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41°N

RESILIENCE

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41° N

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ABOUT 41° N
41° N is published twice per year by the Rhode Island Sea Grant College Program and the Coastal Institute at the University of Rhode Island (URI). The name refers to the latitude at which Rhode Island lies.

Rhode Island Sea Grant is a part of the National Oceanic and Atmospheric Administration and was established to promote the conservation and sustainable development of marine resources for the public benefit through research, outreach, and education.

The URI Coastal Institute works in partnerships to provide a neutral setting where knowledge is advanced, issues discussed, information synthesized, and solutions developed for the sustainable use and management of coastal ecosystems. The Coastal Institute works across and beyond traditional structures to encourage new approaches to problem solving.

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THE UNIVERSITY OF RHODE ISLAND
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STAYING AFLOAT

HOBOKEN, N.J., HAS COME A LONG WAY SINCE IT WAS STRUCK BY Superstorm Sandy in 2012. The city—at a square mile, similar in size to Central Falls—saw 20,000 of its 50,000 residents stranded by rising water during the storm, and its subway famously flooded.

Hoboken's city manager, Stephen Marks, spoke at "Staying Afloat: Adapting Waterfront Business to Rising Seas and Extreme Storms," the 2014 Ronald C. Baird Sea Grant Science Symposium, about measures the city is taking to deal with future storms—including installing flooding pumps, designing parks and playgrounds to hold stormwater, and creating a "community emergency response team" of volunteers who can deliver food, water, and medicines to stranded neighbors. These actions are part of the city's ambitious nine-point resiliency strategy that includes infrastructure, outreach, and zoning efforts.

Other symposium speakers talked about actions being taken in Rhode Island, from adding resiliency to existing buildings, such as by installing floodwalls, to reimaging existing coastal businesses that were devastated by Sandy, and rebuilding them in different ways—for instance, turning a café into a mobile operation that can be moved from its shoreline location in the event of a storm.

This issue of *41°N* looks at coastal resiliency in Rhode Island and elsewhere, and what the issues are in protecting property ranging from ports to private residences. Let us know what you think: Write to us at 41N@gso.uri.edu. We'd love to hear from you!

—MONICA ALLARD COX
Editor

Read more stories from the symposium at seagrant.gso.uri.edu/special-programs/baird/.

On the cover:
In this photo taken on October 30, 2012, a parking lot full of yellow cabs in Hoboken is flooded as a result of Superstorm Sandy. © AP Photo/Charles Sykes

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A man walks past cottages that were destroyed by Superstorm Sandy in Matunuck, October 30, 2012.
Photo © REUTERS/Jessica Rinaldi

maps. Such strategies require patience to navigate the FEMA system and homeowners must cover the cost of a surveyor. Retrofitting low-lying homes can be a costly endeavor. Both the financial costs and time commitment may discourage homeowners of modest means.

At the national level, U.S. Senator Jack Reed (D-RI) successfully included an amendment to the Grimm-Waters 2014 law directing the federal government to explore implementing a program that would essentially allow communities to purchase blanket flood insurance for properties. Reed argues that by collectively sharing the risk, the costs would be spread out.

Already the National Flood Insurance Program allows communities to participate in the Community Rating System. The voluntary program offers premium discounts of 5 percent to 45 percent for homeowners in communities that implement floodplain management measures that exceed the minimum set by the federal government. In Rhode Island, five of the state's 39 communities partake. The participation of Bristol, Middletown, Narragansett, North Kingstown, and Westerly reduces premiums for some residents between 5 percent and 10 percent.

Real estate agents are quick to market such discounts and agents have started highlighting in listings when homes stand outside a floodplain. The local Realtors association has brought in Burnett and researchers to talk to agents about flood insurance and the costs of living on the coast.

In the public sphere, debate over the financial and environmental costs of installing seawalls and the like are leading to heated public meetings and pointed editorials. However, no one has found a solution that protects the environment, satisfies homeowners, and keeps costs under control.

"It's daunting," says Freedman, the geologist. "There are lots of decisions to be made on what to do. But at least if people recognize climate change and sea level rise are a threat they can sit down and work out what can be done about it."

Taking on Coastal Erosion in the Less-Developed World

TRADITIONAL FISHERIES, IMPOVERISHED COMMUNITIES BEAR BRUNT OF THE IMPACTS

by **Carol McCarthy**

IT'S A FAMILIAR BEACH SCENE: A CHILD DIGS HER FEET INTO THE WET SAND AT the water's edge, bracing herself to create a barrier between her sandcastle and the breaking waves. Adults look on from their blankets and low-slung chairs, knowing all along how this will end. Inevitably, the child is no match for the unceasing waves, and they devour her creation.

