Research Strategy

RESTORE Act Center of Excellence for Louisiana

November 18, 2016

ABOUT THE RESTORE ACT CENTER OF EXCELLENCE FOR LOUISIANA

The mission of the RESTORE Act Center of Excellence for Louisiana (Center) is to provide research directly relevant to implementation of Louisiana's Coastal Master Plan by administering a competitive grants program and providing the appropriate coordination and oversight support to ensure that success metrics are tracked and achieved. The Center is a separate program within The Water Institute of the Gulf, which is a not-for-profit, independent research institute dedicated to advancing the understanding of coastal, deltaic, river, and water resource systems, both within the Gulf Coast and around the world. For more information about the RESTORE Act Center of Excellence for Louisiana, visit LA-COE.org.

SUGGESTED CITATION

RESTORE Act Center of Excellence for Louisiana (2016). Research Strategy. RESTORE Act Center of Excellence for Louisiana. Baton Rouge, LA.

Preface

This document is a core component of the Center. It guides the competitive research that the Center supports and is focused on issues pertinent to coastal Louisiana with emphasis on advancing Louisiana's Coastal Master Plan. This document identifies key topical near-term (less than two years) and mid-term (two to five years) research needs, including articulation of the scientific and technical problems underlying these needs, potential outcomes, and multi-disciplinary opportunities. The Research Strategy will be revised during the second year of Center operations (November 1, 2016 – October 31, 2017) to include long-term (more than five years) research needs.

This document identifies near-term and mid-term research needed to support the implementation of the Coastal Master Plan, regardless of the source of funds. Thus, as well as providing clear guidance on the use of Center research funds, this document is also useful for other programs that seek to support research that furthers sustainable and resilient natural and human communities in coastal Louisiana.

Table of Contents

About the RESTORE Act Center of Excellence for Louisiana i
Preface ii
Table of Contents iii
Acknowledgements iv
Executive Summary 1
Introduction 2
Topic 1: Riverine Hydrology and Hydrodynamics 4
Rationale 4
Research Needs 4
Outcomes 4
Topic 2: Coastal and Estuarine Ecology 5
Rationale 5
Research Needs 5
Nutrients, Vegetation and Soil 5
Terrestrial and Aquatic Fauna 6
Outcomes 6
Topic 3: Geotechnical and Structural Engineering 7
Rationale 7
Research Needs 7
Outcomes 8
Topic 4: Deltaic Geology, Delta Building and Subsidence 9
Rationale 9
Research Needs 9
Outcomes 9
Topic 5: Coastal and Estuarine Hydrology, Geomorphology, and Sediment Dynamics 10
Rationale 10
Research Needs 10
Outcomes 11
Topic 6: Physical climatic processes 12
Rationale 12
Research Needs 12
Outcomes 12
Topic 7: Socioeconomics 13
Rationale 13
Research Needs 13
Outcomes 14
Topic 8: Regulatory Policy Issues 15
Rationale 15
Research Needs 15
Outcomes 15

Acknowledgements

Researchers from Louisiana academic institutions who participated in the development of this document as Technical Working Group members include Mark Davis, Allyse Ferrara, Ioannis Georgiou, Kevin Gotham, Scott Hagen, Malay Ghose Hajra, Mark Hester, Brian Roberts, Torbjorn Tornqvist, Jay Wang, and Clint Willson. Research Strategy Contributing Experts provided support to Technical Working Group Members, and participants of the Coastal Research Priorities Town Hall, co-hosted with Louisiana Sea Grant on October 3, 2016, provided input. Angelina Freeman, James Pahl, Richard Raynie, Syed Khalil, Mark Leadon, Ed Haywood, Zachary Rosen, Brian Vosburg, Leigh Anne Sharp, David Lindquist, Elizabeth Davoli, Roy Bergeron, David Peterson, Melanie Saucier, and Mandy Green of the Coastal Protection and Restoration Authority (CPRA) provided guidance and assistance with identifying research needs. Team members of The Water Institute of the Gulf also offered support during the development of this document.

