Chapter 6

Localizing Climate Change
Confronting Oversimplification of Local Responses

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Introduction

People like to live near the coast. They feel happier and healthier there, and have thus historically migrated in the direction of the ocean (Wheeler et al. 2012). Over half of the US population lives along the coast, and this number is growing (Burger and Gochfeld 2017). Meanwhile, there is ample evidence that sea level rise is increasing the frequency of nuisance flooding in coastal communities and heightening the vulnerability of coastal settlements to storm-driven tidal surge and wind damage (Bilskie et al. 2016). The last several years have seen those effects combined in the destruction and disruption wrought by Hurricanes Katrina, Sandy, Matthew, Irma, Harvey, Maria, Florence, and Michael. So, are people fleeing coastal areas at risk of damage and flooding as a result of projected sea level rise and increased storm frequency and severity? The evidence is that after those storms wreaking the most disruption—e.g., Hurricanes Katrina, Sandy, Harvey—some people relocate and fail to return (Fussell, Sastry, and Vanlandingham 2010). However, people's responses to "near misses" are much less clear. For "wake-up call" storms that do not bring widespread devastation and loss of life, like Hurricane Matthew in the southeastern United States, there is little evidence that exposure to the immediate impact of a storm persuades people to consider migration. Many reasons have been advanced for this reluctance to move, among them economics, family ties, and sense of place. Policymakers rely on understanding those triggers, or the incentives that they can use to persuade people to

take action, so it is critical to understand the individual values that could be engaged by those policies.

In this chapter, we focus on the state of Georgia in the southeastern United States. As many as 10 percent of Georgia's coastal residents are projected to be displaced by sea level rise by the year 2100 (Hauer et al. 2016), and those who remain will most likely be affected by extreme weather events of increasing severity (Gutmann et al. 2018). We use a mixed-methods approach, employing surveys and interviews directly following Hurricane Matthew (2016), to investigate how the complexity of residents' attitudes, perceptions, and beliefs about climate change contribute to their subsequent adaptation decisions in a population recently impacted by a damaging storm. Using events such as this as touch points allows researchers to discuss future scenarios with residents in a grounded way. For a short period of time, the scope and nature of anticipated climate-related changes were made clearer to residents and were isolated from the myriad other sociodemographic changes that will affect these communities in the coming years.

Residents of coastal Georgia live on a low-elevation littoral plain fringed by extensive marshes. Sea level rise as a consequence of climate change is already evident in people's daily lives. The causeway connecting one community, Tybee Island, to the mainland is more frequently flooded—twenty-three times in 2015—as a consequence of high tides, onshore winds, and locally heavy rain. In contrast to much of the eastern seaboard of the United States, the Georgia coastline is not heavily developed with accompanying coastal fortifications. It is a self-evidently vulnerable area, exposed to storms originating in the Atlantic Ocean. Much of the damage caused by Hurricane Matthew was from wind and rain rather than storm surge; however, sea level rise inexorably raises the likelihood of sustaining damage in such events as it raises the base level over which the other events unfold.

Working against any plans or intentions to migrate are people's ties to place and the attractive features of coastal living. The coastal city of Savannah, Georgia, is the oldest in the state, established in 1733, and is an acclaimed example of city planning. Originally the center of a British colony in the southeast United States, the city has evolved from a trading past based on agriculture to a thriving center of commerce, industry, and beach and cultural tourism. The smaller coastal cities of Brunswick, Darien, and St. Marys also have their roots in the eighteenth century, settled originally to occupy the coast and later becoming fishing and trading centers. The economy of the region was shaped by slave labor. After the U.S. Civil War, former slaves remained in the area, giving the region a rich mix of cultures with deep historical roots (Morgan, 2010). In more recent years, though, the entire southeast coast of the United States has boomed as a location for
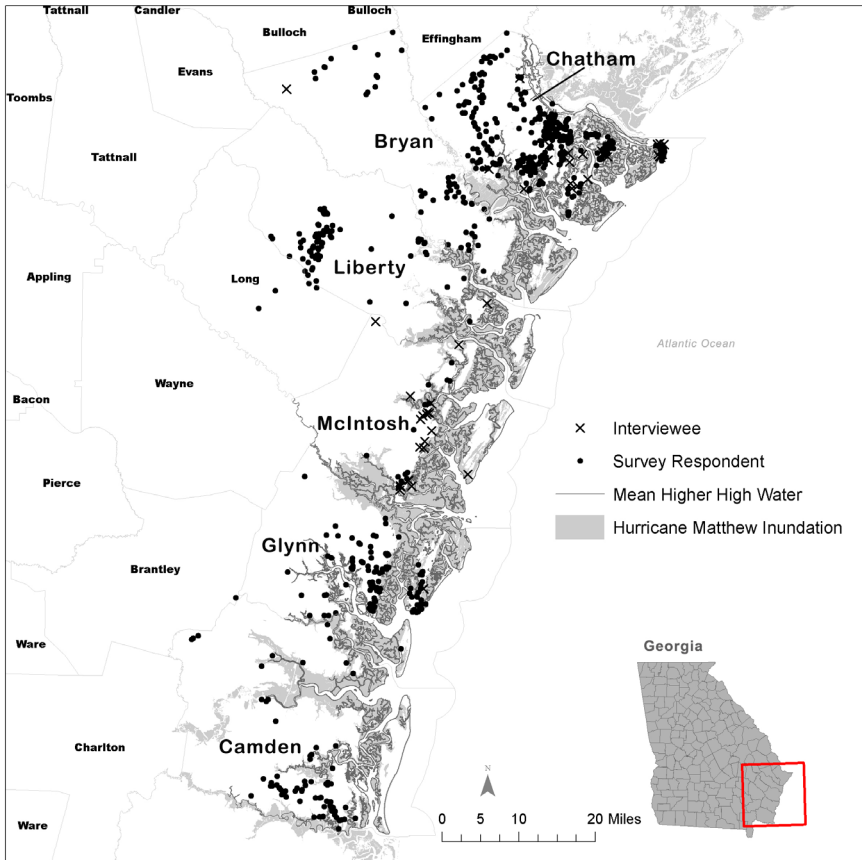
Figure 6.1. Coastal Georgia showing the normal Mean Higher High Water line, the estimated surge extent of Hurricane Matthew, and survey and interview respondent locations. Map by Micah Taylor, USA 31.489946° N, -81.499712° W. Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community. Accessed December 2018.

a range of industries and as a destination for retirement and tourism, with concomitant growth in permanent homes, second homes, and resorts. It is in the midst of these conflicting pressures, attracting and repelling, that residents of the coast and their communities are increasingly faced with important decisions about their plans for the future.

Background

Climate change is expected to cause a slow, incremental, but unavoidable rise in sea level, and it will spur increasingly violent storms originating

over warmer coastal waters. A substantial literature has arisen that discusses the possible scope and severity of the anticipated changes together with their significant economic and human consequences (Rahmstorf 2017; Hauer et al. 2016). Hauer (2017) projects the displacement of 2.5 million people from the Miami/Fort Lauderdale/West Palm Beach area alone. However, it is not clear how people whose homes are at risk of rising sea levels or increasing storm damage will migrate or what incentives or triggers will cause them to move.

In October 2016, Hurricane Matthew passed northward off the coast of Georgia, resulting in new record tide levels at Fort Pulaski, adjacent to the city of Savannah. In the course of this event, the area experienced all of the anticipation and trauma of evacuation, return, and cleanup, but the resulting damage affected relatively few people, homes, and businesses by comparison with Hurricanes Katrina, Sandy, and Harvey. As a result, we realized in the aftermath of Hurricane Matthew the possibility of interviewing and surveying a population sensitive to and knowledgeable about the impacts of severe storms on their lives yet largely able to return to their homes and, thus, be available for our questioning.

Adaptation to Climate-Related Change

There are two main adaptation paths in response to climate-related change. For some people in some situations, it may be possible to protect or directly adapt their home to withstand the changing sea level or storm frequency and severity. After Hurricane Sandy destroyed homes on Staten Island, New York, some residents chose to rebuild their homes by raising the living areas substantially above flood level and using more storm-resistant construction (Bukvic, Smith, and Zhang 2015; Bukvic and Owen 2016). For others, the response, again dictated by personal circumstances, would be to relocate to an area safe from current and anticipated risks.

