Sky-Blue Waters Clouding Over: Declining Water Quality in the Minnesota River

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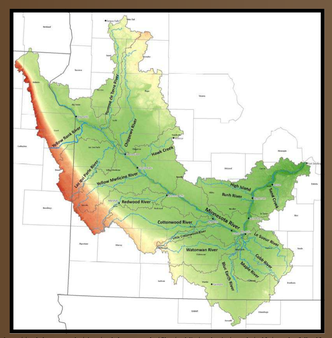
Abstract

The Minnesota River is one of the most polluted rivers in the nation. Amongst a host of pollutants, the river is predominately impaired by a high sediment load. The majority of this sediment load originates from river channel erosion, which has been drastically accelerated by extensive agricultural field artificial drainage. Despite decades of clean-up efforts, the water quality of the river has yet to decisively improve. Why have these efforts failed to yield significant results? The lack of substantial results is not indicative of a failure in technical solutions, but rather is indicative of a problem within the stakeholders working to restore the Minnesota River. The lack of significant water quality improvements in the Minnesota River is due to the lack of proper funding, the complex and integrated nature of watershed management, and the social barriers associated with said management. To achieve significant water quality improvements, an ecosystemic watershed management plan that emphasizes people driven solutions must be put into effect.

Site Description

Minnesota River Basin

Flowing some 335 miles from its source, Big Stone Lake in South Dakota, to its confluence with the Mississippi River at Fort Snelling near St. Paul, the Minnesota River and its basin spans roughly 15,000 square miles. An estimated 65-85% of the basin is used for agriculture, primarily annual row cropping.



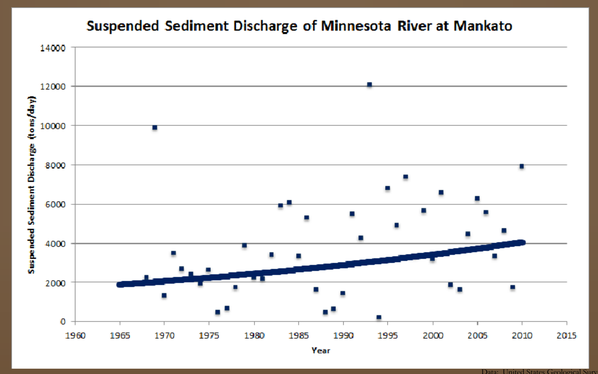
http://mrbdc.mnsu.edu/sites/mrbdc.mnsu.edu/files/public/mnbasin/trends/pdfs/trends_full.pdf

Methods

- **Literature Review:** A comprehensive review of literature pertaining to the Minnesota River's poor water quality and the barriers to progress was conducted. Literature included reports conducted by the Minnesota Pollution Control Agency, University of Minnesota Water Resources Center, and the United States Department of Agriculture.
- **Data Analysis:** Data from the United States Geological Survey pertaining to the river's poor water quality and the effectiveness of technical solutions was analyzed.
- **Interviews:** Interviews were conducted with the multitude of stakeholders involved in the improvement of the Minnesota River's water quality.

Problems with Past Restoration Attempts

- The "low-hanging fruit" solutions have been exhausted.
  - Buffer Strips
  - Conservation easements
- Solutions are not employed on a large enough scale or targeted properly.
- There are many stakeholders, both public and private, involved with the restoration of the Minnesota River, many of which do not possess the same perspective or objectives. Often agricultural interests and non-agricultural interests do not align.
- With the large number of stakeholders, there is considerable confusion over jurisdiction and responsibility within the watershed.



Data: United States Geological Survey

The average daily suspended sediment discharge of the Minnesota River has shown no consistent decline despite the implementation of technical solutions.

Conflicting Results

- The Minnesota Pollution Control Agency cites that the insects that compose the bottom of food chain have not returned and fish remain scarce.
- The Department of Natural Resources reports the return of large game fish.
- The Water Resource Center at Minnesota State University, Mankato argue conclusive water quality improvements will simply take more time.

Findings

- The Minnesota River Basin has an extensive history of land use changes, predominately the increase in agriculture.
- On average, 65% of the river's high sediment load originates from river channel erosion, not agricultural field runoff.
- The high occurrence of channel based sediment is due to increased water flow caused by an increase in agricultural field drainage.
- Despite past and current restoration and mitigation efforts, the river's water quality has failed to conclusively improve.
- The lack of results indicates not a technical problem, but a set of economic, political, and social barriers.
- Water quality restoration and mitigation efforts require one focused approach to achieve meaningful results.

http://startribune.com/local/119981244.html?page=1&c=y

Confluence of Minnesota River (left) and Mississippi River (right) at Fort Snelling

Conclusion

- Watershed management must espouse proper hydrological boundaries rather than arbitrary political boundaries.
- Efforts to improve water quality must be on an ecosystemic level rather than on a problem-by-problem basis.
- A watershed coalition which includes all watershed stakeholders must be formed and utilized.
- Solutions must be anthropocentric and involve all stakeholders within the watershed. These solutions must be reached by consensus rather than top-down approaches.
- The installation of buffer strips, water storage systems and refined agricultural field drainage systems must be specifically targeted within the greater watershed to reduce sediment load.
- **A comprehensive funding plan must be established that calls on all stakeholders involvement.**

References

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