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## Levees, Urbanization and Public Perception: Implications for Southeast Louisiana Wetlands

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Levees, Urbanization and Public Perception:  
Implications for Southeast Louisiana Wetlands

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  
Geography

by

Jacquelyn Ann Marchand

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for his unwavering support and guidance

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## **Abbreviations used in this document**

Environmental Protection Agency	.....	EPA
Federal Bureau of Investigation	.....	FBI
Mississippi River and Tributaries Project	.....	MRT
U.S. Army Corps of Engineers	.....	Corps USACE
U.S. Geological Survey	.....	USGS



## **Abstract**

The wetlands of Louisiana have provided protection against floods and storms for thousands of years. With the construction of the Mississippi River levees and increased urbanization the wetlands are quickly disappearing, thus leaving the area vulnerable to hurricane storm surge. Since Hurricane Katrina, levees have been showcased as the only way of fully protecting southeast Louisiana from floods and storms; however, this is also being accompanied by a push for more funding for coastal restoration. There is evidence that hurricane protection levees and coastal restoration are incompatible. This research examines the implications of levees on the wetlands both directly and indirectly. Furthermore, a survey was conducted to discover public perception about the impacts of levees in southeast Louisiana by residents most at risk for flooding from hurricane storm surge.

**Keywords:** public perception, wetlands, southeast Louisiana, hurricane protection levees

# **Chapter 1**

## ***Introduction***

The Louisiana wetlands are a unique ecosystem in which is embedded the cultures of southern Louisiana. Southeastern Louisianans obtain from the wetlands the benefits of fishing, hunting, timber and tourist attractions. Moreover, southeast Louisiana depends upon the wetlands for protection against hurricanes. It is known that the wetlands serve as a wind and storm surge reducer. The U.S. Army Corps of Engineers (Corps) has estimated that for every 2.75 miles of wetlands a hurricane must cross, storm surge is reduced by 1 ft. (USACE 1965). Crucial as these lands are Louisiana now faces a seemingly inevitable disaster – the disappearance of the wetlands.

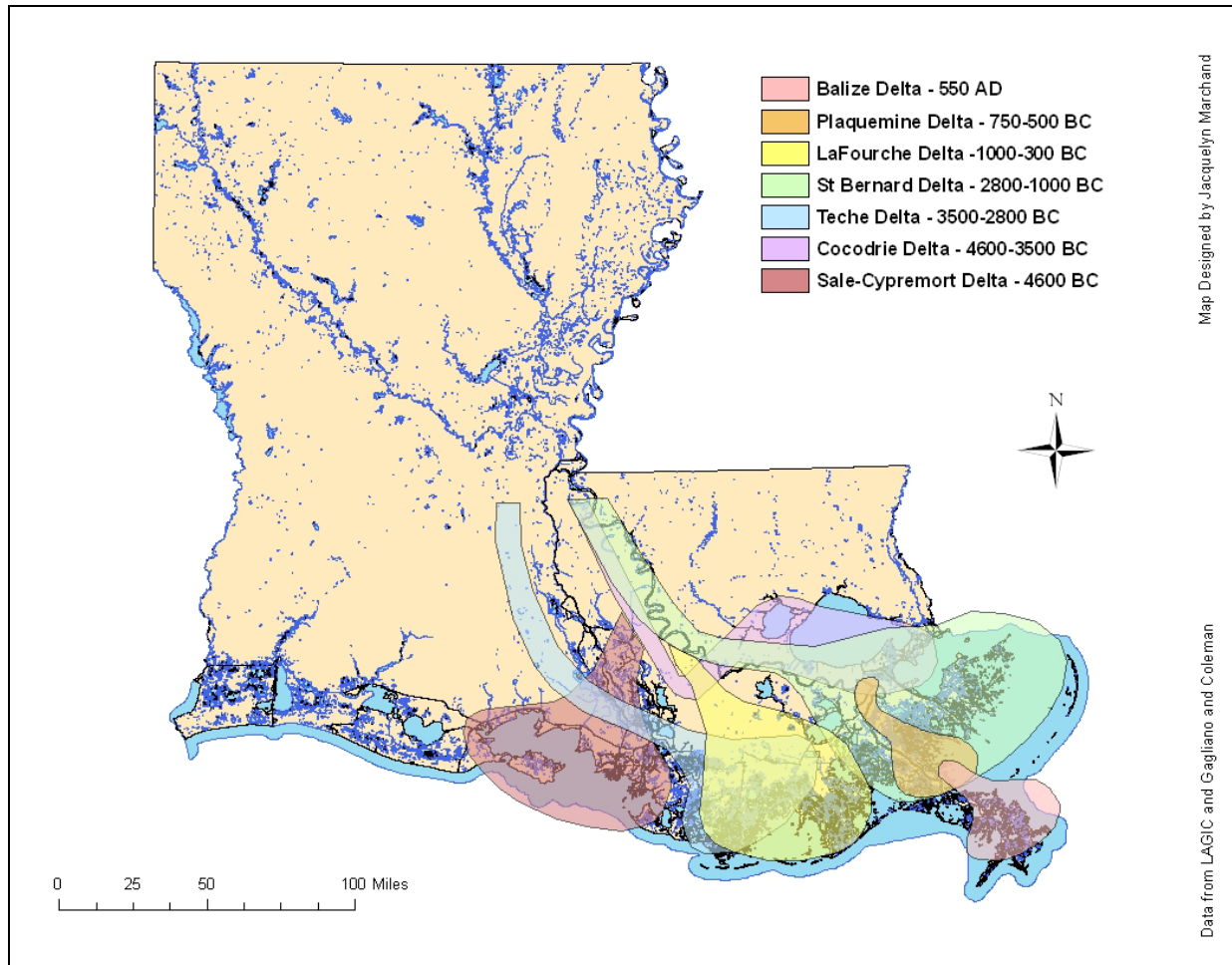
The wetlands are a fragile environment, dependent upon the influx of water and sediment from the Mississippi River to keep them alive and healthy. However, man introduced to the area urbanization and river engineering, both of which have proved to be disastrous for the wetlands. The construction of urban centers disrupts the natural environment and aggravates natural processes such as erosion and subsidence to the point that nature can no longer balance these negative actions with positive natural replenishment. Urban centers also require the destruction of wetlands in order to create dry land on which to build (Science Working Group on Coastal Wetland Forest Conservation and Use 2005, North Carolina State University Water Quality Group 2003). River engineering has introduced artificial levees that prevent the flood waters of the Mississippi River from nourishing the surrounding areas (van Heerden and Kemp 2007, Sparks 2006, Tibbetts 2006, Addison 2005, Caffey 2005, Hartman and Goldstein 1996, EPA and Louisiana Geological Survey 1987, Walker et al 1987). Thus slowly starved of nutrients and sediment the wetlands quickly begin to die.

There is one final blow currently being dealt that, if not stopped, could mean the end of Louisiana's wetlands. There is much encouragement from politicians for development in the wetlands (Burdeau 2008), and many people, including local organizations, believe that it is feasible to build category 5 levee protection and also save the wetlands (Rosenthal pers. comm. 2008). There are now many projects in place for coastal restoration, but all focus on mitigating the damage already done and ignore the actual causes of the problem. Furthermore, it seems as though Louisianans do not want to be told that they may be part of the land loss problem. We live in a culture where federal levees are seen by many as the panacea of all flooding problems and living on the bayou is prized so long as all the modern amenities, e.g. paved roads, driveways and large backyards, are there too. Yet we live in a time when coastal restoration has become a top political priority and has received much media attention. It seems as though the public may be misinformed about these issues, and this potential misperception seems to have crept into every corner and now dominates our opinions and actions to the potential detriment of the wetlands. The purpose of this research is to examine these issues and determine whether the aforesaid public misperception exists and to what extent it is affecting southeast Louisiana's coast.

## Chapter 2

### *Plight of the Wetlands*

In order to understand the effects of urban sprawl on the wetlands, we must first know something about the physiographic properties of the area. Southeast Louisiana was built by the Mississippi River. Since around 4600 B.C. until the river was contained by the Mississippi River and Tributaries Project (MRT) in the 20<sup>th</sup> century, the Mississippi River overflowed its banks annually and deposited sediment in the floodplain, which over time built up dry land (note that the Mississippi River occasionally breaks through the MRT levees, but not to the extent it did before the levees were raised to their present height). The annual floods were also a time of course changing for the river. During a major flood (either annual flooding or flooding from hurricane storm surge) if a crevasse, a break in the levee, formed the river would make a sudden shift to a different distributary, thus changing its course. This sudden shift is called avulsion. Another slower process is as a river's channel becomes less and less efficient because of sedimentation and bank gradation, the river will begin to erode its banks and change its course as it seeks to reach sea level in the quickest way possible. But in regards to the Mississippi River, avulsion is the main process of channel switching. When the channel changed, a new delta would be built (Ellis and DuBowdy 2008). It was the joint efforts of sediment deposition and course changing that eventually built up the Louisiana coast (Fig. 1). Over thousands of years the Mississippi River flooded, deposited sediments, built up land, changed courses, and then started the process over again giving us what we now know as southeast Louisiana.