Executive Summary

The Water Institute of the Gulf (the Institute) was selected by the Coastal Protection and Restoration Authority (CPRA) to serve as the State's RESTORE Act Center of Excellence (the Center). On November 1, 2015, the U.S. Department of the Treasury awarded CPRA a grant to begin its research program. This followed submission of a proposal to CPRA that introduced a phased approach to systematically (1) develop and implement the Center of Excellence program, (2) administer a competitive grants program that rewards the best and most relevant research proposals, and (3) provide the appropriate coordination and oversight to ensure success metrics are tracked and achieved. The proposal was developed in collaboration with academic partners in Louisiana.

The mission of the Center is to support research directly relevant to implementation of Louisiana's Coastal Master Plan. Developed by CPRA with input from citizens, legislators, parish representatives and stakeholder groups and using the best available science and engineering, the Coastal Master Plan focuses state efforts and guides actions needed to sustain Louisiana's coastal ecosystems, safeguard coastal populations, and protect vital economic and cultural resources.

As a guiding document for the competitive research that the Center supports, the Research Strategy focuses on issues pertinent to coastal Louisiana with emphasis on advancing Louisiana's Coastal Master Plan. Near-term (less than two years) and mid-term (two to five years) research needs were identified in coordination with CPRA, a Technical Working Group comprised of researchers from Louisiana academic institutions, Research Strategy Contributing Experts, a Coastal Research Priorities Town Hall meeting held in conjunction with Louisiana Sea Grant, and the public.

The Research Strategy outlines research, modeling, and monitoring needs for informing Louisiana's Coastal Master Plan. Information is presented on near-term and mid-term research needs including articulation of the scientific and technical problems underlying these needs, potential outcomes, and cross-disciplinary opportunities.

Research needs were categorized into eight topical areas:

1. Riverine hydrology, including geomorphology and sediment dynamics
2. Coastal and estuarine ecology, including fish, shellfish, wildlife, vegetation and nutrient dynamics
3. Geotechnical and structural engineering
4. Deltaic geology, including delta building and subsidence
5. Coastal and estuarine hydrology, geomorphology and sediment dynamics, including coastal wetland soil dynamics, and barrier beach and shoreline processes
6. Physical climatic processes, including climate change and tropical cyclone surge, and wave dynamics
7. Socioeconomics, including environmental sociology, rural and urban planning, cultural anthropology, hazards geography, risk assessment, community resilience, and coastal industrial and resource economics
8. Regulatory policy issues

In its entirety, this document provides guidance on the use of Center research funds and identifies critical research needs to further sustainable and resilient natural and human communities in coastal Louisiana by supporting implementation of Louisiana's Coastal Master Plan.

Introduction

On July 6, 2012, President Barack Obama signed into effect the Resources and Ecosystem Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act. The Act established the Gulf Coast Restoration Trust Fund in the U.S. Department of Treasury and directed 80% of the civil penalties paid after July 6, 2012, under the Federal Water Pollution Control Act in connection with the Deepwater Horizon oil spill, to be deposited into the Trust Fund and invested. As part of this Act, 2.5% of funds will be dedicated to the establishment of Centers of Excellence in each of the five Gulf Coast States, with each State receiving approximately $26.6 million through 2031.

On January 6, 2014, the Water Institute of the Gulf (the Institute), in collaboration with academic partners from Louisiana, submitted a proposal to the Coastal Protection and Restoration Authority (CPRA) that introduced a phased approach to systematically (1) develop and implement the Center of Excellence program, (2) administer a competitive grants program that rewards the best and most relevant research proposals, and (3) provide the appropriate coordination and oversight to ensure success metrics are tracked and achieved. On November 1, 2015, the U.S. Department of the Treasury awarded CPRA a grant to begin its research program. The Institute was selected by CPRA to serve as the State's RESTORE Act Center of Excellence (the Center).