Butler, Deyle, and Mutnansky (2016) argue that responses to sea level change ought to be highly amenable to thoughtful planning because they take place incrementally and slowly over decades. While their work focuses on the behaviors of Florida municipalities and their plans for the future, their findings indicate that even planning agencies often have a wait-and-see attitude and focus on short-term and economic physical armoring of shorelines versus avoidance and retreat. It may not be surprising that individuals, then, display similar behaviors and are reluctant to make the serious and life-changing commitment to relocate. Moreover, in some case, residents do not perceive the burden of adaptation as being individual; instead, they see it as a governmental response, meaning that they expect external assistance either in managing the threat or in sub-

sidizing any migration actions. Hoogendoorn, Fitchett, and Grant (2016) reported that because of the uncertainty of flood events in coastal South Africa, residents expected governmental agencies to find mechanisms to either protect or compensate people.

Residents' perceptions of risk are closely linked, and in part are a precursor, to their adaptation strategies. There is only sparse literature on how perceptions of risk shape migration response, and much is associated with developing populations facing threats of famine and loss of livelihoods. Evacuation from disaster-impacted areas has received much more attention. McCaffrey, Wilson, and Konar (2018) studied wildfire evacuation decisions and identified two distinct population types, those who evacuate and those who stay in place. In both groups, there was a substantial subset of "wait and see" respondents.

While governments will inevitably be centrally involved in planning and facilitating large-scale adaptation measures, their actions will be strongly shaped by the perceptions and decisions of residents in their jurisdictions. Policy implementation will only be successful if it accords with individual inclinations and provides them appropriate support (Song and Peng 2017). Song and Peng's study examined the likelihood of residents in Panama Beach, Florida, relocating away from low-lying areas in response to rising sea level. They examined people's perceptions of risk, their experiences of past hazards, their ability to cope with change, and their relocation destinations. Residents' characteristics affect their relocation responses, but not necessarily in ways that are easy to interpret. While well-educated people might be expected to understand the risks, they were more reluctant to relocate; the attitudes of friends and family might be more influential in decisions to move than the scientific information available. Hazard awareness is positively associated with willingness to relocate, but direct past experience of hazards had little effect. The emerging lesson from these studies is that the range of adaptation strategies available is vast, as is the range of individual responses, and is shaped by individual characteristics, coping abilities, and social influences. While surveys of attitudes and behaviors reveal the broad range of responses to changing conditions, they are limited in their ability to tell us why people make the choices and decisions that they do.

Displacement and Migration

Much of the literature examining migration patterns after severe weather events focuses on two issues: first, the sudden and dramatic dispersal of people after events like Hurricanes Katrina in New Orleans and Sandy in the New York/New Jersey region; and second, the planned-for but

wrenching removal of entire populations from mid-ocean islands. The lessons of these events may or may not be transferable to the issues of slowly rising risk for populations that, on the face of it, do have places to move to and avoid catastrophe.

Hurricane Katrina scattered one million evacuees across the United States (Grier 2005). The population of New Orleans has not returned to pre-storm levels, but studies looking at returning displaced residents have revealed a series of possible, and plausible, reasons for not returning. Landry et al. (2007) found that rates of return could be affected by a range of demographic factors, but the results were highly variable. For example, they found higher proportions of middle-income households planning to return, but it was challenging to separate the influence of factors such as home ownership, the economic resilience of individuals, and that some neighborhoods of historically low-income populations were the most affected by flooding and subsequently uninhabitable. Groen and Polivka's 2010 analysis of people returning after Katrina revealed similar patterns: a decrease in the percentage of blacks in the population, i.e., more whites and Hispanics, and a decrease in the number of lower-income/education families, i.e., more residents with higher income/education. This observation was reinforced by Fussell, Sastry, and Vanlandingham (2010), who found that black residents returned at a lower rate than white residents did but that the disparity disappeared when they controlled for housing damage. Blacks tended to live in areas more affected by flooding. Studies of post–Hurricane Sandy relocation reveal the same kinds of patterns. Older residents were more willing to consider relocation, as were homeowners facing extensive repairs. Most would prefer to stay, but the cost of flood proofing by raising homes is prohibitive for many (Bukvic, Smith, and Zhang 2015; Bukvic and Owen 2016). Indeed, financial considerations can overturn plans to return and rebuild (Bukvic, Smith, and Zhang 2015; Bukvic and Owen 2016).

In the aftermath of a major disaster like Hurricanes Katrina, Sandy, and Harvey, relocation, albeit temporary, is unavoidable, and much of the shaping of the response is in the hands of agencies at all levels of government, from local to federal. By contrast, response to slower-onset changes such as sea level rise or increased storm frequency are subject to individual perceptions and interpretations. Stojanov and colleagues (2017) explored residents' perceptions of recent and future climate change impacts in the Maldives, low-elevation islands in the Indian Ocean, and their willingness to consider moving away. More than 50 percent of respondents perceived the threats as serious and accepted that migration might be an option. However, to individuals, the risks of sea level rise were not as serious as other important cultural, economic, and social challenges. Willox, Harper,

and Edge (2012) examined communities' responses to climate warming in Labrador, Canada, where increasing temperatures are disrupting hunting, fishing, travel, and the look and feel of the landscape. They point to the impacts of those changes on place attachment and emotional health and well-being and to the challenges of developing adaptations and mediations. What is most evident, however, from these readings of the literature is that, for the numerous displacement studies, we have extensive social science survey-based evidence for a variety of behaviors but limited direct knowledge about the individual decisions that led to the summary observed behaviors. Conversely, for those studies that do explore individual responses to the threat of displacement, the expressions of cultural, spiritual, and place values appear central to decision-making but lack the generalizability and comparability that a policymaker would need to be able to propose a response. Our concurrent quantitative and qualitative studies sought to connect the synoptic and granular insights that these approaches offer.

Attachment to Place

Adger et al. (2012), in a broad review of the cultural dimensions of adaptation to climate change, argue that scholars have not paid enough attention to the role of place and identity in understanding individuals' decisions to remain in place or relocate. Groen and Polivka (2010) examined determinants of return migration after Katrina. Despite alluding to "sense of place" potentially being a factor in decisions about migration or return, their findings focused on demographic and economic factors, such as the cost of damage recovery, and failed to examine the "attractor" values of place, familiarity, neighbors, or even jobs. In examining the attitudes of coastal residents of Panama Beach, Florida, Song and Peng (2017) suggest that social ties and emotional attachments are hindrances to relocation, but their study focuses on attitudes toward planned retreat from coastal threats; they do not report on the values respondents sought by continuing to live on the coast.

In other studies that specifically address sense of place, the conception of sense of place that emerges is more one of attachment to knowledge systems (that cannot be readily addressed by policy) than to physical location (that can be regulated, etc., by policy and investment) (Hoffman 2017). Willox, Harper, and Edge (2012), in their examination of Inuit ties to the land in Canada, where traditional lifestyles were threatened by disrupted hunting, fishing, and traveling, people's responses were not so much about attachment to particular physical places as they were to the traditional practices carried out in that landscape. While it is understand-

able that most studies are focused on future behaviors, it is not clear that the questions asked in prior surveys fully address the range of factors that will affect decisions and actions to evacuate or migrate. Moreover, it is not clear how sense of place might interact with demographic or spatial location issues to shape migration responses.

Effects of Location

One factor that may have received less attention yet seems central to any consideration of migration is the role of proximity to a source of flooding or storm damage, both physical and perceptual, in decisions to relocate. Milfont and colleagues (2014) studied the relationship between New Zealanders' belief in the reality of climate change and their proximity to the shoreline. The model they developed controlled for height above sea level, regional poverty, and individual differences in gender, age, education, and wealth, indicating a connection between physical proximity and the psychological acceptance of climate change. Conversely, Bukvic and colleagues (2018), surveying residents in the aftermath of Hurricane Sandy, found only minor effects of proximity to shoreline on willingness to relocate. They suggested that factors such as residents' confidence in being able to adapt or retreat may play a bigger role than physical location in migration decisions, although those exposed to repeated flooding and offered buyouts were more likely to consider relocation.

