Local CZM Capacity Pre and Post Hurricanes Katrina, Rita, Gustav and Ike: A Comparison Study

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Louisiana Sea Grant College Program

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SUMMARY REPORT*

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Abstract

The hurricane events that continue since 2005 bring into critical focus the need to assess how best to provide the necessary tools to build knowledge and local capacities to manage the needs of present and future coastal Louisiana challenges. In this study, capacity is defined as agreement with regulator ideology that undergirds policy and regulation promulgated by Louisiana Department of Natural Resources. Designed as a natural experiment, this study is a follow-up to a pre-Hurricane Katrina study of the effectiveness of Louisiana's Local Coastal Program (LCP) in building local coastal zone management capacity in local decision-makers (Norris-Raynbird, 2006). Using personal interview and mail-out survey methods, it compares post event data (2011) with the pre-event data (2005).

Comparisons of the 2005 and 2011 data show that there has been a shift in ideological framing that moves the 2011 cohort of respondents further away from agreement with regulatory ideology. As expected, all respondents perceived high risk associated with hurricanes, surge and flooding, but three factors are found to influence perception of greater risk, specifically 'regulator frame', 'having an LCP' and 'proximity to coast'. In 2011 there is greater awareness of the how weather events translate into extended economic vulnerabilities from infrastructure damage, business interruption, loss of investment capital and property loss. Of all mitigation strategies presented, respondents overwhelmingly indicate that voluntary inland relocation is the least relevant mitigation strategy to their parish. Regardless of coastal or inland location, most parishes indicate reliance on large scale technological/engineered strategies (structural mitigation such as levees and flood control devices or non-structural mitigation such as wetlands restoration). Less support was found for regulatory mitigation strategies. For elevation requirements currently mandated by the state, parishes have adopted one of three strategies: 'stall tactics', 'enforcer strategy', or 'soft compliance'.

Executive Summary

This study has examined ideological framing shifts and perceptions of vulnerability and attitudes toward selected mitigation (both structural and non-structural) strategies among local decision makers in coastal Louisiana. In a natural experiment design, we have compared data from 2005 (pre-Hurricane Katrina) and 2011 (after several years of repeated hurricane activity). Much of the analysis is based on a frame index constructed from attitudinal measures. This frame index measures respondent agreement with 'regulator ideology' as this is defined by the mandates of LA DNR and from the literature on regulator framing. This is an important measure, as agreement with ideology behind the regulations, and agreement with regulation itself is inextricably connected to implementation of and compliance with regulations coming from LA DNR and federal agencies. The following statements highlight the findings:

● **All categories of respondents have shifted slightly away from the regulator frame** (comparing CZM Admin, Council/Jury and Advisory Panel)**.** The respondent categories showing agreement with regulator ideology were CZM Administrators and planners.

● Respondents exhibiting the **least agreement with regulator ideology were Council/Jury and Advisory Panel.** This was a surprising shift. In 2005, Advisory Panel members had exhibited the highest levels of agreement with regulator ideology.

● Wetland loss and elevation requirements are key concerns. While it is logical that concern over wetland loss and the related vulnerabilities would enhance agreement with elevation requirements, such was not the case. **78% parishes indicated reliance on non-regulatory technological/engineered infrastructure strategies** (i.e. wetlands restoration, hurricane levees, and flood control devices).

● Respondents were unified on voluntary relocation. Respondents from **83% of the coastal zone parishes indicated that voluntary relocation was not an option.** While next least desired, assisted relocation (buyout) had a greater range in perceived relevance.

● Perceived risk to physical hazards such as hurricanes, storm surge and flooding was high among all respondents. However **three conditions influenced even higher perceptions of risk: 'having an LCP', 'regulator frame', and 'coastal proximity'.** Respondents perceived no economic risk related to loss of natural resources due to coastal hazards.

● The **Regulator Frame Index** developed in 2005 and used again in 2011 has proven to be a **reliable and statistically robust assessment tool.**

● Parishes have adopted one of **three strategies in response to new elevation requirements**: '**stall tactics', 'enforcer strategy', or 'soft compliance'.**

● While capacity as defined by agreement with regulator ideology has diminished slightly, there are **other acquired capacities identified**: **constituent learning** in the recovery process, **political savvy of local officials** in attracting recovery dollars, and **operations knowledge** in preparedness and response.

Introduction

Subsequent to the passage of the federal Coastal Zone Management Act of 1972, the State of Louisiana Coastal Resources Management Act (1978) was passed to address coastal use issues and management of the state's coastal resources. Enabling legislation designated the Louisiana Department of Natural Resources (LDNR) as the lead agency responsible for resource management and coastal use issues of 7,721 miles of coast and a population of approximately 2,044,900 residents within the coastal zone (National Oceanic and Atmospheric Administration).

The state coastal zone management program known as the Louisiana Coastal Resources Program (LCRP) was federally approved in 1980 and established a general consistency with the aims and objectives of the federal program, while maintaining state authority to manage. Louisiana's coastal zone plan invited parishes within the designated coastal zone to develop Local Coastal Programs that would take on some of the permitting and public outreach responsibilities of coastal zone management as these apply to matters of local concern. In 2005, twelve (10) out of nineteen (19) coastal parishes had developed a Local Coastal Program (LCP) and two (2) had pending applications. In 2009 - 2011, there had been no official change in status (Fig. 1).

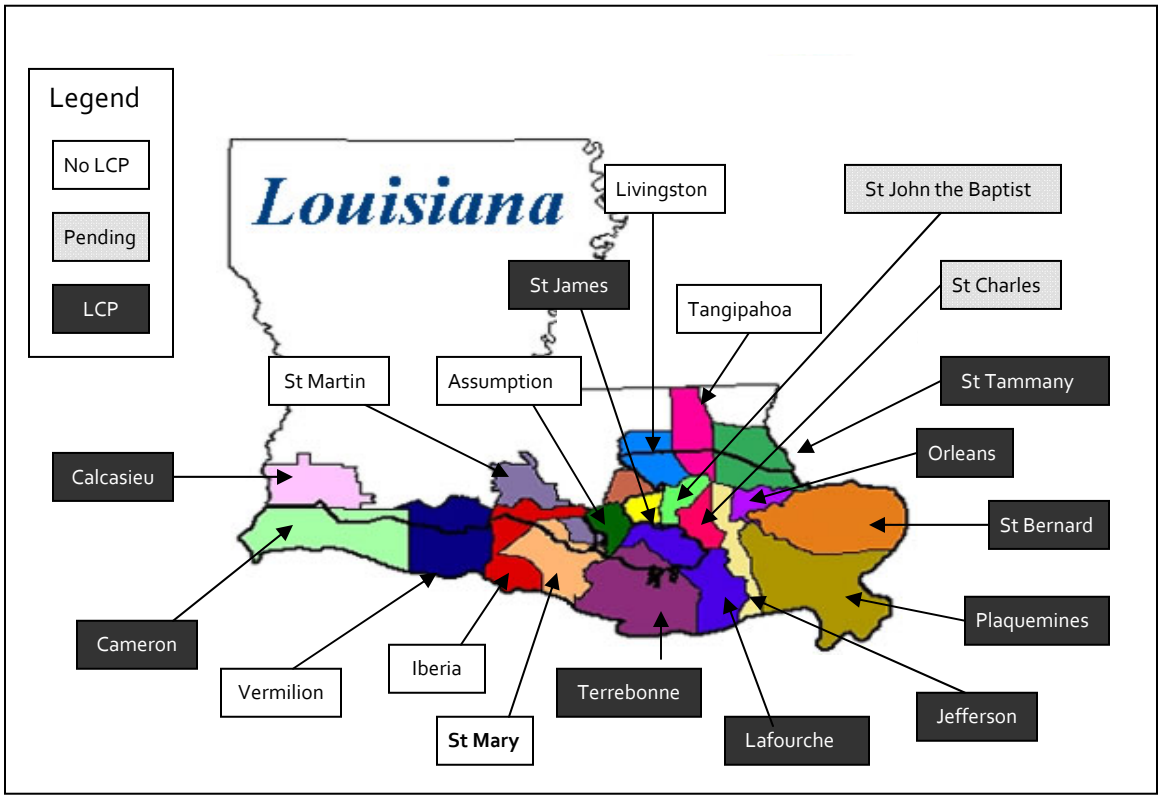

Fig. 1 Louisiana Local Coastal Program Parish Status Comparison 2005 and 2009
Source: Louisiana Department of Natural Resources, full citation in references.

