Study shows reforestation in Lower Mississippi Valley reduces sediment

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A modeling study by U.S. Forest Service researchers shows that reforesting the Lower Mississippi Alluvial Valley can significantly reduce runoff from agricultural lands and the amount of sediment entering the area's rivers and streams—and ultimately the Gulf of Mexico. The journal *Ecological Engineering* recently published the results of the study by Forest Service Southern Research Station scientists Ying Ouyang, Ted Leininger, and Matt Moran.

The Lower Mississippi Alluvial Valley, located in the historic floodplain of the Mississippi River, stretches from Cairo, Illinois south to the Gulf of Mexico. One of the largest coastal and river basins in the world, the area is also one of the most affected by floods, erosion, and sediment deposition as a result of more than a century of converting bottomland hardwood forests to agricultural lands.

Sediments from frequently flooded agricultural lands often carry pesticides and fertilizers, the latter associated with the formation of the hypoxic (low oxygen) dead zone in the Gulf of Mexico. Forest buffers reduce runoff and sediment load from flooded agricultural lands; in the Lower Mississippi Alluvial Valley, the frequently flooded agricultural land in the batture (land that lies between a river and its levees, pronounced batch-er) seems a prime site to start reforestation efforts.

The U.S. Endowment for Forestry and Communities (the Endowment) commissioned the study, and co-funded it with Forest Service State and Private Forestry. "This study provides further evidence of the key role

forests play in flood control and in reducing sediment flow from agricultural lands into our watersheds," notes Carlton Owen, president and CEO of the Endowment. "The new forest areas would also provide regional economic and environmental benefits by not only improving water quality but also wildlife habitat and recreational opportunities."

The researchers chose two Lower Mississippi River Alluvial Valley watersheds—the large Lower Yazoo River Watershed and the smaller Peters Creek Watershed—to model the effects of reforestation in or near the battures on water outflow and sediment load (the amount of solid material carried by a river or stream). They performed two simulations, the first to predict water outflow and sediment load without reforestation, the second to project over 10 years the potential impacts of converting different levels—25, 50, 75, and 100 percent—of the land to forest in or near the battures.

"Comparing simulation results with and without reforestation showed that converting agricultural lands close to streams into forests would greatly lessen water outflow and reduce the effects of sediment load as far as the Gulf of Mexico," says Ouyang, lead author of the article and research hydrologist at the SRS Center for Bottomland Hardwoods Research. "In general, the larger the area converted, the greater the effect. For the Lower Yazoo River watershed, a two-fold increase in forest land area would result in approximately a two-fold reduction in the annual volume of water outflow and the mass of sediment load moving into the river."

More information: www.srs.fs.usda.gov/pubs/45134

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