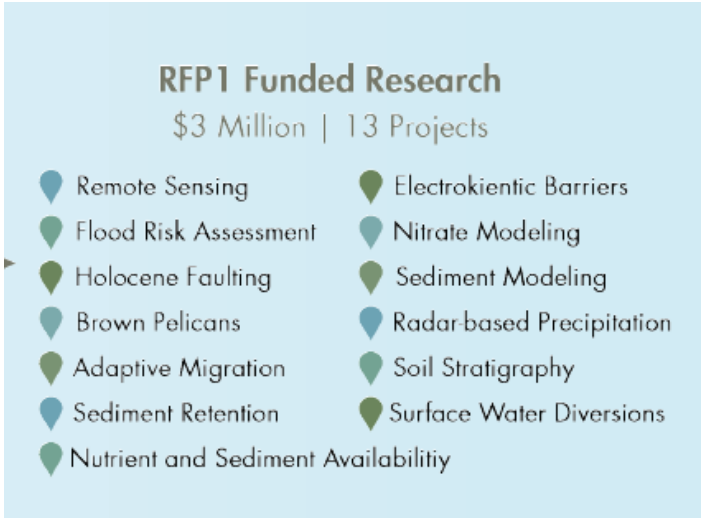
RESTORE ACT CENTER OF EXCELLENCE FOR LOUISIANA ALL-HANDS MEETING AUGUST 17, 2018

Background



The Water Institute of the Gulf was selected by Coastal Protection and Restoration Authority to serve as the State's RESTORE Act Center of Excellence, and on November 1, 2015, the U.S. Department of the Treasury awarded CPRA a grant to begin its research program. Funding for the research program comes from fines and penalties in the wake of the 2010 Deepwater Horizon oil spill.

Announced on June 22, 2017, 13 projects were awarded with a total near $3 million that includes research and collaborative awards as well as graduate studentships. On August 17, 2018, the RESTORE Act Center of Excellence for Louisiana, in cooperation with Louisiana's Coastal Protection and Restoration Authority, held an all-hands meeting in Baton Rouge to receive updates from the 2017 grant awardees funded under the first request for proposals.

Projects

Coupling hydrologic, tide and surge processes to enhance flood risk assessments for the Louisiana Coastal Master Plan ($499,882)
PI: Scott Hagen, Professor in Department of Civil & Environmental Engineering, Louisiana State University
Co-Investigators: Matthew Bilskie, LSU; Hugh Roberts, ARCADIS; Don Resio, University of North Florida

In August 2016, a low-pressure system brought intense rainfall across southeastern Louisiana. During the heart of hurricane season, some officials were asking what happens if a tropical system makes landfall in the wake of a rain event that has already saturated soils and created localized flooding. This project is working to couple inland modeling with storm surge modeling with a focus on the Barataria and Lake Maurepas watersheds to ultimately provide information that can help develop better long-term plans for vulnerable communities. Work has been done on developing a synthetic coupled rainfall runoff and storm surge event and the team is working toward a goal of evaluating the coupled hydrologic and surge influence on coastal flood hazards.

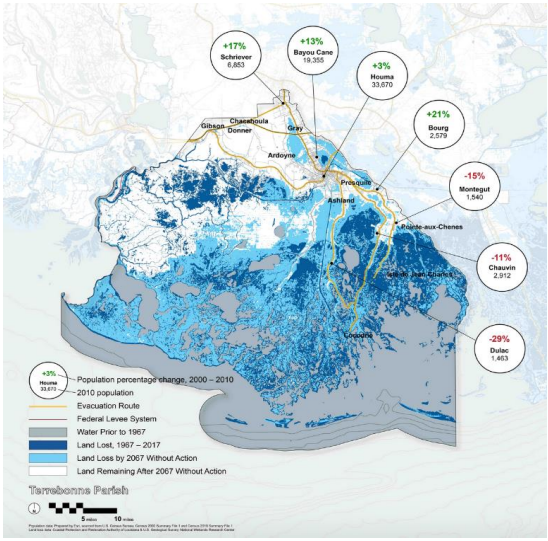
An evaluation of faulting in Holocene Mississippi River Delta strata through the merger of deep 3D and 2D seismic data with near surface imaging and measurement ($349,174)
PI: Mark Kulp, Associate Professor of Earth and Environmental Sciences and Director of Coastal Research Laboratory, University of New Orleans
Co-Investigators: Nancye Dawers, Tulane; Rui Zhang, University of Louisiana at Lafayette; David Culpepper, The Culpepper Group; John Lopez, Lake Pontchartrain Basin Foundation; Kevin Yeager, University of Kentucky

