

Will Florida be lost forever to the climate crisis?

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From sea level rise to habitat loss, the effects of the climate crisis are on the verge of making south Florida uninhabitable

21 April 2020

Few places on the planet are more at risk from the climate crisis than south Florida, where more than 8 million residents are affected by the convergence of almost every modern environmental challenge – from rising seas to contaminated drinking water, more frequent and powerful hurricanes, coastal erosion, flooding and vanishing wildlife and habitat.

If scientists are right, the lower third of the state will be underwater by the end of the century. Yet despite this grim outlook, scientists, politicians, environment groups and others are tackling the challenges head on. Below are some of the biggest threats posed by the climate crisis to south Florida today, along with solutions under consideration. Some of these solutions will have a lasting impact on the fight. Others, in many cases, are only delaying the inevitable. But in every situation, doing something is preferable to doing nothing at all.

Sea level rise

The threat: By any estimation, Florida is drowning. In some scenarios, sea levels will rise up to 31in by 2060, a devastating prediction for a region that already deals regularly with tidal flooding and where an estimated 120,000 properties on or near the water are at risk. The pace of the rise is also hastening, scientists say – it took 31 years for the waters around Miami to rise by six inches, while the next six inches will take only 15 more. At such a rate, many of Miami Beach's iconic landmarks, the world famous South Beach, and the picturesque art deco hotels of Ocean Drive, will be lost within three decades, according to some studies.

Possible solutions: Dozens of municipalities, the four counties of south-east Florida, and partner groups such as the Nature Conservancy have combined their efforts through the south-east regional action climate plan to tackle the crisis. In Miami Beach, dubbed the "ground zero" of sea rise, a multifaceted and costly Rising Above program is already under way. It includes elevating roads, building new sea walls and installing new and higher capacity pumps and drainage systems to alleviate flooding. In the Florida Keys, the approach to will probably tilt more towards managed retreat: abandoning areas too expensive to maintain and focusing on measures with a better cost-benefit ratio. Parts of the Keys are going to simply disappear, some within two decades.

The cost: The participating counties and municipalities are contributing to a \$4bn statewide spend, including Miami Beach's \$400m Forever Bond, a \$1bn stormwater plan and \$250m of improvements to Broward county's sewage systems to protect against flooding and seawater seepage. In the Keys, many consider the estimated \$60m a mile cost of raising roads as too expensive.

Water contamination

The threat: Saltwater from sea level rise is seeping further inland through Florida's porous limestone bedrock and contaminating underground freshwater supplies, notably in the Biscayne aquifer, the 4,000-sq mile shallow limestone basin that provides drinking water to millions in southern Florida. Years of over pumping and toxic runoff from farming and the sugar industry in central Florida and the Everglades have worsened the situation. The Florida department of environmental protection warned in March that "existing sources of water will not adequately meet the reasonable beneficial needs for the next 20 years". A rising water table, meanwhile, has exacerbated problems with south Florida's aging sewage systems. Since December, millions of gallons of toxic, raw sewage have spilled onto Fort Lauderdale's streets from a series of pipe failures.

Possible solutions: A comprehensive 30-year Everglades restoration plan was authorized by Congress in 2000 to “restore, preserve and protect” the south Florida ecosystem by improving water flows to help flush the salinity, and a 78bn-gallon Everglades agricultural area reservoir (EAA), a key component of the congressional plan, is earmarked for land once leased by big sugar. The restoration plan, however, has stalled amid funding wrangles, and the storage reservoir plan delayed several times.

The cost: The Everglades restoration plan was originally priced at \$7.8bn, rose to \$10.5bn, and has since ballooned to \$16.4bn. Donald Trump’s proposed 2021 federal budget includes \$250m for Everglades restoration. The estimated \$1.8bn cost of the reservoir will be split between federal and state budgets.