That scenario, magnified many times, plays itself out every day on coastlines around the globe, where accelerating erosion relentlessly scrubs away at the creations of both people and nature. Rising sea levels, burgeoning populations, and rapid coastal development have created conditions that threaten everything from sandcastles to skyscrapers, ecosystems to economies. And those threats reso-

A boy stands by a house in Ghana that is being claimed by the sea.
Photo © Nyani Quarmyne/Aurora Photos/Corbis

"WE ASK THEM, 'FIFTY YEARS AGO, WHERE WAS THE SEA?'"

nate on a large scale: the United Nations Atlas of the Oceans reports that 40 percent of the world's population lives within 60 miles of a coastline. That's about 2.8 billion people.

Coastal environments and the hazards that threaten them are, by their nature, perpetually dynamic and shifting, not fixed on any map. Addressing coastal hazards requires methods that are easily adaptable to changing circumstances, and that view problems and solutions from multiple perspectives. That's the approach the Coastal Resources Center (CRC) at the University of Rhode Island's Graduate School of Oceanography takes in its work of fostering resilient coastal communities here in Rhode Island and in nations half a world away.

CRC's founding work focused on Rhode Island, and the center applies the coastal management expertise developed in the state to resilience and climate change work in the less-developed regions of the world. In these nations, poverty, lack of resources, and scanty education are often the norm, and the notion of self-government largely remains foreign.

"We're starting from scratch there," Don Robadue, a senior coastal manager at CRC, said of the center's work in less-developed nations. "But we see relevance and transferability. The jobs are the same."

Despite such stark differences between Rhode Island and say, sub-Saharan Africa where CRC has a large presence, coastal threats and the work to combat them share similarities. Coastal communities in Rhode Island and abroad have suffered erosion and seen natural buffers—including dunes, wetlands, and forests—removed, paved over, or otherwise destroyed. And pressure from businesses, industries, and governments to build economies and create jobs regardless of the expense to fragile ecosystems is universal.

In the face of these challenges, CRC works with local people on climate change-related policies, laws, planning, and practices in a collaborative way that engages interested parties from all spheres of the community.

In a project that recently wrapped up in Tanzania, CRC and its local partners focused on adaptation actions that employed local skills rather than large-scale, expensive efforts that require outside expertise. They conducted vulnerability assessments in coastal villages where tourism is an important industry and followed these up with achievable adaptation plans focused on beach erosion. A village climate change committee worked with local hotels to plant stretches of native grasses along beachfronts. Other coastal villages decided to focus on improving their food security by testing new, climate-resilient agricultural practices.

In Ghana, the challenges are many. Floodplains, where shacks house the poorest of the poor, are more frequently and severely inundated from sea level rise than other homes, putting hundreds of lives in jeopardy. There also is intense pressure to protect shoreline property that has become valuable for its proximity to the nation's burgeoning offshore oil and gas industry, which has been a major contributor to the doubling of the population in five years. Having discovered that breakwaters, seawalls, and other barriers often fail and are not affordable, communities are grappling with other solutions. Such actions include protecting mangrove habitats along the shoreline that form a natural barrier and stemming the longtime practice of "sand winning"—the removal of sand from beaches for construction use.

The CRC-led project worked with leaders in the Ahanta West District who approved by-laws for wetlands conservation in four crucial areas, creating a model for other districts in Ghana's Western Region. That region's Shama District adopted a shoreline management plan that maps physical resources and assesses vulnerability. It is the first of its kind in the nation. These efforts have mobilized communities to take action. District-level "toolkits" for coastal management created during the project have given communities the knowledge and the confidence to push back against developers and to map areas for designated use or protection against erosion and environmental degradation. Leaders in all six districts are talking about ways to integrate their efforts across the region to achieve greater results.

Because of what the Ahanta West District accomplished, Ghana's national government is now requiring all districts to adopt shoreline management plans, said Kofi Agbogah, director of Hen Mpoano (Our Coast)—a Ghanaian non-governmental organization that grew out of the project.

Hen Mpoano has relied on personal relationships with traditional village leaders, media outlets, and even a radio soap opera to inform, entertain, and persuade

A woman in Ghana participates in efforts to clear a choked waterway. Ghana is requiring all districts to adopt shoreline management plans.
Photo © Nyani Quarmyne/Aurora Photos/Corbis

people to act—whether in a shaky floodplain shack or the posh office of the president. "People were glued to their radios on Tuesday nights," Agbogah said of the program that wove illegal fishing, shoreline sanitation, and coastal issues into a story line rich with tales of love, bribery, and corruption.

The reality of climate change does not have to be taught to even the poorest people abroad with the least amount of formal education. "We ask them, 'Fifty years ago, where was the sea?' They say: 'Three hundred meters out, today it is here.'" Agbogah said. "So they know it is moving and it is going to move. They are living it day by day."

Karen Kent, a senior coastal manager at CRC and project manager for The Gambia project, agreed: "People there (in Africa) are much closer to it. They might say, 'this tree used to bloom in April and we'd know that it was time to plant our rice, now it blooms earlier.'"