Following a mandate by the U.S. Department of Treasury requiring that Centers of Excellence must focus efforts on a selected set of disciplines, the Center focuses on the following:

- Coastal and deltaic sustainability, restoration and protection, including solutions and technology that allow citizens to live in a safe and sustainable manner in a coastal delta in the Gulf Coast Region
- Coastal fisheries and wildlife ecosystem research and monitoring in the Gulf Coast Region
- Sustainable and resilient growth, economic and commercial development in the Gulf Coast Region
- Comprehensive observation, monitoring, and mapping of the Gulf of Mexico

Working within these disciplines, the mission of the Center is to support research directly relevant to implementation of Louisiana's Coastal Master Plan. The Coastal Master Plan, which was developed by CPRA with input from citizens, legislators, parish representatives, and stakeholder groups using the best available science and engineering, focuses state efforts and guides actions needed to sustain Louisiana's coastal ecosystems, safeguard coastal populations, and protect vital economic and cultural resources. The Coastal Master Plan is updated every five years, providing an opportunity for new knowledge and understanding to be incorporated. In addition, ongoing project implementation, operation, and maintenance utilize the most up to date thinking about system dynamics and project interactions within the complex natural and human landscape. Thus, many opportunities exist for research to support project implementation, and the Center is one vehicle through which research is targeted towards supporting implementation of the Coastal Master Plan.

This document guides the competitive research that the Center supports and includes research needs focused on issues pertinent to coastal Louisiana with emphasis on advancing Louisiana's Coastal Master Plan. The Research Strategy has two overarching objectives:

1. Identify research topics and needs with potential to develop knowledge and research outputs directly applicable to implementation of the Coastal Master Plan
2. Characterize research needs that inform the planning, design, construction, and post-construction assessment of restoration and protection projects by CPRA

The following guiding principles serve to address and fulfill the objectives:

1. Knowledge and understanding developed will be used in the regular updates of the Coastal Master Plan
2. Research findings will be used to increase efficiency, enhance reliability, and reduce uncertainty associated with Coastal Master Plan implementation
3. Research needs addressed now will improve long term outcomes as the Coastal Master Plan will continue to be implemented for decades
4. The research community's broad appreciation of coastal system dynamics, including natural, restoration and protection response, and social and economic aspects, will be leveraged to support the Coastal Master Plan

Research needs were identified in coordination with CPRA, a Technical Working Group comprised of researchers from Louisiana academic institutions, Research Strategy Contributing Experts, a Coastal Research Priorities Town Hall meeting held in conjunction with Louisiana Sea Grant, and the public. This Strategy includes both near-term (less than two years) and mid-term (two to five years) research needs grouped by topical area, with the specific duration of the research being dependent on the activities proposed to meet the need. For each topic, the scientific and technical problems underlying these needs are outlined, research needs are identified, including some that address multiple topical areas, and some potential outcomes (e.g. measurable impacts or results) are briefly summarized.

Neither the topical areas nor the research needs listed under each topical area are prioritized; grouping by topical area is for organizational purposes only. The Center and those who supported the development of the research needs recognize that some of the most relevant research on coastal sustainability issues are cross-disciplinary in nature. Thus, the needs identified here should not only be considered as individual needs; rather, researchers can use these needs to develop research proposals that are focused on informing Louisiana's Coastal Master Plan by addressing one or more of the areas identified. Some cross-referencing by topic area is provided to indicate overlap or linkage among research needs in different topical areas. These are illustrative only and researchers will undoubtedly identify other areas of overlap and synergy as they prepare proposals. Similarly, many research needs listed here include a number of concepts that can be addressed individually or collectively. Their listing together within a research need does not necessarily imply that a single research project needs to address every aspect of the issues identified. Concepts are grouped for efficiency of presentation and to aid researchers with identifying the many aspects of some issues relevant to the Coastal Master Plan.