With some parishes having an LCP and other parishes not, the decision-making process is somewhat disjointed. Decisions for such things as coastal land use, wetlands permitting, coastal community sustainability and resiliency designated 'local concern', are situated in parish government in parishes with an LCP. However, in parishes without an LCP, these same decisions of local concern are split between the state (wetlands permitting) and parish government (land use, community sustainability and resiliency). Non-LCP coastal zone parishes were required to have a Coastal Zone Manager employed by parish government. In this system, CZM mandates, training, regulations and funding flow from LDNR to parishes ostensibly to build capacity and create management consistency. This procedure of CZM knowledge transfer and management consistency has in effect attempted to create local 'regulators' out of those regulated. As previous studies on wetlands permitting (Krogman, 1996), local coastal zone management (Norris-Raynbird, 2006), and land use planning (Wilkins and Emmer, 2008) show, there are conceptual framing incoherencies and critical knowledge gaps in local coastal zone decision making in Louisiana.

The hurricane events of 2005 (Katrina and Rita) brought into public focus profound gaps in the management capabilities of all levels of government in Louisiana and the nation. In the aftermath, the dependency of local parishes on other levels of government and external resources coupled with painfully slow and sometimes absent local recovery (Henstra et al., 2008; Roberts, 2006) underscored local needs. In the past few years a concerted effort toward recovery has ensued (Lui and Plyer, 2008). Local parish government reorganization has occurred; new special interest organizations have emerged; research on response to the hurricanes and associated hazards has provided more knowledge; government outreach programs have been developed or are in developmental stages; and funding initiatives have invited and fostered industry/government/community partnerships. The aforementioned factors joined with repeated incidence of severe hurricanes have kept the collective memory of 2005 fresh and focused on meeting the risk challenges in the coastal zone. This leads to the question: has there been change to local coastal zone management capacity?

This study focuses on whether the factors of repeated severe hurricanes, a persistent focus on recovery and re-organization of parish governments have reduced the knowledge gaps and contributed to greater coherency in local decision making in coastal zone management, specifically as this applies to vulnerability and risk perception, land use planning, sustainable development, regulatory and non-regulatory mitigation[1] strategies and community resilience. Following after the study "Capacity Building: An Inquiry into the Local Coastal Program Component of Coastal Zone Management in Louisiana" (Norris-Raynbird, 2006), this research compares 'before' data (collected in the summer of 2005 prior to Hurricanes Katrina and Rita) with 'after' data (collected

[1] In using the term 'mitigation' we refer to both structural (i.e. permanent structures such as levees, flood walls, control devices, jetties, seawalls) and non-structural (i.e. wetland restoration, relocation, building codes, construction standards, land use regulations). We wish to acknowledge that FEMA uses 'mitigation' to refer specifically to non-structural strategies and 'flood control works' to refer to structural protection (FEMA.gov). See also Lindell, Perry and Prater, 2007.

2010-2011) on the ways that CZM issues (CZ management, risk, vulnerability, mitigation strategies, community adjustment and resilience) are framed and how CZM knowledge is acquired.

Unemployment, economic loss to communities, infrastructure loss, erosion of subsistence economy,, community fragmentation and disparate recovery are only some of the social stressors currently found in coastal Louisiana (Gramling, Darlington, Woodell and Brassieur, 2006; Kates, Colten, Laska and Leatherman, 2007; Coastal Communities Resiliency Project NOAA Bibliography, 2010), that may have profound effect on the frames relevant to and in use by local decision makers. Such stress may diminish local government capacity or enhance it. It is crucial that we better understand the relationship of these factors to conceptual framing to be better able to form and implement policy and programs to build local capacities consistent with resilient and sustainable objectives. Because recovery and restructuring have now been in process for six years, it is also an appropriate time to examine how social resources (intellectual, financial, organizational) are influencing coastal management decisions being made about how to live in the natural environment of coastal Louisiana.

These avenues of inquiry speak to the serious need to assess how best to provide the necessary tools to build knowledge and local capabilities to meet the needs of present and future challenges in coastal management in Louisiana. By conducting the study after only a five year interval since Hurricane Katrina during which there have been repetitive storms, information is still fresh in the minds of the respondents who will be interviewed, yet the duration is long enough for there to have been the changes that are the focus of the study.

This study, funded by Louisiana Sea Grant specifically asks:

1. What are the current issues, concerns and challenges faced by parish decision makers and how have these impacted coastal zone management decisions?
2. Have there been any framing shifts among local CZM decision makers comparing Time 1(2005) and Time 2 (2011) data (in particular the comparison of the Regulator and the Regulated conceptual frames)?
3. What are the perceptions and attitudes on specified mitigation strategies for coastal vulnerabilities?
4. What are the current vulnerability/risk, sustainability and resiliency perceptions among local CZM decision makers and how do these compare to data from 2005?
5. What are the current attitudes towards regulatory and non-regulatory mitigation planning including land use and relocation?

Methods

This study is a pre-event / post-event natural experiment. It is a follow up to a pre-hurricane study of the effectiveness of Louisiana's Local Coastal Program (LCP) in building coastal zone management capacity in local decision-makers (Norris-Raynbird, 2006). Field work consisting of personal interviews, attendance at LCP / CZM meetings and coastal zone related events, and attendance at parish jury or council meetings commenced summer 2009 and occurred again in the summer of 2010. We had set a target of twenty interviews with parish presidents and CZM Administrators. But opportunity allowed us to obtain interviews with 30 people including parish presidents, CZM Administrators, parish planners and engineers from 18 parishes. Despite repeated attempts we unable to schedule interviews in Orleans parish in 2009 or 2010. In this time frame, changes were occurring with city personnel and in 2010, the BP oil spill took precedence over all other activities (New Orleans was the hub of related activity).

The conversational interviews were semi-structured around specified topic areas (i.e. recollection of hazard events, views on hazard adjustments, local problems/concerns, perceptions of constituency viewpoints, perception of parish resiliency). The recorded interviews were transcribed and content analysis identified common response trends and emergent themes. Meeting observation notes were similarly analyzed.

A mail-out survey was sent to the entire population (N = 333) of coastal parish CZM decision makers of the 19 coastal parishes (Appendix 1). This population included parish council or police jury members, CZM administrators and staff, coastal advisory panel members, and parish employees in ancillary positions (i.e. flood managers, parish engineers, planners, and emergency preparedness). The original plan was to send out the first mailing of the surveys in January 2010, however delays in transcription of the interviews slowed progress. Because the survey design was based in part on information from the interviews, it was necessary to have the interviews of 2009 transcribed and reviewed before the survey content could be finalized. One change to the survey instrument that was the result of several respondent comments was the change to include Gustav in the title of the research. This inclusion was very important to many respondents interviewed and validated the wisdom of gathering field data in preparation for survey distribution. When the BP oil spill occurred in April 2010, the decision was made to delay sending out the surveys until the focus on the oil spill had dissipated and the effect on the survey minimized.[2] Many months passed before it was felt that the attention on the oil spill had diminished enough so as not to direct the focus away from non-oil related

[2] The researchers knew that they would already be in the field in summer 2011 to complete remaining interviews, and that the delays caused by the oil spill also presented a unique opportunity to efficiently gather oil-spill related data. A proposal to extend the research topic domain and research period into the third year was developed immediately but then languished unbeknownst to the researchers in Administration at UNO. By the time it was received by LA Sea Grant, the available funding had been dispersed and the proposal was rejected. The delays due to the oil spill issues put the initial research many months behind and with the research period terminating at the end of May 2011, an extension for submitting the report after the June due date was requested. Analysis of the survey data began in June 2011.

coastal issues. We also felt that waiting to send out the survey would have a positive effect on the return rate. In the interim, the survey instrument was pretested with an individual who had previously worked for LADNR. No alterations to content matching the 2005 were made, however wording on some new questions was adjusted for clarity.

