to the individual, leading to stronger and more long-lasting bonds. From this perspective, stronger and more impassioned reactions and responses to risk might be observed if an event occurs in places that are more proximal (and thus more important) to an individuals' personal internalization of environment.

Building upon a SOP foundation, Till (Dissertation Chapter 2), as well as others (Greider & Garkovich 1994; Larson et al 2013; Stedman 2003) have shown that *environment* is perceived much more broadly than in biophysical terms. Rather, *environment* includes social aspects of community, place, and meaning. Understanding *environment* more holistically is important given predictions of environmental change and associated implications for human habitability, mobility, and decision making. Discussions of environmental change address the physical predictions of change – river flow rates, the intensity of the next hurricane season, or elevated summer temperatures.

However, such discussions rarely address the social aspects of these environmental changes – a loss of community cohesion, a need for change in social support structures, or how to personally start internalizing loss or change (Ferguson-Bohnee 2015; Plastrik and Cleveland 2019; Dundon and Abkowitz 2021). SOP constructs like place attachment and place meaning are beginning to be applied within the US Gulf Coast, where threats from biophysical changes are growing. This more holistic and socially inclusive framing of environment is particularly critical for investigating mobility, and alternatively resistance to mobility, as a form of adaptation by residents (Cutter & Emrich 2006; Burley 2010; Simms 2017; Colten et al 2018; Maldonado 2019; Simms 2021; Simms et al 2021). While mobility and migration are increasingly accepted as a trajectory of adaptation in the face of mounting natural environmental risk and change, it is also becoming clear that leaving is an option of 'last resort', and many people (both individually and collectively) will "do all that they can to stay where they are" (Wong-Parodi as quoted in Irfan 2022).

This broadened conceptualization of environment, together with open understanding that migration away from ones' home and place while logical on paper is increasingly identified as not the desired, or intended, migration outcome allows us to ask questions that directly encompass multiple dimensions of *environment*. The following section introduces the case study of this research paper and illustrates how to apply the concepts introduced in the prior sections to questions that directly investigate not only risk and environmental perceptions, but their intersectionality within movement decisions.

Study Setting and Significance

Broad Setting

Globally about 40% of the world's population live within 60 miles (100 km) of a coast (Neumann 2015; UN 2017). In the United States some 94 million people (29% of the US population) live in areas that are immediately adjacent to a coast. Populations across the northeastern, eastern, and southern United States, inclusive of the Gulf Coast, are already confronting the challenges and impacts of physical environmental threats. In Louisiana, specific threats include sea level rise, land subsidence and erosion, nuisance flooding, and hurricanes. Despite such threats many residents are staying, even as risk intensifies. This represents new challenges for planners, local councils, and emergency managers as they try to account for people choosing to leave, while still supporting those who remain. Additionally, such authority figures in receiving areas can face abrupt demographic shifts as new residents arrive at rates not accounted for by existing predictions.

Terrebonne Parish

Terrebonne Parish is one of the most southern parishes of Louisiana and third largest by area. Home to over 110,500 people, the Parish has an average elevation of only 1-2 feet above sea level. The urban center of Houma is situated at an average elevation of 8 feet. The topographic reality for the parish is that "more than 85% of the parish area is made up of water and wetlands and the highest point in Terrebonne Parish is only 13 feet above sea level" (TPCG 2020). The landscape of the parish is dominated by marsh, swamps, bayous, and lakes, with the population mostly found near the Thibodaux metro

area and the city of Houma, then closely following the edges of the bayous that extend south toward the Gulf of Mexico (Figure 3.1). Proximity to the Gulf combined with a wetland dominated low-lying Parish geography also means that in their daily lives' residents are balancing physical risks – from flooding, erosion, subsidence, sea level rise, pollution, saltwater intrusion, storms, and hurricanes – with life and livelihood decisions.

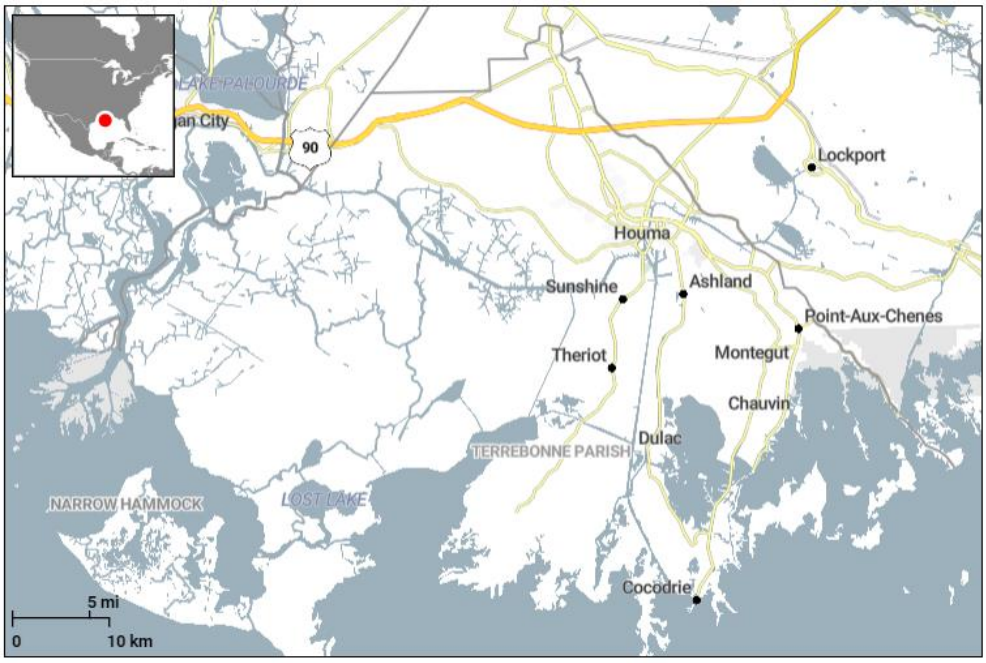

Figure 3.1. Terrebonne Parish Map. Map illustrating Terrebonne Parish, and its main south-north roadways (sand-colored lines), which largely follow bayous extending towards to US Gulf Coast. Parish boundaries are indicated by grey lines, Highway 90 depicted in yellow.

This paper focuses on Terrebonne Parish, Louisiana and poses the following questions:

1. At what scale(s) do residents recognize threats from erosion?
    1.1. What do residents express as being responsible for the erosion threat they contend with?
2. What does "environment" mean to community members of this low-lying coastal Parish?
3. At what scale(s) (proximal versus distal) is environment identified and experienced by residents – inclusive of natural and social elements?
4. How do residents express their connection to place across different scales; Home/Bayou/ Community, using Sense of Place constructs; Dependence, Identity, and Attachment?

The research presented in this paper first investigates the scale of perceived threat of environmental events using erosion impact as a focal topic before moving on to address residents' perceptions about causes of erosion across their parish. It then goes on to explore holistic perceptions of environment generated by parish residents. A breadth of examples of what environment encompasses is identified, with findings when investigated across scales. Scale here is considered over a continuum of proximal to distal importance as emphasized by respondents. Scale is then specifically investigated against SOP principals across the level of the home, bayou, and community. The immediate goal of this work is to holistically portray how environment is perceived by residents. These views matter because while it is clear biophysically derived environmental risks are increasing across coastal areas both within the US and around the globe, not insignificant

numbers of coastal residents are actively choosing to remain in place. To better understand why this may be occurring, a more robust understanding of what environment means is needed. Incorporating environment that is both social and biophysical will contribute to more productive and inclusive discussions of environment with relevance for preparedness, migration choice, and emergency management within areas exposed to, and experiencing, heightened biophysical environmental challenges and risks – on the US Gulf Coast and elsewhere.

Field Work and Methods

Participant observation, rapport building, survey, and semi-structured interviews occurred across Terrebonne Parish, Louisiana, from April 2019 to October 2019, with an additional field visit in Feb 2020 to complete outstanding interviews and interact with the area and its people during a different time of year. All fieldwork concluded prior to the beginning of the COVID-19 pandemic in the US in early 2020, with neither the virus nor pandemic precautions featuring in the research design. This project also concluded before the landfall and effects of hurricanes Laura, Delta, and Zeta (2020), and Ida (2021). Ida cataclysmically impacted Terrebonne Parish, and the lives of participants and contacts with whom the PI engaged during this study period. As such, results in this article represent a distinct historical moment within the palimpsest of personal environmental experience and perceptions of Terrebonne Parish residents. Field work did coincide with the landfall of Hurricane Barry (July 11th-19th, with landfall on July 13th 2019). This was the first hurricane system to test many of the Post-Hurricane Katrina infrastructure

improvements, inclusive of floodgates and levee alterations put in place since 2005. While Barry only made landfall as a category 1 hurricane and was quickly downgraded, the volume of associated flooding and storm surge within the parish did generate great concern. While levees within the parish did not fail or break, at least one was overtopped, exacerbating flooding and damage to effected areas.

This project utilized traditional ethnographic approaches as well as anthropological survey and interview techniques. The mixed-methods design helped facilitate acquisition of richer and more meaningful data. Fieldwork began in April 2019, with participant observation and exploration of the parish. Individuals were recruited directly or approached the PI of their own accord. Recruitment for surveys began with opportunistic engagement at local markets, churches, businesses, libraries, club events, and docks, later expanding to include snowball sampling through participant referral and word of mouth. Additionally, an article (digital and print) ran in the Houma Courier, a local newspaper, in mid-May introducing the PI, the project, and encouraging residents to reach out should they wish to participate.

A survey instrument either administered by the PI, or filled in independently by the participant, generated the foundational data for the project (IRB # STUDY00009200 – Appendix C and D). Eligibility criteria were broad; the only restrictions being that individuals had to reside within Terrebonne Parish, have lived within the parish for a minimum of one year, and be at least 18 years of age at the time of recruitment. Of the 189 surveys distributed and/or administered, 129 were returned. Validity and completion

checking disqualified six surveys, resulting in a final data pool of 123 for analysis (a 65% response rate). The survey consisted of a suite of socio-demographic and economic questions, including; age, gender, level of education, occupation, family size, residential status, and income. Respondent profiles represent a range of ages, living situations, family histories and other characteristics (Table 3.1). Most participants took 40 minutes to an hour to answer all questions. As an additional quality check that the responding participant pool was broadly representative of the parish at large, ten scientific understanding questions from the USGSS (United States General Social Survey) were included in the survey instrument. Participant responses to these ten questions were in alignment with historical USGSS data, thus lending support that the research sample was broadly representative of area residents. Select sets of answers from the survey were investigated to specifically address the research questions for this article, particularly perceptions of; erosion threat and experience, environmental meaning, scale of environmental engagement, and connection to place across different scales. The following sections outline specific survey sections, questions, methodologies, and analyses.

Upon obtaining consent, survey participants were entered into a follow-up pool for extended semi-structured interviews. Interview participants were randomly selected from the pool by the PI. To ensure similar perceptions and opinions were not over sampled, and a diversity of demographic profiles and perceptions was maintained, cut-offs were employed. After random selection, participant data was cross-checked against profiles and characteristics of those already interviewed. This addressed the potential for

oversampling and at same time maintained a diversity of responses and opinions across potential interviewees. Of the ninety-four participants who consented to be interviewed, eighty were invited to participate. By the conclusion of the field portion of the project in Feb 2020, sixty-three interviews were conducted; an interview response rate of 79%, and total interview to survey overlap of 51.2%. To maintain the confidentiality of participants, all names appearing within this manuscript are pseudonyms. Interviews lasted on average between 1 and 2 hours, were digitally recorded, and the PI kept additional notes. In accordance with research and IRB permissions interview participants were reimbursed for their time at a rate of $10 per hour, to a maximum of $20. Interview questions were designed to complement survey responses, allowing participants the opportunity to expand upon prior answers and provide additional context. Interview recordings were transcribed by the author, stored, and processed using MAXQDA software. The codebook developed for probing interview transcripts focused on inductive theme identification using a grounded theory approach (Creswell & Creswell 2017). Codes of potential interest were first identified from survey responses, grouped within hierarchies of related concepts, and refined through subsequent text analysis from interview data. Qualitative text analysis of transcript sections was performed independently of survey data to investigate language use and potential relationships between identified concepts.

The Louisiana Coastal Master Plan focuses on confronting and managing erosion. To engage with this challenge, a subset of survey questions directly targeted knowledge about coastal and wetland conditions, erosion, and its impacts on the lives and

livelihoods of participants. The approach also investigated if scale was relevant to erosion risk threat for participants. Three geographic scales were queried; Louisiana as a whole [State], Terrebonne Parish as a whole [Parish], and the participant personally and their way of life [Personal]. Aggregated responses to these questions are presented in Table 3.2. A linked set of survey questions asked who, or what, respondents' thought was responsible for erosion threat within Terrebonne Parish There were three response options: Human Action, Human Inaction, and Environmental Change. During interviews, respondents also provided detailed examples of causal behaviors within each category. Each response option had three levels of responsibility: Responsible, Somewhat Responsible, or Not Responsible. This causality data is visualized in three dimensions, with data points representing unique participant responses across all three causes and responsibility levels. The qualitative causality data, along with the three-dimensional visualization culminated in the development of Figure 3.2. Taken together, Table 3.2 and Fig 3.2 results address the scale of environmental threat and responsibility components of the first research question.

A detailed set of survey questions queried knowledge about local physical environmental conditions, future predictions, and perception of the impact such conditions would have on respondents during their lifetime. Part of the survey asked participants to record up to five terms/answers to the following question: *Please list up to the top 5 things that come to mind when I say "Your Environment".* The first (most salient) response that came to mind was recorded first, and so on until all answers were recorded, so answers are ranked 1-5. The total data set for analysis comprised 610

responses. Processing for plurals, closely related terms, and duplication, resulted in a data set of 133 unique answer terms with corresponding frequencies ranging from 1 to 39. Additionally, first responses were investigated independently to explore salience. Contextual information from field notes and interviews informed theme identification. Starting from the full 133 term data set, eleven distinctive themes were identified. These eleven themes were further grouped into four response domains. Additional notes taken by the PI at the time answers were recorded, as well as direct probing during interviews, allowed the PI to assign an affect to each provided answer. This determination was based on careful analysis of notes and interviews, focusing on the context in which responses were provided, the tone of voice used, body language, and other cues. Affect was coded as negative, neutral, or positive, similar to prior analysis performed by the author (Till Chapter 2). For visualization, terms within each theme were ordered by total frequency (most frequent at the bottom and least frequent at the top), and themes presented within their associated domain cluster. This visualization was then split across each type of affect, resulting in Figure 3.3. The interpretation of these results directly addresses the second research question.

To further explore concepts of environment and the proximal-to-distal scales at which respondents engaged with environment, qualitative text analysis of interview transcripts revealed the juxtaposition of environment as both a setting of risk and a socially significant and indivisible part of identity of respondents. Environmental narratives from respondent interview transcripts were coded to pull out sentiment (emotional terms) directly associated with environmental features. A focus was language

use and saliency, paying attention to tone of voice, enthusiasm or conviction, and emotive gestures observed as respondents discussed their answers. One interview question specifically asked interviewees; *If you had to choose/identify a single core item or element that is central to your internalization of 'environment', what would this be and could you please explain your answer?*

Scale is used as a lens through which to interpret all responses. Scale here is defined as a continuum ranging from proximal (more core/centrally important to an individual) to distal (less central/ less important to an individual). This is inclusive of geographic designations (e.g. home-parish-state), as well as concepts of functional distance, personal network, and individual concepts of attachment. Proximal environmental elements are those which were more immediate, influential, and conscious to a respondent, while distal elements were either mentioned in passing or were more peripheral to the individual's day-to-day experience of the environment. The lens of scale was utilized when coding across all interview transcripts, resulting in the identification of two modes of environmental expression: environmental elements as *Background for life*, and environmental elements as *Leading characters*. Investigation of these qualitative data addresses the third research question of this project.

Finally, a structured set of survey questions modified from Hernández et al (2007) & Jorgensen and Stedman (2006) explored Sense of Place at three scales, participant's home/property (personal scale), bayou (intermediate scale), and community (large scale). These SOP questions queried respondents on three constructs of place; the strength of

their place Dependence, Identity, and Attachment. Participants indicated the level of agreement with provided statements using 5-point Likert scales ranging from strongly disagree (low connection) to strongly agree (high connection). Response scales deliberately did not include a neutral option, but did include a 'not applicable/don't know' option. For visualization purposes, the response options of strongly disagree and disagree are grouped, as are agree and strongly agree. Responses were converted to a percentage, grouped by SOP construct, and visualized by scale levels (Home-Bayou-Community) using excel (Figure 3.4). Interview transcripts were screened to identify potential reasons from observed patterns. To investigate significant differences between constructs by scale pair-wise t-tests were performed. First, responses for all six SOP statements were grouped to quantify attachment by scale for agree (high connection to place) and disagree (low connection to place) respondents. Additional t-tests compared scale of place connection for the three SOP constructs individually. Results from this analysis address the fourth and final research question.

Results

Participant sample and demographic data

Participants were almost evenly split by gender [49% male and 51% female] and ranged in age from 18 to 79 years. A majority of participants had long histories in the parish; 67 [54.5%] spent their whole lives in the parish, and 91 [74%] participants had at least one parent who had grown up within the area. On average, participants had lived in Terrebonne for 38.5 years. Many participants could trace numerous generations to the

parish, or immediately surrounding areas. For respondents who had a parent from the Terrebonne area, the mode was five generations of continuous habitation within the parish. A range of incomes were present within the sample, and a majority of respondents indicated contentedness with their overall economic situation, irrespective of income amount. Table 3.1 presents a summary of participant socio-demographic-economic characteristics.

Table 3.1.
Characteristics of Study Respondents. n=123

Demographic Characteristic	Participant Data
Gender	60 Male [48.8%] 63 Female [51.2%]
Age	Range 18-79 years Mean 49 years
Length of time in Terrebonne	Range 1-79 years Mean 38.5 years.
Lived whole life in Terrebonne	Yes 67 [54.5%] No 56 [45.5%]
Family from the Parish or immediate area	Yes 91 [74%] No 32 [26%]
What side of the family is from the area	Mothers side 26 [21%] Fathers side 10 [8%] Both 55 [45%] Not from the area 32 [26%]
Length of Generational Attachment* (*for those with generational connection)	Range 2-8+, Mean 4.4 generations Mode 5 generations
Income (Personal)	Ranged from < $10,000/year – > $100,000/year 58.5% earned $60,000/year or more 23.6% earned $30,000 - $59,999 17.9% earned $29,999/year or less
Level of Contentment with personal financial situation	60.1% Very or Extremely Content 26.9% Indifferent 13.0% Unhappy or Very Unhappy

Perception of Erosion Threat by Scale, Impact, and Causes

Erosion is a highly visible sign of coastal biophysical environmental change. From the pool of survey participants, 69.1% [n=85] had heard of the Louisiana Master Plan and thought they knew its main topics. Of those 85 people, 67% [n=57] were *somewhat confident* that the plan would succeed, while 27% [n=23] were *not confident, or not confident at all* in the plan's success.

A summary of residents' level of concern (*not, somewhat, very*) for coastal erosion at state, parish, and individual scales is presented in Table 3.2. Every respondent was at least somewhat concerned about erosion at the state level, and almost 77% of respondents stated they were "very concerned". A similar pattern emerged for Terrebonne Parish. Only 4.1% of respondents were unconcerned about erosion and 81% were very concerned. Erosion was perceived of as a "serious" personal threat for 72% of individuals and 70% of respondents felt it was a serious threat to their way of life. Only 11% and 13% of respondents identified no personal threat or threat to their way of life associated with erosion. Results indicate that there is unanimous concern about erosion at the state level, and erosion at the Parish level directly impacts the lives and livelihoods of 87-89% of participants to at least some extent. Erosion, and by association environmental threat is a known and acknowledged risk for residents living in Terrebonne Parish.

Table 3.2

Level of concern for erosion across State, Parish, and Personal Scales. Percentage and [count]

Spatial Scale	**Question**	**Response Level(s) n=123**		
		Not at all concerned	***Somewhat concerned***	***Very concerned***
State	How concerned are you about coastal erosion in Louisiana?	0% [0]	23.58% [29]	76.42% [94]
Parish	How concerned are you about coastal erosion in Terrebonne Parish?	4.07% [5]	15.45% [19]	80.49% [99]
		No	***Yes – but not serious***	***Yes & Serious***
Personal	Does coastal erosion in Terrebonne Parish pose a threat to you? *If yes – do you consider that threat to be serious?	11.38% [14]	16.26% [20]	72.36% [89]
	Does coastal erosion in Terrebonne Parish pose a threat to your way of life? *If yes – do you consider that threat to be serious?	13.01% [16]	17.07% [21]	69.92% [86]

Three options were provided in the survey as causes of erosion [Human Action, Human Inaction, and Environmental Change]. Respondents indicated each cause as; *responsible, somewhat responsible* or *not responsible* for erosion. About 31% of respondents identified human action as r*esponsible* for erosion. This is nearly double the number who responded that environmental change [17%] or human inaction [14%] were *responsible*. Figure 3.2 integrates levels of responsibility across the three causes of erosion to display the causal landscape of erosion across all participants. The distribution of responses across erosion causes is unequal. The most frequent answer combination was human [in]action and environmental change all identified as *somewhat responsible*

for erosion across Terrebonne Parish [44 respondents, 35.8% - yellow circle in figure 3.2]. Results indicate that a majority of respondents acknowledge a significant anthropogenic component to erosion at the parish level – 84 out of 123 responses (68.3%) indicated human [in]action as being *responsible* or *somewhat responsible*. Of those 84 respondents there was significant overlap [73/84, 86.9%] with respondents who also expressed environmental change as being *responsible* or *somewhat responsible* for erosion. For participants who indicated at least one of the three erosion cases as *not responsible* [38 respondents (30.9%)]; seventeen perceived a lack of causation from environmental change, thirteen for human inaction, and eight perceived human action had no effect on erosion. One respondent indicated all three causes as *not responsible* but did not provide an alternative answer as to what was responsible. Conversely, five respondents identified all three causes as *responsible* for erosion.

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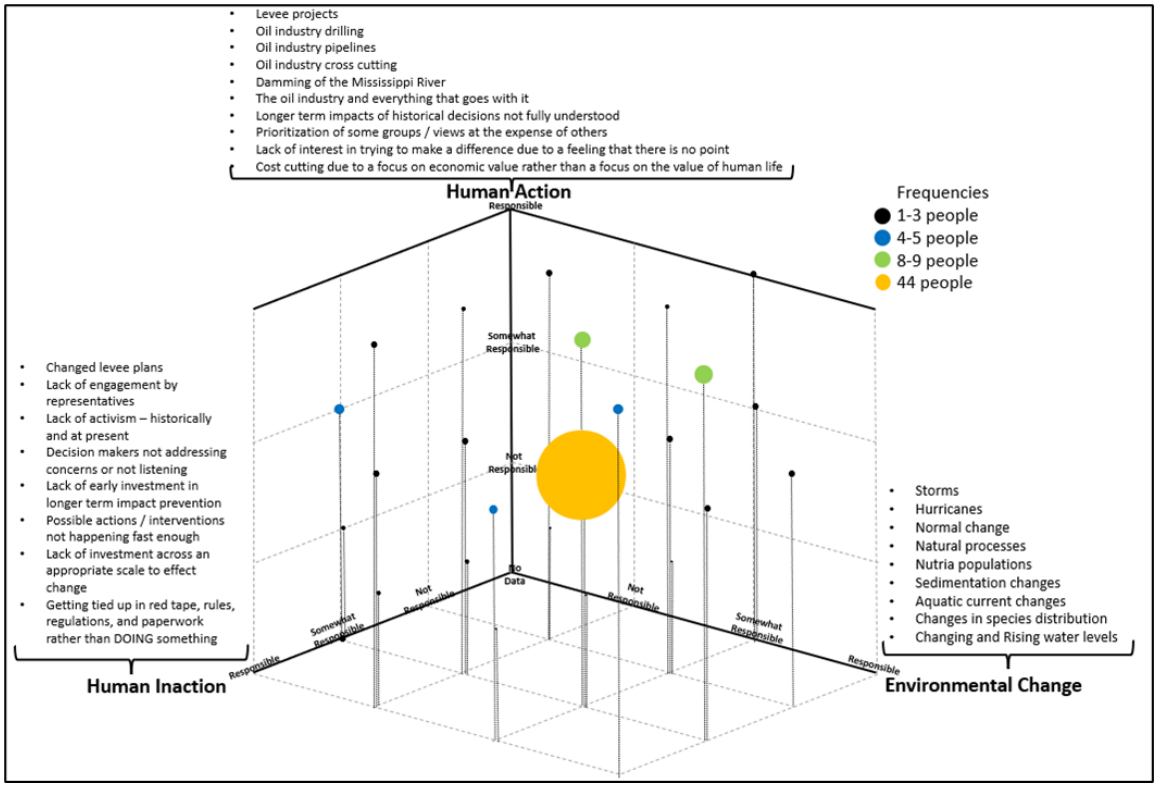

Figure 3.2. Causes of Erosion and Levels of Responsibility. Graph axes correspond to the three causes of erosion - Human Action (Y axis), Human Inaction (left X axis) or Environmental Change (Z axis). Data points represent clusters of individual respondent answers across causal categories by level of responsibility. Data points are scaled by frequency (color and size). Specific causes identified by respondents for each category are listed. A large group of respondents (n=44 / yellow node) framed all three causal factors as "*somewhat responsible*" for erosion. See Supplementary Table S3.1 for a full break down of the data used for this figure.