A second issue with respect to spatial location is whether people have directly experienced or observed impacts of past storms. The effect of direct experience on the development of environmental attitudes and behavior has been noted by numerous authors (e.g., Duerden and Witt 2010) and undoubtedly contributes to the credibility of environmental projections (Dong et al. 2018). However, in considering the spatial extent of rising sea level, and, hence, its impact on populations (e.g., Hauer 2017), planners and policymakers have usually treated the phenomenon as an orderly "bathtub" rise of level to a new projected shoreline or flood zone boundary. Instead, the dynamics of storm surge driven by onshore winds and shaped by coastal geomorphology can dramatically extend the influence and evidence of flooding (figure 6.2). Bilskie et al. (2016) is an example from a growing literature indicating the inland extent of potential flooding under future storm conditions. Musser, Watson, and Gotvald (2017) collected high water mark data (Koenig et al. 2016) to illustrate the extension of post–Hurricane Matthew flooding beyond mapped flood lines. While many past studies have looked at the influence of proximity to shorelines or flood zones as possible influences on migration behavior
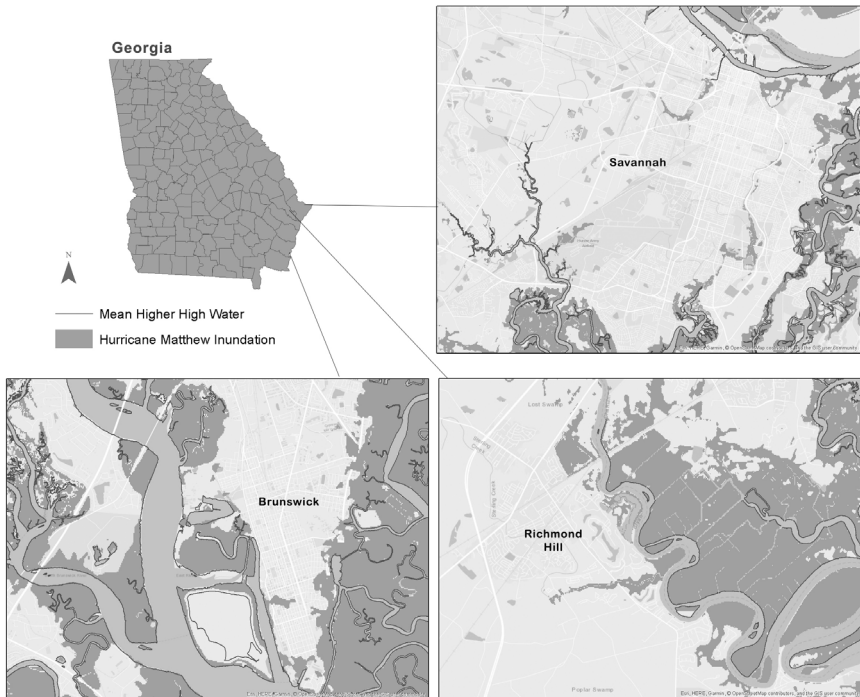
Figure 6.2. Estimated surge extent of Hurricane Matthew in Savannah, Brunswick, and Richmond Hill. Map by Micah Taylor, USA 31.489946° N, -81.499712° W. Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community. Accessed December 2018.

(e.g., Milfont et al. 2014; Stojanov et al. 2017), and others have looked at past experience of storm-related damage on future behavior (e.g., Bukvic and Owen 2016), we have not found any that consider the effects of residents' proximity to, or direct observation of, past flooding or other damage on their attitudes or behavior.

Study Design

Our study was designed to address some of the gaps we have described. We used a mixed-methods approach that would enable us to examine both population-level effects through an online survey and individual-level perceptions and expected behaviors through ethnographic interviews. Our approach follows the model below (figure 6.3).
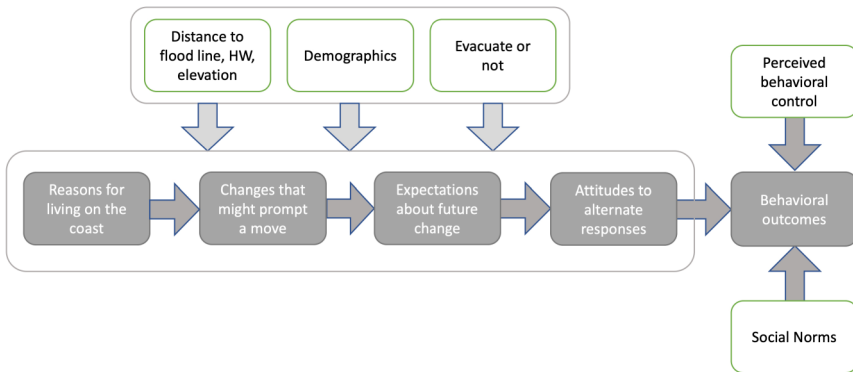
Figure 6.3. Study conceptual design: main study components shaded and external factors in open boxes. © Brian Orland.

First, we examine why people live on the coast, what changes might prompt them to consider moving away, and their expectations for future climate-related change. We then look at their attitudes toward future change and their expected response behaviors as shaped by the social norms expressed by those around them and their perceived level of personal control over outcomes. At each step, we investigate effects of distance from shoreline and observed high water marks, of demographic variables, and of past compliance with evacuation notices.

A survey of residents regarding their intentions to migrate addressed all six coastal counties of Georgia (figure 6.1). In-depth interviews were focused in Chatham County, the location of Savannah and growing in population, and in McIntosh County, rural and declining in population. While the coastal counties of Georgia play an increasingly important role in the economy and lifestyle of the state, except for Chatham County they are sparsely populated. Those with strong economic development, Chatham and Glynn, are growing. Liberty and McIntosh Counties are experiencing decline (table 6.1).

Surveys: A 139-item survey of residents of the six Georgia coastal counties was conducted via Qualtrics Panels in May 2017, seven months after Hurricane Matthew in October 2016. There were 2,509 surveys distributed via email. After removal of out-of-area responses, duplicates, and other low-quality responses, we have an analysis set of 991 responses. Survey questions were modeled on a number of prior studies. While there is an extensive literature associated with evacuation-related behavior (e.g., Pham et al. 2020), there have been fewer studies of intentions to migrate away from the coast in the face of climate-related change. A study of public understanding and intended behavior in the face of sea level change in

Table 6.1. County populations and populations at risk of coastal Georgia, sorted north to south. US Census, 2017. Source: American Community Survey, reported by Headwaters Economics, headwaterseconomics.org/par. Table by Brian Orland.

	Total Population	Percent change 4/1/10–7/1/16	Children under 5 as percent of total	Elderly over 65 as percent of total	White as percent of total	Black/African American as percent of total	Individuals in poverty as percent of total	No high school degree as percent of total
Georgia	10,310,371	6.4%	6.5%	12.3%	59.8%	31.2%	17.8%	14.2%
Coastal total	539,319	7.4%	7.1%	13.3%	58.7%	33.8%	17.3%	10.9%
Chatham	289,082	9.0%	6.7%	13.8%	53.3%	39.8%	18.0%	10.7%
Bryan	36,230	19.9%	7.3%	10.0%	78.4%	15.2%	13.3%	9.6%
Liberty	62,570	-1.4%	10.0%	7.5%	46.8%	41.3%	16.9%	10.3%
McIntosh	13,927	-2.8%	4.7%	20.1%	61.8%	35.1%	20.1%	17.6%
Glynn	84,502	6.1%	6.1%	17.5%	66.9%	25.4%	18.7%	12.4%
Camden	53,008	4.9%	7.7%	11.2%	74.5%	18.2%	14.0%	9.0%

the United Kingdom (Thomas et al. 2015) was used to guide our survey instrument. The Climate Change Attitude Survey (Christensen and Knezek 2015) and an attitudes and migration survey (Wilmot 2009) were used to guide the wording of individual questions.

Interviews: In March 2017, we conducted sixty-six interviews with seventy-two respondents. Interviews were designed to examine how individuals frame the problems they face and what their strategies are for responding to extreme weather events. We asked about rationales and motivations for their attitudes and behaviors during and after the storm. We selected interviewees to capture diversity in components of social vulnerability (e.g., age, ethnicity) and to approximate the demographic makeup of the coastal region. Fifty-six percent of respondents were female, and 44 percent were male. The majority, 75 percent, identified as White, with 22 percent identifying as Black or African American and 3 percent as mixed race. They ranged in age from twenty-five to ninety-one, with 53 percent above sixty-five. Median household income was $50,000 and ranged from $0 to $400,000 (table 6.2). Interviews covered migration histories, political economic contexts, storm experiences and attitudes, and adaptation possibilities. All interviews were recorded and transcribed for coding.

