

From coastlines to the Everglades, researchers tackle sea level rise

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Under the streets of Miami Beach, seeping up through the limestone, water creeps into storm drains and pours into the streets. It happens once a year when the sun and moon align in such a way that gravity pulls at Earth's water. The phenomenon is known as King Tide. It is the highest of high tides, and every year, it puts Miami Beach at risk of major flooding.

FIU researchers were on-site during the latest King Tide event to collect and assess data. The efforts are part of a university-wide initiative to study, better understand and develop solutions for [sea level rise](#). Plans are under way to create an institute dedicated to the interdisciplinary work being done at FIU, which includes collaboration among researchers from Arts & Sciences, Architecture and the Arts, Business, Law, Public Health and Social Work, Engineering, Hospitality and Tourism Management, as well as Journalism and Mass Communication.

South Florida ranks as the world's most vulnerable urban region in terms of assets exposed to the effects of [sea level](#) rise. FIU's research is dedicated to developing and implementing solutions for the major environmental and economic challenges created by the rising seas.

Beyond the Shoreline

When King Tide arrived in October of 2014, all eyes were on Miami Beach and a new pump system that helped to keep the water off the streets—this time. But the manner in which the water traditionally invades is a stark reminder that when it comes to sea level rise, there is more to be concerned about than just the shoreline. The hidden danger is largely the water within. In South Florida's case, that means the Everglades.

"The greater South Florida ecosystem is predicated on the balance of freshwater and saltwater," said Todd Crowl, researcher within the institute and director of FIU's Southeast Environmental Research Center. "When that ecosystem hits its tipping point and an imbalance occurs, that's when this whole thing collapses."

A natural region of subtropical wetlands, the Everglades is a complex system that features sawgrass marshes, cypress swamps, mangroves and

marine environments. The Everglades is also the main source of freshwater for the Biscayne Aquifer, South Florida's primary water supply. Beneath the river of grass, rising sea levels are pushing saltwater inward into the Everglades.

This intrusion is already affecting South Florida residents through a shrinking and tainted aquifer. Some communities, such as Hallandale Beach, can attest to the problem as underground wells have been closed due to saltwater, forcing communities to buy water from other sources.

"Few people might make the connection between sea level rise and the water pouring out of their faucets," said Evelyn Gaiser, a wetland ecologist and interim executive director of the School of Environment, Arts and Society. "We simply don't have freshwater moving in at the rate we need it, but Everglades restoration provides a solution for that."

The River of Grass

In 2000, the Comprehensive Everglades Restoration Plan was approved as part of the U.S. Army Corps of Engineers' Water Resources Development Act. The 30-year plan provides a framework to restore and protect the water resources of Central and South Florida.

Every two years, the National Research Council issues a report evaluating the progress of the plan. In the 2014 report, the authors raised concerns about slow progress, noting sea level rise is causing new concerns for the already troubled Everglades.

"Climate change and sea level rise are reasons to accelerate restoration to enhance the ecosystem's ability to adapt to future changes," authors of the report wrote.

Much of FIU's work in the Everglades is based on research conducted

within its [Florida Coastal Everglades Long Term Ecological Research program](#), which studies how hydrology, climate and human activities interact with ecosystem and population dynamics in the Everglades. With 9 million residents in the greater South Florida region, long-term data will be the key to long-term solutions.

Certainty in Uncertain Times

One of the greatest uncertainties with sea level is just how high and how fast the seas will rise. Without that knowledge, it's difficult to plan for how South Florida should adapt. Conservative projections suggest sea levels could rise by almost a foot by 2100, but some scientists believe that number will be closer to three feet.

Earth and Environment Professor René Price, along with a team of international researchers, recently completed a study, based on historical data that identifies the timings at which accelerations might first be recognized.

While she can't say for sure today, Price knows a data-driven prediction about rate and height is near.

"Our results show that by 2020 to 2030, we could have some statistical certainty of what the sea level rise situation will look like in 2100," Price said. "That means we'll know what to expect and have 70 years to plan. In a subject that has so much uncertainty, this gives us the gift of long-term planning."

Even with long-term predictions on the horizon, immediate action is still required as sea level rise is the reality today. Communication and collaboration among scientists, policy makers and community members are crucial in FIU's efforts to not only study climate change but also to help define how South Florida responds to the rising seas.

Hydrologist Henry Briceño spends much of his time in the community sharing what he and his students are working on and engaging policy makers in the issues they uncover.

"It's really not enough what we do in the lab and field. What we discover has to transcend the decision-makers," Briceño said. "We have to take this crisis and turn it into an opportunity. South Florida has the opportunity to become a leader worldwide to tackle sea level rise. We have a way out. We can adapt. Humanity can deal with this and can prevail."

Provided by Florida International University

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