

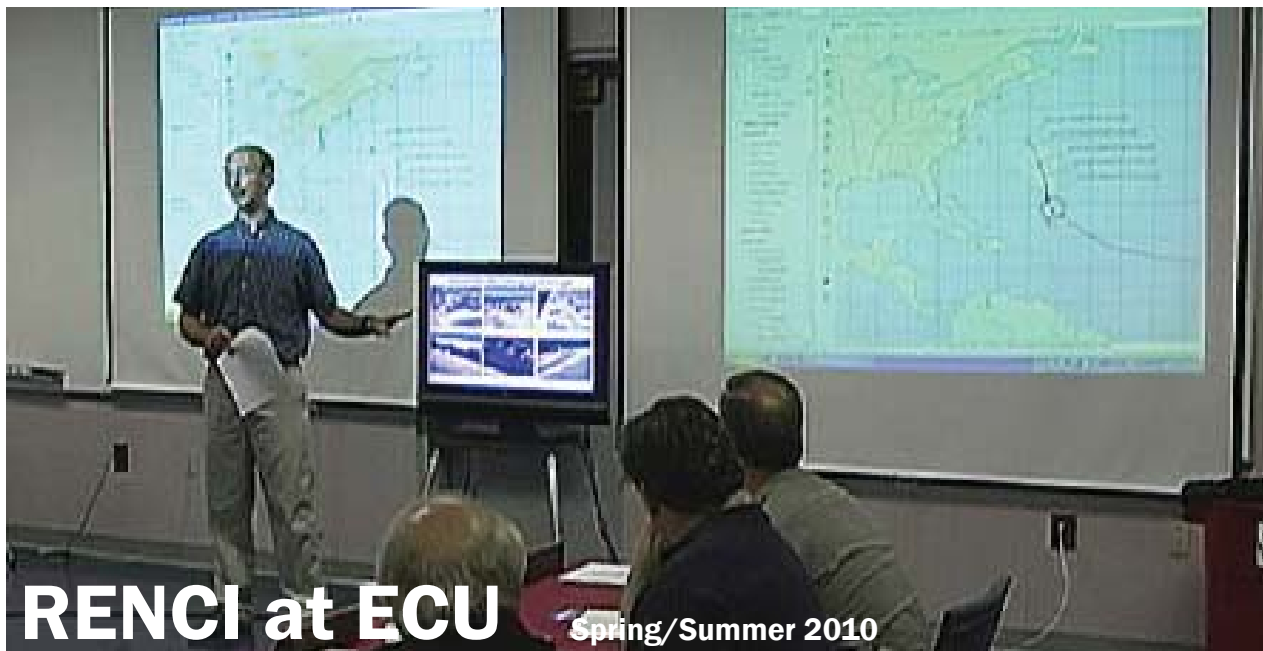
East Carolina University

Coastal Systems Update

Vol. 3.1 Spring/Summer 2010



**Working with Emergency
Management in North Carolina**



Dr. Tom Allen, Director

Coastal Systems Update

Message from the Director

Hurricanes hit somewhere in North Carolina every three years on average. The last severe storm to hit our coast was Hurricane Isabel in 2003. Though it's been seven years since Isabel, North Carolina residents must be ready for disaster every hurricane season. Thus, each year emergency managers have the daunting task of preparing citizens and responders for the potential impact of a hurricane on our state. RENCi at ECU is pleased to be part of these efforts through a variety of projects, partnerships, and outreach efforts. In this issue of *Coastal Systems Update*, we focus on a few of these emergency management-related projects.

At the opening of hurricane season 2010, we partnered with the ECU's Center for Natural Hazards Research and the North Carolina Division of Emergency

Management to bring emergency responders and planners together with federal managers, weather service scientists, and experts in social sciences. The first annual hurricane conference held here at ECU provided a unique opportunity for the emergency management community to focus on planning for the hurricane season using the latest available information and tools. We also worked with Dare County emergency management and the National Weather Service to plan and conduct a hurricane decision-making exercise.

Several of our projects span the crossroads where science meets public understanding. Our Storm Surge Visualization project demonstrates tools that can help managers communicate the devastating effects that hurricanes can have on beachfront communities. You can see our products for Dare County at <http://nccohaz.ecu.edu/stormvis/index.html>.

The BioVis project helps us better understand how people react to maps and other visualizations of storm information.

As we embark on our 5th year, we will build upon our successful engagement efforts, continuing our work with the emergency management community. We're also embarking on new projects that tackle the difficult problem of shoreline erosion, examining both geological processes and the economic implications. We'll be partnering in this research with the North Carolina National Estuarine Research Reserve, the Albemarle-Pamlico National Estuary Program, and North Carolina Sea Grant.