**Fig. 1: Historical deltas of the Mississippi River**

Flood protection levees may seem like a good change for the communities in southeast Louisiana, but they are in fact a harmful change to the wetlands (van Heerden and Kemp 2007, Tibbetts 2006, Addison 2005, Hartman and Goldstein 1996). It is general knowledge now that the levees are hugely responsible for the unhealthy state of the wetlands. With the construction of the MRT levees the waters of the Mississippi River can no longer reach the floodplain of southeast Louisiana. Without the constant intake of nutrients and sediments from the river, the wetlands are starved to the death. However, levees continue to be the preferred method of flood protection in southeast Louisiana. After Hurricane Katrina in 2005 many New Orleans advocacy groups, e.g. Levees.org, Women of the Storm, SaveBigEasy.org and Levees Not War, and local,

state and federal politicians began to lobby Congress for category 5 levee protection funding. After Hurricanes Gustav and Ike caused serious flooding in the southernmost parishes of Louisiana in 2008 many residents and local politicians began calling for federal levee protection to prevent such an event from occurring again (Moore 2008). (Note that these efforts are focused on building new or upgrading existing hurricane protection levees that will tie into the MRT levees.) The same people are also urging funding for wetlands protection and restoration and as such appear to have a conflict of interests, which will be discussed below.

Subsidence is a natural occurrence. It is slow and countered by natural replenishment in southeast Louisiana; however, due to man's interference, it has become a serious problem to the wetlands. The soil created by the river's deposition is soft, loosely compacted and contains high levels of organic material. When the soil eventually begins to compact and the organic material begins to deteriorate, the land begins to subside as the soil's volume decreases (Anderson et al 2005). However, human interference has increased the rate of subsidence, and as such created a problem where there was once none. By enclosing the Mississippi River, man has prevented sediment deposition, which is the natural antidote for subsidence. The pumping of ground water also causes the soil to subside (Tibbetts 2006). After the water is removed, open spaces are left that were once occupied by water, and eventually the soil begins to compress these spaces. Furthermore, urbanization on such soil increases the soil's weight load and serves only to aggravate the subsidence problem. According the U.S. Geological Survey (USGS), subsidence alone has accounted for 53% of land loss in the Louisiana deltaic plain in the last century (Addison 2005). By cutting off the life line of the wetlands and urbanizing the area man has created a problem out of a natural phenomenon, and threatened the existence of the land on which he lives.

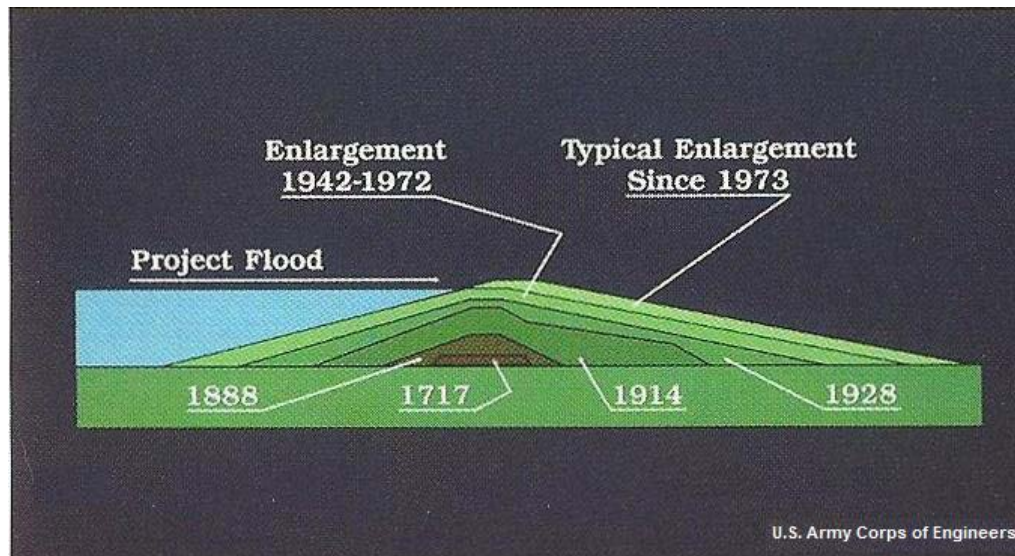
## Chapter 3

### *Metropolitan Growth and Its Impacts*

The levee systems of New Orleans have provided residents of the area with a sense of security (perhaps false) from flooding, a particular concern for an area that is mostly at or below sea level and surrounded by water (there are 3 systems that protect the city of New Orleans: the Mississippi River and Tributaries Project, the Greater New Orleans Hurricane and Storm Damage Risk Reduction System and the West Bank and Vicinity Hurricane Protection Project). The systems provide protection not only against annual spring flooding from the Mississippi River, but also against the increasing threat of flooding from hurricane storm surge. While both types of protection are significant in the history of the area, it is the protection against Mississippi River flooding that has played the most important role in the growth of the New Orleans metropolitan area.

Since New Orleans was founded, levees were seen as the means of protecting life and property against the floods of the Mississippi River. Sieur de Bienville began construction on the first levee system around New Orleans in 1717. The maintenance and expansion of this system was then left to private citizens (Kemp 2000). Through the French and Spanish colonial governments and even to American possession of the territory this policy was kept in place. The city of New Orleans made various attempts to make the levee system a public project, but, due to financial shortfalls, it continued to fall back on the private citizen maintenance plan (Colten 2006). The private citizen maintenance plan, however, was detrimental to the system because more often than not landowners were careless with the upkeep of the levees on their property, and because of this failures in the system were not uncommon. In 1879, the federal government decided to get involved in flood protection, and authorized the Corps to develop a

comprehensive flood control plan (USACE 2004). The Corps raised the Mississippi River levees several times, but again and again the river continued to break through (USACE) (Fig. 2).



**Fig. 2: Levee lifts from 1717 to 1973**

Finally, after the Great Flood of 1927 devastated the Lower Mississippi River Valley, Congress and the Corps began looking at other options besides the “levees only” policy that for so long had been used. The Corps submitted a complex plan of levees, floodways and flood control structures, known as the Mississippi River and Tributaries Project (MRT), to Congress, and the plan was approved in the Flood Control Act of 1928 (USACE 2004). The project consisted of a main levee system 2,203 miles long, 1,607 miles along the Mississippi River and 596 miles along the Arkansas and Red Rivers and in the Atchafalaya Basin (Fig. 3).



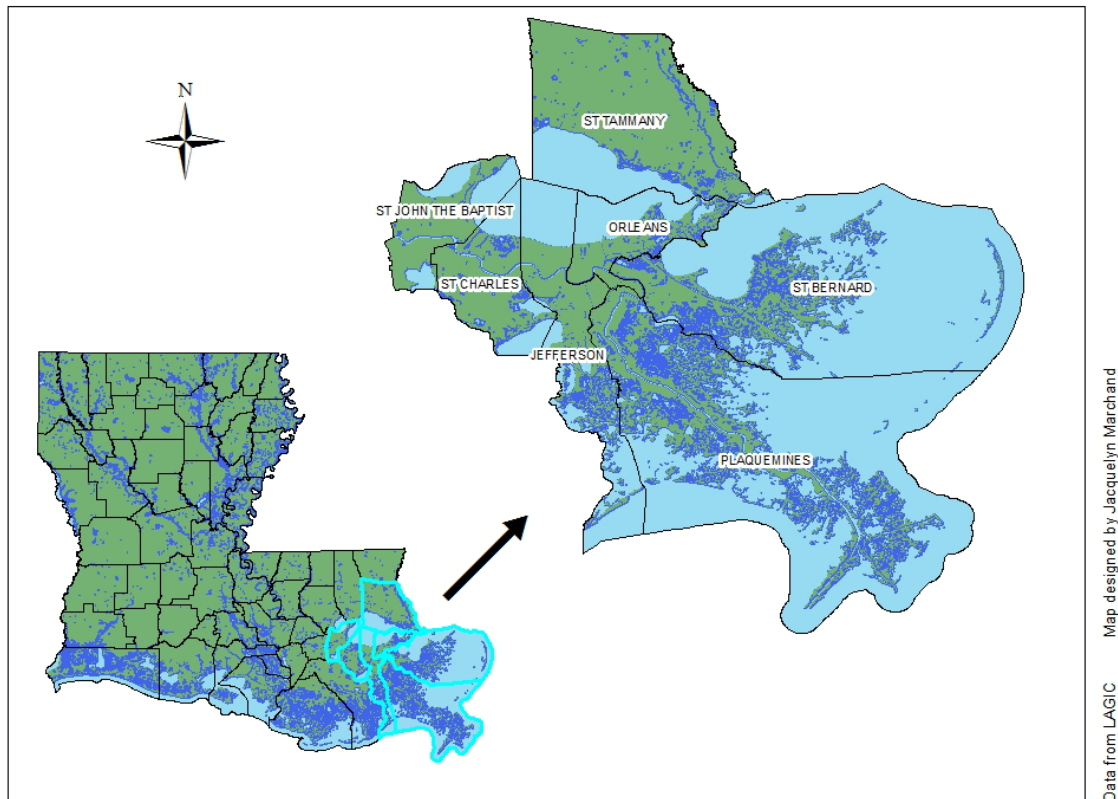


**Fig. 3: Mississippi River and Tributaries Project area highlighted**

The levees stand an average 25 ft. high, and can hold back about 20 ft. of flood waters before any concern needs to be raised (Marchand pers. comm. 2007). It is this system which has, by containing the Mississippi River, allowed New Orleans to expand into the metropolis it is today.

However, the expansion of the city did not occur overnight. It began as a very slow process that gradually picked up momentum and then suddenly exploded. In the early 1900s many New Orleans residents began moving to the west bank as the city became more densely populated. City officials began looking for ways to keep residents, and soon realized that they had the technology available to drain the backswamps, which would allow them to accommodate more people. They began the draining process, but further development was hindered by the onset of World War II (Shepherd 2005). It was not until the G.I. Bill of 1944 was passed that the pace of development in former backswamp areas began to pick up again. Among the many provisions of this bill the most important was that it provided veterans with low interest, no down payment loans for homes, which started the mass exodus from the cities to the suburbs.