The goals of this project include mapping the distribution of faults in standard seismic industry data, identify faults that may extend up to the Holocene and project fault plans upward towards the surface to see where they may manifest themselves in surface traces, determine slip rates of faults, collect cores across fault traces to help determine slip rates, and assess potential impacts to infrastructure through examining high-resolution surveys on roads that cross fault traces. "We need to better understand that vertical motion," Kulp reported in August. Three study areas are planned in northern Terrebonne-Timbalier Bay, Bayou Lafourche near Golden Meadow, and the Lake Pontchartrain/Lake Borgne areas of the Deltaic Plain to better understand the vertical motion of land surfaces. Coring locations in all three study areas were identified in August, but most cores are already collected in lakes Pontchartrain and Borgne and cores in the other study areas will be collected in fall 2018. Seismic surveys of all areas are also set to begin at that time.

Assessment of coastal island restoration practices for the creation of brown pelican nesting habitat ($299,733)
PI: Paul Leberg, Professor in Department of Biology, University of Louisiana at Lafayette. Co-Investigator: Jordan Karubian, Tulane University

Leberg and his team are investigating how island restoration ultimately impacts birds, with a focus on Eastern brown pelicans and testing the "field of dreams" theory that, "if you build it, they will come." As Leberg said in August, there are several barriers that can impact bird colonization of restored coastal islands, including the Gulf of Mexico dead zone, influxes of freshwater in the area, predators such as fire ants or raccoons, and other factors. If these challenges substantially impact the quality of available nesting habitat on islands, or foraging habitat quality in nearby waters, breeding colonies may struggle to persist despite restoration efforts. This project is comparing restoration sites of varying ages, which are located in different coastal regions and have undergone different levels of restoration, with some sites having been restored multiple times. The work is being conducted using the Louisiana Department of Wildlife and Fisheries database, remote cameras to study predators and pelican nesting behavior, and GPS telemetry to examine adult foraging patterns. The ultimate goal is to see whether current restoration strategies meet their intended goals of creating wildlife habitat while also countering coastal land loss.

From adapting in place to adaptive migration: designing and facilitating an equitable relocation strategy ($295,338)
PI: Marla Nelson, Associate Professor Planning and Urban Studies, University of New Orleans
Co-Investigators: Traci Birch, LSU Coastal Sustainability Studio; Anna Brand, University of California-Berkley; Renia Ehrenfeucht, University of New Mexico

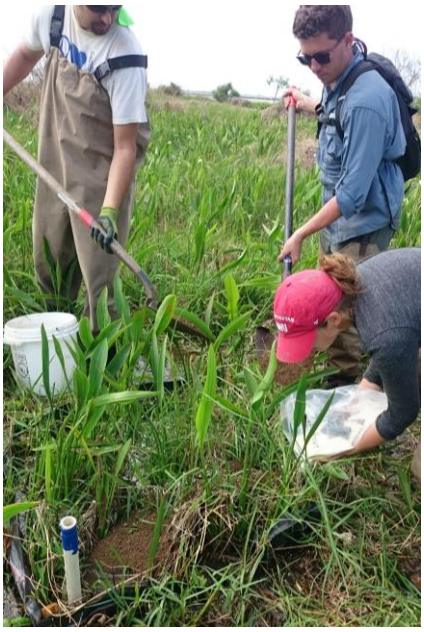


The project is working to answer the questions of what factors drive decisions of whether, when, and where communities relocate as well as how local officials can facilitate equitable relocation and resettlement of residents. Identifying potential answers involves interviewing Terrebonne Parish residents and officials, reviewing past policies and programs, better understanding the challenges, and identifying innovative practices. Resident participants were selected by sending letters to residents outside the levee system, through social media, ads in houmatoday.com, notices in community spaces and snowball sampling. The plan is to interview 50-60 residents in the first year and 25-30 in the second year of the grant. As of August, 49 resident interviews had been completed with 25 of them currently live in bayou communities, 10 have relocated and 14 live out of Terrebonne Parish who haven't recently relocated. The project is on track to meet the interview goal for the year. Interview recordings are being transcribed, coded and analyzed. At the same time, between 20 to 30 local officials will be interviewed, with eight of those interviews already completed as of August.