Participants were also prompted to identify examples of Human Action, Human Inaction and Environmental Change, which they believed were or are causing erosion. Within the human [in]action categories, respondents overwhelmingly placed blame on the oil industry (both directly or indirectly) based on activities associated with canal dredging, pipeline construction, and associated hydrological changes. Additional issues separate from the oil industry were bureaucratic inaction and perceived lack of incentive structures. Respondents who identified human inaction as *responsible* frequently stated

this was in relation to individuals, agencies, and representatives not fighting hard enough [both historically and in present times] against changes and plans proposed by oil industry affiliated groups, or alternatively spending too long negotiating a plan rather than doing something. Damming and upstream alterations of the Mississippi River, as well as associated hydrological and sedimentation changes, were also frequently mentioned as examples of human actions that cause erosion. Respondents did acknowledge that some degree of erosion was an inevitable natural process, yet human activities (E.g., the damming of the Mississippi river, and oil industry developments) were nearly unanimously identified as accelerating natural erosion or causing the wider landscape to be more susceptible to hurricane and storm related erosion. However, many respondents did not want to see an end to oil related activities in the area. Many respondents stated that it would mark the death of the town/community if the oil and associated industries relocated or closed. Respondents expressed reluctant optimism that remediation programs, conservation, and restoration efforts would be successful, however, there was a reflective acknowledgement by some respondents that such efforts were too-little-too-late and were only going to buy limited time. This quote from David, a 68 year old retired fisherman reflects this tension, …"*mitigating the inevitable, it is only a matter of time, and sadly, and more truthfully, a matter of money before we admit there is no use. The damage has been done, and done for so long that efforts to fix it seem to be moving one step forward, to chase a goal which started ten steps ahead, only to be pushed a further three steps back before they even start* ".

The two main findings from the investigation into erosion are, first, that erosion *is* perceived as a serious risk to individuals, at personal, parish, and state levels by respondents. Second, erosion threat is emerging from a mix of human action, inaction, and environmental changes and this in turn sets a stage for how respondents perceive of their *environment* within the geographic context of Terrebonne Parish. Results of the deeper investigation into *environmental* perception are presented next.

Environmental Components – What does 'Environment' mean?

The survey question; *Please list up to the top 5 things that come to mind when I say "Your Environment",* generated 610 responses. All but five participants provided a full list of five responses. As answers were provided in order, "first answers" suggested elements that were most salient for participants. The five most frequent first answers were: *Home/House* [n=14], *Family* [n=12], *Bayou* [n=6], *Humidity* [n=6], and *Air/Air Quality* [n=6]. All other first responses had a frequency of five or fewer. The dominance of *Home* and *Family* as salient environmental elements is notable, as these features are not traditionally associated with environment.

Thematic coding, informed by contextual information from field notes and interviews, identified eleven themes for the *What is your environment* dataset. These eleven themes are further grouped into four domains. Three themes [BioPhysical (n=101), Earth Systems-Nature & Climate (n=60), and Flora & Fauna (n=27)] are nested into a domain of *Nature* [n=188 / 30.82%], which captures naturally occurring biophysical environmental characteristics. The next three themes [Personal Space

(n=112), Identity/Attachment/ Lifestyle (n=90), and Health and Wellbeing (n=22)] are grouped within the *Socio-Cultural* domain [n=224 / 36.72%], which captures social and cultural aspects of environment. The third domain, *Modification* [n=63 / 10.33%], captures three themes [Infrastructure (n=39), Protection Efforts (n=13), Change (n=11)], which refer to alterations to environmental features and components. The fourth and final emergent domain is *Risks* [n=135 / 22.13%] that includes two themes [Anthropogenic Involvement (n=70), and Natural Process Hazards (n=65)], which captures negative experiences of environment as well as threats to the lives and livelihoods of residents.

Across all 610 responses there were 133 unique terms, with frequencies ranging from 1 to 39. *Hurricane(s)* n=39, *Family* n=24, *Home* n=24, *Violence/Violent* n=24, and *Drugs* n=23 were the five most frequent answers, followed by *Friends* (n=16). Eighteen answers had a frequency of ten or greater. Fifty-one responses had a frequency of three or greater. The remaining 82 had a frequency of two [n=58], or one [n=24]. Of the 18 responses with a frequency of ten or greater, eight fall into the *Socio-Cultural* domain, four from the *Risks* domain, and the remaining six fell within the *Nature* domain. Figure 3.3 summarizes frequencies of mention for responses, arranged by theme, grouped by domain, and presented by the affect expressed by respondents as they described their terms.

"What is your Environment" Responses Arranged by Affect, Theme, & Domain

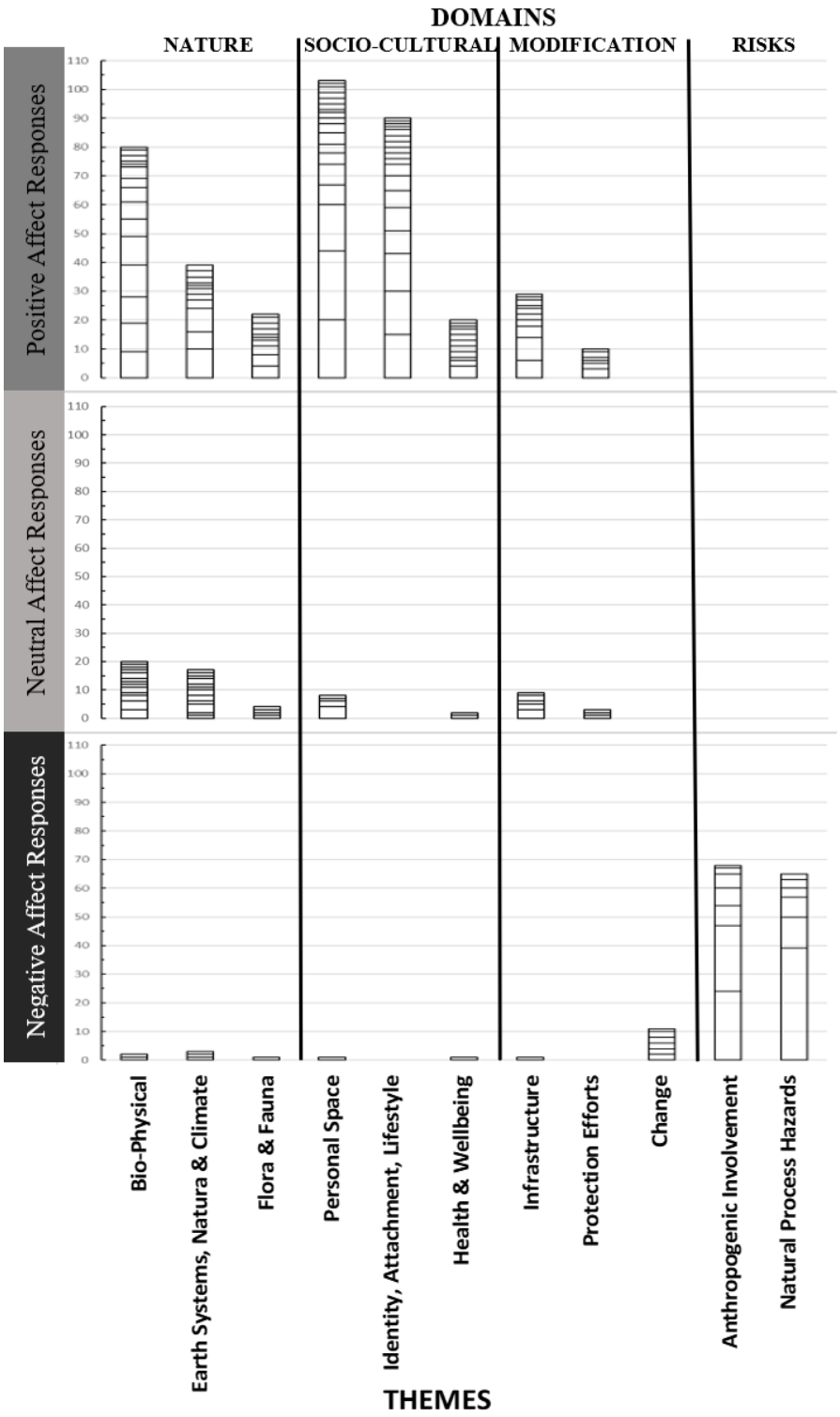

Figure. 3.3. "What is your Environment": Environment Characteristics by Themes and Domains, categorized by Affect**.** Frequencies for all 610 response terms, are grouped by the eleven themes (bottom of figure), and four domains (top of figure). Frequency values are presented on the Y axis, grouped by affect (top=positive, middle=neutral, bottom=negative). Responses within the Identity/Attachment/Lifestyle theme were universally positive. Responses within the Change, Anthropogenic Involvement, and Natural process Hazards themes were universally negative. Responses for the remaining seven themes had a mix of affect. Responses within the Natural and Socio-Cultural domains cover two thirds of responses and were largely positive. Supplementary Table S3.1 details individual theme response terms and frequencies.

Themes within the *Nature* domain include biophysical responses more traditionally associated with the term environment. The most frequently expressed responses within each of this domain's themes were 'Land' and 'Air Quality' (Bio-Physical), each with 13 responses, 'Heat/Hot' (n=12) (Earth Systems-Nature & Climate), and 'Trees' (n=5) (Flora & Fauna). Themes within the *Socio-Cultural* domain reflect terms that describe emotional attachments and personal experiences associated with environments. The most frequently expressed responses were 'Family and 'Home' (n=24) (Personal Space), 'Subsistence' and 'The Past/Memory' (n=15) (Identity/Attachment/Lifestyle), and 'Comfort' (n=4) (Health and Wellness). Within the *Modification* domain 'Work/Work Availability' (n=10) and 'School(s)' (n=8) were the most frequent responses (Infrastructure theme). All other Infrastructure responses had a frequency of four or less. The Protection Efforts theme comprised six unique responses all reflecting efforts to combat ecological challenges to the local area and prolong human use of available resources, for example conservation and restoration efforts. 'Levees' (n=4) was the most frequent response within the Protection Efforts theme.

The Change theme emerged as an oppositional counterpart to the Protection Efforts theme. The six unique responses within the Change theme alluded to the process and impacts of change within the landscape of the Parish. For example, answers reflected a 'Loss' or 'Disappearance' of something meaningful to the respondent. The Change theme is also the first theme to be expressed negatively. All participants described negative emotions; such as anger or sadness when responding. The Risks domain comprised two themes and both encompass entirely negative sentiments of participants. The Anthropogenic Involvement and Natural Process Hazards themes captured risks stemming from social/human causes and physical nature respectively. The most frequent responses within the *Anthropogenic Involvement* theme ('Violence/Violent' (n=24) and 'Drugs' (n=23)), were mentioned much more frequently than other terms. The next most frequent term within this theme was 'Guns' (n=7). The dominance of violence and drugs within this theme were negatively experienced social sources of risk that generated a strong and immediate emotive reaction from respondents. In contrast, the Natural Process Hazards theme was dominated by the response 'Hurricane(s)' (n=39). The next most frequent answer within this theme was 'Dangerous' (n=11), which was always contextualized by respondents in a biophysical context rather than a social one.

In aggregate, the results presented in Figure 3.3 demonstrate that the vast majority of perceptions of environment were positive. While responses within the Risk domain were universally negative, these only account for 135 responses of 610 total responses. In contrast, 392 responses across 9 themes and 3 domains were expressed by respondents in positive terms.

Expression and Experience of Environment at Proximal and Distal Scales.

Interview participants (n=63) were selected from the larger survey participant pool to capture the depth and breadth of perceptions present within the survey data set. Results presented here explore one question: "*If you had to choose/identify a single core item or element that is central to your internalization of 'environment', what would this be, and could you please explain your answer?*" Statements were coded according to environmental feature, sentiment expressed, and the scale at which the response was described (proximal = most personally important or meaningful versus distal = less personally important or immediately impactful). A surprisingly narrow set of four environmental features emerged; "the people" (n=28), "religion" (n=17), "water/bayou" (n=10) and "hazards" (n=8).

"*The people, the people and everything they stand for. Their values, their big hearts, and especially the cooking*" remarked Peter, a relatively new member of the parish who moved with their family only four years earlier. This first category encompassed 'the people', who share 'common values, and was the most common response (n=28 44.4%). For 22 of 28 respondents the answer came almost immediately after the question was asked, with no hesitation or deliberation. This core element of environment was expressed as important to individuals personally (i.e. at a proximal, personal scale).

"*I would have to say the Church*" Irene remarked, with a clear sense of pride in her voice. And she was not alone in her thinking, as 17 other respondents (27%) also

mentioned centers of religious observance as a core environmental element. The prevalence of religion here contrasts results in the survey data where Religion (within the infrastructure theme) was only mentioned as an environmental feature by four participants (3.25% of the total n=123 sample). This connection to place and environment as mediated through engagement with religious observance and worship is very personal to the individual, but also links individuals to their broader community. Description of this environmental element was always linked to a specific center of worship and a particular congregation rather than generalized to Parish or State-level worship centers.

Ten responses (15.9%) centered around the water/wetlands/bayou or the ecosystems from which those features are derived. Participants always shared a personal story that was positive and identity-affirming when describing time spent on/in the water. These stories were detailed and emphatic, even when the element being discussed only lived in memory. One participant described a particular island location as their core environmental element. However, as their answer progressed it became clear that the physical place discussed was no longer accessible due to rising waters. However, its features lived on 'in the mind' and memory of this respondent. The physical had been tangibly lost beneath the lapping waters. To this respondent (and others with relatable tales), the memory was as real as the table we were sitting at, and respondents related that letting those features go (letting go of the memory) would be like "*losing a part of myself, in the same way as losing a leg or a hand*." The physical geographic locations described across all ten responses were only accessible by boat and always some distance away from participants' homes. The locations described were geographically distant,

however, the internalized meanings of these core environments to the participant were very personal and thus were proximal in importance.

The remaining eight responses centered around storms and hazard events, particularly hurricanes. However, while a storm/hurricane/flood may have been the catalyst of their answer, it was not the focal point. The focus of respondents' answers turned quickly to the experience of the storm; inclusive of preparations, riding the event out, checking on neighbors, and then the *coming together* that happens during the cleanup and recovery phases. These core environmental elements were of distal importance (the hazard event itself), however associated environmental elements (the social aspects that come with riding out a storm) had strong proximal significance to the respondent. All eight participants in this response group had either personal or direct family experience with at least one major hurricane event, though only three had suffered what they termed as significant property damage. It is notable that while the biophysical hazard event itself prompted negative sentiments, there was no indication of blame or resentment. When elaborating upon their answers, all eight participants shared positive and personal experiences. For example, Sam – 57 year old contractor – remarked:

> *"Storms can get bad here, sure, and hurricanes hit us from time to time, but that's just what life means down here. There is no reason to get mad about it. You prepare, you plan, get your food stocked up, generators prepped, that kind of thing. Check what the weather people are saying, what the LUMCON cameras look like, you know that kind of thing. Neighbors will get together, families make plans. Sure, some may evacuate if things look like they are going to get bad, but there is always someone who will stay, there has to be, to check on folks, to help those who need it, to nail a board or two across a window or keep a neighbors door closed when it gets blown in. The normal day-to-day just kind of stops and folks go into 'hurricane mode' (laughs). We all just know it, we know what to do, and we do it. … I tell you what, you have never really truly experienced this place until you have had your neighbor come over from across*

> *the street while the eye* [of a hurricane] *passes over to give you beer, see if you need anything, and just kind of be there and talk until the wall gets close."*

In addition to the four core features identified above, additional interesting threads emerged from the, "*What is the core item or element that is central to your internalization of environment,"* question. These threads were expressed in the form of more wide-reaching (geographical) sentiments – such as pride in being "from South Louisiana", as well as more social connections to heritage, area histories, or family. Resilience and a feeling of shared identity though shared experience was also common, especially in relation to experiencing and overcoming tragedy, loss, or risk. These latter two examples are potentially the product of many respondents having extensive multi-generation ties to the immediate area. The people-place interactions identified by respondents ranged over the entirety of Terrebonne parish.

Expressing Environment: Background (Distal) and Leading Characters (Proximal)

In analyzing interview transcripts in their entirety to address the interaction between perceived environment and scale, two response domains emerged: environmental elements as *Background for life*, and as *Leading characters*. These two positions are very different. They are described below, again paying attention to the scales at which respondents described their relationships to places and physical events. Much like a good stage production, no final performance is complete without both background scenery and its leading characters. Considering both together emphasizes interactions and connections between people and places and queries the experience of environment by parish residents.

Environment as Background – Distal Scale

The water-dominated, low-lying topography of Terrebonne Parrish is 'a given' for all parish inhabitants. It is a foundation on top of which environmental perception is constructed and experienced. Hurricane threat, and all associated impacts were prominent parts of interview responses, and all participants mentioned hurricanes either generally, or with specific reference to named storms, most commonly: Gustave, Katrina, Rita, Matthew, and Andrew. Despite this, risks of hurricanes were commonly framed as a risk that was accepted, and as a short-term inconvenience. Negatives were outweighed by the more positive aspects of "environment," inclusive of the people, the climate, the culture, the food, and lives built upon easy and reliable access to the water. Infrastructure and social group dynamics were also mentioned as components of environment in this background – environmental experience as distal – context. These elements of environment were also expressed in matter-of-fact terms, an expected part of living in the parish. For example, roads (or bayous) got you from point A to point B, but the activity experienced at point B was the 'main event', the road was not important. Alternatively, many families (and communities) have long and established histories of performing particular actions in a particular way, have a preferred shop, or 'go-to' person when something goes wrong. This social dynamic was not questioned or deviated from, but nor was it seen as significant. What was important was what happened 'after'. In much the same way as the road was not important, it was the taken-for-granted environmental feature that enabled the desired outcome. Thus, these seemingly significant actions, commonly the result of decades or generations of social conditioning were framed distally in respondents' response language as simply a means-to-a-more-important-end.

The ‘taken-for-granted,’ background mindset of some environmental components emerged strongly from coding interviews. As well, while negative hazard experiences and infrastructure elements were mentioned, they were often not directly elaborated on. In infrequent cases when these topics were described extensively, it was often to build context for a different topic, which the participant was more engaged with sharing.

This idea of bypassing taken-for-granted environmental features in favor of more personally important ones is expressed in the use of ‘but’ statements by respondents. For example, when addressing risks present across the area, 55 participants (87.3%) who directly (and in frank terms) discussed risks used “but” statements. This allowed for the acknowledgement of the risk, and then a shift “but” to present their solution to the risk. The effect was to minimize the personal severity of that risk. For example, David, a lifelong parish resident exclaimed “*Yes the hurricanes can be bad, <u>but</u> they are nothing we can’t handle*”. Justin, a resident with four generations of attachment to South Louisiana remarked, “*Oh sure things can get pretty bad, we have rebuilt our house twice and our camp at least three times that my family can remember, <u>but</u> that is just what we do. You take the hit, you recover, rebuild, and move on”.* These “but” statements diminish negatively experienced aspects of environment that may be perceived as risky, damaging (physically and/or emotionally), or dangerous, and emphasize more positive responses. This observation highlights respondents’ human reaction to risk. Risk, or the event responsible for risk is framed distally, while the ‘what comes after’ is highlighted as proximal, and more important. In the two examples above, significant environmental events/features are downplayed to ‘the background’ of residents lived experiences of

environment and place. Broad risk to the region, or community, is acknowledged, but the focus shifts to more personally important topics like recovery and moving on. The "yes, but" framing employed by respondents focuses attention away from a risk event itself and backgrounds select environmental features in favor of more personally meaningful ones. While examples of such 'but' statements were commonly identified as divisions between natural and socio-cultural environmental domains (commonly associated with the minimization of some kind of experienced or potential risk event), this was not universal across interviews. Examples of some socio-cultural environmental features being minimized to the background in favor of other environmental components were also identified.

Environment as Leading Character – Proximal Scale

Environment was also a leading character in statements from interviews. In particular, three topics - *Change & Continuity, Cultural Identity,* and *Celebration* - emerged in this context. In each case respondents expressed the environment as important – i.e. proximal to identity, place connections and enjoyment of life. It is noteworthy that all three themes relate to more cultural/social perceptions of environment. The most prominent environment as main character elements integrated the twin concepts of *Change* and *Continuity* (128 identified instances across 56 interviews). These concepts almost unanimously co-occurred within statement blocks, with only three instances recorded where Change was discussed without the identification of a related Continuity statement within the same interview section. For example, Michael, a life-long bayou resident remarked:

> *"You see that out there [*pointing south-east across the rippling water*] all that was land in my grandparent's day, except the bayous of course. I'd say in my parents' time, the waters really started to come up, and more and more land gave way to water. But we adapt, we survive, we know where the deep places are, and we teach that to our children. We teach that to whoever needs to know. Connection between generations is what makes this place so special, there is knowledge here that you won't learn in any book, or on the internet you folk are so attached to. You have to go right to the source, the people, and get to know us. Not like a number on a page on one of your surveys, know us like share meals, share your celebrations and your hardships and share ours in return. Know us like you would your own brother or sister. That is what we have down here, that is what holds us all together, in good times and bad. I guess you could say that is our environment, and I know you won't find what we have here anywhere else in the world".*

Statements with similar sentiments, around the impact of change over time, the importance of lived memory, or the uniqueness of South Louisiana (with specific reference to Terrebonne or its neighboring parish's) came from participants both with and without generational or familial connection to the parish. Emotion came through (both verbally in tone of voice as well as facial expressions and body language) when residents discussed this linked people-environment dynamic. It also echoed an energized sense of belonging and connection. Respondents expressed such cultural-environmental elements combined a sense of pride through positive body language and expressions. These topics and themes were spotlighted center stage, while the backdrop was water, risk, and mounting challenges. Findings describe a people who largely acknowledge change, accept risk, but choose to focus on their own personal agency in interacting with the elements comprising their environment.

Environmental topics involving food, or cultural heritage, or shared identity through shared experience – were the second most common context for environment as

leading character with 98 identified instances across the 63 interviews. Statements like "*You won't find what we have down here anywhere else in the world. I mean, the people, we are a particular lot down this way and that is something I am very proud of*" – Ben 50 year-old business owner – were echoed across respondents irrespective of length of time spent living within Terrebonne Parish and highlight the critical importance of the social environment to participants. Sentiments connecting celebratory interactions with family or friends, usually spanning multiple generations, occurring in specific places were the third most common topic (92 instances identified):

> "*When the family comes together it is a whole thing, you know, there are so many of us, from all over really, but we all come back. We come back to be here, in this place with our loved ones, in the same place our loved ones before us did the same thing. Sure - the landscape has changed a bit, but the history is still right here, the memories are right here. And when we come together, we create new memories that will be shared for generations to come. Home just feels more whole when you are together you know"* – Catherine 43 year-old technician.

Here, the socially constructed connection between people and place is both tangible; generations gathering physically at a home, and intangible: gathering in a place where prior generations have performed the same activity and thus feeling connected to them. Both types of connection highlight a deeply rooted sense of belonging, of culture, and of social-environmental characteristics that residents would not be able to achieve in a different physical geographic location.

In the previous section, examples of "but" statements were introduced that minimized [usually biophysically framed] risk in favor of focusing on what came after. However, the opposite was also true. For the examples presented next, "but" statements

highlight and identify specific thresholds of environmental risk past which respondents will not go. Risk is no longer trivialized for this group of nine respondents. The risk, threat, or change is no longer expressed in distal terms. Rather a "but" statement elevates it to leading character classification. "*I used to really like it here*" remarked Susan, "*but over recent years things have changed, really since Katrina I guess. The people seem different, insurance is much worse, and I'm not getting any younger. I just don't feel as connected as I once did, so why would I live out the rest of my days somewhere that does not make me happy to be alive*". Susan expresses an alternative form of "but" statement where it signals that the risk(s) are no longer something that can be looked past. The environmental elements the participant used to enjoy, take for granted, or simply accept within their experience of their environment [e.g. flooding risk, hurricane threat, or drug use] no longer are background. The environmental feature has moved up the importance continuum from distal to proximal and can no longer be looked past. In total, these nine respondents (and an additional 8 who did not use "but" statements during their interviews), discussed their environment in ways that challenged the importance and prominence of previously accepted environmental features. Of these 17 participants, eleven were either not residents of the parish since birth or were planning to leave the parish in the near future.

