Studying the Climate Potential of California's Dunes

A seed grant will help researchers assess how coastal dunes can protect communities as sea levels rise.

California Coastal Dune Science Network

By Boyce Upholt, California Sea Grant

Few Californians know that the state's coastline once featured humped dunes on over a quarter of its beaches. Today, in some places up to 98% of those dunes are gone, lost to development — flattened for the sake of modern beach aesthetics or, in some cases, to mine the sand.

Lately, California has been turning back the clock, with dozens of dune restoration projects underway. While it's clear that investing in dunes can help coastal communities buffer impacts from rising sea levels and help sustain beach habitats, the science supporting such projects has been limited. Now, though, thanks to $1.9 million in funding from the University of California Climate Action Seed and Matching Grants, the California Coastal Dune Science Network is

developing a statewide hub for dune research and using this science to provide actionable recommendations. The ultimate goal is to help spread effective dune restoration to new areas along California's coast.

Studying the shifting sands

The U.S. Geological Survey has estimated that with three feet of sea-level rise, California could lose a quarter of its beaches, which makes dune restoration urgent. But it's also challenging. Just a few years ago, even with several dune restoration projects underway, there was very little baseline data about California's dune ecosystems — including where they existed historically and where they remain today. In 2019, Laura Engeman, the coastal resilience specialist at California Sea Grant and Scripps Institution of Oceanography, began by bringing together various dune managers and restoration practitioners to provide restoration efforts with a firmer scientific footing, calling the resulting coalition the California Coastal Dune Science Network.

The network now includes over 100 members, with a leadership team of 13 researchers from universities, agencies and nonprofits across California. "As a group, we can think about not just individual sites, but the state as a whole," Engeman says. "And then we can create guidance for communities interested in replicating or using the methods that are being tried. Before they can be replicated, we have to know what works."

The network started by cataloging coastal dune restoration projects already underway — describing the restoration methods and linking to available reports and data — and then developing an advisory group to set research priorities. But pursuing those priorities would require funding.

Support in a changing time

Thankfully, in 2022, California budgeted $100 million to invest in climate action research and innovation projects led by the state's universities. One of the resulting programs, the California Climate Action Seed and Matching Grant, has now steered $83 million toward projects involving more than 130 groups and agencies across the state.

That includes a $1.9 million seed grant to the University of California, Santa Barbara, one of the institutions affiliated with the California Coastal Dune Science Network. The funding has increased the Network's capacity, allowing California Sea Grant's research associate Jenna Wisniewski to serve as its project coordinator, supporting a range of tasks. These include developing GIS maps of dunes, organizing workshops and compiling monitoring reports. Ultimately, the grant will allow the Network to formalize some of the group's ongoing research.

The first step will be to fully inventory California's coastal dunes — identifying where they existed, where they still exist and how vulnerable they are to erosion and sea-level rise. By monitoring and studying 17 restoration sites, the network's team will assess how restored beaches respond to storms.

Once this baseline data is in place, the team will create a decision-making framework to help researchers pinpoint what sites will profit from dune restoration — particularly as a climate resilience strategy. The funding will also allow the network to create state-wide guidance on methods for how to create, maintain, evaluate and monitor protective dunes.

"The amount of sea-level rise we will see in the next generation will be much more than most of our ancestors have seen," says Ian Walker, a professor of geography at the University of California, Santa Barbara, who is the principal investigator on the seed grant. "Our biggest goal is to help coastal communities decide where it makes sense to keep, restore or re-introduce dunes and provide insights on best practices based on dozens of examples from across the state. We want to highlight how dune restoration can be a viable adaptation strategy as informed by current practices and best science."

https://caseagrant.ucsd.edu/news/studying-climate-potential-californias-dunes