Topic 1: Riverine Hydrology and Hydrodynamics[1]

RATIONALE

The Coastal Master Plan recognizes that the use of riverine resources, including freshwater and sediments, is crucial to achieve a sustainable coastal ecosystem. While knowledge of riverine resources has increased markedly in recent years, details surrounding specific ways of using rivers, including the Mississippi River, through sediment diversions, require additional research. The long-term future of rivers as resources, as impacted by climate change, needs exploration to support Coastal Master Plan implementation.

RESEARCH NEEDS

- Investigate impacts of relative sea level rise on riverine hydraulics and sediment transport and deposition (Also see Topic 6)

- Improve understanding of cycling of sediments between riverine, estuarine and shelf systems, and forecasting models of sediment supply from the State's rivers to the coastal zone

- Identify and evaluate innovative/engineering methods of sediment delivery, capture and transport via rivers to bay/wetland systems, including improved understanding of sediment capture by existing man-made diversions and flooding control structures (Also see Topic 3)

- Develop improved parameters and coefficients for influence of vegetation on flow velocities and sediment transport for river diversions (Also see Topic 2)

OUTCOMES

Outcomes may include: improved understanding of riverine hydraulics and resulting boundary conditions into sediment diversions and future hydrographs of river flow; improved understanding of sediment dynamics, including spatial and temporal sediment availability and composition, and methods for determining sediment capture; and improved predictions of sediment diversions, wetland building potential, and the fate of diverted sediments.

[1] including geomorphology and sediment dynamics

Topic 2: Coastal and Estuarine Ecology[2]

RATIONALE

Sustaining coastal habitats to support recreational and commercial activities as well as storm protection are objectives of the Coastal Master Plan. While broad-scale planning tools have been recently improved, interactions among species and their response to changing coastal conditions is still somewhat uncertain. Research is needed on primary producers and the factors that influence them, the wetland soils that underlie the basic land-water structure of much of the coast, and the trophic interactions and other environmental factors that influence restoration outcomes for fish and wildlife.

RESEARCH NEEDS

Nutrients, Vegetation and Soil

- Improve understanding of effects of water quality, anthropogenic and restoration activities, and natural processes on coastal primary producers, including: individual responses and linkages between emergent marsh, submerged aquatic vegetation, coastal forests and woody plant communities, phytoplankton and benthic microalgae, and linkages between emergent and submerged communities

- Develop nutrient-vegetation empirical relationships to identify controlling biogeochemical processes and plant species response for use in models

- Improve understanding of the feedbacks between plant dynamics and the environment on nutrient retention, cycling and export from coastal ecosystems, including relative distribution of different ecosystem types and sub-habitats

- Improve quantification of nutrient budgets, and models that represent them both within and across different ecosystems and along salinity gradients, by tracking transformation and assimilation pathways for nutrients within receiving basins, including water, primary productivity, soils, and upper trophic levels, under a range of potential flow conditions and restoration scenarios

- Compare existing methodologies for in-situ characterization of the shear strength of coastal marsh soils, evaluate preferred instrumentation and/or methodology across habitat types, and assess relationships between shear strength and below-ground biomass

- Assess and refine wetland type definitions in coastal Louisiana using data available from the Coastwide Reference Monitoring System (CRMS) including relationships between wetland type and environmental drivers such as salinity

- Identify and test improved methods for estimating vertical accretion in coastal Louisiana to increase efficiency and reliability of routine measurements of wetland soil accretion

---

[2] including fish, shellfish, wildlife, vegetation and nutrient dynamics

- Improve predictions of emergent wetland vertical accretion (both mineral and organic), soil strength, elevation change and plant diversity under restoration and non-restoration scenarios for all wetland types, including in-situ production and retention of organic material, carbon sequestration, and elevation feedbacks

Terrestrial and Aquatic Fauna

- Investigate the effects of altered hydrologic conditions on food webs, including carbon and nutrient flow through the food web, effects on important prey assemblages (i.e. epifaunal and infaunal invertebrates and planktonic organisms that are prey for estuarine nekton), and how altered trophic dynamics may influence productivity of fishery species and upper trophic levels (including important wildlife species) (Also see Topic 5)