Seemingly overnight the classic “cookie cutter” houses were erected in mass numbers (Humes 2006). From 1945 to 1975, though more towards the end of this period, the suburbs exploded in New Orleans metro area. The metro area doubled in size in just 25 years (1950-1975).



**Fig. 4: Metropolitan New Orleans**

Growth on the east bank of Jefferson Parish was uncontrollable, and the residents were followed quickly by businesses, entertainment and industries (Lewis 2003). Roads and highways began to expand just as quickly, which enabled the further expansion of the suburbs. By the 1980s Jefferson Parish’s west bank and the upper portion of Plaquemines Parish were experiencing the effects of the new developments (Shepherd 2005). This suburban growth continues even today. Many developers are constructing new subdivisions on the west bank of St. Charles Parish even though the area does not have hurricane protection. St. Tammany Parish

is experiencing significant urban development as more and more people flee the inner city and the highly vulnerable (to hurricane storm surge) south shore of Lake Pontchartrain, and the parish now has about 20.1% of the population of the metro area (U.S. Census Bureau 2009)

But as the demand for suburban homes increased, the natural environment of southeast Louisiana decreased. Urban development has been noted as an important factor in converting wetlands to open water. Between 1950 and 1978 developed land in southeast Louisiana increased by 59,000 acres, with Jefferson Parish, immediately west of Orleans Parish, experiencing the greatest growth at 14,500 acres. Major urban development is usually followed by, and major suburban development is usually preceded by, highway development, and between 1967 and 1984 four federal or federally aided highway projects destroyed 2,640 acres of wetlands in coastal Louisiana (Früge 1986). Even today with the wetlands crisis so publicized and studied urban sprawl continues to be a major problem for the wetlands. A recent example of this problem occurred in St. Charles Parish in the late 1980s and 1990s. A developer named Rathborne began constructing a subdivision, Willowridge, on a 103-acre site on the west bank of St. Charles Parish, which contained 45 acres of wetlands. Federal law states that anyone wishing to develop on wetlands must file for a Section 404 permit (called so because it falls under Section 404 of the Clean Water Act), which is overseen by the Corps. However, Rathborne did not file for a permit, and illegally began to develop those wetlands. It wasn't until 1999 that the illegal development was finally caught, but by then the subdivision was almost complete. The company was then fined \$620,000, ordered to set aside 373 acres of wetlands as a conservation servitude, file for the permit regarding the original 45 acres of wetlands, and to set aside the usual mitigation site (USACE 1999). However, the subdivision was allowed to remain as it was nearly complete. The master plan of Rathborne is to build a large suburban area in phases, and

now residents of the existing phases are concerned that the new development will further threaten the wetlands, including the conservation servitude, along with their chances of getting hurricane protection levees (Prendergast pers. comm. 2007). Although the original 45 acres of wetlands that were destroyed seem like a tiny piece of puzzle, it appears to be a more menacing problem than most people realize because it opens the door to more and more wetlands development, which means more and more wetlands destruction. There are many “only 45 acres” being destroyed illegally and legally. A little bit here and a little bit there can lull us into a false sense of security because we think we’re being conservative. However, small numbers add up, and those 45 acres here and there seem to be adding up to a major land loss problem.

## Chapter 4

### *Obscure Factors in Wetlands Loss*

There are many factors that play significant roles in the loss of Louisiana's wetlands – some more publically prominent than others. For example, the oil and gas and the logging industries' impacts on the wetlands have been well-documented by environmental and wetlands conservation groups, the media, scholars and, via all of the previous, the public. These industries have undoubtedly contributed to the demise of the wetlands (Faulkner et al 2007, Science Working Group on Coastal Wetland Forest Conservation and Use 2005, Ko et al 2004); however, there are other factors in the wetlands problem that, though not as well-known, are just as, if not more, detrimental. These issues are: wetlands development, hurricane protection levees and public perception about contributing factors to wetlands loss. Little, if any, is said about these issues, which thus creates potentially more fatal problems because they are obscured and thus potentially ignored.

As mentioned previously, anyone who wants to develop on wetlands must apply for a Section 404 permit through the Corps. The developer must submit the plan for the project in question, and an assessment of the impacts the project will have on the wetlands will then be conducted. The Corps will review the project and environmental impact report and, weighing the impacts on the wetlands vs. the “public good” of the project, make a decision whether to accept or reject the application. In theory this process should prevent over-development of the wetlands, but in practice it appears to be only slowing over-development. In southeast Louisiana the Corps receives dozens of Section 404 applications each year, and though most applications go through significant modification in order to reduce environmental impacts, very few of them are rejected (Slumber pers. comm. 2008). This presents the problem of “regulated” unchecked

wetlands development. The impact of an individual project may be reduced and by itself seem insignificant compared to the overall problem, but considering the total acreage of these projects together it is a substantial amount of wetlands that are being destroyed. Louisiana is losing approximately 25 mi<sup>2</sup> of wetlands “naturally”, i.e. via erosion and subsidence, each year (Barras, Bernier and Morton 2008). Wetlands loss due to subdivisions such as Willowridge is not counted in those statistics because developers are required to create a mitigation site. With each approved application comes the loss of more wetlands in addition to what is being lost naturally each year. It is true that those developers whose projects seriously impact or otherwise destroy wetlands must mitigate their impacts by either restoring wetlands elsewhere or creating new wetlands; however, some researchers are beginning to believe that constructed, i.e. artificial, and enhanced wetlands cannot fully replace what was lost (Ambrose 2000, Deweese 1994, Race and Fonseca 1996, Race 1985, Race and Christie 1982). If this is true, mitigation efforts required under Section 404 may be fruitless. This would present an even bigger problem than before because the supposed mitigation would not be successful, and the statistics for net loss of wetlands would increase.

Another factor causing wetlands loss is the construction of levees. It is widely known now that the Mississippi River levees initiated the demise of Louisiana’s wetlands by stopping the flow of nutrients and sediments from the river (van Heerden and Kemp 2007, Sparks 2006, Tibbetts 2006, Addison 2005, Caffey 2005, Hartman and Goldstein 1996, EPA and Louisiana Geological Survey 1987, Walker et al 1987). However, hurricane protection levees are also contributing to wetlands destruction. Hurricane levee protection systems enclose or block off areas, some of which contain wetlands, to protect communities from storm surge. Thus water cannot flow in and out as it would naturally. The enclosed wetlands, or impoundments, are cut

off from an influx of new nutrients, and so wetlands deterioration in these areas is accelerated (Smith et al 2008, Center for the Study of Public Health Impacts of Hurricanes 2006, North Carolina State University Water Quality Group 2003).

Some may argue that hurricane protection in the form of a ring levee, a levee which completely encircles an area, around a community does not affect wetlands because it only surrounds one or two communities. This is partially true in that the acreage of affected wetlands is reduced by bringing the levees as close as possible to the communities; however, there are still negative impacts that are inevitable. If the community that is to be protected is in the wetlands, wetlands must be destroyed in order to build the levees. It is also probable that the levees will not be directly against any homes, but rather a buffer zone will be created so as not to damage anyone's property. This can result in wetlands being enclosed inside the hurricane protection system.

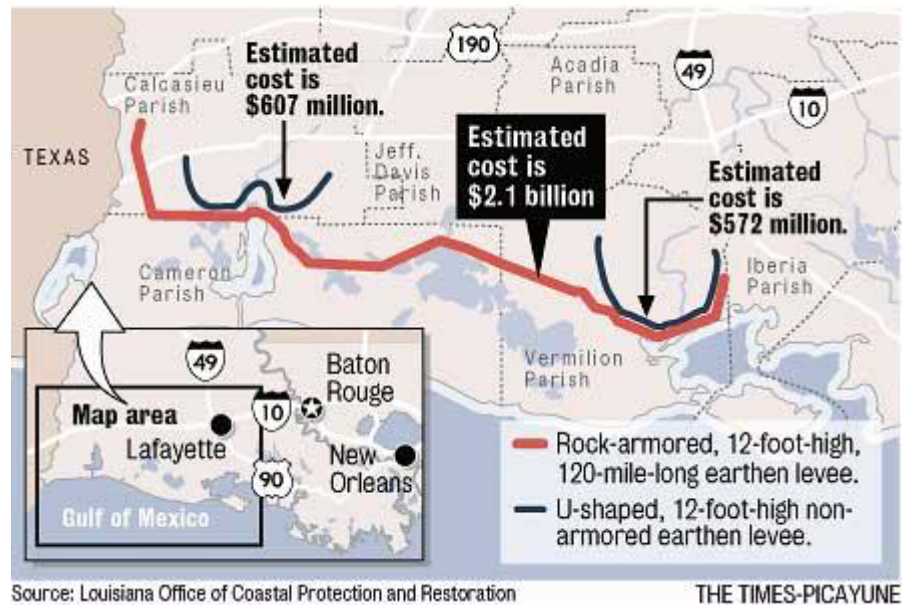
Some may argue that one or two ring levees could not have so detrimental an effect on the wetlands. However, if one or two communities get ring levees, it would open the door to other communities getting levees. If other communities lobby their political representatives long and hard enough, they would probably have a good chance at getting hurricane protection. By allowing construction of individual hurricane protection systems for communities, there is the chance of also creating a domino effect, i.e. once one or two communities get levee protection, everyone will want levee protection. This could end up dotting southeast Louisiana with many small hurricane protection systems or a few large systems such as the two systems proposed for southeast and southwest Louisiana. These systems, called the "Great Wall of Louisiana" (Figs. 4 and 5) by critics, would protect the most populated areas of St. Tammany Parish all the way to St. Mary Parish in the southeast and Calcasieu, Cameron and Vermilion Parishes in the

southwest (McQuaid, Marshall and Schleifstein 2005, Schleifstein 2009). Note the large amount of land that would be enclosed in these systems. Undoubtedly, these projects would have significant impact on interior wetlands. Of course, we must also note the sparse wetlands outside the southeast system. Eventually these wetlands will disappear due to erosion and subsidence, and this would bring the Gulf of Mexico to the foot of the hurricane protection system, which would then create problems of erosion of the levees. More funds would then be needed to armor these levees, and it would be a constant battle to keep them from succumbing to the Gulf.



