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Franklin & Marshall Professors

Announce Legacy Sediments Article in Science

Franklin & Marshall College professors Robert C. Walter, Ph.D. and Dorothy J. Merritts, Ph.D. this week announced the publication of an article in the journal *Science* that outlines the contributions thousands of 17th to 19th Century milldams have made to causing sediment and nutrient pollution in today's streams.

The research published by Drs. Walter and Merritts have lead to changes in public policy dealing with the cleanup of the Chesapeake Bay and other watersheds.

The article, "Natural Streams and the Legacy of Water Powered Mills," is the feature cover story in the January 18 edition of *Science*, the most prestigious scientific journal in the world.

Financial support for the research was provided by the Department of Environmental Protection, the Pennsylvania members of the Chesapeake Bay Commission and Franklin and Marshall College.

The article shows that many streams in the mid-Atlantic region are impaired by centuries-old land use practices, primarily by the construction of early American milldams and contemporaneous deforestation for agriculture.

These practices increased sediment erosion, and the filling of millponds with sediment by the mid-19th Century. The authors conclude that high sediment and phosphorus loads (and to some degree nitrogen) in streams today are impacted substantially from stream bank erosion of stored "legacy sediment.?/P>

In addition, the work significantly alters the traditional scientific view on how mid-Atlantic streams formed and evolved. Areas called "floodplains?throughout the 20th Century are not floodplains, but the surfaces of the sediment filled millponds.

The research concluded that the current state of streams in the region ?of small meandering streams with gravel beds and high, fine-grained banks -- is not the "natural?state that existed at the time of European settlement and that the pre-settlement streams were more akin to vegetated wetlands than they were to actual streams.

Original stream valleys had many small channel-like threads of water flowing around vegetated islands, and the entire valley received frequent overbank flow. This wetland pre-settlement condition is in stark contrast to the current state in which high, dry "floodplain?surfaces are covered by invasive grasses, shrubs, and trees that normally would not exist in a riparian (river corridor) environment.

The results of this research have implications for environmental and agricultural policy. Stream restoration is a multi-billion dollar industry, fundamentally the authors found we have been restoring some streams to the wrong “natural?state.

In addition, the authors argue that agricultural best management practices are working better than previously realized, and that there has been a source of sediment and nutrients that was unknown before this research brought this to light.

Follow-up studies have shown that from 50 to 90 percent of sediment load attributed to agriculture or overland runoff is actually coming from streambanks and legacy sediments.

The Department of Environmental Protection is already pursing the development of a floodplain restoration best management practice based on these new facts and recognized similar practices in the recently published Stormwater Management Best Practices Manual.

The work done by Drs. Walter and Merritts has been used by watershed restoration specialists like LandStudies, Inc. in Lititz, Pa to help develop techniques for floodplain restoration.

“Numerous watershed assessments we completed pointed to a previously unidentified source of sediment and nutrient pollution affecting water quality in our streams,?said Mark Gutshall, LandStudies, Inc.. “It wasn’t until we saw the work Drs. Walter and Merritts did that provided an explanation for what we were seeing in our assessments. We’ve worked closely with them ever since.?/P>

“Our floodplain restoration technique is designed to restore a stream to its original floodplain by removing the legacy sediment that would otherwise find its way downstream,?explained Gutshall. “Once we knew to look for old mill dams, we could accurately locate the old stream bed level and essentially put the stream back the way it was, with natural meanders but without the eroded stream banks.?/P>

“This is another case where science and history were able to document a source of pollution that is dramatically changing the way we restore water quality in our watersheds,?said Gutshall. “The fact the work Drs. Walter and Merritts have done was published in preeminent journal like *Science* not only validates what they found, but makes it a more important force in changing public policy.?/P>

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