

The Chesapeake Bay is full of life: thriving fisheries, picturesque beach towns, and flocks of tourists who come every year to spend a lazy summer by the waves. Standing along the shore, you can hear the sounds of a busy community. There are fishermen calling out to one another from the docks as their lines whizz across the water, laughter bubbling up from the restaurants scattered along the waterside, and the backdrop of it all, the peaceful sloshing of waves against the shoreline. But if you were to travel back in time, you would see all the land those waves have consumed.

The islands of the Chesapeake have lost more than a foot of land since 1950, twice the worldwide average. The last half century has seen the coastline of the bay recede dramatically as many islands shrink to a fraction of their former size.

According to the most recent predictions from the University of Maryland Center for Environmental Science in 2018, sea levels in the bay could rise up to an additional 1.6 feet by 2050, forcing even more of the bay's coast underwater. On a larger scale, if global emissions don't meet the Paris Agreement standards, the melting of polar ice caps could escalate sea levels by 20 feet globally by the end of the century, the UMD Center continues. Sea level rise is painting a picture of real and immediate danger for the bay's ecosystem and its surrounding communities.

Confronting the current crisis

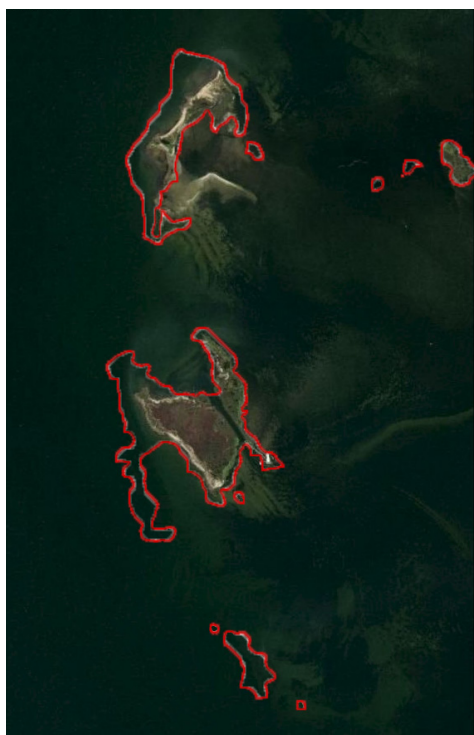
Late November, Fox Island Education Center announced its official closing due to the bay's rising water levels. Thousands of students have visited Fox island during its lifetime, lodging in its solitary cabin and mucking around its marshes.

"It was the most memorable experience from sixth grade," senior Jack Yang from Richard Montgomery says. He remembers his trip to the island as a highlight of his time at Roberto Clemente Middle School. "With only nature around you and water, it was a nice break from the hustles from everyday society."

Since Yang's trip in 2013, the island has

effectively disappeared under the waves of the bay. "It is a huge loss, not only for Clemente students, but for everyone who didn't have the chance to go there," he says.

Fox Island is not the first of the Chesapeake's islands to face rising sea levels, and it won't be the last. "There are lots of little islands in the Chesapeake, and for centuries, they have been flowering communities," Ronnie Anderson of the Chesapeake Bay Foundation (CBF) says. "Now they are disappearing literally under the water and people are not able to live in their ancestral homes."



COURTESY OF THE CHESAPEAKE BAY FOUNDATION
FAST CHANGE Fox Island is smaller than thirty years ago (change outlined in red).

Along the bay's shore, residents of coastal Kent County watch their properties repeatedly flooded. "I live on the water down here and [the sea level] gets up pretty high," Bob Neuens, a Kent County deputy sheriff, says. "Couple of times it flooded my dock, and my dock is pretty high up above the water." When asked if the frequency of flooding has increased in the last twenty years, Neuens exclaims, "Definitely."

The buildings on these islands and along the coast are increasingly susceptible to flooding and erosion. As average sea levels continue to rise, so too will high tides, causing the frequency of "nuisance" floods—water levels 1.75 feet higher than usual—to increase. By 2100, nuisance floods would be virtually a daily occurrence. These floods may erode a building's foundation—and its monetary value.

