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Testing the Waters: The Social Contexts of Homeowner Flood Mitigation

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Testing the Waters

The Social Contexts of
Homeowner Flood Mitigation

A Thesis

Submitted to the Graduate Faculty of the
University Of New Orleans
in partial fulfillment of the
requirements for the degree of

Master of Arts
in
Sociology

by

Maggie L. Olivier

B.A., University of Louisiana at Lafayette, 2005

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Abstract

South Louisiana regularly experiences effects from flooding. This study looks at what homeowners are doing to reduce their losses from floods through the practices of flood mitigation. I developed four hypotheses to predict homeowners' mitigation behavior. (1) Homeowners with a history of flooding are likely to mitigate more than those without previous flooding. (2) High-disposable-income homeowners are more likely to mitigate than low-disposable-income homeowners. (3) The stronger the place attachment among homeowners, the higher the likelihood they will mitigate. (4) Homeowners who have experienced effective mitigation measures in the past are more likely to mitigate than those who have not. To test these hypotheses, a survey was administered in five different neighborhoods throughout Orleans and Jefferson parishes having high concentrations of repeatedly flooded homes. The findings suggest severity of past flooding, disposable savings, strong relationships with neighbors, and discussion of flooding with neighbors are the strongest predictors of flood mitigation.

Keywords and Phrases:

Flooding
Homeowner mitigation
Place attachment
Repeatedly flooded homes

Chapter 1: Introduction

New Orleans. The name of this world-renown city is often spoken with excitement and wonder. New Orleans! The smell of beignets wafting through the air as one passes Café Du Monde on Saturday morning in the French Quarter makes one think of life's simple pleasures. A view of the Crescent City Connection spanning the Mississippi River as its lights shimmer above the water make the walk along the riverfront seem almost magical. The taste of the cuisine is unsurpassable with gumbo or red beans and rice flavored in such a fashion that locals can't live without it and tourists are hooked after just one bite. The fall is filled with exhilaration from the weekly Saints games and ongoing chants of "Who dat! Who dat!" February rolls around with Mardi Gras, and costumes and parade floats fill the streets. King cake is available at every bakery in the city, even at the local grocery stores. People from all over the United States make their way here annually to experience Jazzfest and Voodoo Fest in April and October, respectively. On Sundays, one side of Lakeshore drive shuts down so that traffic doesn't interrupt the social gatherings along the lakefront. City Park is covered in century old oak trees, blocking enough sun that a brisk walk in the late afternoon requires a light jacket. Jazz rings out of every corner of Bourbon Street as beads bombard those walking along. Buskers put their hats down for tips as they perform their talents. The streetcar gliding through St. Charles Avenue transports passengers throughout the Uptown area. These are images that come to mind when people think of New Orleans or the experiences they have had here.

Place is a powerful thing. It becomes a part of the identities of those who create it. To exemplify this claim, Edward Casey quotes Contra Descartes as he states, "place is regarded as constitutive of one's sense of self...there is no place without self and no self without place" (2001a:684). People are the character of place. They differentiate place from space or site by

adding culture and life. “A site possesses no points of attachment onto which to hang our memories, much less to retrieve them...place, in contrast, characteristically presents us with a plethora of such cues” (Casey 1987:186). The same description can account for the differentiation of house, the physical structure in which people live, and home, the place where people create memories and feel comfortable, safe, and attached. In his book on place memory, Casey (1987) discusses how place is the root of memories. Hence, victims of devastating floods such as Hurricane Katrina who lose their homes or are displaced for any period of time can easily become disoriented by losing a sense of place, thus losing a sense of self (Casey 1987). Edward Casey furthers this notion that a home, one in which the inhabitant spent a majority of his/her childhood, embodies more than a personal dwelling, it is essentially a part of their identity and the memories of the experiences that made them who they are:

A house, especially one that has been our childhood home, is certainly not a simple location, for such a location cannot effectively contain memories. Instead, in its prehensive power, a house serves as an active enclosure for the most cherished—which is to say, the most intimate memories of place. (Casey 1987:213)

New Orleans has been home to people from all walks of life. Those who were born here, stay here. Those who visit do not want to leave. What is it about New Orleans that draws people near? There is something different here; something very special and the people who live here feel it. They are embraced by it. They are attached to this place. The music, food, dancing, entertainers, festivals, celebrations, parks, oak trees, lakes, the Mississippi river, and superdome are all integral components of the City of New Orleans that pull people in.

Another image that is integral to New Orleans is flooding. Long before Hurricane Katrina, flooding was a major problem in the New Orleans metropolitan area. Flooding affects the culture and life that exist in this area. Residents’ memories and experiences keep them here,

a site that was developed from a drained swamp, protected by levees since first inhabited, and that has suffered numerous floods ever since. Despite the reality of flood troubles, people stay here. The theory of place attachment helps researchers make sense of reasons people remain in a neighborhood or area that has been flooded over and over again. Edward Casey describes “‘place panic’-that is, the special anxiety occasioned by being out of place or losing one’s place” as a condition “that every human being knows to some degree, each of us having been displaced at some point in our lives”(2001b:721).

How can New Orleans residents protect themselves from inundation so that they can stay in a place they feel is home? Many residents have learned to adapt to the frequent flooding by making changes to their homes and properties in hopes of keeping their flood losses low while others have not and are tired of dealing with flooding; yet, for whatever reason, they do not leave the area. A major purpose of this study is to look at what residents are doing to stay safe that will enable them to remain in a place to which they feel so attached. This study will attempt to explore how place attachment effects homeowners’ decisions to mitigate. It will also explore what other variables effect homeowners’ decisions to mitigate.

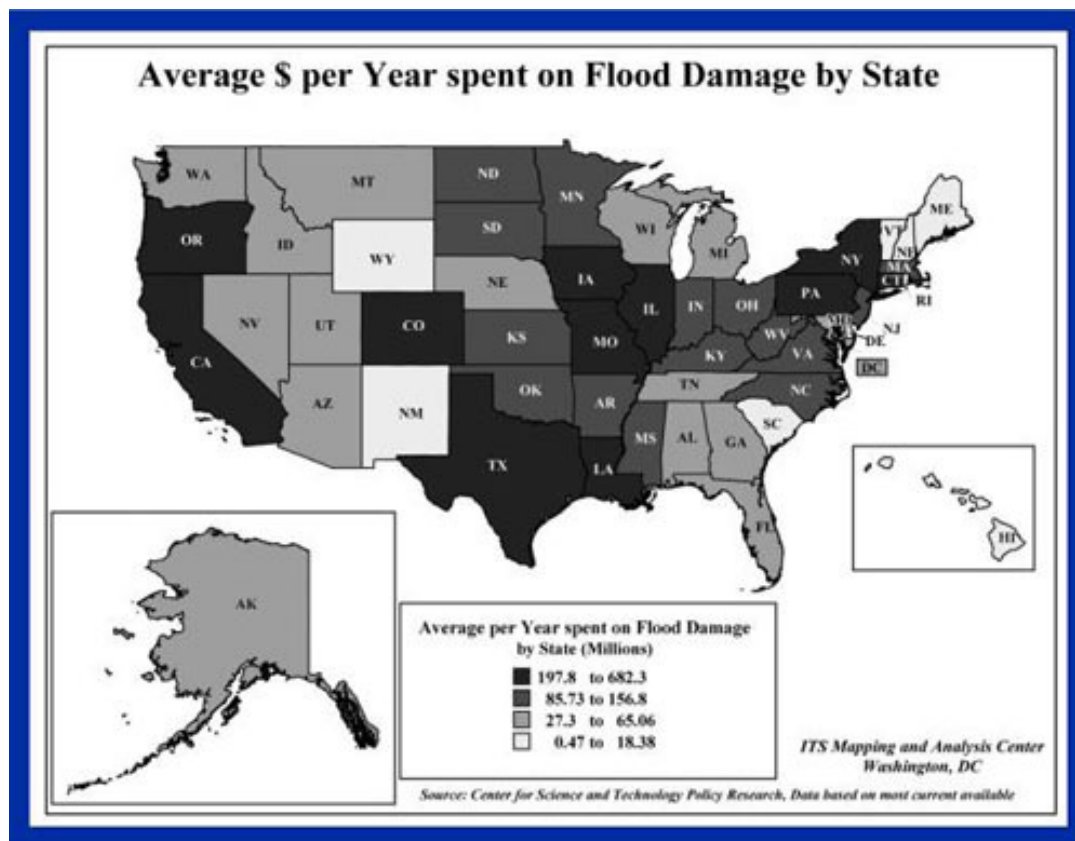
Problem Statement

The goal of this study is to unmask residential flood mitigation decisions of homeowners living in flood-prone areas. People living throughout the United States suffer from floods, the country’s most common natural disaster (Flooding: America’s, 2004). Residential flooding is a monumental problem for Orleans and Jefferson parishes in particular. Homeowners continually experience damage from flooding to the contents of their homes and physical structures. Some homeowners turn to flood mitigation or make protective changes to their homes as a way to counteract the negative impacts of flooding. While homeowner mitigation cannot stop the streets

from flooding, it can reduce the amount of damage people experience in their homes from the invasion of water. Federal, local, and private funds are constantly spent on flood recovery efforts whether due to a massive flood, such as the one that resulted from Hurricane Katrina, or everyday shallow floods that follow a heavy downpour. Sadly, there are economic, social, and emotional repercussions every time floodwaters enter a home.

Louisiana is the recipient of the majority of money annually spent on flood damages nationwide, with an average of \$198 to \$682 million spent per year (see Figure 1). While street flooding cannot be stopped, the amount spent on flood damage can be lowered drastically if more people prepare their homes for flooding by participating in mitigation efforts.

Figure 1- Average \$ per Year spent on Flood Damage by State



Retrieved from <http://www.fema.gov/areyouready/flood.shtm>

Decision-making is rarely an individual task. From small decisions such as what to wear on a first date or where to eat dinner to more critical decisions such as deciding on a career path or continuing to live in a place that is repeatedly flooded, decisions are almost always an interactive process of discussing possible solutions and their outcomes. Many factors go into decision-making when choosing whether or not to adopt flood mitigation measures.

Research Questions

Based on knowledge of the problem and the material reviewed, the following research questions emerge: (1) Are homeowners protecting the neighborhoods, homes, and/or properties in which they live from future flooding? (2) How are homeowners protecting their neighborhoods, homes, and/or properties from future flooding? (3) What factors affect a homeowner's decision to participate in mitigation activities?

In an attempt to answer these questions, I developed a survey instrument to measure homeowners' attitudes and behaviors toward flood mitigation and to evaluate the predictors of mitigation decisions. An ambition of this study is to have the information collected to contribute to making mitigation a viable and economically feasible way for homeowners to protect themselves from future losses due to unwanted flooding. Additionally, a goal of the study is to assist in increasing of mitigation activity that will reduce the overall costs of flood destruction for the nation and allow residents to continue to live in a place they call home.

Significance of Research

There are many advantages to mitigating. Homeowners make their flood-prone communities safer places to live, and save themselves and the National Flood Insurance Program money for flood recovery. To illustrate, the 20,000 communities currently participating in mitigation allow for a savings of \$1.1 billion annually to our nation in prevented damages

attributed to floods (Mitigation's Value 2007). Mitigation also aids in a speedy recovery after flood occurrences because housing standards set forth by the NFIP diminish flood damage. Residents who have flood insurance are able to protect their assets. For instance, over 200,000 insured victims of Hurricanes Katrina and Rita were granted \$23 billion in flood claim payments by FEMA to replace their homes and personal belongings. As evidenced by results of a recent Multi-hazard Mitigation Council study, the general public, as in taxpayers, saves an average of four dollars for each dollar spent on mitigation. It is implied that the financial impacts on an individual, community, and the whole of society are not so harsh when mitigation is involved (Mitigation's Value 2007).

Purpose Statement

The purpose of this study is two-fold. It will attempt to test the theory of place attachment by looking at how attachment to place affects the mitigation behaviors of those living in flood-prone areas while also measuring what predictors influence people to mitigate their homes from flooding. This quantitative study will engage the challenge of studying human behavior while recognizing that the knowledge ascertained cannot be purely positive, rejecting the idea of one absolute truth (Creswell 2003). This is known as the postpositivism paradigm.

This topic is important to study because this area knows the repercussions of flooding far too well, particularly of catastrophic magnitude. Three years post-Katrina, homeowners are continuing to struggle with displacement and the issues faced to get back in their homes. Discovering what homeowners think and feel about mitigation enables researchers to approach mitigation outreach from a different angle that may promote measures of mitigation that can be affordable and accessible to as many homeowners as possible. This knowledge can help prevent New Orleans' residents from experiencing the destruction that resulted from heavy rain events

and disasters, and hopefully be applied to the mitigation approaches for all types of disasters experienced all over the world.

Chapter 2: Literature Review

Introduction

Gladwin, Gladwin and Peacock (2001) present an article that models hurricane evacuation decisions that can be applied to mitigation decisions. The authors explain the difficulties decision-makers struggle with when deciding on whether or not to evacuate:

The model captures the complexity and messiness of real-life decision-making by including criteria showing how people are constrained by their perceptions of the hurricane, the safety features of their homes, the time they have available to prepare for the hurricane, their age, and the reactions of other family members who are also deciding whether or not to evacuate. (Gladwin et al. 2001:136)

The decision on whether to mitigate one's home is definitely a complex one as well. The dependent variables are whether or not the homeowner has mitigated, an index variable of mitigation actions excluding elevation, and the action of elevation. Mitigation itself will be discussed briefly. There are many factors that a person weighs when deciding to partake in flood mitigation. An overview of the literature enabled me to select pertinent factors to measure that have been reported to influence mitigation. These factors serve as the independent variables or possible causes or predictors of mitigation decisions. The independent variables discussed in this study include prior flood experience, income, place attachment, personal responsibility, self-efficacy, and prior flood mitigation effectiveness.

Mitigation

Flood mitigation as focused for this study involves all action taken prior to, during, and after a flood event to minimize its effects on personal property. The practice of mitigation also strives "to reduce the personal and community disruption, economic expense, and bodily harm engendered by floods (Laska and Wetmore 2000:268). Pre-event mitigation activity is ideal because it is designed to provide the greatest amount of anticipated flood protection. This is

because floodwaters are unlikely to reach inside a mitigated house, especially an elevated one. The trend, however, has been the opposite of this logic. Homeowners do not often consider mitigation until after a devastating experience.

Mitigation can take many forms. For instance, a person can avoid common flooding by inhabiting a home not located in a floodplain. This greatly reduces the chances of falling victim to floodwaters. Another option is to strengthen a home located in the floodplain by retrofitting or altering a structure in a manner that would protect it from future damage (Board on Natural Disasters 1999). For the purposes of this project, retrofitting is the form of mitigation activity that will be studied since all the homes in the study area are located in the floodplain.

Retrofitting involves modifying an existing structure to protect it from flooding as well as from other hazards. FEMA identifies six types of retrofitting suitable for houses. They are: elevation, wet floodproofing, relocation, dry floodproofing, floodwalls, and demolition/rebuild (FEMA 1998). When deciding which mitigation measure best suits a person's house, the homeowner has to consider the home's construction type, type of foundation, lowest floor elevation, and overall condition of the home. With these conditions in mind, deciding which measure is best for the structure "will be based primarily on legal requirements, the technical limitations of the methods, and cost" (FEMA 1998:65).

Elevation is very common as well as costly and time-consuming. Elevating a house means raising the lowest floor of a house to or above the Base Flood Elevation so that floodwaters flow beneath the floor as opposed to into the house. The walls and contents of a person's home, in effect, stay dry during a flood (FEMA 1998). However, the higher the house is raised, the more vulnerable the roof and walls are to strong winds that are present during a hurricane. While elevation appears to be a sound form of mitigation as it raises a house out of

harm's way, Laska and Wetmore (2000) found that many residents feel that partaking in mitigation measures such as elevation will affect their property's value, thus hindering the decision to elevate one's home.