In summary, qualitative results indicate that environmental features play different roles for residents, both as leading character and background. Environmental elements were leading characters. They were core to experiences and described in proximal terms – particularly in expressing points of pride, identity, and ties to family. These elements

describe the role of environment in personal terms, even as experiences occur in many physical spaces. These descriptions co-exist with environmental elements that are backgrounded and distal. These more distal environmental elements frame the setting and backdrop to life in Terrebonne Parish, yet are not given much active consideration by most participants. Interestingly, risky, water-dominated landscapes beset by challenge and change were frequently identified as foundational aspects of a backgrounded, distal environment. They were a taken-for-granted part of living within the parish – something that lives were built upon rather than fought against. An interesting counter-category emerged as well. For a small group of respondents, the labels of Leading Character and Background for the same environmental elements were reversed. Previously backgrounded environmental elements became leading characters that pushed respondents past their tolerance for risk. Together, these qualitative findings inform the third research question and point toward the importance of personal experiences of environment within place. Sense of Place and importantly connection to place are investigated more thoroughly in the next section.

Sense of Place – Environmental Connection Across Scales

Results from previous sections illustrate the breadth of meanings participants associate with 'environment' and highlight the prominence of social and cultural environmental elements for Terrebonne residents. This section addresses the final research question; *How do residents express their connection to place across different scales?* Here, I apply the broader term of "place" expressed by parish residents to explore place Dependence, Attachment, and Identity at three scales: Home, Bayou and

Community (Figure 3.4). A majority of respondents agreed they were dependent upon, attached to, and valued the identity affirming attributes of, their home, bayou, and community, compared to those who did not. Broadly, respondents scored most positively on place Dependence attributes and weakest on Identity attributes, regardless of scale. Place Attachment scores were intermediate between the two.

Collectively, agreement with provided statements was highest within the Dependence and Attachment constructs, while the Identity construct provided more mixed agreement across all three scales investigated. Interview data suggests a potential reason for this dip in agreement with identity statements. Participants travel to different locations for enjoyment or work activities that may not always be within the parish, within the specific geography they reside in, or within the geography of the scale categories defined by the survey instrument. Additionally, environmental identity affirming interactions may be sought from within areas that while still local/within the parish, were not adequately captured by the three scales depicted. For example, 22 participants noted that one of the things they enjoyed the most was fishing or being out on the water in a recreational or livelihood capacity. The interconnecting web of waterways present within the south and west of the parish are one example of this, yet this landscape is not adequately captured by the scales presented within the questions. Some participants also explicitly mentioned going outside of their community, outside of the parish, or even the state in order to pursue activities they enjoyed; Sandy (42 year old administrator) remarked "*I like to get out once in a while, to disconnect, to just get away and not worry about things, but I always return, home is home*", while Andrew (38 year

old contractor) noted "*For as much as I love this place, you can't really get away in your back yard, everyone knows you, or wants you to do something, you have to go elsewhere to get away from that, and that's nice every once in a while…but there is always gumbo calling me back again*".

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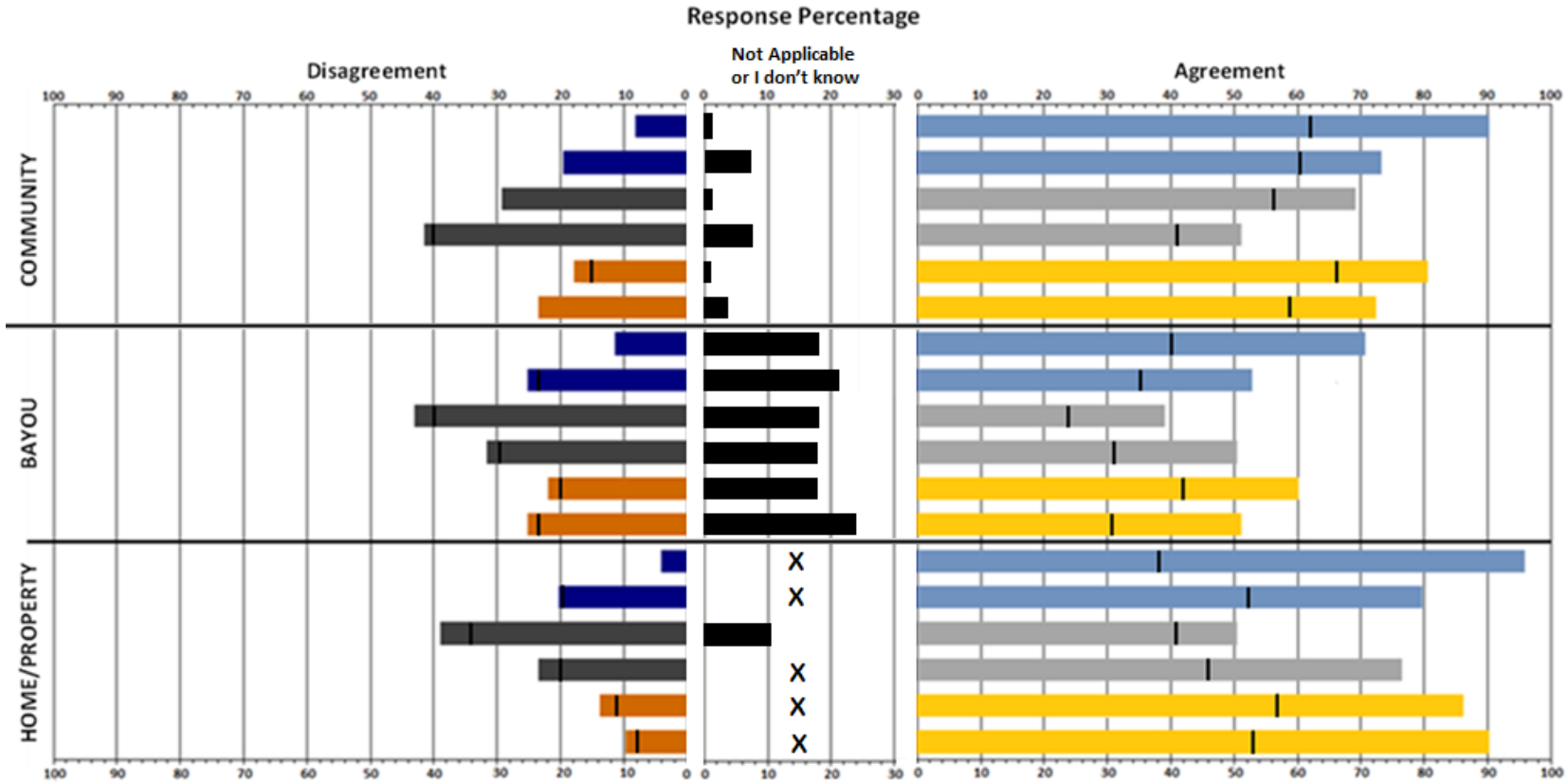

Dependence	1	My [] reflects the type of person I am
	2	I really miss my [] when I'm away from it for too long
Identity	1	My [] is the best place for doing the things I enjoy the most
	2	For doing the things that I enjoy the most, no other place can compare to my []
Attachment	1	My [] is my favorite place to be
	2	I feel that I can really be myself at/in my []

Figure 3.4. Sense of Place Responses Across Spatial Scales [Community, Bayou, Home/Property]**.** Strong disagreement and disagreement responses are displayed to the left in darker colors, with disagreement displayed closest to zero (categories separated by vertical black lines). Agreement and strong agreement are displayed to the right in lighter colors, with agreement displayed closest to zero. In cases where no black line is present there were no "strongly disagree" responses recorded. Respondents who answered "Not Applicable" or "I don't know" are visualized in the center. The scale of the graph is total percentage of responses. Bar lengths reflect this visually and together add to 100%. Survey questions are shown at the bottom of the graph, with [] indicating scale terms [Home/Property, Bayou, or Community]. Bars within the graph are presented in the same order as questions. Patterns of disagreement and agreement are similar across all scales. The scale at which there was the strongest agreement with sense of place constructs, and thus the strongest connection to place is "Home/Property". Responses targeting Identity were the most mixed. The highest level of agreement and strong agreement was Dependence question one.

Patterns of response for Place constructs within Home-Bayou-Community place categories were largely similar. Respondents scored the *Dependence* statement "*My* [*Home/Bayou/*Community] *reflects the type of person I am"* highest.). At the community scale, 90% of respondents agreed (28% strongly) with this statement, and agreement rose to 96% (56% strongly) for the 'Home' scale level. The pattern held for Bayou, although agreement (70%) was lower overall and nearly 18% answered "I don't know" or "Not applicable". After this *Dependence* statement, respondents scored both *Attachment* statements "*I feel I can really be myself at/in []*", or "*My [] is my favorite place to be*" most positively for Home, Bayou, and Community. There was lower agreement overall with both *Identity* statements across the Home, Bayou, and Community levels. Responses within the Bayou scale generated the most "Not Applicable" or "I don't know" responses while the Home and Community scales only saw minimal 'non-responses'. Between 17.9% and 23.6% of respondents answered "*I don't know*" or "*Not applicable*" for Bayou level questions, indicating either no engagement with Bayou-centered activities or lack of

identifying connection to these waterways. Only one question from the Identity construct at the scale of the Home garnered non-responses, potentially for the reasons outlined in the previous section.

Comparing aggregate responses for the three SOP constructs across scales, respondents scored the personal level of 'Home/Property' most positively. Eighty percent of respondents agreed or strongly agreed with four of the six place constructs at the scale of Home/Personal, (both *Dependence* questions and both *Attachment* questions). At the Home scale, 77% of respondents agreed/strongly agreed with the *Identity* question "*For doing the things I enjoy doing the most, no other place can compare to []*" – the highest positive score for any Identity question across the three place options (Home/Bayou/Community). Additionally, more respondents strongly agreed with each of the place constructs for Home than for either Bayou or Community. Although descriptive, these results suggest that respondents feel stronger positive connections to place at the level of Home or personal property than at the scale of the Bayou or the wider Community. T-tests comparing levels of agreement and disagreement within the three SOP constructs by scale found no significant differences. However, when aggregated agreement data for all three sense of place constructs was compared by scale, sense of place at the level of the Home/Property was (minimally) stronger than connection to place at the level of the Bayou ($p \leq 0.05$). No significant differences were observed in the [dis]agreement data between home and community scales.

In summary, the scale at which the strongest agreement with sense of place constructs is “Home/Property”, followed by Community. Results for the Bayou scale of analysis were mixed. By construct, respondents seemed to be most connected to Place based on *Dependence* and *Attachment* attributes and less so for *Identity* reasons, at least for the three constructs tested. In aggregate, these results address the fourth research question of this project.

Discussion

What does ‘environment’ mean? This deceptively simple question is at the very foundation of global efforts to combat environmental change. Island and coastal geographies represent one frontline in this challenge, and since the turn of the millennium, global attention has increasingly focused on coastal risk, vulnerability, and adaptation. However, research continues to view environment and risk through a biophysical environmental lens, without posing a bigger question – What does environment mean to those individuals who call impacted areas home? Resilience and adaptation policy narratives as well as action plans for coastal dwelling populations are many and varied, but typically frame environment as a hazard. However, many coastal residents choose to stay despite risk, and it is imperative to better understand this choice. This paper explores the idea of *environment* at a foundational level for a geographically defined at-risk coastal population: The residents of Terrebonne Parish, Louisiana. Before higher order questions about adaptation, resilience, transformative change, or mobility can be asked, a foundation of what exactly *environment* means to these coastal residents

is needed. The work presented here showcases that *environment* is far more broadly conceived by Terrebonne Parish residents than just biophysical hazard or material landscape, and the subject of *environment* is an area both worthy of further investigation and demanding of it.

A novel aspect of this paper is the incorporation of scale in thinking about conceptualizations of *environment*. Work by Solís and colleagues (2017) introduce the term; the "Decision-Making/Accountability, Spatial Incongruence Problem" (DASIP) and explored questions of scale mismatch between policy-maker decisions in three case studies (urban heat-island mitigation research in Arizona, water transfer conflicts in Kansas, and hydraulic-fracturing debates in Texas). While working within a different problem space, I argue their investigation of scale is applicable to decision making under uncertainty as experienced by coastal populations. DASIP recognizes three challenges:

> *"The scale and spatial unit of the jurisdiction of decisions that are made may be incongruent with the data that influence those decisions; the impact of such decisions may affect and be affected recursively by behavior, discourse, and outcomes in yet different spatial areas of different scales; and, most importantly, the spatial unit and scale to which decision makers are held accountable for such decisions may furthermore be incongruent with either data, decisions, or impact." (p. 681*)

Mismatch in the understanding or application of scale can lead to significant challenges, and also add to the uncertainties of coastal residents living with risk. I expand this idea to explore environmental connections and meanings at different scales.

Scale was explored in this paper in three ways. First, respondents evaluated threat from erosion at personal, state, and parish scales, then qualitatively in terms of how respondents described their connections to environmental features (proximal as compared to distal framing), and finally through comparing [dis]agreement with constructs of SOP across scales (Home/Bayou/Community). The DASIP also has clear application for potential mismatches in the policy formation for coastal residents. When a decision narrative is proposed that utilizes a narrow set of environmental characteristics (e.g., focusing on impacts at specific scales), this can be incongruent with alternative environmental perceptions held by residents (originating from a differing perception of scale, importance, or accountability). Decision makers, especially those involved with emergency management, currently focus on biophysical environment as risk and a risk or hazard event itself. Environment as risk is centered, i.e. made proximal to the narrative of hazard. Yet, as demonstrated by the majority of respondents interviewed for this study, such biophysical environmental risk was a far more distal, and backgrounded environmental feature.

I started with respondents' perceptions on erosion as a tangible example of environmental change that directly impacts residents' lives and livelihoods. The threat of erosion was perceived strongly across all geographic scales, but most strongly at the scale of the parish as it connected to respondents lives and livelihoods. The most frequent combination of erosion causes identified by respondents was the triple threat of human action, human inaction, and environmental change identified as "*somewhat responsible*" for erosion across the parish by 35.8% of respondents. A majority of respondents

identified anthropogenic factors (either human action or inaction) as being responsible for erosion far more frequently than environmental change alone. This is notable and has substantial implications for the way risk and change are framed by policymakers in the context of future preparedness.

When investigating the influence of climate change beliefs on the perceived consequences of climate change, Hoogendoorn and colleagues identified that "people who believed climate change to be caused by human activities rather than by natural processes perceived the consequences … to be worse than those who believed climate change to be caused by natural processes" (2020 p1577). They conclude that this disconnect between causality and outcomes is a fallacy because the impacts or suffering caused by an event such as a hurricane are not dependent upon the cause of that hurricane, but rather by the disaster event itself (Hoogendoorn et al 2020). The results of this study highlight that most respondents indicated they were very concerned about erosion and its threat to their livelihoods, the parish, and the state This suggests that residents already are hyper-alert to negative effects of environmental change. However, qualitative results emphasize that for many respondents' environmental change elements such as erosion or hurricanes were also an accepted part of life in the parish, and this aspect of environment was backgrounded to other more socially oriented aspects of life in South Louisiana. Even as many respondents framed erosion as human-caused, worsening outcomes from hurricanes and associated environmental change are still contextualized by many residents as part and parcel of living in Terrebonne Parish.

This research builds upon previous work by the author and further extends findings that personal perceptions of environment extend well-beyond traditional biophysical concepts to include cultural, social, and other human-engaged characteristics of place. The prominence and salience of 'Family' and 'Home' as environmental terms identified first by participants, speaks to the importance of these features within conceptualizations of the *environment*. Framing humans as connected to their environment through language like coupled human-natural systems (Turner et al 2003), is not new to the wider global change literature, but this language continues to implicitly maintain the human-nature separation – particularly when coming at environment from a hazard and vulnerability context. Results from this paper challenge the assumption that environment is exclusively a natural, biophysical, climatological, and geospatial construct that (only) negatively affects those who experience it. Notably, survey results found that only 20 (15%) of unique environmental terms (or alternatively 142 instances out of 610 - 23.9% total responses) across three themes (Change, Anthropogenic Involvement, and Natural Process Hazards), were negative. The majority of environmental terms provided by respondents were expressed as positive, despite the ever-present risk that living within the parish brings. Revisiting Morton (2007:1), results support the statement that "the environment that is out there" in Terrebonne Parish, had moved into the cognitive foreground of "right here" for respondents. The environment transformed from just a physical context/background that surrounds and sustains residents to become a conscious and essential part of their social milieu, and while the negative is acknowledged, it is the positive that provides meaning and context for daily life.

Interrogating the meaning of environment is crucially important. As climate change scholars have stated, there is significant power in the terms used, and associations made, when discussing the topic of climate change. Rudiak-Gould cautions that stating 'climate change is an environmental issue' brings with it all the associated baggage of the Western nature-culture dichotomy (2016 p263). Therefore, framing climate change as "*environmental*," "predisposes anthropologists to adopt either an ecological-anthropology paradigm … or a political-ecology paradigm…which is not wrong but is incomplete" (Rudial-Gould 2016 p261). Results from this paper additionally highlight that understanding what *environment* is remains incomplete if more socially conceived environmental features are excluded. Analysis of environmental terms highlights that respondents undoubtedly consider social aspects of the environment as meaningful (Figures 3.2 and 3.3). As well, the two most frequently named core features of the environment in interviews were social (People and Religion), then followed by Water, and Hazards. Respondent descriptions of environmental change frame *environmen*t as both background and leading character, but social-environmental connections are critical to both perspectives (similar connections are identified in Aijazi 2015; Bauer & Ellis 2018; Quinn et al 2019). This points to a need for scholars and policy makers alike to directly and clearly define their meanings of *environment* more broadly to include social and cultural characteristics of place.

Distal – Proximal – A personal spectrum of importance

Qualitative investigation of language by respondents identified distal – *Environment as Background* – framings, which were commonly associated with the

concepts of change. Environmental variability did bring feelings of detachment and loss. However, pride and determination were sentiments often expressed in interviews particularly in statements first highlighting a change or threat, then followed by "but", and a solution or expression of resolve. Such sentiments contrast with more proximal, and important, environmental components. Many respondents described their experiences with their chosen "most important" environmental elements in close personal terms, emphasizing among other things, key social events, family, and kinship ties. The environment was often a leading character in these descriptions. In this perspective, respondents still recognized risk and loss, but chose to emphasized other positive elements of their environment. They focused on those characteristics of coastal life that gave them greatest satisfaction. The work of Baláž and Valus (2020), which addresses risk tolerance, migration, and life satisfaction across nine European countries echoes this balancing of risk and life choices. They suggest that the ability to tolerate higher risks and, plan and manage one's own life, is likely to foster increased life satisfaction" (Baláž and Valus 2020 p1603). Even for the few respondents from Terrebonne Parish for whom environmental risk came out of the background and took center stage as a proximal reason to re-think staying, there was still a happiness versus risk choice to navigate. As noted by one respondent, Susan, "*why would I live out the rest of my days somewhere that does not make me happy to be alive*"? Respondents focused on particular environmental components – internalizing their environment, and risks, as either foreground or background.

Aijazi (2015) made a similar observation termed, “Social Repair Orientation” (SRO). For those living in areas where navigating environmental precarity is ‘normal’, there is a tendency to navigate from a space of social disruption (such as that experienced after a hazard event), toward a life of meaning (Aijazi 2015 p15). “A social repair orientation to disaster recovery reorients the scale of discussion to that of everyday life” (Aijazi 2015 p24). This perspective is reflected by respondents utilizing ‘*but’* statements when discussing risks or hazard events. Findings align with a SRO framework where some of those who have experienced disaster are able to look beyond mere risk and momentary disruption, toward their wider aspirations of life *after* disruption (Aijazi 2015 p24). This approach to thinking about intersections between place and recovery is beginning to gain anthropological attention as evidenced by the recent edited volume *Rethinking Post-Disaster Recovery* (Centemeri et al 2021). The work of Baláž and Valus (2020) has so far focused on younger individuals, but this balancing of proximal (close/personal/most important) and distal (far/displaced/less important) risk, seems to be one that Terrebonne residents are navigating even as their coastal environment continues to change.

Sense of Place

In combination with survey and interview questions on environment, I explored the SOP of respondents using established metrics to link environmental connection and meaning. Investigation of SOP constructs across different spatial scales has not been widely utilized within research on place. Connection to place emerged as strongest at the scale of the Home, especially for the SOP constructs of Dependence and Attachment.

Fewer respondents expressed positive attachment at the Bayou classification, which could reflect, 1) not spending time on these waterways or, 2) lack of dependence upon, identity with, and attachment to that landscape. We found no statistically significant differences in SOP constructs across scales. Sample size and question phrasing may have impacted this result. Additionally, the two questions used to capture *Identity* produced the most mixed responses, potentially suggesting that *Identity* is less of a useful place construct within this Parish population, or that the question phrasing should be re-framed to more accurately capture identity as expressed and experienced by parish residents.

Themes relating to identity did emerge from the qualitative data – especially relating to food, cultural heritage, pride in "the South" / "South Louisiana", and shared identity through shared experience. These are issues that future work could and should address to gain additional insight into the scale at which place connection occurs for coastal populations. Stedman (2003), Masterson et al. (2017) and others have used SOP to emphasize human-biophysical environment connections and social-ecological systems framing. In similar terms I suggest that SOP more broadly can be used to better understand environmental connection and meaning.

I suggest that this connection between Home-Place-Environment may indicate in quantitative terms why residents of Terrebonne Parish, and more generally of South Louisiana, are so collectively reluctant to leave their homes – even when faced with undeniable risk and change. Residents of "The Island"- Isle de Jean Charles exemplify these connections (Ferguson-Bohnee 2015; Simms 2017; Maldonado 2021; Simms 2021;

Simms et al 2021). As expressed by Simms et al "the worries and keen awareness of a vanishing [physical] environment intensify the feelings of the uniqueness of their "place" and in many cases makes residents more compelled to hang on to it and remain in place as long as possible" (2021 p325). The lengthy generational occupation of the parish may also both directly and indirectly play a role here. Living residents not only have their over personal memories and connections to place, but they have internalized the connection of past generations who have also occupied the same area – in some cases even the exact same property. A caveat to these results, however, is recognizing that the results may skew toward long residence times and strong people-place connectedness because those for whom risk was too high, may have already left. This is a weakness associated with the sampling strategy. This gap could be addressed in the future by snowball sampling with current residents, but asking about friends and family who have already migrated out of the region or further from the coast.

As framed in the introduction, and earlier in this discussion, mismatch in the understanding or application of scale of perceived risk can lead to significant policy challenges, and add to uncertainties for people living with risk. This research suggests that respondents react to coastal risks from a set of life experiences connecting people to places and people to people. However, the Louisiana Coastal Master Plan emphasizes hazards in terms of mitigation, minimization, and management. There is little mention in the document of social connectedness, long histories in places, or alternative framings of risk as "normal". Decision narratives that utilize a narrow set of environmental

characteristics to describe threat is incongruent with alternative social-environmental perceptions held by residents and identified by this research.

Globally, decision makers and residents in coastal environments are actively weighing risk and experience. Choices for residents are stark. Some migration studies are beginning to make connections between non-migration or voluntary immobility stances of respondents in threatened areas. Examples include resisting migration in; the Pamir Mountains in Tajikistan facing threat of floods and avalanches (Blondin 2021), the Maldives facing sea level rise and erosion (Kelman et al 2019), and coastal, low-lying Bangladesh at risk from the same (Mallick et al 2022). The roles of place and identity in decisions are beginning to emerge. Drawing from Seamon (2015), Simms et al. state "Place is interconnected to multiple aspects of social lives, including environmental conceptualizations, rootedness to place, quality of life, and feelings of inclusion and non-inclusion" (2021 p 317). Such sentiments were echoed by study respondents in Terrebonne Parish when they described letting go of memories of places, as "*losing a part of myself, in the same way as losing a leg or a hand*". The experienced reality of being uprooted from place for those with deep connection to place is devastating (Simms et al 2021 p317) and sentiments such as those from Oliver-Smith echo this sentiment: "removal from a most basic physical dimension can mean removal from life" (2009 p124).

Conclusion

Crate and Nuttall (2009) threw down a challenge for Anthropologists working in climate change.

> "*As a discipline concerned with understanding social complexity, cultural diversity, and the interrelationships between society and environment, anthropology is well suited to make significant and finely tuned contributions to integrated assessments of climate change"* (Crate & Nuttall 2009 p 396)

They criticize that too often social scientists describe patterns, but stop short of influencing the scope and direction of 'scientific work' (Crate & Nuttall 2009 p 396-397). In 2016 Brondizio amplified the call to put social science at the core of climate research, policy making, and media-public interfaces (p122). This is still an ongoing aspiration. While recent multidisciplinary and interdisciplinary climate/environmental change projects do include social scientists, collectively we as a discipline still have a lot of ground to cover before the robust contributions we provide are considered core project components of such multidisciplinary efforts.

The findings in this paper emerge from a distinct historical moment within the palimpsest of environmental experiences and perceptions of Terrebonne Parish residents. Hurricane Ida made a direct hit of Terrebonne Parish in 2021. Currently available data places Ida as the second most costly hurricane to hit the Gulf Coast region (and the 5th most damaging to hit the US) leaving $75.25 billion dollars of damage. The hurricane also left residents with a choice: forcing residents again to face the decision to rebuild and recover, or consider other futures elsewhere. The pace of change is speeding up for

this coastal region. There is also an associated concern for researchers that the pace of change may outpace the progression of research set to try to understand its implications (Brondizio 2016 p121). As noted by proponents of the Louisiana Coastal Master Plan, their initiative is "a moonshot bet" (Nobel 2022), and collectively we may be running out of time to complete the research needed to truly make informed decisions. With the little time remaining, it is all the more vital to ensure we are asking the right questions about *environment*, and not making assumptions about meaning. We, as researchers, need to work in ways that elevate the perceptions of those who our research is designed to serve: those living their lives on the front lines of change, risk, and identity.