Spatial location: Respondents to our surveys were asked to provide their street address so that we could assess their proximity to shoreline and flood zones as well as elevation above sea level; 742 respondents provided that data.

Table 6.2. Interview and survey respondents versus census demographic characteristics. US Census, 2017. Source: American Community Survey, reported by Headwaters Economics, headwaterseconomics.org/par. Table by Brian Orland.

	Total Population	Elderly over 65 as percent of total	Gender, Female as percent of total	White as percent of total	Black/ African American as percent of total	Individuals in poverty as percent of total	No high school degree as percent of total	Graduate degree as percent of total
Georgia	10,310,371	12.3%	51.0%	59.8%	31.2%	17.8%	14.2%	30.4%
GA Coastal	539,319	13.3%	51.1%	58.7%	33.8%	17.3%	9.7%	23.9%
Interviews	72	53.0%	56.0%	75.0%	22.0%	–	–	–
Surveys	991	10.2%	69.1%	67.6%	20.0%	21.7%	3.4%	14.4%

Study Method

The aim of the study, as stated above, was to explore the relationships between perceptions, attitudes, and outcomes as shaped by demographic, social, and environmental factors. These are diagrammed in figure 6.3, the main study components shaded and the external factors in open boxes. Our general strategy for reporting results is to use the survey data to identify and evaluate responses to underlying constructs in each of the major components, then show how those respond to external factors such as demographic variables, past evacuation behavior (as a proxy measure of risk tolerance), and proximity to impacted areas. We then explore reasons for the responses by reference to the interview data that provides much richer means of revealing motivations of our respondent populations.

Survey data: Demographic variables examined included Age Class (18–24, 25–44, 45–64, 65+), Gender, Household Income, Educational Achievement, and Ethnicity (table 6.2). Expecting that evacuation behavior might provide insights into anticipated migration behavior, we asked whether survey respondents evacuated or not during the Hurricane Matthew event; 436 (62.8 percent) reported that they evacuated, 258 (37.2 percent) stayed in place. In addition to the survey data, we calculated four additional variables expressing proximity to the ocean and other water bodies: (1) the distance between each participant address location and Mean Higher High Water (MHHW) as determined by the National Oceanic and Atmospheric Administration (NOAA); (2) elevation of the address above Mean Higher High Water (MHHW); (3) the distance between each participant address location and the edge of the storm inundation zone taken from the surge forecast data and validated with US Geological Survey (USGS) High Water Mark data. Variables with multiple ordinal levels (e.g., Age category, Household Income) were examined using One-Way Analysis of Variance; Categorical variables, in this case all with two classes, were examined using unequal population t-tests. Because the aim of this chapter is to explore the relationships between perceptions, attitudes, and outcomes, we used data reduction for each component (figure 6.3) of our survey via Principal Components Analysis (PCA), assuming that Likert scale data had interval-quality characteristics and using varimax rotation to preserve statistical independence of the derived constructs for use in the succeeding components of the study.

Interview data: We use the Principal Components from the quantitative phase of our study to guide analysis and discussion of the qualitative data. For instance, since the PCA of questions regarding people's reasons for living on the coast revealed three factors that we titled Lifestyle, Family

Ties, and Job/Financial, discussion of interview data related to the same question addresses the same three factors.

Attachment to Place

Factors That Encourage People to Live on the Coast

People are attached to their homes on the coast for a variety of lifestyle, family, and economic reasons. The area's beauty, pace, affordability, and suitability as a retirement destination are reported as important by two-thirds or more of respondents. We asked respondents, "Why have you chosen to live in coastal Georgia?" Six out of ten responses mentioned that the factors reported were important or very important to them (table 6.3). Principal Components Analysis of responses to the eleven questions revealed three factors achieving Eigen values >1.0—Quality of Life, Family Ties, and Pragmatic (a combination of raising kids, job-related considerations, and financial investment factors)—that accounted for 60.6 percent of total variance. Cronbach's alpha for the six items in Lifestyle was 0.84, generally regarded as Good, and 0.69 for Family Ties, which is Acceptable, indicating strong internal consistency in responses to these factors. The 0.36 figure for Pragmatic indicates the individual variables were weakly related (Pairwise correlations 0.08, 0.13, 0.27).

Table 6.3. Reasons for living in coastal Georgia. [Q] = Quality of Life, [F] = Family Ties, [P] = Pragmatic. The superscript letter indicates the factor grouping. Data by Brian Orland.

	Slightly / not at all important	Important / very important
I enjoy the area's natural beauty [Q]	16.4%	78.8%
I like the pace of life [Q]	19.1%	74.5%
It's an affordable place to live [Q]	21.2%	71.0%
It's a good place to retire to [Q]	21.4%	66.3%
I feel a strong connection to the coast [Q]	26.5%	65.8%
I enjoy the recreational opportunities [Q]	26.4%	65.0%
I have family and friends in the area [F]	18.8%	63.8%
I grew up in the area [F]	21.8%	39.3%
It's a good place to raise kids [P]	21.1%	59.3%
I moved for job-related reasons [P]	22.2%	45.7%
It's a good financial investment [P]	36.5%	42.0%

There was a small effect of length of coastal residence on rated importance for Lifestyle factors as reasons for living on the coast at the p=0.01 level (F [1, 740] = 6.74) and a larger effect for Family Ties, p=<0.0001 (F [1, 740] = 163.84). For many respondents, time spent living on the coast equates to time spent building friendships and raising families, so that stronger relationship is not surprising. In contrast, people of all ages and length of residence are attracted by the quality of life factors contributing to Lifestyle. Previous experience of hurricanes did not affect the importance of Lifestyle, but those with no previous experience in an area prone to hurricanes expressed greater importance for Family Ties (M=0.19, SD=0.98) than those with experience (M=-0.25, SD=0.97); t(740)=6.00, p<0.0001. While this seems contradictory, that those with less experience of hurricanes would be more concerned about ties to family and friends, the Georgia coast prior to Hurricane Matthew had not sustained any direct hurricane damage since 1898, so long-term residents had no previous experience to draw upon.

Lifestyle was more important for older respondents, p<0.0001 (F [3, 738] = 10.33) but Family Ties were less important, p=0.0003 (F [3, 738] = 6.25). There were small positive effects of Household Income, p=0.038 (F [6, 735] = 2.24) and of Level of Education, p=0.025 (F [6, 735] = 2.42), on the importance of Lifestyle. Higher Household Income, p=0.002 (F [6, 735] = 3.47) and Education, p<0.0001 (F [6, 735] = 5.44), had negative effects on the importance of Family Ties. Although age, household income, and level of education were not highly intercorrelated, each has logical connections to the importance of lifestyle factors and less importance of family ties. Older people choose the coast as a place to retire to, wealthier people may have chosen the area as the location of a second home, and education might be associated with either age or income.

Lifestyle was more important for whites (M=0.11, SD=0.99) than for African Americans (M=-0.28, SD=0.96); t(661)=-4.40, p<0.0001. Blacks and African-Americans, however, found Family Ties more important (M=0.35,

Table 6.4. Correlation table, major demographic characteristics. Data by Brian Orland.
** Correlation at the p<0.0001 level, * Correlation at the p=0.02 level.

	Time lived on the coast	Age of respondent	Household income	Educational attainment
Time lived on the coast	–			
Age of respondent	0.225**	–		
Household income	0.086*	0.217**	–	
Educational attainment	0.063	0.291**	0.459**	–

SD=0.90) than whites (M=-0.07, SD=1.02); t(661)=4.82, p<0.0001. Gender had no effect on importance of Lifestyle. Females, however, attached more importance (M=0.07, SD=1.02) to Family Ties than males did (M=-0.16, SD=0.93); t(738)=-3.06, p=0.002. Evacuation behavior was not related to reasons for living on the coast.

Distance from Mean Higher High Water (MHHW), from the high-water mark associated with Hurricane Matthew (HWM) and with Elevation above MHHW, each were negatively related to Lifestyle factors as reasons to live at the coast—p<0.0001 (F [1, 740] = 15.80), p=0.002 (F [1, 740] = 9.76), p<0.0001 (F [1, 740] = 19.06) respectively, suggesting that location close to the shore is closely related to the importance of Lifestyle. Distance factors were not related to Family and Friend Ties.