Enhancing sediment retention rates of receiving basins of Louisiana sediment diversions ($292,495)
PI: Kehui Xu, Associate Professor, Department of Oceanography and Coastal Sciences, Louisiana State University (LSU)
Co-Investigators: Samuel Bentley, LSU; Yanxia Ma, LSU; Z. George Xue, LSU

The project is looking at the characteristics of riverine mud such as grain size, the settling and compaction of dredge material, impact of shear stress and other factors. "If we can improve the mud retention by 10 or 20 percent, that's a really large number because there is so much mud being carried by the river," Xu said, explaining that if sediment in the river was 100 units, about 80 of those units would be mud. As of August, Xu and his team had done literature reviews, data mining and analysis, and model setup. The goal is to come up with a holistic view of the retention rate for sediment with specific focus on Sediment Retention Enhancement Devices (SREDs) effectiveness in maximizing a diversion's ability to build land.

Plant and soil response to the interactive effects of nutrient and sediment availability: Enhancing predictive capabilities for the use of sediment diversions and dredging ($292,914)
PI: Tracy Quirk, Assistant Professor, Department of Oceanography and Coastal Sciences, Louisiana State University
Co-Investigator: Sean Graham, Nicholls State University



Including greenhouse and field studies, the project goal is to improve understanding of how nutrients and sediment interact and effect marsh nutrient cycles, plant productivity, above and below ground biomass accumulation and decomposition as well as soil organic matter accumulation and accretion. The working hypothesis is that in areas with limited sediment supply, additional nutrients have the potential to reduce root growth, but in areas receiving combined sediment and nutrient enhancement, increases in both above and below ground biomass are expected. The field plots for the project were set up in March with the greenhouse work occurring both at Louisiana State University and at Nicholls State University. New information is intended to be integrated into existing models that inform the Coastal Master Plan.

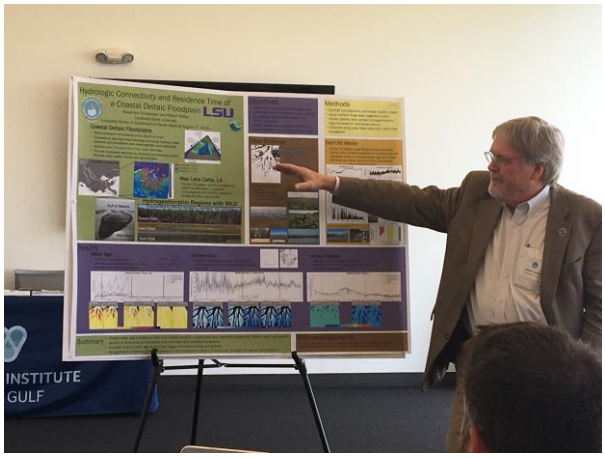
Integrating high-fidelity models with new remote sensing techniques to predict storm impacts on Louisiana coastal and deltaic systems ($501,270)
PI: Kehui Xu, Associate Professor, Department of Oceanography and Coastal Science, Louisiana State University (acting PI). Co-Investigators: Qin J Chen – Professor, Civil and Environmental Engineering, Northeastern University; Claire Jeuken, Deltares USA; Brady Couvillion, U.S. Geological Survey.

The goal is to develop and validate a coupled, process-based Delft3D and XBeach modeling system using the Caminada Headland and Hurricane Gustav as a test case. A one-way coupling of Delft3D, SWAN, and XBeach was implemented to simulate the impact of Hurricane Gustav on the Caminada Headland complex and good agreement with field observations has been found so far. Products from this work will include a database of remotely-sensed and ground-truthed biophysical information for the Mississippi River Delta, a high-fidelity hydrodynamic and eco-morphodynamic modeling system as well as conceptual strategies to maximize sediment retention of barrier island restoration projects.

