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REPORT IN BRIEF

Mississippi River Water Quality and the Clean Water Act:

Progress, Challenges, and Opportunities

The Clean Water Act has reduced much of the pollution in the Mississippi River from "point sources" such as industries and water treatment plants, but problems stemming from urban runoff, agriculture, and other "non-point sources" have proven more difficult to address. Too little coordination among the ten states along the river has left the Mississippi River an "orphan" from a water quality monitoring and assessment perspective. Stronger leadership from the U.S. Environmental Protection Agency (EPA), along with better interstate coordination, is needed to address these problems. Specifically, the EPA should establish a water quality data-sharing system for the length of the river, and work with the states to establish and achieve water quality standards. For this effort, the EPA and the Mississippi River states should draw upon the lengthy experience of federal-interstate cooperation in managing water quality in the Chesapeake Bay.

The Mississippi River is, in many ways, the nation's best known and most important river system. It is a source of drinking water for millions of people and supports many recreational and commercial activities. The river's ecosystems provide environmental goods and services that are of great value to communities along the river and to the nation.

Mississippi River water quality is of paramount importance for the sustainability of these values and uses. However, many different human activities across the Mississippi River basin affect water quality. These include manufacturing, urbanization, timber harvesting, and agriculture. Locks, dams, levees, and other hydrologic modifications along the river also affect water quality.

The river has a variety of water quality problems, at different scales. There are some localized problems, such as legacy contaminants like PCBs and DDT, and fecal bacteria from sewage discharges. At a larger scale, excess nutrient loadings from across the basin cause water quality problems within the river. Those loadings also result in nutrient overenrichment further downstream and are the primary cause of the "dead zone" in the Gulf of Mexico. Sediment problems also affect

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large areas of the river. In the upper river, excess sediments are a problem in many areas. Downstream in Louisiana, by contrast, reduced sediment in river flows, due to retention behind upstream dams, has contributed to losses of coastal wetlands. At the scale of the entire river, nutrients (primarily nitrogen and phosphorus from fertilizers) and sediments are the two primary water quality problems.

Although the Clean Water Act has led to many successes in reducing point source pollution, nonpoint source pollution such as runoff from agricultural land and urban areas, has proven more difficult to manage. One challenge in addressing nonpoint source pollution is that the Clean Water Act does not provide for its direct regulation, in contrast to point source pollution, which is regulated under the act.

Efforts to reduce nonpoint source pollution are hampered by inconsistencies among the ten Mississippi River corridor states in their water quality standards (consisting of designated uses and water quality criteria) and monitoring programs. State-level water quality monitoring programs along the river have different levels of resources and have not been well coordinated, leaving the river an "orphan" from a water quality monitoring and assessment perspective. The Clean Water Act assigns most interstate water quality coordination authority to the EPA, but EPA has failed to use its mandatory and discretionary authorities to provide adequate oversight of state water quality activities along the river.

Implementation of the Clean Water Act

The Clean Water Act is the cornerstone of surface water quality protection in the United States. Passed in 1972, along with important subsequent amendments, the act employs regulatory and nonregulatory measures designed to reduce direct pollutant discharges into waterways, finance wastewater treatment facilities, protect wetlands, and manage polluted runoff. Congress designed the act "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The act also called for zero discharges of pollutants into navigable waters by 1985 and "fishable and swimmable" waters by mid-1983. The U.S. Environmental Protection Agency (EPA) and the states are jointly responsible for implementing the act.

The Clean Water Act calls upon the states, working in conjunction with the EPA, to establish designated uses for surface waters, and corresponding water quality criteria for specific contaminants in order to protect those uses. The Clean Water Act aims to achieve water quality improvements by requiring technology-based standards for point source discharges. This approach to point source management has had many successes, having reduced, for example, sewage discharges into the Mississippi River.

Differences in Upstream and Downstream Portions of the River

The upper and lower portions of the Mississippi River exhibit many contrasts that affect the nature of water quality problems and the extent of water quality monitoring programs. Much of the upper Mississippi River is a river-floodplain ecosystem that contains navigation pools, braided channels, islands, extensive bottomland forests, and floodplain marshes. In contrast, on the lower river, many natural connections between the river channel and its floodplain have been severed by the construction of large flood protection levees. The lower river has fewer backwater areas and islands than in the upper river. Flows of the lower river are much larger than those in the upper river, and they contain dangerous currents and eddies, making both river-based recreation and water quality monitoring activities more difficult.

In the upper Mississippi River, high rates of sediment input and deposition are important concerns. In the lower Mississippi River, deprivation of sediments—due in large part to the trapping of large amounts of sediments behind dams on the Missouri River—is a significant problem. Sediment deprivation is, for example, a key contributor to losses of coastal wetland systems in southern Louisiana.

Top: Lock and dam on the upper Mississippi River; photo courtesy the Alexis Park Inn and Suites. Bottom: Lower Mississippi River near Vicksburg, MS. Photo courtesy Jan Hoover.

