

# North Carolina's Albemarle Peninsula



**Exposed cypress roots and stumps along an eroded shoreline are a vivid sign of how sea-level rise and severe storm events are altering the Albemarle Peninsula's natural systems.** ©Jennifer Henman

Global climate change is changing the places we know and cherish – places like the Albemarle Peninsula in eastern North Carolina. Within our lifetimes we are seeing the visible effects of climate change and sea-level rise on this low-lying coastline, with potentially devastating ecological and economic consequences.

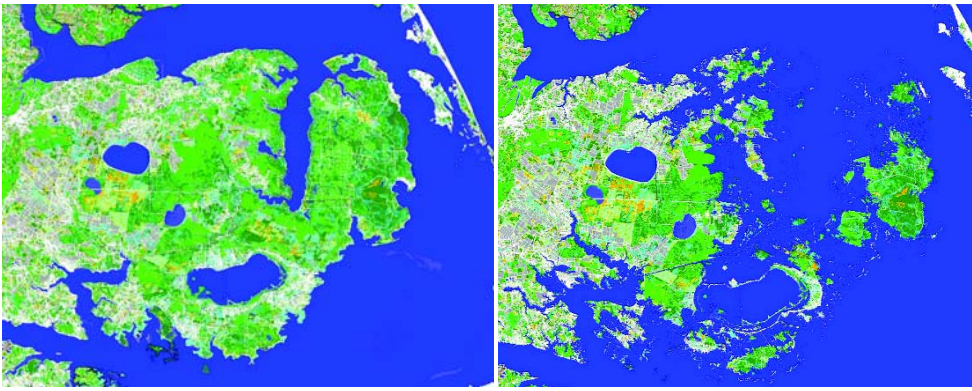
Climate change is caused primarily by the release of heat-trapping gases, chiefly carbon dioxide, produced by vehicles, industrial processes, power plants and deforestation. The gases we emit today will linger in the atmosphere for decades. The longer we wait to take steps to reduce emissions, the steeper and more costly the cuts in emissions will need to be in the future to prevent dangerous rates of climate change.

The Nature Conservancy is studying the anticipated impacts of climate change on several ecosystems like the Albemarle Peninsula and how those places will respond. From this information, we can develop the tools and long-term conservation strategies that address a place's adaptation to a changing climate.

**On the Albemarle Peninsula**, water is as much a part of the landscape as the land itself. Extending into the Albemarle-Pamlico estuary like a great outstretched hand, the peninsula is so low and flat that water and earth have mingled to form a diverse landscape of lush swamp forests, nearly impenetrable pocosin bogs, broad bands of fresh and brackish marshes and languid blackwater creeks and rivers.

More than 400,000 acres on the peninsula have been placed in conservation, and millions of dollars in state, federal and private funds have been invested in land acquisition and other conservation activities.

But now, partly due to global climate change, sea level is rising in North Carolina at such a rate – and land along the coast is subsiding – that water actually threatens the Albemarle Peninsula's ecosystems and its most important conservation lands. Even without actual inundation, the



**Satellite imagery combined with a high-resolution computer model illustrate the Albemarle Peninsula as it appears today (left) and the extensive areas likely to be flooded from a 20-inch increase in sea level (right).**  
 © Ben Poulter, Duke University/Chris Zganjar, TNC

peninsula could be altered by increased erosion, saltwater intrusion, a rising water table and disintegration of the region's peat soils. A warming climate also could lead to shifts in species distribution and vegetation, invasions of non-native species and an increase in the incidence of fire.

With an eye on the future, The Nature Conservancy has begun working with the U.S. Fish and Wildlife Service and other partners to develop long-term management strategies at the Alligator River National Wildlife Refuge and elsewhere on the peninsula. We are working to understand which strategies will contribute most to the resilience of wetland ecosystems on the peninsula and to the stability of the peninsula's large deposits of carbon-rich peat soils. In doing so, we hope to give these ecosystems time to adapt to a future much different than today.

### *Strategies to Lessen the Impacts of Climate Change*

#### **hydrologic restoration**

Drainage ditches and canals dug over the past two centuries to gain access to timber, develop farmland and reduce mosquito-breeding have changed the hydrology on thousands of acres across all parts of

the peninsula. These artificial waterways also serve as channels for saltwater intrusion into areas with peat soils.

One of our first projects is to design hydrologic models of the Alligator River refuge and adjoining lands to gain a better understanding of the area's complicated flow of water. The model will identify those ditches and canals that could be filled or outfitted with water control structures to reduce the impacts of salt intrusion and peat soil disintegration.

#### **wetland restoration**

Water control structures will also be used to manage water levels for wetland restoration. We are particularly interested in the effects of changing climate on soil formation in pocosins, marshes and other peat-based systems because the formation of new soil increases land elevation and could keep up with the pace of sea-level rise. After water control structures are installed, we will test whether these ecosystems can be manipulated to foster peat growth or reduce peat degradation.

In areas likely to be submerged in the short term, flood- and salt-tolerant species will be planted to help hold the systems together. Native bald cypress trees, for instance, are tolerant of brackish

water and once established are capable of persisting for decades and even centuries after their roots are submerged.

#### **oyster reef restoration**

Native oyster reefs will be constructed along the shorelines of the peninsula as a way to reduce wave energy and erosion and possibly help build up the shoreline. The reefs will create new shallow-water habitats and semi-sheltered shorelines, which will be planted with salt-tolerant grasses and cypress. These fringing reefs will be located in areas that, although less than ideal today, might be more amenable to oyster survival under future climate conditions.

We do not know for certain what future ecosystems on the Albemarle Peninsula will look like. Even the ecological near-future is virtually unknowable. However, we do believe it is possible to take steps to reduce the likelihood of catastrophic transformations. There are a variety of practical management actions that can be taken so that ecosystems and species have the time they need to adapt.

The Nature Conservancy's climate-adaptation work alone will not be enough to avoid the devastating impacts of climate change on nature, people and the places that sustain both around the world. The severity of global climate change can be reduced by limiting the emissions of heat-trapping gases. For the sake of the planet, practical policies to slow, stop and reverse the trend of emissions causing global climate change must be adopted and implemented by governments everywhere.

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<http://nature.org/initiatives/climatechange/>

The current rate of relative sea-level rise in the Albemarle region is nearly two inches every decade. Even if humans take steps to reduce the production of greenhouse gases significantly, the rate of sea-level rise is expected to double in 50 to 100 years. If we don't take those steps, the rate could triple.

When the sea rises just a few inches in this part of the world, flooding will extend far inland. High-resolution models developed for The Nature Conservancy show that up to 469,000 acres of low-lying lands on the Albemarle Peninsula could be flooded by as little as a 12-inch increase in sea level and that nearly 750,000 acres could be flooded by a 20-inch rise.