Change Factors That Might Prompt Considering Migration

In the survey, respondents were asked, "Imagine your life in coastal Georgia changed. For each of the following changes, please indicate whether it might make you consider moving away from your current home." Four (of fifteen) items were cited as reasons for considering leaving the coast by 60 percent or more respondents after Matthew—Sea-level rise threatens your home, Increase in crime, No longer feels like a relaxed area, and Storm damage becomes more frequent—demonstrating the mix of economic and social considerations that impact decisions. PCA of the fifteen questions in table 6.5 revealed three factors that would likely induce people to move: Loss of Quality of Life, Increased Costs, and Job/Family Losses. Together, these accounted for 53.3 percent of total variance. Cronbach's Alpha for the six items in Loss of Quality of Life was 0.83, generally regarded as Good, and 0.79 for Increased Costs, also Good, but the 0.54 for Job/Family Loss is low, indicating that the individual variables were weakly related (Pairwise correlations 0.21, 0.28, 0.36).

While in general the importance of factors that might cause people to move away matched, in reverse—the importance of reasons for living at the coast—the responses to the loss of values were not as strongly stated. There was a small negative effect of length of coastal residence on rated importance for Loss of Quality of Life as a reason for leaving the coast at the p=0.006 level (F [5, 736] = 3.27), but no effect for Increased Costs as a rationale. There was a small negative effect of higher Household Income, p=0.042 (F [6, 735] = 2.19) on the importance of Loss of Quality of Life. African Americans attached more importance (M=0.01, SD=1.04) to Loss of Quality of Life than whites did (M=-0.06, SD=0.98); t(661)=6.00, p<0.0001. No other demographic or distance variables had effects on the importance of Loss of Quality of Life. Those who evacuated found Increased Costs

Table 6.5. Considerations for moving away. Factor groupings: ^{Q} = Loss of Quality of Life, ^{C} = Increased Costs, $^{J/F}$ = Job/Family Loss. Data by Brian Orland.

	Probably / definitely not move	Probably / definitely move
No longer feels like a relaxed area ^{Q}	32.4%	63.3%
Environmental pollution increases ^{Q}	36.4%	59.3%
Sense of community declines ^{Q}	45.0%	49.6%
Loss of area's natural beauty ^{Q}	45.8%	48.9%
Reduced access to public lands for recreation ^{Q}	52.7%	40.5%
Cultural and historical aspects decline ^{Q}	56.8%	37.6%
Sea level rise threatens your home ^{C}	18.7%	75.7%
Increase in crime ^{C}	26.2%	71.0%
Storm damage becomes more frequent ^{C}	36.1%	60.5%
Increased cost of living ^{C}	38.6%	58.1%
Large profit from selling property ^{C}	31.1%	57.0%
Increased property taxes ^{C}	42.7%	48.8%
Loss of my employment $^{J/F}$	35.8%	47.4%
Family and friends move away $^{J/F}$	51.2%	39.3%
Children grow up and move away $^{J/F}$	46.1%	28.3%

more important (M=0.06, SD=0.96) as a reason to move than those who stayed in place (M=-0.14, SD=1.06); t(642)=2.46, p=0.01. Older people attached slightly less importance to Increased Costs, p=0.0002 (F [3, 738] = 6.62). African Americans attached more importance (M=0.18, SD=0.98) to Increased Costs than whites did (M=-0.07, SD=0.99); t(661)=2.71, p=0.007. There were no other effects of demographic or distance variables.

Expectations about Future Change

Survey respondents were asked to report on their concerns for both their region and for themselves personally with respect to sea-level rise and damaging storms. Concern for both impacts is similar at the level of the region. However, for sea-level rise personal concern is lower (Table 6.6). Coastal residents are closely aware of where their homes sit with respect to sea level and distance from areas affected by storm surge. Those outside the threatened areas would expect no lasting damage.

Table 6.6. Regional and personal expectations regarding sea level rise and damaging storms. Data by Brian Orland.

	Not at all concerned	Slightly unconcerned	Neutral	Slightly concerned	Extremely concerned
To what extent are you concerned about sea level rise affecting the region?	13.34%	10.11%	18.19%	45.42%	12.94%
To what extent are you concerned about sea level rise affecting you personally?	16.58%	19.81%	36.93%	12.53%	14.15%
To what extent are you concerned about damaging storms affecting the region?	5.39%	7.28%	14.96%	49.87%	22.51%
To what extent are you concerned about damaging storms affecting you personally?	7.28%	8.63%	14.15%	47.31%	22.64%

None of the demographic, evacuation, or distance factors exhibited effects on survey respondents' expectations regarding sea level rise, that is, length of residence on the coast, gender, or distance between home and the ocean. There are small effects of age and household income on expectations of damaging storms, with those over sixty-five reporting somewhat lower expectations, but the effects were not linear with respect to either factor.

Attitudes to Adaptation Responses

The Theory of Reasoned Action (Fishbein and Ajzen 1975) posits that intentions to perform behavior, in this case adaptation measures, will be determined by an individual's positive attitude toward the behavior and their belief that others want them to perform the behavior. The Theory of Planned Behavior (Ajzen 1985) adds the element of self-efficacy, namely the individual's conviction that they can undertake the adaptation action. While the theories have been extensively applied in health fields to study intentions to exercise or undergo therapy, they have broad applicability to areas where people have volitional control over outcomes and are sufficiently informed to form a confident intention. They have been used to investigate inconsistencies in people's expressed intentions and actual migration behavior (Lu 1998) and with respect to international mi-

gration (Bilgili and Siegel 2015; Groenewold, Bruijn, and Bilsborrow 2012; Klabunde and Willekens 2016). With few exceptions (e.g., Lu 1998), most examine international migration for economic and security reasons. We have found no instances of application of these models to the issue of migration in the face of coastal climate-related hazards.

If a projected 10 percent of Georgia coastal residents are displaced by sea level rise (Hauer et al. 2016), then it will be critical to know what intentions and behaviors arise from their emerging beliefs in order for migration to be planned and managed. From the responses to the questions above, it seems clear that there are few policymaking opportunities in our examinations of the effects of demographic and distance-to-shore variables on the reasons people live at the coast or what might cause them to consider moving. Interactional models of reasoned action describe the relationships between beliefs and attitudes and behavioral outcomes. We examined how attitudes regarding sea level rise and increased storm severity might result in intentions to migrate, using both survey and ethnographic methods.

A group of questions addressed attitudes toward sea-level rise and increased storm damage: "What are your attitudes toward different possible responses to sea level change and increased storm frequency and severity?" The single strongest response was, "I will take the necessary measures to stay in my home," with 61.6 percent in agreement with the statement (table 6.7). Two other statements achieved more agreement than disagreement, that both local and federal government should do more to protect homes. All statements about attitudes to moving elsewhere skewed toward disagreement. PCA of the ten questions in table 6.6 revealed three factors with respondents' agreement with statements about attitudes: Government Entitlement, Personal Responsibility, and Government Appreciation. Together, these accounted for 63.1 percent of total variance. Cronbach's Alpha for the four items in Government Entitlement was 0.84, generally regarded as Good. A 0.63 rating for Government Appreciation is low, but there are only two variables contributing to the factor. A 0.41 rating for Personal Responsibility is Poor, and the individual variables are only weakly related (Pairwise correlations ranging from -0.17 to 0.51). Nevertheless, the groupings do represent three important attitudes: "I'm entitled to having the government protect me, but not by moving me," "I have to take personal responsibility for responding," and "I'm grateful for government's role in protecting me and my community."

There was no effect of length of coastal residence on the value of Government Entitlement. Agreement on the value of entitlement declined with increasing Age, $p=0.0003$ (F [3, 738] = 6.25), and Household Income, $p=0.0001$ (F [6, 735] = 4.56). African Americans were more strongly in

Table 6.7. Attitudes to adaptation responses. Factor groupings: [E] = Government Entitlement, [P] = Personal Responsibility, [G] = Government Appreciation. Data by Brian Orland.