- Improve quantification and modeling capabilities of the ability of restoration activities to create habitat and influence coastal wildlife and fish and shellfish populations, including how diversions, outfall management and other restoration activities can be managed for wetland and wildlife benefits

- Investigate the impacts of restoration activities on the availability and quality of avian habitats and identify locations where avian habitats can be improved with woody plantings

- Improve understanding of the natural histories and habitat utilization of coastal and estuarine species of concern, potential effects of restoration projects on reproduction, recruitment and populations dynamics of these species, and investigate effects of habitat changes, climate fluctuations and restoration activities on movement, migration and estuarine connectivity for animals utilizing coastal habitats, including movement of fishery species such as larger estuarine nekton (red drum, spotted sea trout, dolphins, etc.) (Also see Topic 6)

- Investigate methods to expedite oyster spat colonization and maintain sustainability of natural and bioengineered reefs

OUTCOMES

Outcomes may include: simulations of plant responses to the effects of nutrient loading rates; identification of how salt marsh planting success and restoration project sustainability can be enhanced; an understanding of how restoration actions affect life history dynamics for wildlife and fish/shellfish; framework to guide restoration implementation minimizing disruption to estuarine flora and fauna; and improved consideration of wetland soil processes in predictive models.

Topic 3: Geotechnical and Structural Engineering

RATIONALE

Understanding the behavior of the materials used to construct coastal protection and restoration projects is essential to predicting their performance under different environmental conditions, and planning of operations and maintenance activities. In addition, projects often involve the placement of engineered structures within natural environments where understanding the interaction between the structure and the surrounding environment is crucial to successful implementation.

RESEARCH NEEDS

- Conduct combined geotechnical and morphodynamic studies of the interdependence between hard infrastructure (i.e. levees, breakwaters) and nature-based infrastructure (e.g., oyster reefs, wetlands) including the protective role of intertidal coastal wetland vegetation on levees, and its capacity to resist erosion (Also see Topic 2 and Topic 6)

- Reduce uncertainty for project engineering and design, implementation and sustainability of both hard and nature-based infrastructure, and develop robust methodology for design, implementation and monitoring (Also see Topic 2)

- Assess impact of levee mass, material and construction method on structural integrity, compaction, physical stability, and maintenance requirements

- Develop improvements for effective ground-based and/or remote techniques for levee monitoring

- Develop standardized geotechnical laboratory and field testing procedures beyond existing capabilities for hydraulically-dredged slurry for wetland creation/restoration projects

- Assess the resilience of engineered flood defense systems under hurricane-induced waves and currents and develop innovative methods for protecting coastal infrastructure, including flood defense systems, from impacts such as wave-induced erosion (Also see Topics 2, 5 and 6)

- Conduct laboratory evaluation and computational assessments using emerging innovative non-rock shoreline protection technologies such as suppression and sediment collection system, pile-supported wave screen system, wave attenuation devices, buoyancy compensated erosion control modular system, and geotextile tubes to inform potential for adoption in practice

- Investigate technology for foundation soil improvement, and develop guidelines for structure designs to reduce uncertainty by considering soil-structure-current (wave) interactions in restoration and protection projects including braced flood protection structures (i.e. vertical walls)

- Evaluate effects of restoration actions, such as diversions, on soil deformation under sediment loading

- Assess the performance of lightweight aggregate subjected to long-term seawater exposure as deployed for coastal restoration

OUTCOMES

Outcomes may include: guidelines for selecting the best technology for specific coastal applications to accumulate sediments and create new land; a better understanding of wetland soil and vegetation interactions and their combined ability to provide protection to coastal infrastructure including levees; information to support development of efficient and cost-effective foundation-improvement methods; new methods for detection and mitigation that also involve structural engineering considerations as well as novel sensing solutions; and a set of local calibration factors for very soft to soft soil conditions that can be used with greater confidence to predict the performance of braced floodwalls under hurricane storm surges and improved design procedures for floodwalls.

