

**TWILLEY, LSU**  
**DHS Coastal Resilience Center**  
**Research Project:**  
**Annual Project Performance Report**

Covers reporting period January 1, 2016 – June 30, 2016

**1. Project Title:** Integrated Modeling Approaches with Application to Pre- and Post-disaster Planning for Creating More Resilient Communities

**2. Principal Investigator / Institution:** Robert R. Twilley, Louisiana Sea Grant/Oceanography & Coastal Science, LSU

**3. Other Research Participants/Partners:**

Jeff Carney, Coastal Sustainability Studio, LSU

Traci Birch, Coastal Sustainability Studio, LSU

Carola Kaiser, Center for Computation and Technology (CCT), LSU

Brant Mitchell, Stephenson Disaster Management Institute (SDMI), LSU

**4. Short Project Description (“elevator speech):**

We propose to develop pre- and post-disaster planning and adaptation tools for coastal communities to increase resilience. These efforts will enable vulnerable communities to plan, react, and recover more quickly and effectively in areas facing repetitive disturbance. The goals of the program are to improve emergency response with regard to protecting vulnerable infrastructure and populations, and to reduce repetitive loss by providing accurate impact data to community planners in the immediate aftermath of an event.

**5. Abstract:**

We propose that an integration of coastal modeling tools linked to innovative design/planning approaches, together with effective outreach to both emergency managers and land use planners, is needed to provide crucial community-level data for effective pre- and post-disaster planning. Beyond large-scale models or those that only demonstrate one aspect of hazard impact (e.g. storm surge), communities need clear guidance on exactly which vulnerable infrastructure and populations may be threatened and/or protected (pre-disaster planning and rapid response), and accurate post-event impact to make crucial land use and redevelopment decisions quickly. The ability to leverage this type of community-specific data provides the opportunity to avoid loss and rebuild for maximum future risk reduction. We will incorporate established modeling outputs into a new consequence model showing how flood risk (both from storms and SLR) will impact people, industry, and infrastructure. Together this group will provide (1) planning tools that visualize aggregated risks to include

hurricane force winds, storm surge, and inland flooding along with vulnerable populations based on socio-economic status; (2) modeling and visualization tools to communicate flood risks during a tropical cyclone event by identifying vulnerable populations and structures that are susceptible to storm surge; (3) post-landfall search and rescue grid system with prioritization based on socio-economic vulnerabilities; (4) methodology for helping community planning departments and recovery planning teams effectively utilize and implement changes to their built environment through effective resilience based planning. Louisiana Sea Grant and CSS will engage federal, state and local planners and emergency managers to incorporate these products into planning efforts.

## **6. End users:**

This project, starting with the establishment of a focus group of federal, state and local planners and emergency managers, will determine what variables should be tracked in terms of consequences of storm surge to people, homes, and infrastructure to assist them in making critical decisions during and immediately following storm events. End users involved in this process will include:

- Federal Emergency Management Agency (FEMA) - Federal Preparedness Coordinator
- Department of Homeland Security (DHS) Federal Protective Services - Protective Service Advisor
- National Weather Service (NWS) – Slidell/New Orleans Forecasting Office
- Louisiana Governor’s Office of Homeland Security and Emergency Preparedness (GOHSEP) – Christopher Guilbeaux, Deputy Director for Preparedness, Response and Interoperability-
- Louisiana Coastal Protection and Restoration Authority (CPRA) – Chris Ellis, Director
- Louisiana Department of Wildlife and Fisheries (LDWF) – Patrick Banks, Deputy Director
- Louisiana Office of Community Development (OCD) – Pat Forbes, Secretary
- Louisiana National Guard, - MAJ Robert Fudge
- US Coast Guard – Sector New Orleans - Port Security Specialist
- Local Planners –
  - Bob Rivers, Planning Director – City of New Orleans
  - Louissette Scott, Planning Director – City of Mandeville, LA
  - Chris Pulaski, Planning Director – Terrebonne Parish, LA
  - Doug Burguires, Assistant Planning Director, Lake Charles, LA
  - Jennifer Gerbasi, Terrebonne Parish Recovery Planner
  - Dexter Accardo, Director - St. Tammany Parish OHSEP
- Emergency Managers –

John Rahaim, Director – St. Bernard Parish

Earl Eues, Director, Terrebonne Parish

- Sea Grant Agent - Kevin Savoie, Camaron Parish

Each of the agencies described above have already been involved in the development of CERA and its use during several recent hurricane events, such as Hurricane Isaac. These agencies have made commitments through attendance at workshops dedicated to training on CERA products, and technology updates prior to hurricane season, that demonstrate the partnerships that exist to the project proposed. In addition, SDMI has established relationships with local partner communities in Vermilion Parish, such as Abbeville, that will serve as case studies for the Consequence Model production and targeted planning efforts.

