



RESEARCH NEEDS

RESTORE Act Center of Excellence for Louisiana

*Version 3.0
October 2026*



ABOUT THE LOUISIANA CENTER OF EXCELLENCE

The mission of the Louisiana Center of Excellence (LA-COE) is to support 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. LA-COE is a separate program within The Water Institute, 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.

ABOUT THE WATER INSTITUTE

The Water Institute is an independent, non-profit, applied research institution advancing science and developing integrated methods to solve complex environmental and societal challenges. We believe in and strive for more resilient and equitable communities, sustainable environments, and thriving economies. For more information, visit www.thewaterinstitute.org.

SUGGESTED CITATION

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EXECUTIVE SUMMARY

The Water Institute (the Institute) was selected by the State of Louisiana's Coastal Protection and Restoration Authority (CPRA) to serve as the State's RESTORE Act Center of Excellence (LA-COE). 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 from the Institute 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 most sound and 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 LA-COE 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 the document of priority research needs to inform competitive research that the LA-COE supports, this Research Needs document focuses on issues pertinent to coastal Louisiana with emphasis on advancing Louisiana's 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 Research Needs document broadly outlines research, modeling, and monitoring needs for informing Louisiana's Coastal Master Plan. Information is provided on the rationale or the articulation of the scientific and technical problems underlying these research needs, and the potential outcomes to directly support the Coastal Master Plan. This document is also intended to be a primary source for crafting future "Request for Proposals (RFP)" for the LA-COE. The document includes a list of research needs under various categories. These needs were identified primarily by scientists, engineers, and planners from CPRA with contributions from scientists and engineers at the Institute. Additional input was solicited from academic institutions. The document provides a broad framework to guide future RFPs to draw from in a manner that would address cross-disciplinary and applied research questions. Future RFPs will emphasize and outline specific applied research questions and the related needs that must be addressed to meet CPRA's planning, design, and project implementation needs. These needs are often cross-cutting through the various disciplines and topical areas as outlined in the document. These research questions will be prioritized then organized around themes that would ultimately define the overall emphasis of any given RFP. It is noteworthy that the list of topics outlined below should not be considered an exhaustive list of important research needs. The research needs herein are topics of high priority to CPRA and are currently underfunded. There are other important topics not included in this strategy as they are currently being addressed by other sources of national research funding such as National Science Foundation,



National Oceanic and Atmospheric Administration, National Academy of Sciences, or regional sources such as Louisiana Sea Grant, etc.

Research needs (in no particular order) are categorized into five topical areas:

- Topic 1: Coastal Water Quality and Nutrient Cycling
- Topic 2: Estuarine and Coastal Ecology
- Topic 3: Geotechnical and Coastal Engineering
- Topic 4: Deltaic Geology, Subsidence, and Barrier Island Dynamics
- Topic 5: Human Dimensions

In its entirety, this document provides guidance on the use of LA-COE research funds and identifies important research needs to further sustain natural and human communities in coastal Louisiana by supporting implementation of [Louisiana's Coastal Master Plan](#). These research needs will be given priority under LA-COE funding opportunities. For some RFPs, the LA-COE will also consider funding research proposal activities that are not explicitly described in this document but still align with the research needs topics listed above.



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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 the 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. Collectively, these Centers of Excellence are known as the Centers of Excellence Research Grant Program and they coordinate to leverage resources and minimize or avoid duplication. Each Center of Excellence works closely with a state entity to administer a competitive grants program and to ensure that research results are aligned with eligible disciplines and support effective policy and ecosystem management.

On January 6, 2014, the Water Institute (the Institute), in collaboration with academic partners from Louisiana, submitted a proposal to the State of Louisiana's 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 (LA-COE).

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

1. 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
2. Coastal fisheries and wildlife ecosystem research and monitoring in the Gulf Coast Region
3. Offshore energy development, including research and technology to improve the sustainable and safe development of energy resources in the Gulf
4. Sustainable and resilient growth, economic and commercial development in the Gulf Coast Region
5. Comprehensive observation, monitoring, and mapping of the Gulf

Working within these disciplines, the mission of the LA-COE 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 topics included in this Research Needs document are related to the objectives of the 2023 Coastal Master Plan and are closely aligned with the Treasury-mandated disciplines (Table 1). While the Coastal Master Plan supports Louisiana and the people who live and work on the coast, discipline #3 does not directly relate to the implementation of the Coastal Master Plan, therefore the LA-COE does not focus on #3.