	Mean on -2, 0, +2 scale	Disagree / Strongly disagree	Agree / Strongly agree
LOCAL government should do more to protect my home [E]	0.156	23.3%	37.5%
The FEDERAL government should do more to protect my home [E]	0.113	27.1%	37.2%
The FEDERAL government should help me move somewhere safer [E]	-0.338	46.2%	23.6%
LOCAL government should help me move somewhere safer [E]	-0.363	46.9%	22.4%
LOCAL government is doing a good job to protect my home [G]	-0.007	22.7%	23.7%
The FEDERAL government is doing a good job to protect my home [G]	-0.186	28.4%	14.8%
I would take the necessary measures to stay in my home [P]	0.534	11.8%	61.6%
I could not recover from losses or damage to my home [P]	-0.156	43.8%	31.5%
I would like to relocate elsewhere [P]	-0.302	45.4%	26.1%
I think about moving to another part of my community to avoid future losses or damage [P]	-0.367	48.2%	24.1%

agreement (M=0.42, SD=1.02) about the value of Government Entitlement than whites were (M=-0.15, SD=0.93); t(661)=6.23, p<0.0001. No other demographic or distance variables had effects on levels of support for Government Entitlement. There were no effects of demographic or distance variables on respondents' agreement that Local and Federal Government were doing a good job. In fact, 53.5 percent and 56.7 percent, respectively, responded in the neutral category, indicating ambivalence to government efforts.

Actions That Might Be Taken in Response to Climate-Related Change

We asked respondents the extent to which they agreed with statements about possible responses in the face of change: "The statements below

reflect the actions you might take in the future in response to sea level change and increased storm frequency and severity." Only two statements received strong expressions of agreement: "I will storm- and flood-proof my home" and "I will move to be closer to family and friends if my home is threatened." "I intend to move back to where I moved from" received strong disagreement. Intentions to move to safer locations and within a five-year time frame received neutral or negative responses. PCA of responses to the eleven questions in table 6.7 revealed only two factors achieving Eigen values >1.0—Intention to Move and Stay in Place—that accounted for 51.9 percent of total variance. Cronbach's Alpha for the seven items in Intention to Move was 0.82, generally regarded as Good, and 0.49 for Stay in Place indicates the individual variables were weakly related (Pairwise correlations 0.21 to 0.28).

Comparing the mean values of the variables that comprise Intention to Move shows that there is net *disagreement* on intentions to move and that agreement *declined* further with increasing time lived on the coast, $p=0.007$ (F [5, 736] = 3.19), increasing age, $p<0.0001$ (F [3, 738] = 29.94),

Table 6.8. Actions that might be taken. Factor groupings: [M] = Intention to Move, [S] = Stay in Place. Data by Brian Orland.

	Mean on -2, 0, +2 scale	Disagree / Strongly disagree	Agree / Strongly agree
I will move to be closer to family and friends if my home is threatened [M]	0.185	26.9%	42.8%
I will move to somewhere I can get flood insurance [M]	0.059	25.9%	34.4%
I intend to move to another home in the next five years [M]	0.007	37.5%	39.4%
I intend to move somewhere safer but still close to my current home [M]	-0.214	38.5%	25.8%
I will move in the next five years to be closer to friends and family [M]	-0.315	46.6%	22.8%
I intend to move within five years to somewhere hurricane risk is lower [M]	-0.322	47.4%	24.2%
I intend to move back to where I moved from [M]	-0.549	52.7%	18.2%
I will storm- and flood-proof my home [S]	0.507	11.9%	53.8%
I will stay where I am, whatever happens [S]	-0.097	35.4%	28.5%
I intend to stay here as long as I get government assistance for repairs [S]	-0.156	35.7%	26.8%

household income, p=0.002 (F [6, 735] = 3.46), and educational attainment, p=0.04 (F [6, 735] = 2.23). Those who had evacuated (M=0.06, SD=0.95) were more likely to consider moving than those who stayed in place (M= -0.13, SD=1.06); t(642)=2.35, p=0.02. African Americans were more positive toward moving away (M=0.29, SD=1.01) than whites were (M=-0.12, SD=0.98); t(661)=4.38, p<0.0001. Increasing distance from the Hurricane Matthew High Water Mark (USGS Seed and Stain data) was weakly related to expressed intentions to move away, p=0.01 (F [1, 740] = 6.05), as was increased elevation about MHHW, p=0.006 (F [1, 740] = 7.65). As for people's reasons for living at the coast, these are counterintuitive findings suggesting that living close to the ocean is a more powerful "pull" factor than a reason for moving.

The other factor emerging from the PCA was Stay in Place. Contrasting with observation on intentions to move, agreement on Stay in Place *increased* with increasing time lived on the coast, p<0.0001 (F [5, 736] = 5.93), and increasing age, p=0.04 (F [3, 738] = 2.81). Household income and educational attainment did not have an effect on intention to stay in place. Those who had evacuated (M=-0.064, SD=0.97) were more likely to consider moving than those who stayed in place (M=0.13, SD=1.05); t(642)=-2.13, p=0.03. Gender and ethnicity did not show effects. Increasing distance from the Hurricane Matthew High Water Mark was weakly negatively related to expressed intentions to stay in place, p=0.02 (F [1, 740] = 5.59). Elevation above MHHW did not exhibit an effect. Again, this suggests that closeness to the ocean is more likely to result in intentions to stay in place.

It might be expected that the decision to move away from the coast or stay in place would be related to people's original reasons for living on the coast. For our respondents, those reasons fell into three groups—the attractions of the coastal lifestyle, attachment to family and friends, and practical issues such as the location of a job or the choice of a good place to raise children. Conversely, their reasons for considering moving away fell into three groups—loss of the coastal lifestyle they valued, loss of the family ties through children and friends moving away, and the pragmatics such as cost of living. Even so, there is strong agreement with any statements relating to staying in place and disagreement with those relating to moving away. Our interviews bore out and underscored people's reluctance to consider moving away (table 6.9).

It seems from the above analysis that respondents' motivations for moving or staying are complex, interrelated, and highly context dependent. It might also be expected that people's intentions to move away from the coast or stay in place would be affected by their expectations for climate-

Table 6.9. Interviewee intentions to stay or move away from the coast. Data by Meredith Welch-Devine.

	No.	
Will not consider moving	30	45.50%
Will consider moving if I suffer catastrophic damage	11	16.70%
Will consider moving for mild to moderate climate-related changes	14	21.20%
Will consider moving for other personal reasons	11	16.70%
TOTAL	66	

related change, in this case sea level rise or increased frequency of damaging storms. While intentions to move away are positively related to expectations of both sea level rise (r[741] = 0.15, p<0.0001) and severe storms (r[741] = 0.17, p<0.0001), those values are small. Intentions to stay in place show no significant relationship to either climate-related factor.

Our interviews of coastal residents yielded additional insights. In response to questions about their expectations for the future, many respondents replied to the effect of, "If it started happening every year I'd move" (e.g., C22/23, M20/21) or "If my home were completely washed away, I'd move" (e.g., C07, M24), and many of those respondents think it may happen at some time—just not necessarily within their lifetimes. Those who were directly impacted by Hurricane Matthew are clearly more motivated to move away:

> C11: I am not going to live on Tybee again. . . . Everything is changing, and a hurricane did come to Tybee, and it was a bad hurricane. Also, another thing that would happen was if it rained and it was a high tide, I would have to pull the sandbags in front of the . . . you know. I just can't live like that. And, seriously, for me? Once I experienced a flood, I don't want to do that again. I just am not going to put myself back there. And I feel really bad because I miss Tybee a lot. If I feel like it's in my heart, but . . . I can't.

> C05: I can see climate change in my backyard, with the amount of water that comes in on the spring king tide. It's no longer down the bank, it's up in my yard now, so my wife and I are moving. . . . My daughter lives in XXXX, and the primary reason is to be closer to them. But my wife and I have been through eight hurricanes now. . . . and this one was pretty bad for us. . . . And then the third thing is climate change, getting away from the coast where, as I understand it from the research I've read, hurricanes aren't getting more frequent, but they're getting bigger and heavier. Stronger storms. So that's why we're going up there.

Intentions to Move Away

The Theory of Planned Behavior anticipates that behavioral outcomes are shaped by the attitudes that respondents bring to decision-making about eventual migration. The first step in investigating these relationships is via correlations of Attitudes toward adaptation responses and migration-related Behavioral Outcomes—Intentions to Move or Stay in Place.

