Coastal wetlands may not impede hurricane storm surges

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The long-held belief that coastal wetlands help protect communities from flooding during hurricanes has been called into question, casting doubt on one of the benefits of restoring wetlands.

Back in 1964, the US Army Corps of Engineers estimated that tropical storm surges lose about 7 centimetres in height for every kilometre they travel over coastal wetlands.

This rule of thumb has since been cited extensively by government and advocacy groups to support the case for regenerating wetlands in Louisiana, which has lost 1.3 million acres of marsh since the 1930s.

Last week, however, an expert panel of 26 coastal scientists announced that the data used to derive this rule is flawed.

Evidence that wetlands mitigate storm surges must therefore be considered shaky, Robert Young at Western Carolina University, Cullowhee, told the Joint Annual Meeting of the Geological Society of America in Houston, Texas.

Most studies that have explored how the landscape affects storm surges have been based on the high watermarks left on the insides of buildings after a flood.

Talking sensors

However, relying on these marks tends to underestimate the level of the flood water, says Abby Sallenger of the US Geological Survey in St Petersburg, Florida. “They’re not reliable, and you can’t always find watermarks where you need them,” he says.

Watermark measurements are used by coastal scientists to judge the performance of their computer predictions.

These complex simulations, which take hours to run on a supercomputer, work by dividing up satellite images of the landscape into small squares, each of which is then assigned a roughness value corresponding to the terrain type and the degree to which it impedes water flow.

The accuracy of the model is then tested by “hindcasting” the calculated water flows against historical watermark data.

One way to improve the quality of data used to check these models could be to use sensors that detect when they have been submerged, says Michael Turco of the US Geological Survey in Houston, Texas.

Since hurricane Rita in September 2005, Turco's team has raced into the paths of incoming storms to strap sensors to pilings and other structures likely to survive the high winds. In future, scientists would like to install lines of sensors along the path of the surge to measure changes as it travels.

Valuable habitat

Turco is still analysing data from 100 sensors he placed along 600 kilometres of coast during hurricane Ike last month, which he says could shed light on how wetlands there affected the storm surge.

For now, the government of Louisiana needs to start making back-up plans to relocate communities at risk of flooding, Young says. "Wetlands restoration is important, but to believe that we're going to be able to engineer our way out of this is hubris."

This is a sensitive issue among Louisiana residents, who point out that the state's fishing and oil industries depend on its coastal communities.

Windell Curole, director of the South Lafourche Levee District on the coast south of New Orleans, says that wetlands may shield against smaller storms and the everyday erosion of levees by waves. He also points out that the marshes provide a habitat for alligators and other species.

However, every scientist approached by New Scientist suspects that marshes provide little protection from the biggest storms – a view that Curole concedes is probably true. "Some advocates want to overstate the point; what we need more than anything else is the truth," he says.