The Coastal Master Plan is regularly updated, providing an opportunity for new knowledge and understanding to be incorporated. In addition, ongoing project implementation, operation, and maintenance use 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 LA-COE is one vehicle through which research is targeted towards supporting implementation of the Coastal Master Plan.

This Research Needs document serves as a revision from Version 2.0. Topics from the version 2.0 have been refined and reduced to more strategically guide the competitive research that the LA-COE supports, which includes research needs focused on issues pertinent to coastal Louisiana with emphasis on advancing Louisiana’s Coastal Master Plan. This Research Needs document is intended to identify research topics and needs with potential to develop knowledge and research outputs directly applicable to implementation of the Coastal Master Plan.



Table 1. Comparison of the 2023 Coastal Master Plan objectives with the Research Needs (RN) topics and their alignment to the U.S. Department of the Treasury's eligible disciplines.

		Objectives of the 2023 Coastal Master Plan				
		Flood Protection RN Topic 3, 4	Natural Processes RN Topic 1, 2, 3, 4	Coastal Habitats RN Topic 1, 2, 3, 4	Cultural Heritage RN Topic 5	Working Coast RN Topic 2, 3, 5
Eligible Disciplines of the U.S. Department of the Treasury	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	X	X	X	X	X
	Coastal fisheries and wildlife ecosystem research and monitoring in the Gulf Coast Region		X	X		X
	Sustainable and resilient growth economic and commercial development in the Gulf Coast Region	X			X	X
	Comprehensive observation, monitoring, and mapping of the Gulf	X	X	X	X	X

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

- Knowledge and understanding developed will be used in the regular updates of the Coastal Master Plan
- Research findings will be used to increase efficiency, enhance reliability, and reduce uncertainty associated with Coastal Master Plan implementation
- Research needs addressed now will improve long-term outcomes as the Coastal Master Plan will continue to be implemented for decades
- The research community's broad appreciation of coastal system dynamics, including natural, restoration and protection responses, and social and economic aspects, will be leveraged to support the Coastal Master Plan
- All data will be publicly available through repositories and coordinated with existing groups such as the Gulf Monitoring Community of Practice

Initial 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 resulting Research Strategy (V1) was used to guide the inaugural Request for Proposals (RFP). This third version of the Research Needs document updates the research needs identified in the Research Strategy (V1) and subsequent Research Needs (V2) document, accounting for research completed from the previous three LA-COE funding cycles (Henkel et al. 2026) and the results of an internal CPRA effort to synthesize recent research and identify subsequent knowledge gaps (Coastal Protection and Restoration Authority, 2025). Each of the topics herein include the rationale underlying the needs, identify research needs, and identify potential outcomes or tangible management implications in support of the Coastal Master Plan. The list of research needs is not intended to be an exhaustive list. There are important needs not included here because they are being addressed by other funding sources (e.g., federal, state, or other). The lists provided herein are not merely examples; the items were identified jointly by the technical staff and researchers at CPRA and the Institute.

Research awards from the RFP1, RFP2, and RFP3 competitions have been issued. Both project summaries and awardee information can be found at LA-COE.org. Future RFPs will extract from the broad list of research needs herein depending on the specific needs of CPRA at the time of releasing each individual RFP. The sequence and interdependencies of the topics and research needs as well as the available funds will be considered by LA-COE and CPRA to guide future RFPs and research awards. Future RFPs may only consider a few of the research topics or needs in any particular RFP that will target knowledge gaps and priorities set forth by CPRA and a strategic approach will be described for that funding cycle. The exact timing of future RFPs is unknown. Future RFPs will follow the processes, including the independent review processes, as detailed in the [Standard Operating Procedure](#) (Version 4) (LA-COE, 2023), available at LA-COE.org.



TOPIC 1: COASTAL WATER QUALITY AND NUTRIENT CYCLING

RATIONALE

Water quality and nutrient cycling are fundamental drivers of the health, productivity, and resilience of Louisiana's coastal ecosystems. The movement and transformation of freshwater, nutrients, and other constituents across watersheds, riverine systems, estuaries, and coastal basins influence habitat conditions, ecological function, and the long-term sustainability of restoration efforts. Understanding how nutrients are transported, transformed, assimilated, and retained across these interconnected systems is critical to predicting ecosystem responses, supporting habitat sustainability, and minimizing unintended consequences such as harmful algal blooms. Improved understanding of these processes is needed to reduce uncertainty, support adaptive management, and inform the planning, design, and implementation of Louisiana's Coastal Master Plan.