A retrofitting method that is not very common, but can be relatively inexpensive is wet floodproofing. To wet floodproof a house is to make uninhabited areas of the house and its contents resistant to flood waters that enter the space. This is common for basements, a feature not found in Orleans or Jefferson Parishes. However, the historic district neighborhood Broadmoor in Orleans Parish is known for its *raised* basements. Homeowners use the second floor of the home as the first floor of living space thereby alleviating the chances of incurring flood damage in the living space. An example of wet floodproofing is to elevate household appliances such as water heaters, A/C units, or a washer/dryer off the floor level so that they are not damaged when a flood occurs (FEMA 1998).

Of all retrofitting methods, relocation may be the most effective because the house is literally moved out of the flood zone. The house is jacked up and driven to a new site on higher ground where it will not be exposed to damaging floodwaters (FEMA 1998).

Dry floodproofing uses the structure of the house as a barrier to keep floodwaters out by sealing the exterior walls with impermeable coatings. This type of retrofitting works best for homes suffering from shallow flooding since water reaching levels greater than three feet can cause the walls to collapse as the hydrostatic pressure building up outside the house become too much. The house's construction type is of critical importance with this retrofitting method (FEMA 1998).

Floodwalls are personal barriers surrounding an individual property. Usually not exceeding four feet, a floodwall serves the same purpose as sandbags; only a floodwall's

concrete or brick perimeter is permanent and cannot be penetrated by water. Construction of a floodwall requires enough space between houses to accommodate the size of a floodwall. Also, someone must attend to filling in the entry gap with a steel sheet for it to be effective during an event (FEMA 1998).

When a house has incurred so much flood damage that it would be cheaper to tear down the house than to repair it, demolition/rebuild, now referred to as reconstruction, occurs. The house is demolished and then replaced with a stronger, disaster resistant home of a similar size and style (FEMA 1998).

There are also many informal types of mitigation such as raising the water heater or A/C unit or installing a drainage pipe in the yard to transport water from a person's backyard to the storm drains on the streets. However, these mitigation measures are dependent on the homeowner's willingness to pay for and implement the changes themselves. Brenkert-Smith, Champ and Flores (2006) found that for residents dealing with wildfires, "changes to homes such as siding, roofing, and windows were preferred tactics and the items had been or would eventually be replaced, usually on a timeline dictated by personal finances" (765). This implies that the homeowners who partake in mitigation are highly motivated to protect their homes. Lack of mitigation can be particularly dangerous for a community in the event of a disaster. Howard Kunreuther termed the phrase "natural disaster syndrome" to describe the "combination of underinvestment in protection prior to the event and liberal use of taxpayers' funds after a disaster" (Kunreuther 2006:1). This syndrome relates to homeowners' decisions of mitigation or lack thereof. Because disasters have low-probability of occurring, many homeowners do not see the point of voluntarily investing in measures of protection. However, these same homeowners assert that they wish they had implemented mitigation measures after they are victims of a

disaster. With increasing development right outside of man-made levees and lack of protective measures, disasters can cause catastrophic losses. Reasons why people choose **not** to adopt mitigation measures include: can't justify paying for mitigation when disaster probability is perceived so low; individuals usually only consider short-term benefits of saving costs as opposed to long-term; many homeowners are constrained by their limited budgets; interdependency on neighbors; and expectation of disaster relief money from the government after a disaster is argued as a component, though empirical research suggests people do not base their decisions on this expectation. Also, the NFIP is available, but not always sought. The challenge then, Kunreuther explains, is to convince homeowners to want to participate in mitigation activity.

Mitigation is far too often disregarded because individuals lack the willingness to admit that they are in harm's way. The perception of risks often goes unnoticed unless there are effective information sources that can heighten a homeowner's awareness level as explained in the study on the impact of information and risk perception on hurricane evacuation (Burnside, Miller and Rivera 2007). This follows the "out of sight, out of mind" mentality. Flood protection is brushed under the carpet until a disaster strikes, and suddenly, these individuals cannot ignore the problem any longer. Dennis Mileti (1999) backs this idea by stating that individuals are flawed for, "planning only for the immediate future and forecasting that future mainly on the basis of the immediate past" (137). Mileti and Darlington (1995) found that a written brochure on the prediction of the next "big" earthquake in central California yielded a high societal response and was very effective in motivating local residents to prepare for the impending event. This article suggests that warning the public prior to a predicted flood event should increase mitigation activity of those in the predicted area. In addition, Mileti and

Darlington 's (1995) study found that the most likely to be prepared were the ones with recent damaging earthquake experience, mitigation was taken by neighbors and friends, and those who had mitigated before receiving the prediction. Similarly, Hurnen and McClure (1997) claim that their research suggests that earthquake preparation does increase, as risks are known as well as the consequences of that hazard.

While many disaster studies have been done, relatively few have been conducted on mitigation practices. This suggests that there is a low interest in mitigation.

Also, not much literature was found on mitigation that analyzed demographics such as age and educational level, or legal requirements and their effects on homeowners' decisions to mitigate. I now discuss the independent variables.

Prior Flood Experience

The literature on risk perception guided the study towards measuring homeowners' prior flood experience. This enables homeowners to see their risk through lived experiences. These experiences can then serve as a possible indicator of mitigation activity. Individuals with experience of prior flooding positively relates to the increase of homeowner flood mitigation as indicated in a study on the adoption of mitigation measures (Laska and French 2000; Sims and Baumann 1987). In some instances, the structure may have flooded several times before the current owner inhabited the home. It is the experience of the owner as well as the house that must be considered. Perhaps the current homeowner never personally dealt with a flooded home, and may not be so apt to prepare for the possibility of future flooding. On the other hand, the homeowner may have flooded previously in a different home and is more aware and willing to adopt mitigation measures to prevent future flooding in the new home.

Flooding can be broken down into the frequency, depth, and duration of standing water experienced by a homeowner. If the water from frequent flooding is shallow and stays in the house for just a few hours, the homeowner is likely to mitigate to protect his/her furniture and save money from not having to continually replace the furniture flood after flood (Sims and Baumann 1987). On the other hand, a homeowner may not mitigate if the experienced flood was a deep, long duration flood such as Katrina because that type of flooding may not happen again in his/her lifetime. These experiences affect the decision to mitigate.

Income

Income is a major predictor of mitigation. Mitigation measures cover a wide range of costs from as low as a few hundred dollars to as high as \$100,000, depending on the structure being modified and the type of mitigation implemented. Because many homeowners struggle with budget constraints, paying for mitigation out-of-pocket is mostly not feasible. Rogers (1963) found that monetary resources correlate highly with innovativeness, or in this instance, adoption of new mitigation practices.

Mitigation is more frequently executed when projects cost less (Sims and Baumann 1987). As indicated in a study on wildfire mitigation, participants found low-cost, low-effort mitigation options reasonable to reduce major losses (Brenkert-Smith et al. 2006). Having a restricted budget makes it difficult for homeowners to see the long-term savings of mitigation, and they often focus on short-term savings (Kunreuther 2006).

Place Attachment

Place attachment is divided in the literature into two main categories; the physical environment and the social networks people create within a neighborhood (Brenkert-Smith et al.

2006; Burley 2006; Laska and Wetmore 2000; Paton 2003; Rogers 1963; Rogers and Beal 1958; Rogers and Cartano 1963; Sims and Baumann 1987; Vaske and Kobrin 2001).

To further explain, Woldoff (2002) distinguishes attitudinal attachment, the way someone feels about the place they live, from behavioral attachment, which involves the social interaction of neighbors as measures of neighborhood attachment. She proposes that it is important to include both types of attachment when measuring the concept of neighborhood attachment. These dimensions of neighborhood attachment are useful in determining how people are attached to their communities and how that attachment affects decisions to mitigate following the stressor of multiple floods (Woldoff 2002).

Homeowners are often attracted to physical landscaping qualities of an area including aesthetic landscape qualities, such as a nearby lake or park. Orleans and Jefferson Parish residents are surrounded by the Mississippi River, Lake Pontchartrain (shown), City Park, Lafreniere Park, the city skyline, European-style architecture, among a myriad of other physical features. These features can create pleasurable bonds of residents to certain physical locations (Laska and Wetmore 2000).

Illustration 1- Lake Pontchartrain



To demonstrate strong place attachment in St. Bernard Parish, a feeling that is felt across the board by those who were displaced by Hurricane Katrina had a common mentality post-storm, “It don’t matter that we don’t have the school systems. It don’t matter that we don’t have nowhere to live. It don’t matter that we living in these mobile homes. We want to live here. This is where we want to be. This is where we from” (Still Waiting 2007). Although this

particular homeowner is expressing her attachment to the place despite its immediate post-Katrina condition, the use of “we” implies that there are deeper social ties that evolved from just being in that particular location. This shows how attachment to people stems from attachment to physical place.

The other category of place attachment is the social networks that a community member creates. While attachment begins with the physical place simply because it is where one is, one develops an attachment to people over time as friendships ensue and relationships grow with neighbors. Social relations are found to be a main component in the communication of ideas (Rogers and Cartano 1962; Castle 2002). This leads us to social capital. Social capital is information exchange, trust, and reciprocity among norms and networks that initiate collective action in social and economic systems (Castle 2002; Woolcock 2002). James Coleman (1988) suggests there are three forms of social capital. These include obligations and expectations, information channels, and social norms. Though there is much dispute about what social capital is and whether it is better to measure it by its effects or characteristics, Coleman (1988) claims that it always facilitates action. It serves as a resource to achieve the interests of the collective. Social capital is useful because it might help people participate in activities they might not have necessarily considered or participated in without the support of social capital. In the interest of this study, one of these activities can be a form of mitigation action. Place attachment is a dimension of social capital through social networking. Social networks can take the form of informal communication with neighbors, involvement in community, and sense of belonging. In addition, opinion leaders and innovators are types of personal influence that can come from neighbors who have a tendency to lead others (Rogers and Cartano 1962). These types of information channels are elements of social capital as presented by Coleman (1988).

One study conducted on wildfire mitigation decisions of wildland-urban communities in Colorado found that informal communication with neighbors and within-household negotiations assist mitigation decisions (Brenkert-Smith et al. 2006). Hurnen and McClure (1997) adds to the literature that conversations with neighbors on risk knowledge can increase preventative activity. Also, Mileti (1999) describes how neighbors mull over big decisions together, essentially discussing the plan of action aloud in a group of gathered neighbors. Although not neighbor specific, Weinstein and Sandman (1992) assert that their precaution adoption process model gauges the effectiveness of getting people to recognize their risks and take action to prevent it. This model explains how neighbors who discuss risk, i.e., flooding, are considering ways to overcome their potential hazard, in this case, through the use of mitigation.

Sense of belonging is a key factor in the social dimensions of place attachment. This is suggested by Richard Stedman, “Sense of place is therefore conceived of as encompassing meanings, attachment, and satisfaction” (Stedman 2003:672). He goes on to report that sense of place is more than the physical environment. It is part of the constructed interpretations of the setting as derived from experience with the particular place. Similarly, sense of community is an influential predictor of the decision to prepare for disasters (Paton 2003). Results from a study published in The Journal of Environmental Education show that place dependence (a functional attachment) influences place identity (an emotional identity), which is then significantly related to environmentally responsible behavior (Vaske and Kobrin 2001). David Burley’s (2006) study on coastal land loss and place attachment also relates to place dependence and place identity as his respondents spoke of livelihoods, memories, and emotions associated with living along the Gulf Coast. This suggests the hypothesis that those with a strong attachment to place will likely engage in flood mitigation. People who have lived in the same neighborhood their entire lives

may be reminded of childhood memories when exposed to familiar triggers such as seeing the same town Christmas tree lit for the first time each year.

One way to study sense of belonging is to look at whether or not residents are part of any organization in their community. A study on the adoption of residential flood mitigation measures found that homeowners who are also community organization members are more likely to adopt residential flood mitigation measures (Sims and Baumann 1987). Obviously, when residents are invested in where they live, they will try to protect their investment as best as they can. Maintaining family and friendship ties is yet another component of place attachment and sense of belonging (Laska and Wetmore 2000). As a St. Bernard Parish resident stated, “It’s more than just a place, more than just a house, it’s a heritage” (Still Waiting 2007). Another indication of family and friendship ties is a St. Bernard resident expressing, “I wanted to leave Louisiana, but to sit here and think about my aunts, I don’t think I could leave them” (Still Waiting 2007). This quote suggests that attachment to people is a stronger indicator of place attachment than attachment to physical place.

Place attachment implies that the stronger social relationships are in a community, the more likely one will mitigate in order to maintain that social relationship as well as protect home. Flooding is a burden and many do not want to relive the experience. A St. Bernard Parish resident declares, “I miss New Orleans, but I don’t want to go back and have to do this again” (Still Waiting 2007).

The role of opinion leaders and innovators can be strongly persuasive of people’s decisions. Rogers and Cartano (1962) explain that, “Opinion leaders are defined as those individuals from whom others seek advice and information” (435). When two people are conversing face-to-face and one person’s attitude or behavior changes based on what the other

person says, the result is personal influence (Rogers and Cartano 1962). This suggests that neighbors are likely to discuss the possibility of mitigating if at least one person on the block (the innovator or opinion leader) is participating in mitigation. Rogers (1963) showed that innovators influence peer adoption of new ideas. Ultimately, Alfred Schutz suggests, “it is our interest at hand that motivates all our thinking, projecting, acting, and therewith establishes the problems to be solved by our thoughts and the goals to be attained by our actions” (Wagner 1970:111). To encourage the idea that decisions are socially influenced, Howard Kunreuther claims that neighbors may give into tipping behavior whereby all neighbors follow the actions of a few leaders who elevate their homes (Kunreuther 2006).

Personal Responsibility

Personal responsibility contributes to which mitigation decisions, if any, are made. Paton (2003) suggests that some homeowners feel it is their duty to take personal responsibility for where they choose to live. If the home is in a flood-prone area, and the homeowner is aware of the risk and decides to continue living in that location, the homeowner is accepting the possibility that their home is likely to flood and incur damages whether or not relocation is a viable option. Pursuing necessary measures to minimize flood damage before it happens can be considered personal responsibility for living in a floodplain. A study conducted on wildfire mitigation decisions echoes this argument when mentioning how self-reliance of homeowners is an expectation on the protection of their properties (Brenkert-Smith et al. 2006). There is also the idea that homeowners have come to expect the government to come to the rescue (Kunreuther 2006; Laska and Wetmore 2000). While the prospect of receiving government money is argued as a component of not adopting mitigation measures, empirical research suggests people do not base their decisions on this expectation (Kunreuther 2006).

Another study on tropical cyclones in Australia shows that mitigation possibilities are assessed through a vulnerability and capacity model from which to base mitigation decisions (Anderson-Berry and King 2004). It is then up to the homeowners to take that information and implement the suggested mitigation measures to protect themselves from future cyclones. This study implies that it ultimately relies on the homeowner to take personal responsibility for protecting one's self.

Laska proposes that Americans suffer from "first-world privilege," the idea that safety nets allow homeowners to sit back and wait for the catastrophic event to occur. These homeowners have the mentality that they will be taken care of so they do not participate in self-protecting mitigation measures.

Self-Efficacy

Self-efficacy, belief in one's effectiveness, is another variable that may encourage or discourage a person to adopt mitigation measures. Laska and Wetmore (2000) found that people are likely to take on mitigation efforts themselves. While elevating a home requires a contractor, professional training, and money, there are some mitigation measures that are less extensive that homeowners can perform on their own such as sealing the walls with an impermeable coating or raising air conditioner units or large appliances several inches off the floor. The perception of how effective their personal implementation will be is a motivator of many homeowners taking action as indicated in a recent article on disaster preparedness (Paton 2003).

