Careful sleuthing reveals a key source of sedimentation

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Much of the Mississippi River's sediment load doesn't come from field runoff, according to work by scientists at the U.S. Department of Agriculture (USDA). Instead, the scientists with USDA's Agricultural Research Service (ARS) have confirmed that stream bank collapse and failure can be chief contributors to high sediment levels in the silty streams and rivers that flow into the Mississippi. ARS is USDA's chief intramural scientific research agency.

The U.S. Environmental Protection Agency lists sediment as the most common pollutant of rivers, streams, lakes and reservoirs in the United States. Trapped sediment can reduce the useful lifespan of dams and reservoirs, exacerbate flooding, harm aquatic plants and animals, and transport other pollutants downstream. Over the years, billions of dollars have been spent on stream bank protection and restoration efforts to stem erosion and reduce sedimentation loads.

The source of this sediment load is often attributed to erosion and runoff from farm fields. But ARS hydrologist Glenn Wilson, who works at the agency's National Sedimentation Laboratory in Oxford, Miss., spent several years looking more closely at the causes of stream bank erosion. His studies focused on how seepage-the lateral movement of water through the ground-could prompt conditions that led to stream bank failure.

Wilson and others confirmed for the first time that a stable stream bank can quickly become unstable when seepage erosion is added to the mix

of factors that promote bank failure. They found that seepage from stream banks was eroding layers of soil that subsequently would wash down the face of the stream bank and into the stream itself. This added to the sediment load in the stream and also left the bank itself weakened and vulnerable to collapse.

The researchers concluded that stream bank failure may stem as much-or more-from the effect of seepage erosion undercutting the stream banks as from the added weight of the waterlogged stream banks.

More information: Results from this work were published in the Journal of Hydrologic Engineering and Earth Surface Processes and Landforms.

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