COASTAL RESILIENCE CENTER

A U.S. Department of Homeland Security Center of Excellence

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# Home

Helping our nation. Weathering any storm.

We are the coastal resilience center.

## DHS SCIENCE & TECHNOLOGY DIRECTORATE

**Cross-Border Threat Screening and Supply Chain Defense (CBTS)**

Led by Texas A&M University

**Masters of Business Administration – Security Technology Transition (MBA STT)**

Led by George Washington University

**Coastal Resilience Center (CRC)**

Led by University of North Carolina at Chapel Hill

**Center for Accelerating Operational Efficiency (CAOE)**

Led by Arizona State University

**Arctic Domain Awareness Center (ADAC)**

Led by University of Alaska

**Maritime Security Center (MSC)**

Led by Stevens Institute of Technology

**Criminal Investigations and Network Analysis Center (CINA)**

Led by George mason University

**Critical Infrastructure Resilience Institute (CIRI)**

Led by University of Illinois at Urbana-Champaign

**Soft-Target Engineering to neutralize the Threat Reality (SENTRY)**

Led by Northwestern University

**National Counterterrorism Innovation, Technology, and Education Center (NCITE)**

Led by the University of Nebraska at Omaha

## Leaders in Resilience

Our investigators look into the eyes of every storm that threatens the shores of our country. The Department of Homeland Security relies on us for cutting-edge weather prediction models that support shoreline communities and help to save lives. We confer with people in those communities to develop better strategies for bouncing back from coastal catastrophes.

Mar 31

A New Era in Flood Mapping: FEMA Adopts Our Tech

Mar 31

NPR Covers Our Research

Mar 30

Guiding Communities. Bouncing Back.

**Twitter Facebook YouTube LinkedIn Instagram**

[Video

Title: CRC Impacts: Preparing for Natural Hazards]

## COMMITTED PARTNERS. APPLIED RESEARCH.

"I won't show up to hurricane season without [your **ADCIRC** storm prediction system]!" -Peter Brown, Rear Admiral, US Coast Guard

"The city plans to use [your **PIRS** hazard modeling system] in its upcoming master plan development." -Justin Cates, Director of Emergency Management, Nashua, NH

"[**PIRS**] is an effective tool allowing us to evaluate our existing plans and policies." -George Homewood, Director of Planning, Norfolk, VA

## ABOVE AND BEYOND

We approach problems connected to coastal hazards in multiple ways. Find out more about our unique research on those hazards and how shoreline communities directly benefit from the findings.

**[ABOUT PROJECTS](https://coastalresilience.wixsite.com/coastal-resilience/about%22%20%5Ct%20%22_self)**

## Footer

*Established as a Center of Excellence by the Department of Homeland Security Directorate of Science and Technology*

[DHS Logo

Image: DHS seal

Text: Homeland Security

Science and Technology]

**DHS Coastal Resilience Center of Excellence**

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Chapel Hill, NC 27517

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**Fax**: 919-445-9669

[University of North Carolina at Chapel Hill Logo:

Image: The Old Well

Text: The University of North Carolina at Chapel Hill]

[Contact form]

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# About

[Image:

[DHS Logo

Image: DHS seal

Text: Homeland Security

Science and Technology]

Coastal Resilience Center (CRC)

## A DHS Center of Excellence

The CRC conducts research and education to enhance the resilience of people, infrastructure, economies, and the natural environment to the impacts of coastal hazards such as foods and hurricanes.

LAUNCH: 2015

PARTNERS: More than 30 university, industry, and government partners

EXPERTISE: Disaster recovery and mitigation planning, coastal hazards/ storm surge modeling, risk communication, decision support modeling, infrastructure assessment, and engineering

DHS ALIGNMENT: Federal Emergency Management Agency, U.S. (Coast Guard, Cybersecurity and Infrastructure Security Agency

[CRC Logo:

Coastal Resilience Center

A U.S. Department of Homeland Security Center of Excellence]

A nationwide consortium led by:

University of North Carolina at Chapel Hill

100 Europa Ore, Suite 540

Chapel Hill, NC, 27517

In partnership with:

Jackson State University in Jackson, Mississippi

## University Partners

Colorado State University, CO

Cornell University, NY

East Carolina University, NC

Florida State University, FL

Jackson State University, MS\*

Johnson C. Smith University, NC

Louisiana State University, LA

North Carolina State University, NC

Old Dominion University, VA

Oregon State University, OR

Rensselaer Polytechnic University, NY

Texas A&M University, TX

Tougaloo College, MS\*

University of Central Florida, FL

University of Maryland, MD

University of North Florida, FL

University of Puerto Rico-Mayaguez, PR'

University of Rhode Island, RI

University of Texas -Austin, TX

\*Minority Serving Institution (MS)

## Enterprise Partners

ARCADIS

Seahorse Coastal Consulting

NASA Jet Propulsion Laboratory

AECOM

WaterWonks. LLC

American Planning Association

American Red Cross

Association of State Floodplain Managers

International Association of Emergency Managers

National Association of Emergency Managers

Salvation Army

American Shore & Beach Preservation Association

## Research and Education Capabilities

* High-resolution coastal flood, storm surge and wind forecasting
* Hazard mitigation and recovery planning
* Education and training for the current and future homeland security workforce

## Impacts

**Protecting flood-prone communities**

CRC uses the Advanced Circulation (ADCIRC) Prediction System (APS) to predict location and severity of coastal flooding. APS was used at the North Carolina Emergency Operations Center during hurricanes Matthew (2016) and Florence (2018) and Texas State Operations Center during Hurricane Harvey (2017) to execute search. and-clear operations, position resources in advance of the storm, aid evacuation, and make preliminary damage assessments; and during hurricanes Irma and Maria (2017) for the U.S. Coast Guard to position people and assets.