Coastlines are on the frontlines of climate change impacts, where rising oceans collide with people and society. And the cost of those impacts can tally up quickly in loss of life, degradation of ecosystems, and harm to livelihoods that can ripple outward to larger economies. In Rhode Island, loss of wetlands to sea level rise hurts recreational and commercial fishing and leaves communities more vulnerable to the effects of coastal storms. In Ghana, the exploding population and energy industry create intensified demand for shoreline development in increasingly riskier locations, potentially putting lives in danger and threatening livelihoods, such as fisheries.

Mapping and protecting wetlands and floodplains that absorb storm surges in Rhode Island or creating and enhancing natural buffers to strengthen shorelines in Tanzania are coastal resilience measures that can help guard against the impacts of climate change. And these efforts can be replicated in and expanded to other vulnerable communities.

What works in one place might need to be tailored to a local community's needs and abilities or implemented differently to succeed. But clearly, what won't work is standing still and hoping the waves won't erase all that people cherish along the coast.

THE WORD IS SURGE

by **Elaine Lembo**

Aerial Photograph by **John Supancic**

INDUSTRY EXPERTS AND MARINA owners say the nation's recreational boaters should note one major lesson from the historic $675 million in damages inflicted on them from Superstorm Sandy: surge, in addition to wind and wave strength, must be factored into vessel preparation.

National weather officials have debuted surge-mapping as part of real-time forecasting this storm season (see www.hurricane.gov), which may make it easier to prepare for storm surge—the abnormal rise of water generated by a storm, over and above predicted tides. And at the same time, heeding Sandy's warning, Rhode Island's recreational marine community, from Block Island to Barrington, is poised to respond to the risk.

Certainly, had marinas in low-lying areas of New York, New Jersey, and Connecticut had the advantages of greater piling height and hardstand elevation in combating storm surge of 10 feet or higher with an additional 4 feet of waves, the postscript from Sandy might have been written differently.

Consider the summary after a field review of the U.S. East Coast by a catastrophic event assessment team from BoatU.S., a national advocacy group and insurer: "Every method used for securing large numbers of boats for Sandy had significant risks simply because so much of the marina infrastructure wasn't designed for surge of this magnitude," wrote Beth Leonard, BoatU.S. technical editor. "This will quite likely change as marinas rebuild, and going forward, understanding the surge risk in your area, picking a marina with that in mind, and preparing your boat for both surge and wind should ensure that fewer boats are damaged or destroyed."

So how well are marinas and mooring fields in the Ocean State prepared for surge?

If conversations with stakeholders in the three renowned Narragansett Bay destinations of Newport, Jamestown, and Barrington are any measure, not only do Ocean State boaters benefit from a high level of awareness, they're ahead of the curve on surge as well as many other aspects of storm prep.

Newport Harbormaster Tim Mills, Conanicut Marine founder William Munger, and Brewer Cove Haven Marina general manager J. Michael Keyworth are in charge of different types of refuges. Newport, a world-renowned open roadstead of an anchorage, has more than 900 moorings in addition to traffic from cruise ships, ferries, cargo containers, and transient boats. Conanicut Marina is situated in Jamestown, on Conanicut Island, at the mouth of the bay. Brewer Cove Haven Marina is tucked in farther up the bay in Barrington, off protected Bullock Cove.

Each of these locations experiences different risks from storm surge and wind and offers different benefits to boats that are moored there. Varying factors at each harbor site that impact the risks to boats include topography, prevailing wind direction, water depth, the state of mooring tackle and population of the mooring field, the ground level of hardstand facilities where boats are hauled in the offseason, piling height, and fixed versus floating docks.

Rhode Island marina industry members say they are well prepared for storm surge, but boat owners should plan ahead as well. Melville Boat Basin, Portsmouth

WHAT BOAT OWNERS SHOULD KNOW AND DO BEFORE A STORM HITS

1. Expect your marina or municipal anchorage to have a storm emergency plan; understand it thoroughly six months ahead of hurricane season. Know the area's vulnerabilities and have an alternative plan. Owners of small boats may consider having them hauled; larger sailboats and megasized power yachts may benefit by relocating to the protected Kickemuit River, New Bedford, Mass., or to New York's Hudson River, Munger advised.

2. If you choose to keep your boat on a mooring, ensure that the mooring tackle is sound and the pennant—the line connecting the buoy to the boat—has anti-chafe gear. Also, realize that "it's the guy upwind of you that will be the problem," Mills said, particularly if that person's vessel isn't properly secured.

3. If you are tied to a fixed slip, dock, or pier, use long breast lines—the lines connecting the side of the boat to the fixed structure—"so the boat can go up and not get impaled when it comes back down," Munger said. Floating docks that move with the rise of water are increasingly seen as a desirable alternative.

4. If a storm's coming, be a responsible property owner. Take advantage of the many reliable sources of information about boat prep.

5. Marina owners and managers should constantly upgrade facilities. Keyworth, who has drafted plans based on his study of damage done by dozens of hurricanes, has spearheaded the upgrade of his yard. "We have to be aware of surge," he said. "I've had the good fortune of being able to reconfigure the facility. The docks are stronger and the pilings are higher. If you want to stay in business that's what you have to do."