Topic 4: Deltaic Geology, Delta Building and Subsidence

RATIONALE

Implementing the array of protection and restoration projects identified in the Coastal Master Plan in the context of the delta-chenier geologic system presents specific challenges. Few other major protection and restoration programs provide a precedent from which to learn. Integrating the longer-term geologic dynamics with the need for action to address near-term and mid-term needs presents a challenge for project planners and engineers. Targeted research in this area can help reduce uncertainty and/or quantify appropriate bounds of geologic dynamics for project implementation.

RESEARCH NEEDS

- Evaluate, qualitatively and quantitatively, temporal patterns of subsidence, geological stability and natural- and human-induced compaction, including direct measurements of subsidence on barrier islands/headlands and deep subsidence associated with fluid extraction, faulting, sediment loading and glacial isostatic adjustment (Also see Topic 3)

- Improve identification of faults and other geological features (e.g. slump blocks), including location, direction, and magnitude of movement, and estimations of geological stability

- Enhance and extend capabilities in coastal morphodynamic modeling for extrapolating short-term field measurements to decadal predictions of coastal change

- Investigate novel methods to enhance sediment retention and maximize the process of land building

- Improve predictions of coastal processes (e.g. interior ponding, subsidence, sand shoreline dynamics, and shore edge erosion of the marsh platform) under normal and storm conditions (Also see Topic 2)

- Compare model predictions of deltaic development (e.g. lobe and splay development) with existing data and knowledge to reduce uncertainty in predictions of delta and crevasse splay growth and decay

OUTCOMES

Outcomes may include: information on spatial patterns of subsidence, deep subsidence and compaction rates throughout coastal Louisiana; better constraints on the coupling between subsidence and land loss to inform restoration planning; predictions of wetland creation rates as a function of location/environmental setting, such as grain size and presence/absence of vegetation.

Topic 5: Coastal and Estuarine Hydrology, Geomorphology, and Sediment Dynamics[3]

RATIONALE

The barrier shorelines and wetlands of coastal Louisiana are the foundation on which the productive ecosystem is based. Research in this area has been built upon in the development of the Coastal Master Plan. Understanding the nature of the sedimentary resources available and implications of their use for Coastal Master Plan implementation presents an ongoing challenge for researchers. In addition, focusing on the details of wetland loss processes from a geomorphic perspective, as well as larger-scale coastal dynamics, can provide important insight for both project planning and implementation.

RESEARCH NEEDS

- Investigate potential effects of restoration activities on Louisiana estuarine, beach, shoreface and continental shelf ecosystems, including the influence of various offshore borrow sources on aquatic habitats

- Analyze the use of hard structures (seawall, breakwaters, terminal groins, etc.) as barrier island/shoreline protection measures (Also see Topic 3)

- Investigate and monitor created marsh platform settlement, compaction, consolidation, erosion, and induced subsidence, and assess relationships to marsh hydrology, salinity and soil saturation (Also see Topics 3 and 4)

- Utilize a systems approach to investigate the relationship and interdependence and transitions among internal marshes/wetlands, back bays, passes/inlets, barrier island-geomorphology, and tidal prism for incorporation into models

- Investigate surface and subsurface coastal flow regimes from the coast to inland areas, and from the river to the coast to improve predictions of fresh/salt balance across the coast

- Investigate the interaction between hydrologic and coastal hydraulic processes (Also see Topic 6)

- Investigate optimal use of sediment resources (including sediment from maintenance dredging and confined disposal facilities) for marsh platform creation, barrier island restoration, and other restoration projects (Also see Topic 4)

- Investigate the impact of relative sea level rise on various sediment deposits (nearshore and offshore) (Also see Topic 6)

- Improve models of wetland morphological change to reflect the spatial variation in sediment accumulation deposited by hurricanes/storms of different categories/strengths

- Develop improved techniques and approaches for coastal engineering design and assessment of barrier island and barrier shoreline restoration projects including wave-induced sediment

---

[3] including coastal wetland soil dynamics and barrier beach and shoreline processes

transport and morphologic change, sediment retention and sustainability, and impacts of projects on coastal and estuarine systems (also see Topics 3 and 6).