**Guiding resilient planning and rebuilding**

CRC developed the Plan Integration for Resilience Scorecard to assess community plans for their ability to work collectively to reduce future flooding and storm risks. The Scorecard has been used in Norfolk, Va., and League City, Tx., and is being used in Nashua, N.H., and to assess communities near Houston, TX., following Hurricane Harvey. In the wake of Hurricane Matthew, CRC worked with several communities to develop community rebuilding plans.

**Improving risk communication**

Using tailored personal communications delivered by text messages, CRC relays disaster risk information to motivate individual actions to become more prepared.

**Educating the next generation of hazards professionals**

Through education programs, CRC educates future hazard researchers, educators and practitioners, emphasizing the development of courses, minors, and certificate programs at Minority Serving Institutions (MSIs). Since 2016, instructors have taught more than 30 courses to more than 500 students across seven university campuses.

## Feedback from Our Partners

“I won't show up to hurricane season without (ADCIRC),” said Rear Admiral Peter J. Brown, Commander, 7th Coast Guard District, in 2017 about his experience using the ADCIRC Prediction System to inform decisions during hurricanes Irma and Maria.

"The Resilience Scorecard (developed by CRC researchers] is an effective tool allowing us to evaluate our existing plans and policies against the backdrop of resilience... We plan to revisit our scores and use the Resilience Scorecard as we begin developing our updated comprehensive plan so we can maximize our opportunities to transform Norfolk into the resilient coastal community of the future.”

George Homewood, Director of Planning & Community Development City of Norfolk, VA, 2018]

[Map:

A map of the United States with CRC partners pinned.]

31 TOTAL PROJECTS

23 RESEARCH PROJECTS

8 EDUCATION PROJECTS

## Coastal Hazards Modeling

UNC-Chapel Hill

Rick Luettich

UNC-Chapel Hill

Brian Blanton

NC State University

Casey Dietrich

University of Texas-Austin

Clint Dawson

University of North Florida

Don Resio

University of Rhode Island

Isaac Ginis

Florida State University

Wenrui Huang

Seahorse Coastal Consulting

Jason Fleming

Coastal Probabilistic Hazard Analysis

Rick Luettich

Embry-Riddle Aeronautical University

Stephen Medeiros – completed

Louisiana State University

Scott Hagen – completed

Matthew Bilskie – completed

## Education & Workforce Development

Jackson State University

Robert Whalin

Johnson C. Smith University

Hang Chen

Ahmed Faik

Tougaloo College

Meherun Laiju

University of Puerto Rico at Mayagüez

Ismael Pagan-Trinidad

Ricardo Lopez

NC State University

Gavin Smith

Partners for Educational Development

Olivia Scriven

Louisiana State University

Barry Keim – completed

University of Maryland

Sandra Knight – completed

## Coastal Infrastructure Resilience

Oregon State University

Dan Cox

Colorado State University

John van de Lindt

Joint Port Resilience Assessment Project, Vanderbilt University

Janey Camp

Craig Phillip

Austin Becker

Rensselaer Polytechnic Instititue

Victoria Bennett – completed

NC State University

Mohammed Gabr – completed

Rensselaer Polytechnic Institute

Al Wallace – completed

Building Resilient Communities

UNC-Chapel Hill

Phil Berke

Texas A&M University

Jaimie Masterson

University of Rhode Island

James Prochaska

Austin Becker

Louisiana State University

Robert Twilley

Flood Apex Program

Rick Luettich

Tom Richardson

Old Dominion University

Wie Yusuf

Larry Atkinson

Community Resilience Project, Jackson State University

Jessica Murphy

Hurricane Matthew Disaster Recovery & Resilience Initiative (NC)

Gavin Smith – completed

University of Delaware

Rachel Davidson – completed

Eastern Carolina University

Jamie Kruse – completed

Cornell University

Linda Nozick – completed

Texas A&M University

Jen Horney – completed

University of Rhode Island

James Opaluch – completed

# Projects

CHASING THE STORM. AIDING THE RECOVERY.

A LEGACY OF FULL-SPECTRUM SUPPORT.

**MODELING**

[We developed the Advanced Circulation (**ADCIRC**) model to help planners predict what was once unpredictable. Our projects related to this are changing the way that our nation responds to the most dangerous storms.](https://coastalresilience.wixsite.com/coastal-resilience/media)

**COMMUNITY**

We combine social sciences with empirical data to help coastal disaster zones achieve better outcomes across the board. Our Plan Integration for Resilience Scorecard (**PIRS**) is the capstone of this research.

**EDUCATION**

We partner with Minority-Serving Institutions (**MSIs**) to promote disaster management career tracks while training the next generation of coastal engineers. Our major degree programs are state-of-the-art.

# People

MANY PEOPLE. ONE MISSION.

THE LEADERS IN COASTAL RESEARCH.

## MODELING

[**V. BENNETT**](#_DELTA_MONITORING)

[**I. GINIS**](#_IMPACT_HAZARDS)

[**M. BILSKIE**](#_TIDE_TRACKING)

[**S. HAGEN**](#_TIDE_TRACKING)

[**B. BLANTON**](#_OPS_DASHBOARD)

[**W. HUANG**](#_IMPACT_HAZARDS)

[**S. BUNYA**](#_ADCIRC_SYSTEM)

[**R. LUETTICH**](#_ADCIRC_SYSTEM)

[**C. DAWSON**](#_WAVE_COUPLING)

[**S. MEDEIROS**](#_TIDE_TRACKING)

[**C. DIETRICH**](#_FLOOD_PREDICTION)

[**D. RESIO**](#_WAVE_COUPLING)

[**J. FLEMING**](#_PRODUCT_EXPANSION)

[**T. RICHARDSON**](#_BUSINESS_DEVELOPMENT)

## COMMUNITY

[**L. ATKINSON**](#_STRESS_MEASUREMENT)

[**S. KNIGHT**](#_EMERGENCY_P.M.P.)