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SUPPLEMENTARY INFORMATION

Table S3.1

Data used for the construction of Figure 3.2. Positioning of numbers within the grid captures the three-way comparison of responsibility answers. Red numbers presented in the lower left corner capture the 'no-data' response for the Environmental change response group – as seen in the Somewhat responsible human inaction column.

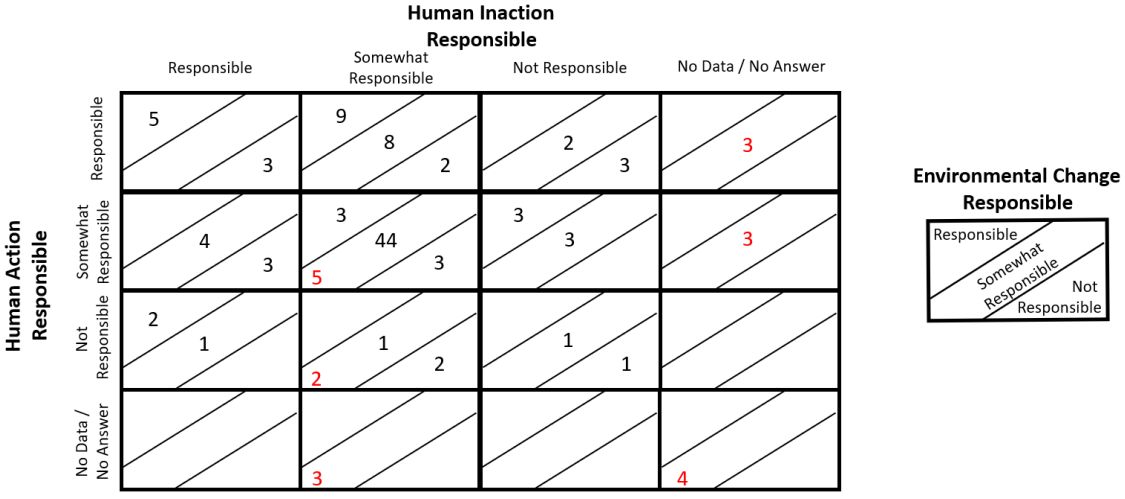

Table S3.2

Data used to generate Figure 3.3. Light grey indicates themes constructed from majority neutral and positive affect responses. Dark grey indicates themes constructed from majority negative affect responses.

Domain	Theme & Affect	Unique Response	Frequency			
			Positive	Neutral	Negative	Total
Nature	Bio-Physical	Air Purity/Quality	9	3	1	13
		Land	10	3	0	13
		The Bayou/Bayou	9	2	1	12
		Water	11	0	0	11
		Water Purity/Quality/Clean Water	10	1	0	11
		Swamp	6	2	0	8
		Marsh	6	1	0	7
		Coast/Coastal/The Coastline	5	0	0	5
		Air	3	1	0	4
		Temperature	4	0	0	4
		Canals	1	1	0	2
		Clouds	0	2	0	2
		Low-lying areas	1	1	0	2
		Physical Surroundings	2	0	0	2
		Wetlands	2	0	0	2
		Brackish	1	0	0	1
		Flat land	0	1	0	1
		Mountains	0	1	0	1
		Planet	0	1	0	1
	Earth Systems-Nature & Climate	Heat/Hot	10	1	1	12
		Weather	6	1	1	8
		Nature	8	0	0	8
		Humidity	3	3	0	6
		Ocean Health	2	1	0	3
		Climate Change	0	2	0	2
		Eco Systems	2	0	0	2
		Global warming	0	2	0	2
		Rain	1	1	0	2
		Weather Change	1	1	0	2
		Weather Conditions	0	2	0	2

		Wild Weather	0	1	1	2
		Healthier Environment	2	0	0	2
		Mother Nature	2	0	0	2
		Soil Health	2	0	0	2
		Muggy	0	1	0	1
		Weather patterns	0	1	0	1
	Flora & Fauna	Trees	4	1	0	5
		Animal(s)/Animal Life	4	0	0	4
		Wildlife	3	0	0	3
		Alligators	2	0	0	2
		Fauna	1	1	0	2
		Flora	1	1	0	2
		Frogs	2	0	0	2
		Living creatures/Living Things	2	0	0	2
		Plants	2	0	0	2
		Water critters	1	1	0	2
		Bugs	0	0	1	1
Socio-cultural	Personal Space	Family	20	4	0	24
		Home	24	0	0	24
		Friends	16	0	0	16
		Community/My Community	7	2	1	10
		Property/My Property	7	0	0	7
		House/My house	4	0	0	4
		People	3	1	0	4
		Pets	4	0	0	4
		Yard	3	0	0	3
		Boats/My Boat	2	0	0	2
		Friendly people	2	0	0	2
		Humans	1	1	0	2
		Neighborhood	2	0	0	2
		Neighbors/My Neighbors	2	0	0	2
		Social	2	0	0	2
		Social Arrangements	2	0	0	2
		Motherhood	1	0	0	1
		My farm animals	1	0	0	1
	Identity/ Attachment/ Lifestyle	Subsistence	15	0	0	15
		The Past/Memory	15	0	0	15
		Heritage/History	13	0	0	13
		Culture	8	0	0	8

		Food	8	0	0	8
		Seafood	6	0	0	6
		Fishing	5	0	0	5
		Exciting	4	0	0	4
		Hunting	2	0	0	2
		Sports	2	0	0	2
		Success	2	0	0	2
		The choices I make	2	0	0	2
		The things and people I surround myself with	2	0	0	2
		Way of Life	2	0	0	2
		Compatibility	1	0	0	1
		Energy	1	0	0	1
		Temperament	1	0	0	1
		Where I live and work	1	0	0	1
	Health and Wellbeing	Comfort	4	0	0	4
		Health	2	0	0	2
		Life	1	1	0	2
		Lifestyle	2	0	0	2
		Nurture	2	0	0	2
		Physical Safety	2	0	0	2
		Quality of life	2	0	0	2
		Safe	2	0	0	2
		Generalized daily mood	0	1	0	1
		Quality of life in my community	1	0	0	1
		Space to move	1	0	0	1
		Water for Drinking	0	0	1	1
Modification	Infrastructure	Work/Work Availability	6	3	1	10
		School(s)	8	0	0	8
		Church	4	0	0	4
		Economics/Economy	2	2	0	4
		Houma	2	0	0	2
		Local Government	2	0	0	2
		Resources	1	1	0	2
		Suburban	2	0	0	2
		Traffic	0	2	0	2
		Roadway Conditions	0	1	0	1
		Stores/My Stores	1	0	0	1
		Town or City	1	0	0	1

	Protection Efforts	Levees	3	1	0	4
		Conservation	2	0	0	2
		Drainage	1	1	0	2
		Landfill safety	1	1	0	2
		Protection	2	0	0	2
		Restoration	1	0	0	1
	Change	Disappearing	0	0	2	2
		Lack of Restoration	0	0	2	2
		Loss of family	0	0	2	2
		Loss of recreational sports	0	0	2	2
		Manmade issues caused by the intercoastal and man trying to control the MS river	0	0	2	2
		Loss of barrier islands	0	0	1	1
Risks	Anthropogenic Involvement	Violence/Violent	0	0	24	24
		Drugs	0	0	23	23
		Guns	0	0	7	7
		Polluted/Pollution	0	0	6	6
		Trash	0	0	5	5
		Insurance Costs	0	0	2	2
		Polluted Water Ways	0	0	2	2
		Abandoned boats/vehicles	0	0	1	1
	Natural Process Hazards	Hurricane(s)	0	0	39	39
		Dangerous	0	0	11	11
		Erosion/Coastal Erosion	0	0	7	7
		Rising sea level	0	0	3	3
		Subsidence	0	0	3	3
		Flooding/Flood(s)	0	0	2	2

CHAPTER 4

ENVIRONMENTAL INFLUENCE WITHIN MIGRATION DECISION INTENTION ACROSS A COASTAL PARISH

Abstract

The mounting impacts of climate change are putting coastal populations at great risk. This global phenomenon is currently largely framed in a one-way cause-and-effect relationship, where coastal dwelling individuals, communities, and populations, are exposed to risk, experience a hazard event, and then are either forced to relocate, or do so of their own accord. However, an increasing number of recent studies are finding that individuals and communities are choosing to remain in place, despite mounting risks imposed by biophysical environmental changes and events. The work presented here builds upon this foundation by investigating the influences that inform migration decisions for residents of Terrebonne Parish, Louisiana. Using data from 123 surveys and 63 interviews we find that personal level influences of self-reflection and personal experience exert the greatest influence on movement intention. This was true both for individuals intending to remain or move. No support is found for the idea that economic or natural-environmental factors are more influential in decisions to migrate away from one's home. Support is found for social-environmental factors influencing decisions for those who choose to remain. Regression findings indicate that inclusion of socially and environmentally derived variables can improve model performance when compared to a base model utilizing only demographic and economic variables. Results demonstrate that internalization of risk by coastal residents is not a straightforward relationship, but rather

one mediated by; social-environmental factors, personal experience, and trust, which in turn influences their intention to migrate, move locally, or remain in place despite escalating risk. This work expands the investigation of migration decisions to actively include those whose intention is to remain and investigates the role of previously neglected social-environmental factors. Findings have wide implications for community leaders and emergency managers due to the intersection of trust and influence when communicating with at-risk communities who perceive risk differently.

Introduction

In the face of mounting exposures to risk from biophysical environmental processes and human-engineered collapses, associated recovery costs, and environmental/landscape instability, coastal peoples globally are grappling with decisions about their future. Do they migrate away from risk and associated uncertainties, or stay in place and adapt to their rapidly changing surroundings? Early migration scholarship focusing on migration decision making assumed that those who could migrate away to mitigate risk would do so. However, more recent work highlights that more often many people intend to remain in place despite escalating threats to their own lives, livelihoods, and property (Farbotko et al 2018; Farbotko et al 2020; Schewel 2020; Blondin 2021). It is worth noting the work of Mallick et al. here that "having the aspiration and capacity to remain in place when one is capable of migrating differs from being trapped in a location due to resource constraints or place attachment" (2022 p114; and see also Adams 2016; Nawrotzki and DeWaard 2018). The study of migration by its very nature is invested in

understanding the factors and decisions that *cause* movement (Schewel 2020:346). While current efforts are expanding to engage with those who in fact do not migrate, this is still an area with many unanswered questions. Understanding why individuals, or groups, might choose to remain in place despite risk is important not only for better risk management planning and policy implementation, but also holds significance for community planning, social cohesion, and individual wellbeing.

Movement away from coastal danger is nothing new to humanity, as evidenced by the numerous now submerged archaeological sites around the globe and the growing fields of coastal and marine archaeology (Auriemma & Solinas 2009; Bailey & Flemming 2008; Ford 2011; Sivan et al 2001). Movement away from coastal risks are also of increasing global concern – stemming from sea level rise and related issues of erosion and subsidence. High profile examples including the pacific nations of Tuvalu, Kiribati, and The Republic of the Maldives (Balesh 2015; Hirsch 2015; Marino & Lazrus 2015; Stratford 2013) were brought to the world's attention in the last three decades in part due to work by the International Panel on Climate Change (IPCC). Similar sea level rise challenges and questions are present in coastal and low elevation parts of non-island nations including India, China, Bangladesh, and the USA – centering coastal risk as an immediate dilemma for any nation with a coastline. There is now an extensive and growing body of research dedicated to investigating the impacts that sea level rise will have on coastal populations, predicting and planning for choices about mobility. Much of this work focuses on larger scale international movements aligning with national sovereignty (see Biermann and Dingwerth 2004; Willcox 2012) and cultural identity

concerns (for example Stratford et al 2013), while other work, disproportionally focusing on Bangladesh, highlighting domestic coastal challenges and internal migration decisions that do not cross an international border, yet still raise similar cultural identity (Paul & Ramekar 2018) and social mobility (Sams 2019) concerns. Reflections on domestic mobility are becoming more common place as climate change impacts are experienced more widely. For example, case study comparisons of Alaska with inundating Pacific Nations are increasing, e.g. focusing on relocation planning and forced displacement of residents (Marino & Lazrus 2015). At the local planning level across many coastal areas of the United States, there are strategic discussions about implementing 'managed retreat' to maintain longer-term habitability and adaptability for coastal areas – though such approaches are not without their own suite of challenges (Ajibade et al 2020; Hino et al 2017; Jessee 2022; O'Donnell 2022; Siders 2019). Discussions are also beginning in the USA on what sea and riverine level rise would mean for coastal archives, cultural structures, and excavated and unexcavated sites of archaeological, historical, and cultural significance (Anderson et al 2017; Peres & Wolf 2018). Additional work underscores what movement away from cohesive communities means for community culture and social unity – for those who stay behind (Simms et al 2021), for those who move (Bhugra & Becker 2005; Ferguson-Bohnee 2015), and for those in destination areas (Oucho & Williams 2019).

To further contextualize the influences acting upon the migration decision making process for individuals residing in one coastal Louisiana Parish, the research presented in this article works across three literatures: Risk, Information and Trust, and Migration.

Utilizing a mixed methods approach, influences on the movement intention (both to leave or to remain) are investigated through a regression model oriented toward predicting mobility outcomes. The framing of coastal mobility decisions within a biophysical landscape dominated by risks is the current status quo for migration assessments of coastal populations. Risk assessments and negative associations with risky landscapes or hazard events are prevalent, yet for those living within the social landscapes of these areas the outlook is different. A more positive experience of environment is found, one in which landscapes weave together historical connections, life experiences, and livelihood decisions (Chapter 3 This Dissertation). Thus, for a robust assessment of the migration decision making influences on parish residents, we must first understand what risk is and how it can be understood. Next an understanding of decision making is needed to identify how information is obtained, evaluated, trusted, and used. Finally, insight from migration theory is needed, as this is the point at which the previous two literatures meet; assessment of risk and trust of information inform a migration decision – a decision whose outcome may be to migrate, or to remain.

Risk

Since Starr's 1969 article exploring what society is willing to pay for safety, an ideal emerged that there is "a definable (i.e. measurable) phenomenon called risk" and that "societal management of risk seeks to minimize the probability and/or magnitude of undesirable consequences" (Rayner & Cantor 1987 p3). In this perspective, Risk = (*Probability* x *Magnitude*) / *Time* (Rayner & Cantor 1987 p4). This ideal that the potential or probable exposure to risk can be calculated and presented though data,

numbers, or figures has been criticized as reifying risk. It loses sight of the multifaceted phenomenon that *is* risk, for example ignoring the role of social relations in mitigating the experience of risk (Rayner & Cantor 1987 p3). Coastal areas are of great interest in this discussion, as residents commonly face multiple risks whose cumulative impacts over time can be more than the sum of individual event effects. For example, areas of the US Gulf coast are at risk from naturally occurring processes including; sea level rise, land subsidence, flooding and nuisance flooding, salinization, and erosion, as well as storm and hurricane event exposure, all of which represent risks to life and livelihoods, and can cost billions to recover from[3]. Risk from non-naturally occurring events can be equally, or even more costly, for example The Deepwater Horizon oil incident in 2010, had devastating biological (Abbriano et al 2011; Silliman et al 2011; Smith et al 2011), economic (Hodges et al 2020; Keating et al 2020), and social effects (Cope et al 2013; Cope & Slack 2017) for the entire Gulf region, both in the immediate aftermath and extending to the present day.

Risk in a migration context is commonly associated with the balancing of an area hazard or disaster likelihood against a person's desire/willingness to reside within that area. An individual's place of residence may be relatively stable, yet be exposed to the risk of a potential disaster event, either through natural processes (for example; hurricanes, blizzards, wild fire, volcanic eruption, flooding etc), or man-made events

[3] The 2021-2022 Disaster Relief Fund for the USA, as managed by FEMA, totaled 55 Billion dollars (Congressional Research Service 2022). "In 2021, there were 20 separate billion-dollar weather and climate disasters [in the USA]. The total cost for these events was $145 billion, making this the third most costly year on record"(NOAA 2022a).

(such as; traffic accidents, industrial accidents, or civil unrest and war). Residents perceive of such risks and weigh them in relation to their own thresholds of experience and self-interest. Re-evaluation of their assessment of 'acceptable' risk can take place gradually with age over a life-course, as well as abruptly after experience of an event. Risk evaluation may result in temporarily relocation (evacuation with subsequent return), e.g. the residents who evacuated pre and post Hurricane Katrina and then returned home (Groen and Polivka 2010; Li et al 2010). Alternatively, residents may decide to permanently relocate after a hurricane experience (Do 2019; Zaninetti and Colten 2012) if risk is evaluated as too high. For example, it is estimated that 14% of the population of Puerto Rico left the island in the wake of hurricane Maria (Meléndez & Hinojosa 2017), and 47% of the population of New Orleans had not returned almost a year after being devastated by hurricane Katrina (Plyer 2016). Scholars are working at the interaction between risk perception, hazard experience, and migration decisions, (for some examples see: Adger et al 2021; Bardsley and Hugo 2010; Hunter 2005; Sudmeier-Rieux et al 2017; Williams and Vladimir Baláž 2012; Wisner et al 2012), however, there remains a gap in understanding between organizational expectations of how individuals will respond to risk and personal internalization of risk by individual residents of "at-risk" areas.

Risk perception and thresholds of risk acceptance/tolerance are individual level phenomena. However, formalized risk assessments are commonly carried out at larger scales (county, region, state, nation) to help higher level decision makers and leaders evaluate, and make decisions about, risk messaging and risk mitigation for designated

areas. At managerial or governmental levels, risk assessments usually designate areas along a scale of risk, typically calculated in terms of probabilities of economic impact/loss or human loss of life. There is also an assumption that people with a more extensive understanding of risk, and awareness of its potential impacts to them, will in turn have higher levels of preparedness for those risks. This, however, is demonstrated to not always be the case. The phenomenon of the 'Risk Perception Paradox' describes a fallacy whereby degree of risk exposure and degree of risk preparation are positively correlated (Wachinger et al 2013). While De Vries (2011 p19) argues that a "false sense of security rooted in historical experience, in dwelling" is responsible for the lack of evacuation (which is one of many preparedness responses to risk), reasons for remaining are exceptionally complex and could among other things relate to; acceptance of risk through personal threshold evaluation (Adger et al 2018), personal weighing of costs and benefits (Mallick et al 2022), economic opportunities and barriers (Klugman 2009; Wiegel et al 2021), extension of historically set precedents and marginalization (Adger et al 2018), as well as personal internalized contentment with, and connection to, sense of place as a source of existential safety (Adams 2016; Wiegel et al 2021). It is noteworthy to mention that while hazard events can be predicted with calculated probabilities of occurrence and impact, and that exposure to, and experience of, an event has been shown to be an important motivating factor in migration decisions, the affect (i.e. positive or negative response) evoked by the experience of an event cannot be predicted (Siegrist and Gutscher 2008). Studies have also shown that individuals living in areas determined to be of high, or low, assessed risk do have a general understanding of the risks associated with living in such locations. However, it is not uncommon for residents in

high-risk areas to under-estimate risk and vice versa (Siegrist and Gutscher 2006). For example, individuals in southern Louisiana face hurricane risks, yet those who have not experienced damage, or lack prior hurricane experience can foster feelings of relative safety and thus harbor resistance to evacuation (Howell et al. 2005). Similarly, De Vries (2011) found that "long-term residents have lived through many hurricane threats and … these residents are less likely to feel that they should leave their homes" in response to hurricane warnings. This situation is also reflected in the "well-known age gradient [effect] where the most likely to migrate are young adults and the least likely are older adults" (Hauer & Jacobs 2022 p2). Regardless of underlying reasoning for resistance to mobility, the existence of the risk perception paradox has vast "implications for future risk governance and communication as well as for the willingness of individuals to invest in risk preparedness or risk mitigation actions" (Wachinger et al 2013 p1049). Relatedly, a deficit of perceived understanding of information should not be assumed to correspond to a deficit in comprehension of risk or of its consequences. A common example of this is the notion that public apathy over climate change is the result of poor public scientific literacy (Pidgeon & Fischhoff 2011). However, Kahan et al. showed that public divisions over climate change information "do not stem from an incomprehension of science, but rather from an internal conflict of interest when forming beliefs" (2012 p732), while Morss et al have demonstrated that an individuals' worldview can impact how they perceive and respond to near-term threats and internalize risk information pertaining to such events when it is presented (2020 p1643).

For this paper, risks relating to incremental short-term and long-term [environmental] change or designated [environmental] disaster events are a daily fact of life for parish residents. Existing literature does not actively engage with how individuals within an 'at-risk' area personally internalize those risks and how those perceptions can influence migration decisions. This work seeks to add to the developing social science literature documenting residents of 'at-risk' locations who are remaining in place despite risk. Internalization of information, and personal trust in that information play a large role in evaluating risk. The function of information and how it can influence decisions is discussed next.

Data, Trust, and Influence

There are a staggering variety of analytical tools and models currently utilized and adapted to consider mobility questions. Such models are often data-driven and forward-looking. Hauer (2017) for example, utilized county-county migration data derived from Internal Revenue Service tax records to make predictions of US internal migration related to sea-level-rise by 2100. While useful for predicting possible futures, such approaches are not without challenges – for example, more course-grained/higher resolution data can result in under, or over, estimation of conclusions (Morrison et al 2019). The counter point to such predictive models are backward-looking models, where the event of interest has already occurred and event data is available. Much of the hazard-event migration investigations occurring in the US derive from major hazard events and their resulting population shifts over immediate and longer-term time scales. Because data disproportionally represents larger (and more catastrophic) events, a bias exists where

data from such events is overrepresented, while data from smaller and lower impact events is underrepresented, leading "to a patchwork of our understanding of environmental migration" (Hauer & Jacobs 2022; Hoffmann et al 2020). Near countless case studies have attempted to investigate mobility, or mobility propensity, by exclusively using personal *attributes* of their participants; e.g. age, education level, income, geographic location etc. Mobility research is not so well versed at identifying sources of *influence* within a migration decision *before* the movement decision outcome has been enacted. Few studies have probed the sources of public or personal influence coastal residents depend on to make decisions about movement when facing risk (see Schmidt et al 2014 as a notable exception).

A shift from socio-demographic *attributes* of residents to *perceptions* of residents living in places represents an insider-outsider shift in thinking about decision influences. Questions of influence engage with issues of trust, scale, and characteristics that promote acceptance or refutation of information. Literature on trust and acceptance of information (see examples by Baba 1990; Primiero et al 2017; Rowland et al 2022) emphasizes that individuals are more likely to be influenced by people or ideas that are aligned with their own worldviews, and worldview can in turn impact decision outcomes (Lazo et al 2015; Morss et al 2020). Cultural cognition theory (see Kahan 2012) states that individuals form perceptions of risk that reflect and reinforce their "cultural way of life" (Newman et al 2018 p989). [Dis]Trust in information can also have a hierarchical component when power dynamics are involved and can be especially tense in situations of trust between organizations and minorities. For example, "there is a long history of minority groups in

the United States distrusting medical and public health leadership" (Cordasco et al 2007), also see Jacobs et al (2006), & Johnson-Agbakwu et al (2020). Personal experience of a natural hazard and trust - or lack of trust - in authorities and experts have the most substantial impact on risk perception (Wachinger et al 2013 p1049). This '(dis-)/trust in the known' effect can be leveraged in some situations to help in changing practices through nudging or peer-pressure/peer-support behavior – as seen with recycling (Deng et al 2021), smoking cessation (Alemanno 2012), exercise, obtaining/maintaining sobriety (Kelly et al 2019), and other social activities (Simmons 2013). Within the hazard-evacuation setting, individuals in evacuation scenarios put more trust in information from local sources – sources that they are more personally familiar with – than those from sources they have less or no familiarity (Wray et al 2006). Similar investigations have identified a general psychology of trust (Castelfranchi et al 2003), which highlights connections between trust and proximity (Choi and Wehde 2020), trust and event experience (Scammell et al 2009), and additionally how breaks in trust can occur or be avoided (Cordasco et al 2007; Leiserowitz et al 2013; Schmidt et al 2014). In a context of coastal hazards, individuals may have varying levels of trust in a range of near and far influences, i.e. personal reflection (thinking things over in ones' own mind without direct input from anyone else), their own experience, (nearby) influences from family, friends, local media and policy and decision-makers. Alternatively, influences may be more distant, i.e. non-local friends or family, state/federal decision-makers or national media. This then begs the question, for individuals undertaking migration decisions: Does more trusted information come from sources more local and known to

them? In this paper we explore the types of influences considered by Terrebonne Parish residents in their migration decision making processes.