Respondents' intentions to move away were strongly positively related to respondents' attitudes of entitlement ($r[741] = 0.25$, $p<0.0001$), very strongly to their attitudes of personal responsibility ($r[741] = 0.55$, $p<0.0001$), and less strongly to their appreciation of government assistance ($r[741] = 0.11$). Their intentions to stay in place were moderately positively related to attitudes of entitlement ($r[741] = 0.28$, $p<0.0001$) and appreciation for government assistance ($r[741] = 0.23$, $p<0.0001$) but moderately negatively related to their attitudes toward taking personal responsibility ($r[741] = -0.12$, $p<0.0001$). While most of these correlation values are modest, Analysis of Variance reveals the strong relationship of intentions to move away with attitudes of personal responsibility, $r^2 = 0.30$, ($F [1, 740] = 320.49$, $p<0.0001$).

Mitigating Variables, Social Norms, and Perceived Behavioral Control

The behavioral intentions that were expressed were not solely shaped by respondents' values. The Theory of Planned Behavior proposes that respondents' behavioral intentions would reflect the opinions of those around them: family, friends, and trusted community figures who shape the way we behave. In addition, our perceptions of our own abilities to undertake actions shape the actions we consider making.

Our survey asked respondents to tell us what people like them and people they respect are thinking in regard to sea level changes and increased storm severity and frequency, i.e., social norms with respect to climate-related change (table 6.10). We similarly asked people about their capacity to respond, i.e., their perceived behavioral control (table 6.11).

In each case, we again performed Principal Components Analysis to identify a small number of factors to stand in for responses to these individual variables and to be used in subsequent analyses. Three factors emerged from the analysis of Social Norms, explaining 63.8 percent of variance. Reluctant to Move is composed of expressions where people disagree with the idea of moving. Stay in Place is composed of expressions that embrace staying in place. Climate Skeptic includes two expressions that question whether change is occurring. Cronbach's Alpha for the five items in Resistant to Move was 0.79, generally regarded as Good; 0.64 for

Table 6.10. Investigating social norms. Factor groupings: [R] = Reluctant to Move, [S] = Stay in Place, [C] = Climate Skeptic. Data by Brian Orland.

	Disagree / Strongly disagree	Agree / Strongly agree
Most people like me worry about having to leave their homes [R]	26.5%	49.3%
Most people like me believe sea level rise will force us out of our homes [R]	38.6%	30.3%
Most people whose opinions I value will move to a safer part of this community [R]	33.3%	29.5%
Most people like me are thinking of moving in the next five years [R]	42.7%	28.6%
Most people like me will choose to move to a new community [R]	41.2%	26.8%
Most people like me will do what is needed to stay in their homes [S]	8.7%	66.5%
Most people like me expect to be living in the same home twenty years from now [S]	30.9%	46.6%
Most people whose opinions I value expect to ride out any storms [S]	25.7%	45.6%
Most people whose opinions I value are not concerned about sea level rise [C]	30.1%	35.8%
Most people whose opinions I value expect the climate to remain as it is [C]	35.6%	30.2%

Climate Skeptic, a low score; and 0.57 for Stay in Place, which indicates the individual variables comprising the factor were not strongly related (Pairwise correlations 0.25 to 0.37), although the correlation probabilities were all significant at $p < 0.001$.

Three factors also emerged from Perceived Behavioral Control, explaining 54.08 percent of variance. Cronbach's Alpha for the three items in Personally in Control was 0.58, generally regarded as a low score; 0.52 for Seek Advice, a poor score; and 0.54 for Victim of Circumstances, also poor. Pairwise correlations within factors are between 0.14 and 0.38, correlation probabilities were all significant at $p < 0.001$

Accordingly, we examined the relationships between the factors comprising Social Norms and Perceived Behavioral Control and the actions that might be taken in response to climate-related change—Intentions to Move or Stay in Place. For each of these factors, tables 6.12 and 6.13 present the correlation values, r, and Analysis of Variance for each interaction with the factors of Social Norms and Perceived Behavioral Control.

Table 6.11. Investigating perceived behavioral control. Factor groupings: [C] = Personally in Control, [A] = Seek Advice, [V] = Victim of Circumstances. Data by Brian Orland.

	Disagree / Strongly disagree	Agree / Strongly agree
Any choice about moving is up to me [C]	12.5 percent	69.2 percent
I am confident that I'll be able to move if that becomes necessary [C]	14.5 percent	65.5 percent
I will not have a problem moving to a new community if that becomes necessary [C]	21.9 percent	57.1 percent
I'll research authoritative sources to decide if it is necessary to move [A]	11.4 percent	64.7 percent
I can wait until later to make any decision about moving [A]	11.2 percent	60.4 percent
I'll seek advice from people important to me before deciding to move [A]	16.7 percent	59.1 percent
It will NOT be easy for me to decide to move if the time comes [A]	29.5 percent	49.6 percent
I will be able to recover from any damage my home suffers [V]	24.7 percent	43.1 percent
I'm concerned that I'll be forced to move by unexpected events [V]	32.3 percent	38.0 percent
I will NOT be able to pay for protection to allow me to stay here [V]	31.0 percent	36.8 percent

Table 6.12. Behavioral outcomes: intentions to move away. **Bold indicates strong associations**. Data by Brian Orland.

		r	r²	df	F	p
Social norm	**Reluctant to move**	**0.59**	**0.34**	**1,740**	**385.28**	**<0.0001**
	Expect to stay	-0.28	0.08	1,740	63.18	<0.0001
	Expect no change	0.06	0.003	1,740	2.48	0.12
Perceived behavioral control	Personally in control	0.19	0.04	1,740	27.75	<0.0001
	Will seek advice	-0.03	0.001	1,740	0.77	0.38
	Victim of circumstances	**0.40**	**0.16**	**1,740**	**137.26**	**<0.0001**

Table 6.13. Behavioral outcomes: intentions to stay in place. **Bold indicates strong associations**. Data by Brian Orland.

		r	r²	df	F	p
Social norm	Resistant to move	0.02	0.00	1,740	0.39	0.39
	Expect to stay	**0.44**	**0.20**	**1,740**	**180.05**	**<0.0001**
	Expect no change	0.12	0.01	1,740	11.04	0.0009
Perceived behavioral control	Personally in control	-0.05	0.002	1,740	1.69	0.19
	Will seek advice	**0.41**	**0.17**	**1,740**	**147.90**	**<0.0001**
	Victim of circumstances	0.002	0.00	1,740	0.004	0.95

Figures 6.4 and 6.5 show these associations. In these four cases, the relationships are evident and strong. Residents' stated intentions to move away in response to anticipated change (figure 6.4) are strongly positively related to the same kind of decisions being made by the significant influences around them—family, friends, and respected community figures. They are also strongly positively related to respondents' feelings that they won't be able to pay for protections to allow them to stay and that they might be forced to move by unexpected events. Their intentions to stay in place (figure 6.5) are strongly positively related to the same kinds of intentions among those around them whose opinions they respect and value. They are also strongly positively related to Seek Advice, which is composed of agreements that they would do research or wait until later because it is not easy to make such decisions.
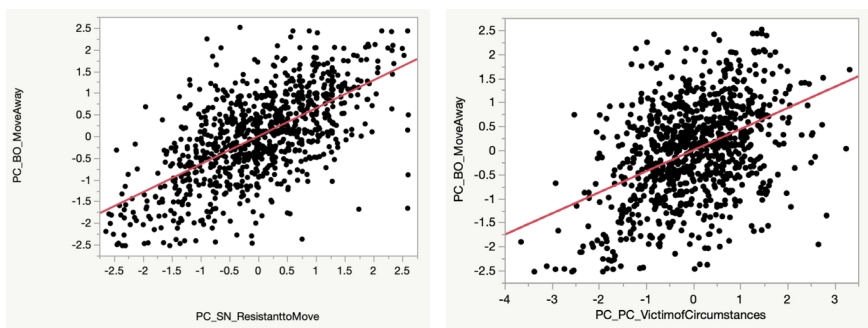

Figure 6.4. Intentions to move away versus (a) social norm, resistant to move, (b) perceived behavioral control, victim of circumstances. © Brian Orland.
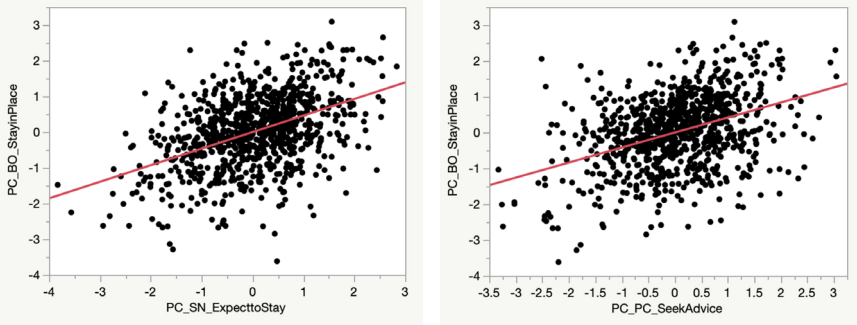
Figure 6.5. Intentions to stay in place versus (a) social norm, expect to stay, (b) perceived behavioral control, seek advice. © Brian Orland.