#### **7. Explanation of Changes:**

The Focus Group was originally scheduled to be held in June 2016. Due to an unavoidable conflict, the Focus Group has been rescheduled to take place in September 2016. The rescheduling of the Focus Group will not have any detrimental impact to the original timeline and milestones of this project.

#### **8. Unanticipated Problems:**

The Focus Group had to be rescheduled as the original time line called for the Focus Group to meet in June 2016. During the only week that was available to all the PI's for this project, there was a conference that would have prevented local planners from participating in the Focus Group. While the team discussed meeting with them separately, a major outcome of this project is to ensure planners and emergency managers are communicating with one another so each can offer input into planning, response and recover processes. Having the cross dialogue was deemed more important than meeting the initial timeline. The Focus Group has now been rescheduled to take place on September 21, 2016.

#### **9. Project Outcomes:**

A major outcome of this project for Year 1 was an aggressive outreach component to ensure local, state and federal planners and emergency managers were aware of this project and its potential to influence their decision-making and planning processes. The project team has completed several outreach opportunities that include the State of Louisiana American Planning Association and the Louisiana Emergency Preparedness Association's general sessions. In addition, direct outreach with several federal agencies to include FEMA Region VI, U.S. Coast Guard, DHS Protective Services and the National Communication Center have also taken place.

**10. Research Activity and Milestone Progress:**

**Research Activities and Milestones: Progress to Date**

<b>Reporting Period 1/1/2016 – 6/30/2016</b>			
<b>Research Activity</b>	<b>Proposed Completion Date</b>	<b>% Complete</b>	<b>Explanation of why activity / milestone was not reached, and when completion is expected</b>
Initiate plans to develop the CERA Consequence Model to capture the diversity of coastal infrastructure and assets in the MRDP.	June 2016	100%	
Conduct preliminary analysis of hurricane impact scenarios to capture the diversity of recovery and adaptation needs in the MRDP.	June 2016	100%	The State currently has an infrastructure database which serves as a basis for the consequence model. Additional work is being performed with individual agencies such as DHS Protective Service and USCG District 8 on refining additional infrastructure requirements.  SLOSH Maxim of Maximums (MOMs) that were recently updated by NOAA and offer higher resolution have been identified to replace the older lower resolution SLOSH MOMs to determine hurricane impacts for planning purposes.
Determine available data to be used in building the Consequence Model. Collect information to integrate in the development of pilot parish(es) for SSVI.	June 2016	100%	The LSU team worked with the State to select the state's 144k point infrastructure database as the basis on which to build the consequence model.
<b>Research Milestone</b>			
With assistance of focus group, determine data not already available that would assist in determining consequences of storm surge.	June 2016	80%	Coordination and planning for the Focus Group has been completed. The Focus Group has been rescheduled to take place on September 20, 2016 due to a scheduling conflict. [Note – Focus group recommended that available parcel data and building footprints data be added to the consequence model.]

<p>Have data sets compiled that reflect the information required to build SSVI.</p>	<p>June 2016</p>	<p>90%</p>	<p>Focus Group to determine how to prioritize inputs and determine which inputs should be included in the SSVI [Note – The focus group agreed with the initial metrics established by LSU-SDMI for the SSVI]</p>
<p>With assistance of focus group, determine sectors not already involved in process and engage in model and planning process development.</p>	<p>June 2016</p>	<p>80%</p>	<p>All known available data sets have been identified. Once the Focus Group has been completed, any gaps identified in data will be addressed, if feasible. [Note – The focus group agreed with the initial data sets that were identified by LSU-SDMI. They also emphasized that critical to the locals would be the status of water utilities, sewer treatment plants and any surge that would disrupt their operations. Without the ability to provide potable water their ability to recover and sustain their populations would be greatly decreased. ]</p>