Fig. 5: “Great Wall of Louisiana”, southeast segment





**Fig. 6: “Great Wall of Louisiana”, southwest segment**

The chances of the “Great Wall of Louisiana” being built are very small according to officials (Schleifstein 2009), but the fact remains that such large scale systems are being considered as methods of storm surge protection, and should such systems be built, they would destroy large amounts of wetlands.

Neither of the previous problems appears to get much attention. Very little is said about the impacts of hurricane protection levees on the wetlands and still less, if any, is said about wetlands development and the Section 404 permitting process. One wonders why such factors would be overlooked in the effort to restore Louisiana’s coast. If these issues have an important impact on the wetlands they should be well-publicized especially since there is mass funding for hurricane protection levees and increasing interests in protecting the wetlands post-Katrina. It may be that fear of another Katrina-like disaster prevents people from examining the long-term impacts of hurricane protection levees, and lack of awareness of the Section 404 permitting process is at fault for its impacts’ obscurity. If this is true, it demonstrates that the wetlands loss

issue is very complex and people are still unaware of some important contributing factors – factors of which the people seem to be a part.

## Chapter 5

### *Literature Review*

#### *Levees*

For many decades Americans have depended on technological solutions to natural hazards. This has been no different in New Orleans where people have utilized artificial levees as a means of flood control since the city was founded. Since the 2005 disaster much focus has been placed on building category 5 flood protection levees for the city. However, despite the backing by the media and grassroots organizations for such massive structures, researchers have warned against the use of this method of flood control as their studies are finding the pros are not outweighing the cons (Freudenburg et al 2008, Kunreuther, Meyer and Michel-Kerjan 2007, Maddocks, Bewsher and Dinham 2007, Kron 2006, Mileti 1999, Hey and Philippi 1995, Tobin 1995, Saarinen 1969, White 1945).

The benefits of levees as flood control structures are generally seen quickly. Tobin (1995) said levees are one of the cheapest and easiest structural flood solutions to build. He also noted that there are few political repercussions to supporting flood control projects. Levees do, in fact, provide protection against floods, but only up to design standards, provided there are no structural flaws or serious damage inflicted on the structure (Maddocks, Bewsher and Dinham 2007). The National Science Foundation (1980) reported that levees and other flood control structures saved 10 million acres of land from flooding during the Lower Mississippi River Valley flood of 1973 and prevented an additional \$15 billion in damage. Levees provide a sense of security (even if false) for those living behind them and relieve the stress of the worrying about the next flood. Maddocks, Bewsher and Dinham (2007) noted that levees are successful in eliminating small floods, and, if high enough, successful in eliminating some larger floods as

well. However, despite the benefits of levees, researchers have found that these are short-term benefits, and they are hiding a serious and increasing problem (Mileti 1999, Saarinen 1969).

Research suggests that residents have misperceptions about the actual effectiveness of technological solutions, such as levees, to flood problems. Regarding such structures as the panacea of flood problems, those living in these “protected” communities grow complacent about local risks as the memory of past floods fades for long time residents or new people who have never experienced a flood move in. The community then falls into a false sense of security (Kunreuther, Meyer and Michel-Kerjan 2007, Maddocks, Bewsher and Dinham 2007, Tobin 1995, Saarinen 1969). Many see the flood risk as eliminated, but eventually a flood will occur that will exceed design standards of the levee and overwhelm the system (Maddocks, Bewsher and Dinham 2007, Mileti 1999). This is inevitable for all levee systems. No technological solution can stop all flood damage (Hey and Philippi 1995). In fact, researchers have found that flood related damages have increased despite levee construction. This phenomenon was pointed out decades ago as Freudenburg et al (2008) noted. White (1945) found that the more the United States spent on flood control projects, the higher the costs of flood damage rose. Hey and Philippi (1995) found that in spite of the massive efforts to control flooding by means of levees mean annual flood damage in the Upper Mississippi River Basin increased by 140%. Tobin (1995) noted that mean annual flood losses have reached almost \$3 billion and per capita flood losses were 2.5 times higher from 1951 to 1985 than they were from 1916 to 1950. According to Mileti (1999) the National Flood Insurance Program’s cumulative statistics of repetitive flood losses from 1978 to 1994 were highest in Louisiana (104,000 claims), closely followed by Texas (101,000 claims). These numbers seem to indicate that while the United States has increased its dependence on structural solutions to flooding the risk for flood damage is greater than ever.

The increase in flood damage is due to several factors. Firstly, levees can create significant hydrological changes. During a flood water would spread over of the floodplain, and while this may have resulted in a larger area being affected, it minimized the height of the water. With levees the water is restricted to a narrow passageway. This may result in an accumulation of water upstream from the levee system, which would raise the flood stage for communities there. Levees could also create problems for communities downstream as the water is accelerated through the restrictions of the system. Secondly, levees, if breached or overtopped, can act as a retention pond. Without the levees the water would come in and go back out on its own. With the levees the water, once inside the system, cannot drain by itself. It must be pumped out, which can significantly delay the recovery process (Tobin 1995). New Orleans in 2005 was an example of this problem. Thirdly, levees can put communities at greater risk for catastrophic losses because of the “levee effect”. First pointed out by White (1945) this phenomenon occurs when a flood protection levee has been built and induces a false sense of security in the “protected” community. This results in increased development in the area as the flood risk is believed to have been eliminated. The increased development now presents a greater potential for catastrophic flood damage as there are more lives and property at risk than if the levee had not been built (Freudenburg et al 2008, Kunreuther, Meyer and Michel-Kerjan 2007, Maddocks, Bewsher and Dinham 2007). Maddocks, Bewsher and Dinham (2007) also pointed out that in smaller “protected” communities there will be less, if any, warning should the levee overtop or fail, thus raising the risk even more for fatalities and catastrophic damage.

The negative aspects of levees are usually not something that “protected” communities see right away. These are usually long-term effects that may take a generation or two to be seen. People have a tendency to think in the short-term (Mileti 1999). Levees do not eliminate floods.

They only postpone them, and the longer a flood is postponed, the more complacent a community will become, and the greater the losses will be once the flood does occur (Mileti 1999). However, it must be noted that the levees themselves are not what cause flood disasters. How much damage is inflicted on a particular community, i.e. how disastrous a natural event is, depends upon the perceptions of risk of the residents.

### ***Perception of Risk***

One of the most important factors in preparation for and reaction to a natural disaster is perception of risk. This is true for individuals as well as communities. A community that is well-aware of a particular risk can be expected to cope with it better than a community which disregards it. Perception of risk is influenced by many things. Researchers have found that experience and the media play important roles in shaping individual perception and thereby shaping community perception. These factors help determine how extensive a disaster will be for as Gilbert White (1945) said: “Floods are ‘acts of God’, but flood losses are largely acts of man.”

In his study of perception of the drought hazard on the Great Plains Saarinen (1966) noted that the more experience farmers had with drought, the more they became aware of environmental limitations. In other words, they began to realize they could not control nature. A decrease in exposure to natural hazards then may result in a lack of knowledge or awareness of local risks. Residents affected by Mount St. Helens’ eruption changed their expectation of the likelihood of another such event after the 1980 eruption (Saarinen and Sell 1985). Maddocks, Bewsher and Dinham (2007) provided the example of Grafton, Australia. The community experienced very few effects from flooding due to levees and seemed to have lost awareness

about the flood risks, and residents could not be expected to cope well when the community finally did flood. Kunreuther, Meyer and Michel-Kerjan (2007) noted that New Orleanians most likely felt fully protected by the levee systems because they had not experienced any significant flooding (besides that of a heavy rain) since Hurricane Betsy in 1965. Thus their awareness of the flood risk decreased, and they were not prepared to deal with the 2005 disaster.

Lack of awareness can also lead to complacency, i.e. satisfaction, smugness, about structural solutions to natural hazards. Saarinen and Sell (1985) noted that residents living near Mount St. Helens were aware that an eruption could occur. They were reminded from time to time via media reports, but no one thought it was imminent. Though people living near Mount St. Helens did not depend on structures to protect them from an eruption, this is an example of how people can become too complacent about risks. The same could be said for New Orleans and its levees in 2005. For years experts and locals talked about “the Big One” that would come one day and flood the city, but no one ever thought it would be in his or her lifetime (Irons 2005).

Complacency can lead people to underutilize mitigation techniques, e.g. raising houses, prior to a disaster, and to blame others for losses, e.g. the federal government, and rely heavily on emergency services when the disaster finally occurs (Mileti 1999). Kunreuther, Meyer and Michel-Kerjan (2007) termed this phenomenon the “natural hazard syndrome”. This syndrome can lead to denial of risks despite repeated warnings from experts and officials. Such was the case with Mount St. Helens as it became a game to residents to slip past security into the prohibited “red zone” near the volcano (Saarinen and Sell 1985). This was also the case with New Orleans where storms became a reason to party. “Hurricane parties” were popular, and the

catch phrase in the city was “We don’t run from hurricanes. We drink them.”<sup>1</sup> The denial of risks only sets the community up for catastrophe.