[**A. BECKER**](#_DECISIONMAKER_AIDS)

[**J. MASTERSON**](#_PIRS_APPLICATIONS)

[**P. BERKE**](#_PIRS_APPLICATIONS)

[**J. OPALUCH**](#_HOW_TO_MOTIVATE)

[**D. COX**](#_DAMAGE_ESTIMATION)

[**J. PROCHASKA**](#_RISK_COMMUNICATION)

[**R. DAVIDSON**](#_STRONGER_HOUSEHOLDS)

[**R. TWILLEY**](#_ADCIRC_FOR_PLANNERS)

[**C. DAVIS**](#_SOCIAL_EQUITY)

[**J. VAN DE LINDT**](#_DAMAGE_ESTIMATION)

[**J. HORNEY**](#_DISASTER_TRACKING)

[**W. WALLACE**](#_SUPPLY_CHAIN_AIDS)

## EDUCATION

[**A. FAIK**](#_MINORITY_TASK_FORCE)

[**O. SCRIVEN**](https://coastalresilience.wixsite.com/coastal-resilience/fema-collaboration)

[**B. KEIM**](#_DISASTER_SCIENCE)

[**G. SMITH**](#_DISASTER_POLICY_M.S.)

[**M. LAIJU**](#_COASTAL_STUDIES)

[**R. WHALIN**](#_COASTAL_ENG._PHD)

**J. MURPHY**

[**W. YUSUF**](#_SUMMER_RESEARCH)

[**I.  PAGAN-TRINIDAD**](#_INFRASTRUCTURE_ED.)

## STAFF

**K. ANDREWS**

ADMIN

**L. LOWE**

ADMIN

**R. LUETTICH**

LEAD P.I.

**T. RICHARDSON**

EXEC. DIRECTOR

**B. ROSENBLOOM**

COMMS

**A. SCHWAB**

PROJECT MANAGER

**R. WHALIN**

ED. DIRECTOR

**D. ZDANOWICZ**

## BOARD

**N. ANDERSON**

**J. PARK**

**D. BELLOMO**

**J. PINE**

**C. BERGINNIS**

**T. PRATT**

**J. COOPER**

**E. STANLEY**

**G. GALLOWAY**

**L. WEISHAR**

# Media

[MODELING](#_MODELING) | [RESILIENCE](#_COMMUNITY) | [EDUCATION](#_EDUCATION) | [VIDEOS](#_VIDEOS) | [PRESS](#_PRESS)

## MODELING

### ADCIRC SYSTEM

ADVANCED PREDICTION

**ADCIRC PREDICTION SYSTEM DEVELOPMENT COORDINATION AND IMPROVED CONNECTIVITY WITH HYDROLOGIC MODELS**

**SUMMARY**

A substantial portion of the Coastal Resilience Center’s research portfolio involves the development and application of new capabilities for the ADCIRC Prediction System (**APS**) which is comprised of ADCIRC, the ADCIRC Surge Guidance System (**ASGS**), and a growing number of output products. This project provides resources for the overarching coordination across the ADCIRC portfolio, from process improvements to transition.

**DR. RICK LUETTICH**

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**DR. SHINTARO BUNYA**

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[PROJECT FILE](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_487dedd377ca403b90c8eaab5bed6971.pdf) | [FEATURED PRESS](https://www.dhs.gov/science-and-technology/news/2019/07/30/snapshot-adcirc-prediction-system)

[Video: About the ADCIRC Prediction System

Link: <https://youtu.be/Zo8NsVzQm2E>]

### OPS DASHBOARD

VISUALIZATION EXTENSION

**EXTENSION OF ASGS OPERATIONAL AWARENESS DASHBOARD (OAD)
FOR REAL-TIME VISUALIZATION**

**SUMMARY**

This project extends the previously developed Operational Awareness Dashboard (OAD) that monitors the health and status of ADCIRC Surge Guidance System (ASGS) activities being conducted across several HPC sites. The dashboard provides a real-time view of ASGS simulations. We will extend the OAD to collect and display more detailed information, including messages that allow rapid visualization of real-time ASGS results.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_599449d97b4c419883d2531db6556d63.pdf) **|** [**FEATURED PRESS**](https://endeavors.unc.edu/unseen-science/)

### FLOOD PREDICTION

WITH ADAPTIVE MESH

**IMPROVING THE EFFICIENCY OF FLOODING PREDICTIONS
VIA ADAPTIVE MESH RESOLUTION**

**SUMMARY**

Coastal communities rely on predictions of flooding caused by storms, but these predictions can take hours on even the fastest supercomputers. In our ongoing project, we have improved the efficiency of a widely used, predictive model for coastal flooding. We continue to refine and transfer technologies to end-users.

**DR. CASEY DIETRICH**

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_93873593116e4523913fcf1d2205f4c4.pdf) | [**FEATURED PRESS**](https://ccht.ccee.ncsu.edu/ms-2020-carter/)

### WAVE COUPLING

ADCIRC UPGRADE

**ACCURATE AND FAST SPECTRAL WAVE MODELING AND COUPLING WITH ADCIRC**

**SUMMARY**

Computer models are currently being used to understand and predict coastal flooding due to tropical and extratropical storms. The focus of this project is to improve upon existing wave modeling capabilities in terms of both accuracy and computational effort in support of coupled wave-storm surge coastal flooding predictions.

