

Sea level rise is swallowing US farmland much faster than expected

By [Andrei Ionescu](#) Earth.com staff writer

You may have seen images of “ghost forests” – haunting stretches of dead trees along the mid-Atlantic coast. Their pale trunks rise from encroaching marshes after being killed by saltwater they were never meant to withstand.

They’ve become a kind of visual shorthand for [sea level rise](#). But a new study suggests the real story is playing out somewhere less photogenic: on working farmland, where the sea level is advancing nearly twice as fast, and where almost nobody is paying attention.

Between 1984 and 2022, roughly 25,000 acres of farmland in the Chesapeake and Delaware Bay watersheds quietly converted to marsh.

That’s not a projection. That’s land already gone, measured using four decades of satellite data and confirmed through field surveys.

Farmers fighting a losing battle

There’s a comfortable assumption built into a lot of thinking about sea level rise and [farmland](#) – that farmers, because they have so much to lose, will protect their land. And they have tried, through levees, earthen berms, or drainage ditches.

“There’s this assumption that we’ll never let sea level rise consume farmland, that people will protect valuable land. And it’s just wrong,” said co-author Matt Kirwan, a professor of marine science at [William & Mary’s Batten School of Coastal & Marine Sciences](#).

“We found lots of examples where small levees were built at the edges of fields to prevent [saltwater intrusion](#), but they only slowed down the loss. They couldn’t stop it.”

What’s happening is gradual and, in a way, invisible.

Saltwater creeps inland through groundwater, tidal creeks, and storm surges. Freshwater plants die, and salt-tolerant marsh grasses take their place.

The line between dry land and wetland inches steadily inward, year after year. On the mid-Atlantic coast, which is seeing sea levels rise at roughly double the global average, that process is moving fast.

Crops collapse faster than trees

Here’s where the study gets genuinely counterintuitive. You’d expect forests to be more vulnerable than farmland since trees seem more permanent, more fixed, less adaptable.

But the data show the opposite. **Marsh encroachment happens up to seven times more frequently on agricultural land than on forested land in the same region.**

“It’s not that farmland is flat and therefore it retreats faster. Trees have lifespans of hundreds of years,” Kirwan said. “It can take decades to kill a tree. Agricultural crops have lifespans of less than a year.”

A forest can absorb decades of saltwater stress before it visibly collapses. A crop field can’t.

“On farmland, it’s much more subtle. It’s a row of [crops](#) at the edge of the field that’s brown instead of green, but it still adds up to thousands of acres of lost agricultural production,” Kirwan said.

Coastal protections are running out

Virginia and Maryland protected tidal wetlands in the 1970s, which means almost no new coastal defenses have been built since then.

Some of the old berms are still standing and still helping. Field surveys showed that maintained levees do help slow sea level rise-driven retreat rates on farmland, bringing them closer to those of nearby forests.

But there aren’t enough of them, permitting rules make new construction difficult, and the ones that exist can’t hold back the sea indefinitely.

“Some of the berms are still being used and maintained, but a lot of them have been abandoned and are now surrounded by marsh,” said lead author Grace Molino, a Ph.D. graduate of the Batten School.

Rural farmland rarely gets attention

Coastal adaptation gets most of its attention and most of its funding in urban areas.

Seawalls, flood barriers, and managed retreat from developed neighborhoods. All of that makes sense where population density and property values are highest.

But less than 15 percent of U.S. [coastal watersheds](#) are heavily developed. The rest is rural, and that coastline has been almost entirely left out of the conversation.

“It’s really underappreciated how large human impacts can be even in rural areas where you don’t have the big beach houses, you don’t have the big seawalls,” Molino said. “Everything’s more subtle, but they’re still having a big impact.”

Knocking on doors for answers

Getting to that rural coast as a researcher isn’t straightforward either. Most scientific fieldwork happens on public land, where access is easy.

Privately owned farms are different. To do her field surveys, Molino had to go old school – cold calls, knocking on doors, hoping someone would let a scientist onto their land.

Most did. And what she found when she got there was unexpected in its own way.

“The landowners there have this unbelievable wealth of knowledge,” Kirwan said. “Most of them have lived on the land for several generations and know a lot about the neighboring properties and how things have changed.”

One Maryland landowner, who uses his flooded-out fields as a hunting retreat during waterfowl season, had already worked out his own adaptation strategy. He is converting land too salty to farm into [wildlife habitat](#).

“Individual landowner decisions have such a strong influence on the changes that we’re seeing on the coast,” Molino said. “It’s so important to actually get out into the field and talk with them and understand what’s driving these decisions.”

Saving marshes, losing farmland

There is one uncomfortable complication to the story. Marshes aren’t just the villain here – they’re also victims of sea level rise.

If marsh ecosystems can’t build soil fast enough to keep pace with rising water, they need to move to higher ground.

Farmland offers them a faster migration route than forest does. In a narrow ecological sense, what’s destroying a farmer’s livelihood might be giving a threatened [marsh](#) ecosystem somewhere to go.

That’s a genuinely difficult tension, and there are no easy answers. But Molino is clear about who she thinks needs to be at the table when those answers get worked out.

The research already paid one small, practical dividend.

At a farm she visited, a landowner asked her to let him know if she spotted any breaches in his levees.

When she got back to the lab, she picked up the phone and gave him the exact GPS coordinates of every breach she’d found: science serving a farmer – a good place to start.

The study is published in the journal [Nature Sustainability](#).

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