Hurricanes

The threat: In October 2018, Hurricane Michael made landfall in the Florida Panhandle as the first category 5 cyclone to strike the US since 1992. In the devastating hurricane season just one year before, major storms named Harvey, Maria and Irma combined to cause damage estimated at \$265bn. Scientists have evidence the climate crisis is causing cyclones to be more powerful, and intensify more quickly, and Florida’s position at the end of the Atlantic Ocean’s “hurricane alley” makes it twice as vulnerable as any other state.

Possible solutions: Previous efforts to tame hurricanes were a failure, and experts see mitigation strategies, including more robust building codes, as the best defense. Hurricane Andrew in 1992, which destroyed more than 63,000 houses, led to the implementation of a statewide construction code that is updated every three years, though there are regional variations, and criticisms that industry lobbyists have too much sway.

The cost: With homeowners and businesses largely bearing their own costs, the specific amount spent on “hurricane-proofing” in Florida is impossible to know. A 2018 Pew research study documented \$1.3bn in hazard mitigation grants from federal and state funding in 2017, along with a further \$8bn in post-disaster grants. Florida is spending another \$633m from the US Department of Housing and Urban Development (HUD) on resiliency planning.

Wildlife and habitat loss

The threat: Florida’s native flora and fauna are being devastated by climate change, with the Florida Natural Areas Inventory warning that a quarter of the 1,200 species it tracks is set to lose more than half its existing habitat, and the state’s beloved manatees and Key Deer are at risk of extinction. Warmer and more acidic seas reduce other species’ food stocks and exacerbate the deadly red-tide algal blooms that have killed incalculable numbers of fish, turtles, dolphins and other marine life. Bleaching and stony coral tissue disease linked to the climate crisis threaten to hasten the demise of the Great Florida Reef, the only living coral reef in the continental US. Encroaching saltwater has turned Big Pine Key, a crucial deer habitat, into a ghost forest.

Possible solutions: The diverse range of challenges requires a piecemeal approach. A state and federally-funded “Noah’s ark” is collecting and preserving coral chunks at venues including Nova Southeastern University as disease research continues. A new state taskforce of marine scientists and biologists is tackling the blue-green algae outbreaks that have choked Florida’s inland waterways. As for the Key Deer, of which fewer than 1,000 remain, volunteers leave clean drinking water to replace salt-contaminated watering holes as herds retreat to higher ground. A longer-term debate is underway on the merits and ethics of relocating the species to other areas of Florida or the US.

The cost: Florida is spending \$4m in the current financial year for expanded water quality analytics related to “nutrient over-enrichment” and \$3m annually for the next five years on Red Tide research. A 20-year NOAA-backed project to restore 3m sq feet of the Great Florida Reef is estimated at \$100m. Such projects can only scratch the surface of the incalculable investment that will be needed to save the states species and their habitats.

Coastal erosion

The threat: Tourist brochures showcase miles of golden, sandy beaches in South Florida, but the reality is somewhat different. The Florida department of environmental protection deems the entire coastline from Miami

to Cape Canaveral “critically eroded”, the result of sea level rise, historically high tides and especially storm surges from a succession of powerful hurricanes. In south-eastern Florida’s Palm Beach, Broward, Miami-Dade and Monroe counties, authorities are waging a continuous war on sand loss, eager to maintain their picture-perfect image and protect two of their biggest sources of income, tourism dollars and lucrative property taxes from waterfront homes and businesses.

Possible solutions: With the other option abandoning beaches to the elements, city and county commissions have little choice but costly replenishment projects with sand replacement and jetty construction. Federal law prohibits the import of cheaper foreign sand, so the municipalities must source a more expensive alternative from US markets, often creating friction from residents who don’t want to part with their sand. Supplementary to sand replenishment, the Nature Conservancy is a partner in a number of nature-based coastal defense projects from West Palm Beach to Miami.