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**DR. CLINT DAWSON**

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_008cf46c517747649145d77d5be5399f.pdf) | [**FEATURED PRESS**](https://www.denver7.com/news/national/can-artificial-intelligence-better-predict-flooding-in-coastal-areas)

### IMPACT HAZARDS

HURRICANE EFFECTS

**MODELING THE COMBINED COASTAL AND INLAND HAZARDS FROM HIGH-IMPACT HURRICANES**

**SUMMARY**

This project advances the modeling capabilities of the real-time ADCIRC system for predicting hazards and potential impacts from tropical and extratropical cyclones on critical infrastructure and communities in the United States. The primary focus is on improving wind, coastal ocean circulation, wave, and hydrological modeling of combined multiple hazard impacts, including coastal flooding due to storm surge and inland flooding due to rainfall.

**DR. WENRUI HUANG**

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**PROJECT FILE** | [**FEATURED PRESS**](https://phys.org/news/2018-09-oceanographer-hurricane-precise.html)

[Video: Coastal Resilience Center – Dr. Isaac Ginis

Link: <https://youtu.be/wZcbuDYUfE4>]

### PRODUCT EXPANSION

FUNDING EVOLUTION

**SUSTAINABLE REAL-TIME MODEL GUIDANCE**

**SUMMARY**

We are at a crossroads. The Department of Homeland Security, Science and Technology Directorate has invested in us at the Coastal Resilience Center for over ten years. We have produced numerous high-profile successes and built momentum. The time has now come to scale up our DHS-supported victories into long term sustainable and diversified revenue.

**DR. JASON FLEMING**

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_47eed97c30334dc3a59fc93586e40424.pdf) | [**FEATURED PRESS**](https://www.tacc.utexas.edu/-/designsafe-adcirc-provide-storm-surge-simulators-for-natural-hazards-community)

[Video: adcirc particle track test

Link: <https://youtu.be/DEKlcPf-Js0>]

### BUSINESS DEVELOPMENT

A WAY FORWARD

**ADCIRC PREDICTION SYSTEM BUSINESS PLAN DEVELOPMENT**

**SUMMARY**

We intend to transition products and services associated with the real-time 24/7 ADCIRC Prediction System (**APS**), comprised of the ADCIRC Surge Guidance System (**ASGS**), the Coastal Emergency Risks Assessment decision support web portal (**CERA**) and the ADCIRC storm surge model. The challenge is to develop a viable business model for the APS that will allow us to transition innovations from CRC projects into stakeholder desired products and services.

**TOM RICHARDSON**

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_4402328e3ad34bbabe2c167927a889a7.pdf) | [**FEATURED PRESS**](https://www.witn.com/content/news/Storm-surge-research-helps-save-lives-510789481.html)

[Video: A better weather forecast coming soon thanks to…

Link: <https://youtu.be/lOqWW6qgGD0>]

### TIDE TRACKING

ADCIRC UPGRADE

**DEVELOPMENT OF AN OPTIMIZED TIDE AND HURRICANE STORM SURGE MODEL FOR THE WEST COAST OF FLORIDA FOR USE WITHIN ADCIRC**

**SUMMARY**

This project simplifies an existing high-definition, research-grade tide, wind-wave and hurricane storm surge model of the west coast of Florida for use in the **ADCIRC** (Advanced Circulation) Surge Guidance System (**ASGS**). The goal is to enable the model to complete a five-day simulation forecast in less than one hour, while retaining water surface elevations that are within 10 percent of the original research-grade model.

**DR. SCOTT HAGEN**

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**DR. STEPHEN MEDEIROS**

Stephen.medeiros@erau.edu

[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_b8a8ea60ffa14d559b2ebc6e542dff4d.pdf) | [**FEATURED PRES**](https://www.livescience.com/57216-sea-level-rise-projections-threaten-coasts.html)S

[Video: Coastal Resilience Center – Dr. Scott Hagen

Link: <https://youtu.be/n9yUUU51TsI>]

### DELTA MONITORING

REMOTE-SENSING AID

**ESTABLISHMENT OF REMOTE-SENSING BASED MONITORING PROGRAM FOR HEALTH ASSESSMENT OF THE SACRAMENTO DELTA**

**SUMMARY**

This project employs a sensor-based and model-aided approach to provide engineers and decision makers with systematic tools to assess the health and provide early warning of deteriorating levees in the Sacramento Delta. The modeling tool integrates the use of measured data with the concept of performance limit states to effectively achieve a performance-based, network-level health assessment of the levee system.

**DR. VICTORIA BENNETT**

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_912da8df7a4345cc82eb663a2c112eef.pdf) | [**FEATURED PRESS**](https://www.wral.com/nc-state-study-finds-levees-are-at-risk-with-frequent-flooding/18957913/)

[Video: How rising water levels impact Delta. Sacramento…

Link: <https://youtu.be/8TVR3qlT7vw>]

## COMMUNITY

### PIRS APPLICATIONS

MEASURING RESILIENCE

**APPLICATIONS OF THE PLAN INTEGRATION FOR RESILIENCE SCORECARD (PIRS) AT THE NATIONAL SCALE IN PARTNERSHIP WITH THE AMERICAN PLANNING ASSOCIATION**

**SUMMARY**

The Plan Integration for Resilience Scorecard™ (**PIRS**) assists local practitioners to assess the degree to which networks of local plans target geographic areas most prone to hazards and evaluate the coordination of local plans. We partner with 1-2 low-capacity communities with higher proportions of low-income people of color to explore the intersection between two types of tools: 1) well-established plan quality evaluation protocols to guide and enhance individual plans and 2) PIRS to guide the coordination of individual plans.