## 11. Transition Activity and Milestone Progress:

### Transition Activities and Milestones: Progress to Date

Reporting Period 1/1/2016 – 6/30/2016			
<b>Transition Activity</b>	<b>Proposed Completion Date</b>	<b>% Complete</b>	<b>Explanation of why activity / milestone was not reached, and when completion is expected</b>
Develop a Focus Group to determine desired variables to assist decision makers in analyzing consequences of storm surge. Determine the most effective means to display results of consequence model. Participants at a minimum will include – The Louisiana Governor’s Office of Homeland Security and Emergency Preparedness, Louisiana National Guard, U.S. Coast Guard – 8 <sup>th</sup> District, Louisiana Department of Wildlife and Fisheries, Federal Emergency Management Agency, DHS Protective Services, local Emergency Managers.	June, 2016	80%	NOTE: SDMI is complete – members include GOHSEP Deputy Director, FEMA RVI National Preparedness Officer, Terrebonne Parish EM, St. Bernard Parish EM, DHS Protective Services Officer, and USCG – Sector New Orleans – Port Security Specialist, planners from across the state have been identified and invited. Communities approached include Orleans Parish (City of New Orleans), Terrebonne Parish, St. Tammany Parish, and Calcasieu Parish (City of Lake Charles). Expected completion August 2016.
Develop contacts with various federal, state and local and professional organizations to establish connections that enhance the utility of products developed in this project. Examples include American Planning Association, Association of State Floodplain Managers Association, FEMA National Preparedness office, and FEMA MT. Continued effort to work with NOAA NWS office in Slidell (WFO and MRFO) and other regional networks to demonstrate utility to NOAA forecasting capabilities. Connect with parish emergency managers and CIO of New Orleans to demonstrate utility of products at more local level. Participate in the annual Louisiana Emergency Preparedness Association meeting with project presentation.	June 2016	100%	Outreach to various personnel and organizations has been completed; however, the initial focus has been towards Louisiana and Region VI. We will continue to expand the national relevance of this project by bringing in additional users such as the National Communications Center which is responsible for providing situational awareness for all communications infrastructure during tropical cyclones and U.S. Coast Guard – Sector New Orleans. While this task has been marked complete as we have met our original intent, this milestone will be ongoing throughout the duration of the project.
<b>Transition Milestone</b>			
Execute a workshop of the Consequence Modeling focus group.	June 2016	80%	Coordination and planning for the Focus Group has been completed. The Focus Group has been

			rescheduled to take place on September 21, 2016 due to a scheduling conflict.

**12. Interactions with education projects:** N/A

**13. Publications:** N/A

**14. CRC Performance Metrics:**

<b>CRC Performance Metrics</b>			
<b>Metric</b>	<b>Research</b>	<b>Education</b>	<b>Center</b>
Courses/certificates developed, taught, and/or modified		See Table	
Enrollments in Center-supported courses/certificates			
HS-related internships (number)			
Undergraduates provided tuition/fee support (number)			
Undergraduate students provided stipends (number)	1		
Graduate students provided tuition/fee support	1		
Graduate students provided stipends (number)			
Undergraduates who received HS-related degrees			
Graduate students who received HS-related degrees			
Certificates awarded (number)			
Graduates who obtained HS-related employment			
SUMREX program students hosted (number)			
Lectures/presentations/seminars at Center partners			
DHS MSI Summer Research Teams hosted (number)			
Journal articles submitted (number)			
Journal articles published (number)			
Conference presentations made (number)	5 (APA,		
Other presentations, interviews, etc. (number)	6 (FEMA		
Patent applications filed (number)			
Patents awarded (number)			
Trademarks/copyrights filed (number)			
Requests for assistance/advice from DHS agencies	7 (Includes		
Requests for assistance/advice from other Federal	5 (GOHSEP,		
Total milestones for reporting period (number)	8		
Accomplished fully (number)	3		
Accomplished partially (number)	5		
Not accomplished (number)	0		
Product/s delivered to end-user/s (description and	See Table		
External funding received	See Table		
Leveraged support			
Articles on Center-related work published on website			
Coverage in media, blogs (number)			
Social media followers (number)			
Posts to social media accounts (number)			
Events hosted (number)			
Website hits (number)			

**Table for Documenting CRC Research Project Product Delivery**

Product Name	Product Type	Approx. Delivery	Recipient or Anticipated End
CERA	Software	June 2017	See list of users in item #6
Consequence Model	Software	December 2017	See list of users in item #6

**Table for Documenting External Funding and Leveraged Support**

External Funding			
Title	PI	Total Amount	Source
Improved Algorithms for Computing Storm Surge (STORM)	Twilley, co-PI	\$206,560	NSF
Coastal SEES Project on Accelerated Flood Risk with Delta Degradation	Twilley, PI	\$298,683	NSF
Cyber SEES – Simulation Management System for Flood Modeling	Twilley, co-PI	\$75,000	NSF
Port Resilience Index	Twilley, PI	\$20,000	NOAA
Louisiana Community Resilience Institute	Carney, PI Birch, Co-PI	\$50,000	Kresge, Sea Grant

Leveraged Support	
Description	Estimated Annual
Free office space	\$14,000
Portion of university indirect returned to project	\$13,240
Reduced rates on high performance computer	\$25,000
Support for ASGS development by Louisiana Sea Grant	\$25,000