- Develop and apply efficient techniques to collect high fidelity elevation data throughout coastal wetlands to enable ground-truthing of LiDAR data (Also see Topics 1, 2, 4 and 6)

OUTCOMES

Outcomes may include: quantitative and semi-quantitative relationships to assess barrier island/shoreline response to restoration, or determination of sand deficits; quantified effect of backbarrier marsh loss on barrier island sustainability; simulation tools for shoreline evolution along inlet-barrier systems; spatial distribution of marsh erosion/accretion/compaction patterns; quantitative and semi-quantitative relationships that can be used in modeling wetland evolution; a better understanding of fluxes of sediment at eroding wetland boundaries; better modeling tools to simulate future sedimentation potential; analysis of the economic and ecological tradeoffs associated with rock shoreline protection measures for coastal Louisiana; high-resolution maps of land area change and better metrics/statistics for coastline change; forecasting tools that establish the relative contribution of mechanisms that drive coastal change including storms.

Topic 6: Physical climatic processes[4]

RATIONALE

The Coastal Master Plan recognizes the importance of both future climate change and episodic forcing, such as storms and droughts, in shaping the future of the coast and the success of protection and restoration projects. Research focused specifically on the needs of the Coastal Master Plan can improve outcomes for both the protection and restoration components of the program.

RESEARCH NEEDS

- Develop techniques to improve meteorological forcings on coastal systems models (e.g. wind speed and direction, precipitation)
- Investigate the effects of changing air temperature, including the direction and intensity of winter temperature extremes, on coastal flora and fauna
- Evaluate effects of different assumptions about coastal storm character and frequency on assessments of future coastal flooding
- Improve modeling of storm effects (winter and tropical) and waves, and interdependence between the two, on restoration projects
- Understand variability in wave dynamics including wave regeneration, inlet bathymetry, the role of structures, nearshore salinity, and sediment transport during normal and storm conditions to improve predictive models (Also see Topic 5)
- Improve storm surge models by coupling hydrologic and coastal hydraulic flooding processes (Also see Topic 5)
- Develop efficient approaches to integrated/coupled systems modeling to capture storm-related changes, such as predicting failure of engineered structures (e.g. levees) (Also see Topic 3)

OUTCOMES

Outcomes may include: improved capability or predictive models for physical climatic processes; increased understanding of the effects of climate change on restoration outcomes for flora and fauna; a better understanding of coastal storms and their effects on the coastal landscape; and refined storm surge analyses to inform project planning and design.

[4] including climate change and tropical cyclone surge and wave dynamics

Topic 7: Socioeconomics[5]

RATIONALE

The Coastal Master Plan has increased its focus on communities and resiliency while sustaining the coastal ecosystem. The dramatic changes that have occurred across the coast of Louisiana in the last century, as well as the annual threat of storm surge flooding, make considering effects of the Coastal Master Plan in the next 50 years even more challenging. As well as an objective concerned with protection from storm surge flooding, the Coastal Master Plan addresses sustaining cultural heritage and supporting the working coast. Targeted research that increases understanding of recent and potential future change in social and economic conditions across the coast will be important for achieving these objectives.