**DR. PHIL BERKE**

**​**

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_26783722b91d48429688b674711002d9.pdf) | [**FEATURED PRESS**](https://www.dhs.gov/science-and-technology/news/2019/05/14/snapshot-vulnerability-reduction-scorecard-helps-cities)

[Video: Coastal Resilience Center – Dr. Phil Berke

Link: <https://youtu.be/L1XrGuowvLI>]

### SOCIAL EQUITY

MARGINALIZED SUPPORT

**A LANDSCAPE STUDY OF SOCIAL EQUITY DATA NEEDS AND ITS ACCESS AND AVAILABILITY TO SUPPORT THE DISASTER RESILIENCE OF MARGINALIZED COMMUNITIES**

**SUMMARY**

This research project identifies how to improve the measurement of outcomes for marginalized communities and help guide investments in those outcomes when developing disaster recovery plans and programs. We apply an exploratory sequential mixed methods design that uses qualitative and quantitative methods to identify indicators that measure and track the well-being and recovery of marginalized populations, such as the distribution of disaster recovery funds.

**DR. CASSANDRA DAVIS**

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_4e7d3e6aa56741d89e143327fc6d1aa8.pdf) | [**FEATURED PRESS**](https://www.axios.com/2022/09/21/climate-disasters-communities-of-color-toll)

[Video: Moving from research to practice : A reflection on…

Link: <https://youtu.be/MPeNujyiUNY>]

### DAMAGE ESTIMATION

SURGE HAZARD STUDIES

**EXPERIMENTAL AND NUMERICAL STUDY TO IMPROVE DAMAGE AND LOSS ESTIMATION DUE TO OVERLAND WAVE AND SURGE HAZARDS ON NEAR-COAST STRUCTURES**

**SUMMARY**

This project demonstrates the effectiveness of the new damage functions developed in Year 1-6 for predicting hurricane surge and wave impacts to residential and commercial structures. We will validate with observed damage data from Hurricane Michael impacts to Mexico Beach, Florida. We will collaborate with LSU and UPRM to incorporate Engineering with Nature (mangroves) in mitigation planning and stakeholder engagement.

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**DR. JOHN VAN DE LINDT**

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_72015424ea364868a543fc619da7bdf3.pdf) | [**FEATURED PRESS**](https://nbc16.com/news/local/could-stilts-help-a-building-survive-a-tsunami-or-hurricane-storm-surge)

[Video: CRC Impacts: Protecting Coastal Infrastructure

Link: <https://youtu.be/35-DtsIkj0k>]

### STRONGER HOUSEHOLDS

A NEW APPROACH

**AN INTERDISCIPLINARY APPROACH TO HOUSEHOLD STRENGTHENING AND INSURANCE DECISIONS**

**SUMMARY**

Regional natural disaster risk cannot be fully managed without addressing the vulnerability of the existing building stock. Nevertheless, two primary mechanisms to manage this risk— insurance and retrofit —are presently underutilized. This interdisciplinary project advances understanding of homeowner insurance purchase and retrofit decision-making and the role it plays in system-wide efforts to manage coastal natural disaster risk associated with the existing building stock.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_5bbfede5e71845b0a21218746c3c1921.pdf) | [**FEATURED PRESS**](https://www.udel.edu/udaily/2022/september/disaster-research-center-16-million-grant-hurricane-harvey-resilience-equity-economic-prosperity/)

[Video: What Affects Post Disaster Business Recovery?

Link: <https://youtu.be/4srIKqiNdJA>]

### RISK COMMUNICATION

MOTIVATING ACTION

**COMMUNICATING RISKS TO MOTIVATE INDIVIDUAL ACTION**

**SUMMARY**

This project applies the Transtheoretical Model (**TTM**) to disaster plans. One-size-fits-all communications for disaster preparedness have been found to produce only 2% action toward increased preparedness annually. This project’s most recently feasibility study produced results showing 38% of participants moved to be taking action in being prepared for severe storms. This was 19 times greater than the one-size-fits-all approach.

**DR. JAMES PROCHASKA**

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**[PROJECT FILE](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_c1d70119f267464e9ab6ecd7e81af938.pdf%22%20%5Ct%20%22_blank)** | [**FEATURED PRESS**](https://www.uri.edu/news/2018/01/uri-faculty-collaborate-to-prepare-rhode-islanders-for-hurricanes-other-big-storms/)

[Video: Coastal Resilience Center – Dr. James Prochaska

Link: <https://youtu.be/s5bBuWpMXK8>]

### ADCIRC FOR PLANNERS

COMMUNITY-BASED DATA

**INTEGRATING CERA-PLANNING SOFTWARE TO DEVELOP HAZUS MODELING AND PLANNING TOOL FOR ADCIRC**

**SUMMARY**

Communities need clear guidance to identify and prioritize vulnerable infrastructure and populations that may be threatened and/or protected to optimize pre-disaster planning and rapid response efforts. We build on previous research integrating ADCIRC Prediction System results with Hazus flood exposure and damage modeling techniques to evaluate the impact of natural hazards to improve planning.