Prior Mitigation Experience

Homeowners who have mitigated in the past can be swayed by the effectiveness of their mitigation techniques when considering future mitigation. A study on reducing flood loss by flood-proofing suggests that there has been a lack of faith in existing flood-proofing methods

(Laska and Wetmore 2000:269). For instance, if a homeowner elevated his or her home three feet from grade, this may have protected the house from regular, shallow flooding. But three feet from grade was likely to be ineffective for a Katrina-like flood. Since this mitigation measure was ineffective, it is interesting to see if the homeowner elevated the house higher to avoid another Katrina-like flood, or kept the house at its current level after repairing. Mileti (1999) suggests that it is important to evaluate the beliefs people have on mitigative activity as it may serve to gear people towards implementing mitigation measures, and then continue to increase mitigation activities that have proven effectiveness according to his *attitude theory*. With mitigation, one does not know when one succeeds because success means the home never floods. It is the consequences of mitigation failures that are noticed.

The review of mitigation literature suggests key components of what influences people to take on mitigation. Literature on mitigation is currently sparse, however, it provides several concepts that have indicated mitigation activity across a number of disasters. The emergence of these concepts has allowed me to create hypotheses to test.

Hypotheses

I developed four hypotheses. Appendix A illustrates the conceptual model for mitigation decisions and its predictors. (1) Homeowners with a history of flooding, including Katrina and prior flooding are more likely to mitigate than those without previous flooding experience. (2) High-disposable-income homeowners are more likely to mitigate than low-disposable-income homeowners. (3) The stronger the place attachment among homeowners, the higher the likelihood they will mitigate. (4) Homeowners who have experienced effective mitigation measures in the past are more likely to mitigate than those who have not.

Chapter 3: Methodology and Research Design

A survey can provide a relatively quick means of data collection, as numerous surveys are delivered, answered, and retrieved in just a few short hours whereas long hours would be spent transcribing a single person's responses to a personal interview. Also, surveys can reach hundreds of people in a relatively quick time frame as opposed to just a few dozen who may get interviewed. This exploratory study employs a purposive sampling procedure using a cross-sectional self-administered survey with the assistance of a small research team. The instrument uses questions that operationalize the dependent and independent variables and attempt to measure the respondent's mitigation behavior (see Appendix B). The instrument was approved by the Institutional Review Board on November 16, 2007 (see Appendix C).

Data Collection

My main interest is why homeowners are, or are not, mitigating in areas where residents may be attached to homes and neighborhoods despite regular flooding. Thus, it is clear that this is not a study exclusively about Hurricane Katrina. It is a study of past flooding that has been documented since 1978 when the NFIP went into effect. I decided to look at five neighborhood clusters with high concentrations of repetitive loss properties in Orleans and Jefferson parishes that represent repetitive flood victims¹. The sample is a purposive sample, which according to Earl Babbie (2007) is "a type of non-probability sample in which you select the units to be observed on the basis of your own judgment about which ones will be the most useful or representative" (Babbie 2007;184). It is proposed that surveying neighborhoods with a concentration of houses that have been frequently flooded provides useful insight since the

¹ The strategy I will use to find this purposive sample is through FEMA's repetitive loss data. According to the NFIP's Community Rating System Coordinator's manual, a repetitive loss property is one that has been paid two or more claims of at least \$1,000 each within any 10-year period since 1978 (FEMA 2006).

residents in these neighborhoods have experienced multiple floods and have made multiple flood insurance claims, which indicates they have experienced multiple losses due to flooding. It also suggests these homeowners are likely to be aware of mitigation and may have a high interest in it.

Surveys allow researchers to gather information from a sample of participants from which the findings can often then be generalized to the larger population (Creswell 2003). Unfortunately, my sample does not provide a representation of all the vulnerable, flood-prone communities across the New Orleans Metropolitan area. Rather, because the sample is derived from flood insurance data, it includes residents who have flood insurance. Thus they tend to represent a more affluent, white, middle-class group of homeowners. Unfortunately, those without insurance are not tracked on FEMA's list of homes that flood repeatedly; therefore, they are not represented in this study. Although the sample is not representative of the entire flooded population, the results of this study can consider the strongest predictors of mitigation action across the area for those of similar, i.e., more affluent, socioeconomic status. Findings might be suggestive of how the flooded population of homeowners might respond.

Using the mapping of repeatedly flooded homes to which I had access, I picked five small neighborhood clusters, each consisting of approximately four street boundaries to represent each chosen area. I recruited fellow graduate students to create a small research team to assist in the distribution of the surveys. Based on the research Michelle Gremillion (2007) produced a year ago on the problems of mail-based surveys post-disaster, I decided to walk through the study areas and deliver the surveys in person. The research team members (when available) broke into pairs and delivered surveys to every home in the five clusters. I also felt that showing my face to homeowners provided a sense of personable interaction that may help increase the

response rate. Because I wanted to distribute the surveys door-to-door, personal safety was taken into consideration when choosing the areas to be studied with the increased crime-rate and lack of police protection post-Katrina.

To give an overview of where the areas are, the neighborhoods in Orleans parish are illustrated in Appendix D. The Orleans Parish neighborhoods where I administered surveys are Lakeview, Audubon, and Marlyville/Fountainebleau. Unfortunately, I could not find a similar diagram for Jefferson Parish neighborhoods to show a layout of Metairie and Kenner, the two Jefferson Parish areas included. The maps (see Appendix E) of each specific area suggest that the four original clusters could provide a possible sample size of approximately 392 households, and with the fifth cluster could yield a total of 462 households. The goal was for fieldwork to be conducted in early January 2008 on two consecutive Saturday mornings, a time when it is likely that the majority of residents are home. Some adjustments were made as the process of fieldwork unfolded, and these adjustments will be explained in the paragraphs below.

Once created, the surveys were pretested on 10 recipients to ensure that all questions were logical and clear. This information helped finalize the survey distributed to homeowners. In preparation for the first day of fieldwork, I had four hundred copies of the survey printed into a booklet on goldenrod colored paper as a way for homeowners to easily distinguish the survey from the mix of other papers on their desks or counters, hoping that the survey would be attention-catching. I also provided envelopes and stamps for ease of return. I affixed mailing labels with my name and the department's mailing address to the envelopes.

I developed a checklist to indicate pertinent information such as which survey ID# corresponds to which address, whether or not anyone answered the door, whether or not the person who answered the door was a homeowner or a renter, whether they were willing to

participate if they were in fact a homeowner, and whether the homeowner preferred to complete the survey on- site or wished to mail it back to the University of New Orleans (see Appendix F). This checklist served as a means of keeping track of the data collection process. In addition, I created a script for each team member to deliver when approaching the homeowner (see Appendix G). The day before distribution, I numbered all the surveys, fixed the stamps and mailing address labels to the envelopes, printed enough checklists, scripts, and maps of the areas for each team member, and bought clipboards on which the checklists could easily be written.

Saturday, January 12, 2008 began the journey through neighborhood #1, located in Metairie in Jefferson Parish. I along with three other team members paired off and began knocking on doors at 10:30AM. The map suggested there were approximately 145 properties, but our walk-through provided us with 143 total properties. Of the residents who answered their doors, 1% were renters, 9% completed the survey on site, 22% suggested they would mail the survey back to UNO, and 8% said they were not interested. Of the 143 properties contacted, 56% were not home, 3% were vacant, and 5% were for sale. For the homes where no one was home, we left the survey and envelope in the door with an insert explaining what the study was about (for insert, see Appendix H). The team also counted 2 FEMA trailers in the area. We ended the distribution of surveys three-and-a-half hours later with 124 surveys dropped off, allowing us to reach 87% of the area's expected study subjects. This was the largest area of the study, and because it was the first, it provided a good indication of how long it would take to get through the other neighborhoods.

I began delivering the surveys in neighborhood #2, a Kenner neighborhood also located in Jefferson Parish, at 1:00 PM on Saturday, January 19, 2008. The area appeared to have about 95 properties. I knocked on a total of 91 doors, came across 3% renters and 16% of homeowners

who were not interested in participating in the study. More than half of the cluster was not home. Only 2% of homeowners completed the survey on-site, while 23% said they would mail the survey back to UNO. I also noticed 5 FEMA trailers and 2 vacant homes, one of which was for sale. It took me approximately three hours and forty-five minutes to complete this cluster's fieldwork where I was able to hand deliver 72 surveys, 79% of the total possible participants for the area.

Still feeling the pressure of time, I took advantage of the nice weather and attempted to get my team together at the last minute just two days later on Monday, January 21, 2008. This is an inconsistency, not being a Saturday as the previous fieldwork days had been, but because it was Martin Luther King Day, I felt that I may find quite a few folks home. My plan was to complete all fieldwork by the end of the day. Since assembling my team was not successful, I entered the field solo once again. I began distribution at 12:30 PM in neighborhood #3 located in Lakeview in Orleans Parish. The map signified roughly 100 properties. I was surprised to see an overwhelming amount of homes still in the condition that Katrina waters left them. The walk-through presented 76 homes to include in the study. There were 12% renters, 4% homeowners not interested in participating, and 34% houses with no one home. Only 1 homeowner completed the survey on-site while 14% of homeowners said they would mail it in. Throughout the cluster I saw at least 25% vacant homes, 3% homes for sale, several lots for sale, 2 FEMA trailers, and many other homes under construction. I got through the area in two-and-a-half hours and then continued to what was to be the final area of the study. I dispensed 40 surveys in this neighborhood, only 40% of what I expected to hand out in Lakeview.

A team member returned my earlier phone call and agreed to walk through neighborhood #4 with me. This cluster is part of the Audubon Neighborhood in Orleans Parish. There

appeared to be 54 properties on the map for this area, however, we knocked on the doors of 50 homes and came across 10% renters and 8% of residents not interested in taking part in the study. Four percent of the homeowners completed the survey on-site while 34% of other homeowners opted to mail in the survey. Of the properties contacted, 44% were not home. There were no homes for sale, nor any that appeared to be vacant. It only took us slightly longer than an hour to get through this cluster as we ended at 5:40PM. A total of 41 surveys were distributed in this area giving us 82% of the expected sample.

As a follow-up to the hand-delivered survey as suggested by Don Dillman (2007), I sent out reminder postcards addressed to the current resident on February 12, 2008, three weeks after doing fieldwork for clusters 3 and 4 (see Appendix I). I mailed out 200 postcards to all the homes in the four clusters where no one was home or for which I was expecting the homeowner to mail the survey in. I felt a hand-written signature would create a more personal feel to which the homeowners may better respond. Fifteen postcards were returned to sender as either “not deliverable as addressed” or “vacant.” Although I developed the address list as we conducted the fieldwork, making it as up-to-date and as accurate as possible, vacancy cannot always be detected just by looking at a house. There were about 74 completed surveys for the study at this point, providing a response rate of 27%.

In an attempt to increase the number of cases collected, I chose a fifth neighborhood to study in Orleans Parish. Five weeks after the initial data collection, one research team member and I delivered surveys to the Marlyville/Fountainbleau area on February 16, 2008. We were in the neighborhood from 11:15 AM to 1:45 PM. As indicated by parcels on the map of neighborhood #5, there were approximately 70 possible properties from which to elicit response. After our walk-through of the 72 actual properties, we left surveys on the doors of those not

home, which accounted for 49% of the total properties in the cluster. Twenty-five percent of the homes were either vacant or for sale while 7% of the residents attested to being renters. Six percent of homeowners completed the survey on-site while another 14% said they would mail the survey back to UNO. Unlike the other 4 clusters, no one said that they were not interested in completing the survey. In total, 49 surveys were handed out in this area, 70% of the expected possible subjects for this cluster.

Over the course of the next week, several more surveys came in through the mail. I sent out a second survey on February 19, 2008 to the same set of homeowners I sent the postcard to, excluding the few who returned their surveys. The purpose of sending out a second survey was so residents had another chance to participate in the event that they misplaced or threw out the original survey. The front and back cover of the second survey was slightly altered to include the reminder dialogue on the first page and a pre-addressed, metered back cover so that homeowners could simply fold and tape the survey to mail it back. This approach saved on extra envelopes and stamps. A week after that, I sent out a second survey to cluster 5 homeowners. I skipped the reminder postcard for this area merely for time sake as I was hoping to get all responses in by March 1, 2008 so that I would have ample time to analyze the results. A few more surveys came in over the course of these few weeks with 3 of the surveys returned as “not deliverable as addressed”.

The sample yielded 95 completed surveys, a 29% total response rate (see Table 1). The highest percentage came from neighborhood #1 (Metairie) with 41%. Neighborhoods 3 (Lakeview) and 5 (Marlyville/Fountainbleau) came in next. This was followed by 14 total responses coming from neighborhood 4 (Audubon), and the smallest percentage from neighborhood 2 (Kenner) at 11%. The sample of all 5 neighborhoods yielded 7% renters, 7%

completed the survey on-site, 28% gave the impression they were going to mail the survey back, 65% were not home, and 10% of residents expressed they were not interested in participating in the study.

Table 1- Survey Response Rate

Neighborhood	# of surveys distributed	n (# of surveys returned)	% of total surveys completed
1	124	39	41%
2	72	10	11%
3	40	17	18%
4	41	14	15%
5	49	15	16%
Total	326	95	29%

Also, while Dillman's Tailored Design (2007) suggests making five separate contacts with your potential participants as a way to maximize your response rate, my data collection method did not include five contacts. The first 4 clusters received 3 contacts, the second, third, and fourth of Dillman's recommended five contacts including initial delivery of survey, reminder postcard, and the mailed out first replacement survey. Cluster #5 only had 2 contacts (initial delivery of survey and mailed out first replacement survey) with the reminder postcard skipped due to time constraints.

In trying to explain the low response rate, it is difficult to know how many homes where no one answered the door are actually inhabited by homeowners or renters. Also, as illustrated by the return of undeliverable postcards and replacement surveys, homes may be vacant yet not appear to be so. Considering the conditions of these neighborhoods two years post-Katrina, this is not a bad response rate.

Sample Studied

This sample (n=95) is demographically consistent throughout all five neighborhoods including Metairie (neighborhood 1), Kenner (neighborhood 2), Lakeview (neighborhood 3), Audubon (neighborhood 4), and Marlyville/Fountainebleau (neighborhood 5). That was not the intention when choosing the areas to study. However, the purpose of surveying homeowners that repeatedly flood as documented by FEMA tends to reflect a higher income, white, middle-class unit just by virtue of having flood insurance². Table 2 depicts the average age of the homeowners in the sample is 53 years old (see Table 2). Females outnumbered males by sixteen in terms of respondents, and reported their average household income to be approximately between \$80,000 and \$89,000 a year. The mean education of the residents implies that most in the sample have some post-high school education. Some respondents are new to their current homes while others have been living there for as long as 64 years. The average length of residency in current home for the members of this sample is slightly longer than 16 years. Although I did not ask about race on the survey, I can assert from the face-to-face interactions with those who answered their doors that the majority (about 90%) of this sample is white. The other 10% is made up of black and Hispanic homeowners.

² It is important to know the opinions and behaviors of a demographically varied sample, including low-income and minority homeowners. In the case of this particular study, it was not possible to do so based upon my sampling methodology. With the focus being on flood insurance holders, the study did not capture responses of the lower-income and minority populations.

