

North Carolina could lose up to 40% of its wetlands to sea level rise by 2070, new study shows

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Sea level rise poses a grave threat to salt marshes and other coastal wetlands along the North Carolina coast, according to a newly published

study.

North Carolina and Louisiana are the only two states that could lose [coastal wetlands](#) under virtually any sea level rise scenario. The study was published in the journal *Environment Research Communications*.

"North Carolina may benefit a lot from different [wetlands](#) protection measures, but it also needs to prepare for a world with fewer wetlands and think about what that looks like," said Climate Central CEO and chief scientist Ben Strauss, who was one of the study's authors.

The Climate Central team produced a [mapping tool](#) that can show estimates for different sea level rise and land use scenarios. For example, if the world meets the 2015 Paris Agreement target of keeping global warming to 2 degrees Celsius (about 3.6 degrees Fahrenheit) and North Carolina fully develops its coast, Climate Central found it could lose about 40% of its coastal wetlands by 2070 and 62% by 2100. If North Carolina fully conserves its coastline under the same scenario, Climate Central estimates that it could increase wetlands 42% by 2070 and 41% by 2100.

North Carolina's 220,000 acres of salt marsh offer a wide variety of benefits from providing habitat for juvenile fish to taking the force out of waves during hurricanes. Salt marshes naturally migrate inland, but many have struggled to keep pace with quickly rising sea levels. And when a bulkhead or home is built alongside a marsh, that migration becomes impossible, dooming the ecosystem.

A McClatchy report last year found that there has been a 22% increase in developed land within a half mile of [salt marshes](#) across North Carolina, South Carolina and Georgia since 1996. Since 2009, North Carolina regulators have approved about 3,300 permits for bulkheads.

The Climate Central study indicates that while wetlands up and down the North Carolina coast would be imperiled by sea level rise, the northeastern part of the state faces greater risk.

"Our analysis amounts to, simply don't develop lowlands adjacent to these wetlands," Strauss said. "That's all it is."

Letting salt marshes move

The findings come as little surprise to groups who have been working to preserve North Carolina's coastal wetlands. The Coastal Federation, for example, has long touted the benefits of living shorelines—marsh sills that allow sediment to build up along the coastline in an effort to help salt marshes keep pace with rising seas.

Kerri Allen, a coastal advocate who manages the Federation's Wrightsville Beach office, said wetlands play a vital role in North Carolina's coastal economy.

"Without healthy wetlands we don't have healthy waterways, we don't have [clean water](#), we don't have beaches that people want to come swim in," Allen said.

Allen agrees that purchasing large parcels of undeveloped land or placing conservation easements on targeted parcels could play a key role in wetlands preservation.

"That is really going to be an important tool in that toolbox," Allen said, "and really one that I think is not discussed as often as it should be when talking about sea level rise and climate change and our vulnerability here on the coast."

The Coastal Federation started such project in 1999 with the North

River Wetlands Preserve. The 6,000-acre Carteret County tract was once a working farm, but wetlands across much of the land have been restored or preserved.

Pew Charitable Trusts has supported the Southeast Regional Partnership for Planning and Sustainability's South Atlantic Salt Marsh Initiative. That effort, which launched in May 2021, has set out to conserve a million acres of salt marsh from North Carolina to Florida by working with a broad range of groups from the Department of Defense to the Gullah/Geechee Nation.

Leda Cunningham works on coastal issues for the Pew Charitable Trusts and is based in North Carolina. Cunningham said the state is an example of a place where it is important to not only consider and protect where marshes are today, but where they could be in the future.

The patchwork of interests that own land along and adjacent to the coast can make that difficult.

"Coastal communities really stand to gain by protecting their shorelines, especially with green infrastructure," Cunningham said. "This is about our own communities' survival."

Measuring salt marshes

Hannah Sirianni, an East Carolina University coastal geographer, has set out to measure wetlands, particularly around the Swanquarter National Wildlife Refuge in Hyde County.

Sirianni expressed concern that the Climate Central study and maps do not reflect marsh elevation accurately enough to be used to guide local planning. The laser from the LiDAR measurement system used, Sirianni said, cannot penetrate wetlands' thick grasses and vegetation.

As part of her research, Sirianni trudged through the Swanquarter Refuge, a place where the vegetation can be so thick that it felt like she was walking on pads. By doing that, Sirianni and her team could put a rod onto the ground and check to see how accurate the laser measurement actually was.

Sirianni found that the laser measurements estimate elevation of North Carolina marshes up to 1.77 feet higher than they actually are in some places.

"We need to ground truth the data if we're going to use it for local decision making," Sirianni said.

Strauss, the Climate Central scientist, agrees. The mapping tool's best use, he said, is to toggle between locations and scenarios to get a general sense of the risk [sea level rise](#) poses to salt marshes.

If a place seems to have a serious threat, Strauss said, that could indicate that it is worth investing in a more site-specific study.

"It's more of a screening tool, screening analysis," Strauss said. "But with that in view, it clearly says North Carolina has a lot to be concerned about."

More information: Maya K Buchanan et al, Resilience of U.S. coastal wetlands to accelerating sea level rise, *Environmental Research Communications* (2022). [DOI: 10.1088/2515-7620/ac6eef](https://doi.org/10.1088/2515-7620/ac6eef)

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