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[Video: Coastal Resilience Center – Dr. Robert Twilley

Link: <https://youtu.be/VbVS1BGC9hk>]

### DISASTER TRACKING

TOOLS INTEGRATION

**IMPLEMENTING THE DISASTER RECOVERY TRACKING TOOL**

**SUMMARY**

Without monitoring recovery and comparing post-recovery status with pre-disaster benchmarks, it is difficult for communities to assess whether or not they are achieving a quality recovery, improving disaster resilience, or building back better. The Disaster Recovery Tracking Tool provides a framework for end users (e.g., planners, emergency managers, long-term recovery committees) to track progress on 79 metrics of disaster recovery.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_1042152890274e3598221f48aa66110f.pdf) | [**FEATURED PRESS**](https://disasterphilanthropy.org/blog/tool-tracking-equitable-recovery/)

[Video: Coastal Resilience Center – Dr. Jennifer Horney

Link: <https://youtu.be/jIH640zw0sw>]

### HOW TO MOTIVATE

OVERCOMING BARRIERS

**OVERCOMING BARRIERS TO MOTIVATE COMMUNITY ACTION TO ENHANCE RESILIENCE**

**SUMMARY**

There is little quantitative information on the ability of communities to adapt to the threat of coastal hazards. This project helps increase community resilience by providing a better understanding of the barriers that communities face in adapting to coastal storm hazards, and by designing and testing interventions that can have the potential to overcome these barriers.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_4932ddf0b38b4b8683c82323b1107e5b.pdf)

[Video: Coastal Resilience Center – Dr. James Opaluch

Link: <https://youtu.be/5XkcUePCYU8>]

### DECISIONMAKER AIDS

CONSEQUENCE THRESHOLDS

**HAZARD CONSEQUENCE THRESHOLD MODELS FOR EMERGENCY MANAGEMENT AND RESPONSE DECISION-MAKING**

**SUMMARY**

Emergency managers need relevant, local-scale information about potential consequences of extreme events in advance of a storm’s landfall. Our approach allows critical facility managers’ expertise about impacts to be integrated in model outputs in the same way that “damage functions” are traditionally utilized to model potential structural or economic damages.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_2333aad2743d45ce83f09262af784240.pdf) | [**FEATURED PRESS**](https://www.tbsnews.net/bloomberg-special/rising-seas-are-next-crisis-worlds-ports-459966)

[Video: The Rhode Island Coastal Hazards Analysis, Mod…

Link: <https://youtu.be/_1wqJhm2CDQ>]

### SUPPLY CHAIN AIDS

STUDYING SUPPORT

**DECISION TECHNOLOGIES TO SUPPORT COASTAL INFRASTRUCTURE RESILIENCE**

**SUMMARY**

The resilience of a coastal community to an extreme event depends upon the resilience of its critical infrastructures, one of which is the system of supply chains that provide the goods and services that make a community livable – Community Supply Resiliency (**COMSURE**). The objective of the proposed research is to better understand, describe, and portray the supply chains that provide the goods and services needed to respond to and recover from an extreme event, such as a hurricane impacting a coastal community.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_6dbebf3ec68240fba22104a179797a66.pdf) | [**FEATURED PRESS**](https://news.rpi.edu/content/2020/06/01/simulations-indicate-heightened-risks-when-pandemic-and-hurricane-season-overlap)

[Video: Coastal Resilience Center – Dr. Al Wallace

Link: <https://youtu.be/sSloSRisr1A>]

### STRESS MEASUREMENT

RESILIENCE PLANNING

**A TOOL TO MEASURE COMMUNITY STRESS TO SUPPORT DISASTER RESILIENCE PLANNING AND STAKEHOLDER/END USER ENGAGEMENT**

**SUMMARY**

This project involved development of a Hazards Stress Test Tool (**HSTT**) that supports coordinated actions in all risk management and mitigation phases involving collaboration between federal, state, local, tribal, and private sector partners. We concluded that the project direction should be adjusted to produce a decision support framework that supports not only planning, but the integration of planning within a broader decision making context including implementation and funding.

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[Video: Coastal Resilience Center – Dr. Larry Atkinson

Link: <https://youtu.be/u3fq5kVdShw>]

### LAND MANAGEMENT

BUILDING BACK

**THE CREATION OF AN OPEN SPACE MANAGEMENT GUIDE FOR FEMA-FUNDED BUYOUT PROPERTIES AND INJECTING THE STUDY AND PRACTICE OF BUYOUTS INTO THE GRADUATE PROGRAM**

**SUMMARY**

The acquisition of hazard-prone housing (i.e., “buyouts”) and the conversion of the land to open space represents one of the most effective risk reduction and adaptation techniques. Limited consideration has been given to the assemblage of useful information and the creation of actionable guidance that informs communities about how to develop and implement an open space management strategy for buyout lands. Our open space management guide fills that void.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_b7218ae3face4084aa3abbeba69a052a.pdf) | [**FEATURED PRESS**](https://design.ncsu.edu/admissions/certificates/disaster-resilient-ped/)

[Video: Gavin Smith – Final

Link: <https://vimeo.com/428860109?embedded=true&source=vimeo_logo&owner=99342759>]

## EDUCATION

### COASTAL ENG. PHD

JACKSON STATE UNIV.

**PHD IN ENGINEERING (COASTAL ENGINEERING AND COMPUTATIONAL ENGINEERING) AT AN HBCU**

**SUMMARY**

This project established and institutionalized a Ph.D program in Engineering (Coastal Engineering and Computational Engineering concentrations) at Jackson State University, a Historically Black College and University (**HBCU**). After formalizing doctoral engineering program concentrations for both Coastal Engineering and Computational Engineering, the program has helped increase workforce diversity in the greater Homeland Security Enterprise (**HSE**) and STEM fields.

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**PROJECT FILE** | [**FEATURED PRESS**](https://twitter.com/nasagoddard/status/994960835960328193)

[Video: Coastal Resilience Center – Dr. Robert Whalin

Link: <https://youtu.be/NzochlIVMBY>]

### MINORITY TASK FORCE

JOHNSON C. SMITH UNIV.

**PREPARING TOMORROW'S MINORITY TASK FORCE IN COASTAL RESILIENCE THROUGH INTERDISCIPLINARY EDUCATION**

**SUMMARY**

During fall and spring semesters, faculty members engaged students each in research activities related to coastal resilience subjects, utilizing relevant software, data analytics, data science to understand natural disasters and find effective solutions. During the summer, 14 students were also engaged over a one-week period in similar research projects.