Table 2- Demographics of Sample

Demographic	Mean	Standard Deviation	Range	n
Age	52.97 years	14.208	23-87 years	94
Sex	1.59	.495	M=1 F=2	M=39 F=55
Income	8.19 (\$80,000-\$89,000)	3.66	0->\$130,000	95
Education	15.76 years	3.140	4-24 years	95
Length of Residency	16.25 years	15.14	.5-64 years	92

While the sample represents a somewhat whiter, better educated, and more affluent group of homeowners than one might expect in New Orleans, it is relatively representative of a typical homeowner in the current New Orleans metropolitan area. As a way to demonstrate this, the American Housing Survey for the New Orleans Metropolitan Area in 2004 gives statistics about homeowners, not the population as a whole. The survey reports that 71% of homeowners in the area are white, not much less than the approximate 90% found in my sample (HUD 2004:68)³. The educational attainment of homeowners having a high school diploma or higher is 81.8% (HUD 2004:79)⁴. This is slightly less than my sample with 97% of respondents having a high school diploma or higher. Also, the majority (35,600) of homeowners surveyed reported an income between \$60,000 to \$79,000 annually (HUD 2004:84)⁵. The income distribution of my sample is slightly greater than the best estimate of the median income of all New Orleans metropolitan homeowners with an income averaging between \$80,000-\$89,000 annually. In addition, a second study conducted post-storm at the Brookings Institution provides a more

³ Found in Table 3-1 of the HUD survey.

⁴ Found in Table 3-9 of the HUD survey.

⁵ Found in Table 3-12 of the HUD survey.

updated representation of homeowners who are in the area now: “In the New Orleans metropolitan area, hurricane-induced loss produced a population that was more white and less poor than the pre-hurricane population” (Frey and Singer 2006:8). Therefore, I have concluded that while my sample clearly diverges from a probability sample, it still appears to be fairly representative of the post-Katrina metropolitan area homeowner population.

Explanation of Data Clean-Up

Because I had only 95 cases, finding significance through hypothesis testing was a challenge. As a way to overcome this challenge, I was guided to clean-up and condense the data into a form that was meaningful and could be analyzed through discriminant analysis to test for strength of relationships. I began by changing dichotomous missing data from blank to zero with zero meaning “no.” Fourteen respondents said “no” for the question asking if the homeowner ever made mitigation changes to his/her home (Q-8 on the survey). Yet, they marked choices for which mitigation action they performed in Q-10. For these, I changed “no” answers to “yes.” Question 20, which asks from whom the homeowner first learned about mitigation, had 8 respondents answer more than one choice. I made these cases missing values by leaving them blank.

I also recoded several variables to maintain consistency throughout the analysis. Q-41 was recoded so that 1=low, in this case “very willing to move,” and 5=high, “very unwilling to move.” Also recoded were Q-12 and Q-13 so that both were valued low to high and “change was not yet in place” was recoded into 0-“no changes were made”. This variable is now has values from 0-3.

Another recoded variable is relationship with neighbors. “I know nothing about my neighbors” has been collapsed with “my neighbors and I don’t do anything together” since there

was only one case under “I know nothing about my neighbors.” I recoded 1=My neighbors and I don’t do anything together, and 2=My neighbors and I are good friends and spend time together.

Also, in order to create a meaningful crosstab controlling for income, I recoded the variable into two categories, low to moderate and high. Low to moderate represents \$0-\$89,000 while high is noted as \$90,000 to \$130,000 and over. Values 1-8 were recoded to 1 (n=55). Values 9-13 were recoded to 2 (n=40).

Chapter 4: Variables and Measurement

All of the variables used in the analysis of the study, both dependent and independent, are listed in Table 3. The table includes the variable name, description, level of measurement, mean, standard deviation, and range for each. Every variable in the table has been given a number used to easily identify it in tables presented throughout the analysis. I operationalized the concepts that emerged from the literature to create these variables (see Appendix J). Through careful consideration, I worked through each concept to decide how to best measure it with the most appropriate question. I looked at past surveys and sought the advice of those most familiar with flood studies. I then pretested the surveys to ensure choices were exhaustive and clear.

Table 3- Variables in Analysis

Var #	Variable Name	Description	Measurement	Mean	Std. Dev.	Range
1	mitigated	Has the homeowner ever mitigated?	Nominal, see survey Q-8	.45	.500	0-1
2	mitact	Index of mitigation actions	Nominal, see survey Q-10:1-6;8-12	1.44	2.02	0-11
3	elevated	Has the homeowner elevated house?	Nominal, see survey Q-10:7	.09	.294	0-1
4	kflood	Did the house flood for Katrina?	Nominal, see survey Q-1	.90	.938	0-1
5	timesflooded	How many times has the house flooded?	Nominal, see survey Q-6	2.11	1.722	0-7
6	prevflood	Did the homeowner experience flooding in a previous home?	Nominal, see survey Q-7	.15	.356	0-1
7	waterdepthinfeet	Water depth in feet following Katrina	Interval/Ratio, see survey Q-2	2.45	2.70	.16-10.50
8	lengthflooddays	Length of time Katrina waters stayed in the home	Interval/Ratio, see survey Q-3	5.78	7.88	0-30.00

(Table 3 cont.)

Var #	Variable Name	Description	Measurement	Mean	Std. Dev.	Range
9	income	What is the homeowner's approximate total household income?	Ordinal, see survey Q-48	8.19	3.662	1-13
10	personalsav	Did homeowner pay for mitigation with personal savings?	Nominal, see survey Q-14:0	.25	.437	0-1
11	NOnative	Is the homeowner a New Orleans native?	Nominal, see survey Q-28	.69	.463	0-1
12	timincurhome	Length of residency in current home	Interval/Ratio, see survey Q-29	16.25	15.14	0-63.50
13	rateplace	How does the homeowner rate the neighborhood as a place to live?	Ordinal, see survey Q-35	3.36	.622	1-4
14	njoylandscape	How much does the homeowner enjoy the landscape of the area?	Ordinal, see survey Q-40	4.27	.973	1-5
15	talkwitneigh	Does the homeowner talk to neighbors when out in yard?	Nominal, see survey Q-31	.95	.224	0-1
16	discussflood	Does the homeowner discuss flooding problems with neighbor?	Nominal, see survey Q-32	.78	.417	0-1
17	discussmit	Does the homeowner discuss mitigation with neighbor?	Nominal, see survey Q-33	.49	.503	0-1
18	commorg	Is the homeowner a member of any community organizations?	Nominal, see survey Q-34	.34	.475	0-1
19	relatwitneigh	Description of homeowner's relationship with neighbors.	Ordinal, see survey Q-30	2.42	.519	1-3

(Table 3 cont.)

Var #	Variable Name	Description	Measurement	Mean	Std. Dev.	Range
20	friendshere	Do most of the homeowner's friends live in the N.O. metropolitan area?	Nominal, see survey Q-37	1.75	.607	0-2
21	relativeshere	Do most of the homeowner's relatives live in the N.O. metropolitan area?	Nominal, see survey Q-38	1.28	.948	0-2
22	personalresp	How much does the homeowner believe it his/her responsibility to protect his/her home from future flood damage?	Ordinal, see survey Q-21	3.26	1.20	1-5
23	extentselfprot	To what extent does the homeowner believe he/she can protect his/her home from flooding?	Ordinal, see survey Q-22	1.72	1.04	0-4
24	priormiteffect	How effective were prior mitigation actions?	Nominal, see survey Q-12 and Q-13	.69	1.60	0-6

Dependent Variables: Mitigation Actions

The first dependent variable is whether or not the homeowner has mitigated. The second is the index variable of mitigation actions excluding elevation (described below). The third is the sole action of elevation. Whether or not someone has ever mitigated his or her home is measured by survey Q-8. Mitigation activity is measured by survey Q-10, choices 1-6; 8-12. Elevation is measured by survey Q-10, choice 7.

To analyze the types of mitigation activities homeowners participated in, I created an index of the dependent variable mitigation activity (see Tables 3 & 4). Survey Q-10 lists 11 activities that are considered to be equivalent. Each respondent was scored 0-11, depending on how many activities were undertaken (see Tables 3 & 4).

This index has a Cronbach's Alpha of .794, mean of 1.44 actions, range from 0-11 actions, and a standard deviation of 2.02. Although this may not be a well-supported model statistically despite its high reliability, a scale of mitigation actions of more or less comparable activities allows me to look for consistency in the predictors of mitigation by focusing on the strength and direction of the independent variables. This index includes all mitigation action variables except "elevated your house". I excluded house elevation from the index variable because to elevate one's house is far more time-consuming and exponentially more expensive to do than any of the other activities mentioned, thereby making it incomparable to the other activities (see Illustration 2 for elevated house).

Table 4- Index of the Dependent Variable- Mitigation Actions Taken (survey Q-10)⁶

Variable	1	2	3	4	5	6	7	8	9	10	11
# Respondents	28	13	3	8	1	3	10	12	1	36	16
%	29	14	3	8	1	3	11	13	7	38	17
n	95	95	95	95	95	95	95	95	95	95	95

⁶ Description of variables:

1. Raised the water heater or other major appliances.
2. Raised the wiring and fuse boxes.
3. Installed a valve to prevent sewer backup.
4. Installed drainage pipe in the yard.
5. Installed a wall to divert water away from the house.
6. Dry floodproofed house.
7. Attended a community meeting about mitigation.
8. Joined with neighbors to advocate for adequate flood protection.
9. Written or emailed elected official to advocate for adequate flood protection.
10. Purchased flood insurance.
11. Performed other mitigation activities (such as raised A/C unit, see Illustration 3 for example).

Illustration 2- Newly elevated House in Lakeview



Illustration 3- Raised A/C Unit



Independent Variables

The first predictor I examine is the respondent's experience with prior flooding. This predictor measures the frequency, depth, and duration of flood water. I use three items to indicate the frequency of flooding experienced by the respondent, including whether or not the respondent experienced flooding resulting from Hurricane Katrina (kflood), the number of times the respondent experienced previous flood events in their current home (timesflooded), and whether or not the respondent experienced flooding in a previous location (prevflood). I use one item to measure the depth of Hurricane Katrina floodwaters inside the house (waterdepthinfeet). Another item indicates the duration of time Katrina floodwaters remained in their house (lengthflooddays, see Table 3).

The second predictor deals with the homeowner's financial matters including income. Income not only consists of household income, it also considers homeowner budget constraints. The single item that measures income indicates the respondent's approximate annual household income (income). I also use one item to measure budget constraints. This is whether the respondent had enough savings to afford mitigation measures employed on the home (personalsav, see Table 3).

The third predictor of mitigation activity is place attachment as an element of social capital. Place attachment is a two-dimensional predictor that looks at attachment to place and attachment to people. Attachment to place encompasses sense of belonging, whether the neighborhood is of satisfactory quality, and enjoyment of nearby bodies of water and parks. Two items indicate sense of belonging by measuring whether the respondent is native to the New Orleans Metropolitan area (NOnative) and the duration of residency (timincurhome). One item measures neighborhood quality by indicating the respondent's rating of the overall quality of the

neighborhood (rateplace). Another item of attachment to place measures physical landscape by indicating the degree of enjoyment a respondent feels from landscapes specific to the New Orleans area (njoylandscape, see Table 3).

The other dimension of place attachment is attachment to people. This includes communication with neighbors and social networks, community involvement, family and friendship ties, and opinion leaders and innovators. I use seven items total to measure attachment to people (see Table 3). Three items measure communication with neighbors and social networks that serve as information resources that facilitate action. These items indicate whether the respondent converses with neighbors (talkwitneigh), whether or not the topic of conversation is the area's flooding problems (discussflood), and whether or not the topic of discussion is mitigation (discussmit). One item measures community involvement by indicating whether the respondent is a member of any neighborhood organizations (commorg). Three items measure family and friendship ties to help indicate if these ties are predictors of mitigation. These three items include a description of neighbor relations (relatwitneigh), proximity of friends (friendshare), and proximity of relatives (relativeshere, see Table 3).

The fourth independent variable is personal responsibility. One item indicates the degree to which the respondent believes it is his/her personal responsibility to protect his/her home from flood damage (personalresp, see Table 3).

The fifth predictor of mitigation is self-efficacy, the belief in one's effectiveness. One item measures self-efficacy by indicating to what extent the homeowner feels he/she has personal control of being affected by flooding (extentselfprot, see Table 3).

The sixth predictor of mitigation is the respondent's experience with prior mitigation. As a way to measure this, I created another index labeled *priormiteffect*. It includes two items: (1)

Effectiveness of mitigation measures for flooding that occurred before Hurricane Katrina; (2) Effectiveness of mitigation measures for flooding that occurred during Hurricane Katrina. Since both items essentially measure the effectiveness of mitigation employed on the home before Hurricane Katrina struck, I felt an index variable could provide a stronger variable. This index has a high reliability with a Cronbach's Alpha of .842. The inter-item correlation is .727. This variable has a mean of .69, range of 0-6, and a standard deviation of 1.60 (see Table 3).

Chapter 5: Analysis & Findings

As I entered the survey responses into the SPSS database, I noticed distinct differences within each neighborhood. Because there were few responses per cluster, I did not run statistical tests to analyze them separately since the results would have no significance. Instead, I will report the percentages of the data. Here is a brief overview of what seemed interesting from each area.

Neighborhood 1-Metairie

- 10% blamed Aaron Broussard (Jefferson Parish President) for their flooding⁷.
- Flooding is a regular occurrence for these homeowners as some people reported flooding at least 7 times.
- 87% were able to repair from Katrina.
- 5% elevated their homes.
- Neighbors discuss flooding much more than they discuss mitigation.
- Those who need advice on mitigation rely on men in their family
- People say they did not mitigate, yet they marked flood insurance under the next question. This indicates that having insurance isn't associated with mitigation.

Neighborhood 2-Kenner

- Only a few responses for this area, so it is difficult to generalize anything.
- No one reported flooding more than 4 times throughout the range of current residency of 2-52 years.
- At 40%, less than half of the respondents ever mitigated.
- 20% have elevated their homes.

⁷ These numbers are from survey data. Raw data are available from the author upon request.

Neighborhood 3-Lakeview

- Every single respondent of this neighborhood cluster flooded for Hurricane Katrina and reported Katrina to be the only flood they experienced. With 65% of respondents having been in their homes for at least 9 years and several for more than 50 years, this shows that Lakeview residents who participated in the survey are not the repeat flood victims of the area.
- There are many active community members as illustrated by the involvement of the community organizations. Many are part of several organizations.
- Almost all have mitigated since Katrina, not before.
- 24% have raised their homes or are in the process of doing so. Almost all the homes along West End Boulevard and Pontchartrain Boulevard are newly raised and mitigated. It is setting a false façade of the neighborhood giving the illusion that Lakeview is back and better than it was pre-Katrina. It's a much different story when you explore past the main street.

Neighborhood 4-Audubon

- Only 1 respondent flooded for Hurricane Katrina.
- Also involved in community organizations.
- Although they didn't flood for Hurricane Katrina, a few have flooded at least 5 times prior to Katrina.
- No one has elevated his or her home. Most of the homes in this area are already several feet above grade.

Neighborhood 5-Marlyville/Fontainebleau

- Again, everyone flooded for Hurricane Katrina as well as many times prior.

- The majority (60%) has mitigated in some fashion, but only 1 respondent elevated their home. Almost all mitigation employed took place post-Katrina.
- These residents are part of neighborhood associations also.

To make sense of the data, I first look at the descriptive statistics. Because there are 95 cases in this study, conducting traditional hypothesis tests is a challenge since there are not enough cases to attain statistical significance. For this reason, there are several types of analytical tests used to help make sense of the data. These include crosstabs, difference of means tests, correlation matrix analysis, and discriminant analysis to locate the most powerful predictors of mitigation.

Crosstabs provide 2x2 matrices that display bivariate relationships. This helps me to visualize the relationships between variables and to calculate percent differences of the independent variable for each category of the dependent variable. The difference of means test allows me to look at the mean of the predictor variable for each category of the dependent variable. A correlation matrix enables me to see which variables are significantly correlated with each other, as well as the strength and direction of that association. A discriminant analysis model indicates the strongest variables that predict group membership by specifying each variable's contribution to the function. These tests will enable me to test the proposed hypotheses and answer the research questions of the study.