Descriptive	2005 Frequency/ Range	%	2011 Frequency/ Range	%
Surveys returned N	84	(100)	91	(100)
Gender: Male	74	(88)	71	(78)
Female	10	(12)	20	(22)
Age:	--		30 – 76 yrs	
Edu: less than H/S	0	(0)	1	(1)
H/S or GED	33	(39)	16	(17)
2yr Assoc/equiv	9	(11)	16	(17)
4yr degree	19	(23)	24	(26)
MA/MS/PhD/oth	21	(25)	33	(36)
No response		(2)		
LCP: yes	52	(62)	68	(81)
no	26	(31)	15	(16)
pending	6	(7)	8	(9)
Type: CZM staff	11	(13)	16	(17)
advisory panel	24	(28)	21	(23)
Council/Jury	48	(57)	20	(22)
Planners	--		22	(24)
Fl mgr/EMS/Eng	--		12	(13)
No response		(2)		

Table 1 Selected respondent demographics 2005 and 2011

The first mailing of surveys took place in March 2011 and a second mailing followed in April 2011. These were accompanied by letters explaining the research project and included a return stamped envelope. The second letter thanked people who had already responded and encouraged the participation of those who had not. By the beginning of May, it was determined that survey return had been maximized and coding and data entry began. The survey return was 91 completed surveys – return rate of 28.5% (a little lower than the 2005 rate of return of 33%). Even though an updated mail list (to accommodate changes in personnel and office location) had been completed from official parish web sites, there were still fourteen (14) returned envelopes with bad addresses.

Among the 2011 respondents, Council/Jury representation was lower than in 2005 and female representation was higher. The 2011 target population also included ancillary

parish employees such as planners, flood plain managers, parish engineers and Emergency Management. With the exception of Assumption, all parishes were represented in the 2011 survey responses. Table 1 highlights respondent demographics from Years 2005 and 2011. It is important to note that the respondents are not 'matched'. The target population is local decision makers years 2005 and 2011. However, personnel and positional changes have occurred between Time 1 and Time 2. What is compared here is local capacity based on frames agreement with DNR regulatory mandates and perceptions of vulnerability. An SPSS-11 statistical package was used for data analysis.

Discussion of Findings

The study has centered around five questions which we address individually.

1. What are the current issues, concerns and challenges faced by parish decision makers and how have these impacted coastal zone management decisions?

The survey instrument and the interviews produced somewhat different results in identifying the coastal zone issue of greatest concern. While many articulated a resistance to permits, without doubt, the issue of greatest concern for respondents on the survey had to do with land loss – **both wetland loss and other land loss**. Regardless of whether a respondent was noting failed mitigation measures, problems with controls of the permit process, or funding inadequacies in large and small projects to restore wetlands, all of these tied into the relentless loss of land as a result of natural processes[3] (subsidence, erosion and sea level rise) and failed attempts to protect, maintain and restore coastal lands. As was the case in 2005, many surveys contained exclamation marks beside comments; some included clippings; some took advantage of the provided sheet to carefully explain their concerns. While this indicated frustration – even desperation, it also indicated pro-action; taking the opportunity to be heard on issues.

The interviews targeted the implementation arm of parish government (Parish Presidents, Parish Managers, CZM Administrators and planners). When asked what the greatest coastal zone issue was for their parish, conversations almost invariably focused on implementation of regulations and compliance issues – a narrower focus but one that reflected their day to day activity. **New elevation requirements** in relation to the FEMAs flood zone maps was a hot topic with concerns raised about the comprehensive regulatory changes mandated and the speed with which they came into effect, accuracy issues, constituency compliance and confusion.

Another concern articulated quite clearly in the interviews was **failures in agency relations** primarily with the Federal Emergency Management Agency (FEMA), but also with the Army Corps of Engineers. A profound lack of faith in the expertise of the

[3] We are not making the distinction here between natural processes and natural processes that have been induced or exacerbated by human activity.

agencies and also distrust were prevalent in the interviews. This interfaced with the 'disputes and non-cooperation' comments on the surveys. This may provide some explanation of the slippage away from regulator framing when comparing 2011 and 2005 data. While concern for federal agencies verged on the hostile and reservation in state agencies' ability to manage coastal concerns was evident, hope and tentative confidence was expressed for some state agencies – in particular the newly formed Coastal Protection and Restoration Authority (CPRA).

The impact that these concerns have had on local coastal zone decision making and regulatory adjustments are evident in the **compliance strategies** adopted by parishes, specifically the 'stall' strategy, the 'soft compliance' strategy and the 'enforcer' strategy. Several parishes initiated stall tactics in relation to the new regulations by filing for appeal and contesting the DFIRM maps, thus keeping widespread compliance with the new regulations at bay. Other parishes elected to promote the new regulations through education and outreach programs, 'one on one' assistance to their constituents, and developing a team effort with their constituents in working toward compliance. A few parishes adopted an 'enforcer' strategy, where an individual had responsibility for being the new sheriff in town so to speak and mandated compliance with a heavy hand.

An effect of coastal recovery mandates and the funding available to kick start the implementation process, is the scramble to get it. This has led to parish officials' increasing self-described **savvy in political maneuvering** to attract 'recovery' funding to the parish.

Knowledge gains were not limited to political savvy however. A common theme in the conversational interviews was **knowledge gains in preparedness and response among local decision makers.** Respondents described a sharp learning curve and the sense that they had learned much about preparedness which had in turn increased their capacity to respond to the needs of the parish in disaster situations. In a similar vein, respondents noted that **constituent learning** was in evidence in the responsiveness of citizens to calls for evacuation. Respondents also noted a new trend of constituents listening to expert advice, the openness to learning how to build more sustainably, and an improved 'civic mindedness' that is beginning to understand the multiple issues involved in recovery and resilience. While it would be an error to suggest that these 'positive' repetitive storm learning outcomes are widespread and deeply embedded in the psyches of the coastal constituency, there was sufficient mention of constituent learning to identify unmistakable inroads in the area of constituent engagement in building resilient homes and communities.

2. Have there been any framing shifts among local CZM decision makers comparing Time 1(2005) and Time 2 (2011) data (in particular the comparison of the Regulator and the Regulated conceptual frames)?

It is important to reiterate the relevance of assessing the framing present in respondents when examining dimensions of capacity in local decision making. The mandates and

regulations that flow from LA CPRA and LA DNR, the training provided in agency outreach, and the information made available to local coastal parishes stem from 'regulator' ideology which promotes non-structural mitigation, sustainable development, comprehensive planning, building codes and the like. The rules and regulations that flow from this limit what citizens and local governments can and cannot do in their parishes. Those who are regulated may have an opposing frame promoting non-regulation, non-compliance, freedom to act without restraint and the unimpeded authority of the parish to set their own rules. These opposing frames were identified in 2005 prior to Hurricane Katrina. The question at hand asks: are there shifts in framing that have occurred after a period of devastating and repetitive loss due to storms? The findings show that there have indeed been shifts in framing. However, **these shifts are not as great as expected, and they are not in the direction of regulator frame agreement**. Overall, agreement with the regulator frame ideology is slightly weaker in 2011compared to 2005.