RESEARCH NEEDS

- Explore and evaluate ecosystem services and associated values of coastal habitats in areas experiencing ongoing or predicted habitat shifts and coastal protection and restoration activities (Also see Topic 2)

- Investigate effective approaches to integrate socio-ecological systems (i.e. human-natural systems) and coastal community resilience to improve coupling of the planning and implementation of coastal protection and restoration projects (Also see Topic 3)

- Investigate sociological views of restoration (i.e., societal expectation, views, perceptions, and attitudes), and effects of educational tools on attitudes and expectations, and develop best practices to improve community interaction with Master Plan activities

- Develop applied social science research and/or develop tools that enable consideration of social indicators of recovery, risk perception, social capital, and socio-economic vulnerability in decision making

- Document endangered cultures and peoples of Louisiana to ensure incorporation of vulnerable communities and locations into Coastal Master Plan analysis, modeling and project selection

- Investigate methods to coordinate, integrate and encourage coastal parish future land use planning efforts that are consistent with the Coastal Master Plan and account for future flood risks

- Evaluate success of existing efforts to develop and integrate non-structural methods of hazard mitigation into protection planning and best practices for implementation and gauging program success (Also see Topic 3)

- Assess how various state-wide/federal efforts approach pre/post disaster redevelopment and hazard mitigation planning and how their efforts could be applied to Louisiana

---

[5] including environmental sociology, rural and urban planning, cultural anthropology, hazards geography, and coastal industrial and resource economics

- Investigate new models for coastal or hazard mitigation zoning codes, or other flood ordinances that include hazard mitigation or flood risk reduction elements to protect current and future community development and recovery

- Investigate best practices and adaptation strategies for at-risk communities to climate-related coastal hazards, incorporating traditional ecological knowledge (Also see Topic 8)

- Expand documentation of repetitive losses and analyze data to support hazard mitigation planning

- Investigate and develop innovative and equitable resettlement and relocation policy approaches that increase options for affected households, reduce risk and build more resilient communities

- Develop easy-to-use approaches to readily incorporate sea level rise and subsidence projections into parish and local comprehensive and hazard mitigation plans (See Topic 6)

OUTCOMES

Outcomes may include: increased understanding on the relationship between the parish planning elements of disaster management, resilience, environmental planning and economic development; best practices of planning integration at the parish level; identification of innovative and equitable policies that reduce risk and build more resilient communities; aid state and local governments in identifying mitigation projects; evaluation of various natural, social, and economic predictive factors that affect coastal community resilience; improved understanding of the linkages and feedbacks between the natural and human components to evaluate long-term coastal resilience.

Topic 8: Regulatory Policy Issues

RATIONALE

Project implementation in coastal Louisiana must be conducted in the larger context of national regulations while also working with the concerns and desires of local governments and citizens. Understanding the limitations and opportunities presented by this larger policy context is important to expedite implementation, anticipate potential issues early, and work as appropriate to develop solutions that enable implementation to proceed.

RESEARCH NEEDS

- Investigate legislative/policy changes that would improve the state's ability to implement projects by reducing delays or eliminating unnecessary requirements

- Evaluate alternatives to Corps of Engineers New Orleans District standard operating procedures regarding Federal Standard and maintenance dredging to maximize the beneficial use of dredged material

- Investigate statewide standards and best practices for parish comprehensive plans that recommend all future development consider climate change impacts, and are consistent with the Coastal Master Plan (Also see Topic 6)

- Investigate policy adjustments to floodplain and zoning requirements that could better enable adaptation by coastal citizens to geophysical changes, including policies on redevelopment in highly flood prone or vulnerable areas after a storm event (Also see Topics 6 and 7)

- Conduct an assessment of comprehensive plan and/or hazard mitigation plan implementation effectiveness to better determine on-the-ground impacts and implementation challenges and investigate best practices for integrating hazard mitigation plans with other planning processes including the Master Plan

- Investigate the interaction between community insurability/financeability and coastal change and restoration

OUTCOMES

Outcomes can include: more robust integration between the Coastal Master Plan and parish and local plans; and identification of opportunities to use incentives to encourage parish and local governments to bring their plans and actions in line with the Master Plan.

301 NORTH MAIN STREET, SUITE 2000
BATON ROUGE, LA 70825

(225) 448-2813
WWW.LA-COE.ORG