Decisions & Migration

Decision Theory as a literature involves a storied progress of approaches, largely stemming from psychology and economics perspectives, and advanced by scholars such as Herb Simon, Richard Cyert, James March, Michael Cohen, and Daniel Kahneman, all with the end goal of understanding *how* we [as individuals, groups, and organizations] arrive at decisions. To date, the framing of the individual level decision process for migration largely mirrors the classic migration framework published by Black and colleagues (2011 – Figure 2 pS5). In this framework, decision inputs grouped into the macro level factors [Political, Demographic, Economic, Social, and Environmental] influence the decision-making process, are mediated by personal characteristics and intervening obstacles, and each of these elements can in turn be influenced by biophysical environmental changes.

Migration models, either derived from individual location case studies, or aggregated area data, typically use demographic and economic characteristics to predict movement of individuals, groups, or populations (see Stillwell 2005; Radu 2008; Davis et al 2018; Dubey & Qureshi 2021 for select examples). Environmental considerations in such models are almost exclusively restricted to biophysical attributes (such as hurricane landfall or annual rainfall manifesting as either drought or flood conditions) that drive decision outcomes towards an intention of ‘move’. Non-biophysical environmental

factors – such as social or cultural environmental connections or meanings associated with landscapes – are largely absent from the theoretical literature on migration. However, emerging descriptive and qualitative work suggests that such environmentally connected factors do figure into migration decisions, largely as moderating factors contributing to reasons to stay in place rather than as a driver to relocate (Binder et al 2015; Hunter et al 2015; Mallick et al 2022; Swapan and Sadeque 2021; Till Dissertation Chapter 2; Till Dissertation Chapter 3; Wiegel et al 2021). Integrating these social/cultural-environmental factors into quantitative models to predict migration, inclusive of predicting non-migration, in locations where risk exposure is high and predicted to increase, is an important step in advancing our understanding of how environmental factors effect migration decision making.

Additionally, many migration models are founded on the underlying assumption that mobility is both a desired and an achievable outcome. As such, the focus is migration 'drivers'– emphasizing the "forces leading to the inception of migration" (Van Hear et al 2018, 927), and subsequent movement. Migration is an important means of adaptation to mounting environmental changes and challenges (Black et al 2011; Hoffman et al 2020; Vinke et al 2020; Warner et al 2010). Yet, an increasing number of studies are identifying non-migration (Mallick & Mallick 2021; Schewel 2020, 329), voluntary immobility (Blondin 2021; Farbotko 2018), and voluntary sedentarism (Mallick et al 2022) as active migration decision outcomes despite risks. This suggests that a default assumption that the desired migration decision outcome is to leave is no longer sufficient or accurate. This difference illustrates elements of movement decision making under conditions of

risk – a lens through which the research presented here seeks to capture new and salient insights into the intersection of environment (both physically and socially experience) and the migration intention to migrate or to remain.

Migration Decisions: The Nexus of Risk & Influence

With insights from these three literatures, coastal residents make decisions to stay or migrate at the nexus of influence and perceived risk. We first explore influence in two ways and examine sources of public and personal information that coastal residents perceive to be important in their movement decisions. We then examine how residents rank economic, life stage, social-environmental, and physical-environmental factors as affecting their movement intentions. Then we use a data set of 123 coastal LA residents with known movement intentions (remain, move-locally, or move) to explore the predictive power of socially informed environmental factors using regression. We hypothesize that socio-environmental characteristics can also be predictive of migration intentions in addition to typical demographic and economic attributes.

Specifically I ask:

1. Where do individuals get the information that informs their migration decisions (what are sources of influence), and how influential is that information in their decision-making process?
2. How influential are macro factors; economic, life stage, social-environmental, physical-environmental, in affecting movement decision intention?

3. Beyond typically implemented socio-demographic and economic factors, can inclusion of environmental variables improve prediction of migration intention?

Numerous locations around the US Gulf Coast, the Florida panhandle, and the North-Eastern United States are currently grappling with the challenges of environmental change – notably how to keep resident's safe despite mounting risks to those living closest to the coast. Within the spatial context of a landscape already designated by its leaders as being 'at-risk' from biophysical environmental and other hazards, do residents share this same view of their environments? The setting for the research presented here is Terrebonne Parish, Louisiana. This is a coastal landscape directly on the front lines each hurricane season. Predictions for this coastal region are increasingly grim. Expectations are that flood event frequency will exceed national averages by 2050 (NOAA 2022), and millions of US Gulf coast homes will be at risk of critical inundation by 2045 – including up to 150,000 across southern Louisiana alone (Underwater Report 2018). A 2019 investigation found that the average subsidence rate for Terrebonne Parish was about half an inch per year – nearly four times the global average (Lux 2019). Subsidence, and the closely related phenomena of erosion, both lead to increased detrimental impacts from storms and hurricanes as natural protective barriers become inundated, or simply get washed (or blown) away. This was most recently experienced in 2021 with the aftereffects of Hurricane Ida, which is currently estimated to be responsible for the loss of 106 square miles of protective wetlands (Schleifstein NOLA 2021). Change is nothing new to the peoples of this parish, and many families have deep ancestral roots (Ferguson-Bohnee 2015; Till Dissertation Chapter Three; Simms et al 2021). In the face of

mounting challenges, the research presented here represents an important illustration of influences and movement within a landscape of increasing risk. With future physical environmental changes across coastal and low-lying areas all but certain, the only real question is how quickly, and severely, predicted changes may manifest. There is no question that there are biophysical environmental risks present – what is questionable is how important such factors actually are within the movement decision of individuals who call such at-risk areas *Home*.

Setting

Fieldwork over seven months in Terrebonne Parish, Louisiana is the basis for this paper. Terrebonne Parish is one of the most southern parishes of Louisiana and third largest by area. Home to over 110,500 people, the Parish has an average elevation of only 1-2 feet above sea level. The main urban center of Houma is situated at an average elevation of 8 feet. The landscape of the parish is dominated by wetlands, bayous, and lakes, with the population mostly found near the Thibodaux metro area and the city of Houma, then closely following the edges of the bayous that extend south toward the Gulf of Mexico (Figure 4.1). This proximity to the Gulf drives the economy of the parish through seafood and oil production. Both industries are major sources of direct and indirect employment for the area. Additional industries of note include sugar cane production, and aquatic engineering opportunities such as ship years and machine shops, both of which reflect a parish economy tightly connected to its warm and accessible aquatic landscape. Proximity to the Gulf combined with a wetland dominated low-lying Parish geography also means that in their daily lives' residents are balancing physical

risks – flooding, erosion, sea level rise, saltwater intrusion, storms, and hurricanes – with life and livelihood decisions. Their lives and lived experiences are informed by risk, but this does not mean these people view themselves as 'at-risk' (Williams & Baláž 2012).

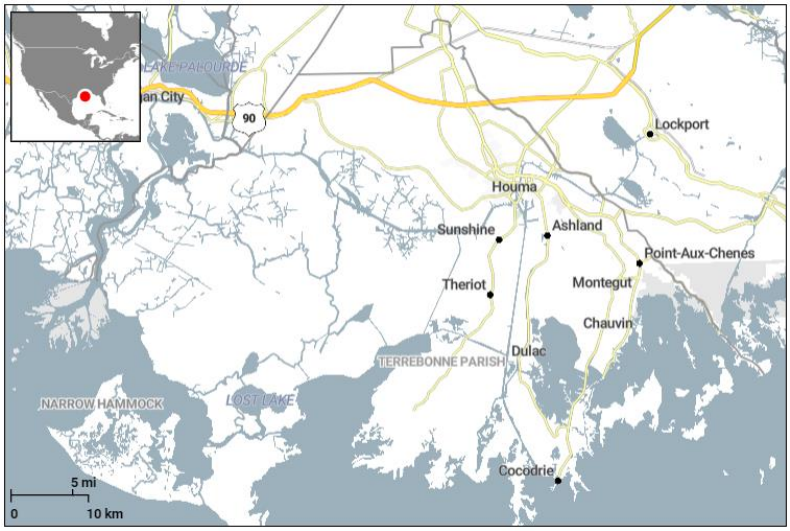

Figure 4.1. Terrebonne Parish Map. Map illustrating Terrebonne Parish, and its main south-north roadways (sand-colored lines) which largely follow bayous extending towards to US Gulf Coast. Parish boundaries are indicated by grey lines, Highway 90 depicted in yellow.

Data & Methods

Data collection occurred from April 2019 to October 2019, with an additional field visit in Feb 2020 to complete remaining interviews and observe parish life during a different time of year. Data collection from parish residents occurred through implementation of a 16-page survey instrument (Appendix D) that was either self-administered or PI-administered, with 51% of survey respondents also completing follow-up semi-structured interviews (IRB # STUDY00009200 – Appendix C). Field work concluded before the COVID-19 pandemic became a serious concern, so the

pandemic did not feature in project design. The study also concluded before the area was ravaged by hurricanes Laura, Delta, and Zeta in 2020, and Ida in 2021, the latter catastrophically impacting the immediate area and lives of all contacts and participants within this study.

Eligibility was restricted to residents of Terrebonne Parish, who had been living within the parish for a minimum of 12 months and were at least 18 years of age at the time of participation. Of 189 surveys distributed, 129 were returned (123 were complete) for a response rate of 65%. Surveys took most participants between 40 minutes to an hour to complete. A suite of demographic information was collected, and additional questions targeted environmental perceptions and understanding (select findings published in Till Dissertation Chapter 2). The research presented here expands upon those findings and contextualizes environmental data within a migration intention framework. Migration/movement intention was investigated through an initial question "*Which of the following statements best describes your current residence plan*," which asked respondents to select which of seven options best represented their current, or future, movement intention (Table 4.1). Follow up question sets were administered depending upon stated movement intention; with movers and non-movers answering different, yet complimentary, question blocks. These questions probed the reasons for their migration decision, including experiences of hazard events, types of decision influences (family, media etc.), and the relative level of importance different stimuli have on the movement intention of individual participants. Survey answers were digitized by the author and stored in SPSS (v. 25/v.27) for analysis. To supplement and expand upon survey data, 63

interviews were completed by the conclusion of the project in Feb 2020. Interviews lasted between 1 and 2 hours, were digitally recorded, and were designed to complement, expand upon, and provide additional context for survey responses. Interview recordings were transcribed by the author, stored, and processed using MAXQDA software.

Table 4.1

Movement intention answer options and corresponding movement intention classifications. Respondents who answered "Other" (n=7) as their movement intention were reallocated by the PI to answer ID 1.

ID	Answer Options	Binary	Three-Way
1	I do not intent to leave my home in this area a long as I live	NOT MOVING	NOT MOVING
2	I intend to leave my current home, but stay within the local area	MOVE	MOVE LOCALLY
3	I intend to leave this area at some point in the near future		MOVE
4	I intend to leave this area at some point in the distant future		
5	I am currently in the process of leaving this area		
6	I do not want to leave this area, but feel that in the future I will be forced to leave	NOT MOVING	NOT MOVING
7	Other (please specify)	reallocated	reallocated

A dependent variable [Migration Intention] was constructed from data in two ways. The first is binary; Move [1], and Not Moving [0]. Contextual analysis of field notes and additional survey response allowed the PI to place respondents who had self-identified as 'other' into the answer category 'no intention to leave my home'. An emergent third category was a large number of respondents who intended to relocate, but to a location still within Terrebonne Parish - 37.7% of 'move' responses. Outside of respondents who indicated they had no intention of moving, this group represents the

next most frequently selected answer option. This data distribution prompted the construction of a second movement classification type – a Three-Way movement intention category. Participants identifying this movement intention filled in the 'move' questions within the survey rather than the 'remain' question set. Move-locally respondents are considered separately from the Move and Not Moving respondents (Table 4.1). The variable distribution displayed for this Three-Way classification is shown in Table 4.2. A distribution for the Binary classification is presented at the top of Table 4.3.

Table 4.2

Variable description of the Three-Way movement intention dependent variable.

Variable	Variable Components	Respondent Count	% of respondents within each movement group, n=123
Movement Intention Three-Way	Not Moving	70	56.9%
	Move Locally	20	16.3%
	Move	33	26.8%

To address the first research question, data generated from the following survey question was utilized: *On a scale of 1-10 (1 being 'no impact at all' and 10 being 'extremely influential') please rate the significance of the following situations to you in your decision to [remain / move].* A set of 12 different situations was presented, each representing a different type of influence that could impact the migration decision of the participant. Two influences reflect personal experience, five influences are Louisiana-specific and five were external to Louisiana. Influences within the last two groups ranged from interactions with family or friends to engagement with area leaders, media, or materials these organizations produced. As the decision making and trust literatures speak

to the proclivity of individuals to seek engagement with locally produced information, specifically targeting different spheres of influences ranging from near/close to distant/wide geographic scales (self/within LA/outside LA), allows finer grained details about the importance of these influences within the decision to emerge. The Three-Way movement intention classification is used for this analysis to more thoroughly test if the move locally group expressed significantly different influence patterns from those in the remain or move groups. Kruskal-Wallis testing quantified significant differences between variables across movement intentions. Tests were performed on individual variables across movement classifications, as well as across variable groups [personal, within LA, and outside of LA] across movement intention categories, with additional post-hoc t-testing performed with Bonferroni correction. Box-and-whisker plots of migration influence variables were constructed using Microsoft Excel. Plots display quartiles, medians, and means across all influences. Results and significant findings are displayed in Figure 4.2.

Analyses to address the second research question are based upon on the following survey question: *Decisions to move are often never simple, and are made up of multiple parts. On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following factors in your decision to [remain in Terrebonne Parish / move].* Four factors*; Economic, Life Stage, Social-Environmental, Natural-Environmental* were then provided as options. Analysis proceeded in a similar manner as implemented for addressing research question one. The 'three-way' movement classification was used as the dependent variable to further

investigate any potential differences between decision influences expressed by move-locally participants. Kruskal-Wallis tests quantified significant differences between factor means across movement intentions, and additional post-hoc Bonferroni correction t-testing was performed to comprehensively investigate potential differences. A box-and-whisker plot of influence distributions was constructed using Microsoft Excel, with the plot displaying quartiles, medians, and means across factors. Results and significant findings are displayed in Figure 4.3.

A binomial logistic regression addresses the third research question. Kruskal-Wallis testing revealed limited differences between variable distributions for move-locally and move categories, and results from the analysis required for figures 4.2 and 4.3 identified only one instance where *move-locally* participants were not significantly different from *remain* participants. For these reasons, the Binary not-moving/move classification is used as the dependent variable for the regression (‘move’ coded as 1 - Table 4.3). Socio-demographic and economic variables typically used in the existing literature are included as independent variables for movement intention. Three additional variables that explicitly highlight social-environmental interactions, perceived environmental risks, and future predictions of environmental change are incorporated. Table 4.3 displays variables included in the binomial logistic regression model and the distribution properties of each variable. The following paragraphs briefly describe each variable included.

Base Demographic and Economic Variables

Sociodemographic and economic factors are commonly considered as key predictors in migration decisions. Five such attributes are tested in this analysis (Table 4.3). Respondent *Gender* [Gender] identifies respondents who self-identified as male [0], or female [1]. None of the 123 participants self-identified outside of this binary. Age at the time of data collection was recorded as a continuous integer ranging from 18 to 79 years. A created variable; *% Life in Parish* [%LiP], represents the percentage of an individual's life, measured in years, that they have lived on a permanent basis within Terrebonne Parish. This variable helps to addresses age-related biases associated with using age in years directly. The variable %LiP has five categories 1-5; 1-49% [1], 50-69 % [2], 70-89% [3], 90-99% [4], and 100% [5] finalized from naturally occurring clusters and break points within the data. The variable *Children* [Children] is defined as presence, or absence, of dependent children, with three categories; Respondent not providing for any children [1], At least one child being provided for [2], Child/Children are grown / no longer living with respondent [3]. *Education Level* [Education] summarizes a constructed variable from answers to the question "*Highest level of formal education obtained?* * how far in school did you go**. Responses were evaluated and coded into five designations; Early education to some high school [1], Completed high school [2], At least some college (but did not finish) [3], Completed college [4], and Completed college and obtained additional certification or graduate studies [5]. Lastly, *Income* [Income] depicts respondents personal annual individual income classified into four levels; $1-$29,999/year [1], $30,000-$59,999/year [2], $60,000-$99,999/year [3], and >$100,000/year [4]).

Environmentally Informed Variables

A focus of the broader study is understanding the role(s) of the environment, conceptualized holistically (Till Dissertation Chapters 2 and 3), in migration decisions. After exhaustive variable testing, three environmentally derived variables are included as predictors in the regression presented (Table 4.3). The variable *Erosion threatening way of life* [EroTwoL] is constructed from answers to the binary question; *Does coastal erosion in Terrebonne Parish pose a threat to your way of life*? (No [0], Yes [1]). The variable *Event changed perception and/or movement intention* [EvChange] derives from two survey questions; "Has a specific event (or events) changed your perception of your environment?" (Yes/No), and "Has a specific event (or events) impacted your movement plans?" (Yes/No). Overlaying these two questions generates four possible answer combinations; Yes-Yes [1], Yes-No [2], No-Yes [3], and No-No [4]. It is expected that someone who has experienced an event that changed their environmental perception, and an event has changed their movement plans, would perceive their environment differently than individuals who responded in the negative to the same questions (No- No). No-Yes and Yes-No combinations suggest no substantial event experiences and/or effect on migration intention. The last variable in the model *Prediction Inaccurate* [PredInnac] is derived from the question *I think that future environmental change predictions for this area are incorrect/inaccurate*. Classifications are recorded across five designations; Strongly Agree [1], Agree [2], Disagree [3], Strongly Disagree [4], N/A/Don't know [5]. Agreement answers imply a rejection of future environmental change predictions for the area, while disagreement answers infer an acceptance of future predictions.

Binary logistic regression was performed in SPSS (v.27), utilizing all variables in Table 4.3. All variables are categorical. The first variable category within each variable is treated as the reference [indicated with *]. The final model is maximized for Cox & Snell and Nagelkerke R Squares, as well as percentage of cases correctly attributed across movement classifications. Results of the model are presented in Tables 4.4 & 4.5 and qualitative quotes from respondent interviews are used to expand and contextualize findings.

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Table 4.3
Regression Variables, their Component Levels, and Data Distributions. Reference variable categories indicated with *

Variable	Variable Components	Respondent Count	% of respondents of total sample size n=123
Dependent Variable			
Movement Intention	Not Moving (0)	70	56.9%
	Move (1)	53	43.1%
Independent Variables: Demographic			
Gender	*Male (0)	60	48.8%
	Female (1)	63	51.2%
%LiP[#]	*1-49% (1)	23	18.7%
	50-69% (2)	16	13.0%
	70-89% (3)	19	15.4%
	90-99% (4)	12	9.8%
	100% (5)	53	43.1%
Children	*Respondent not providing for any children (1)	31	25.2%
	At least one child being provided for (2)	42	34.1%
	Child/Children are grown / no longer living with respondent (3)	50	40.7%
Education	*Early education to some Highschool (1)	6	4.9%
	Completed High School (2)	15	12.2%
	At least some college (didn't finish) (3)	25	20.3%
	Completed College (4)	39	31.7%
	Completed college and some additional certification or graduate degree (5)	38	30.9%
Economic			
Income	*$1 - $29,999/year (1)	22	17.9%
	$30,000-$59,999/year (2)	29	23.6%
	$60,000-$99,999/year (3)	46	37.4%
	>$100,000/year (4)	26	21.1%
Environmental			
EroTwoL[#]	*No (0)	30	24.4%
	Yes (1)	93	75.6%
EvChange[#]	*Yes-Yes (1)	38	30.9%
	Yes-No (2)	48	39.0%
	No-Yes (3)	5	4.1%
	No-No (4)	32	26.0%

PredInnac[#]	*Strongly Agree (1)	6	4.9%
	Agree (2)	30	24.4%
	Disagree (3)	57	46.3%
	Strongly Disagree (4)	10	8.1%
	NA/Don't Know (5)	20	16.3%

[#] The Demographic variable [%LiP] is the percentage of a respondents' life lived within Terrebonne Parish. Abbreviations of the three Environmental variables are as follows:
[EroTwoL] – Erosion threatening way of life
[EvChange] – Event changed perception and/or movement intention
[PredInnac] – Derived from the question *I think that future environmental change predictions for this area are incorrect/inaccurate*.

Results

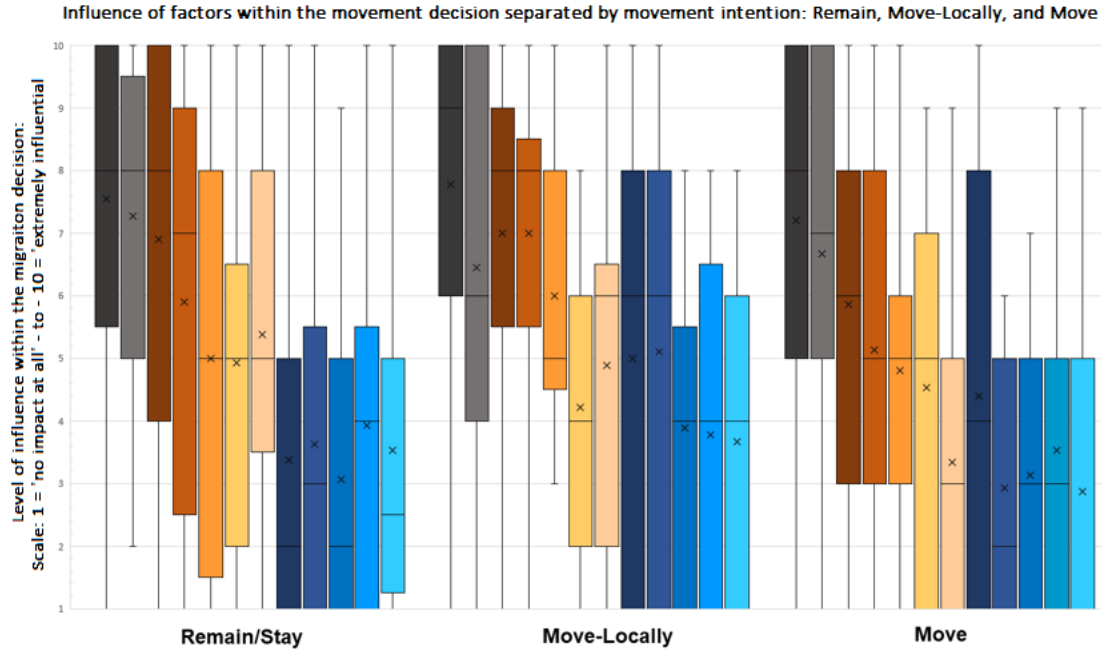
Figure 4.2 explores the degree of influence participants placed upon different sources of information within their choice of movement intention. Section A presents results across the three movement intention classifications; Remain, Move-Local, or Move. The influence scores for 'Personal Level' information sources (grey bars) are highest (indicating most influence on the decision) across all movement categories. On average *Self-reflection* and *Experiencing Local Conditions* also scored as the most influential of all factors investigated. Local level 'Within LA' influences (orange bars) were more moderately influential. 'Outside LA' influences (blue bars) had the lowest average scores of all information sources, i.e. had less influence on migration decisions. This pattern is largely repeated within each movement intention classification. Kruskal-Wallis tests explored differences between influence scores of information sources. No significant differences across movement intentions were observed, with one exception being the influence of "*Reading/viewing material produced by local news media*", however, this difference did not hold in post-hoc testing. While this lack of notable significant differences across each influence individually in degree of influence exerted

on the movement decision was surprising, the overall small sample size within each movement intention group, the wide score distributions and subsequent standard deviations of the data likely contributed to this result.

Degree of influence was also tested using grouped data, with scores from each of the three scales; 'Personal', 'Within LA' and 'Outside of LA', grouped together and tested (Figure 4.2B). No significant differences were observed across movement classifications for the grouped Personal Level influence scores. Grouped 'Within-LA' information sources show significantly higher scores for residents in the move-locally movement category, and the move category, when compared to those in the remain group. Grouped 'Outside of LA' information sources were found to have the opposite relationship, with these information sources found to have significantly higher influence scores within the remain movement intention when compared to both the move-locally and move groups. No significant differences were observed between the move-locally and move groups for either the 'Within LA' or the 'Outside of LA' influence scores.

Migration Intention Influences

A)



Personal Level	Within LA Level	Outside of LA Level
Self-reflection (thinking things over without the input of anyone else)	Interactions/Conversations with family members within LA	Interactions/Conversations with family members outside of LA
Experiencing local conditions	Interactions/Conversations with friends outside LA	Interactions/Conversations with friends outside LA
	Interactions/Conversations with familiar faces/community members within LA	Interactions/Conversations with contacts outside of LA
	Reading/viewing material produced by local council / leaders	Reading/viewing material produced by national council / leaders
	Reading/viewing material produced by local news media *H* Statistic: 5.06513 *p-value:* 0.07945 *	Reading/viewing material produced by national news media

B)

Post-hoc *Bonferroni* corrected comparisons of movement category grouped means, compared pairwise.