Discussion

The amenity and quality of life aspects of living on the coast contribute strongly to respondents' reasons for living on the coast and the changes that would make them consider moving. Natural beauty, the pace of life, recreational opportunities, and sense of connection all contribute strongly, and the potential loss of those as factors in deciding to move away all suggest that quality of life is a dominant consideration. While family and friend connections, growing up in the area, and being a good place to raise kids were positive contributors to wanting to stay on the coast, agreement on these was less emphatic. Economic issues such as investment opportunities and jobs were also less important. Demographic differences were related in expected but not substantial ways. Older, wealthier, and better-educated residents were more in agreement that lifestyle issues were important to their decisions to live on the coast than family, friend, and economic ones. African Americans and females found family and friends more important in their decisions. However, there were no demarcations of sufficient clarity or significance that might indicate an opportunity for policy intervention to incentivize migration to safer areas.

People's expectations for the future similarly appear little affected by demographic or locational factors (table 6.6). They are equally concerned about the potential effects of both sea level rise and increased storm damage on the region, and equally so regarding the personal impacts of storm damage, but are less concerned for the personal impacts of sea level rise. Hurricane Matthew's damage was significantly more widespread than flooding, and potential flood areas are a relatively small proportion of our entire six-county study area. We had also expected that location would

have an effect on people's willingness to consider moving away, especially those closest to the water (distance to MHHW and elevation above MHHW) or who may have experienced flooding (distance to HWM). In fact, we were surprised that those more distant from the shore were more likely to consider migrating than those who lived closer, as shown by the relatively strong negative relationship between distance from the coast and the importance of lifestyle factors in choosing to live in the coastal region. The explanation lies in the roles that lifestyle amenities of the shore play in people choosing their shoreline or close-to-shoreline homes, and those considerations outweigh the practical issues of flood or storm damage hazard. It may be that wealthier people can afford to adapt to those hazards or that advanced age means that the next impact may not occur in their lifetime. Individual interview responses underscore those attitudes:

> P02: In fact, the storm hasn't changed our thinking about living here. We still look at it as a long shot. That's what life is about, really. You make your choices and hope they work out. Sometimes they do, and sometimes they don't. We played the odds by moving here, so after four years, we got hit. Maybe it'll be another hundred years. . . . I'm not a scientist, but based on what I read about climate change, chances are we'll probably have more disruptive weather, more violent weather. If it became a once-a-year or twice-a-year thing, we're both sixty-nine years old. We might think about moving somewhere, but I don't know where. . . . I think this island will be in serious jeopardy in the future. It's sad to say because it's such a beautiful place. But long term? Not during my lifetime, I don't think. I certainly think that this will not be a habitable island in the not too, too distant future.

Attitudes were strong regarding staying in respondents' current homes. They would take the necessary protective measures and not expect to relocate. This response may be shaped by their experience of weathering a hurricane (Matthew) that inflicted less damage than expected throughout the region. Very exposed locations were impacted badly, but those were few. There are strong feelings among our respondents that government should do more to protect homes and equally strong feelings that government should not help people move elsewhere. Government plays a challenging role in these coastal locations, where some do not accept that sea levels are rising (6 percent in this survey) or damaging storms becoming more frequent (5 percent), yet they are expected to plan for and invest in protecting communities.

While the actions that might be taken by respondents grouped strongly into intentions to move away or to stay, there were few demographic or distance factors that might have shaped those decisions. Older, wealthier, and better-educated residents were less inclined to move away, and African Americans were more likely to consider moving. Some of these

observations run counter to the expectation that wealthier people would have the means to move away whereas African Americans are likely to have less means and the stronger ties to family expressed in our survey that might keep them in place.

The Theory of Planned Behavior framework was helpful in thinking about how the attitudes held by coastal residents would convert to intentions to act in response to climate-related change. What was surprising was the strength of the mitigating factors of Social Norms, the way that influential people around you shape your actions, and Perceived Behavioral Control, the extent to which people feel they have the means or ability to take action. The Social Norm "Reluctant to Move" was highly related to intention to move away, a factor composed of intentions to move but under duress—"if my home is threatened," and negatively "back to where I moved from," as was the Perceived Behavioral Control factor where respondents expressed their fear they will be forced to move by unexpected events and may not be able to afford protection. The Social Norm "Expect to Stay in Place" was highly related to intentions to stay in place. The Perceived Behavioral Control "Will seek advice" was also highly related—the constituent variables, "I'll research authoritative resources," "It will NOT be easy for me to decide . . . ," and "I can wait until later to make any decision," taken together resemble procrastination, and may thus lead to respondents remaining in place.

Conclusion

Our research has produced four major findings. First, people do not expect to migrate in the face of climate-related change; the overwhelming expectation is that people will do all they can to stay in place. Second, quality of place expressed as natural beauty and offering recreational opportunities plays a larger role in thinking about the future than demographic variables or economic or social ties. Third, those further from the ocean and the reach of storm flooding are more likely to consider future migration—the amenity of the coast is a strong "pull" factor. Finally, the oldest, wealthiest, and best educated residents are less inclined to move away from the coast than younger, less wealthy, and less educated cohorts.

The intent of this study was to explore less-studied aspects of the decisions shaping possible future migration away from the coast as well as to revisit those demographic and distance variables that are more familiar. In doing so, however, it raises further questions. One overarching observation relating to the title of the chapter is that people's individual values,

attitudes, and resulting actions are hugely variable. We treated age as a four-level categorical variable (18–24, 25–44, 45–64, and 65+), household income as a seven-level variable (25,000 through to $150,000+), and educational attainment as a seven-level variable (from not finished high school to graduate degree). For each, responses toward several factors, such as reasons to live on the coast or to move away, attitudes to climate-related change, and intentions to move away, showed that the highest category of age, income, or education behaved differently. The oldest, wealthiest, and best educated frequently responded "out of line"—less influenced by coastal qualities of natural beauty and recreation, less intentions to move than younger, less affluent, and less educated cohorts. The significance of this lies in the fact that those characteristics tend to describe the people most likely to shape policy, direct resources, and argue persuasively for the outcomes they desire. We do not have detailed enough information to chase this idea further, but we should be concerned if the values and actions of decision-makers diverge from those of the public at large.

Although it should come as no surprise that quality of life and lifestyle issues are central to the attractiveness of the coast, we observed a perplexing trade-off, that resistance to moving away *increases* as distance to open water *decreases*. Homes and businesses may be exposed and vulnerable to sea level rise and storm damage, but until the problems arrive at the property there is no reason to leave the environment you value.

We heard these same kinds of seemingly contradictory, yet logical in their context, statements numerous times in our interviews. Sometimes the decision to stay in place is driven by attachment, sometimes by lack of means to move, sometimes by the knowledge it can easily be rebuilt, sometimes by inability to make the decision to move. Policy to date has often been based on simplification of maddeningly complex situations. Policies impose lines on the ground, define segregations of the population, and assume that attitudes once held are permanent and immutable. Our work demonstrates that simplified views are not adequate as a basis for policy development. Even so, while our survey responses hint at the various threads and pressures at play, the synoptic view of traditional quantitative analysis also hides the richness of local variability, including the local holdout who is nevertheless key to understanding and responding to the conundrum of how or whether to help communities that may prefer to be left alone:

> **M09:** I think it's [sea level rise] on the way. I think with everything getting warmer and warmer, the winters not being as cold, I think that's causing it. . . . But I'm not moving. I'm not moving anywhere, so definitely not that. . . . It's just home.

Acknowledgments

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