Effect of respondent type

Noteworthy is the comparison between different types of respondents. In 2011, agreement levels with regulator framing increased in the CZM Administrators/staff group compared to 2005. Both CZM Administrators/staff and planners (a new group added in 2011) had the highest levels of regulator frame agreement. In contrast, **advisory panel members as a group showed less agreement with the regulator frame**. This is a change from 2005 where that group had the highest level of regulator frame agreement; there is a marked decrease in the group means between 2005 and 2011. Change to membership rosters for advisory panels that have occurred since 2005 offers one explanation. With the many additional resources available to parishes, this has been an incentive for constituents with specific interests to exert influence through advisory panel membership. Comments on surveys and interview data support this explanation.

Effect of having an LCP:

While there is no official change in the number of local coastal programs (LCPs) there is evidence in the interview transcripts of two parishes considering developing a local coastal program. This is in addition to the parishes that have remained stuck in the pending stage since 2005. The 2005 study demonstrated that having an LCP had a statistically significant positive effect on regulator frames agreement. This effect was most noticeable in parishes with newer and pending LCPs and was attributed to the focused effort of developing and learning to manage an LCP plan consistent with state and federal coastal legislation and mandate. The findings of 2005 are corroborated in 2011. Having an LCP exerts a positive effect on regulator frame agreement. With the 'newer' LCPs (in 2005) now having aged into the mature LCP category, the effect is most significant when we compare the group means of No LCP parishes with that of the Mature LCP parishes. It is important to note that the strength of the effect of having an LCP on regulator frame agreement has weakened slightly since 2005 in all categories of LCP status. This supports the finding that overall, agreement with regulator frame ideology has decreased. Further, slight movement away from regulator frame agreement

may shed light on what appears to be a status quo situation despite repetitive loss and efforts on the part of regulatory agencies to educate local coastal decision makers on the necessity of regulation and benefits of sustainable practices.

From the interviews, it is evident that the Local Coastal Program has taken a back seat to other agendas and initiatives. This program has not attained the importance, effort or resources necessary to support the central role it could potentially play in reaching out to all local decision makers. Few other state coastal initiatives are set up to be a continuous part of local government structure. Even CWPPRA projects and other funding initiatives which bring Council/Jury members, Advisory panel members and CZM Admin/staff to the table do so only sporadically. The focus is on securing a successful bid on funding. These initiatives are perhaps not the best means of delivering lessons in sustainability and resilience. This study affirms that encouraging development of an LCP and maintaining good agency relations is a successful method of disseminating information and educating local constituents on best practices in coastal decisions as defined by LA DNR.

3. What are the perceptions and attitudes on specified mitigation strategies?

Coastal mitigation can take many forms. It can be on an individual scale i.e. choosing to move inland, having a household evacuation plan, elevating your home. Mitigation can also be large scale, for example, relying on large engineered flood control systems, building higher levees, building diversions. The attitudinal measures on specific mitigation strategies were analyzed with the frame index variable. All but one achieved significance, but the items pertaining to **relocation** and the item on **relying on levees and flood control devices** to ease vulnerability produced very strong results. A generalized statement said that 'inland relocation makes sense in a long term cycle of unstable weather and rising seas'. Respondents with a regulator frame tended to agree with this somewhat, but those with regulated frames disagreed strongly. One thought was that inland coastal respondents might perceive things differently than coastal proximate respondents, but such was not the case. There was no pattern to the responses that aligned with coastal parish location. The pattern was based on ideological frame.

Another statement took a more personal stance, stating that 'inland relocation is not something that I would ever consider'. Here, regulated frame respondents agreed very strongly and regulator frame respondents disagreed only slightly. Once more, the pattern was not associated with location but rather with ideology. An important distinction to make, was while it was profoundly clear that relocation was not an option with which most respondents agreed, the differences between those who agreed somewhat and those who did not at all, had to do with their conceptualization of coastal vulnerabilities. There was at least some consideration of relocation regardless of how small in the minds of regulator frame respondents. For those with mixed frames and with regulated frames, the resistance to relocation was marked. We address additional data on this issue in the discussion of the last research question (Question 5).

Attitudes on the structural mitigation strategy statement that pertained to relying only on levee systems and flood control devices to reduce vulnerability in their parish, showed that regulated frame respondents strongly agreed, and regulator frame respondents strongly disagreed. Regulated frame respondents preferred external large scale technological/engineered structural mitigation options to individual level non-structural mitigation including regulatory mitigation strategies.

There was general agreement by respondents that **land use planning** was an appropriate mitigation strategy for their parish, and there was general consensus that **zoning** was on the table for in all parishes. It is important to note language and phrasing changes incorporated into the survey to get at finer distinctions in meaning. The contrast between 'land use planning' and 'land use regulation' produced very different results and is discussed in Question 5. With regard to zoning, this question was phrased in the absolute negative ('zoning is not a consideration in my parish') so most respondents disagreed with this statement – they admitted that zoning was a consideration. Note that the question did not ask them if they agreed with it. Having said this, it is also important to note that within the duration of this study, there have been inroads made in the area of zoning and land use. The interviews most of which were done summer 2009, told of the difficulties faced by parish governments in the attempt to introduce land use planning and the 'Z-word' into conversations with constituents. By spring 2011, most survey respondents indicated at least some support of land use planning and acknowledged that zoning was being considered in their parish. With regard to regulatory mitigation, the greatest contention revolved around regulations pertaining to building codes and elevation requirements.

4. What are the current vulnerability/risk, sustainability and resiliency perceptions among local CZM decision makers and how do these compare to data from 2005?

There were statistically significant differences in the perception of multi-hazard physical vulnerabilities: between LCP parish respondents and non-LCP parish respondents. There were also statistically significant differences in the perception of multi-hazard vulnerabilities between regulator frame respondents and respondents having other frames. This was expected as presence of LCP exerted a positive effect on agreement with regulator frame. Also as expected, parish location was statistically significant in its influence on perceptions of vulnerability. The variables (parish location, LCP/ no LCP) however were not highly correlated. Parishes were fairly evenly split between coastal proximate (10 parishes) and inland coastal (9 parishes). And as noted previously, LCP parishes were evenly distributed between inland coastal and coastal proximate locations.

A fascinating difference between 2005 and 2011has occurred. In 2005, before Hurricane Katrina, almost all respondents perceived moderately high vulnerability to hurricanes/tropical storms and there was no statistical difference between LCP respondents and non-LCP respondents. In 2011, while most respondents rated vulnerability to hurricanes as high, there now was a discernable difference in how high.

LCP respondents perceived far greater vulnerability. For LCP respondents, perceived vulnerability to hurricanes/storms had increased disproportionately to non-LCP respondents in comparison to 2005 responses. The same phenomenon occurred with land loss. In 2005, there was no statistically significant difference between LCP respondents and non-LCP respondents in their perceptions of high vulnerability to land loss. In 2011, LCP status respondents perceived greater vulnerability to land loss due to both erosion and subsidence than did non-LCP respondents. This is likely due to the fact that LCP respondents have been more frequently exposed to information on current coastal conditions as a result of organized effort enabled by the LCP. Efforts by CZM Admin/staff, planners and advisory panel members in outreach and education of constituency and Council/Jury have intensified around the issue of risk. The effect of organized effort around risk perception is less evident in non-LCP respondents.