The media also affects perception of risk. Most people rely on the media to inform them about local risks (Saarinen and Sell 1985), and so might logically assume that their perceptions of those risks will be heavily influenced by the media’s portrayal. Sandman (1994) found that the media dedicates very little time to educating the public about risks. He noted that more focus was placed on environmental politics and opinions rather than evidence. Saarinen and Sell (1985) reported that officials and experts complained of being misquoted and misinterpreted by the media. Mileti (1999) said the media tends to portray risks and disasters in ways that are misleading and oversimplified. He also noted that the media can perpetuate myths about a risk or disaster. Misinformation can warp perception and either cause people to disregard a risk or overreact to it.

As the success of mitigation efforts depend largely on the cooperation of the local communities, it is crucial to understand local perception of the risk in question. If residents do not see an imminent danger to themselves and their property, they are more than likely not going to take the necessary precautions to minimize damage (Mileti 1999). Furthermore, if residents do not see long-term implications of a particular structural solution to a hazard, e.g. levees to protect against flooding, they more than likely will not give much thought to alternative solutions especially if the structural solution is cheaper, easier and quicker to put in place. Perception of risk could probably be labeled as the deciding factor as to whether or not a community faces a catastrophe.

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<sup>1</sup> Reference to a popular alcoholic drink



## Chapter 6

### *Survey*

Misperception of natural hazards is not something unique to a particular area or people. White (1945), Saarinen (1966) and Saarinen and Sell (1985) made note of this phenomenon in different areas of the United States with different natural hazards. Misperception of natural hazards also appears to exist in southeast Louisiana, and it appears as though it dominates the mindset of people in the area. Much media attention is given to the construction and improvement of hurricane protection levees and coastal restoration. New Orleans advocacy groups such as Levees.org have been lobbying for federal funding for category 5 levee protection and coastal restoration. However, it seems that many people fail to see the conflict between levees, which promote urban development, and wetlands. With the strong following claimed by the New Orleans advocacy groups and the influence of the media on people's perceptions of risk, it would seem that such misperception may exist in southeast Louisiana. However, before any conclusions could be made about this phenomenon further research was necessary.

In order to demonstrate whether or not public misperception exists about the impacts of urbanization and levees on the wetlands an opinion survey was developed. The survey had several goals. The first goal was to examine what are the driving factors behind people choosing to live in "unprotected" areas and if the expectation of hurricane protection played a role in choice of residence. This is important in understanding some of the driving forces, whether they are push or pull factors, behind urban expansion. Therefore the target population is not people who live behind the federally built hurricane protection systems in the New Orleans metro area, but rather those people who are living outside the "protected" areas. This portion of the

population was also chosen because they may be more likely to push hardest for new or upgraded protection.

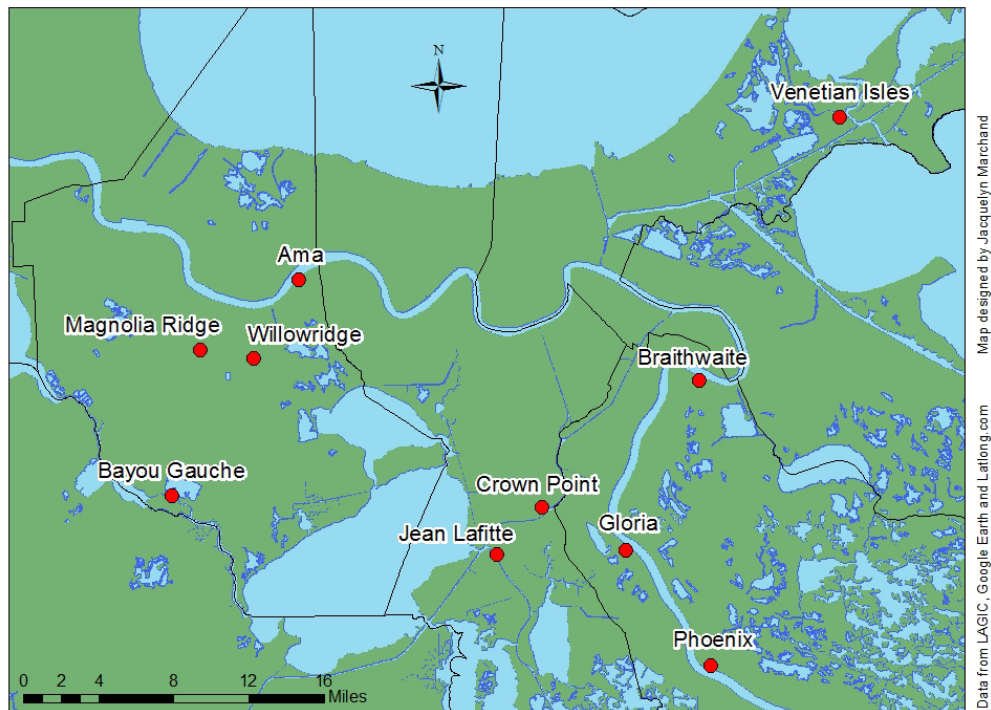
The second goal was to examine how much support exists for hurricane protection levees and whether or not people see the conflict between hurricane protection levees and coastal restoration. Understanding people's perceived value of levees as a means of flood control is important because these perceptions can influence personal, community and governmental decisions regarding flood control and mitigation. Such perceptions can also influence policies and programs designed to restore Louisiana's wetlands.

The third goal was to examine what people perceived as primary factors in wetlands loss. This is important because these perceptions can influence what actions are taken to restore the wetlands via governmental and organizational policies and programs. If these perceptions are the result of misunderstanding and misinformation then the results could be less effective coastal restoration efforts.

It was determined that the best portion of the New Orleans metropolitan population to survey would be those living outside the two federally built hurricane protection systems. This group was selected because by choosing to live in "unprotected" areas and then lobbying the government for hurricane protection levees they contribute to the levees-urbanization cycle previously mentioned. This group, therefore, is directly involved in urban expansion and resulting impacts on the wetlands and also in the continuation of the levee effect in the area. Their perceptions about hurricane protection and wetlands loss may play a major role in the levees-urbanization cycle, and as such they appear to be good candidates for the survey.

## Methodology

The survey was sent to 10 communities outside the federally built hurricane protection levee systems. It was determined that newer communities, i.e. those built since 1990, would be more suitable for the project since older communities in southeast Louisiana could be fishing villages or people who for many generations adapted themselves to living “unprotected” on the bayou. This is especially important as the study is dealing with the impacts of urban expansion and levees on the wetlands. However, if not enough newer communities could be found, an older community could be used provided it had experienced relatively significant population growth sometime since 1990. In addition at least 50 addresses must be available for each community. The communities chosen for the study were: Venetian Isles in Orleans Parish; Crown Point and Jean Lafitte in Jefferson Parish; Ama, Willowridge, Magnolia Ridge and Bayou Gauche in St. Charles Parish; and Braithwaite, Gloria and Phoenix in Plaquemines Parish (Fig. 6).



**Fig. 7: Communities selected for study**

All of the communities selected except Willowridge were populated prior to 1990. This does not mean that more post-1990 communities do not exist. Many of the newer communities are unincorporated and so collecting specific data for them is difficult. Several communities that were initially considered had to be discarded because of lack of data.

The street names were recorded for each community using Google Maps. The addresses for each street were obtained using Whitepages.com's Reverse Lookup. Alderman and Beavers (1999), Lowry (1994), Zelinsky (1980) and Reed (1976) all utilized phone directories in perceptual research. Whitepages.com was chosen because it was free and easily accessible. The limitation of using this source was that not all addresses are listed either because of lack of data, the resident had requested his listing to be removed, or some addresses, though not removed from public viewing, do not appear when using such functions as Reverse Lookup. In the latter case, the user must specifically type in the name or address to get that particular result. After addresses were obtained they were numbered, and then 50 addresses for each community were selected using a random numbers table. Five hundred surveys were mailed – 50 to each community. After mailing a problem arose in regards to undeliverable surveys. Many were returned marked “No mail receptacle”, “Vacant” or “Unable to forward”. Returned surveys were sent out a second time using alternate addresses, but, due to budget and time limitations, if they were returned a second time, they were not sent out again.

The survey was composed of 10 questions (Appendix A). The first question asked the participant how long he or she lived in his or her respective community. The participant was given 5 year ranges from which to choose. The purpose of this question was to examine if there were any significant differences in answers given based on how long respondents lived in the area.

The second question asked the participant why he or she chose to live in his or her respective community. The purpose of this question was to demonstrate the primary reason(s) people left the “safety” of the existing levee protection systems for “unprotected” areas.

The third question asked whether or not the participant had any concerns about the lack of hurricane protection levees when he or she decided to live in his or her respective community and what those concerns were. The purpose of this question was to demonstrate if people were aware of flooding risks when they chose their residences, and to discover if there were any specific or unusual concerns about the lack of protection.

The fourth question asked whether or not the participant anticipated hurricane protection levees would eventually be built for his or her community and whether or not that anticipation (or lack of it) influenced his or her decision to live in that community. The purpose of this question was to demonstrate if people were moving to areas in anticipation of being protected by the government and if that anticipation (or lack of it) had any significant influence on their decisions to live their respective communities.

The fifth question asked if the participant did anticipate the construction of hurricane protection levees, how far in the future did he or she believe the construction to be. The participant was given 5 year ranges from which to choose. The purpose of this question was to see if there was any correlation between the anticipated ranges of years hurricane protection levees were expected in and the communities in which the respondents lived.