Look for RENCi at ECU at the 2010 National Outreach Scholarship Conference in Raleigh in October, 2010, as we continue our efforts to support research and outreach that improves our understanding of North Carolina's coastal hazards. ■

Cover Photo: Hurricane Workshop Presenters (from left): Dr. Patrick Long, Dr. Catherine Smith, Dr. Burrell Montz, Mr. Mike Sprayberry, Dr. Ken Wilson, Dr. Jamie Kruse, Dr. Tom Allen.

RENCI at ECU and Dare County Emergency Management Conduct Hurricane Decision-Making Exercise

RENCI at ECU director Dr. Tom Allen designed and led an informative hurricane response tabletop exercise for decision makers in several coastal counties on June 8, 2010 in Manteo, N.C. The exercise was planned in cooperation with Dare County Emergency Manager Sandy Sanderson, National Weather Service (NWS) forecaster Rich Bandy, and Virginia emergency management officials. For the exercise, Allen and his team modeled a simulated hurricane named Felix, a major hurricane with land-fall occurring in Dare County, which would trigger a mass evacuation of North Carolina coastal counties and the Hampton Roads, Virginia, area. Sanderson invited a number of officials who would be involved in the event of a real emergency to participate in the interactive evacuation and decision-making exercise. Attendees included local elected officials and their government staff, law enforcement supervisors, the Hatteras National Seashore superinten-

dent and emergency management officials from Virginia. After a welcome from Mr. Sanderson, Dr. Allen presented a brief seminar to update the local officials and staff on the changes to the NWS forecast products and the HURREVAC decision-support tool that were used in the exercise. Of particular interest were changes to the Saffir-Simpson hurricane scale and the timing of watches and warnings issued by the NWS. RENCI at ECU storm surge visualization products were also demonstrated and discussed. The hurricane scenario was presented to the decision-makers as a series of NWS briefings, HURREVAC models, and visualizations as the storm neared the coast. The exercise provided an opportunity for participants to learn about information sources available to them during a hurricane, how and when decisions about evacuation are made, and how communication is maintained. Participants had the opportunity to provide feed-

back about types of information products and communications they found useful and which they need to make decision during a hurricane emergency. Renci at ECU staff, including Stephen Sanchagrin, Technology Coordinator; and Nick Lee, undergraduate student assistant, assisted in developing materials for the exercise and were on hand to help with the technical logistics. The exercise was monitored by RENCI at ECU staff and ECU faculty including Michelle Covi, Outreach Coordinator; Donna Kain, Director of Outreach and Communication; ECU researcher Burrell Montz, Chair of the Department of the Department of Geography. Dr. Allen and the team plan to use input from monitors and participant evaluations to refine and develop new visualization products and plan for future exercises. ■



ECU Hosts the First Annual Hurricane Workshop for North Carolina Emergency Managers

Just before hurricane season, ECU's RENCI Engagement Center and Center for Natural Hazards Research, together with the North Carolina Division of Emergency Management, hosted the first annual Hurricane Workshop for Emergency Managers. About 100 emergency management personnel, ECU faculty, National Weather Service meteorologists, and emergency technology specialists from RENCI attended the May 26, 2010, workshop at The Murphy Center at ECU in Greenville. The workshop focused on technological improvements in hurricane forecasting, response, and decision-making.

Mike Sprayberry, Deputy Director and Operations Chief of the NC Division of Emergency Management, was on hand to welcome the group along with Vice Chancellor Deirdra Mageean and Dean Alan White. Sprayberry also discussed revisions to the Coastal Region Evacuation & Sheltering Standard Operating Guide (CRES-SOG). The CRES-SOG—developed with input from residents, county emergency management, non-profits, transportation officials, and health services professionals among others—is designed to assist all NC counties in developing and coordinating evacuation and sheltering plans.

Joe Stanton, NC Division of Emergency Management (NCEMA) Disaster Assistance Branch Manager and Deputy Recovery Chief, highlighted important issues for recovery planning. He discussed several resources available including a new guide to procedures for different types of disasters and information about state and federal recovery assistance programs.

Updates from FEMA, the National Weather Service, and RENCI

Rebecca Jennings, Hurricane Program Specialist with the FEMA, demonstrated the 2010 version of HURREVAC. The software integrates real-time data from the National Hurricane Center (NHC) and a variety of other data collection points with information from FEMA about human activity. The software can be customized to develop local evacuations clearance times based on factors that emergency managers can select.

