

New model could help rebuild eroding lands in coastal Louisiana

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Jaap Nienhuis, assistant professor of Earth, Ocean and Atmospheric Science, said Coastal Louisiana is losing about a football field of its wetlands every hour. Credit: U.S. Geological Survey

As coastal lands in Louisiana erode, researchers, environmentalists and engineers are all searching for ways to preserve the marsh coastline.

Now, a Florida State University researcher has developed a [model](#) to

help stakeholders figure out what factors they need to consider to rebuild land in this fragile wetland.

The model is outlined in the journal *Geophysical Research Letters*.

"Coastal Louisiana is losing a lot of its wetlands—about a football field every hour," said Jaap Nienhuis, assistant professor of Earth, Ocean and Atmospheric Science. "It's really, really fast."

The Mississippi River has been leveed to prevent occasional flooding. But the levees have also prevented sediment from coming through and building land to offset the subsidence and land loss.

Engineers and coastal experts have been looking at ways to make small cuts in the levees to allow for some of that sediment to flow through. The idea of a sediment diversion has been around for a long time, but figuring out how much land will be built or how long it will take has been a challenging issue.

That's where Nienhuis' model comes in to play. He and his fellow researchers created a simulation that took several factors into account to see how long it would take to build land under a variety of scenarios. They looked at water and sediment discharge, root strength and soil consolidation.

The effectiveness of sediment diversions vary depending on wetland characteristics.

When determining the best way to build land in these at-risk areas, researchers or engineers could plug the relevant data into Nienhuis' model to sketch out potential outcomes.

"We wanted to know what kind of wetland or what kind of diversion

would be most conducive to land building," he said. "It really is a very delicate balance looking at the sediment concentration, what vegetation is there and how much. It requires a lot of very good data."

In the "sweet spot," Nienhuis said, engineers could potentially build 30 to 40 square kilometers of land within a few decades. However, in areas where there might not be as much vegetation or too much sediment or water is allowed in, the areas could wind up eroding more [sediment](#) and causing land loss instead of land gain.

"We can use models like this to tell civil and environmental engineers what is important for land building and what's not," he said.

Nienhuis said his model is relatively specific to the Mississippi Delta, but it could potentially be applicable to other areas as well.

More information: Jaap H. Nienhuis et al. Crevasse Splays Versus Avulsions: A Recipe for Land Building With Levee Breaches, *Geophysical Research Letters* (2018). [DOI: 10.1029/2018GL077933](https://doi.org/10.1029/2018GL077933)

Provided by Florida State University

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