Overall, perceived vulnerability to pollution was not on the radar in both 2005 and 2011, with one exception. Regulator frame respondents perceived higher vulnerability to pollution than did other respondents. For both years, when respondents were grouped by parish location and LCP status, the variance between the groups was not great; and group means were only mid-range. The percentage of respondents who perceived only low/moderate vulnerability, however decreased to 50%. What this means is that while perceptions on vulnerabilities to pollution have increased slightly in the respondents of 2011, the differences (with the exception of regulators) is not statistically significant for groupings by LCP status or parish location.

When we looked at the economic vulnerabilities, there were fewer differences between 2005 and 2011. The differences between LCP and non-LCP respondents in perceptions of vulnerabilities for infrastructure damage, property damage and business interruption are commensurate in 2005 and 2011. LCP respondents perceived greater vulnerability in both years. New in 2011 was the perception of vulnerability to loss of investment capital. LCP respondents perceived greater vulnerability than did non-LCP respondents. Interestingly, there was not even a moderate level of perceived risk to loss of natural resources for either LCP or non-LCP respondents in either 2005 or 2011.

More change was evident in perceptions of physical vulnerability than in economic. LCP respondents perceived greater economic vulnerabilities in both 2005 and 2011 than did non LCP respondents. But LCP respondents in 2011 perceived greater vulnerability to physical hazards than they had in 2005. The possible explanation when comparing the changes visible in 2011 to 2005 is two-fold. First, LCP respondents may be better-versed in the economic vulnerabilities due to infrastructure damage, business interruption and property damage because these things may be more regularly and broadly discussed in planning and advisory meetings resulting in a more coherent understanding of relative risks. Second, LCP respondents may be 'outpacing the pack' so to speak in their perceptions of very high vulnerability to physical hazards for the same reasons – they are involved as a cohort. The LCP may be instrumental as an organizing feature and as this data demonstrates, is associated with perceptions of vulnerability and perhaps an enhanced realization of risk. An interview with a non-LCP respondent comes to mind. When asked if the parish felt any urgency with regard to

vulnerability to storms and hurricanes the response was the same as it had been when asked in 2005: "It's not on their (constituents') plate yet". In 2005, this same respondent had said "The wolf's not at the door". Perhaps minimization is a luxury that LCP respondents have realized they don't have.

5. What are the current attitudes towards regulatory and non-regulatory mitigation planning including land use and relocation?

In a resounding and unified voice, respondents indicated that **voluntary relocation inland was not an option.** Fifteen (15)[4] coastal parishes (83%) specified this strategy as the least relevant to their parish. Less resounding and unified was the reaction to **assisted (buyout) relocation inland.** While it was the next least relevant mitigation measure, there was a much broader range of responses to assisted buyout which were associated with ideological framing (i.e. regulator frame, mixed frame and regulated frame). Regulator frame respondents comprised the lone voice that thought that assisted relocation was a relevant strategy.

Four parishes (4) specified **educational outreach** to citizens as being most relevant to their parishes (three of which were inland coastal). Six (6) parishes specified **regulatory strategies** (mandatory elevation, tighter building codes or land use regulations) as most relevant. Both of these are internal social-structure strategies. Educational outreach to citizens and regulatory mitigation strategies fit hand in glove, but there was no evidence of this connection among most respondents. Without educational outreach to citizens (including elected officials that represent them), regulatory mitigation strategies are a tough sell in the implementation process – compliance strategies as we have seen can produce stall tactics or heavy-handedness, both of which lead to resistance and failed mitigation. There isn't the time or the money to accommodate such outcomes.

There was also a **reliance** (with the exception one coastal proximate and two in inland coastal parishes) by parishes **on non-regulatory structural technological/ engineered infrastructure strategies** (parish levees and flood control devices, large engineered hurricane projects) and **non-structural wetlands restoration** projects as the most relevant mitigation strategies. A total of fourteen (14) parishes specified infrastructure as the most relevant to their parish and this was a fairly even split (6 inland coastal and 8 coastal proximate parishes). Only two parishes indicated that a mix of both social and infrastructure strategies were needed – a more holistic understanding of the importance of social (education and regulation) strategies combined with technological/ engineered infrastructure strategies.

There was a clear preference for non-regulatory mitigation strategies across parishes. In Question 3, respondents indicated their agreement with statements. In Question 5, respondents did the reverse, they indicated the ranking of each mitigation strategy. This provided a kind of 'double check' on perceptions. Regulated frame

[4] Recall that there was no survey data for Assumption parish; 83% is 15 out of 18 parishes.

respondents consistently balked at any strategy resembling regulation including 'assisted relocation – buyout'. Despite being a small group of survey respondents (11% in 2011) they exerted a considerable effect when surveying perceptions of local decision makers.

One noteworthy distinction is the language of the land use mitigation statements in the attitudinal measure ('land use planning') and the ranking question ('land use regulation'). While as discussed under Question #3, agreement levels were high across all categories of respondent frames in the attitudinal measure that used the phrase 'land use planning', there was considerable variance created when the word 'regulation' was introduced in the ranking question. What appears on the surface as a contradiction in findings is really the effect of language. 'Land use planning' affords a broader interpretation than does 'land use regulation'. This is supported by the consistent aversion to 'regulation' most specifically on the part of 'regulated' frame respondents.

Statistical significance of variance in group means between regulated frames respondents on all regulatory strategies indicate the importance frames analysis to better understanding the attitudes of local coastal decision makers. The good news for regulatory mandates is that there was a healthy group of regulator frame respondents (33% of survey respondents in 2011) and another also robust group of mixed frame respondents (55% in 2011). This is where efforts should be focused to build greater support for state and federal coastal management mandates.

Recommendations

The recommendations in this section meet the objectives of the research study and provide critical information to LA Sea Grant for program planning and management in:

- topic orientation in local focus groups, workshops, and administrative seminars conducted or sponsored by LA Sea Grant as part of their outreach commitment
- identifying areas of resistance and areas of cooperation in parish jurisdictions to assist interagency and intergovernmental communications
- strategies for achieving federal mandates of coastal community resiliency and sustainability

1. **Focus group topic: inter-parish information exchange for parish decision makers**

Local decision makers have developed strategies for dealing with new regulations that have been mandated in the coastal zone. Some strategies are less conducive to compliance and implementation than others. Some interview respondents noted that there is no information on how other parishes are managing the implementation process. In essence, many of the strategies of implementation are strategies of default because parishes do not have the tools for facilitation of implementation strategies that are more conducive to compliance. So there are two levels of compliance at issue here: first at the local government level, and second at the constituency level. Because there is so much organizational variation between parishes, a cross section focus group of parish officials, administrators, planners and operations people will gather specific information on what

information is needed and how Sea Grant could be involved in development of an exchange site. By galvanizing around the constituency issue, a neutral area of information exchange could be created that would facilitate the issue of local government buy in.

2. '**No Council/Jury Member Left Behind' workshops**

Of all respondent groups, Parish Council and Police Jury members are far more likely to have a 'regulated' frame and little in-depth coastal management knowledge. A more recent development (in 2011 data) is the stronger presence of the regulated frame in Advisory Panel members – largely due to opportunities to exert special interests in recovery and development of parishes. Both these groups share a common desire to "get a piece of the pie". The pie should have educational requirements attached to it. Individuals in local government are forming local policy, making decisions on development and land use, spending precious resources to fight regulatory mandates from the state and federal level. And they are doing these things with inadequate knowledge about coastal processes, sustainable development and resiliency. Even when the administrative branch of parish government understands state and federal coastal mandates, many respondents have implicated the elected officials in the parish as a difficult stumbling block. It is critical to reach this group and they must perceive a benefit to participating in knowledge acquisition if building capacities in local parishes that align with sustainable practices is going to occur.