Baltimore-based Claire Cambardella of the Chesapeake Bay Foundation has noticed the floodwaters already creeping higher on shore. "We see high water... flooding the sidewalks and streets along the Inner Harbor," she says. Anderson, sta-

tioned at Arthur Sherwood Education Center in Annapolis, found much greater tidal fluctuations this year. "There have been some super high tides where things might wash off the docks," she says. "It's not a huge deal for us, but if these become more regular occurrences, it might be a problem."

Wrecking the wetlands

The rising waters are also threatening the bay's marshlands, ecosystems crucial to the area's ecological health. "[Marshlands] serve as... the transition between land and water," Anderson says. "It acts like a sponge and can hold sediment and nutrients and even acts as a filter... [and] prevents [trash] from washing into the water."

These marshlands also form a habitat for birds and vegetation alike. "That's an area that's really important for migratory birds and it's one of the largest contiguous concentrations of wetland along the eastern seaboard," Cambardella says. "It is habitat for animals and flood control for people."

Marshlands can ordinarily adapt to environmental changes, but not at this speed. "[Marshlands] would move to higher elevations and the whole community would sort of migrate upland, but we are not giving them the time to do that," Anderson says. As the water levels rise, these marshlands might disappear.

With the depletion of the marshlands, fresh water and nutrients like nitrogen and phosphorus will make their way into the bay. Algae and other invasive microorganisms thrive on a surplus of these nutrients, which will further pollute the water and threaten bay wildlife such as the oyster.

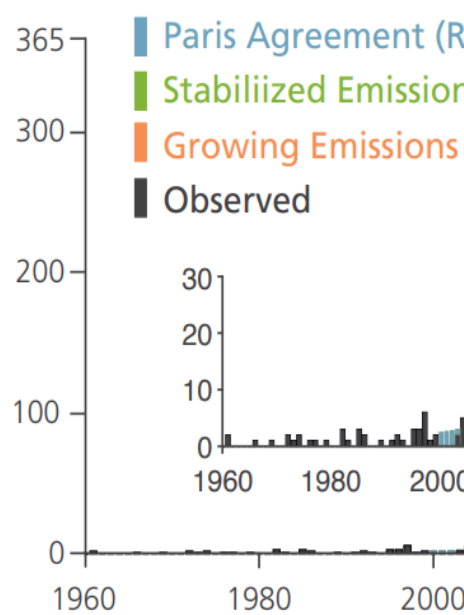
"Oysters need salt water to grow," Cambardella says. "They pull minerals out of the water and if they are in fresh water, they won't be able to do that." As a result, "2018 was a really tough year for oyster growth because of all the fresh water," she says.

Other iconic bay creatures, like the bluefish and blue crab, are facing population problems as well. "Back 20-30 years ago, [the fish were] all bluefish... and now, it's all rockfish, no bluefish," Neuens says. Until recently, "bluefish was the only big fish you could find in the bay." The increase in fresh water has forced the bluefish farther downstream; water that used to ream with fish now has almost none. "The water is crystal clear right now. It wasn't like this years ago," Neuens says.

The increase of fresh water also makes it more difficult for shelled creatures to survive, presenting a challenge for fishermen to make money. "If... the crabs aren't moving because it's been so fresh, then [fishermen] are not going to be able to make a living," Anderson says. "There are a lot of watermen who were actually deciding that they would make a better living doing something on land."

But rising sea levels also intrude into farmland, making many land jobs unsustainable. "As those new levels rise, salt water creeps up the groundwater table," Cambardella says. Salt can easily flow through the coastal farmland and kill shoreline vegetation ill-adapted to the saltier conditions.

Trees along the bay, with roots deep in the sediment, are already feeling the effects of the rising saltwater. "If you look at pictures of Dorchester County, you'll see stands of dead trees," Cambardella says. Farmers are then forced to abandon their once-fertile lands and settle farther inland, destroying acres of diverse habitat in the process.



NO CAP Emission projections yield an anti-

Dealing with the danger

Despite current efforts to curb global warming, sea levels are still expected to rise 1.6 feet by 2050, according to the University of Maryland Center for Environmental Science.