RESEARCH NEEDS

- Improve quantification of nutrient sources, sinks, transport pathways, and loading rates across watersheds, the Mississippi River and other riverine systems, and receiving basins at multiple spatial and temporal scales.
- Improve understanding of nutrient transformation, assimilation, and cycling pathways within watersheds and receiving basins, including interactions influencing water quality and the potential for ecosystem changes such as estuarine hypoxia.
- Improve understanding of the environmental factors influencing phytoplankton biomass and community composition and determine factors that lead to the formation of harmful algal blooms (HABs) to facilitate the identification and prediction of these blooms.
- Better quantify and model surface and subsurface water flow from inland to the coastal zone to assess potential impacts of upland removal of freshwater withdrawals and relative sea level rise on riverine and coastal hydrodynamics, saltwater wedge dynamics, and coastal environmental conditions.

OUTCOMES FOR COASTAL MASTER PLAN IMPLEMENTATION

- Improved understanding of nutrient sources, transport, transformation, and cycling across watersheds, riverine systems, estuaries, and coastal basins to support science-based management of water quality and coastal ecosystems.
- Science-based guidance for developing, implementing, and operating restoration projects to mitigate excess nutrient inputs, improve water quality, and reduce the occurrence and impacts of harmful algal blooms.
- A system-wide understanding of surface and subsurface water flow, backed by quantitative modeling and a robust monitoring network, will provide scientific guidance into how the State of



Louisiana can manage freshwater for all its uses, and maintain its critical functionality for coastal ecosystem sustainability and the viability of Coastal Master projects.



TOPIC 2: ESTUARINE AND COASTAL ECOLOGY

RATIONALE

Providing storm protection and sustaining coastal habitats to support recreational and commercial activities are objectives of the Coastal Master Plan. Restoration and protection projects implemented to meet these objectives will have multiple effects on Louisiana's soils, plants, fish, and wildlife.

Understanding the range of effects, as well as how they interact, is important to inform and prioritize actions. Significant drivers of change in ecological resources include relative sea level rise, increasing air and water temperatures, nutrient dynamics, changes related to climate and weather such as rainfall quantity and intensity, and watershed land cover and land use.

RESEARCH NEEDS

Vegetation and Wetland Soil Building

- Increase understanding and quantification of processes affecting marsh surface elevation specifically rates of organic matter accumulation and subsurface soil expansion in relation to sea level rise, droughts, and storms across different wetland types and locations.
- Improve knowledge of feedback processes between inorganic sediment accretion from storm deposition and growth and sustainability of emergent marsh vegetation.

Terrestrial and Aquatic Fauna

- Determine the effects of existing river diversion projects on the abundance, distribution, movement patterns, growth, food web stability, and trophic dynamics of ecologically and economically important freshwater, estuarine, and coastal biota (including all life history stages of phytoplankton, infauna, shellfish, fish, birds, submerged aquatic vegetation, and key wildlife species).
- Determine fish and wildlife use of created or restored marsh, ridge, barrier island, and oyster reef habitat, including assessment of habitat functionality, habitat quality, and equivalency relative to natural reference habitats.
- Develop new approaches to evaluate the potential impacts and benefits of proposed projects to fish and wildlife resources, including species and habitats of regulatory concern,

OUTCOMES FOR COASTAL MASTER PLAN IMPLEMENTATION

- Improved quantification of estuarine and coastal ecosystem change resulting from no action, or with restoration and protection actions to inform the choice of restoration and protection actions that will optimize ecological benefits of restoration in different locations or different ecotypes.
- Increased data on ecological processes and floral and faunal populations to support Coastal Master Plan model development as well as improve existing models via calibration/validation exercises for improving predictions of estuarine and coastal conditions with and without restoration actions, as prioritized through Coastal Master Plan modeling needs.



- Increase understanding of ecological responses to restoration and protection to inform project design to maximize use by key fish and wildlife species.
- Improved ability to assess, avoid, minimize, and mitigate impacts to fish and wildlife resources, including species and habitats of regulatory concern, and to support environmental compliance, permitting, consultation, and post-construction monitoring requirements associated with Coastal Master Plan implementation.