Descriptive Statistics

Mitigation is fairly common in this sample with 45% of homeowners reporting that they have mitigated their home at some point (see Table 3, variable 1). Twenty-eight percent of residents who mitigated reported doing so after Hurricane Katrina. The top 4 actions people have done to protect their homes from future flooding include purchasing flood insurance,

raising major appliances such as the water heater, washer/dryer, and A/C units, raising the wiring and fuse boxes, and joining with neighbors to advocate for adequate protection (see Table 4).

The biggest motivation for homeowners to mitigate is to simply not flood anymore. The most commonly reported quality of mitigation was that it was appropriate for the homeowner's house, with the most frequently reported mitigation desired to be yard drainage. Yard drainage is installing a pipe in the ground that allows backyard flooding to flow to storm drains in the street, thus, preventing water buildup in the house. This is favored over secure levees and pumps. Of the entire sample, 9% reported elevating their home (see Table 3, variable 3). The main reason people said they have not mitigated is that mitigation costs too much money.

Homeowners in this area have had their share of prior flooding experience. A solid 90% of respondents flooded for Hurricane Katrina with the water reportedly flooding anywhere from .16 feet to as high as 10.5 feet in some areas (see Table 3, variables 4 & 7). Although the respondents most frequently reported flooding one time other than Hurricane Katrina, several residents have dealt with multiple floods, with 3 homeowners reporting flooding at least 7 times since they bought the home. Flooding is not new territory for 15% of respondents who said they experienced floods in previous homes (see Table 3, variable 6). Previous flooding crosstabbed with the variable ever-mitigated shows that 35.7% of homeowners who experienced flooding in a previous home have mitigated (see Table 5). This does not support hypothesis #1 because less than half of the respondents who experienced flooding in a previous home mitigated their homes.

Table 5- Crosstab of previous flooding by ever mitigated

		Experienced flooding elsewhere		Total
		No	Yes	
Have you ever made flood mitigating changes to your home?	No	53.1%	64.3%	52
	Yes	46.9%	35.7%	43
Total		100%	100%	95

Pearson Chi-Square=.604, df=1, not sig.

For income, the mode is 13, which tells us that the most frequently reported household income in the sample is \$130,000 or more per year. These people have money. The fact that 25% of those who mitigated used their personal savings to pay for it does not explain disposable income (see Table 3, variable 10). This means that disposable income is not measured by the amount of money a person makes, nor is it measured by whether or not they have savings. There is no way for me to know what their monthly expenses are to ever really measure whether income is disposable or not. It appears that those with savings (100%) were able to mitigate, not necessarily the homeowners who take home the most income. What I can infer is that the more conservative spender who saves money is more likely to have the opportunity to mitigate over someone who does not save (see Table 6). I would re-specify hypothesis #2 to read that homeowners with available savings are more likely to mitigate than those without savings.

Table 6- Crosstab of personal savings by ever mitigated

		Did you pay for mitigation measures with your personal savings?		Total
		No	Yes	
Have you ever made flood mitigating changes to your home?	No	73.2%	0%	52
	Yes	26.8%	100%	43
Total		100%	100%	95

Pearson Chi-Square=38.83, df=1, sig. @ <.01

To further explain, the next contingency table looks at personal savings and mitigation controlling for income (see Table 7). I divided income into two categories: low to moderate (\$0-\$89,000) and high (\$90,000->\$130,000). Income is not a significant factor of mitigation because there is a slight percentage difference between high and low-income categories. Personal savings is a constant across income. To further explain this, 43.6% of those who mitigated and have a low to moderate-income level used personal savings to pay for mitigation. Similarly, 47.5% of people with high-income levels who mitigated also used personal savings to pay for mitigation. This is constant with my finding that savings is a stronger predictor of mitigation than income.

Table 7- Crosstab of personal savings by ever mitigated controlling for income

Approximate income split by low to moderate and high			Did you pay for mitigation measures with your personal savings?		Total
			No	Yes	
1.00	Have you ever made flood mitigating changes to your home?	No	72.1%	.0%	56.4%
		% within Did you pay for mitigation measures with your personal savings?			
	Yes		27.9%	100.0%	43.6%
Total		Count Expected Count	100.0%	100.0%	100.0% (n=55)
		% within Did you pay for mitigation measures with your personal savings?			
2.00	Have you ever made flood mitigating changes to your home?	No	75.0%	.0%	52.5%
		% within Did you pay for mitigation measures with your personal savings?			
	Yes		25.0%	100.0%	47.5%
Total			100.0%	100.0%	100.0% (n=40)
		% within Did you pay for mitigation measures with your personal savings?			

Pearson Chi-Square = 19.826, df=1, sig. @ <.01

Sixty-nine percent of respondents are native to the New Orleans metropolitan area with average length of residency being 16 years (see Table 3, variables 11 & 12). This amount of time spent in the same place makes it easy to understand that 95% of respondents speak to their neighbors when they see them in their yards (see Table 3, variable 15). Many respondents (78%) report that they discuss flooding problems, while 49% discuss mitigation with their neighbors (see Table 3, variables 16 & 17). Less than half of the respondents are part of a community organization (see Table 3, variable 17). Despite the fact that 84% report that most of their friends live in the New Orleans area and 62% report that most of their relatives live in the New Orleans area, 51% have considered selling their homes because of flooding (see Table 3, variables 20 & 21). The social capital these residents have acquired in their time in these neighborhoods promotes mitigation activity. The crosstab shows that when residents have strong relationships with their neighbors to the point they are considered friends (64.1%), they are significantly more likely to mitigate than if they are just mere acquaintances with their neighbors (see Table 8). Another crosstab shows that being a member of one's community organization also relates to mitigation, as 53.1% of those who mitigated were involved in a community organization, though it is difficult to draw conclusions since the table is not significant (Table 9).

Table 8- Crosstab of relationship with neighbors by ever mitigated

		How would you describe your relationship with your neighbors?		Total
		My neighbors and I don't do anything together	My neighbors and I are good friends and spend time together	
Have you ever made flood mitigating changes to your home?	No	68.6%	35.9%	49
	Yes	31.4%	64.1%	41
Total		100%	100%	90

Pearson Chi-Square=9.55, df=1, sig. @ <.01

Table 9- Crosstab of community organizations by ever mitigated

		Are you a member of any organizations in your community?		
		No	Yes	Total
Have you ever made flood mitigating changes to your home?	No	58.7%	46.9%	52
	Yes	41.3%	53.1%	43
Total		100%	100%	95

Pearson Chi-Square=1.20, df=1, not sig.

I propose that the discussion of flooding and mitigation is not directly a measure of attachment, but rather an outcome of attachment that results from building relationships with neighbors through social networking; hence, social capital. The discussion of flooding and mitigation encourage the act of mitigation as 51.4% of homeowners who discussed flooding and 53.2% who discussed mitigation acted on preventive mitigation measures (see Tables 10 & 11). Again, Table 11 is not significant; suggesting that discussion of flooding is still a stronger predictor of mitigation than discussion of mitigation. To reinforce the argument, discussions of flooding and mitigation are intervening variables that result from having a strong relationship with one's neighbors, for without the relationships, the discussions would not take place. Table 12 illustrates that 92.3% of respondents who are good friends with their neighbors discuss their flooding problems as opposed to 69.2% who discuss mitigation (see Table 13). The discussion of flooding suggests that experience produces knowledge from which people can converse about the experience and that flooding is a more common conversation topic than mitigation. Talking about flooding and mitigation appears to promote mitigation action more so than being a native to the area, enjoying the landscape, conversing with neighbors about things other than flooding and mitigation, and close proximity of friends and family, all of which have less than 50%

responses for having ever mitigated when crosstabbed with the dependent variable. It would be helpful to re-specify Hypothesis #3 into two separate hypotheses to account for a broader sense of place attachment. (3) Homeowners with a strong relationship with neighbors are more likely to mitigate than those with a weak relationship with neighbors. (4) Homeowners who discuss flooding and mitigation with their neighbors are more likely to mitigate than those who do not have such discussions with neighbors.

Table 10- Crosstab of flood discussion by ever mitigated

		Do you and your neighbors discuss flooding problems?		
		No	Yes	Total
Have you ever made flood mitigating changes to your home?	No	76.2%	48.6%	52
	Yes	23.8%	51.4%	43
Total		100%	100%	95

Pearson Chi-Square=5.01, df=1, sig. @ <.05

Table 11- Crosstab of mitigation discussion by ever mitigated

		Do you and your neighbors discuss flood mitigation?		
		No	Yes	Total
Have you ever made flood mitigating changes to your home?	No	62.5%	46.8%	52
	Yes	37.5%	53.2%	43
Total		100%	100%	95

Pearson Chi-Square=2.36, df=1, not sig.

Table 12- Crosstab of relationship with neighbors by flood discussion

		How would you describe your relationship with your neighbors?		
		My neighbors and I don't do anything together	My neighbors and I are good friends and spend time together	Total
Do you and your neighbors discuss flooding problems?	No	27.5%	7.7%	17
	Yes	72.5%	92.3%	73
Total		100%	100%	90

Pearson Chi-Square=5.631, df=1, sig. @ <.05

Table 13- Crosstab of relationship with neighbors by mitigation discussion

		How would you describe your relationship with your neighbors?		
		My neighbors and I don't do anything together	My neighbors and I are good friends and spend time together	Total
Do you and your neighbors discuss flood mitigation?	No	62.7%	30.8%	44
	Yes	37.3%	69.2%	46
Total		100%	100%	90

Pearson Chi-Square=9.043, df=1, sig. @ <.01

Although the majority of respondents did not do prior mitigation from which to gauge its effectiveness, of the homeowners who did, about 72% of those said it was effective against previous floods and 68% said the measures were effective against Hurricane Katrina. Because prior mitigation effectiveness is not a dichotomous variable, I did not run a crosstab of it with mitigation; therefore, hypothesis #4 should not be altered based on findings thus far.

Analysis of Mean Differences

The difference of means test allows me to look at the mean of the predictor variable for each category of the dependent variable. By finding the predictors with the statistically

significant difference of means, I can begin to identify the most pertinent predictors of mitigation. I created 3 separate tables to indicate the mean values of the independent variables. Table 14 indicates the means of variables that measure prior flooding experiences depending on whether or not the homeowner mitigated. The significant variables are the depth of Katrina floodwaters in feet and the duration Katrina floodwaters remained in the home measured in days (see Table 14). The difference of means method signifies that the deeper the floodwaters that entered the house, the more likely the homeowner is to mitigate. Also, the longer the water stayed in the house, the more likely the homeowner is to mitigate. These findings generally support hypothesis #1, showing that previous flooding is a predictor of mitigation. However, it is not about the number of times flooded, it is the severity of the flood that is a significant predictor of mitigation. Therefore, hypothesis #1 should no longer suggest that homeowners with a history of flooding are more likely to mitigate than those without previous flooding experience, but rather, homeowners with a history of *severe* flooding are more likely to mitigate than those with a history of frequent, shallow flooding.

Table 14- Means of Prior Flooding Variables against Mitigation Y/N

Variable name**	Mitigate-No	Mitigate-Yes
Kflood	.81 (n=48)	.81 (n=43)
Timesfloodwoutdk	2.14 (n=49)	2.07 (n=42)
Prevflood	.17 (n=52)	.12 (n=43)
Waterdepthinfeet	1.79* (n=52)	3.24* (n=43)
Lengthflooddays	4.22* (n=52)	7.66* (n=43)

* difference of mean statistically significant at <.05

** see Table 3 for variable description

Table 15 indicates the means for variables that measure place attachment in both dimensions of attachment to people and attachment to physical place. The significant variables

for place attachment are whether or not the respondent discusses flooding problems with his/her neighbors, relationship with neighbors, and nearness of relatives (see Table 15). The method suggests that homeowners who talk about flooding are more likely to mitigate than those who do not. Another result shows that homeowners who are friends with their neighbors are more likely to mitigate than those who are not. Finally, homeowners who have nearby relatives are more likely to mitigate than those who do not. This finding shows that attachment to people is more strongly associated with mitigation than attachment to place as all three of the significant variables measure attachment to people. These findings generally support hypotheses # 3 and 4, showing that place attachment is a predictor of mitigation. The strongest predictors of mitigation through place attachment come from the dimension of attachment to people, measuring family and friendship ties and communication with neighbors, an indicator of social capital. This is consistent with findings in Tables 8, 10, 12, and 13.

Table 15- Means of Place Attachment Variables against Mitigation Y/N

Variable name**	Mitigate-No	Mitigate-Yes
Nonative	.73 (n=52)	.65 (n=43)
timeincurhomeinyears	13.63 (n=50)	19.37 (n=42)
Rateplace	3.36 (n=50)	3.36 (n=42)
Njoylandscape	4.18 (n=50)	4.38 (n=42)
Talkwitneigh	.94 (n=52)	.95 (n=43)
Discussflood	.69* (n=52)	.88* (n=43)
Discussmit	.42 (n=52)	.58 (n=43)
Commorg	.29 (n=52)	.40 (n=43)
Relatwitneigh	2.27* (n=49)	2.61* (n=41)
Friendshere	1.80 (n=50)	1.68 (n=41)
Relativeshere	1.52* (n=50)	1.00* (n=43)

* difference of mean statistically significant at <.05

** see Table 3 for variable description

Table 16 illustrates the means for all the other independent variables used to predict mitigation including income. Personal savings and mitigation that proved effective in prior rain events are significant independent predictors of mitigation (see Table 16). The difference of means indicates that people paid for their mitigation measures with their own money. This generally supports the re-specified hypothesis # 2 and is consistent with Table 6, showing that people who have money saved mitigate more often than those who rely on loans or federal disaster aid. The findings also show that homeowners who successfully mitigated in the past are more likely to mitigate again in the future. This finding generally supports original hypothesis # 4, though because of the re-specified hypotheses for place attachment, the hypothesis on prior mitigation effectiveness will become hypothesis # 5.

Table 16- Means of all other Independent Variables against Mitigation Y/N

Variable name**	Mitigate-No	Mitigate-Yes
Income	7.94 (n=52)	8.49 (n=43)
Personalsav	.00* (n=52)	.56* (n=43)
Personalresp	3.10 (n=48)	3.47 (n=36)
Extentselfprot	1.52 (n=48)	1.95 (n=40)
Priormiteffect	.00* (n=52)	1.53* (n=43)

* difference of mean statistically significant at <.05

** see Table 3 for variable description

There are certain qualities of mitigation that are significant. These qualities are not listed in Table 16, as they are not independent variables, but rather qualities of the independent variable that I feel are important to note. Mitigation measures that have the qualities of cost effectiveness, being inexpensive, and taking little effort to do can predict that a homeowner is likely to mitigate when the measure embodies these qualities.

Correlation Matrix

Table 17 presents a matrix of Pearson's correlation coefficients of ordinal and interval level variables used in the analysis. These variables contain higher levels of measurement than nominal variables that have no order; therefore, nominal variables were excluded from this table since they cannot provide the direction of the association and are not as useful. While a significant association cannot prove that the independent variable causes the dependent variable, it can help find important relationships of dependent and independent variables.

The significant associations are noted with asterisks and bold print. The dependent variable mitact is significantly associated with the depth of floodwaters, length of residency, relationship with neighbors, and extent of a one's belief in one's ability to protect one's home from flooding. These associations are indicators that deeper floodwater, longer time of residency, strong relationship with neighbors, and strong belief in one's ability to protect home all gear towards mitigation and supports original hypotheses 1 and 3.

The strongest association of the entire table is the association of depth of floodwaters and length of time the floodwaters remained in the house with a Pearson's correlation coefficient of .830 that is significant at the .01 level. This finding suggests that the strongest predictors of mitigating are the variables that measure severity of flooding and is consistent with the findings from Table 14 and hypothesis #1 (re-specified). There is a relationship between depth of floodwaters and duration of time the floodwaters remained in the house that predicts the decision to mitigate. In conjunction with re-specified hypothesis #1, the deeper the floodwaters and the more days the water stayed in the house, the more likely the homeowner is to mitigate.

