

### Ecologist takes a long view of Frost Museum mission



After more than a decade of planning, and 67 years after its first incarnation as the Junior Museum of Miami, the new \$305 million Phillip and Patricia Frost Museum of Science is open.

The massive downtown complex in Museum Park includes both a planetarium and an aquarium. The core buildings center around a multistory interior courtyard and outdoor decks that capture Biscayne Bay breezes. That's the first clue natural systems hold sway here.

"Most science museums emphasize chemistry and physics, but we've done something much more ambitious," says Fernando Bretos, the Frost Science curator of ecology. "We also have human health, the history of flight, astronomy, and Florida habitats."

On the wind- and sun-swept decks of the upper floors, visitors can explore the River of Grass indoor-outdoor exhibit, which offers a mini-Everglades experience. A three-level aquarium features the 500,000-gallon Gulf Stream Aquarium, with tuna and sharks. Thirty other tanks offer a glimpse into the diversity of life in tropical seas, including a look into the life of living corals.

Here you can be enthralled by touch tanks full of sea stars and urchins. But turn your gaze outward, and you can be equally mesmerized by the expansive Miami skyline of sea and

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cityscape. And just beyond Biscayne Bay, you can make out wild, green places like Virginia Key, where this museum is helping restore fragile shorelines.

Bretos says he hopes the “core samples” of Florida habitats will instill visitors with a greater appreciation of what makes Florida unique. “We want people to appreciate that Florida is covered in these places,” he says. “We want them to see how valuable these habitats are.”

Our coral reefs and estuaries, our pinelands and hammocks are our heritage. Unfortunately, they’re under threat by a combination of forces -- development, pollution, neglect, and the impacts of climate change.

Here’s where Frost Science’s focus on education can help. “We hit the science first, but we’re also a conservation organization,” Bretos says. “That’s part of our ethic.”

One way to do that is to get people out in the environment, making tactile, multi-sensory connections.

While still a graduate student, Bretos says, he realized there were many children in Miami who’d never even been to a beach or met the delicate sea creatures that live among the seagrass beds just offshore.

That’s why he founded Museum Volunteers for the Environment (MUVE), which gives people a hands-on experience restoring natural landscapes. MUVE has been especially active on Virginia Key, revegetating the North Point’s dune beaches, which are essential sea-turtle nesting beaches.

Frost Science recently acquired the Science Barge, a floating marine laboratory and environmental education center, anchored off Museum Park. The “museum outside the museum” concept also extends to the Batchelor Environmental Center at Florida International University’s Biscayne Bay Campus in North Miami, which houses a raptor rehabilitation program.

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Bretos has enlisted the help of other scientists. Marine biologist Andrew Baker, featured in one of the exhibit videos, connects science to conservation. “As far as coral reef ecosystems go,” he says, “unless we do something in the next 10 to 20 years, many of the large coral reef systems around the world will not bounce back and we will have to suffer their losses.”

And here’s why: “Corals are very sensitive to increases in temperature, and with the carbon dioxide we’re putting into the atmosphere, coral bleaching is becoming more frequent and severe, and threatening the future survival of these organisms.”

The research work of scientists like Baker offers hope. He explains in the video that scientists are trying to cultivate corals that are more heat-resistant and less susceptible to bleaching. These corals could be “seeded” into Miami’s existing reef systems; they could become the basis of healthier reefs that can survive in our increasingly heated and acidic oceans.

Science now carries a sense of urgency, and a new generation needs to take on the unique challenges the world faces, Bretos says: “Today everyone has to be a scientist because everyone is affected.”

To that end, Frost Science’s education wing fosters field trips and mentorships, and is a potential incubator for the next-generation solutions. The programs start with preschool science education and continues to the award-winning Upward Bound Math and Science program for first-generation college-bound students. In every child who visits, there’s the potential for a future scientist who can figure out a cure for cancer or go to Mars, Bretos says. Or perhaps help slow a Sixth Extinction, the massive dying-off of species in the Anthropocene.

Bretos says his dream is to have a permanent climate change exhibit that could be a national model for science education. Miami is, after all, ground zero for climate change’s devastating effects.

“Miami has done a great job of incorporating the arts -- but we’ve left behind science and technology,” he says. “The new Frost Museum of Science will help change that.”

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