The sixth question asked if the participant supported the construction of hurricane protection levees for his or her respective community. The purpose of this question was to demonstrate how much support existed for levees as means of flood control.

The seventh question asked if the participant felt the federal government was obligated to build hurricane protection levees for his or her respective community. The purpose of this question was to demonstrate if a sense of entitlement to protection from the federal government exists in southeast Louisiana.

The eighth question asked the participant how he or she felt about restrictions on residential, commercial and industrial expansion outside of levee-protected areas and if the wetlands would benefit from such restrictions. The purpose of this question was to demonstrate if people saw such expansion as detrimental to the wetlands and dangerous to lives and property.

The ninth question asked what the participant felt was primarily responsible for the loss of Louisiana's wetlands. The purpose of this question was to demonstrate what the perceived primary causes of wetlands loss are and whether or not urbanization and levees were among those perceived primary causes.

The tenth question asked the participant how he or she felt about the joint effort of hurricane levee protection construction and coastal restoration. The purpose of this question was to demonstrate if people see a conflict between levees and wetlands preservation.

## ***Results***

Of the 500 surveys mailed 96 (19.2%) were returned, and only 94 (18.8%) were useable. The number returned for each community was generally good although 4 communities had very low numbers. Total returns for each community are shown in Table 1.

**TABLE 1**  
**Number of useable responses per community**

Name of community	Number of useable responses received
Venetian Isles	13
Crown Point	15
Jean Lafitte	4
Willowridge	15
Bayou Gauche	13
Ama	9
Magnolia Ridge	2
Braithwaite	11
Gloria	9
Phoenix	3

Answers for the first question regarding how long the participant lived in his or her community were tallied. Results are shown in Table 2.

**TABLE 2**  
**Question 1: Years Lived in Community**

Years live in community	Percent of respondents
0-1	4.3%
2-5	18.1%
6-10	20.2%
11-15	19.1%
More than 15	38.3%

Answers for the second question regarding why the participant chose to live in his or her community were recorded with one word describing each reason given. There was a great variety in responses for this question, and so it was necessary to narrow down the categories. Using the *Roget's 21<sup>st</sup> Century Thesaurus* the responses were grouped into 9 major categories: Personal, Amenities, Away From City, Financial, Nature/Environment, Location, Relocated Post-Katrina, Natural Hazards, and Did Not Choose. This method was utilized by Shortridge (1985) when examining survey responses about the vernacular Middle West. Many participants

gave multiple reasons for choosing to live in their communities, and as such the percentages reflect how many participants gave a reason that fell under a particular category. Some participants gave multiple reasons that fell under the same major category. This duplication was eliminated by counting a participant only once for each category under which his or her responses fell. The major categories were then ranked according to percentage of participants whose answers fell under that particular category. The results are shown in Table 3.

**TABLE 3**  
**Question 2: Reasons why participants chose to live in respective communities**

Category	Percentage of participants who fell under category
Personal	52.1%
Amenities	31.9%
Away From City	26.6%
Financial	19.1%
Nature/Environment	14.9%
Location	4.3%
Relocated Post-Katrina	3.2%
Natural Hazards	3.2%
Did Not Choose	1.1%

Answers for the third question regarding whether or not participants had any concerns about the lack of hurricane protection levees when he or she first decided to live in the community and what those concerns had been were first tallied. In regards to if concerns existed, 77.7% of participants said they did not have concerns about the lack of hurricane protection levees when first deciding to move to their respective communities, and 22.3% of participants said they did have concerns. The results were then tested against a 50/50 hypothetical sample using chi-square with Yates' correction for continuity and were found to be significant ( $\chi^2 = 27.68$ ,  $N = 94$ ,  $P < 0.001$ ). Responses for what those concerns had been were very general and were not subject to analysis.



Answers for the fourth question regarding whether or not participants anticipated that hurricane protection levees would eventually be built for their communities and whether their anticipation or lack thereof affected their decisions to live in those communities were tallied. In regards to anticipation of the construction of hurricane protection levees, 69.1% of participants said they did not anticipate construction and 30.9% of participants said they did anticipate construction. The results were then tested against a hypothetical 50/50 sample using chi-square with Yates' correction for continuity and were found to be significant ( $\chi^2 = 13.04$ ,  $N = 94$ ,  $P < 0.001$ ). In regards to whether or not the above anticipation influenced decisions to live in the communities, 77.7% of participants said their anticipation or lack thereof did not influence their decisions to live in the communities and 22.3% of participants said it did influence their decisions. The results were tested against a 50/50 hypothetical sample using chi-square with Yates' correction for continuity and were found to be significant ( $\chi^2 = 27.68$ ,  $N = 94$ ,  $P < 0.001$ ).

Answers for the fifth question regarding how far into the future participants believed the construction of hurricane protection levees were tallied. Twenty-nine people previously said they anticipated the construction of hurricane protection levees and as such were asked to select the range of years they anticipated such construction. One person did not respond to this question and was removed from the analysis of this particular question. Results are shown in Table 4.

**TABLE 4**  
**Question 5: How far in the future the construction of hurricane protection levees was anticipated**

Years	Percentage of respondents
0-1	10.7%
2-5	50.0%
6-10	32.1%
11-15	0.0%
More than 15	7.1%

Answers for the sixth question regarding whether or not participants supported the construction/improvement of hurricane protection levees for their respective communities were tallied. Eighty-four percent of participants said they did support the construction/improvement of hurricane protection levees, and 11.7% said they did not support such construction/improvement. One person said she was unsure if she supported the construction/improvement, and 3 people did not respond at all to this question. These four were removed from the analysis of this particular question. The “yes” and “no” answers were tested against a hypothetical 50/50 sample using chi-square with Yates’ correction for continuity and found to be significant ( $\chi^2 = 49.88$ ,  $N = 90$ ,  $P < 0.001$ ).

Answers for the seventh question regarding whether or not participants believed the federal government was obligated to build hurricane protection for their communities and why were tallied. In regards to whether or not participants believed the federal government should build such protection, 71.3% said the federal government is obligated, and 23.4% said the federal government is not obligated. One person responded “I don’t know”. Four people did not respond to this question. These 5 were removed from the analysis of this question. The “yes” and “no” answers were tested against a hypothetical 50/50 sample using chi-square with Yates’ correction for continuity and found to be significant ( $\chi^2 = 21.76$ ,  $N = 89$ ,  $P < 0.001$ ). In regards to the reasons why participants believed the federal government was obligated to build hurricane protection levees, answers were recorded using one word to describe each reason given. Because of the great variety in answers, the categories used for analysis had to be narrowed down. Using the previously mentioned thesaurus method, answers were grouped into 8 major categories: Government’s Obligation To Citizens, Others Have Them, Government’s Fault For Current Situation, Economic Reasons, Community Cannot Help Itself, Government Promised Help,

Benefits Communities, and Federal Property. Many participants gave multiple reasons for why they held this belief, and as such the percentages reflect how many participants gave a reason that fell under a particular category. Some participants gave multiple reasons that fell under the same major category. This duplication was eliminated by counting a participant only once for each category under which his or her responses fell. The major categories were then ranked according to percentage of participants whose answers fell under that particular category. The results are shown in Table 5.

**TABLE 5**  
**Question 7: Perceived reasons why the federal government is obligated to build hurricane protection levees**

Category	Percentage of respondents who fell under category
Government Obligation To Citizens	44.4%
Others Have Them	20.6%
Government's Fault For Current Situation	14.3%
Economic Reasons	14.3%
Community Cannot Help Itself	6.3%
Government Promised Help	4.8%
Benefits Communities	4.8%
Federal Property	1.6%

Answers for the eighth question regarding whether or not participants supported restrictions on expansions into the wetlands were tallied. Forty-four and seven-tenths percent of participants said they supported restrictions in all categories (residential, commercial and industrial), and 39.3% of participants said they did not support restrictions in any of the categories. Three people said they supported restrictions for commercial and industrial expansion, but not for residential. One person said they supported restrictions for residential expansion, but not for industrial or commercial. Three people said they did not know if they supported restrictions or not. Eight people did not respond to this question. These 15 participants were removed from the analysis of this question. Those who supported or did not

support restrictions in all categories were tested against a hypothetical 50/50 sample using chi-square with Yates' correction for continuity and was found to be not significant ( $\chi^2 = 0.2$ ,  $N = 79$ ,  $P > 0.1$ ).

Answers for the ninth question regarding what participants believed were the primary reasons for the continued loss of Louisiana's wetlands were recorded using one word to describe each reason given. Because of the variety of answers given it was necessary to narrow down the categories used for analysis. Again using the thesaurus, answers were grouped into 6 major categories of which one had 6 subcategories: Environmental Factors; Human Activities: River Levees, Oil and Gas Industry, Waterways, Urbanization, Corps of Engineers, and Abuse; Apathy, Government; Other; and Don't Know. Many participants listed multiple factors they believed to be primarily responsible for Louisiana's wetlands loss, and as such the percentages reflect how many participants gave a reason that fell under a particular category. Some participants gave multiple factors that fell under the same major category. In order to avoid duplication a participant was only counted once for each category under which his or her answers fell. The major categories were ranked according to the percentage of participants whose answers fell under that particular category. Note that the Human Activities subcategory percentages reflect how many participants counted in Human Activities gave reasons that fell under a particular subcategory. As such the subcategory percentages do not add up to 100%. Results are shown in Table 6.