For waterbodies that remain impaired after application of technology-based (and water-quality-based) controls of point source discharges, the Clean Water Act requires development and application of total maximum daily loads (TMDLs) to achieve water quality standards. TMDLs represent the amount of a pollutant that can be discharged into a waterbody consistent with applicable water quality standards. Achievement of water quality criteria requires analysis of total contaminant loadings to particular waterbodies and establishment of TMDLs that cannot be exceeded. TMDLs provide the basis for plans to control both point and nonpoint sources of particular contaminants. The TMDL framework is more easily implemented in smaller watersheds within individual states than in multi-state waterbodies like the Mississippi River. For TMDLs and water quality standards to be effectively employed in interstate rivers, the effects of interstate pollutant loadings must be fully considered in developing a TMDL.

The Clean Water Act requires the EPA to establish water quality criteria; oversee and approve state water quality standards and TMDLs; set water quality standards and the TMDL process when state efforts are inadequate; and safeguard water quality interests of downstream and cross-stream states. Despite the authorities granted to the EPA within the Clean Water Act to coordinate interstate water quality issues, large-scale water quality problems exist in the Mississippi River due to nutrient loadings and sediment loading and retention. The low-oxygen (hypoxic) "dead zone" in the northern Gulf of Mexico also continues to persist.

Congress did not design the Clean Water Act to address every process that affects Mississippi River water quality, and many structural and physical changes to the Mississippi River pre-date passage of the act. The Clean Water Act cannot be used as the sole legal vehicle to achieve all water quality objectives along the Mississippi River and into the northern Gulf of Mexico. Nevertheless, the Clean Water Act provides a legal framework that, if comprehensively implemented and rigorously enforced, can effectively address many aspects of intrastate and interstate water pollution, although the emphasis to date has been predominantly on the former.

Agriculture and Water Quality

Agriculture contributes the major portion of nutrients and sediments delivered to the Mississippi River. Reductions in pollutant loadings, especially nutrients, from agriculture therefore are crucial to improving Mississippi River water quality. The U.S. Department of Agriculture (USDA) administers several incentive-based conservation programs designed to implement best management practices (BMP) to reduce levels of nutrient and sediment in runoff. Participation in these programs is voluntary but there are financial incentives to implement BMPs.

Effective management of nutrient and sediment inputs and other water quality impacts from agricultural sources will require site-specific, targeted approaches directed at areas of higher nutrient and sediment runoff. Recent increases in biofuels production, and the increased nutrient and sediment pollutant loads this likely will induce, provide an even stronger rationale to target applications of USDA conservation programs. The EPA and the USDA also should strengthen their cooperative activities designed to reduce water quality impacts on the Mississippi River and the northern Gulf of Mexico from agriculture.

State-Level Leadership

The ten mainstem Mississippi River states have different priorities regarding the river and devote different levels of resources to water quality data collection. Broadly speaking, there is a distinction between priorities and approaches of the upper river states compared to the lower river states. One example is that the five upper river states established the Upper Mississippi River Basin Association (UMRBA) in 1981 to help coordinate their river-related programs and to work with the federal agencies on Mississippi River issues. There is no equivalent organization for the lower river states. The Lower Mississippi River Conservation Committee (LMRCC) is a multi-state organization established to discuss river biology and restoration issues, but it does not have representation of gubernatorial appointees or employ full-time staff like the UMRBA.

The Mississippi River states will have to be more proactive and cooperative in their water quality programs for the Mississippi River if marked improvements in water quality of the river are to be realized. The lower Mississippi River states should strive toward creating a cooperative mechanism similar in organization to the UMRBA. The EPA also should facilitate stronger integration of water quality programs of all ten Mississippi River states.

EPA Leadership

To help promote a more systematic approach to monitoring, the EPA should take the lead in establishing a water quality data-sharing system for the length of the Mississippi River. Several federal agencies, including NOAA, the Corps of Engineers, and the USGS, have collected various water quality data for different stretches of the river and into the gulf. All these programs have merit, but there is no single federal program for water quality monitoring and data collection for the river as a whole.

The EPA should coordinate with the Mississippi River states to ensure the collection of data necessary to develop water quality standards for nutrients in the Mississippi River and the northern Gulf of Mexico. As part of this effort, the EPA should draw upon the considerable expertise and data held by the federal agencies noted. Also, the EPA Administrator should ensure coordination and consistency among the four EPA regions along the Mississippi River with regard to water quality issues along the river and in the northern Gulf of Mexico.

The EPA also should develop water quality criteria for nutrients in the Mississippi River and the northern Gulf of Mexico. Further, the EPA should ensure that states in the Mississippi River watershed establish water quality standards (designated uses and water quality criteria) and TMDLs such that they protect water quality in the Mississippi River and the northern Gulf of Mexico from excessive nutrient pollution. In addition, through a process similar to that which has been developed for the Chesapeake Bay watershed, the EPA should develop a federal TMDL, or its functional equivalent, for the Mississippi River and the northern Gulf of Mexico.

Looking Ahead

The Mississippi River provides immense value to the nation. This report's recommendations will not be easy to implement and will entail a higher degree of collaboration and compromise among interest groups, states, and agencies, than has been the case in the past. Some of the recommendations will require additional levels of resources to realize scientific and programmatic improvements. These challenges will have to addressed, however, if the purposes of the Clean Water Act are to be realized along the Mississippi River, and the river accorded a level of protection and restoration commensurate with its many values.

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