The independent variable income significantly relates to two variables, including time in current home and extent of a homeowner's belief in his or her ability to protect his/her home

from flooding. These findings do not test the re-specified hypothesis #2, as the variable personal savings is a nominal variable and therefore not included in the matrix.

Variables of place attachment that have significant relationships are length of residency, rating of neighborhood quality, enjoyable landscaping qualities, and relationship with neighbors. The association between length of residency and relationship with neighbors suggests that the longer one has lived in one's current home, the more likely one is to become friends with one's neighbor. High ratings of both neighborhood quality and enjoyable landscaping qualities have significant associations with relationship with neighbors. A significant association between relationship with neighbors and personal responsibility for protecting one's home suggest that homeowners are attached to their communities socially and want to protect themselves so they can stay there. This final finding is consistent with findings from Table 15 and generally supports re-specified hypothesis # 3; that homeowners who have a strong relationship with their neighbors are more likely to mitigate than those with a weak relationship with their neighbors.

There is a strong association of homeowner's belief of personal responsibility towards protecting his/her home from future flood damage and the extent of a homeowner's belief in his or her ability to protect his/her home from flooding (self-efficacy). This means that the stronger the belief that it is the homeowner's responsibility to protect his/her home from future flood damage, the more a homeowner believes he or she can effectively protect his/her home suggesting that personal responsibility and self-efficacy are predictors of mitigation. This finding does not support or refute any of the hypotheses.

Table 17- Correlation Matrix of Ordinal and Interval Level Variables in the Analysis

Variable ***	Mitact	Waterdep thinfeet	Lengthfl ooddays	income	timincurh ome	rateplace	njoylands cape	relatwitn eigh	personalr esp	extentself prot
Mitact	1									
Waterdep thinfeet	.318**	1								
Lengthfl ooddays	.198	.830**	1							
income	.197	.130	.095	1						
timincurh ome	.249*	.004	.000	-.291**	1					
rateplace	.031	.074	-.008	.134	-.131	1				
Njoyland scape	.129	.125	.052	.172	.123	.110	1			
relatwitn eigh	.306**	.017	-.066	.168	.209*	.314**	.361**	1		
Personalr esp	.147	-.163	-.126	.104	.059	.116	-.059	.255*	1	
extentself prot	.231*	.065	.067	.279**	-.160	-.017	.045	.110	.584**	1

* significant at <.05

** significant at <.01

***see Table 3 for variable description

Multivariate Analysis

Discriminant analysis is another technique to help determine what the strong relationships with the dichotomous dependent variable are. William Klecka describes discriminant analysis as, “a statistical technique that allows the researcher to study differences between two or more groups of objects with respect to several variables simultaneously” (Klecka 1980, 7). While the data are not from a strictly random sample, a comparison of sample and population parameters suggests that the sample is fairly representative (see pg. 31). The dependent variable is untruncated, as it is a true dichotomous variable, and the sample is adequate, with the smaller group having 40 cases and the larger having 45 cases. The sample size of the smaller group does exceed 5 times the number of predictor variables discriminated against, meeting the sample size assumption. The two outliers found in the data for length of time the floodwaters remained in the house suggest the possibility of measurement error since respondents were asked to recall information from a stressful event that happened two years earlier. This information could have been recalled incorrectly, but it is plausible that these respondents were hit by Hurricane Rita three weeks after Katrina leaving no time for floodwaters to recede. Also, a potential problem with multicollinearity was handled by removing from the model depth of floodwater because it is too highly correlated ($r = .830$) with duration of days floodwaters remained in the house. Also removed is personal responsibility because it is too highly correlated ($r = .584$) to the extent of one’s ability to protect one’s home from flooding.

Even though the model does not meet all of the assumptions, discriminant analysis is an appropriate type of analysis for this study because it allows me to look at how the predictors of mitigation like prior flood experiences, personal savings, dimensions of place attachment, self-efficacy, and prior mitigation effectiveness relate to the two-group dependent variable; those

who mitigate and those who do not. The standardized canonical discriminant function coefficient serves as a partial coefficient and is used to ascertain each independent variable's relative classifying importance as it reflects each variable's unique contribution to the classification of the dependent variable (Garson 2008). By comparing each variable's standardized canonical discriminant function coefficient, I can compare the strength of all the predictors against each other. Fisher's function coefficients provide the same results as discriminant function scores; therefore, I will use only one type of function, the standardized canonical discriminant function.

Table 18 shows results of the discriminant function model. The model is significant at the .01 level with a Wilks' lambda score of .341 and an Eigenvalue greater than 1. Since the model is significant, I can evaluate each independent variable's coefficient to find which ones classify mitigation activity.

The strongest association with mitigation by far is personal savings. This suggests that people who have available savings are most likely to be the ones who mitigate their homes, as proposed by hypothesis #2 and is consistent with findings in Tables 6 and 16. Prior mitigation effectiveness is the second strongest predictor, also suggesting that people who believe what they did to their homes before Katrina was effective are likely to do it again, which is consistent with the prediction in re-specified hypothesis #5, as well as findings in Table 16. The third strongest association is relationship with neighbors, which coincides with re-specified hypothesis #3 and Tables 8, 15, and 17. The next important variable is community organization. This suggests that homeowners who are involved in a neighborhood association and are invested in their community are more likely to mitigate than those who are not, however, this finding does not support or refute any of the hypotheses. The extent of one's ability to actually protect one's

home from future flooding is of strong importance to mitigation activity but does not explain any of the hypotheses. Another predictor is length of days floodwaters remained in a person's home. This finding supports re-specified hypothesis #1, that the severity of a past flood will promote mitigation activity over frequency of a past flood, which is also consistent with Table 14. The final predictor of mitigation according to the discriminant function model is nearness of relatives, which is consistent with the findings in Table 15.

The weakest variable is discussing flooding with neighbors. It does not support re-specified hypothesis #4. This model not only supports four of the five proposed hypotheses, it is useful in helping test the theory of place attachment by allowing me to examine which predicted independent variables of place attachment classify mitigation activity. Again, the three strongest predictors of place attachment that predict mitigation activity are close relationships with neighbors, involvement in the community through organizations, and close proximity of relatives, all social components of place attachment.

Table 18- Discriminant Analysis of Dependent Variable "ever mitigated"

Variable Name	Standardized Canonical Coefficient (Model 1*)
Lengthflooddays	.367
Personalsav	.760
Relatwitneigh	.544
Discussflood	.079
Commorg	-.489
Relativeshere	-.347
Extentselfprot	.266
Priormiteffect	.626

*Significant at <.01 on Wilks' Lamda (.341)

Eigenvalue =1.933

n=85

Chapter 6: Conclusion

Overview

To answer the research questions, this study has shown that mitigation activity is happening post-Katrina, and the instrument has allowed me to measure what people are doing and what factors predict mitigation activity. Because this study is an exploratory one, the purposive sampling left little variance in socioeconomic status in regards to education and income levels. The sample includes mostly homeowners with flood insurance who also happen to be more educated, affluent, and have been living in their homes longer than the average citizen. While these findings are not representative of the entire population, their implications can be useful to the rest of the flooding population in determining what motivates homeowners to mitigate their homes.

As the findings emerged, I was able to re-specify the four original hypotheses into five new ones that reflect results of the data analysis and look at specific components of the independent variables, specifically components of previous flooding experience, income, place attachment, and prior mitigation effectiveness. (1) Homeowners with a history of severe flooding are more likely to mitigate than those with a history of frequent, shallow flooding. (2) Homeowners with disposable savings are more likely to mitigate than those without savings. (3) Homeowners with a strong relationship with neighbors are more likely to mitigate than those with a weak relationship with neighbors. (4) Homeowners who discuss flooding and mitigation with their neighbors as a result of social capital are more likely to mitigate than those who do not have such discussions with neighbors. (5) Homeowners who have experienced effective mitigation are more likely to mitigate than those who have experienced ineffective mitigation. I then tested these hypotheses using crosstabs, mean differences, a correlation matrix, and

discriminant analysis to reveal the strongest predictors of mitigation. The discriminant function table reinforces the strongest predictors of mitigation. The standardized canonical discriminant function coefficients support all five re-specified hypotheses except #4, which states that homeowners who discuss flooding and mitigation with their neighbors are more likely to mitigate than those who do not have such discussions with neighbors. The key findings follow.

The difference of means, correlation matrix, and discriminant analysis methods (see Tables 14, 17, and 18) support hypothesis # 1 on previous flooding experience. It is not supported by the contingency table (see Table 5). A very strong predictor of mitigation is the severity of a past flood. It is important to clarify that those who answered yes to mitigate y/n includes people who elevated their homes, 9% of the sample. This implies that for these 9%, severity is not necessarily the motivation for mitigation, but rather, they were required to elevate by law if their homes were substantially damaged. For the other 91% that was not mandated, the statistical tests suggest severity promotes mitigation activity over frequency of a past flood.

The difference of means and discriminant analysis methods (see Tables 16 and 18) support hypothesis #2 on available, personal savings as a predictor of mitigation. It is of strongest importance when classifying who mitigates and who does not as indicated by Table 17. Despite the fact that the average income of the sample is high, savings is a stronger predictor. Controlling for income, Table 7 also illustrates that savings is a stronger predictor of mitigation than income. This suggests that those who create a safety net for themselves by spending their money conservatively are the ones most likely to mitigate. The fact that the timing of the survey occurred before the distribution of public disaster money, post-Katrina restricts respondents from the option of using federal aid. Therefore, they are constrained to use their own money if they

want to fix their damaged home and mitigate against future floods. This explanation accounts for one reason why so few (9%) have elevated their homes.

Hypothesis # 3 on relationship with neighbors is well supported in all four models, Tables 8, 15, 17, and 18. This illustrates that a strong relationship with one's neighbors promotes mitigation activity. Hypothesis # 4 on discussing flooding with neighbors as a result social capital is supported by two models, the crosstabs found in Tables 10 and 12, and mean differences found in Table 15. Though discussion of both flooding and mitigation has been proven to be strong predictors, discussion of flooding consistently elicited stronger associations than discussion of mitigation. When predicting residential flood mitigation, place attachment by way of social capital seems to be the stronger predictors.

The difference of means and discriminant analysis methods (see Tables 16 and 18) support hypothesis # 5 on prior mitigation effectiveness. The assumption that homeowners who have had effective past mitigation are likely to mitigate again is statistically sound.

Though the predictor of previous flood experience in a different home is significant in Table 5, it does not support hypothesis # 1. Proximity of relatives is significant in Table 15 and supports that place attachment can lead to mitigation; however, it does not support or refute any of the re-specified hypotheses. Drawing from the analytical results, I conclude the strongest predictors of mitigation activity to be severity of past floods, available personal savings, strong relationship with neighbors, discussion of flooding with neighbors, and prior mitigation effectiveness.

Assumptions

The findings on previous flood experience happen to be opposite of the outcome I anticipated before the project began. I assumed that frequent, shallow flooding would be a

stronger motivator of mitigation action because the homeowner would be frustrated with having to replace furniture flood after flood (Sims and Baumann 1987). However, the data indicate that it is the severity of floods, measured by the depth and duration of floodwaters that seem to be a stronger predictor of mitigation.

Also, the assumptions I anticipated with place attachment are in tune with the findings. The social contexts in which homeowners learn about mitigation promote action. Partaking in neighborhood organizations, communicating informally with neighbors about flooding and different types of mitigation causally relate to a homeowner's decision to mitigate (Brenkert-Smith et al. 2006; Sims and Baumann 1987). Opinion leaders and innovators within the social network of a community can easily contribute personal influence to the decision to mitigate as is also suggested by a person's social capital (Castle 2002; Coleman 1988; Rogers 1963; Rogers and Beal 1958; Rogers and Cartano 1962; and Woolcock 2002).

In the eyes of the homeowners, mitigation is just too expensive for something that *may* happen. Although this sample portrays an above average income level, homeowners can probably afford more mitigation measures than they think without spending a fortune. Elevation is the most expensive, but making small changes that are low-cost options can go a long way. For instance, homeowners can change their carpet to tile, raise A/C units to second floor, place their large appliances such as washer/dryer combos and hot water heaters on small platforms that are a few inches off the ground, or if the streets have proper drainage, homeowners can install a pipe under the landscape of the yard that allows water to flow from their backyards to the street to drain. These measures are easy to do and are fairly inexpensive, providing a great opportunity to save money and heartache in the long run when the next flood comes. These are some of the main items the study's sample employed. For instance, 29% raised their water heater or other

major appliances, 17% raised their A/C units, and 8% installed drain pipe in their yards to assist with flooding (see Table 4).

This project could be greatly improved with a larger, more systematic sample. Considering the length of the survey, the number of homes reached, and the time of the survey's distribution where many people still have not returned home after displacement, a 29% response rate is appreciated. Nonetheless, a sample of at least a few hundred could have provided better statistical support and improved the overall quality of the findings.

Limitations

I definitely feel that a limitation of this study was having such a homogeneous sample. Distributing surveys door-to-door did require safety precautions, yet it produced a sampling bias with little variance in demographics. The survey could have been much richer with responses from a diverse group of homeowners. Also a limitation was the short time frame I allowed for data collection. Had I provided myself more time, I could have had the opportunity to reach more communities, which in turn could have brought forth more cases. This would also make the analysis stronger, as I would be able to test for significance over associations.

Doing this survey post-Katrina is a limitation because there are still many people displaced. This made it difficult to find people to participate as well as convince those who are here to participate since so many homeowners are fed up with the post-Katrina situation they are in. Another limitation was the wording of the survey question on education. Asking an open-ended question on formal education seemed to confuse some homeowners and provided ambiguous answers that prevented me from using the data.

My lack of statistical application is a personal limitation to this study. Though I have learned a lot since beginning this project, the study could have benefited if I had a better understanding of statistical analysis before attempting to truly understand the data.

A Look Back

There are several things I would have done differently. For starters, I would have pretested more than 10 surveys. I used the pretested surveys to look for clarity in the questions, get an idea of how much time it would a homeowner to get through the survey, and to ensure all the questions were relevant. In retrospect, I would have used the findings from the pretest more advantageously to help create a concrete idea of how the analysis was to be conducted. I could have transformed questions using the most appropriate levels of measurement to elicit results that work well together. I would have attempted to reach more people by either expanding each cluster size or adding several other clusters to the study, and allotted myself more than two weeks to conduct the fieldwork. In an effort to maximize the response rate, I could have rewalked each neighborhood to reach homeowners who were not home at the time of the initial contact. On the same token, I could have personally dropped off the reminder postcard or replacement survey as opposed to mailing them. This could have also saved on postage costs.

Implications

The findings of this study have several important implications. Severity of flooding implies that homeowners who flood from shallow, frequent floods are not so concerned with mitigation. This leads to a reactive mitigation decision over a proactive one, for homeowners wait until they have experienced a hurricane the magnitude of Katrina before floodproofing their home.

The finding on available savings as opposed to income implies that flood protection has to be a priority for homeowners to employ their hard-earned money on it. For those with savings, mitigation is easier to make happen. For those without, they are the ones still waiting on federal aid money and continue to struggle with “being home.” I recommend that homeowners put aside some of their money to build up savings, but also to explore the least expensive mitigation options that best suit their needs so that they are protected, but not broke once the mitigation measure is in place.

Place attachment theoretically encourages mitigation. The more people are attached to their home, area, or the people by which they are surrounded, the more they want to protect themselves from flooding as a means to stay where they are. The analysis suggests that social place attachment is more important to homeowners than attachment to physical place. While social capital is a dimension of social attachment by way of social networking, it lacks the emotional bond homeowners build over time through friendships with neighbors and nearby relatives. However, dense social networks promote both attitudinal attachment and social capital by way of discussion of community problems such as flooding and community involvement that then encourage mitigation. This implies that the stronger bond a person has with neighbors and nearby relatives, the more likely he or she will mitigate.