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[Video: Coastal Resilience Center – Dr. Helen Chen

Link: <https://youtu.be/yQl676Sr6yI>]

### COASTAL STUDIES

TOUGALOO COLLEGE

**EXPANDING AND STRENGTHENING THE INSTITUTIONALIZED MULTIDISCIPLINARY CERTIFICATE: DISASTER AND COASTAL STUDIES (DCS)**

**SUMMARY**

The DCS certificate provides a comprehensive curriculum, which incorporates a multidisciplinary perspective in understanding the nature of disasters and the organizational issues inherent in the planning, preparedness, management, and mitigation of disaster events. The program also provides training in essential interdisciplinary technical skills such as Geographical Information Systems (**GIS**) and provides field experiences for students through internships with end-users.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_be43d62de5734015829cf84b8f8a6524.pdf) | [**FEATURED PRESS**](https://sites.wp.odu.edu/odudhscrcproject/2019/05/28/sumrex2019/)

[Video: CRC Impacts: Educating the Next Generation of…

Link: <https://youtu.be/n7V5V_DC8_I>]

### INFRASTRUCTURE ED.

UNIV. OF PUERTO RICO

**EDUCATION FOR IMPROVING RESILIENCY OF COASTAL INFRASTRUCTURE**

**SUMMARY**

This project focuses on developing formal and informal education opportunities for students, faculty, professionals and the general public. It includes the curation of a curriculum for a Certificate in Resiliency of Coastal Infrastructure, which qualifies participants to assess impacts of natural hazards on coastal infrastructure, the conditions of existing structures and ways to mitigate future damage and potential risks.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_4923e95310464fc8bf6cbd8cb19bf0f2.pdf)

[Video: Coastal Resilience Center – Dr. Ismael Pagán-Trinidad…

Link: <https://youtu.be/EVRWH0J6UFA>]

### DISASTER POLICY M.S.

N.C. STATE UNIV.

**INSTITUTIONALIZING THE GRADUATE CERTIFICATE IN DISASTER RESILIENT POLICY**

**SUMMARY**

This project institutionalizes the Graduate Certificate Program in Disaster Resilient Policy, Engineering and Design at NC State. Key tasks designed to achieve this aim include: 1) conducting a design studio in a North Carolina community focused on identifying the best uses of open space post-buyout, and 2) continuing the analysis of the national survey of State Hazard Mitigation Officers and the comparative study of innovative housing acquisition programs in the United States, New Zealand and Australia.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_cc67ec1b8c744e53bc61ae1b9f6c340c.pdf) | [**FEATURED PRESS**](https://design.ncsu.edu/admissions/certificates/disaster-resilient-ped/)

[Video: Gavin Smith – Final

Link: <https://vimeo.com/428860109?embedded=true&source=vimeo_logo&owner=99342759>]

### FEMA COLLABORATION

INTEGRATING COLLEGES

**INTEGRATING COLLEGES AND UNIVERSITIES IN FEMA DISASTER RECOVERY FIELD OPERATIONS AND STEADY-STATE PREPAREDNESS**

**SUMMARY**

This research project uses Hurricane Michael, a category 5 event which severely impacted counties of the Florida Panhandle, as a case study to examine FEMA engagement with colleges and universities in disaster recovery field operations. The study applies a mixed-methods approach to explore operational processes to identify, engage and leverage technical assistance from institutions of higher education to support disaster-impacted communities and stakeholder perceptions about those processes.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_8f5ac203764742948ca93fff267e6146.pdf) | [**FEATURED PRESS**](https://www.fema.gov/press-release/20210318/famufsu-college-engineering-students-work-fema-state-hurricane-michael)

[Video: North Carolina officials discuss Hurricane Matthew…

Link: <https://youtu.be/mBkeBmGUkVc>]

### DISASTER SCIENCE

LOUISIANA STATE UNIV.

**LSU'S DISASTER SCIENCE AND MANAGEMENT PROGRAM**

**SUMMARY**

The Disaster Science and Management (**DSM**) program at LSU was founded in 2002 as a freestanding minor within the College of Humanities and Social Sciences, with a major in DSM added in 2007. It is designed to train the next generation of Homeland Security Enterprise professionals. Students in the program gain knowledge and skills to address issues of natural coastal disasters and to build resilience to these disasters.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_e082c1c2379b4d439b003cee614d4178.pdf) | [**FEATURED PRESS**](https://www.washingtonpost.com/news/capital-weather-gang/wp/2013/08/29/louisianas-barry-keim-talks-hurricane-katrina-and-life-as-state-climatologist/)

[Video: Coastal Resilience Center – Dr. Barry Keim

Link: <https://youtu.be/T2JHtX7CGlQ>]

### EMERGENCY P.M.P.

UNIV. OF MARYLAND

**DEVELOPMENT AND TESTING OF A PROJECT MANAGEMENT CURRICULUM FOR EMERGENCY MANAGERS**

**SUMMARY**

This project develops and tests an educational and training curriculum that prepares professionals to manage and deliver disaster-related projects. By incorporating modern project management organizational processes, technologies, and skills, emergency managers are able to manage and execute disaster-related projects and meet resilience goals more effectively and efficiently.

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[**PROJECT FILE**](https://947a1871-2b08-4ce3-93a5-f8e6401c6c61.filesusr.com/ugd/ef55d6_1194baee736e4628af1d06afc15af218.pdf) | [**FEATURED PRESS**](https://www.cnbc.com/video/2021/08/30/heres-whats-next-for-first-responders-in-the-wake-of-hurricane-ida.html)

[Video: Coastal Resilience Center – Dr. Sandra Knight

Link: <https://youtu.be/DeovZea6fG0>]

### SUMMER RESEARCH

OLD DOMINION UNIV.