	Remain N=70	Move-Locally N=22	Move N=30		
Attributes	Mean (SD)	Mean (SD)	Mean (SD)	F Statistic	Post-hoc with *Bonferroni* correction Remain [1], Move-Locally [2], Move [3]
Personal Level	7.414 (2.421)	7.111 (3.160)	6.933 (3.172)	0.314	ns
Within LA Level	3.507 (2.572)	5.822 (2.733)	4.733 (2.840)	14.524***	1<2** 1<3***
Outside LA Level	5.625 (3.127)	4.289 (3.005)	3.373 (2.710)	14.590***	1>2*** 1>3**

Statistical Significance: {≤0.001: '***'}; {≤0.05: '**'}; {≤0.10: '*'} {ns = not significant}

Figure 4.2. *Section A)* Box-and-whisker plots of influences on the movement decision, displayed by movement intention. Score distributions are displayed by quartile with upper/lower quartiles as whiskers. The median value of each influence range is indicated by a horizontal line. Respondents within the Remain classification (the left-most cluster of bars) answered the question: *On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following situations to you in your decision to remain*, while those who intended to move (both locally - central bars, and externally - right most bars), answered the question: *On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following situations to you in your decision to move*. LA is the state abbreviation for Louisiana. All influences were tested for significant differences by movement categories (*Section B*) using post-hoc *Bonferroni* correction. The personal level influence group had the highest influence across movement intentions. Significant differences between movement classifications are observed between the 'remain' classification and both movement options for both 'Within LA' and "Outside LA" level influences. No significant difference in the level of influence is observed between move-locally and move classification.

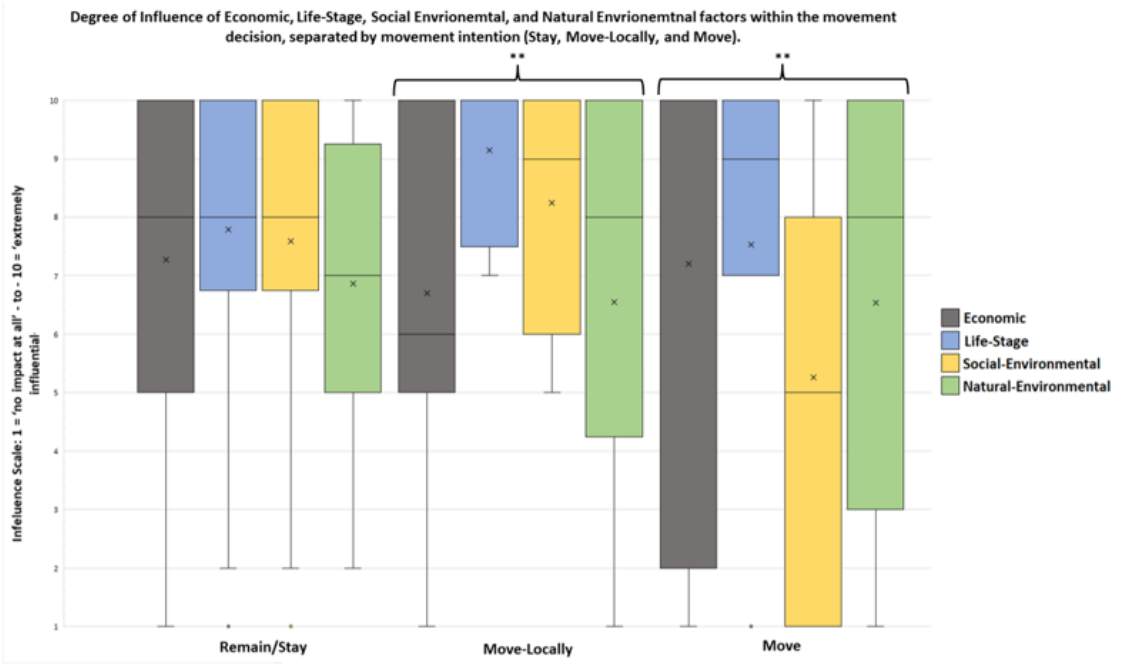
In sum, Figure 4.2 demonstrates that all respondents are more influenced by personal reflection and experiences when making movement decisions, relative to other local, state level, or national level influences. Additionally, more distant information sources – national level leadership and media had consistently lower influence scores, and thus less influence on the movement decision relative to 'Personal' and 'Within LA' information source levels. That said, for those intending to remain in place, 'Outside of LA' sources of information were significantly more influential. While the mean influence score is still relatively low at 5.6, it is significantly higher than the mean scores from those within the move-locally or move classifications.

Figure 4.3 compares mean influence scores of Economic, Life-Stage, Social Environemtal, and Natural Environmental factors on movement intention. Scores for all four domains across movement groups were highly variable. For those intending to

remain in their current place of residence there were no signficant differences in influence across the four factors. However, significant differences between factors were found for the Move-Locally, and Move groups – as indicated by the brackets at the top of the figure. Similar to the previous analysis, potential differences in influence scores for Economic, Life-Stage, Social-Environmental and Natural-Environmental factors were tested across movement classifications. Collectively, all four factors had mid-to-high mean influence scores – all means are above 5 – indicating that all four factors are more than minimally influential on the migration decisoin.

Within wider literature Economic and Natural Environmental factors dominate discussions of migration decision making, yet in this analysis there were no significant differences identified between the influence scores for these factors across movement intentions. The Life-Stage influence mean was marginally higher for the Move-local group than the Remain group (at $p \leq 0.10$), however, the associated *F* statistic for these comparisons was not significant. It is notable that these two mean scores – the influence of Life-Stage in the movement decision for those who intend to Remain or Move-Locally – are the two highest means within the data set. Life-Stage as an influence factor collectively had the highest mean influence scores of all factors investigated. Mean Social-Environmental influence scores were significantly different across movement categories, with Remain and Move-Locally mean influence scores being significantly higher than the mean for those in the Move group, which at 5.27 had the lowest mean influence score of any factor investigated. The mean influence scores for the Social-

Environmental factor between those in the Remain group and those in the Move-Locally group were not significantly different.



Post-hoc *Bonferroni* corrected comparisons, compared pairwise between movement category groups

	Remain N=70	Move-Locally N=22	Move N=30		
Attributes	Mean (SD)	Mean (SD)	Mean (SD)	F Statistic	Post-hoc with *Bonferroni* correction: Remain [1]. Move-Locally [2], Move [3]
Economic	7.28 (3.02)	6.70 (2.79)	7.20 (3.88)	0.240	ns
Life-Stage	7.79 (2.60)	9.15 (1.31)	7.53 (3.44)	2.439	1<2*
Social-Env	7.59 (2.48)	8.25 (2.02)	5.27 (3.25)	10.080***	1>3** 2>3**
Natural-Env	6.86 (2.51	6.55 (3.22)	6.53 (3.34)	0.166*	ns
Statistical significance identifiers: {≤ 0.001: '***'}; {≤ 0.05: '**'}; {≤ 0.10: '*'} {ns = not significant}					

Figure 4.3 Self-reported influence scores of four macro domains of influence on movement decision. Box-and-whisker plots display data distributions by quartile. The median value of each influence is shown by a horizontal line across each bar, between the 2nd and 3rd quartiles, while the X indicates the mean scores. Respondents within the Remain classification (the left-most four bars) answered the question: *On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following factors in your decision to remain in Terrebonne Parish*, while those who intended to move (both externally - right most four bars, and locally - central four bars), answered the question*: On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following factors in your decision to move.* Testing revealed no significant differences between the four factors within the Remain movement classification, but differences were observed between? the Move-Locally and Move groups as indicated by the brackets at the top of the graph. Testing of individual factors across movement classifications revealed significant differences by movement group only for Social-Environmental factors. Those in the Remain, and the Move-Locally groups were influence more by social-environmental factors when compared to those in the Move group. A marginally significant difference was also observed within the Life-Stage factor, where those in the Move-Locally group were more influenced by life stage than those in the Remain group. No significant differences are observed within the Economic or Natural Environmental factor categories despite their visually distinctive looking representations within the graph.

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Binomial Logistic Regression Model

A binomial regression model was constructed using a base of five socio-demographic and economic variables, as well as an additional three variables derived from environmentally focused question responses. The goal was to test whether the addition of environmental variables adds predictive power to the migration model (move/remain). The final model predicted the intention of moving, and was statistically significant at the $p< 0.001$ level, ($\chi 2(8) = 50.382$), explaining 73.7% (Nagelkerke R^2) or 54.9% (Cox & Snell R^2) of the variance in migration intention. The final model correctly classified 90.2% of cases as intending to move or stay. In comparison, the base model without the three environmentally derived variables, accounted for between 41.3% and 30.8% of the variance in movement intention (Negelkerke R^2 and Cox & Snell R^2 values respectively), and correctly classified 74.8% of cases (Table 4.4). The addition of the three environmentally derived variables improved overall model performance. Model parameters and summary statistics are displayed in Table 4.5.

Table 4.4

Regression analytics between base and final models

	Cox & Snell R^2	Negelkerke R^2	Case Classification Accuracy	Hosmer and Lemeshow Test
Base Model: Demographic and Economic variables only	0.308	0.413	74.8%	Chi^2 18.857 Sig 0.16 df 8
Final Model: Inclusive of all variables shown in Table 1	0.549	0.737	90.2%	Chi^2 50.382 Sig <0.001 df 8

Table 4.5.

Regression Model Summary & Significance.

Variable	Variable Components	Coefficient	Standard Error
Independent Variables:			
Demographic			
Gender	Male (0)	-	-
	Female (1)	-1.674	1.203
%LiP	1-49% (1)	-	-
	50-69% (2)	-2.033	1.093
	70-89% (3)	-1.291	1.874
	90-99% (4)	-3.680 **	1.378
	100% (5)	-5.416 **	1.785
Children	Respondent not providing for any children (1)	-	-
	At least one child being provided for (2)	2.534	1.587
	Child/Children are grown / no longer living with respondent (3)	2.683	1.096
Education	Early education to some Highschool (1)	-	-
	Completed High School (2)	7.628 **	3.555
	At least some college (didn't finish) (3)	9.106 ***	2.466
	Completed College (4)	5.409 ***	1.873
	Completed college and some additional certification or graduate degree (5)	9.802 ***	2.216
Economic			
Income	$1 - $29,999/year (1)	-	-
	$30,000-$59,999/year (2)	-1.723	1.827
	$60,000-$99,999/year (3)	-7.847***	2.081
	>$100,000/year (4)	-0.989	1.464
Environmental			
EroTwoL	No (0)	-	-
	Yes (1)	-3.204 **	1.190
EvChange	Yes-Yes (1)	-	-
	Yes-No (2)	-0.817	1.330
	No-Yes (3)	0.919	1.116
	No-No (4)	9.268 *	3.580
PredInnac	Strongly Agree (1)	-	-
	Agree (2)	-5.296 *	3.190
	Disagree (3)	-8.812 ***	2.427
	Strongly Disagree (4)	-5.910 ***	1.735
	NA/Don't Know (5)	-1.470	1.553

Statistical Significance: {⩽ 0.001: '***'}; {⩽ 0.05: '**'}; {⩽ 0.10: '*'}

Of the base demographic variables: [*Gender, %LiP*, *Children*, and *Education*], significant differences were found for the *%LiP* [percentage of a participants life lived within Terrebonne Parish] and *Education* variables (Table 4.5). Individuals living 90-

99% and 100% of their lives in the Parish were 3.7x and 5.4x less likely to move relative to the reference category of people who had lived 0-49% of their lives locally. All *%LiP* variables had negative coefficients within the model, indicating that relative to the reference, individuals who have spent at least 50% of their lives within Terrebonne Parish were less likely to intend to move or leave the area. This is consistent with existing literature, where a similar 'age effect' is identified (e.g. Hauer & Jacobs 2022). All *Education* variables were significantly different from the referent category (Early education to some Highschool) and were associated with strong increases (between 5.4x and 9.8x) in the likelihood of an individual moving (Table 4.5). Individuals who completed High School had a 7.6x increased likelihood of moving compared to those with less education. The largest effects on movement intention, relative to the reference category, was found for individuals who had attended college but not completed their degree program (at 9.1x more likely to move), and those who had completed college and some postgraduate certification (at 9.8x more likely to move). An individual's level of education above a Highschool level was strongly related to a propensity to move (Table 4.5).

Income was negatively related to movement in the model, i.e. higher incomes were associated with staying in place. Only one of the three variable classifications [3] was significantly different from the reference category. Individuals earning a personal income of $60,000-$99,999/year were 7.85x less likely to move compared to those earning less than $29,999/year. Individuals within this income bracket demonstrate the strongest proclivity to remain in place compared to those in the other income brackets.

Individuals who expressed that erosion is/was impacting their way of life (*EroTwoL:* Erosion is a threat to my way of life) were 3.2x more likely to remain (not migrate) than those who stated erosion was not impacting their way of life. This finding is somewhat counterintuitive, and could suggest that individuals are making the decision to remain within the parish despite erosion affecting their life/livelihood. This indicates that while potentially devastating, the impacts of erosion could be an accepted part of the life for respondents who live and work within the parish.

Within the *EvChange* variable [has an event changed perception and/or movement intention of the respondent] only one variable classification approached significance when compared to the referent category; (yes-yes). This was the response category of no-no. Respondents with no-no answers were 9.3x more likely to migrate compared to the reference (Table 4.5). This signifies that individuals' who have <u>not</u> had their environmental perception(s) altered by experiencing an event, *and* who have not had a specific event(s) impact their movement decision are 9.3x more likely to move or have the intention to move, when compared to those who have experienced such a change in perception and event. No significant difference was observed between the reference (yes-yes) classification and the two intermediate classification groups (yes-no, and no-yes). This finding may seem counter to expectation. However, additional analysis of interview transcripts of respondents in the no-no group, identified that their decision to move may be due to other factors weighing more prominently within the decision – specifically job opportunities and retirement – as these decision elements are held onto firmly by some respondents and remain unchanged even if a disruptive disaster event is experienced.

This finding could also be the result of the wording of the survey question – questions asked about the impact/experience of a specific event. If the movement decision of the individual is not considered in direct response to an event, but rather more a reflection of their own holistic and longitudinal assessment of risk/life/livelihood etc, then such individuals would have answered 'No' as their mind is already made up and would not be altered by a momentary change of conditions. For example, one participant noted: "*Oh I've known for a while now that I'll move, I don't want to, but deep down I know it will happen, just quite haven't worked out where I want to go yet. But until I do it does not matter what happens here, no storm is going to kick me out early, that's for sure. I'll leave on my own terms, when I'm good and ready*" – Dan 58 year-old contractor.

Disagreement and strong disagreement with the statement that future predictions of environmental change within the parish are inaccurate [*PredInnac*] (so perceiving generally that environmental change is occurring, risk exists, and predictions made for the area are generally correct) were highly significant in the model and had negative coefficients of -8.8 and -5.9 respectively. Thus disagreement (agreement with future predictions) is associated with a nearly ~9x and ~6x reduction in the likelihood of moving away relative to the referent category (strongly believing future predictions are inaccurate) (Table 4.5). Respondents thus recognize environmental risks associated with staying. However, this belief is <u>not</u> predictive of intention to leave. Agreement that future predictions for the area are inaccurate was close to being significantly different (at $p<.05$ level) from the reference (strong agreement) and also had a similar reduction in movement propensity (-5.3x).

The juxtaposition of a perception of future predictions as correct and a reduction in the likelihood of movement is illustrated by the following quotations from interviews.

> "*Those people don't know what they are talking about, they don't know the area, they are sat in front of some big computer on the other side of the country thinking they can tell us what is going to happen. I don't believe it for a second. They have been wrong before, so why would I believe them now. … It could be another 50 years before that happens, and by then I'll be long gone, so why should I ruin the last years of my life*". Sam – 59-year-old tradesman.

> *"Oh sure I've seen the reports, I've even been to a few of those area meetings. The maps seem reasonable, and I guess their timelines do too. But what they don't account for is us. For me. For what the people down this way live for. For what we are capable of. Sure, things may look bad on paper, but whose to say what will actually happen? I'd rather enjoy my days here, maybe try to get involved in some local efforts, maybe that will make a difference, I don't know, I just can't see myself being happy anywhere else. This is my home. Not just the walls, the rooms, my husband, but well, everything. Changes and all, this is my home".* Sarah – 43-year-old office worker.

In sum, results definitively illustrate that the addition of environmental variables derived from social/cultural environmental factors improve the predictive power of the regression model. An age effect was identified within respondents, with those who had spent 90% or more of their lives in the parish being significantly less likely to intend to move. Significant increases in the likelihood of intention to move were found across all education variables when compared to the referent, and a significant decrease in the likelihood of migration intention was identified for respondents earning between $60,000-$99,999/year. Findings from across all three environmental variables were surprising and ran counter to wider expectations of how these factors would impact movement intention. Experience of erosion directly impacting a respondents' way of life was found to reduce the likelihood of migration (more chance of remaining in place), as

was acknowledgement that future environmental change predictions for the area were accurate. An increase in migration likelihood was identified for those who had not had their environmental perception(s) altered by experiencing an event, *and* who have not had a specific event(s) impact their movement decision While qualitative explanations for these findings were identified within interviews, additional and more in-depth investigation in needed.

Discussion

Predictions about the impacts of physical environmental and climatic change around the world are striking. Successive IPCC reports paint an increasingly stark picture of the potential for new environmental realities that coastal citizens will face by 2050 and beyond. Predictions for the numbers of 'climate migrants' vary, and are contested, but there is general agreement that this number will be in the hundreds of millions (Brown 2008; Kamal 2017; Warren et al 2006). While these predictions include displacement of individuals stemming from a number of stressors and risks, water stress, sea-level rise, and associated erosion and subsidence are major causes. There is general agreement at broad scales that change is occurring, and coastal populations are among those who will be impacted hardest, and fastest. Areas of northwestern Europe, the Pacific, and South Asia are already grappling with these new realities. Numerous studies and reports looking at possible trends globally have tended to focus on the Asian and African continents, for example; "By 2030, about 250 million people may experience high water stress in Africa, with up to 700 million people displaced as a result" (IPCC-Ch9 p148). Studies from India and Bangladesh are also common. Such risk profiles, brought about by change, are also

found within global north contexts, including the coastal United States. Yet investigations from Global-North contexts are markedly less numerous (see Cassegard et al 2017 for select examples), and what studies do exist are more often concerned with climate science research rather than environmental migration topics that are disproportionally addressed from Global-South contexts (Piguet et al 2018). The research presented in this chapter expands on this limited pool of research by focusing attention on domestic environmental migration in a coastal context, in the 'economically' developed Global-North.

The questions explored in this paper were; first, what kinds of information do residents draw on to inform and influence their migration decision, and second, how do socio-environmental factors, that take into account people's experiences of risk, impact individual level migration intentions. Migration literature as a whole has tended to focus on largely socio-demographic and [biophysical] environmental attributes – which populate models of migration predicated on the idea that mobility is not only possible but is the desired outcome. Within landscapes beset by risk – usually investigated in terms of biophysical environmental hazard exposure – little attention has been accorded to social or cultural environmental considerations that keep people in place. Similarly, this focus on drivers of migration ignores that not-migrating may be the desired outcome for many. This work sought to expand upon both these shortcomings by 1) including both *perceptions* of individuals as well as their socio-demographic *attributes,* and 2) actively exploring distinguishing features between those who intended to remain in place (despite risk) and those who intend to relocate. Migration *intention* is the focus of this analysis as

this project was not a longitudinal, or retrospective, investigation. Similarly, intention to migrate in a long-term / permanent capacity, rather than short-term evacuation from particular hazards, was the context of this work.

Influences on Migration Intention

The first question of the paper centered on connections between information sources and the level of influence sources have within the migration decision. Findings show that across all movement intentions, self-reflection and individual experience of local conditions are the most influential factors shaping intention to remain or to migrate. Wide variability in scores was observed for all influences tested, however, an inverse relationship between distance (geographic, mental, or otherwise) of information to the individual and its importance was consistently observed – influence declines with increasing distance. In general terms, 'Personal Level' sources (self-reflection and experiencing local conditions) had more influence than information from all other sources. Sources from 'Within Louisiana' had more influence than information from sources 'Outside of Louisiana', and information from leaders or general media was universally described as the least influential source of information on migration intention. Influence from this latter group of sources, however, was found to be significantly more influential for those who intended to remain – and not migrate. While no clear insights are available from the survey or accompanying interviews to help explain this result, it is possible that the directionality of influence (something that was not directly investigated here) is an important co-consideration. For example; were the information sources

exerting a ‘pushing’ influence, or a ‘staying’ influence relative to the final migration intention arrived at?

Researchers across a range of subject topics have identified examples of individual and community resistance to external messaging, media, and alarmist messaging about “existential environmental threats” (Weigel et al 2021, 43). This has been found in examples of; in-group versus out-group identity and status concerns (Harries 2008), the manner in which people anticipate impacts (Harries 2017), climate change adaptation (Artur and Hilhorst 2012), and disaster preparedness in Asia, Africa, and Oceania (Ayeb-Karlsson et al. 2019). The finding that more immediate and personally accessible information sources had higher influence scores aligns with this existing literature. In the case of Terrebonne Parish respondents, this finding could also reflect the tight social nature of these coastal communities (which also display deep rooted connection through multigenerational occupation), where those external to the area, let alone outside the state, “*would not understand how we do things down here*” (Charles 58 year-old interview participant). This finding is also largely consistent with the trust literature, which suggests that information sources that are known and trusted by the participant are more sought after when making impactful decisions (Wray et al 2006; Choi and Wehde 2020). While this research did not directly test a connection between trust in information and perceived degree of influence when migration decisions are made, findings are suggestive that such a relationship may be worth future investigation. Though variables in this study did display wide ranges of recorded influence (from no influence at all to extremely influential), patterns between proximity of influence to the

individual and influence types did emerge and thus affirm some previous findings about the value of more trusted information/information sources (Castelfranchi et al 2003; Wray et al 2006; Wachinger et al 2013). As well, the scale at which an information source is asked about is important, thus lumping potential influence types broadly may miss finer grained differences in influence scores. For example, by separating interactions with friends into 'Within LA' and 'Outside of LA' groups I am able to test the influence of interactions with friends at a finer grained scale than if 'interactions with friends' had been a singular category. The relationship between influence and the scale from which that source originates clearly warrants deeper investigation with a larger number of respondents, and even more refined influence scale designations, e.g. within parish, within state, within country – potentially better supported by constructs from kinship or social network analysis.

Migration Factors

Migration literature at large has emphasized the role of economic and biophysical environmental factors as direct causal factors in decisions to migrate. Economic factors, for example a job, can act as a push to move away – when employment is lacking, a pull to move away – when employment elsewhere is more enticing, or an anchor to remain in place – when employment is stable (Clark 2014; Akbarpoor et al 2015; Nguyen 2019). Almost unanimously, physical hazards are framed as reasons to move, yet emerging work is beginning to illustrate this traditional association is no longer as widely applicable as previously thought (Blondin 2021; Farbotko 2018; Mallick & Mallick 2021; Schewel 2020). In the work presented here, we found no significant differences in the level of

influence of economic and natural-environment factors across movement intentions (Figure 4.4). Instead, there were significant differences across movement intentions based on life-stage (marginally significant differences) and social-environmental (strongly significant differences) factors. This is consistent with findings by Wiegel and colleagues (2021), who analyzed environmental non-migration in Villa Santa Lucía upon the Chilean Patagonia:

> *…"Our case study of Villa Santa Lucía has shown that the local resistance to outmigration and village relocation policies is neither irrational, purely economically motivated or nostalgic behavior, but grounded in complex and profound considerations of maintaining people´s identity and relationships with their natural environment. Accordingly, local interpretations of the December 2017 mudslide and risk perceptions render leaving Villa Santa Lucía unnecessary. To the local population—in contrast to experts and authorities—the risk of another mudslide simply does not constitute a 'migration pressure' warranting the abandonment of their village"* (Wiegel et al 2021, 43).

Social-environmental perception of Terrebonne Parish residents includes tangible, and positive, aspects such as "home", "family", and belongings, but also intangible elements of place such as wellbeing, memory, attachment, and shared identity though shared experience (Till Dissertation Chapter 3). The range of experiences and expressions of social-environmental considerations by residents may be contributing to the significant differences identified between those who indented to remain in place and those who intended to leave the parish. The significant difference between those intending to relocate within the parish and those intending to move further away was also observed for the social-environmental variable, illuminating this variable as potentially diagnostic of movement intentions that are not traditionally captured by stay-go frameworks or expectations.

Modeling Migration Inclusive of the Environment

Our findings clearly demonstrate that inclusion of environmentally derived variables can improve the performance of a quantitative regression model – both improving the percentage of variability explained, and the percentage of cases correctly classified as intending to move or not. The three socio-environmental attributes included in the model were significant in determining movement intention, yet also illustrate the complex choices before residents. These choices include avoiding perceived risk (and moving or /relocating) or accepting perceived risk (and remaining in their homes). In this study the impact of erosion on an individuals' way of life is treated as an example of the complex relationship between a hazard and the wider, and more personal, experience of environment inclusive of social and cultural associations. The incorporation of non-hazard environmentally derived variables into a migration model, in a way that improves model performance represents a great potential unknown/unexplored domain for migration literature and predictive movement models. Until now, the hazards and disaster space has been the mechanism for inclusion of environment (al be it only in physical manifestations only) and incorporation into migration research contexts. Very occasionally social environmental considerations are made, though commonly context here is to utilize kinship or social network properties, such as a comparative project conducted by Lui et al (2017) investigating wellbeing between migrants and non-migrants between rural and urban environments in China.