3. **Cross sectional intra-parish integrated training seminars**

Much of the training respondents report receiving (and what has been witnessed in the field) happens in silos. That is, flood plain managers are training with flood plain managers, CZM administrators are training with DNR, more specifically LCP training, planners are training with planners. This is not to say that there are no venues where they meet up, and certainly there is evidence of key actors in some parishes who regularly attend a multitude of venues focused on multitude of coastal topics. But typically, potential receivers of information are fragmented…some are isolated and not actually receiving information. Integrated training needs to occur so that information silos do not occur. This is particularly important for mitigation strategies and establishing coherent understandings of sustainable practices and resiliency. For logistical reasons, it makes sense to hold these training seminars in each parish with representatives from many parish departments. It also builds importance, legitimacy and respect for their time. This means a longer term commitment by Sea Grant. One example of a topic would be to introduce the information exchange website that is for coastal parish employees. This could be used as a door opener to initiate conversations with and between representatives from many departments (planning, operations, CZM administrators/staff, flood plain managers). Another topic is 'unpacking sustainability and resilience' – appropriate for facilitated conversations among a cross section of parish personnel.

4. **Workshops to train the trainers**

In support of items 2 & 3, a small cadre of individuals should be trained in: coastal zone best practices, understanding and promoting the mandates of LA CPRA and LA DNR, and understanding the political terrain of each parish. In the ideal, these individuals would speak the different languages of scientists, engineers, planners, Council/Jury members, CZM Administrators, constituents, etc enabling them to facilitate integrated conversations with these groups. They would be able to bridge between divided interests and know (or be able to determine) where the common ground is. They would understand who the stakeholders are in every parish and what their specific interests are. Trainers would hold a delicate position – one that would build trusted relationships with local decision makers, would be respectful of opposing views, and would be able to facilitate learning in hotly contested ideological terrain. Such professionals may exist within local agencies or can be engaged from national organizations and university programs that specialize in environmental issues discussions.

5. **Support the Local Coastal Program**

This may be a challenging topic for Sea Grant because the LCP is nested in LA DNR. But the LCP program is withering – the intent of the program to build capacity in local parishes in the image of the policy mandates of the State, and the Federal Coastal Zone Management Act and program has fallen considerably short of that goal largely because the program has been ignored. Sea Grant can use its resources to interface or partner with LA DNR...or perhaps LA CPRA, to bring more attention and support to a program that could (and should) play a central role in education and outreach – to local decision makers and beyond to the constituency.

6. **Work on areas of resistance through working with areas of less resistance**

- **Voluntary relocation (no buyout)** garnered adamant and cohesive resistance across all parishes and across all respondent types. Slightly less objectionable was **assisted relocation (buyout).** Having said this, many respondents mention the mass of evacuees from hard hit areas having fled inland, who have not been able to return. Certainly this is evident in Plaquemines, St. Bernard, Orleans, and Cameron parishes in particular. Inland coastal parishes have noticed growth, but many parish presidents felt that population patterns had not stabilized. **There is room for negotiation and programmatic assistance in 'assisted' relocation (buyout).** Considering the 'collective resistance' to the mention of relocation, it is probable that outreach strategies need to be developed that work one on one with constituents living in areas placing them more 'at risk'. Sea Grant can adopt a support role in partnering with programs designed for 'relocation assistance'. In addition, Sea Grant could **collate funding information**. There is a confounding amount of information that has not 'trickled down' to the constituent base in any coherent fashion. Synthesizing available funding program information into a web-based and hard copy reference source – a 'one stop shop' of sorts – would make accessing and comprehending the many available federal, state and parish programs so much easier. Frequent updating of this site and binder would be required.

● **Regulations (primarily those attached to the FEMA flood maps)** are energetically being opposed by some parishes that are using precious resources to obtain new data and launch objections. At the heart of this issue, is **taking land out of commerce.** There is much work to be done in managing the perceived potential economic loss and this is an opportunity for Sea Grant to work with local decision makers to see the broader picture. Coastal residents have strongly indicated their desire to stay where they are. Learning how to build sustainable communities that are resilient to severe weather and changing environmental conditions will diminish considerably the vulnerabilities of coastal communities. This will necessarily include sustainable decisions on development. It may be difficult for local decision makers to consider land use regulation as a means to insuring that the communities remain in their vulnerable coastal location. Recall that we earlier suggested (in the literature review) that when short term monetary gains are perceived as unsatisfactory vis à vis long term goals, regulatory strategies are considered more useful. In this current study, land use regulations would be for addressing the effects of chronic, long-term coastal land loss. This is a reframing issue. Sea Grant might ask: how can local decision makers and constituents be given tools to see the bigger picture? Can the interests to remain in their communities and to preserve their culture be more compelling to constituents and local decision makers than short term monetary gains?

7. **Build upon areas of cooperation**

● Several of the non-structural mitigation strategies have modest support that can be built upon (**zoning, land use planning, elevation requirements, tighter building codes on new construction, tighter codes on repairs to existing structures, expanding the coastal boundary**). While we in no way suggest that these are not still hotly contentious, we do suggest that there is sufficient variance in support of them to see these strategies as 'on the table'. There is ripeness to the contentiousness. The modest shift away from regulator framing in favor of regulated framing signifies key actors in place who are promoting individual and special interests. Individual and special interests however, may not serve the community as a whole. The shift also suggests slippage in the faith placed in regulating agencies. But there remains important representation of the regulator frame – often in pivotal positions – with support for the mandates of LA CPRA and LA DNR and more broadly federal coastal zone mandates.

From these findings it is evident that Sea Grant has a clear opportunity to support enhanced coastal community resiliency and sustainable practices.

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Appendices

Appendix - 1

1. What is your occupation? (If retired, state former occupation) _____

_____

2. What is your highest level of education completed?

____ less than high school completion
____ high school/ GED diploma
____ 2 yr associate degree /equivalent college yrs.
____ 4 yr college degree
____ MA/MS/PhD/Prof degree

3. Are you: ☐ Male ☐ Female **4. Age**:_____

5. In your role as a police juror, council member, advisory panel member, or parish employee, list any duties that relate to managing coastal resources, hazards, permits, development, industry, facilities, infrastructure:

_____

_____

_____

6. How many times per week do you have telephone or personal contact about CZM matters within your own parish with:

a) police jury/council members _____ times / wk
b) advisory panel members _____ times / wk
c) CZM Administrator /stafff _____ times / wk

7. Excluding members of your parish police jury, council, advisory panel, or staff, how many times per week do you have:

a) telephone contact with professionals working in coastal zone management? _____ times / wk

b) in person contact with professionals working in coastal zone management? _____ time / wk

8. How may times a year do you participate in the following coastal zone issue related activities:

conferences_____ field trips _____
training seminars/workshops _____
town hall and other public meetings ____
special interest organization meetings _____

9. How many times a month do you do the following coastal zone issue-related activities:

read technical reports _____
read journal articles_____
access federal or state agency web sites_____

10. What is your primary source of information regarding coastal zone issues: _____

11. What in your opinion is the 'best' (reliable and accessible) source of information on coastal zone issues for the public?

