Restoring Sand Dunes Along Puerto Rico's North Coast

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CAMUY, Puerto Rico – Mounds of soft, cream-colored sand dotted with rich, green vegetation protect about 75 miles of Puerto Rico's north coast from rough seas and storms. Crabs, lizards, sandpipers, and sea grape and dropseed plants make their habitat in the dunes, which also serve as nesting areas for the endangered hawksbill, green and leatherback sea turtles.

Over the years, this natural habitat has been ravaged by nature and mankind alike. First came the construction of hotels, apartment buildings and restaurants near the coast, then in September hurricanes Irma and María and more recently strong sea swells have combined to decimate the dunes.

Led by professor Robert Mayer, a biologist at the University of Puerto Rico at Aguadilla, students and local volunteers are striving to revive the dunes by planting rows of wooden pallets to emulate plant behavior and trap sand in specific areas. While stabilizing the dunes, the pallets also encourage vegetation to grow.

In the long term, the pallets help form new dunes.

An assessment of the dunes is being carried out by Mayer's non-profit Vida Marina Center for Coastal Conservation and Ecological Restoration, which is part of the university. Teams are working along the island's north coast: at the 97-acre Nolla Farm in Camuy; at Teodoro Beach in Isabela, 15 miles to the west; and on Dorado Beach, 45 miles to the east.

Particularly along the north shore, underwater sand banks regularly push sand toward the coast, making these areas ideal for sand dune restoration.

"The pressure and heat will dehydrate the sand as it gathers, forming a kind of rock," said Erick Soto Calvente, project manager for Vida Marina. "As it solidifies, the more stable the dune becomes."

Mayer said the largest accumulation of sand has been in the Nolla Farm area of Camuy.

After Hurricane María, Vida Marina received economic aid from the National Fish and Wildlife Foundation through an allocation of FEMA funds. With that funding, the organization acquired an advanced drone, computer and other equipment for its work assessing the dunes.

“The UAV (unmanned aerial vehicle) … allows us to create 3D maps and point clouds, and measure things like area and volume of sand,” said Mayer. “It is a great tool to assess, monitor and plan restoration activities of dunes.”

It was a common practice in the 1960s for companies to remove sand from Puerto Rico’s beaches and mix it with cement for their construction projects. “It is difficult to quantify how many acres of dunes have been lost on the north coast, but there were dunes over 50 feet high in places where nothing is left,” Mayer said.

Today, the stabilization of the dunes is threatened by off-road vehicles and people trampling over them, said Mayer, who founded Vida Marina in 2007. Over the last 11 years, Vida Marina teams have worked to restore more than 10 miles of dunes on the northwestern side of the island.

As a child, Mayer and his father would walk along the coast of San Juan and his dad would explain the value of the dunes and the importance of preserving those beautiful natural barriers.

“With drone technology and aerial pictures, we have been able to analyze the footsteps of beachgoers and their behavior around the sand dunes,” Mayer said.

In Florida, Michigan, New Jersey and South Carolina, wooden bridges have proven effective in deterring beachgoers from trampling the dunes, said Russell Jackson, coastal hazard specialist for the National Oceanic and Atmospheric Administration.

Mayer would like Puerto Rico to emulate that practice which, in the long run, would protect the dunes and the coastline.

“Before we worry about things that happen on land, we must worry about having a strong barrier to keep us safe,” he said.

For video of the dunes assessment at Nolla Farm, visit fema.gov/media-library/assets/videos/163453.

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