The finding here is that, within a setting of indisputable risk exposure, and even acceptance of risk predictions, there is not a simple direct connection between

acknowledgement of that risk and intention to migration away from it. In fact, in the case of erosion threat finding emphasize the exact opposite: an identified erosion threat to a respondents' way of life reduced the likelihood of migration away from the parish. This finding, and an acknowledgement that there is not a direct positive correlation or causal link between risk and migration is in line with other emerging research (Blondin 2021; Farbotko 2018; Luis et al 2014; Mallick & Mallick 2021; Schewel 2020; Wiegel et al 2021).

Local-Level Strategies & Broader Impacts

There is little question that climate change can bring immense pressure to move. However, while migration is an accepted form of adaptation to this threat, it is often a last resort, and can have mixed results when it comes to the reduction of overall risk.

> "*People often do all that they can to stay where they are … that makes it difficult to get people out of the way of likely threats like wildfires or coastal flooding. People say that they're going to move, yet it's unlikely they will move unless they are forcibly moved in response to some climate-related extreme, like their home gets destroyed*" (Wong-Parodi as quoted in Irfan 2022).

However, for the many parish residents who took part in this study, even having their home damaged or destroyed by a flood or hurricane event was not enough to make them consider moving elsewhere. This reluctance to migrate also means that alternative strategies are explored, tested, and/or implemented to extend the potential time residents may have in their homes.

One such initiative is already underway in Louisiana – the managed relocation of those from the largely Native American communities of Isle de Jean Charles (Ferguson-Bohnee 2015). Other strategies found across the parish, and south Louisiana, include raising homes, as well as the regionally managed floodgate and levee system designed to protect more 'up-stream' residences. Select case study examples showcase local level initiatives, either incorporating climate change more actively into decision-making as is occurring in Vanuatu, or active programs working on local level relocation, which is one approach being used by the Fijian government. These examples are both "in-country solutions, not international border crossings" (Irfan 2022), and as such speak to the potential power of local-level, within-country solutions.

Eliciting a better understanding of types of communication that are influential in migration decisions and the role and function of environmental characteristics within the migration decision making process of coastal residents is increasingly important. Councils, emergency managers, and federal agencies all have invested interests in the well-being and lives of their constituents, yet our findings illustrate that influences from such entities may need to be reevaluated. This suggests changes in messaging styles, or expanding delivery methods to frame messages to local context. Scholars have already identified that how climate change mitigation strategies are conveyed matters. When mitigation is framed necessary for environmental reasons, actions are less effective than when national security or economic thriftiness frames are used (Rudiak-Gould 2016 p 263; Zang 2009; Lockwood 2011; Gromet et al 2013; CNA 2014; Gainous and Merry 2022). Nudging or peer-pressure/peer-support behaviors between individuals is likely to

have the largest potential impact yet breaking through that initial barrier of trust and acceptance of information may be the most important step. However, results from the regression analysis demonstrated that agreement with information relating to future environmental predictions of Terrebonne Parish had a counter-intuitive 'staying' effect for respondents. This highlights that efforts by community or regional leaders to simply 'get information out there' is insufficient to facilitate a 'move' intention.

Because the future of Terrebonne Parrish and LA coastal regions in 50 years is inevitably going to be more risky due to the influence of change, this suggests that the message of increasing risk continues to be important. More traditionally styled approaches when framing environmental risks mitigation are not futile. As Douglas and Wildavaky state "an individual cannot look in all directions at once" (1982 p9), so a risk framing allows for directional focus. Framing also helps to overcome the phenomena termed "choice paralysis" as discussed by Schwartz (2004). However, this research highlights that communicating future scenarios of change and risk is not enough. What will be important to consider in the coming years are questions such as; what frame is being used, how it is being used, and who is using it? Given findings of this chapter, increased engagement between residents and decision makers is key, but emphasizing risk alone is incomplete. Similarly, messages of resilience or adaptation are too narrow. A message that acknowledges risk while at the same time recognizing people-place connections as significant, and not something that is easily pushed aside, may be more likely to resonate and allow for further transformative development.

De Vries (2011, p21) states:

> "*For floodplain dwellers, decisions, evaluations, and evacuation plans are not based on forward looking rational projections, but on backward looking referential chains of temporality connecting the timing and occurrence of past events to cultural models of the environment in the present. … When the quality of temporal referencing back to past events is compromised, complacency sets in, and the ability of a population to recover from disturbance is reduced as emergency preparedness is lowered"*.

I would argue as well that migration decisions, inclusive of short-term evacuation decisions, made by Terrebonne residents are not only based upon 'looking backward', but are also very much forward-looking, self-determined decisions about how an individual is choosing to react to their [ever changing] surroundings and make choices in ways that are in keeping with the life they see themselves living. This is not complacency, nor is it a refutation of provided information about the current, or future, state of their surroundings, landscape, or region (as is suggested in some case studies, e.g. Costas et al 2015). Those making decisions to remain in their place, despite risk, do so for a myriad of reasons.

This research highlights the currently under-investigated significance of social-environmental influences within migration decisions of individuals living within a landscape designated by its leaders to be at-risk. Prior work in Terrebonne Parish has identified that aspects of perceived environment can act as both push or anchoring forces in framing the intention to move (Till Dissertation Chapter 2). Additionally, research has shown that many residents of Terrebonne parish have a nuanced, lived experience understanding of, and connection to, environment – inclusive of physical, landscape, cultural, and social features (Till Dissertation Chapter 3). As such, while significant

environmentally derived risk exists across the parish landscape inclusive of flooding, land subsidence, erosion, and hurricanes, for many such uncertainties appear largely as a 'taken-for-granted' inconvenience of living in an otherwise personally fulfilling place (Till Dissertation Chapter 3).

Conclusion

Conditions across Terrebonne Parish are transforming and increasing numbers of Terrebonne residents are grappling or will grapple with what it means to live their lives informed by risk within a landscape beset by uncertainty. While the conditions, history, and people of the parish make the context of this study unique, the overarching topic of how residents make movement decisions, including the decision to remain, is relevant for coastal areas globally. Understanding where and when environmental factors (defined holistically to include biophysical and cultural aspects) are considered within the migration decision making process, and how environmental factors interact with, or influence, other aspects of a decision is increasingly critical. While reliable food supplies, strong anchoring forces, and connection to place may have kept coastally adjacent peoples and communities "home" and sustained residents in the past, the ever-increasing challenges brought on by environmental changes, as well as human-caused impacts (both deleterious and protective), mean that more and more people will consider relocation: either in their lifetime, or for future generations. To borrow from Ionesco and colleagues "An individual's decision to migrate is determined by a number of personal factors … in particular, it directly depends on each person's perception and the interpretation of environmental risks (2017 p66). Thus, insights on critical influences involved in these

decisions have the potential to inform not only migration theory, but also the intersection of information source and trust within contexts of risk. These questions are not just academic. They have the potential to change the way those who actively choose to remain in place are viewed by decision makers in positions of power, whose organizational mandates may be structured to focus on migration as the desired outcome. The findings presented in this research are directly relevant to residents and leaders of Terrebonne Parish, yet are relevant to areas outside of the Parish facing similar challenges, both within the US, and beyond.

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CHAPTER 5

SYNTHESIS, IMPLICATIONS AND FUTURE DIRECTIONS

Climate change research increasingly calls for complex analyses inclusive of diverse, interdisciplinary perspectives and understanding of the challenge as a super wicked problem (Levin et al 2012). This dissertation sought to analyze two main questions related to climate change, specifically within the context of domestic migration decision making for those residing in at-risk coastal locations of the USA. I sought to understand what exactly *Environment* meant to US Gulf Coast residents, and then queried how such perceptions of *Environment* play into movement intentions. The latter question included those whose intention may be to leave and to remain in place despite the actual or potential experience of risk. An additional group emerged from the research, individuals who intend to move, but locally.

The results of this study increase understanding of how people in coastal locations perceive their environment. Findings emphasize that perceptions extend well-beyond traditional biophysical characteristics. Environment is much more than the landscape on which an individual lives and the climatic conditions that are experienced. As well, individuals living within risky coastal locations seem to internalize environment as both background element or a central character in life. Policy and decision makers would benefit from a more holistic appreciation of environmental characteristics held by their constituents. By studying the environment more holistically, and by directly investigating those whose migration intention is NOT to migrate, to borrow phrasing from Ionesco et al

(2017 p64), I *am* able to build a more complete panorama of contemporary migration. This perspective adds socio-cultural framings to environmental components, which are outside of traditional climate metrics or hazard assessments, but do impact intentions to stay or go in contexts of risk.

In this conclusion I will first present an overview of the major empirical and theoretical outcomes of the data chapters. Next, I will briefly discuss the wider implications of this research for Terrebonne Parish, the US Gulf Coast, and in more general terms, global coastal populations. Finally, I consider project limitations and address some research directions to consider in the future.

Summary of Major Chapter Contributions

In **Chapter 2**, I find that a significant proportion of Gulf Coast respondents planned to remain in place even as environmental changes continue, and that under-appreciated social and cultural elements of environment play a significant, and positive, role in anchoring people to place. This chapter consisted of data from three locations along the Louisiana coast. Sampling was opportunistic and sample sizes were relatively small. However, findings did highlight a juxtaposition of perspectives and robust (sometimes contradictory) conceptualizations of environment within coastal places that are hazard prone, yet meaning rich. Findings showcase that economic and environmental factors were important both for those staying in place or intending to leave. This result emphasizes that migration policy which primarily highlights economic opportunities associated with

moving, ignores substantial social and place-based costs for residents who go. Environmental features may push some residents to move, or consider moving, while others latch onto that same feature as a point of connection or pride that anchor them to remain. Despite the small sample size by location, the chapter represents an empirical first step in exploring robust non-economic and non-physical understandings of *environment*. As well, the paper addresses neglected migration topics of, 1) non-migrating individuals, and 2) coastal migration within a domestic Northern context.

In **Chapter 3**, on the basis of a much larger, and geographically consistent, sample, I quantified '*what is environment*' at a foundational level and introduced a novel application of scale to explore perceptions of environmental change and connectedness to certain landscapes. I find that biophysical environmental risk from coastal erosion is widely acknowledged by Parish residents at state, parish, and personal impact scales. However, this did not overly contribute to a negative affective experience of *their environment*. I expand upon findings from Chapter 2 and find that perceptions of environment extend well-beyond traditional biophysical concepts to include cultural, social, and other human-engaged characteristics of place. The prominence of 'Family' and 'Home' as environmental terms identified first by participants, speaks to the salience of these features in conceptualizing the environment.

While framing humans as connected to their environment through language like 'coupled human-natural systems' (Turner et al 2003) is not new to the wider global change literature, this language continues to implicitly maintain the human-nature

separation – particularly when coming at environment from a hazard context as is common in coastal locations. These results challenge the assumption that environment is exclusively a natural, biophysical, climatological, and geospatial construct that negatively affects those who experience it. Despite residing in a geographic space beset by slow and fast on-set hazard events, stemming from both natural and anthropogenic causes, residents had an overwhelmingly positive relationship with their environment and its components. Results additionally highlight that understanding what environment is, is incomplete if more socially conceived environmental features are excluded.

Qualitative analysis of interview data brought out more nuanced understandings of how Terrebonne residents contextualize environment features identified as important. Residents discussed environment in close, proximal terms, as central to their experience of living on the coastal, and in distal terms, in many cases backgrounding environmental hazards as part of normal life. Some residents navigated and personally minimized risk by emphasizing alternative environmental components – usually social or cultural characteristics – that they expressed to be of greater importance. A few residents described hazards and the same risk-mediating elements as having the opposite effect. Living with storms and uncertainty had ultimately pushed them past their internal tolerance thresholds. These results illustrate that adding scale to a consideration of environment and change was value-added for this dissertation. Quantitative analysis of Sense of Place constructs at the scale of Home, Bayou and Community was used as an additional methodological lens to investigate connections between people and their places. Connection to place, and by association connection to *environment*, emerged as strongest at the scale of the Home,

especially for the SOP constructs of *Dependence* and *Attachment*. I suggest in Chapter 3 that this connection between Home-Place-Environment may explain in quantitative terms why residents of Terrebonne Parish, and more generally of South Louisiana, are so collectively reluctant to leave their homes – even when faced with undeniable risk and change.

Chapter 4 centered on migration intentions of Terrebonne Parish residents. It had two major emphases; first it contained a focused assessment of the types of influences that parish residents consider in forming intention to migrate, and second, used logistic regression to directly test a set of established socio-demographic and economic attributes and novel environmental attributes for predicting migration intentions. Personal level influences were more important within the migration decision, regardless of if the intention was to remain in place or relocate. The regression found no support for economic factors as predicting movement intention to stay or go, and some risk-derived environmental variables were demonstrated to have a 'staying effect' rather than supporting the intention to move – a finding which runs counter to established migration literature. Life-stage and social-environmental factors were significant and strong predictors of migration intention. Inclusion of environmentally derived variables improved the performance of the quantitative regression model – both increasing the percentage of variability explained, and the percentage of cases correctly classified as intending to move or not. This chapter highlights the currently under-investigated significance of social-environmental influences on migration decisions of individuals living within a landscape perceived by resident's, and designated by policymakers as risky.

Synthesis of Theoretical Contributions

Environmental anthropologists are directly investigating climate change in the context of human-environmental systems. For example, Pokrant & Stocker made significant contributions to climate change research through their investigations of coastal adaptation responses in coastal Western Australia and Bangladesh and continued emphasis that anthropology has an important role in transdisciplinary approaches aimed at assisting coastal populations to adapt to the impacts of climate change (2011 p118). Hirsch et al (2011) explored sociocultural viewpoints about climate change within urban Chicago and made the observation that change frequently has a "popular dimension informed by mass media, political interests, and global opportunities and markets", yet it is vitally important to "look at climate action as a culturally relevant and historically situated local concern" (Hirsch et al 2011 p.293). Local concern is the key message here. Local, personal-level, proximal perceptions of environment and hazard experience appears to be highly effective in engaging individuals in discussions of environment and environmental change. Additionally, findings from Chapter 4 suggest that it is the personal level at which influence is most exerted when undertaking a migration decision.

Migration decisions may result in the intention to move or relocate, yet a critical finding of this work is that many coastal residents intend to remain. Staying heightens risk exposure, as well as creates tensions – not only between those who remain and those who leave, but also between those who remain and local decision makers, emergency managers and first responders who then become responsible for residents because they 'are still

here'. In such instances locals may have greater adaptive capacity in the form of place-based knowledge and generational learning (Hu & Chen 2016; Simms 2017). This dissertation additionally highlights that local, known, and personal sources of information were more influential on movement decisions. While a direct connection between these proximal influences and trust was not tested in this work, the existence of such a connection is supported by the wider literature. Trust in local sources of information could be critical for understanding movement intentions of coastal residents. One theoretical lens not used in this dissertation, but connected to values-intention-behavior relationships is the Theory of Planned Behavior (TPB) (Ajzen 2020). The TPB differs from its predecessor, The Theory of Reasoned Action (Ajzen 2020 p316), through the introduction of the concept of control. The reasoned action approach was limited due to an intended outcome not being reached due to fluctuations in control. The TPB by contrast "postulates that the extent to which people believe that they have control over behavioral performance could moderate the effects of attitudes and subjective norms on intentions*"* (Ajzen 2020 p316). There may be opportunities to synthesize the qualitative and Sense of Place approach to migration decision making taken in this dissertation with a TPB approach. Future exploration of influence, information, trust, attitude, and behavior attributes related to migration decision making of coastal residents could yield interesting insights into the complex relationship of perception-risk-and control that is present within these risky landscapes.

There is one important caveat to findings emphasizing strong people-place connections and intentions to remain that were expressed by many residents. The study

sample misses individuals whom have already chosen to leave. The mode of time in place for the study sample was five generations of residence in the Parish, and this group by definition represents residents who skew towards staying, and under-represents those whose risk threshold may have already been exceeded – and so they have already left. The attachment and occupation identified within study participants is unique to this coastal setting. In comparison to many more metropolitan areas around the US, multigenerational knowledge of places within families to the extent observed within this research is notable. But how many others may have already left is an important question to consider.

For those intending to stay, another consideration is the resilience implied in finding meaning in life when ones' existence is predicated on the navigation of environmental precarity (Aijazi 2015). As stated by Kurtz:

> *"There are several characteristics of resilience that are nearly universal, however, and although researchers differ in their presentation, three essential themes can be identified: (a) resilience is a property of a system, but not the only property; (b) it is the property which allows a system to recover from disruption through persistence and/or re-organization; (c) this recovery may lead to either a return to the previous, pre-disruption state, or the creation of a new stability." (2017 p.12).*

This latter point, and specifically the idea of either returning to the previous ideal of normal, or finding a new plateau of "normal" is something explored recently in the edited volume "*Migrations & Disruptions*" (Baker & Tsuda 2015). Many Terrebonne Parish residents spoke of change and hurricanes as expected aspects of life, without an assumption of stability.

A new normal is also something that is a pressing concern for the findings of this research. All data was collected before hurricane Ida, and before the COVID-19 outbreak, and thus what was considered to be the ideal of normal in 2019 at the time of this study, may no longer be true. Yet, this is the reality of change on the US Gulf Coast. It is a concern that due to the pace of change outstripping the pace of research, there is not enough time to try to understand patterns of change and its implications for people (Brondizio 2016 p121). The findings and conclusions of this dissertation project represent a distinct historical moment of personal environmental experience and perceptions of Gulf Coast residents. How will decisions change as predicted conditions on the US Gulf coast intensify?

Findlay states that "the most likely effect of environmental change over the next 50 years will be to amplify and modify pre-existing migration channels, and that it is these that will shape the pattern of migration" (2011 p.S57). Until very recently there was limited scholarly focus on the "expected large scale human migration that would result from climate change" (Hastrup & Olwig 2012 p7). One potential reason for this is that addressing this topic requires linking two different scholarly traditions: the social sciences and the natural sciences (Hastrup & Olwig 2012; Piguet et al 2010). As addressed in the discussion of Chapter 4, there is direct need for these two scholarly traditions to join forces and put their collective epistemologies to use in addressing the climate questions facing humanity. Migration is one such concern for a world experiencing environmental change at a rate heretofore unexperienced by modern humans. Will it be existing migration channels that will shape future migration patterns over the next 50 years? Given

that the majority of our understanding of migration comes from international contexts, and dominated by economic or political factors, domestic migration pathways from coastal locations may well be "something new". For the residents of Terrebonne Parish, there do not seem to be established migration channels. Many respondents could trace their ancestry back four, five, or more generations to the same area. Other than short term evacuation movements (which are not widely adhered to), there is no established history of mobility for many residents. What these migration choices will look like is an interesting future question.

If our understanding of migration were to be better informed not just by inclusion of environmental considerations (inclusive of positive biophysical and social characteristics), but also by investigating non-migration as a key outcome, then our ability to predict future migration trends will improve. Such an ideal is slowly looking possible. More studies from more locations globally are tackling these very questions. This direction leads to a more inclusive and environmentally informed understanding of migration decision-making on the front lines where biophysically derived environmental challenges test the resolve of those who call such locations "*Home*".

While new studies are emerging in this space of risk, non-migration, sense of place as anchoring factors, we as researchers are in a battle against time. There is already concern that the pace of observable change is starting to outstrip our collective capacity to understand change, let alone adapt or mitigate it. Also of great importance is the application of such research findings to inform policy, and for that policy to in turn have

time to make a difference. The political discourse around acknowledgement that climate change is occurring at an accelerated rate and that humans are the cause, already exemplifies how slowly robust scientific knowledge can be accepted by policy leaders. We face a future where we do not have 50 years to enact a policy to enable longer term habitability of coastal areas, and frame messages about risk and migration that are aligned with the values of residents. The actionable timeline may not even be 10 years given current predictions that the US will see an much sea-level-rise over the next 30 years as it has experienced in the last 100 (NOAA 2022). As mentioned in Chapter Four, there is no analog in the entirety of human existence for the changes that coastal regions are now experiencing. Likewise, there are few analogs for a rapid the research-to-policy-to-action pipeline. Development of a COVID-19 vaccine might be an exception here. There are few 'best examples' to build from or mimic, and many existing adaptation plans or resilience strategies are not living up to their promises.

It is in this context that the idea of "Transformative Change" is critical (Few et al 2017; Termeer et al 2017; Vermeulen et al 2018; Granberg et al 2019; Novalia & Malekpour 2020; Leonardsson et al 2021). Transformative change stems for the notion that there are no analogs to build from, so new transformation processes are required. This includes new ways of thinking and creating 'outside-of-the-box' research-policy-action processes to address humanity's challenges.

> *"Coherent responses to important problems such as climate change require involving a multitude of stakeholders in a transformative process leading to development of policy pathways. The process of coming to an agreement on policy pathways requires critical reflection on underlying system conceptualizations and commitment to building capacity in all stakeholders engaged in a social learning process"*
> (van Bruggen *et al* 2019).

One critical part of transformative engagement is facilitating diverse groups of stakeholders across multiple jurisdictional levels to explore adaptation problem spaces using real data in ways that facilitate investigation of *what-if* scenarios. Based on the findings of this dissertation, the data used in these what-if engagements should integrate both physical hazard and risk data and include social science findings that engage with place meaning and socially resonant aspects of "environment".

Scenarios processes range from simple thought exercises to incorporation of increasingly nuanced computation and visualization tools or models (van Bruggen et al 2019; Head 2020) used for immersive exploration such as that seen/experienced in the Decision Theater within Decision Center for Desert City in Tempe Arizona (Larson et al 2013). This and other approaches must scale up rapidly to include the perspectives of regular citizens who want to be engaged about their future in places where risk is common, but connection to places are strong. In engaging with these perspectives, emergency managers as well should become better versed in how to communicate both risk and the push-anchoring forces experienced between people and their places.

Limitations & Future Directions

Limitations on methos and data.

As noted in the introduction to this document, all field work, data collection, and data coding and analysis was conducted and completed exclusively by the author. This allows for a richer understanding of the data. However, inter-rater reliability testing during data coding was not applied. This also has limitations for the papers presented here. As I did not have co-team members while in the field I was limited in terms of my time and locations. I could not be in multiple places at once, so while the dataset was robust, there was a limit. There was no one available in the moment to bounce ideas to. Having a larger field team would have facilitated distribution and collection of additional surveys and would have facilitated completion of more interviews. While I am proud of the 123 surveys and 67 interviews successful completed, when it came to data analysis, especially for Chapters 3 and 4, a larger sample size would have likely improved the power of the testing and analysis performed.

There are sources of bias in the findings and conclusions of this dissertation. The focus of the field work and research was to study migration intention. The project was not longitudinal and therefore did not capture the actual act/occurrence of migration. I surveyed and interviewed parish residents who had lived within Terrebonne for at least one year. Despite numerous previous hurricanes, floods, storms, and other risks, threats, disasters, or life events, participants were still “Terrebonne Parish Residents” at the time of field work. Capturing real-time migration decisions is something that I would

personally like to follow up with in the future, it is not something that was possible during the graduate project as planned. However, since the 2020-2021 COVID-19 pandemic and a general increase in familiarity with and accessibility of video communication platforms such as zoom, it may be more widely acceptable to connect with research participants digitally rather than physically. Thus, following up with respondents who indicated an intention to move (to see if it was followed through with), as well as those who had indicated they would never leave (to see if indeed they are still holding to that intention given recent hurricanes) would be a potential future research project.

A larger sample size would have also allowed for greater inclusion of under-represented groups. The distribution of age, occupation, and movement intention in the final data set was robust. Interview sampling attempted to maximize variability across socio-economic groups and wealth status, but there are still some attributes that were proportionally over-represented in the sample. This includes those in higher educational attainment brackets and with higher incomes. This unintentional over-sampling may have been the result of the 'new-comer' effect, in that those with such attributes may have been more interested or wanted to engage with my work and thus were more forthcoming.