_____

_____

12. Using the scale as a guide, circle the number that best describes the extent to which you agree or disagree with statements:

1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree

a) Coastal zone managers have better knowledge in coastal issues compared to that of the general public.
1 2 3 4 5

b) Regardless of ownership, wetlands are a 'public good'.
1 2 3 4 5

c) Having a Local Coastal Program negatively affects local benefits from development.
1 2 3 4 5

d) Environmentalists stall the permit process with complaints.
1 2 3 4 5

e) Permitting is based largely on political interests.
1 2 3 4 5

f) LCPs make coastal mitigation efforts more efficient.
1 2 3 4 5

g) The permit process is unnecessarily problematic.
1 2 3 4 5

h) Considering coastal zone issues, some restraint on use is important in a market economy.
1 2 3 4 5

I) CZ regulations serve environmentalist interests.
1 2 3 4 5

j) A focus on regulations leads to less protection of resources.
1 2 3 4 5

k) Its more important to find solutions to conflicts than to understand the complexities of coastal zone problems.
1 2 3 4 5

l) Its up to the applicant to smooth the permit process by 'doing their homework'.
1 2 3 4 5

m) LCPs ensure that local issues are 'weighed in the balance' of competing interests.
1 2 3 4 5

n) Resource use decisions should be based solely on greatest economic benefit.
1 2 3 4 5

13. Please check the one box that accurately describes your parish with regard to the Local Coastal Program:

☐ No LCP ☐ Pending LCP application
☐ Inactive LCP ☐ Active New LCP < 2 yrs old
☐ Active Established LCP 2 - 5 yrs old
☐ Active Mature LCP > 5 yrs old

14. How many times in the past five (5) years has your parish suffered serious damage due to:

a) hurricanes / tropical storms _____
b) floods _____ c) storm surge _____
d) tornado_____ e) other (specify please):

15. Please circle the degree of vulnerability of your parish to the following:

	Low	Moderate	High
a) hurricanes/tropical storms	1	2	3
b) flooding/storm surge	1	2	3
c) pollution/contamination	1	2	3
d) land loss (subsidence)	1	2	3
e) land loss (erosion)	1	2	3
f) saltwater intrusion	1	2	3

16. Please circle the degree of economic vulnerability of your parish due to coastal hazards with respect to:

	Low	Moderate	High
a) property loss	1	2	3
b) infrastructure damage	1	2	3
c) business interruption	1	2	3
d) loss of investment capital	1	2	3
e) loss of natural resources	1	2	3
f) job loss / unemployment	1	2	3
g) loss of labor pool	1	2	3

17. Using the scale as a guide, circle the number that best describes the extent to which you agree or disagree with statements below:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

a) Land use planning is an appropriate mitigation strategy for my parish.
1 2 3 4 5

b) Zoning is not a consideration in my parish.
1 2 3 4 5

c) Technology/engineering will provide the necessary mitigation strategies for coastal hazards in my parish.
1 2 3 4 5

d) Inland relocation of coastal populations makes sense in a long term cycle of unstable weather and rising seas.
1 2 3 4 5

e) Levee systems and flood control devices are the only means of reducing vulnerability for my parish.
1 2 3 4 5

f) There have been changes in perceptions in my parish concerning land use and coastal permits since 2005.
1 2 3 4 5

g) Relocation more inland is not something that I would ever consider.
1 2 3 4 5

h) Residents in my parish support elevation regulations.
1 2 3 4 5

i) Coastal management has improved in LA since 2005.
1 2 3 4 5

18. Please rank each 'mitigation' strategy listed below according to their relevance for your parish. You can use the same number more than once (1 = very relevant and 5 = least relevant).

a) parish levees and flood control devices _____
b) voluntary relocation of residents (no buyout) _____
c) assisted relocation of residents (buyout) _____
d) mandatory elevation of homes in flood zones _____
e) education of parish residents on mitigation _____
f) tighter building codes on new construction _____
g) large engineered hurricane protection projects _____
h) large wetland restoration projects _____
i) projects to maintain/repair existing wetlands _____
j) land use regulations _____
k) developmental restrictions in designated areas _____
l) building code standards on repairs to structures _____
m) expanding your parish coastal zone boundary _____

19. In your opinion, does a parish Local Coastal Program make a difference in how coastal zone issues are addressed at the parish level?

☐ Yes ☐ No ☐ Don't know

Please explain: _____

_____

_____

21. Rank each strategy (1-5 where 1=priority) in order of its importance to how your parish is or is not implementing new elevation regulations.

a) My parish is seeking revision of regulations __
b) Parish staff are educating residents __
c) Parish staff are physically monitoring compliance __
d) Parish staff are using the permit process to enforce __
e) Parish staff are waiting to implement regulations __

22. In your opinion, what is the most difficult coastal zone issue in your parish?

_____

_____

_____

Thank you for your participation. If you would like to add a comment, please use the lined sheet insert.

Local Coastal Zone Management Capacity Post Hurricanes Katrina, Rita, Ike and Gustav:
A Comparative Study

SURVEY:

Parish Government Officials
CZM Parish Administrators
Parish Departmental Managers
Coastal Advisory Panel Members

Principal Investigators:
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Carla Norris-Raynbird, Ph.D.
University of New Orleans

SG-LNR - 1001

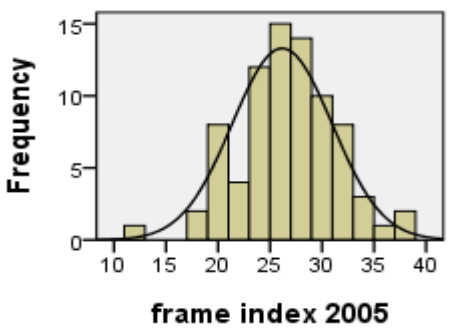
Appendix 2 – Comparison of frame index model selection years 2005 and 2011

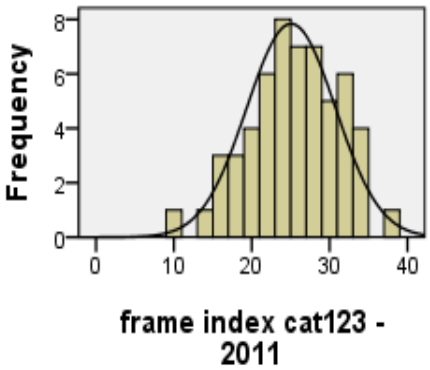
	Model 2005	Model 2011
N	72	90
No. of items	8	8
F Value	15.2496	23.741
Probability at 95% confidence	.0000	.0000
Chronbach alpha	.7107	.6800
Standardized model alpha	.7103	.6720
Item Means Variance	.1787	.2620
Inter Item Correlations Variance	.0149	.0280

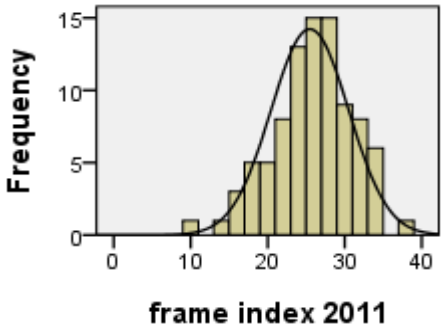
Question items in model as they appear on survey

C) LCPs negatively affect local benefits from development.
D) Environmentalists stall the permit process with complaints.
F) LCPs make environmental mitigation efforts more efficient.
G) The permit process is unnecessarily problematic.
I) Coastal zone regulations serve environmentalist interests.
J) A focus on regulations leads to less protection of resources.
M) LCPs ensure that local issues are 'weighed in the balance'.
N) Resource use decisions should be based solely on greatest economic benefit.

Appendix 3 – Histogram frequency distributions of Respondent frame index tallies 2005 and 2011.