Meteorologists from the National Weather Service and specialists from RENCI presented updates on meteorology and storm visualization. John Cole of the NWS explained storm surge modeling including the SLOSH model (Sea Lake, Overland Surges from Hurricanes) and variations, which provide real-time surge forecasting for first response and recovery.

The NWS begins issuing hurricane watches and warning based on SLOSH models 36 hours prior to the arrival of tropical storm winds and subsequently every 6 hours as the storm gets closer.

Bill Sammler, NWS, discussed conditions for the 2010 hurricane season. NWS changes for this year include the elimination of storm surge from Saffir-Simpson scale and the extension of watches and warnings by 12 hours. Watches will be issued at 48 hours and warnings at 36 hours. The public advisory format is also changing to make it easier to read and can be parsed by computer.

Jeff Orrock, also of the NWS, demonstrated tools for probabilistic wind forecasts available from the National Hurricane Center. Three categories of wind speed are used in predictions that take into account combined uncertainty in tack, intensity; and size. The forecasts go out 5 days.

Brian Etherton, RENCI, invited members of the Emergency Management community to participate in a one-year RENCI project beginning this winter that uses social



Brian Etherton, RENCI, and Tom Allen, Director of RENCI at ECU

science, meteorology, and computer science to explore impacts of weather information on the Emergency Management decision process. One goal of the project is to collaborate with the Emergency Management community to get decision making tools to the stakeholder audience.

Tom Allen, Director of RENCI at ECU discussed several tools and initiatives including the NCCOHAZ internet portal that provides access to visualizations, emergency plans, and hazard mitigation plans. One of the featured visualizations is the Inlet opening potential for hurricane Isabel. A new web-based tool in development, SurgeVis, will use SLOSH, Google Earth, and interactive maps to communicate risks of storm surge to the public. Dr. Allen also demonstrated the risk awareness website, Storms to Life, which includes photographs, news clips, video, and timelines of historic hurricanes and interactive features for comparing storms.

ECU Faculty Discuss Weather-related Social Issues Research

ECU faculty presented a panel on social responses to natural hazard risks. Burrell Montz, Chair of Geography, ECU, introduced the audience to WAS*IS, a capacity building movement that aims to integrate social science, meteorology, hydrology and emergency management. The goal is to foster interdisciplinary relationships between emergency management, forecasters, and researchers in ways that can improve emergency management and response.

Jamie Kruse, Senior Advisor for Environmental Social Science, NOAA, and Professor of Economics, ECU, presented preliminary results of a study of risk perception for four types of risks including flood, hurricane, nor'easter, and coastal erosion. Findings of note



include that the number of years people have lived on the coast and level of education have no influence on people's estimation of risk. Understanding how people assess their risks can help those involved in emergency management target messages about risks.

Catherine Smith and Donna Kain, Department of English, ECU, discussed preliminary results of a 2008-2010 study examining emergency communication, plans, and behaviors of residents, businesses and organizations. In the run up to a severe storm, about a third of residents plan to stay, a small number leave, but most people (60%) look for more information.

The study shows that internet lags well behind older media as a source of information. The most important considerations cited in deciding to evacuate were the strength and direction of a storm and mandatory evacuation orders.

Ken Wilson and Christa Reiser, Department of Sociology, ECU, discussed their study of pets and evacuation decisions. The study of residents in 6 coastal counties showed that the most common reasons people did not evacuate were that they did not think the threat was serious enough, that the storm would not affect them, and that they could not leave their pets. Two-thirds of residents have

pets and are less likely to evacuate. Programs to help pet-owners develop evacuation plans for themselves and their pets could encourage over 15,000 people to evacuate who otherwise wouldn't.

Pat Long, Center for Sustainable tourism, ECU, noted the importance to the area of economic activity associated with tourism. Area businesses and seasonal tourists alike are impacted by severe weather emergencies but tourists may be dependent on area businesses for help and information. Typically businesses use crisis management teams and crisis communication teams to make emergency issues as simple as possible. Acceptance of crisis management and crisis planning is growing, but only a minority of businesses that have plans. A recent study in Florida found that only 43% of tourism offices had crisis management plans. These plans are not all professional and the ability to implement plans is in question for many. Emergency management and tourism-dependent businesses need to work together to mitigate the potential of situations negatively impacting local economics and communities.

Plans are already underway for the second annual workshop to be held at ECU in May of 2011. ■

Project Updates

BioViz Project investigated peoples' reactions to visualizations of hurricane warnings

How do people understand visual representations of storm information? What types of images convey information most effectively? Which might work best to convince people to take the actions that will best protect them in the event of a severe weather event? ECU researchers Nick Murray, Tom Crawford, Tom Allen, and Donna Kain are looking for the answers.