GRADUATE STUDENTSHIP AWARDS (ADVISING FACULTY ARE LISTED)
Electrokinetic barrier for seawater intrusion in coastal Louisiana ($57,519)
Sanjay Tewari, Assistant Professor of Civil Engineering and Construction Engineering Technology
Louisiana Tech University

The project plans to use electrokinetic barriers against seawater intrusion in the coastal region of Louisiana. Efforts will be made to compare the efficacy of this electrokinetic barrier against other techniques that are being used, which is important for many coastal areas that have freshwater crises due to saltwater intrusion. Tewari was unable to attend the all-hands meeting.

Multiple tools for determining the fate of nitrate in coastal deltaic floodplains ($63,100)
Robert Twilley, Louisiana Sea Grant College Program Executive Director

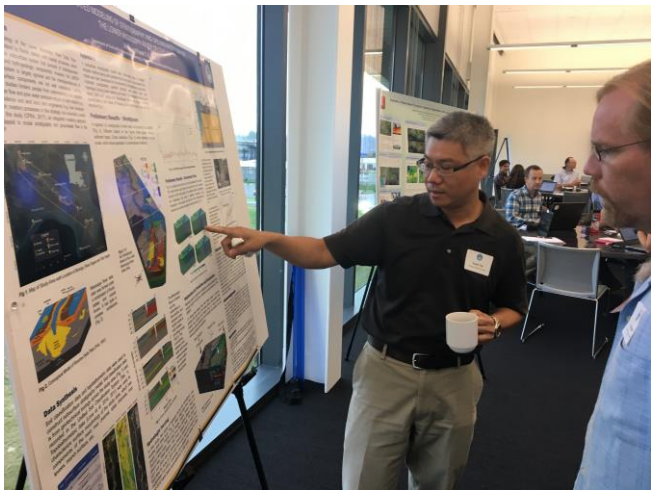


This research project plans to identify what factors maximize the interaction between river water and floodplain wetlands and to better quantify transformation of nutrients (nitrate) by wetland plants, soil, and microbes of deltaic floodplains. Numerical modeling and field experiments will help better understand the fate of nitrate under emerging deltaic floodplains. Field work in the Wax Lake Delta has begun and this field and modeling results will help refine water quality models currently in use.

Project Louisiana rivers' sediment flux to the coastal ocean using a coupled atmospheric-hydrological model ($77,015)
Zuo Xue, Assistant Professor, Department of Oceanography and Coastal Sciences, Louisiana State University

The impacts of decreased sediment supply to Chenier Plain from flood control and other projects on the Mississippi and Atchafalaya rivers are well documented. What is lesser known is the contribution local rivers such as the Calcasieu, Mermentau and Vermillion have on the stability of the Chenier Plain, especially as these local rivers are more vulnerable to long-term and short-term disturbances such as climate change, sea level rise, flooding and restoration projects. This project is coupling atmospheric, surface water and groundwater modeling to better understand sediment movement through these local rivers and examine possible changes in water and sediment changes due to climate change or future restoration projects.

Constructing Mississippi River delta plain soil stratigraphy – implications for coastal land building and compactional subsidence ($70,070)
Frank Tsai, Professor Department of Civil and Environmental Engineering, Louisiana State University



This study investigates coastal land building and compactional subsidence through soil stratigraphy analysis and subsidence modeling of the Mississippi River Deltaic Plain. Results from this project are intended to benefit the Coastal Master Plan's restoration projects, such as marsh creation projects and sediment diversions. This study also investigates surface water-groundwater interactions. Remembering that the Mississippi River is very deep, water that moves through the subsurface layers is driven by the river and tides. The interactions between the river, the gulf, and the groundwater system can particularly be seen during high water events. Groundwater modeling helps predict pore water pressure and this subsurface hydraulic forcing may contribute to either sediment compaction or resuspension in certain areas of the coast.