**TABLE 6**  
**Question 9: Perceived primary causes of wetlands loss in Louisiana**

Category	Percentage of respondents who fell under category
Environmental Factors	56.9%
Human Activities	45.3%
<i>a) River Levees</i>	<i>51.3%</i>
<i>b) Oil and Gas Industry</i>	<i>48.7%</i>
<i>c) Waterways</i>	<i>10.3%</i>
<i>d) Urbanization</i>	<i>10.3%</i>
<i>e) Corps of Engineers</i>	<i>2.6%</i>
<i>f) Abuse</i>	<i>2.6%</i>
Apathy	16.3%
Government	12.8%
Other	8.1%
Don't Know	2.1%

Answers for the tenth question regarding what participants thought about the joint effort of hurricane protection levee construction and coastal restoration required careful analysis of individual responses. Those who gave answers such as “support both”, “long overdue” or “great idea”, etc. were categorized as not seeing a conflict between hurricane protection levees and coastal restoration (89.3%). Those who gave explicit responses as to why the projects are not compatible were categorized as seeing as conflict between hurricane protection levees and coastal restoration (4.3%). One person said she really never thought about it. Five people did not respond to this question. These six were removed from the analysis of this question. The results were tested against a hypothetical 50/50 sample using chi-square with Yates’ correction for continuity and were found to be significant ( $\chi^2 = 70.92$ ,  $N = 88$ ,  $P < 0.001$ ).

### ***Discussion***

As previously mentioned levees and resulting urbanization have long-term negative impacts on the wetlands. They create a cycle of levees-urbanization-move outside “protected”

areas-more levees-more urbanization-move outside “protected” areas, etc. that appears to be perpetuated by public misperception of the long-term implications of such construction.

Misperception about these issues can not only negatively impact the physical environment of southeast Louisiana, but it can threaten the lives and property of those who live there, and as such it is critical to understand the extent of misperception (if it exists) in order to effectively remedy it. An analysis of the survey results will examine if such a phenomenon may exist in southeast Louisiana, and, if it does exist, aid in developing solutions to the problem.

One of the most important things we need to understand in the levees-urbanization cycle is what drives people to leave the “protection” of the current levee systems for “unprotected” areas. This is an important step in the continuation of the levees-urbanization cycle, for without it people would cluster in only a few areas behind a few levee systems, and the impacts of levees and urbanization would not be so widespread. For the purpose of this analysis only the major reasons will be discussed (major being defined as any reason cited by at least 10% of participants). According to the survey results over half of participants cite personal reasons for deciding to live in their “unprotected” communities (see Table 3 on p. 31). Some of the most common reasons were family and friends already living in the community, born and raised in the community, and the community is family-friendly. (Note that people who were born and raised in a community contribute to its growth by choosing to reside there because they will require a place to live. As the population increases naturally, the more people who choose to remain in those communities, the more development will be required to accommodate them.) This may indicate a desire for closeness to family and friends, attachment to the place where one grew up, and a preference for a close-knit community (as opposed to the “impersonal” big city). This is indicative of the Network Theory of Migration whereby family and cultural ties to a particular

place will induce others to move there (Weeks 2005). The large presence of personal reasons may also indicate a need for a sense of security. People tend to feel safe with the familiar, and while a community may not be “protected” by a levee system, residents may still feel safe because there is a network of family and friends, a support system, in the community.

The second major reason for moving to “unprotected” communities was amenities (see Table 3 on p. 31). Many communities can offer residents those things which in the city are poor quality or altogether absent. In the case of southeast Louisiana, many people cited better schools as a reason for choosing to live in “unprotected” communities. Other amenities such as closeness to jobs and better healthcare services can be very attractive to people and a driving factor behind people leaving the “protected” areas.

The third major reason for moving to “unprotected” communities was getting away from the city (see Table 3 on p. 31). According to the survey responses escaping crime was the biggest factor in wanting to get away from the city. Of course with the FBI’s 2009 report on national crime showing New Orleans being the most murderous city in the country (McCarthy 2009), this should come as no surprise. Flight from crime has been a major factor in migration from cities for a long time.

The fourth major reason was financial concerns (see Table 3 on p. 31). Those who cited this reason gave such specifics as lower cost of living, property values and housing options. This may indicate that people leave protected areas because of lack of affordable housing. It may also indicate that people are following investment opportunities. As many people consider their homes and property investments, they will more than likely go where they can get the largest return.

The fifth major reason for leaving “protected” areas was the environment (see Table 3 on

p. 31). Those who cited this reason gave such specifics as closer to nature, enjoyment of rural setting and wildlife. This could indicate that people who prefer slower, quieter lifestyles, but need to stay within commuting distance of the city for employment purposes are populating the “unprotected” areas. It could also indicate that sportsmen and other wildlife enthusiasts tend to live in these areas to be closer to their hobbies.

From the reasons discussed above clearly there appears to be several factors driving people to leave the current hurricane protection systems. Personal reasons certainly dominate, but there are several other factors that have very important influence.

Awareness of risks is an important factor in mitigating damage. It can help a community properly prepare itself for a natural disaster, and while the mitigation efforts cannot protect life and property from all hazards, it can certainly reduce the amount of damage caused. Question three revealed a significant number of participants (77.7%) did not have any concerns about the lack of hurricane protection levees when first deciding to live in their respective communities. This seems to indicate a lack of awareness of local risks. Perhaps because the last hurricane to do major damage prior to Katrina was Betsy in 1965 and because the area had a reputation for near misses with storms people became complacent and the flood risk never crossed their minds. It could also indicate over-confidence in the parish-owned and private flood protection levees. Because there had been no serious flooding from hurricanes in the area for quite a while people may have assumed that the protection in place was adequate (as some participants did say) and felt safe moving to the area. In either case the results do highlight a possibly serious awareness problem.

One theory was that people were enticed to move to “unprotected” communities because they anticipated hurricane protection levees would soon be built for the area. If such protection



would be built, insurance rates would probably drop and property values increase. However, the results of question four indicate otherwise as the test revealed a significant number of people (69.1%) did not anticipate such protection to be built. The second part of the question asked if this anticipation (or lack of it) influenced location of residence. The results indicate that it did not significantly influence participants' decisions (77.7% ). These results seem to support the hypothesis that hurricane protection was not a major concern when the participants made decisions on where to live. As previously mentioned this lack of concern could have stemmed from the fact that southeast Louisiana had not experienced serious flooding from a hurricane in quite a while and had become complacent about risk and mitigation.

The amount of support hurricane protection levees have as a means of flood control is crucial to their existence, for if there were no support among the population, there would be no levees. Results show that a significant number of participants support the construction of hurricane protection levees for their communities (84.0%). This seems to indicate that many people are unaware of, or unconcerned with, the long-term impacts of levees on the wetlands. Of course this does not mean that the population would not be in support of alternative flood control methods, but it does demonstrate that levees as a means of flood control are widely supported in the area.

With the large amount of media attention given to the need for federally-built hurricane protection levees and the huge amount of support given to local organizations, e.g., Levees.org claims over 23,000 followers nationwide as of June 8, 2009, and the MRGO Must Go Coalition claims the support of many state agencies and grassroots organizations, which lobby the federal government for such levee construction, it appears as though southeast Louisianans believe they are entitled to hurricane protection levees from the federal government. Results from question

seven seem to support this hypothesis as a significant number of participants (71.3%) feel that the federal government is obligated to build such levees for their communities. Evidence of entitlement to hurricane protection levees can be found in local organizations such as Levees.org. Below is an excerpt from the group's website:

“Help us make sure New Orleans and America gets the safe levees we deserve.”

Another example is this comment posted on a Levees.org blog:

“...Let's do everything we can to convince Congress to support this water management plan. It definitely will contribute to our economy and to the safety of our entire country. New Orleans and the Gulf Coast first, then CA, FL, NC, SC, NJ!”

This feeling of entitlement can impede the implementation of alternative flood control methods because citizens may be so engaged in getting what they believe they are owed by the government that they may possibly ignore other mitigation methods that could be implemented on a state, local or personal level.

It is also important to understand why people feel the government is obligated to give them protection against natural hazards. This is necessary because in order to convince the population otherwise it is important to understand their mindset. The second part of question seven asked the participants to explain why they felt the government owed them protection. The most prominent reason for the feeling of entitlement was that building such protection was the government's obligation to the citizens (see Table 5 on p. 34). Many participants felt that because they were citizens of the United States and were taxpayers like everyone else they deserved the federal government's help. This presents the problem of convincing the population to take mitigation efforts upon themselves. If they believe the government owes them protection, they may become too dependent on governmental aid and be less likely to take the precautionary

measures necessary to prevent damage on their own because they expect always to be rescued by the government (Kron 2006).

The second major reason was that other communities have protection (see Table 5 on p. 34). This seems to support the hypothesis mentioned earlier about the domino effect of levee construction. Once a few communities have levee protection, all communities will want levee protection, which could then open the door for spotting the coast with numerous small hurricane protection systems or a few large systems as mentioned previously.

Two categories tied for third place as a major factor in the entitlement mindset. The first is that the federal government is at fault for the current situation (see Table 5 on p. 34). Some respondents said the federal government allowed growth and therefore is obligated to protection it, e.g., “If it’s not designated as wetlands and development is allowed to occur, then they have no choice but to help protect the property of citizens.” Others said the federal government allowed the oil and gas companies to destroy the wetlands, e.g., “The government allowed large ship channels and canals to be dug by the oil companies which hastened the destruction of barriers that protected the area.” Still others said it was the federal government’s fault for allowing the coast to erode, e.g., “The federal government is at fault for loss of wetland’s (sic) and coast erode (sic). They stop the freshwater coming in from the river’s (sic) and bayou’s (sic). That was building land and marsh’s (sic) it was carreing (sic).” This seems to indicate that either southeast Louisianans are unaware that they also play a role, via their decisions and actions, in wetlands loss or they do not want to accept responsibility for their decisions.