Project Bio-Viz is a multidisciplinary research effort at RENCI at ECU examining how people interpret hurricane forecast maps. The project links hurricane modeling, cartography and geovisualization, visual motor research, and risk communications specialists. Research subjects are shown different types of hurricane forecast maps and visualizations of

potential storm surges. While they are looking at the maps, staff simultaneously collect biometric data (e.g., eye-tracking, heart rate, facial muscle movement, and brainwaves) and quantitative and qualitative questionnaire responses.

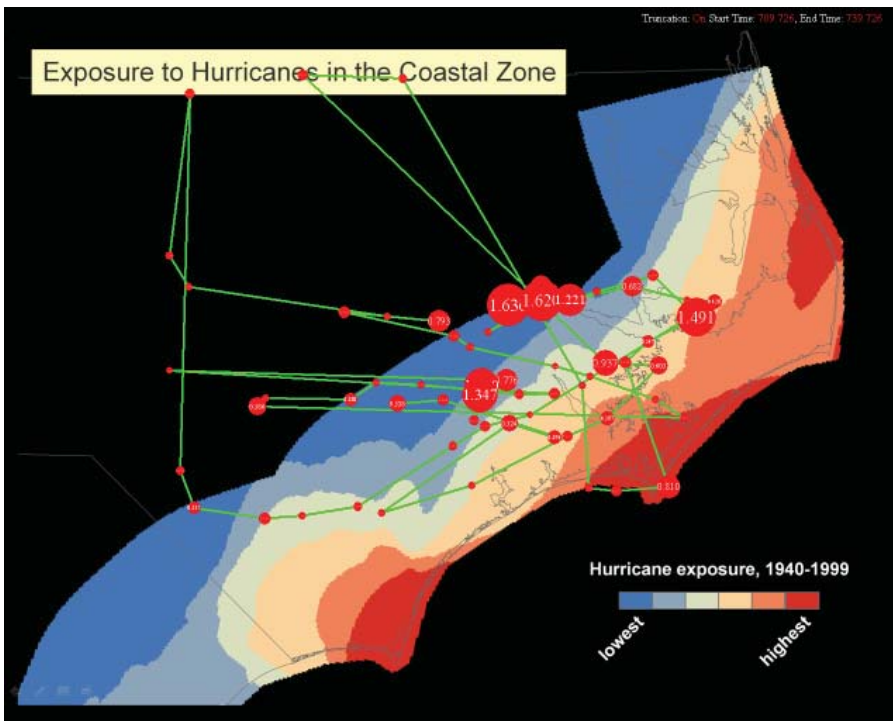
The project begins with the analysis of the hurricane "Cone of Uncertainty," alternative map designs, storm surge visualizations, and scenario-based evacuation decision-making. By understanding how people perceive and react to these maps, we hope to learn and inform forecasters and emergency managers how they can better communicate risks in the future. ■

New Directions for 2010-2011: Examining Coastal Erosion

Over the upcoming year, the RENCI at ECU team plans to investigate and integrate observations of estuarine and ocean shoreline change, and these data and insights will be merged with social science research. We will examine spatial and temporal variability in estuarine shoreline erosion and using a vast existing dataset on ocean shorelines, statistical trends will be analyzed for modeling purposes. In addition, three-dimensional landscape and seascape dynamics will be examined using a suite of state-of-the-art instrumentation at ECU to document and understand changes comprehensively to help answer questions about how barrier islands are being reshaped or moved.

The RENCI at ECU social sciences group will be investigating the needs and costs of beach nourishment in North Carolina using an economic model that will be developed using historical data, beach volume equilibrium profiles, fixed capital costs and property valuation models. The project would make use of RENCI at ECU's mapping and visualization technology to improve the geophysical dimension of the model with the goal of helping beach managers optimize renourishment schedules.

RENCI at ECU will continue to focus on engaging with the community by developing integrated visualization models and improving our understanding and methodology for conveying uncertainty in erosion models. ■



News & Events

Other news

RENCI ROVER at Amateur Radio Field Day

Dr. Paul Fletcher and the RENCi at ECU ROVER participated in the annual Emergency Field Day exercise in Greenville on June 28, 2010. Sponsored by the Brightleaf Amateur Radio Club, Field Day allows amateur radio operators to practice their emergency communications skills in conditions designed to simulate an emergency such as the aftermath of a severe hurricane. These conditions make it necessary to use vehicles with generators, like the ROVER, which is equipped with radios and antennas to allow communications even when land lines and cell phones are not available. ■

Report on Hazardous Weather Risk Communication Available

Director of Outreach and Communication, Dr. Donna Kain, along with her colleagues,

Dr. Catherine Smith and Dr. Ken Wilson have released preliminary results of their study, Hurricane Risk Perception and Emergency Communication Effectiveness in Coastal Zones, funded by North Carolina Sea Grant. Reports and presentations can be found at <http://www.ecu.edu/riskcomm>.