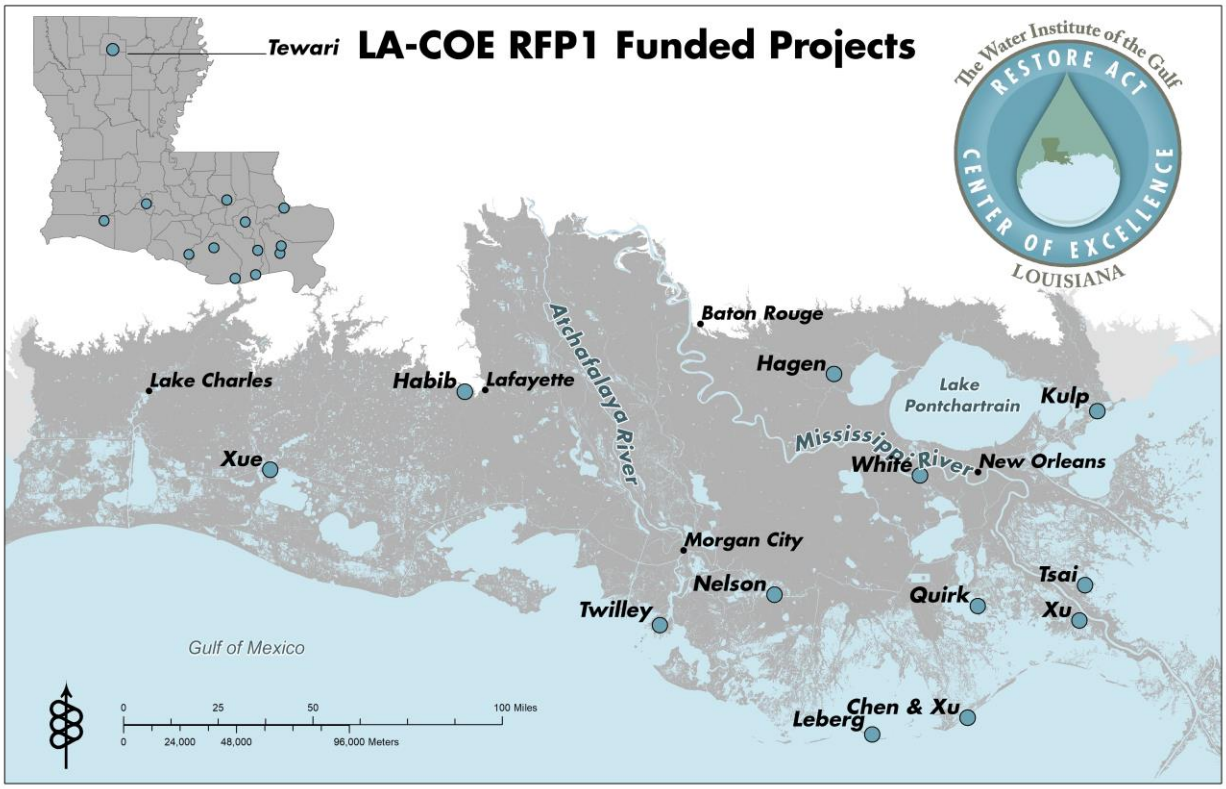
Determining the influence of surface water diversions on physical and nutrient characteristics of wetland soils ($83,328)
John White, Professor of Department of Oceanography and Coastal Sciences, Louisiana State University

In 2007, a series of 139 stations in the Davis Pond outflow area were sampled for plant type, bulk density, total carbon, nitrogen and phosphorus, pH, moisture content, and organic matter content. Results from this were published in 2012. Now more than 11 years later and with years of operation at Davis Pond, this project team is taking samples in the same areas to help answer the questions on whether the operation of the diversion has altered soil properties such as bulk density, organic matter content, or nutrient content, all of which are important to coastal marsh growth and resilience in Barataria Basin. Field work on this project is underway. Data from this research could help inform CPRA about the continued use of freshwater diversions such as Davis Pond and Caernarvon.

Evaluation of radar-based precipitation datasets for applications in the Louisiana Coastal Master Plan ($71,148)

Emad Habib, Professor of Department of Civil Engineering, University of Louisiana at Lafayette

Precipitation is considered a major source of freshwater in coastal Louisiana (50-60 inches/year), and accurate information about its magnitudes and spatial and temporal distributions is critical for successful planning via modeling exercises and restoration project implementation. Regional-scale assessment will be conducted on radar-rainfall datasets and evaluate whether they can be directly used by the Coastal Master Plan planning models. Assessment of the radar datasets will be done using independent rainfall measurements from rain gauges that exist in coastal Louisiana. To enhance the availability of rain gauge data that are needed for evaluating the radar product, the project will install a new set of rain gauges at selected sites over the coastal zone. The project will provide information on how to improve the representation of precipitation in hydrologic and hydrodynamic models at different spatial and temporal scales.



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