

PERSPECTIVES FROM THE FIELD

A Call for Federal Investment in Natural Infrastructure for the 21st Century

Donald L. Hey,
Christopher Vaughn

Our nation's built infrastructure—our water supply and wastewater treatment systems, roads and bridges, railroads, and energy production and delivery systems—needs repair and modernization. At the same time, our natural infrastructure—our forests, prairies, wetlands, streams, rivers, estuaries, and shorelines—are in even greater need of repair. Once restored, these natural infrastructures and ecosystems can address pressing national problems: the need to conserve energy, improve water quality and reduce coastal hypoxia, decrease flood damage, and address global warming.

While built and natural infrastructures are inextricably linked, they are often developed and managed independently. Indeed, historically we have relied on built infrastructure and paid little attention to natural infrastructure. As a case in point, consider how our wetland infrastructure has been greatly abused and neglected over the past 150 years. Some 117 million acres of wetlands in the contiguous 48 states have been drained for agricultural production and urban and industrial development, with losses reaching 90% in some Midwestern states. The results have been catastrophic flood losses, degraded water quality, and decimated wildlife populations. As a nation, we have failed to meet even modest wetland restoration goals. The National Research Council in 1992 recom-

mended restoring 10 million acres of wetlands by 2010, or 555,000 acres per year (Committee on Restoration of Aquatic Ecosystems, 1992, p. 354). Yet, according to the United States (US) Fish and Wildlife Service, only 32,000 acres per year have been restored since 1998 (Dahl, 2006, p. 16)—a mere 6% of the annual goal.

Natural infrastructure can meet our social needs more cost-effectively, efficiently, and sustainably than can built infrastructure. For example, wetlands use solar energy to remove excess nitrogen naturally from domestic, industrial, or agricultural wastewater—excess nitrogen in our rivers and streams is a principal cause of hypoxia and other serious environmental problems around the country. Traditional treatment facilities rely on large amounts of fossil fuel to remove nitrogen and, moreover, require significant capital investment. Wetlands, on the other hand, not only remove excess nutrients more efficiently and sustainably, but provide additional social benefits, including floodwater storage, carbon sequestration, wildlife habitat, and recreational opportunities. Rather than investing in concrete and steel, restoring wetlands would accomplish the same water quality objectives, but with less cost, less energy, and many more social benefits.

Investing in technologies that harness natural ecosystem services will lead to job creation and economic growth. One such technology, called *nutrient farming*, would establish a nutrient-trading market, which would be based on farmers of bottomlands restoring presettlement wetlands and using these wetlands to remove or “harvest” excess nutrients from surface water and sequester carbon from the atmosphere. The nutrient farmers would then sell the resulting nutrient credits to municipal dischargers who cost-effectively cannot reduce their own nutrient loads. Water quality trading, according to one estimate,

could lead to a \$38 million market in the Illinois River watershed alone (Scott et al., in preparation). Such a market would be largely self-sustaining, not requiring further federal investment.

As the nation invests to meet the needs of the 21st century, restoring our natural infrastructure should be a top priority, as recently recommended by a consortium of national environmental leaders (*Transition to Green*, 2008). In particular, restoring our nation's wetlands, rather than expanding fossil fuel-powered, concrete-and-steel wastewater treatment plants, would save billions of dollars in capital costs, reduce consumption of fossil fuels, restore valuable wildlife habitat, and provide a stimulus for new and sustainable economic growth. As recommended by the National Research Council, long-term capital investments in pilot projects are needed to develop the technologies that “represent initial steps toward a larger, basinwide network of land management practices aimed at protecting water quality in the Mississippi River and northern Gulf of Mexico” (Committee on the Mississippi River and the Clean Water Act, 2008).

To this end, the Wetlands Initiative is seeking to implement a pilot project in the Illinois River watershed that will research and demonstrate the potential of nutrient farming as an economic engine for financing the restoration of wetlands on a large scale. This demonstration project will include an integrated research agenda—combining economic, scientific, and sociological research—to test the efficacy of large-scale wetland restoration to provide ecosystem services that are vital to our state's economic and environmental health. Researchers will examine how wetlands reduce nutrient pollution, sequester carbon, control sedimentation, and reduce flood damage. The goal is to produce a nutrient farming model that can be replicated throughout the nation.

References

- Committee on the Mississippi River and the Clean Water Act: Scientific, Modeling and Technical Aspects of Nutrient Pollutant Load Allocation and Implementation. 2008. *Nutrient Control Actions for Improving Water Quality in the Mississippi River Basin and Northern Gulf of Mexico*. National Research Council, Washington, DC, 22 pp. Available at <http://www.nap.edu/catalog/12544.html>.
- Committee on Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy. 1992. *Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy*. National Research Council, Washington, DC, 576 pp.
- Dahl, T.E. 2006. *Status and Trends of Wetlands in the Conterminous United States: 1998 to 2004*. US Fish and Wildlife Service, Washington, DC, 112 pp.
- Scott, B., C. Tallarico, J. Kostel, and R. Peck. In preparation. *Nitrogen Farming in the Illinois River Watershed: An Environmental Economics Market*. Research summary available at http://www.wetlands-initiative.org/images/pdfs_pubs/NutrientFamringILLRiverTest-MarketSummary.pdf.
- Transition to Green: Leading the Way to a Healthy Environment, a Green Economy and a Sustainable Future—Environmental Transition Recommendations to the Obama Administration*. 2008. Prepared by 29 national environmental organizations. Available at http://otrans.3cdn.net/ba9c868ec4fe74fib8_2pm62vhlb.pdf.

Submitted March 8, 2010; revised March 9, 2010; accepted March 9, 2010.

Address correspondence to: Donald L. Hey, Wetlands Research, Inc., PO Box 225, Wadsworth, IL 60083; (phone) 847-244-9003; (fax) 847-244-8133; (e-mail) wetlands1@sbcglobal.net.