TOPIC 3: GEOTECHNICAL AND COASTAL ENGINEERING

RATIONALE

The geotechnical properties in coastal and deltaic soils are quite complex, and accounting for their strong heterogeneity while implementing and constructing restoration and protection projects remains challenging. A thorough understanding of geotechnical soil properties is required to adequately design and construct flood protection and restoration projects within Louisiana's coastal zone. This understanding, along with other refinements and improvements to project design and construction processes, will increase the efficiency of project implementation and improve the long-term performance of projects.

RESEARCH NEEDS

- Improve long-term settlement modelling, including determining how to properly combine input data, model different dredge slurry starting concentrations, and model slurries that are already in compression and do not experience zone settling.
- Conduct investigations and testing programs on constructed earthen containment dikes to determine their geotechnical parameters and develop design data plots for use in future slope stability analyses.
- Compile and evaluate post-construction Instrumented Settlement Plate data from marsh creation projects to track long-term marsh fill geotechnical properties, improve marsh fill consolidation estimations, and develop best-available science guidance and protocols for the use of Instrumented Settlement Plates.
- Conduct investigations that can provide guidance on the minimum distance required between the dredge pipe outfall location and oil-gas pipelines or containment dikes to prevent impacts to these features, considering different dredge equipment sizes and production rates.
- Develop and evaluate innovative monitoring technologies, remote sensing approaches, and analytical methods to improve measurement of project performance, ecosystem response, and physical system dynamics at multiple spatial and temporal scales.

OUTCOMES FOR COASTAL MASTER PLAN IMPLEMENTATION

- New and/or improved design guidelines for marsh fill and creation projects and use of hard structures for shoreline protection and erosion control.
- New and/or improved techniques for assessing coastal restoration project engineering performance and on-going management of projects.
- Reduced uncertainty in the performance, durability, and long-term effectiveness of marsh creation, shoreline protection, and bank stabilization measures, resulting in improved planning, design, and adaptive management.



TOPIC 4: DELTAIC GEOLOGY, SUBSIDENCE, AND BARRIER ISLAND DYNAMICS

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 challenges. Few other major protection and restoration programs provide a precedent to address the importance of geologic controls on projects, such as those in southern Louisiana. In addition, the barrier shorelines, coastal wetlands, shallow estuaries, and shoreface-inner shelf of Louisiana are the foundation upon which the productive ecosystem is based and are critical to humans that live in coastal Louisiana. Linking the geomorphic evolution of these environments to surface geology and groundwater hydrology, and to sediment dynamics, is key to predicting their future evolution and to evaluating the benefits of projects. Targeted research in this area can help reduce uncertainty and/or quantify appropriate bounds of geologic dynamics on project feasibility, design, implementation, and adaptive management.

RESEARCH NEEDS

- Define the role of fault and salt dome tectonics in causing subsidence on project lifespan timescales. Once subsidence mechanisms are characterized and understood, develop and apply novel predictive subsidence modeling approaches to determine potential impacts to projects.
- Evaluate and incorporate new remote sensing techniques and technologies (e.g., NASA-ISRO Synthetic Aperture Radar (NISAR)) to improve the ability to measure elevation change (including subsidence) in coastal wetlands.
- Calibration and validation of parameters and coefficients for influence of vegetation on flow velocities and river sediment transport and deposition.
- Improved quantification and understanding of the environmental factors and processes causing episodic land loss in the lower river and delta, including how the timing, magnitude, and effects of past events influence continuing land loss.
- Improve coastal systems analysis techniques for monitoring and sediment management of barrier island/barrier shoreline restoration projects and adjacent tidal inlets (e.g., sand retention, sand bypassing, beach re-nourishment).
- Improve predictive capabilities of destructive coastal processes on deltaic-chenier coastal land areas (e.g., sand shoreline dynamics, wetland edge erosion, estuarine and shelf floor deflation), and how these processes operate under normal and storm conditions.

OUTCOMES FOR COASTAL MASTER PLAN IMPLEMENTATION

- Predictive models are updated with the rates and impacts of subsidence in coastal Louisiana, resulting in more accurate simulations of project viability and lifespan.



- Enhanced understanding of deltaic processes, sediment transport, and landscape evolution to improve predictions of coastal change and inform restoration planning, adaptive management, and long-term Coastal Master Plan implementation.
- Improved understanding of barrier island and shoreline sediment dynamics, geomorphic change, and restoration project performance to optimize project design, improve long-term sustainability, and increase the resilience of barrier island restoration projects.
- Project designs are updated to increase project performance and their ability to buffer communities, infrastructure, and ecosystems.
- Coastal Master Plan project prioritization is improved by integrating updated assessments of coastal geology, geomorphology, subsidence, and sediment dynamics, including a sediment inventory and budget.