The research explains that discussing flooding problems with neighbors is a stronger predictor of mitigation than discussing actual mitigation. This implies that when homeowners converse about their risks, participate in a two-fold interaction of listening and speaking, they are likely to take action more so than if they discuss active participation in mitigation. Based on this finding, I would recommend community outreach in which credible “experts” present the specific risks a homeowner faces in his or her community to residents who are willing to listen.

By raising awareness of the risks, homeowners are likely to continue to chat about it and respond with some form of mitigation activity.

Place attachment is a powerful thing here in South Louisiana. Whether the water comes or not, residents here will put up a fight with the water to stay near the social and emotional elements they depend on so much. Mitigation can ease the fight and allow them to stay in the place they call “home!”

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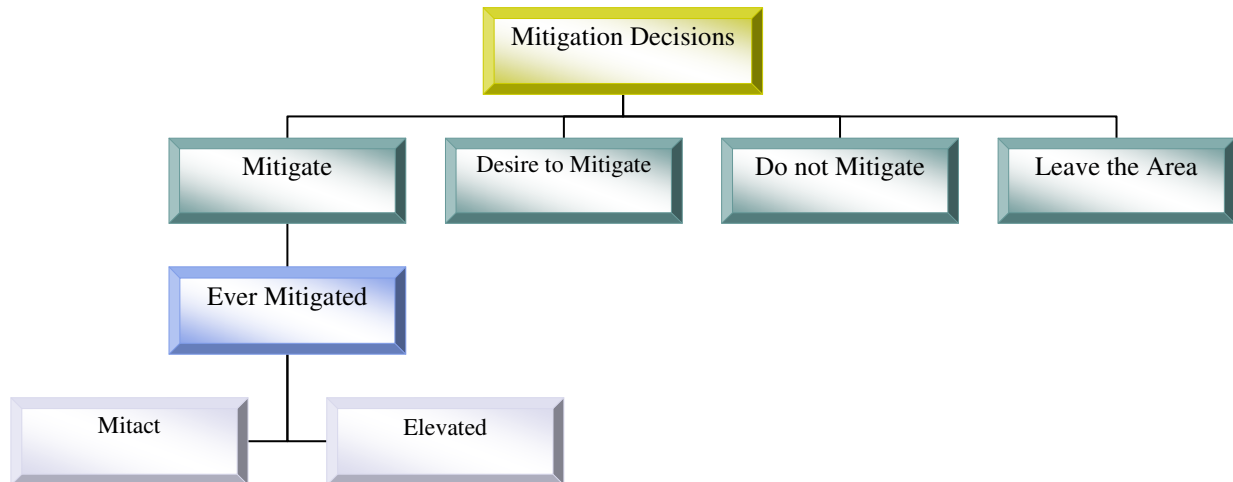
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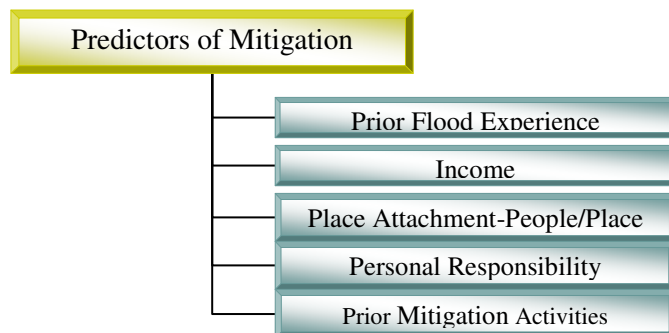
Appendix A- Diagram of Concepts

Conceptual Model

Dependent Variables



Independent Variables



HOMEOWNER MITIGATION
A SURVEY TO DETERMINE THE SOCIAL CONTEXT OF HOMEOWNERS'
DECISIONS TO MITIGATE THEIR HOMES AGAINST FLOODING

Residents of the New Orleans Metropolitan area are very aware of the importance of flood protection. This survey is being done to find out the opinions and actions of residents like yourself who live in flood prone areas about homeowner mitigation (making changes to your home to protect it from future flood damage).

Please answer all of the questions. Select from the answers provided. When you are asked to give only one answer to a question, please do not give more than one. When you are asked to give any number of answers, feel free to circle as many answers as apply to you. However, if you feel a question is too personal, feel free to leave it blank.

If you wish to comment on any question, please do so in the space provided in the margins. Your comments will be read and taken into account.

The results of this study will help to inform policy makers about homeowner mitigation activities. You must be 18 years or older to participate.

Thank you again for your help.



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Please circle the *number* that corresponds to your answer.

Q-1 Did your house flood following Hurricane Katrina in August 2005? By flooding I mean floodwater that entered your living space.

- 0 NO -----IF NO, PLEASE SKIP TO Q-6
- 1 YES
- 9 DON'T KNOW (DIDN'T LIVE IN HOUSE AT THAT TIME)---PLEASE SKIP TO Q-6

(If yes)

Q-2 What was the depth in feet of the floodwaters in the house? _____ feet

Q-3 Approximately how long did the water stay in your house? _____ days

Q-4 Were you able to repair your home's flood damage?

- 0 NO (why not) _____
- 1 YES -----PLEASE SKIP TO Q-6
- 9 DIDN'T WANT TO REPAIR HOME

(If no)

Q-5 Given that 2 years have passed, will you *be able to* repair your home's flood damage?

- 0 NO (why not) _____
- 1 YES
- 9 DO NOT WANT TO REPAIR HOME

Q-6 To the best of your knowledge, how many times has your house flooded, including Hurricane Katrina?

- 0 NEVER FLOODED
- 1 ONCE
- 2 TWICE
- 3 THREE TIMES
- 4 FOUR TIMES
- 5 FIVE TIMES OR MORE (if more, please specify) _____
- 9 DON'T KNOW (HASN'T FLOODED IN THE TIME I'VE LIVED HERE)

Q-7 Did you ever experience flooding in a previous home?

- 0 NO
- 1 YES

Flood Mitigation consists of any changes made to an existing house or property which may help to protect it from being damaged in future floods, ultimately making the area you live in safer against floods. (Note: a house includes the air conditioner, plumbing, electrical wiring, yard).

Q-8 Have you *ever* made a change(s) to your house or property to protect it from flood damage? (Please keep in mind that protecting your home is not the same as repairing it).

- 0 NO -----IF NO, PLEASE SKIP TO Q-18
- 1 YES

(if yes)

Q-9 Why did you decide to mitigate your house or property?

Q-10 What have you done to protect your home or property from flood damage? (Circle the numbers next to *all* that you have done.)

- 1 RAISED THE WATER HEATER OR MAJOR APPLIANCES
- 2 RAISED WIRING, FUSE BOX
- 3 INSTALLED VALVE TO PREVENT SEWER BACKUP
- 4 INSTALLED DRAINAGE PIPE IN YARD SO THAT WATER FLOWS FROM THE BACKYARD TO THE STREET'S STORM DRAINS
- 5 INSTALLED A WALL TO DIVERT WATER AWAY FROM THE HOUSE
- 6 DRY FLOODPROOFED BY SEALING WALLS WITH A WATERPROOF COATING
- 7 ELEVATED HOUSE
- 8 ATTENDED COMMUNITY MEETING ABOUT MITIGATION
- 9 JOINED WITH NEIGHBORS TO ADVOCATE FOR ADEQUATE FLOOD PROTECTION
- 10 WROTE/EMAILED ELECTED OFFICIAL TO ADVOCATE FOR ADEQUATE FLOOD PROTECTION
- 11 PURCHASED FLOOD INSURANCE
- 12 OTHER (specify) _____

Q-11 Why did you select the mitigation measure(s) that you did? (Circle the number next to *all* items that express your decision.)

- 1 IT IS PERMANENT (WON'T REQUIRE REPAIR OR REPLACEMENT)
- 2 APPROPRIATE FOR MY HOUSE AND FLOODING CONDITIONS
- 3 COST EFFECTIVE
- 4 LITTLE EFFORT TO DO
- 5 RECOMMENDED BY AN EXPERT
- 6 INEXPENSIVE
- 7 AUTOMATIC (REQUIRES NO HUMAN ACTION TO BE TAKEN JUST BEFORE A POSSIBLE FLOOD)
- 8 SAW AN ACTUAL EXAMPLE OF THE MEASURE IN PLACE
- 9 OTHER (specify) _____

Q-12 How much did the change(s) as a whole help to protect your home from damage during any flooding that occurred *before* Hurricane Katrina? (Circle *one* answer.)

- 1 CHANGE(S) WAS VERY EFFECTIVE
- 2 CHANGE(S) HELPED SOMEWHAT
- 3 CHANGE(S) DID NOT HELP AT ALL
- 4 CHANGE(S) WAS NOT YET IN PLACE

Q-13 Given how powerful Katrina was, how much did the change(s) as a whole help to protect your home from damage *during* Hurricane Katrina? (Circle *one* answer.)

- 1 CHANGE(S) WAS VERY EFFECTIVE
- 2 CHANGE(S) HELPED SOMEWHAT
- 3 CHANGE(S) DID NOT HELP AT ALL
- 4 CHANGE(S) WAS NOT YET IN PLACE

Q-14 How did you pay for the mitigation measure(s) that was used on your house or property? (Circle all that apply)

- 0 PERSONAL SAVINGS
- 1 BANK LOANS
- 2 FEDERAL DISASTER AID THROUGH ROAD HOME
- 3 SBA LOANS
- 4 OTHER _____

_____	% PERSONAL SAVINGS
_____	% LOANS
_____	% FEDERAL DISASTER AID THROUGH ROAD HOME
_____	% SBA LOANS
_____	% OTHER
= 100%	

NOT AT ALL IMPORTANT VERY IMPORTANT

1 2 3 4 5

0	NO
1	YES

0	NO
1	YES

0	NO
1	YES

A NEIGHBOR WHO HAD ALREADY MADE THE CHANGE TO THEIR HOME.....	1
A CONTRACTOR.....	2
NEWSPAPER, RADIO, TV	3
INTERNET.....	4
DISCUSSION WITH A MITIGATION EXPERT.....	5
GOVT OR NEIGHBORHOOD MEETING.....	6
CITY OR PARISH OFFICIAL.....	7
NO SOURCE, I KNEW HOW OR FIGURED IT OUT AS I WENT ALONG.....	8
OTHER (Specify).....	9
DON'T REMEMBER.....	10
I NEVER LEARNED ABOUT MITIGATION.....	11

Q-21 Given that you live in a flood prone area, how much do you believe it is your responsibility as a homeowner to protect your home from future flood damage? (Circle the number that best reflects your opinion.)

NOT AT ALL MY
RESPONSIBILITY

1

2

3

4

5

COMPLETELY MY
RESPONSIBILITY

Q-22 To what extent do you think *you* can protect your home from flooding? (Circle only one number.)

0 I CANNOT PROTECT MY HOME FROM FLOODING

1 I CAN PROTECT MY HOME VERY LITTLE

2 I CAN PROTECT MY HOME SOME

3 I CAN PROTECT MY HOME CONSIDERABLY

4 I CAN PROTECT MY HOME COMPLETELY

Q-23 Please rate the traits of flood mitigation listed below according to how important they are to you. (Circle *one* number for each quality.)

Flood mitigation should be:

NOT
IMPORTANT

VERY
IMPORTANT

PERMANENT (WON'T REQUIRE

REPAIR OR REPLACEMENT).....1 2 3 4 5

APPROPRIATE TO PROTECT MY HOUSE

FROM FREQUENT, SHALLOW FLOODING.....1 2 3 4 5

APPROPRIATE TO PROTECT MY HOUSE

FROM KATRINA-LIKE EVENTS.....1 2 3 4 5

COST EFFECTIVE.....1 2 3 4 5

LITTLE EFFORT TO DO.....1 2 3 4 5

ONE RECOMMENDED BY AN EXPERT.....1 2 3 4 5

INEXPENSIVE.....1 2 3 4 5

AUTOMATIC (REQUIRES NO HUMAN ACTION

JUST BEFORE FLOOD).....1 2 3 4 5

ONE THAT I COULD SEE A LOCAL EXAMPLE.....1 2 3 4 5

ONE INDIVIDUALLY DESIGNED FOR MY

HOUSE AND SITE.....1 2 3 4 5

Q-24 Do you plan to mitigate, or implement flood protection measures to your house or property in the future?

0 NO -----IF NO, PLEASE SKIP TO Q-26

1 YES -----IF YES, PLEASE GO TO THE NEXT QUESTION

9 DON'T KNOW-----PLEASE SKIP TO Q-27

(If yes)

Q-25 What protective measure(s) would you like to do the most? Why?_____

(If no)

Q-26 Why not? What would be your biggest obstacle with mitigating or protecting your home?

Q-27 To what degree do you believe mitigation can be effective in protecting your home from flooding? In other words, to what degree do you think mitigation will work? (Circle the number which reflects your opinion.)

NOT EFFECTIVE AT ALL

VERY EFFECTIVE

1

2

3

4

5

Q-28 Are you a native of the New Orleans Metropolitan area?

0 NO

1 YES

Q-29 How long have you lived in your current residence? _____

Q-30 How would you describe your relationship with your neighbors, those who live on your block?

1 I KNOW NOTHING ABOUT MY NEIGHBORS

2 MY NEIGHBORS AND I KNOW EACH OTHER, BUT WE DON'T DO ANYTHING TOGETHER

3 MY NEIGHBORS AND I ARE GOOD FRIENDS AND SPEND TIME TOGETHER

Q-31 Do you talk with your neighbors when you see them outside in their yards?

0 NO -----IF NO, PLEASE SKIP TO Q-34

1 YES

(If yes)

Q-32 Do you and your neighbors ever discuss flooding problems?

0 NO

1 YES

Q-33 Do you and your neighbors ever discuss flood mitigation activities?

0 NO

1 YES

Q-34 Are you a member of any organizations in your neighborhood?

0 NO

1 YES

IF YES, WHAT ORGANIZATION(S)? _____

Q-35 Overall, how would you rate your neighborhood as a place to live?

1 POOR

2 FAIR

3 GOOD

4 EXCELLENT

Q-36 Have you considered selling your home because of flooding?

- 0 NO
- 1 I CONSIDERED SELLING MY HOME
- 2 I DISCUSSED SELLING MY HOME WITH OTHERS
- 3 I TRIED TO SELL MY HOME
- 4 I SOLD MY HOME

Q-37 Do most of your *friends* live in or around the New Orleans Metropolitan area or do they live someplace else? (Circle only one number.)

- 1 MOST LIVE IN THIS AREA
- 2 MOST USED TO LIVE IN THIS AREA BUT HAVE NOT RETURNED
- 0 MOST LIVE OUTSIDE OF THIS AREA

Q-38 Other than those who live in your own household, do most of your *relatives* live in or around the New Orleans Metropolitan area, or do they live someplace else? (Circle only one number.)

- 1 MOST LIVE IN THIS AREA
- 2 MOST USED TO LIVE IN THIS AREA AND HAVE NOT BEEN ABLE TO RETURN
- 0 MOST LIVE OUTSIDE OF THIS AREA

Q-39 Suppose you needed advice about whether or not to undertake a flood protection project. Using a "1" for your first choice, please rank the options below to whom you would turn for help?

- ___ FAMILY MEMBER (specify relation) _____
- ___ FRIEND _____
- ___ NEIGHBOR _____
- ___ LOCAL OFFICIAL _____
- ___ INTERNET _____
- ___ OTHER (specify) _____

Q-40 How much do you enjoy the physical qualities of this area such as City Park, Lafreniere Park, Lake Pontchartrain, The Mississippi River, the architecture, etc.?

DO NOT ENJOY AT ALL ENJOY VERY MUCH

1 2 3 4 5

Q-41 Since Katrina, how willing are you to move from... (Circle only one response for each row.)

