Scientists study effects of superstorm Sandy

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Photo credit: Doug Kuntz | A breach in Fire Island is shown. (Dec. 20, 2012)

Researchers and scientists with institutions from North Carolina, Texas and New York are rushing to study the storm's impact on barrier islands, tides, beaches, water quality, marshes and more.

Consider Long Island a petri dish of superstorm Sandy's power.

"We're in a moment in time when there is an opportunity to do something really big and meaningful," said Nate Woiwode, a policy adviser at The Nature Conservancy of Long Island.

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The studies have been undertaken with a sense of urgency to learn as much as possible about Sandy's impact before evidence is lost to time and tides. That immediacy has pushed dozens of researchers to launch studies on water, on shore and in labs -- with or without guaranteed funding. Much of it is science by credit card while they await funding, researchers said.

What they learn isn't just academic. The findings can help political leaders set the future of Long Island by determining how and where to rebuild and manage resources, researchers said.

"If these things [storms] become more frequent and more intense, we really have to recalculate how we look at these issues," said Jim Ammerman, director of New York Sea Grant program, which is screening Sandy-related grant proposals.

The organization has already funded a study of the breach in Fire Island's wilderness area and another focusing on the effects of the Bay Park Sewage Treatment Plant's release of raw and partially treated sewage into waterways for weeks after Sandy.

While the data's being collected now, the results will take some time, Ammerman said.

FIRE ISLAND

The Fire Island breach has attracted several studies, from analyzing how sand was moved and where it was deposited to determining the impact on salinity in Great South Bay and tide changes in Bellport Bay.

Sea Grant has funded the work of Charles Flagg, a research professor at Stony Brook University's School of Marine and Atmospheric Sciences, to study temperature, salinity, sea level, chlorophyll amounts and the clarity of waters impacted by the Fire Island breach. Preliminary results show that salinity has risen in Bellport Bay and high tide is arriving 20 minutes earlier than before Sandy, Flagg said.

Christopher Gobler, also a professor at School of Marine and Atmospheric Sciences, is examining water quality changes in Great South Bay. Like Flagg, he's checking temperature and salinity but also looking at dissolved oxygen and the population of phytoplankton in the water. High levels of phytoplankton can lead to algal blooms, choking off oxygen and creating brown tides.

The breach is an opportunity to look at the bay in a new light, Gobler said. "It [the breach] has the potential, if it stays as is, to really change many aspects of the ecology of the Great South Bay going forward," he said.

But the additional ocean access could bring challenges to the bay, especially to shellfish beds. "There is always the law of unintended consequences," he said. "What ocean predator will be able to make it into Great South Bay?"

BARRIER ISLANDS

A team from the University of Texas at Austin's Institute for Geophysics this month is studying the storm's effect around barrier islands, including Fire Island and Long Beach.

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Working with Adelphi University, Stony Brook and City University of New York researchers, the team is using radar and seafloor mapping technology to determine where and how deeply sand was deposited, and how the ebb, or receding tide, affected areas.

The University of Texas has a "rapid response" fund dedicated to deploying teams quickly to gather data, said John Goff, a senior research scientist at the institute. The cost will probably be about $150,000, he said.

"We didn't want to wait for a bunch more storms to change the sea floor," Goff said. "We want to know where the storm is ripping up sediment, where it is depositing sediment."

More funding will be needed to analyze data, but the information is key. "If we didn't have the data, we couldn't ask for money," Goff said.

The first part of the study covered Fire Island and the second part will focus around Long Beach. Adelphi has preliminarily obtained National Science Foundation funding to measure sediment changes, map debris, test for metals such as mercury and look for traces of sewage in sediments, said Beth Christensen, director of the Environmental Studies Program at Adelphi.

SEWAGE TREATMENT PLANT AND FLOODING

In addition to the Sea Grant and Adelphi work, Gobler and his team will be looking a nutrient levels and disease-causing pathogens and have already found elevated numbers of the latter. "Right now we're looking at how the compromised plant is affecting water quality," he said.

The bacteria's effect on clam activity, fish migration and sea grass growth will probably be evident in warmer months, he said.

Another study is measuring the impact of flooding around Long Island, which varies by location. "We're trying to get an idea of what the different magnitude is," said Jay Tanski, a coastal specialist with Sea Grant. "If you thought it [Sandy] was a 100-year storm and that was really a 40-year storm, it could impact what you rebuild."

MARSHES AND DUNES

The Nature Conservancy is looking at how marsh systems are related to flood impacts on communities. Marshes serve as natural barriers and can minimize wave impacts and the health of the marsh can determine flood impacts on land, said Woiwode.

"There was some benefit to communities that had marshes in front of them," he said. "There are a whole bunch of benefits to healthy coastal ecosystems in place."

The conservancy, in partnership with Western Carolina University in Cullowhee, N.C., is also looking at the effectiveness of natural beach dunes versus engineered dunes.

Knowing what natural or man-made systems worked and protected is critical to preparing for future storms and impacts from rising sea levels, another study area for the Conservancy, Woiwode said.

"If we're going to manage resources in a changing environment, we should know if they can keep pace," he said.