Presentations at The Coastal Society Conference

RENCi at ECU Director, Dr. Tom Allen presented “Geovisualization Strategies to Analyze and Communicate Inundation Risk from Storm Surges” and moderated a session focusing on GIS applications to Coastal Problems at the International Conference of The Coastal Society at the Wilmington, NC Hilton on June 14th. Also presenting at the conference were Director of Outreach Donna Kain and Outreach Coordinator Michelle Covi, who presented “Planning for Hurricanes In North Carolina: A Typology of Organizational Decision Making”. ■

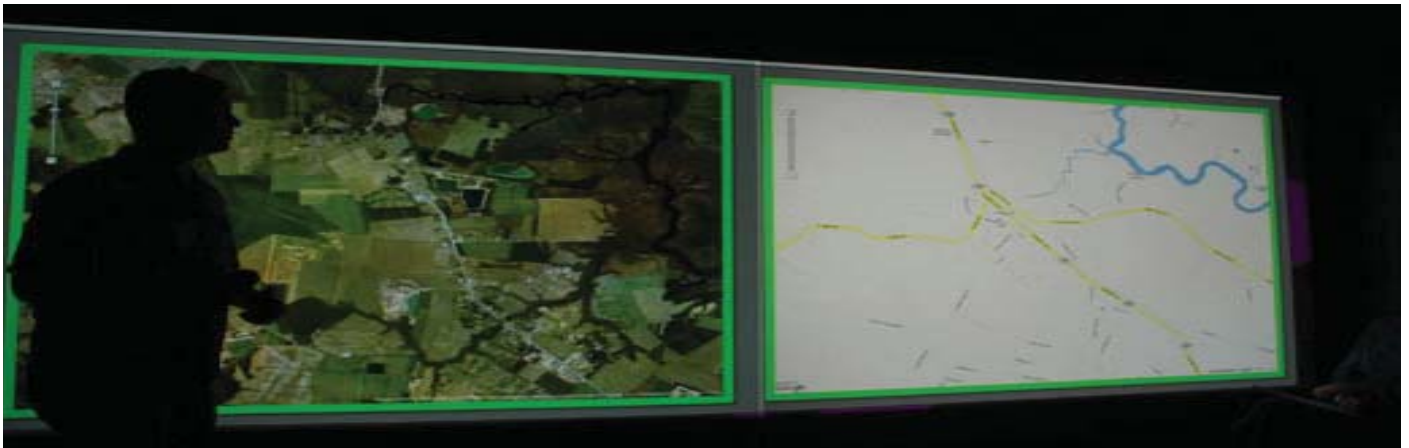
2010 Visualization Challenge Winners

The Visualization Challenge hosted by RENCi at ECU drew excellent presentations again this year. The winners of the Challenge were Ronald Sessoms, undergraduate winner, for “Town of Nashville, NC: Barnes St. Design Proposal,” and Robert J. Howard, graduate winner, for “Investigating the Hydrological Impact of Agricultural Ditches Thru Flow Visualization, Flood Mapping in Currituck County, NC.”

Other Challenge participants included:

- Devon Eulie: Sediment Resuspension in the Pamlico River Estuary: A preliminary investigation
- Andrew Dietsche: Stratigraphy of Core Sound
- Dimitri Quafisi: 3-D visualization sedimentation along the Tar River.
- Stephen Andrew Anstine: Lidar imaging of Ocracoke Island

Winners were recognized at the ECU Research and Creative Week Award Luncheon. ■



Geology graduate student Robert J. Howard presents his project at the Visualization Challenge



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Recent & Upcoming Events

Dare County Hurricane Exercise

June 9
Manteo, NC

NC Arc User Group Conference

September 15-17
Carolina Beach, NC

The Coastal Society 22nd International Conference

June 13-16
Wilmington, NC

2010 National Outreach Scholarship Conference

October 2-6
Raleigh, NC
<http://www.ncsu.edu/project/OPDWebSpace/2010OSC/>

NOAA Sea Level Rise Project Meeting

July 26-27
Greenville, NC

AutoCarto 2010/ASPRS Conference

November 15-19
Orlando, FL

NC Estuarium Program

August 17
Washington, NC

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