	VERY UNWILLING			VERY WILLING	
a. your house	1	2	3	4	5
b. your neighborhood	1	2	3	4	5
c. the city or parish	1	2	3	4	5
d. the state	1	2	3	4	5

Q-42 How attached do you feel to: (circle only one response for each row)

	NOT ATTACHED AT ALL				VERY ATTACHED
a. your house	1	2	3	4	5
b. your neighborhood	1	2	3	4	5
c. your city or parish	1	2	3	4	5
d. your state	1	2	3	4	5

Q-43 What is the approximate percentage of returned residents in your neighborhood since Hurricane Katrina?

- 0 25%
- 1 50%
- 2 75%
- 3 100%
- 9 DON'T KNOW (DIDN'T LIVE HERE BEFORE KATRINA)

Q-44 People often talk about how attached residents are to the New Orleans area. If you had to state an important reason for your attachment, what would it be? _____

Next I would like to ask you a few questions about yourself to help in the interpretation of the results.

Q-45 Do you currently have flood insurance?

- 0 NO -----IF NO, PLEASE SKIP TO Q-47
- 1 YES

(if yes)

Q-46 How many flood insurance claims have you filed since living in this house?

- 0 NEVER FILED CLAIM
- 1 FILED CLAIM ONCE
- 2 FILED CLAIM TWICE
- 3 FILED CLAIM THREE TIMES OR MORE (if more, please specify) _____

Q-47 What is your sex?

- 1 MALE
- 2 FEMALE

Q-48 What is your approximate total household income?

- 1 0-\$19,000
- 2 \$20,000 to \$29,000
- 3 \$30,000 to \$39,000
- 4 \$40,000 to \$49,000
- 5 \$50,000 to \$59,000
- 6 \$60,000 to \$69,000
- 7 \$70,000 to \$79,000
- 8 \$80,000 to \$89,000
- 9 \$90,000 to \$99,000
- 10 \$100,000 to \$109,000
- 11 \$110,000 to \$119,000
- 12 \$120,000 to \$129,000
- 13 \$130,000 or more

Q-49 How many years of formal education have you completed? *Number* of years _____

Q-50 How old are you? _____

Your contribution to this effort is greatly appreciated. Any comments you would like to add related to homeowner mitigation or flooding will be read and taken into account. Thank you.

Appendix C- IRB Approval

***University Committee for the Protection
of Human Subjects in Research
University of New Orleans***

Campus Correspondence

Principal Investigator: Shirley Laska, Ph.D.
Co-Investigator: Maggie Olivier (Graduate Student)

Date: November 16, 2007

Protocol Title: "Testing the waters: The social context of homeowner flood mitigation"

IRB#: 31OCT07

The IRB has deemed that the research and procedures are compliant with the University of New Orleans and federal guidelines. The above-referenced human subjects protocol is review and approved under 45 CFR 46.110(1) categories 6 & 7.

Please remember that approval is only valid for one year from the approval date. Any changes to the procedures or protocols must be reviewed and approved by the IRB prior to implementation.

If an adverse, unforeseen event occurs (e.g., physical, social, or emotional harm), you are required to inform the IRB as soon as possible after the event.

Best of luck with your project!
Sincerely,

Kari Walsh, 
IRB member designee of Chair

Laura Scaramella, Ph.D.
Chair, University Committee for the Protection of Human Subjects in Research

Retrieved from <http://www.gnocdc.org/mapping/docs/Neighborhood.pdf>; modified by Solutient.



Appendix E- Cluster Maps

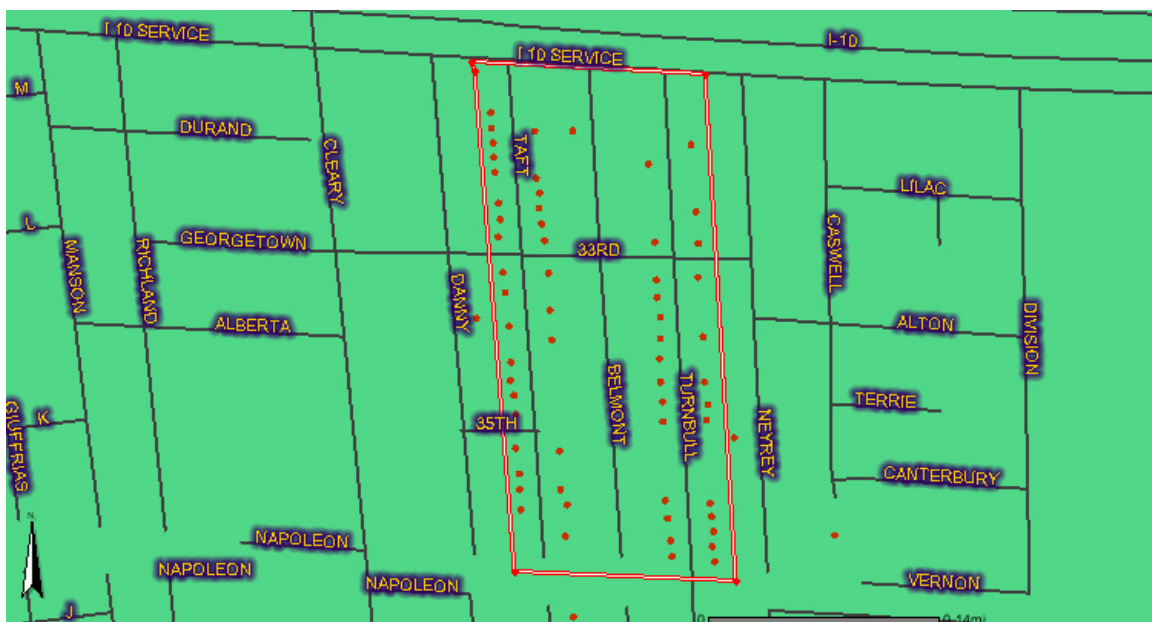
Study Neighborhood 1

Jefferson Parish

Metairie

Boundaries: Taft Park to Turnbull; I-10 Service Rd. to W. Napoleon

Roughly 146 properties total



Study Neighborhood 2

Jefferson Parish

Kenner

Boundaries: Michigan to Mississippi; 21st to W. Napoleon

Roughly 95 properties total



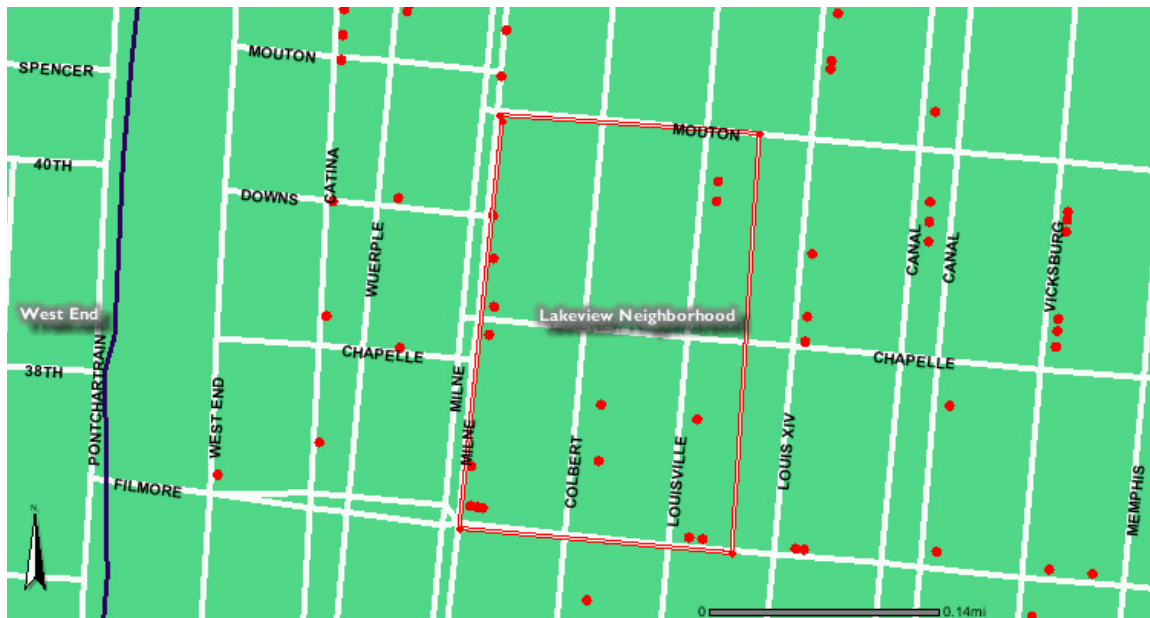
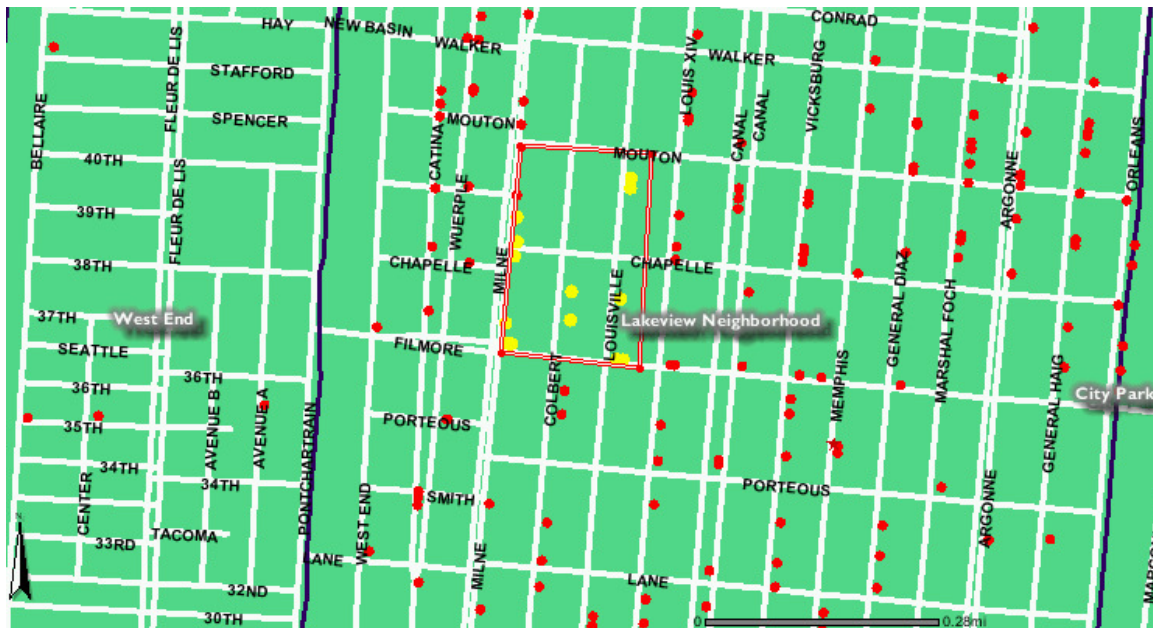
Study Neighborhood 3

Orleans Parish

Lakeview

Boundaries: Milne to Louisville; Filmore to Mouton

Roughly 100 properties total



Study Neighborhood 4

Orleans Parish

Audubon Neighborhood

Boundaries: Octavia St. to Joseph St.; Garfield St. to Prytania St.

Roughly 54 properties total



Study Neighborhood 5

Orleans Parish

Marlyville/Fountainebleau Neighborhood

Boundaries: Octavia St. to Joseph St.; Johnson St. to Rocheblave St..

Roughly 70 properties total



Appendix F- Survey Checklist

[illegible]

Appendix G- Survey Script

Hi! We are from the University Of New Orleans and are conducting a study on homeowner flood mitigation. Are you a homeowner or a renter?

(If renter) Thank you for your time. Have a nice day.

(If homeowner) Would you be willing to participate in our study? (If yes) We have a survey for you to fill out that should take you approximately 10 minutes. I would like to add that there are no risks involved in this study and that your participation is completely voluntary. You can fill it out now and we can come back in about an hour or so to pick it up. Or, if now is not convenient for you, you could mail it back to UNO in the prepaid envelope provided. Whatever is easiest for you. Thank you very much for time and contribution.

(If family member other than homeowner answers, ask if you can leave it for the homeowner to fill out later)

Appendix H- Survey Script Insert

Insert for homes where no one answered the door. Used to serve as the script where we could not verbally do so.

Hi! We are from the University Of New Orleans and are conducting a study on homeowner flood mitigation. If you are a homeowner and would like to participate, please fill out the survey and mail it back to UNO in the prepaid envelope provided before February 25, 2008. The survey should take you approximately 10 minutes to complete. I would like to add that there are no risks involved in this study and that your participation is completely voluntary. Thank you very much for your time and contribution.

Sincerely,
The UNO Sociology Department Research Team

Appendix I- Reminder Postcard



Dear Resident,

This is a reminder concerning a survey delivered to you a few weeks ago on homeowner flood mitigation by the UNO Sociology Dept. Research Team. Your opinion on this subject is very important to understanding what homeowners are doing to their homes to stay safe in a flood prone area. If you have not yet done so, I encourage you to please take a few minutes to complete the survey and return it in the self-addressed stamped envelope you were provided. Your time and cooperation are much appreciated.

Sincerely,

Maggie Olivier
UNO Sociology Graduate Student
mlolivie@uno.edu

Appendix J- Operationalization of Dependent and Independent Variables

Dependent Variable

Mitigation Decisions

Mitigated- Two items indicating whether respondent has ever participated in mitigation (Q-8) and whether respondent has participated in mitigation since experiencing Hurricane Katrina (Q-16).

Independent Variables (Decision-Making Factors and Predictors)

Prior Flood Experience

Frequency-Three items indicating whether or not the respondent experienced flooding resulting from Hurricane Katrina (Q-1), the number of times the respondent experienced previous flood events in this home (Q-6), and whether or not the respondent experienced flooding in a previous location (Q-7).

Depth- One item indicating how deep the water that entered the home was after Hurricane Katrina (Q-2).

Duration- One item indicating the amount of time Katrina floodwaters remained in the house (Q-3).

Obstacles to Repair Home- One item indicating the respondent's obstacles to repair home from flood damage caused by Hurricane Katrina (Q-4).

Income

One item indicating the respondent's approximate household income (Q-48).

Place Attachment (Two-fold; place and people)

Physical landscape- One item indicating the degree of enjoyment a respondent feels from landscapes specific to the New Orleans area (Q-40).

Communication with neighbors/social networks-Four items indicating whether the respondent converses with neighbors (Q-31), whether or not the topic of discussion is flooding problems (Q-32), whether or not the topic of discussion is mitigation (Q-33), who in the respondent's social network would they turn to first for advice on a mitigation project (Q-39).

Community involvement- One item indicating whether the respondent is a member of any neighborhood organizations (Q-34).

Family and friendship ties- Three items indicating a description of neighbor relations (Q-30), proximity of friends (Q-37), proximity of relatives (Q-38).

Sense of belonging- Two items indicating whether the respondent is native to the New Orleans metropolitan area (Q-28) and length of time in current house (Q-29).

Opinion leaders/innovators- One item indicating whether the respondent first learned about mitigation from a nearby neighbor who has mitigated their home (Q- 20).

Personal Responsibility

One item indicating the degree to which the respondent believes it is his/her personal responsibility to protect their home from flood damage (Q-21).

Self-Efficacy

One item indicating the extent of personal control of being affected by flooding (Q-22).

Prior Mitigation Activities

Two items indicating the degree of effectiveness of mitigation measures prior to Hurricane Katrina (Q-12), and degree of effectiveness of mitigation measures during Hurricane Katrina (Q-13).

Vita

Maggie Olivier was born in Houma, Louisiana. She received her B.A. in Sociology from the University of Louisiana at Lafayette. Ms. Olivier is currently working as a research assistant on a Repetitive Loss project at the Center for Hazards Assessment, Response and Technology. She will receive her M.A. in Sociology in May 2008.