A further limitation is the inconsistent nature of the data collection – specifically relating to the surveys. Surveys were either administered by the PI (the PI was present when the survey was completed and filled in, and either aided the respondent or filled in answers on the respondents' behalf) *or* the survey was distributed, filled in by the respondent away from the PI, and then collected at a later time. While all respondents

were free to ask questions or contact the PI at any time, there were notable data challenges in the distributed surveys that could have been avoided if all surveys had been administered in person. I followed up when possible to mitigate this issue. Two sections were greatly impacted by this completion difference. The first was the demographic question relating to the race/ethnicity of the respondent. In an administered setting the PI was able to explain the question and help facilitate collection of the appropriate information. In the distributed setting a notable number of responses came back in a format that was not fully complete, as many respondents had provided ancestry or nationality data. While a race and/or ethnicity response could have been imputed by the PI in some cases, this would not have been consistent enough for the data set as a whole. This resulted in data from this question not being utilized for analysis. The second issue was respondents' self-selecting on sections of the survey to complete. As can be seen in the survey included in Appendix D of this document, there were two mutually exclusive sections at the end of the survey document. One was intended for an individual who did not intend on leaving/moving, and the other for individuals who did intend to move. It was the intention of the PI that identifying a section to fill in would be determined by an individual as perceived by their started answer provided on page two of the survey. Respondents were also prompted with the following text:

~ Movement focused questions are on the next pages ~

If you intend to stay in your current home, please answer the questions on pages 13-14

If you intend to move, within or outside of the parish, please answer the questions on pages 15-16

Within the distributed group of returned surveys there were a notable number for which the respondent had answered the first set of questions while they had indicated they would move. In all cases, this move was local – within the parish – and is likely a byproduct of the respondent not internally conceiving of that move as "moving", or as migration. I was able to adjust answers based on imputing from prior responses in some cases. In others, respondents were re-contacted to correct their responses by filling in the intended survey section. If adjustment or correction were not possible, the survey was deemed to be invalid and no data from it was included in the analysis phase.

Having worked with my survey instrument, and the data it generated over the past three years, I can attest to the fact that there is much room for improvement in the survey. An alternative future direction would be to further develop the survey instrument and further streamlining questions. For example, questions were asked to probe if participants were providing for children / had children. It did not ask about current parents or individuals older than the participant who the participant may be providing for or otherwise tied to. An emerging topic of conversation about migration intention for some respondents was if their parents where still living within the Parish, and if the answer was yes this often had a 'staying' effect. Such side-bar, yet potentially impactful, observations were not captured by the survey instrument incorporated into this dissertation. Additionally, as indicated by the findings of Chapter 4, two of the established metrics for capturing the SOP construct of Identity produced very mixed results. Further refinement of questions, and targeted testing of new SOP metrics may be needed to adequately capture the constructs of *Identity* from Parish residents.

Digitizing the survey distribution of any future project is a must. While the experience from the pilot work had indicated that success would be better with a hard copy survey – due to access to technology/internet concerns – it became apparent that only having a physical survey was discouraging to some potential participants who would have rather filled in an on-line form. Such an alteration to the survey distribution could also likely aid in greater respondent recruitment, thus boosting the overall survey response rate of any future work.

Likewise, an expansion of the geographic scope of the sampling frame could greatly improve a future project. The main field project presented in this dissertation was restricted by a sampling frame restricted to the geographic and administrative border of Terrebonne Parish. Neighboring areas were excluded, as were individuals who worked in Terrebonne, but lived in neighboring parishes. A future project less focused on administrative boundaries, and more aligned with the natural geography of the Gulf Coast, or other social divisions present, could provide more insightful data.

Future Research Directions

This project took place before hurricanes Laura, Delta, and Zeta (2020), and Ida (2021), and before the impacts and consequences of the COVID-19 pandemic. Each of these events, and others not mentioned, have likely drastically changed the perceived environment of parish residents. The data presented in this document represents a snapshot from a particular period of time. A temporal view on these changes would be a valuable contribution to the literature on migration, sense of place and risk.

A longitudinal study of Terrebonne Parish is one possible future direction that this work go. A longitudinal investigation where I followed up with previously recruited respondents would shed light on the relationship between migration intention and result. The research presented in this dissertation was invested in understanding environmental perceptions, and their role in migration decision making. However, the data used in analysis was migration intention to move in the near or distant future. Follow up interviews with these participants to investigate if they did indeed migrate and explore reasons for that decision retrospectively would be valuable. Likewise, following up with participates from the 'never-move' group to see if their intention changed would highlight factors that pushed them across their threshold from stay to go.

Significantly, the unit of analysis for this dissertation is the individual. This is both a strength and a weakness. Future investigation of different strata within the Parish – household – organizations/businesses – emergency managers – decision makers – would be of great significance. While the findings of this dissertation are clearly relevant to decision makers, this connection between environmental perception and stakeholder priorities for managing risk among their constituents was not directly investigated during this project. Targeting different levels of stakeholders from across the Parish or across the Gulf Coast region, with questions pertaining to environmental perception, risk, and decision making would broaden overall understanding of the range of perceptions present across these stakeholder types. This approach would highlight areas of overlap in messages, or gaps in understanding of risk, or perceptions of environment as hazard, or place of belonging. An updated meta-analysis of recent literature involved with

environmental change planning, migration and human mobility in response to [environmental] change, and resiliency and immobility would also be an excellent starting point for future research.

It is my intention to distribute the main findings of this dissertation back to the communities that led to its creation. A shorter, more digestible and lay-person accessible document (an Executive Summary) will be developed for distribution to respondents, local stakeholders and agencies. Initial connections and discussion with emergency managers in Terrebonne Parish will be a conduit for results of the dissertation. Respondents themselves made it clear during the research phase that they would be looking forward to "*seeing how things pan out*" or made reference to "*wanting to see what you could do with all the stories and words you have been collecting*". This giving-back is something that I greatly look forward to.

During such visits I will engage with groups of local residents' to more broadly present findings and in doing so ask if they resonate with people's lived experience in the Parish. Such 'member checking' activities are critical to determine if the findings of this small project are more broadly representative of the parish. Similarly, it could be interesting to present findings outside of Terrebonne and test if the main findings are still relatable to other Gulf Coast residents/parishes/counties. Local leaders and decision makers are engaging with the topics addressed in this dissertation and working with their constituents on issues of great common concern. There is potential power in collecting and communicating the perceptions and words of coastal residents who hold different

perceptions and different internalizations of *Environment* in landscapes that are changing day by day.

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APPENDIX A

CO-AUTHORS PERMISSION

The article presented as Chapter 2 within this dissertation is currently under review for publication. At the time of submission of this dissertation it has yet to be formally accepted.

For publication, this work is co-authored by myself, Charlotte Till, and my adviser, Shauna BurnSilver.

The content of the work and all research performed are my own. All co-authors have granted their permission for this article to be included as a chapter within this culminating document.

Charlotte Till
Nov 8th 2022

Shauna BurnSilver
Nov 8th 2022

APPENDIX B

IRB APPROVAL & EXEMPTION FOR RESEARCH PRESENTED IN CHAPTER 2

EXEMPTION GRANTED

Shauna BurnSilver
Human Evolution and Social Change, School of (SHESC)
480/965-5592
Shauna.Burnsilver@asu.edu

Dear Shauna BurnSilver:

On 6/2/2017 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Pilot project. Environmental perceptions and migration propensities: How emic environmental perceptions fit into migration decision making frameworks.
Investigator:	Shauna BurnSilver
IRB ID:	STUDY00006338
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Demographic and Personal Questions, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Interview Question Pool, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Protocal, Category: IRB Protocol; • Consent Form, Category: Consent Form; • Survey Questions, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 6/2/2017.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Charlotte Till
Shauna BurnSilver
Charlotte Till

APPENDIX C

IRB APPROVAL & EXEMPTION FOR RESEARCH PRESENTED IN CHAPTERS 3 AND 4

EXEMPTION GRANTED

Shauna BurnSilver
Human Evolution and Social Change, School of (SHESC)
480/965-5992
Shauna.Burnsilver@asu.edu

Dear Shauna BurnSilver:

On 11/27/2018 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Environmental Perceptions and Migration Decisions in Terrebonne Parish, Louisiana: Insights from an At-Risk Area
Investigator:	Shauna BurnSilver
IRB ID:	STUDY00009200
Funding:	Name: NSF: Directorate for Social, Behavioral & Economic Science (SBE), Grant Office ID: FP00017186
Grant Title:	FP00017186;
Grant ID:	FP00017186;
Documents Reviewed:	• Interview Questions, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Flyer, Category: Recruitment Materials; • Protocol, Category: IRB Protocol; • Token, Category: Recruitment materials/advertisements /verbal scripts/phone scripts; • Pile Sorting, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Survey Questions, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • NSF DDRIG Proposal, Category: Sponsor Attachment; • Survey Consent, Category: Consent Form; • Interview Consent, Category: Consent Form;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 11/27/2018.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,
IRB Administrator
cc: Charlotte Till
Shauna BurnSilver
Charlotte Till

APPENDIX D

SURVEY INSTRUMENT

Questions and question order are identical to the original survey used in Terrebonne Parish. Some spacing and formatting changes have been made in the version below in accordance with page formatting guidelines of this dissertation document.

Interview Identification Number:

_____

filled in by the researcher

Gender:

_____

Ethnicity:

_____

Race:_____

Age: _____

Current Occupation:

_____

Highest level of formal education obtained*:

_____ *how far in school did you go?

Tear-off line Tear-off line

Do you consent to being contacted for participation in the follow-up interview component of this study?

Yes ( ) No ( ) – if No, there is no need to fill in the information below

Interview Identification Number:

_____

filled in by the researcher

Name:

_____

Last First

Preferred Name (if different from above)**:**

_____

Phone Number:

_____

E-mail: (If you use e-mail)_____

Address: _____

Interview Identification Number:

_____

Which of the following statements about the accommodation in which you currently reside best describes your situation?

( ) Renting – from a landlord who is related to me
( ) Renting – from a landlord who is not related to me
( ) Own my house – currently paying off mortgage
( ) Own my house – no longer paying off mortgage
( ) Living with friend
( ) Living with family member
( ) Other, please specify:_____

Length of time spent living at your current address:_____

Total length of time spent living in Terrebonne Parish:

Years Months

Which of the following statements best describes your current residence plan?

( ) I do not intend to leave my home in this area as long as I live
( ) I intend to leave my current home, but stay within the local area
( ) I intend to leave this area at some point in the near future
( ) I intend to leave this area at some point in the distant future
( ) I am currently in the process of leaving this area
( ) I do not want to leave this area, but feel that in the future I will be forced to leave
( ) Other, please specify: _____

Please indicate which of the following situations best describes you:

( ) Living alone
( ) Living in a stable relationship, or married
( ) Living with other family members
( ) Other, Please specify:_____

Please indicate which of the following situations best describes you:

( ) I have no children that need to be provided for in my household
( ) I have at least one child to provide for in my household
( ) I have at least one child to provide for, but they do not live with me
( ) My children are grown. I no longer provide for them

If you indicated above that you have children, how many do you have:

_____

How old are your children?

Child 1: _____

Child 2: _____

Child 3: _____

Child 4: _____

Additional Children:

_____

Did you grow up in Terrebonne Parish*?

Yes ( ) No ( )

Is your family (in at least some part) from Terrebonne Parish*:

Yes ( ) No ( )

If you answered Yes to the previous question, please indicate the following*:

( ) My mother, or mothers side of the family, is from Terrebonne Parish

( ) My father, or fathers side of the family, is from Terrebonne Parish

( ) Both sides of my family are from Terrebonne Parish

Do you know how many generations of your family (including yourself) have lived in this area? If so please describe this below. (*Area could be the Terrebonne Parish, Louisiana, or US Gulf Coast, please note*).

_____

_____

**If you answered No to the previous question, could you please tell me briefly what brought you to the area and when?*

_____

_____

_____

_____

Other than for school, or short holidays, have you ever lived for an extended period of time in another parish or county within the US?

Yes ( ) No ( )

If Yes, what other area(s) have you lived in, and for how long?

_____

_____

Other than for school, or short holidays, have you ever lived for an extended period of time in a country other than the US?
Yes ( ) No ( )
If Yes, what other country(ies) have you lived in, and for how long?

_____
_____

Are you CURRENTLY directly involved with any community organizations or groups in your area? Examples of these can include school groups, church groups, sports clubs, or volunteer organizations.
Yes ( ) No ( )
If you answered Yes to the previous question, could you please provide examples of the organizations you belong to or work with.

_____
_____

Have you been involved with community organizations or groups in the past but are no longer active in your involvement? Examples of these can include school groups, church groups, sports clubs, or volunteer organizations.
Yes ( ) No ( )
If you answered Yes to the previous question, could you please provide examples of the organizations that you have been previously involved with.

_____
_____

Which of the following best represents your CURRENT PERSONAL financial earnings situation?
( ) < $10,000 / year
( ) $11,000 - $29,000 / year
( ) $30,000 - $59,000 / year
( ) $60,000 - $99,000 / year
( ) > $100,000 / year

How content are you with your current financial situation? 1-Very unhappy, 5-Extremely content
1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )

If you would like to briefly explain your answer to the previous question, please do so here:

_____
_____
_____

How do you receive LOCAL / COMMUNITY NEWS & INFORMATION?
Please mark all that apply. Please leave blank any sources that you do not use.
( ) Printed newspapers: please specify_____
( ) Notice boards, posters, or leaflets: located where_____
( ) Printed news magazines (such as TIME or The Economist): please specify_____
( ) Online newspapers: please specify_____
( ) Online news websites: please specify_____
( ) Television: please specify program(s) _____
( ) Cable: please specify program(s) _____
( ) Radio: please specify station(s)_____
( ) Social media: please specify platform(s)_____
( ) Consumer magazines / Popular magazines / Tabloids: please specify_____
( ) In person conversations
( ) Other: Please specify
_____

Of the information sources you indicated above, what is the source of LOCAL NEWS that you utilize the most often, and why?

_____
_____
_____

BLURB "Now, I would like to ask you a few short questions like those you might see on a television game show. Most questions will be true or false. If you are not sure of an answer, please let me know, or tell me you are guessing. We can skip to the next question".

The center of the Earth is very hot.
True, False [don't know, refuse to answer]

Does the Earth go around the Sun, or does the Sun go around the Earth?
Earth around sun, Sun around earth, [don't know, refuse to answer]

The continents on which we live have been moving their locations for millions of years and will continue to move in the future.
True, False [don't know, refuse to answer]

All radioactivity is man-made.
True, False [don't know, refuse to answer]

How long does it take for the Earth to go around the Sun?
One day, one month, one year, something else, [don't know, refuse to answer]

Electrons are smaller than atoms.
True, False [don't know, refuse to answer]

Lasers work by focusing sound waves.

True, False [don't know, refuse to answer]

It is a father's genetic material that decides whether the baby is a boy or a girl.
True, False [don't know, refuse to answer]

Human beings, as we know them today, developed from earlier species of animals
True, False [don't know, refuse to answer]

Antibiotics kill viruses as well as bacteria.
True, False [don't know, refuse to answer]

BLURB. "Thank you for that. Now I would like to ask you some questions focused around Louisiana generally, and Terrebonne Parish specifically. There are no right or wrong answers, I am interested in your opinion and perception.

How concerned are you about coastal erosion in Louisiana?
Very Concerned, Somewhat concerned, Not at all concerned

How concerned are you about coastal erosion in Terrebonne Parish?
Very Concerned, Somewhat concerned, Not at all concerned

Are you aware that Louisiana has developed a coastal master plan?
Yes No

***How confident are you that the coastal master plan will be managed effectively?**
Very confident, Somewhat confident, Not confident at all

***How confident are you that the coastal master plan will succeed?**
Very confident, Somewhat confident, Not confident at all

* only ask if participant answered yes to the coastal master plan question

Have you heard about the Morganza levee proposal?
Yes No

***Do you support the Morganza levee proposal?**
Yes No
*Only ask if answered yes to previous question

Does coastal erosion in Terrebonne Parish pose a threat to you?
Yes, No, Don't know **If YES, do you consider that threat to you to be serious?** Yes, No, Don't Know

Does coastal erosion in Terrebonne Parish pose a threat to your way of life?
Yes, No, Don't know **If YES, do you consider that threat to be serious?** Yes, No, Don't Know

Do you think coastal erosion in Terrebonne Parish will pose a serious threat to you over your lifetime?
Yes, No, Don't know

Do you think coastal erosion in Terrebonne Parish will affect your future decisions about where to live?
Yes, No, Don't know

Do you think coastal erosion across Louisiana will affect your future decisions about where to live?
Yes, No, Don't know

Do you think environmental change is responsible for Terrebonne Parishes coastal erosion?
Responsible, Somewhat responsible, Not responsible, I don't believe in environmental change, I don't know

Do you think human actions are responsible for Terrebonne Parishes coastal erosion?
Responsible, Somewhat responsible, Not responsible, I don't know

Do you think human inaction is responsible for Terrebonne Parishes coastal erosion?
Responsible, Somewhat responsible, Not responsible, I don't know

Do you think environmental change is responsible for Terrebonne Parishes sinking coastlines?
Responsible, Somewhat responsible, Not responsible, I don't believe in environmental change, I don't know

Do you think human actions are responsible for Terrebonne Parishes sinking coastlines?
Responsible, Somewhat responsible, Not responsible, I don't know

Do you think human inaction is responsible for Terrebonne Parishes sinking coastlines?
Responsible, Somewhat responsible, Not responsible, I don't know

Should Louisiana's coast and wetlands be restored?
Yes, No, Don't know

Who should pay to restore Louisiana's coast and wetlands?
The government only, The oil and gas industry only, Government and oil/gas industry should share the cost, other: please
specify_____

Would you be willing to pay more in taxes to help fund efforts to restore Louisiana's coast?
Yes, No, Don't know

If you answered Yes to the previous question:
What would be your preferred amount paid in additional taxes each year to help fund restoration efforts for Louisiana's coast? _____

What would the maximum amount more in taxes per year you would be willing to pay to help fund restoration efforts for Louisiana's coast?_____

Now we are going to switch tack a little. The questions in the following section will be asking for your opinion or perception about a variety of statements. Again, there are no right or wrong answers, what I am interested in is your opinion or perception.

Please list up to the top 5 things that come to mind when I say "<u>The Environment</u>"
1_____
2_____
3_____
4_____
5_____

Please list up to the top 5 things that come to mind when I say '<u>Your Environment</u>"
1_____
2_____
3_____
4_____
5_____

Which of the following have impacted or affected your understanding of 'Environment'?
Please mark all that apply.
( ) Schooling / Education
( ) Personal experience in day-to-day life
( ) Personal experience of natural disasters
( ) Conversations with family or friends
( ) Programs on T.V.
( ) News Media
( ) Material focused on locations within the US
( ) Material focused on locations around the world
( ) Other. Please Specify:
_____

ENVIRONMENT
The environment in Terrebonne Parish is special to me
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

Nature and Environment are interchangeable concepts to me
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I consider the weather in Terrebonne Parish to be a part of my local environment
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I consider climate within Terrebonne Parish to be a part of my local environment
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I consider built infrastructure within Terrebonne Parish to be a part of my local environment
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I consider local plants and animals to be a part of my local environment
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I consider the local people / social connections to be a part of my local environment
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

The environment in Terrebonne Parish is just a backdrop to my life here
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

OWNERSHIP
Owning a home is important to me
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I am content with my current living arrangements
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

IDENTITY
Having local park(s) or green spaces in my area is important to me personally
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

Having community focused buildings in my area, such as a library, is important to me personally
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I make use of community green spaces during a typical month
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I make use of community buildings during a normal month
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I use or experience bayou areas during a normal month
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I use or experience coastal estuary or beach areas during a normal month
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

ATTACHMENT

I cannot see myself living anywhere else
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

As long as I can earn a living, it does not matter where I am
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

The sense of community I feel here could not be found anywhere else
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

Being near the resting places of family members who have passed is important to me
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I feel a strong sense of identity with the local environment
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

INSURANCE

Do you have an insurance policy that would cover damages caused by natural disasters – such as flooding or hurricanes?
Yes, No, Don't know

Insurance is not something that I spend much time thinking about
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

***With insurance I feel a sense of control over the future**
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know
**Only ask if answered YES to having insurance*

I believe that community leaders have made decisions to help insure the future of my community
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

TEMPORAL KNOWLEDGE

I think that future environmental change predictions for this area are incorrect / inaccurate
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I do not have to worry about the future of this area as I will not be around to experience it
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I do not think that using information about past disasters is a good way to predict future ones
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

Predictions about future disasters, or their impacts, in this area are something that I think about often
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

After talking with many people within Terrebonne Parish it became apparent that sometimes specific events – such as natural disasters – have resulted in changing attitudes and perceptions.

CHANGE

Has a specific event (or events) changed your perception of your environment?
Yes No

If YES, please tell me what this event was, and briefly how it impacted your environmental perception

_____
_____
_____
_____
_____
_____

Has a specific event (or events) impacted your movement plans? E.g. your movement plans (to stay in your home or to move elsewhere) changed after experiencing this event.
Yes No

Please briefly explain your answer to the previous question

_____
_____
_____

SENSE OF ATTACHMENT, IDENTITY, AND DEPENDANCE

I feel that I can really be myself at my home/property
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My home/property reflects the type of person I am
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My home/property is my favorite place to be
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I really miss my home/property when I'm away from it for too long
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My home/property is the best place for doing the things that I enjoy most
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

For doing the things that I enjoy most, no other place can compare to my home/property
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I feel that I can really be myself at my Bayou
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My Bayou reflects the type of person I am
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My Bayou is my favorite place to be
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I really miss my Bayou when I'm away from it for too long
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My Bayou is the best place for doing the things that I enjoy most
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

For doing the things that I enjoy most, no other place can compare to my Bayou
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I feel that I can really be myself in my community
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My community reflects the type of person I am
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My community is my favorite place to be
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I really miss my community when I'm away from it for too long
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

My community is the best place for doing the things that I enjoy most
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

For doing the things that I enjoy most, no other place can compare to my community
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

~ Movement focused questions are on the next pages ~

If you intend to stay in your current home please answer the questions on pages 13-14
If you intend to move, within or outside of the parish, please answer the questions on pages 15-16

RESIDENCE STAYING*
***Answer the following questions if you are NOT planning on leaving your current home/place of residence**

Ties to living family members are a major reason why I do not want to leave this area
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

Ties to family history in the area are a major reason why I do not want to leave
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

Sense of community in this area is a major reason why I do not want to leave
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

The environment in this area is a major reason why I do not want to leave
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

*If "Agree" with the previous question please list / state the aspects of the environment that are the reason you do not want to
leave_____
_____
_____
_____

The thought of starting over somewhere else is unbearable
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I cannot see myself being happy anywhere else
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I want to leave, but am unable to
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

~ If you "Agree" with the previous question, could you please briefly state what factor(s) are blocking or impeding your movement decision and why?
_____
_____
_____
_____
_____
_____

~More questions on next page~

On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following situations to you in your decision to remain. N/A if needed.

Self-reflection (thinking things over without the input of anyone else) _____
Experiencing local conditions _____
Interactions/Conversations with family members within LA _____
Interactions/Conversations with family members outside of LA _____

Interactions/Conversations with friends within LA _____
Interactions/Conversations with friends outside LA _____
Interactions/Conversations with familiar faces/community members within LA_____
Interactions/Conversations with contacts outside of LA _____
Reading/viewing material produced by local council / leaders _____
Reading/viewing material produced by local news media _____
Reading/viewing material produced by national council / leaders _____
Reading/viewing material produced by national news media _____

Are there other situations or influences that have impacted your decision to move that are not listed above? If so, please state these below, and on the same scale used above rate their influence on your decision.

_____
_____
_____
_____
_____
_____

If you had to pick the main reason(s) for staying, what would these be for you, and why?

_____
_____
_____
_____
_____
_____

Movement decisions are often never simple and are made up of multiple parts. On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following factors in your decision to remain in Terrebonne Parish.

Economic _____
Life Stage _____
Social _____
Environmental _____

RESIDENCE – LEAVING/MOVING*
***Answer the following questions if you ARE planning on leaving the local area/your current home**

The decision to leave this area was simple
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

The final decision to leave this area took a long time to make
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

I once thought that I would never leave this area
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

This area was always intended to only be a short-term part of my life
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

Deciding where to go was the hardest part about deciding to leave
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

The environment in this area is a major reason why I want to leave*
Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable/Don't know

*If "Agree" with the previous question please list / state the aspects of the environment that are the reason you want to
leave_____
_____
_____

Decisions to move are often never simple and are made up of multiple parts. On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following factors in your decision to move.
Economic _____
Life Stage _____
Social _____
Environmental _____

~More questions on next page~

On a scale of 1-10 (1 being "No impact at all", and 10 being "Extremely influential", please rate the significance of the following situations to you in your decision to move. N/A if needed.

Self-reflection (thinking things over without the input of anyone else) _____
Experiencing local conditions _____
Interactions/Conversations with family members within LA _____
Interactions/Conversations with family members outside of LA _____

Interactions/Conversations with friends within LA _____
Interactions/Conversations with friends outside LA _____
Interactions/Conversations with familiar faces/community members within LA_____
Interactions/Conversations with contacts outside of LA _____
Reading/viewing material produced by local council / leaders _____
Reading/viewing material produced by local news media _____
Reading/viewing material produced by national council / leaders _____
Reading/viewing material produced by national news media _____

Are there other situations or influences that have impacted your decision to move that are not listed above? If so, please state these below, and on the same scale used above rate their influence on your decision.

_____
_____
_____
_____
_____
_____

If you had to pick the main reason(s) for leaving, what would these be for you, and why?

_____
_____
_____
_____
_____
_____
_____

Can you think of any factors that may block or impede your decision to leave the area?
Yes ( ) No ( )

If yes, could you please briefly state what these are and why you think they may impact your ability to leave Terrebonne Parish?

_____
_____