The cost: Authorities usually match federal funding for replenishment projects. An \$8m project restored almost 125,000 cubic yards to three Broward county beaches last winter, and \$55m will be spent on a 400,000-sq yd restoration on three others beginning in the fall. The region’s showpiece, Miami Beach, benefited from 61,000 cubic yards of new sand this year at a cost of \$16m. Statewide, Florida spends an average \$50m annually on beach erosion.

Climate gentrification

The threat: “Climate gentrification” is a buzzword around south Florida, a region barely 6ft above sea level where land has become increasingly valuable in elevated areas. Speculators and developers are eyeing historically black, working-class and poorer areas, pushing out long-term residents and replacing affordable housing with upscale developments and luxury accommodations that only the wealthy can afford. In Miami, the controversial Magic City Innovation District in the neighborhood of Little Haiti is a billion-dollar, 17-acre, towering behemoth blending commercial, residential, entertainment and hotel space. It has drawn legal action from locals who say their rights have been trampled.

Possible solutions: Experts argue there are ways to lessen the impact of climate gentrification on local populations without the need for displacement, such as providing affordable working space and housing for existing residents, and using sustainable construction practices and environmentally friendly materials. Magic City’s developers insist they are committed to the neighborhood, including below-market cost housing. Local authorities and activist groups are working to “protect” areas by investing in revitalization and affordable housing projects.

The cost: No study has yet calculated the overall cost of affordable housing lost to the climate crisis. Private developers will bear the expense of mitigating the impact on the neighborhood – \$31m in Magic City’s case over 15 years to the Little Haiti Revitalization Trust, largely for new “green” affordable housing. The University of Miami’s Housing Solutions Lab has a \$300,000 grant from JP Morgan to report on the impact of rising seas to South Florida’s affordable housing stocks and recommend modifications to prevent it from flooding and other climate events. A collaboration of not-for-profit groups is chasing \$75m in corporate funding for affordable housing along the 70-mile south Florida rail trail from Miami to West Palm Beach, with the first stage, a \$5m project underway to identify, build and renovate 300 units.

Politics

The threat: Florida has long been plagued by political leadership more in thrall to the interests of big industry than the environment. As governor from 2011 to 2019, Rick Scott, now a US senator, slashed \$700m from Florida’s water management budget, rolled back environmental regulations and enforcement, gave a free ride to polluters, and flip-flopped over expanding offshore oil drilling. The politician who came to be known as “Red Tide Rick”, for his perceived inaction over 2018’s toxic algae bloom outbreaks, reportedly banned the words “climate change” and “global warming” from state documents.

Possible solutions: It’s too soon for deep deliberations on Scott’s successor, fellow Republican Ron DeSantis, but in little more than a year in office he has made several moves that surprised environmentalists. He appointed Florida’s first chief science officer, created an algae taskforce, struck a deal to prevent drilling in parts of the

Everglades, and won a tussle with Florida's legislature to expand an ambitious land acquisition and preservation program. Last month, state legislators approved the first dedicated climate bill. It appears a promising start for a new administration, but activists say more needs to be done. In January, the Sierra Club awarded DeSantis failing grades in an environmental report card, saying he failed to protect Florida's springs and rivers and approved new roads that threatened protected wildlife.

The cost: Florida's spending on the environment is increasing. The state budget passed last month included \$650m for Everglades restoration and water management projects (an instalment of DeSantis's \$2.5bn four-year pledge) and \$100m for Florida Forever. A \$100m bridge project jointly funded by the state and federal governments will allow the free flow of water under the Tamiami Trail for the first time in decades.

Still, Florida has woken up to the threat of climate change, it is not yet clear how effective the response is going to be. The challenges are innumerable, the costs immense and the political will to fix or minimize the issues remains questionable, despite recent progress.

At stake is the very future of one of the largest and most diverse states in the nation, in terms of both its population and its environment. Action taken now will determine its survival.

This story is a part of Covering Climate Now's week of coverage focused on Climate Solutions, to mark the 50th anniversary of Earth Day. The Guardian is the lead partner in Covering Climate Now, a global journalism collaboration committed to strengthening coverage of the climate story.