The other third major entitlement factor is economic (see Table 5 on p. 34). Many cited specifics such as the country benefits from the oil and gas industry, the government will benefit economically, and it stimulates growth in the area. One might argue, though, that the existence

of the communities does not determine the existence of the oil and gas industry, and that if communities would invest in alternative flood control methods, the government and the communities would both benefit economically in the long-term and not just the short-term.

Urban expansion into the wetlands is a major yet obscure cause of wetlands loss in Louisiana. With the major efforts underway to obtain category 5 levee protection without examining alternative flood control methods it raises doubts as to whether or not people would support placing restrictions on expansion into the wetlands. Results from question eight, however, show that there is no significant difference from the results obtained via the survey and a hypothetical 50/50 sample (44.7% support restrictions, 39.3% do not support restrictions). This seems to indicate that there are just as many people who support restrictions as those who do not support them. This may be taken as good news for those who believe such restrictions are necessary for restoring the wetlands because it may be easier to gain support for them.

Another perceptual issue that must be considered when looking at wetlands loss is what people believe is primarily responsible for that loss. If people do not see levees or urbanization as a major cause of wetlands loss, one cannot expect the population to alter the current urban growth and protection situation. According to the results from question nine, there are 4 perceived major causes of wetlands loss in Louisiana. Over half of participants believe that environmental factors are to blame for wetlands loss (see Table 6 on p. 36). Some particular factors mentioned included subsidence, erosion, storms and saltwater intrusion. This seems to indicate that people do not understand wetlands ecosystem, of which all the above phenomena are a part, which can thus perpetuate misperception about wetlands loss.

The second major perceived cause is human activities (see Table 6 on p. 36). The specific factors listed under this category were considered important enough to subcategorize

them. The first major subcategory is river levees. Participants obviously see the damage done to the wetlands because the river has been prevented from replenishing the land; however, they apparently do not see the damage that is or could be done by hurricane protection levees. The second major subcategory is the oil and gas industry, which is interesting to note considering many in question seven cited this industry as an important economic asset which the government needs to protect via hurricane protection levees. Waterways and urbanization tied for a distant third place. It is also interesting to note that human activities came in second place as a perceived primary cause of wetlands loss and the subcategories name activities that are known to be detrimental to wetlands, but that little effort is placed on altering these activities to minimize the damage done.

The third major perceived cause is apathy. Many participants cited lack of funding and lack of care as primary causes of wetlands loss. While it is true that years of ignoring the problem has allowed it to worsen, spending more money does not guarantee the problem will be solved. A recent study says the Mississippi River is not carrying enough sediment to replenish the wetlands, and so even if all levees were removed and the river was allowed to build up the delta, the wetlands would still be in danger (Blum and Roberts 2009).

The fourth major perceived cause is government; specifically mentioned were politics and politicians. Many participants believe the red tape and political games are to blame for wetlands loss because they hold up funding and can prevent coastal restoration programs from being implemented.

One goal of this research was to examine whether or not people perceive hurricane protection levees as detrimental to the wetlands and thus contradictory to coastal restoration efforts. According to the results from question ten a significant number of people do not see any

conflict between hurricane protection levees and coastal restoration (89.3%). This seems to indicate that most people have no idea of the incompatibility of the two projects as shown by Smith et al (2008), the Center for the Study of Public Health Impacts of Hurricanes (2006), and North Carolina State University Water Quality Group (2003), which also presents the problem of trying to convince the population not to build levees, but rather look into alternative flood methods.

From the survey results discussed it would appear that the problem of misperception regarding local risks exists in southeast Louisiana. Though concerns about hurricane protection were absent in the past according to the results, they are obviously a major concern post-Katrina for the participants. Fear of a reoccurrence of the 2005 disaster in New Orleans seems to play a major role in this sudden appearance of such concerns. However, this fear may also be blinding people to the impacts of levees on the wetlands. There appears to be a lack of awareness of the long-term implications of hurricane protection levees and their incompatibility with coastal restoration efforts. There is strong support for hurricane protection levees, not just as evidenced from the survey, but also as evidenced from media reports and grassroots organizations. However, this is very often accompanied by strong support for coastal restoration. The survey results indicate that a significant number of participants do not see any conflict between hurricane protection levees and coastal restoration. This is indicative of the previously mentioned misperception not only of local risks, but of the long-term effects of the preferred risk reduction method, i.e. levees, on the fragile environment and the increased dangers it poses to life and property. Over-dependence on the federal government may increase the potential for more losses as people wait for the protection they believe is owed to them and possibly overlook alternative (and perhaps better) mitigation methods. Support for this can be found in the fact that

there are massive efforts underway to secure the construction of hurricane protection levees, but very little is being done to promote alternative methods such as raising homes, preventing the development (or redevelopment) of areas highly prone to flooding, etc. Of course this survey merely touches the surface of the existence of misperception of hazards in southeast Louisiana. Further research is necessary to more firmly establish the existence of such misperception and to better understand its extent and implication for the area.

## **Chapter 7**

### ***Conclusion***

Communities in southeast Louisiana have always faced environmental challenges even before the demise of the wetlands. Residents, seeking to live in conventional cities and communities, have used technology in an attempt to harness nature and bring it under their control. Levees have long been used to control annual spring flooding from the Mississippi River and hurricane storm surge. Feeling protected by such structures, the ever-present risk of flooding faded in the memories of residents. More and more homes were built on slabs rather than being raised, the levee effect kicked in high gear and soon urbanization spread outside the “protected” areas. The demise of the wetlands was well underway by this time due to the Mississippi River levees; however, as people continued to expand residentially, commercially and industrially land loss was accelerated. In recent times, especially post-Katrina, levees have become an important part of the fight to control nature. As southeast Louisiana becomes more urbanized, its people become more dependent on levees to prevent floods – a dependence that could prove fatal for the environment. The impacts of hurricane protection levees on the wetlands have already been examined, and Katrina proved to us that nature can overcome the barriers we place in front of it.

The communities of southeast Louisiana were not built in harmony with nature. In order for the area to survive major changes to the current policies should be considered. Government and organization officials could also consider education programs to help mitigate the apparent misperception of public. The area’s dependence on levees should be examined in order to determine if it is feasible to wean residents off such flood protection. Perhaps programs could be developed to help introduce alternative methods of flood control and mitigation. Kreibich et al



(2005) suggested the mitigation methods of evasion, resisting, drawback and securing, which are flood proofing measures for buildings. Another mitigation method would be to place restrictions on wetlands development, i.e., further expansion into the wetlands could be altogether stopped, and existing development could be restricted as much as possible as done in Miami-Dade County, Florida (Burby, Nelson and Sanchez 2006). Areas that are most at risk for severe flooding could be phased out as residential areas. Government at all levels could assist in this process by participating in buyouts of such areas. If such methods are utilized rather than the standard levee method, southeast Louisianans dependence on levees as flood control could greatly diminish and allow the communities of the area to survive with the environment rather than always be in fear of it.

None of the previous suggestions can be fruitfully implemented though unless public misperception is addressed. If people do not understand the implications of levees and urbanization on the wetlands, they may be less likely to want to turn to other methods. As Tobin (1995) pointed out levees are the cheapest and easiest method of flood control. Fear of another Katrina-like disaster may drive people to lobby for whatever gives them instantaneous, though short-lived, results rather than that which will provide long-term, though longer in the making, mitigation of the hazard. Public education is key to overcoming misperception about the true impacts of hurricane protection levees and urbanization on the wetlands. However, changing people's minds may prove to be a difficult task. Convincing people to change their lifestyles may prove challenging. There may be people who will not listen. Furthermore it will be necessary to convince the politicians to change the governmental policies on these issues, which may prove to be an enormous challenge by itself.

Current policies and programs appear to be doing very little for coastal restoration. Though there are several groups in Louisiana dedicated to bringing attention to the plight of the wetlands, they all promote current policies. Southeast Louisianans should consider adopting a new way of life in order to help the area survive. We should look at reducing our impact and building with our natural environment rather than against it. Otherwise the southeast Louisiana wetlands we know today will be known to future generations only in the pages of history.

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## APPENDIX A

**This is an opinion survey. It is designed only to obtain a better understanding of Louisianans' feelings and opinions on hurricane protection levees, wetlands and flooding issues. As such there is no "right" or "wrong" answer. Please answer as *you* see the issue. All responses are anonymous. If you need more room, please use the back of the paper.**

1) How long have you lived in [name of community]? Circle one answer below.

0-1 year      2-5 years      6-10 years      11-15 years      More than 15 years

2) Why did you choose to live in [name of community]?

3) When you decided to live in [name of community] did you have any concerns about the lack of hurricane protection levees? If yes, what were those concerns?

4) Did you anticipate that hurricane protection levees would eventually be built for the area? Did this influence your decision to live there?

Answer question 5 only if you answered "yes" to question 4. If you answered "no", skip question 5 and go to question 6.

5) How far into the future did you think the construction of hurricane protection levees would be? Circle one answer below.

0-1 year      2-5 years      6-10 years      11-15 years      More than 15 years

6) Do you support the construction/improvement of hurricane protection levees for [name of community]?

7) Do you think that the federal government is obligated to build hurricane protection levees for [name of community]? Please explain your answer.

8) How do you feel about restricting residential, commercial and industrial expansion outside of levee-protected areas? Do you think southeast Louisiana's wetlands would benefit from such restriction?

9) What do you believe is primarily responsible for the continued loss of Louisiana's wetlands?

10) How do you feel about the joint effort of construction of hurricane protection levees and coastal restoration?

## VITA

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