To combat this rise, Maryland is already employing an aggressive strategy to reduce the state's greenhouse gas emissions. In 2016, the Maryland legislature passed the Greenhouse Gas Reduction Act, requiring a 40 percent reduction in emissions by 2030. The state Department for Natural Resources will soon develop a set of guidelines that suggest new structural plans to adapt to the coming climate challenges.

Locally, the Chesapeake Bay Foundation has implemented a variety of programs to preserve the coastal land that remains above the water. "We have a Healthy Soils Pro-



UP AND EARLY Bob Neuens comes back from a morning of fishing in the Chesapeake Bay

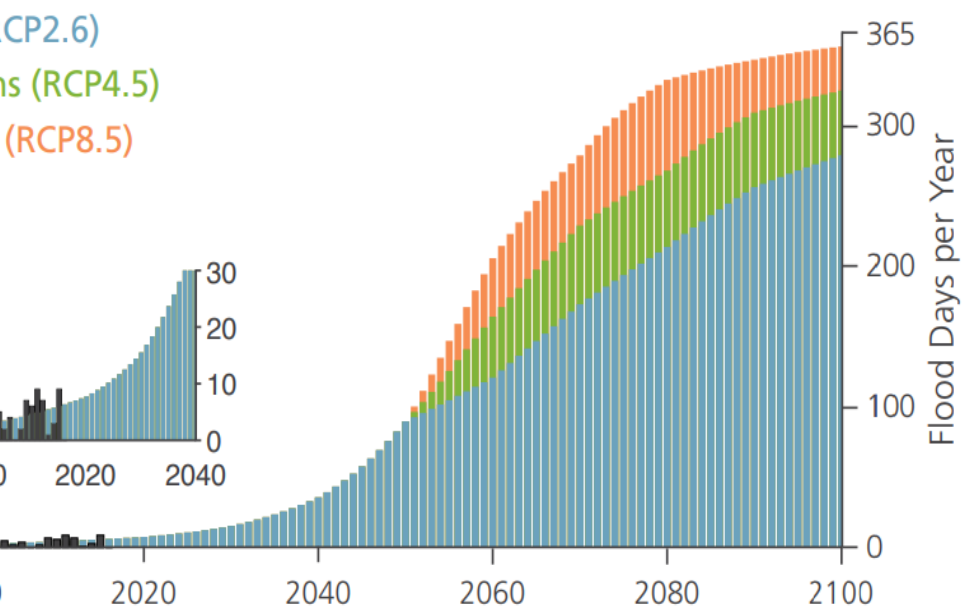
"There are lots of little islands in the Chesapeake... now they are disappearing literally under the water."

- Claire Cambardella



Rising waters, rising stakes

Exploring the threat of the rising seas on the Chesapeake Bay



COURTESY OF THE UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE

...ated rate of flood days per year much higher than outlined by the Paris Agreement

...gram that helps farmers implement practices that will keep water on the land and not create as much surface runoff," Cambardella says.

The Foundation is also going forward with an emphasis on community involvement. "As part of our Making History campaign... we're trying to get a million more people involved in the Chesapeake Bay advocacy, we're trying to plant one million trees in Pennsylvania, and we're trying to put ten billion oysters back in the bay," Anderson says.

At the root of the CBF's efforts is the Chesapeake Clean Water Blueprint. This Blueprint encourages neighboring states to reduce nitrogen, phosphorus, and sediment inputs from flowing into the bay. Each of the CBF's initiatives is one more step toward mitigating the effects of climate change.

A precarious future

It's hard to imagine—standing at the edge of the water or walking along the edge of the marshlands, watching blue herons skim across the water—that the bay will soon lie beneath the waves.

Although the Chesapeake Bay itself has seen harsher effects of climate change than most of the world, efforts from outside the region can also help reduce the risks of rising sea levels. "We need people inside the watershed and outside the watershed to realize that they can protect their local water," Anderson says.

Though scientists believe that bay towns are within decades of disappearance, some residents still hold hope. "It's too late to solve it completely," Cambarella says, "but we know that we can adapt and we can adjust."

RISKY BUSINESS As water levels increase, lifesavers like these will be used more often



HIGH STAKES Bustling cities like Annapolis are acknowledging the threat of rising seas

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