Appendix 4 – Correlation matrix of Likert measure mitigation statements and tally 2011

Correlations[a]

	land use mitigation	zoning not considered	eng / tech solutions	inland relocation	levee / flood control only	relocate not ever	frame 2011
land use mitigation	1	-.344*** .001	.194 .069	.159 .137	-.104 .330	-.162 .129	.225** .034
zoning not considered	-.344*** .001	1	-.245** .021	-.280*** .008	.205 .055	.280*** .007	-.195 .067*
eng /tech solutions	.194 .069	-.245** .021	1	.016 .880	-.005 .961	.016 .878	.096 .369
inland relocation	.159 .137	-.280*** .008	.016 .880	1	.021 .848	-.514*** .000	.368*** .000
levee / flood control only	-.104 .330	.205 .055	-.005 .961	.021 .848	1	.306*** .004	-.498*** .000
relocate not ever	-.162 .129	.286*** .007	.016 .878	-.514*** .000	.306*** .004	1	-.486*** .000
frame 2011	.225** .034	-.195 .067*	.096 .369	.368*** .000	-.498*** .000	-.486*** .000	1

***. Correlation is significant at the 0.01 level (2-tailed).

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

* Correlation is significant at the .10 level (2-tailed).

a. Listwise N=89

Appendix 5 – Mitigation strategy implementation rankings sum and means by CZ parish* (2011)

Report

parish#		levee & flood control	vol reloc no buyout	assist reloc buyout	mandate elevation flood zone	citizen mitigation edu	code reform new const	large engin hurr protec projects	large wetland protec projects	maintain exsit wetland projects	land use regs	devel restrict select areas	code reform repair exist structures	expand cz bondary
Calcasieu	Mean	4.50	3.00	3.00	3.17	1.17	1.17	2.33	1.67	1.67	1.67	2.33	1.83	3.67
	Sum	27	18	18	19	7	7	14	10	10	10	14	11	22
Cameron	Mean	2.55	4.09	3.45	2.45	2.36	2.64	2.91	1.55	1.55	4.00	3.09	2.82	3.55
	Sum	28	45	38	27	26	29	32	17	17	44	34	31	39
Iberia	Mean	4.00	4.00	3.33	3.00	3.67	3.67	4.00	3.67	3.67	4.00	3.33	3.33	4.00
	Sum	12	12	10	9	11	11	12	11	11	12	10	10	12
Jefferson	Mean	1.00	4.00	4.00	2.00	2.25	1.75	1.25	1.25	1.25	1.75	1.75	1.75	2.67
	Sum	4	16	16	8	9	7	5	5	5	7	7	7	8
Lafourche	Mean	1.25	3.75	3.75	2.63	2.00	2.63	2.38	1.50	1.50	2.63	2.38	2.00	3.00
	Sum	10	30	30	21	16	21	19	12	12	21	19	16	24
Livingston	Mean	5.00	4.00	4.00	1.00	3.00	5.00	1.00	3.00	3.00	4.00	4.00	1.00	5.00
	Sum	5	4	4	1	3	5	1	3	3	4	4	1	5
Orleans	Mean	1.00	3.60	2.40	1.60	1.60	1.20	1.60	1.00	1.00	1.40	1.40	1.40	2.20
	Sum	5	18	12	8	8	6	8	5	5	7	7	7	11
Plaquemines	Mean	1.40	4.10	2.90	2.00	1.70	1.60	2.00	1.30	1.30	1.90	2.00	1.90	2.50
	Sum	14	41	29	20	17	16	20	13	13	19	20	19	25
St Bernard	Mean	1.33	4.33	3.33	2.33	2.00	1.67	2.00	2.00	2.33	2.00	2.67	2.67	4.00
	Sum	4	13	10	7	6	5	6	6	7	6	8	8	12
St Charles	Mean	1.00	5.00	4.20	2.40	2.20	2.20	2.00	2.40	2.40	2.40	2.40	2.20	3.20
	Sum	5	25	21	12	11	11	10	12	12	12	12	11	16
St James	Mean	1.29	4.00	3.71	1.86	2.00	1.57	1.86	1.86	1.57	2.71	2.57	2.29	3.57
	Sum	9	28	26	13	14	11	13	13	11	19	18	16	25
St John Baptist	Mean	1.00	4.00	3.00	2.00	1.00	2.00	3.00	1.00	1.50	1.50	1.50	1.50	3.00
	Sum	2	4	3	4	2	4	3	1	3	3	3	3	3
St Martin	Mean	1.00	5.00	5.00	1.00	1.00	1.00	5.00	1.00	1.00	1.00	1.00	1.00	1.00
	Sum	1	5	5	1	1	1	5	1	1	1	1	1	1
St Mary	Mean	1.00	5.00	5.00	2.50	3.00	1.50	1.00	2.00	2.00	3.00	3.50	1.50	4.50
	Sum	2	10	10	5	6	3	2	4	4	6	7	3	9
St Tammany	Mean	3.00	2.00	2.00	1.00	1.00	1.00	2.50	1.50	1.50	1.50	1.00	1.00	2.50
	Sum	6	4	4	2	2	2	5	3	3	3	2	2	5
Tangipahoa	Mean	4.75	5.00	4.00	2.50	3.25	2.25	4.25	2.75	3.00	2.00	2.25	2.50	4.25
	Sum	19	20	16	10	13	9	17	11	12	8	9	10	17
Terrebonne	Mean	1.00	3.44	1.88	2.44	2.33	1.78	1.11	2.00	2.00	3.33	2.78	2.44	3.11
	Sum	9	31	15	22	21	16	10	18	18	30	25	22	28
Vermilion	Mean	1.00	5.00	2.33	1.33	1.67	1.67	1.00	1.00	1.00	3.00	2.33	1.33	2.67
	Sum	3	15	7	4	5	5	3	3	3	9	7	4	8
Total	Mean	1.92	3.99	3.26	2.24	2.07	1.97	2.18	1.74	1.74	2.57	2.41	2.12	3.21
	Sum	165	339	274	193	178	169	185	148	150	221	207	182	270

*** No data for Assumption parish**

Appendix 6 – Implementation strategy rankings sum and means by CZ parish* (2011)

parish#		seeking revision of regs	staff are educating residents	staff phys monitoring compliance	using permit process to enforce	waiting to implement regs
Calcasieu	Mean	2.17	1.50	1.50	1.00	5.00
	Sum	13	9	9	6	25
Cameron	Mean	1.45	3.00	1.36	2.00	3.09
	Sum	16	33	15	22	34
Iberia	Mean	4.33	2.67	3.00	2.00	3.00
	Sum	13	8	9	6	9
Jefferson	Mean	1.67	2.00	1.67	1.33	2.67
	Sum	5	6	5	4	8
Lafourche	Mean	2.13	3.00	2.50	1.87	4.14
	Sum	17	24	20	15	29
Livingston	Mean	1.00	1.00	1.00	1.00	1.00
	Sum	2	2	2	2	2
Orleans	Mean	2.80	2.20	2.20	1.20	3.00
	Sum	14	11	11	6	12
Plaquemines	Mean	1.90	2.60	2.50	2.70	2.44
	Sum	19	26	25	27	22
St Bernard	Mean	3.00	1.50	1.50	1.00	5.00
	Sum	6	3	3	2	10
St Charles	Mean	3.00	3.00	2.00	2.20	2.60
	Sum	15	15	10	11	13
st James	Mean	3.38	2.63	2.75	1.50	3.13
	Sum	27	21	22	12	25
St john Baptist	Mean		2.00	1.00	1.00	
	Sum		2	1	1	
St Martin	Mean	1.00	2.00	1.00	3.00	1.00
	Sum	1	2	1	3	1
St Mary	Mean	3.50	3.50	2.00	1.00	5.00
	Sum	7	7	4	2	10
St Tammany	Mean	1.00	2.00	3.00	2.50	2.50
	Sum	2	4	6	5	5
Tangipahoa	Mean	3.75	3.00	2.75	1.50	5.00
	Sum	15	12	11	6	20
Terrebonne	Mean	2.22	2.00	2.13	2.22	3.38
	Sum	20	18	17	20	27
Vermilion	Mean	1.00	1.00	2.00	1.67	1.67
	Sum	3	3	6	5	5
Total	Mean	2.32	2.42	2.11	1.82	3.25
	Sum	195	206	177	155	257

*** No data for Assumption parish**