**CONNECTING UNIVERSITIES FOR RESILIENCE RESEARCH ACCESSIBLE TO END USERS (CUR2ATE)**

**SUMMARY**

This project connects university resources – faculty and staff expertise, student interest and learning capacity – with coastal resilience needs of community partners (government agencies, nonprofit and volunteer organizations, businesses, neighborhoods or communities). It provides a comprehensive toolkit for use by university faculty, staff, and students, and partner organizations or groups to pursue collaborative university-community projects focused on addressing coastal resilience issues.

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[Video: 2019 Summer Research Team – Florida A&M University…

Link: <https://youtu.be/BJLr6vn54VU>]

## VIDEOS

### [ABOUT US](https://www.youtube.com/watch?v=fi47LVtCles)

WHAT WE DO

### [THE ROLE OF STATES](https://www.youtube.com/watch?v=SsOdsg1xkcM)

RECOVERY POLICIES

### [ABOUT ADCIRC](https://www.youtube.com/watch?v=Zo8NsVzQm2E)

A CLOSER LOOK

### [HIGHER LEARNING](https://www.youtube.com/watch?v=n7V5V_DC8_I)

UPGRADING EDUCATION

### [VULNERABILITY](https://www.youtube.com/watch?v=iw8ZuV6M_sA)

WHY IT MATTERS

### [PRESERVING ASSETS](https://www.youtube.com/watch?v=35-DtsIkj0k)

A STUDY OF IMPACTS

### [THE NEXT GENERATION](https://www.youtube.com/watch?v=n7V5V_DC8_I)

TEACHING THE NEW GUARD

### [ALL HANDS](https://www.youtube.com/watch?v=IcKPQjoHFCw)

DIVERSITY IN RECOVERY

## PRESS

# Updates

All Posts

Staff

Mar 31 • 2 min

## A New Era in Flood Mapping: FEMA Adopts Our Tech

[Image:

Dead trees standing in a coastal wetlands.]

The Federal Emergency Management Agency (FEMA) hosted to announce and showcase updates to their [Hazus software](https://msc.fema.gov/portal/resources/hazus), including the new [Flood Hazard Import Tool (FHIT)](https://www.fema.gov/sites/default/files/documents/fema_flood-hazard-import-tool.pdf). The Department of Homeland Security [Coastal Resilience Center of Excellence](https://coastalresiliencecenter.unc.edu/) participated in the event and was represented by [Dr. Rick Luettich](https://coastalresiliencecenter.unc.edu/investigator/dr-rick-luettich/), who presented an overview of [ADCIRC](https://adcirc.org/) and the [ADCIRC Prediction System](https://www.adcircprediction.org/)™ (APS™).

The Hazus FIHT is an open source tool that allows Hazus users to rapidly access and incorporate publicly available flood hazard data for flood analysis. FIHT supports the use of ADCIRC storm surge model output, with future plans to add other flood data sources.

ADCIRC, co-developed by Dr. Luettich, is a system of computer program for predicting circulation, water levels and flooding that has been designed to work in complex coastal areas. ADCIRC is widely used within the academic, governmental and private sectors for forensic flood studies, flood hazard delineation and coastal flood mitigation design. The ADCIRC Prediction System provides timely, event-based storm surge guidance to help pre-storm planning and post storm response.

During the FEMA event, Niyam IT, Inc. Geographic Information System (GIS) Analyst Ashley Hoke gave a general overview of Hazus and the latest updates, while GIS developer Colin Lindeman provided a demonstration on how to access and use the new FIHT tool. Risk Analytics Program Manager Doug Bausch dug into more detail on how to use the data within Hazus.

In his ADCIRC overview, Luettich summarized the model’s features and discussed various coastal hazard applications including retrospective studies, hazard studies under past and future climates, and severe storm forecasts. He also noted how ADCIRC can be incorporated into other areas of practice such as planning and design studies.

Luettich also highlighted that significant recent developments for ADCIRC included integrating precipitation to allow representation of compound flooding and shifting toward the use of cloud-based storage and processing. Working in the cloud limits reliance on institution-based computers, greatly increases on demand capacity and improves security and resource stability.

The Coastal Resilience Center continues to develop and expand its expertise in conducting research and education to enhance the resilience of the nation’s people, infrastructure, economies and the natural environment to the impacts of coastal hazards such as floods and hurricanes, including the effects of future climate trends.

Staff

Mar 31 • 1 min

## NPR Covers Our Research

[Image:

A shoreline at sunset.]

Coastal Resilience Center researcher and University of Rhode Island professor of oceanography Dr. Isaac Ginis is featured in [an NPR article](https://www.ctpublic.org/2021-11-16/climate-change-research-new-england) about his team’s new research on the combined threat of rising sea levels and extreme weather focuses on coastal areas in New England. By simulating hazards like flooding with computer models, the researchers say their findings could help prepare communities that are vulnerable to the impacts of climate change.

Staff

Mar 30 • 1 min

## Guiding Communities. Bouncing Back.

Communities deserve a chance to bounce back from natural disasters in a big, green way. That’s why our researchers just published a new guide on how to put certain types of land to use after catastrophes.

After an emergency hits, people need a place to come together. Dr. Gavin Smith has been working with students and fellow researchers to channel resources from federal buyout programs into creating green spaces for people to build community.

Local officials should pay close attention to towns like Grand Forks, ND that built a place for festivals on top of previously flooded neighborhoods. That case study and a dozen others like it are featured in this revitalizing research.

[Download Guide](https://coastalresilience.wixsite.com/coastal-resilience/post/guiding-communities-bouncing-back)