

Erosion and Siltation The Long and Lingerin Problems of our Missouri River System

Before the construction of dams along the Missouri River, water and sediment were free to interact to find a balance between erosion and siltation. Dam construction changed that. It has led to sediment management challenges like accelerated erosion downstream of the dams and sedimentation in reservoirs.

When erosion and siltation happen, someone, somewhere is losing land to the river system. Conversely that land, which is typically high-value crop land before being eroded into the river, is being deposited somewhere, usually contributing to sandbars or accumulating on the banks.

Erosion and siltation remain two of the most important river management issues in the state despite a host of other issues that have arisen: water storage fees, sandbar habitat construction for threatened and endangered species, reservoir management for navigation in downstream states, maintaining state control of permitting and water use, and large downstream diversions of Missouri River water.

In the late 1990s, the BOMMM (Burleigh, Oliver, Morton, Mercer and McLean counties) Water Board asked the North Dakota State Water Commission to conduct a study and analysis of erosion and siltation accumulation in the Missouri River system in North Dakota.

The study entitled the “Missouri River Bank Erosion: Garrison Dam to Lake Oahe” can be found in state



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archives and is still relevant today. The preface of that study noted “bank erosion ... continues to cause problems (and) ... if no action is taken (will cause) ever increasing economic impacts.” A possible solution was an ambitious \$13 million (in 1997 dollars) revetment, or bank stabilization, project along the most vulnerable stretches of the river.

The study did not result in revetment work as noted but it did act as a catalyst for Congress to embark on Title VII of the Missouri River Protection and Improvement Act of 2000. Title VII provided a 75% federal cost contribution (matched by 25% from the state) to further investigate sediment issues of the Missouri River. It also led to the creation of a 16-member task force appointed by then-Governor John Hoeven. It included federal participation by the Army Corps of Engineers, the U.S. Departments of Agriculture, Energy and Interior and members of local water boards.



North Dakota commissioned a 2009 study titled “Impacts of Siltation in the Missouri River in the State of North Dakota” that produced astonishing findings. Data collected and analyzed showed approximately 45 million tons of sediment is deposited in the Missouri River in North Dakota in any given year, with nearly 85% of that coming out of Montana, mostly from the Yellowstone River.

How much is 45 million tons of sediment? Imagine filling 5.6 million dump trucks stretched bumper to bumper in a continuous line from Bismarck to Mexico City – 12 times – for a total of 27,000 miles. Or those same trucks lined up from the northern tip of Alaska to the southern tip of South America, and still have enough trucks to make the Bismarck-to-Mexico City trip five times. That’s a lot of sediment.

Using a system storage measurement, the Corps has estimated that system-wide sediment deposits in the mainstem dams equate to a loss of 76,000 acre-feet annually, of which Garrison Dam receives 27% of the total deposited sediment. That is nearly 25 billion gallons of lost water storage.

Besides the obvious issue of having reservoirs filling with sediment (in 2017, the Corps estimated a total system storage loss of nearly 6%), other impacts include the loss of agricultural land, increased flooding conditions, reduction in power generation, impacts to recreational use of the system, and increased maintenance on water supply facilities. Collectively, this is a concern to all river system users.

In terms of dollars, sediment impact to agriculture in the state is as much as \$980,000 per year in 2009 dollars.

The biggest loser is Williams County with an impact of \$500,000 experienced there. The economic impact to hydropower is even more significant, estimated at approximately \$35 million per year.

State studies in 1997 and 2009 came to essentially the same conclusions:

- Sedimentation of the reservoirs is ongoing, cumulative and destructive, causing huge economic and resource loss to the state.
- There may be no clear remedy for the problem
- Prevention of sediment accumulation is problematic as there are overlapping issues of responsibilities, lack of funding for any meaningful actions, and a complex permitting system.

It is fair and accurate to say BOMMM and the Missouri River Joint Water Board drew the same opinions and conclusions from the two studies. Except for putting a stamp of state and federal government authority on the issue, North Dakota did not need the studies to recognize the problems. While the state may not have had solid numbers on the tons of sediment being deposited each year, of the loss of acres due to sediment, or economic losses, it knew in 1997 and knows today that reservoir sedimentation is one of the great unresolved issues of Missouri River system management in the state.

This article is part one of a two-part series on the sediment challenges faced by the Missouri River system in North Dakota. The North Dakota Department of Water Resources will provide a state perspective of the sediment challenges of the river in October 2023.