TOPIC 4: HUMAN DIMENSIONS

RATIONALE

Even with full implementation of the Coastal Master Plan, land loss in some locations will continue, while in other locations land area will be largely maintained. Residents of communities outside the major levee systems may require some form of nonstructural protection and in other cases, adverse future environmental conditions may displace people, infrastructure, and likely even entire communities. Even if the planned risk reduction systems (both structural and nonstructural) and restored coastal habitats identified in the Coastal Master Plans are implemented, some degree of residual storm surge-related risk will remain. The resilience of coastal Louisiana is dependent on maintaining the cultural, social, and economic viability of coastal communities in the face of expected environmental changes. The key objective of the Human Dimensions research topic is to enhance our fundamental understanding of the impacts of Louisiana's coastal crisis on residents and communities and to apply concepts and empirical findings to contemporary, real world problems of coastal planning and management. Research studies can draw from several broad themes, including environmental sociology, rural and urban planning, cultural anthropology, hazards geography, and coastal industrial and resource economics.

RESEARCH NEEDS

Population Change and Social Sciences

- Develop dynamic metrics to calculate the social impacts (e.g., population change and composition, place attachment and identify, effects on social equity, public health, impacts on low to moderate income population, changes to infrastructure and critical services such as schools, health services, etc.) of individual restoration and risk reduction projects, future without action, and suites of projects on coastal communities.
- Identify the key drivers of coastal population shifts and methods to project those shifts over time. Identify coastal communities that may be expected to receive an influx of population over time, as well as those expected to decrease in population over time.

Planning and Built Environment

- Evaluate the impacts of coastal land loss and future coastal protection and restoration activities on adaptive capacity of communities, health services delivery, specific governmental sectors, businesses and industries, or other social services.
- Evaluate the capacity of inland/upstream coastal communities to handle population growth in terms of planning for the built environment and infrastructure. Identify how population changes and future flood risk may influence housing development policy, transportation systems, water/wastewater systems, and other key sectors for coastal parishes in context of both urban and rural communities.
- Evaluate the quality of state and local plans including land-use plans, comprehensive plans, and hazard mitigation plans, and develop methods and best practices for integration of state and local planning efforts in Louisiana that draw from efforts internal and external to Louisiana. Develop



impacts into coastal parish planning efforts, and to evaluate the effectiveness of plan implementation.

Coastal Economy

- Valuate ecosystem services and quantify the linkages between ecosystem services provided by coastal habitats and the economic, social, and cultural well-being of coastal residents and communities using primary (e.g., surveys and interviews) and secondary data sources.
- Quantify the economic linkages between the Gulf of Mexico, coastal communities, and regional urban hubs and identify system vulnerabilities and pain points (real and perceived) that may adversely impact business operations (e.g., identifying the linkages from fishers to port/docks to transportation to wholesalers to retailers).
- Identify and assess the benefits, both monetized and non-monetized, of coastal protection and restoration projects identified in the Coastal Master Plan, beyond the typical emphasis on future losses avoided.

Risk Communication

- Identify communication techniques (via community meetings, social media, etc.) related to future flood risk perception and individual decision making that result in increased 1) participation in the Flood Risk and Resilience Program, 2) awareness and support of Coastal Master Plan restoration and risk reduction projects, and 3) science communication to the public, media, and formal educators.

OUTCOMES FOR COASTAL MASTER PLAN IMPLEMENTATION

Improved planning and management at the state and local level to reduce risk, improve financial and social conditions, and build more resilient communities through:

- A qualitative and quantitative understanding of the social impacts of future without action compared to a future with coastal protection and restoration projects (individually and as a suite of projects).
- An understanding of how, why, and where people relocate due to coastal risk and/or environmental change.
- Anticipating impacts of coastal hazards and/or environmental change on the delivery of critical and essential services (e.g., transportation, water delivery, wastewater treatment) and how these are affected by coastal protection and restoration projects.
- Better preparation for population transitions reduces strain on existing communities due to anticipated population growth/decline.
- Strengthened adaptation efforts due to increased community investment in transitional efforts (e.g., policy change, non-structural protection projects, relocation, changes to service provision).
- An improved understanding of the vulnerability of coastal industries and the coastal economy to risk and/or environmental change.



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