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Removing Muck with Markets: A Case Study on Pollutant Trading for Cleaner Water

By Michael DeAlessi

POLICY BRIEF 24

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Policy Brief

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Policy Brief

Removing Muck with Markets: A Case Study on Pollutant Trading for Cleaner Water

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Overview

Regulatory restrictions on nutrient and suspended solid pollution have improved water quality in most U.S. watersheds. But many watersheds still suffer from poor water quality. A good example is Wisconsin's Fox-Wolf River Basin where poor water quality remains a problem, especially due to phosphorus loading. Most of the gains in water quality have come from point-source reductions, which have now reached the stage of diminished returns and increased costs. Nevertheless, reducing point-source loads continues to be the target for stricter regulation.

Market mechanisms to allow trading underneath a cap for both point and nonpoint sources offer a promising avenue to further and more practical improvements in water quality in the nation's watersheds. The Fox-Wolf River Basin provides a good case study.

The State of the Watershed: An Expensive Pollution Problem[1]

Much of the pollution today is generated from nonpoint sources such as agriculture, construction, forestry, and industrial categories which do not necessarily have the financial resources or applicable technologies to implement the same control measures that the larger point dischargers have.

Although water quality has improved dramatically in recent years, excessive levels of nutrients and suspended solids still reach Green Bay on a daily basis, compromising aquatic health. Aquatic health is important not only for environmental quality, but for its effect on recreation and the livelihoods of river tribes.

As a result of a 1988 Remedial Action Plan for the Fox-Wolf River Basin, point-source dischargers were required to meet a 1 mg/L phosphorus limit. A level of 0.3 mg/L was set for the future, but further reductions from these point sources will be costly and produce little improvement in overall aquatic health.

The Trading Approach to Pollution Reduction

Watershed-based trading presents the prospect of a win-win situation for point sources, nonpoint sources, and the watershed itself. A limitation of 0.3 mg/L is very stringent and will be expensive to achieve. Furthermore, it is generally believed that a discharge limit of 0.3 mg/L that is applied only to point-source dischargers will not be enough to provide the water quality necessary to comply with Clean Water Act standards. Additional reductions will be necessary. This is where trading provides great value.

At its core, the trading concept is simple: A point source can pay a nonpoint source to install Best Management Practices[2] (BMPs) that reduce pollutant loads to the watershed.

BMPs are management standards that guide forest, agriculture, construction, and other activities to reduce nonpoint-source pollution. BMPs are based on the practical experience of land managers and improvements in the scientific and technical understanding of the relationship between land management practices and environmental impacts. In agriculture examples include the installation of buffer strips along stream beds, adequate fencing to keep livestock from directly soiling surface water, the placement of sheds over manure piles to minimize runoff, and the use of pest control techniques that are low in chemical intensity.

Through trading, water quality improves, and the point source avoids having to install more costly pollution controls at its own facility in order to comply with the more stringent standard. Trading offers a way to leverage limited resources to attain water quality goals more cost-effectively than traditional regulatory methods allow. The concept is flexible enough to encourage Clean Water Act compliance on a watershed basis while incorporating emerging technologies and pollution prevention techniques.

A watershed trading scheme to reduce pollutants to the Fox-Wolf River Basin has the potential to allow for the greatest pollution reduction at the lowest cost and greatest efficiency. The U.S. EPA explicitly "endorses trading as an economic incentive for voluntary pollutant reductions from point and nonpoint sources of pollution," because trading "can provide greater efficiency in achieving water quality goals in watersheds by allowing one source to meet its regulatory obligations by using pollutant reductions created by another source that has lower pollution control costs."[3]

A cap and trade program in the Fox-Wolf Basin would appear to offer distinct advantages over more traditional approaches to pollution reduction and deserves further exploration by stakeholders. However, just how such a trading scheme would be implemented requires stakeholder agreement on the procedures and administrative practices that govern trading.

The cap on pollutant loading to the watershed would be based upon the Total Maximum Daily Load (TMDL) of each target pollutant such as phosphorus or sediment. Typically, the creation of a trading program holds current dischargers to their existing permits, only applying the trading scheme to the additional requirements that are imposed.

Stakeholders/Lead Agencies

The Fox-Wolf Watershed Alliance, a not-for-profit organization with public, private, and industrial members, has taken the lead to organize stakeholder involvement. Ultimate oversight, however, rests with the Wisconsin Department of Natural Resources and the U.S. EPA.

Other stakeholders include regional, county and municipal agencies, environmental organizations, consultants, representatives from agriculture and other nonpoint–source dischargers, industry and *other* point-source dischargers, consultants, riparian property owners and residents, those who use the watershed for recreation and for food, and those who use the watershed as a source of drinking water.

The Fox-Wolf Basin

There are potentially hundreds of trading participants in the basin. A study by the Watershed Alliance of the potential economic advantages of trading in the Fox-Wolf found that BMPs could reduce phosphorus from nonpoint sources at an average cost of $26/lb., while further reductions (below the *1 mg/L limit)* from point sources would cost an average of $73/lb.

Examples of Successful Trading Programs in Air4

According to the U.S. EPA, the watershed trading approach is very similar to that used in the highly successful Acid Rain Cap and Trade Program, which has reduced sulfur dioxide emissions by one-third compared to 1990 levels at a fraction of the anticipated cost and with nearly universal compliance. Other similar programs implemented at the local level include California's RECLAIM program in the South Coast region and Illinois's ERMS program in the Chicago area.

Examples of Watershed Trading

Several specific regions around the country demonstrate significant experience with water quality trading. In Connecticut, for example, nitrogen trading among publicly owned water treatment plants that discharge into Long Island Sound is expected to achieve the required reductions while saving an estimated $200 million in control costs that would have been passed on to consumers.

North Carolina's Tar-Pamlico Basin Association is North America's foremost example of a nutrient trading community with experience in point-source and nonpoint-source trading.[5] The association came into being after a series of fish kills and other water quality problems caused the Tar-Pamlico Basin to be designated "nutrient–sensitive" water. At the time, all of the point-source dischargers were operating within the limits of their discharge permits.

Some process had to be developed to engage farmers and other producers of nonpoint-source discharges in an overall river basin solution. A total of 200,000 kg/yr in loading (180,000 kg in nitrogen and 20,000 kg in phosphorous) had to be reduced in order to achieve water quality goals. The prospect for cost savings by means of cooperation, as opposed to point-by-point controls, was promising. U.S. EPA studies of the cost of removing pollutants in the area indicated that further reductions in nutrients from point sources would range

from $1,892 to $17,294 /kg. The cost of removing the same pollutant by nonpoint sources was estimated to range from $147 to $262/kg.

Tar-Pamlico demonstrates that more can be accomplished at lower cost when the incentives are right. Without trading, the association estimates it would have cost its members an average of $7 million in technology upgrades to achieve a comparable level of nutrient reduction that a $1 million investment in nonpoint-source controls yielded.

Opportunities and Challenges for Implementing the Approach in the Fox-Wolf

One of the major challenges in a trading scheme that involves both point and nonpoint sources is overcoming the uncertainty in estimates of nonpoint-source loads and reductions, particularly as compared to point-source discharges. This uncertainty is due to several factors including:

- precipitation;
- effectiveness of land management practices;
- time lag between implementation of some practices and full implementation of all necessary BMPs; and
- soil characteristics and the effect of cover and slope on delivery to receiving waters.

The U.S. EPA supports the following approaches to compensate for uncertainties in determining loads from nonpoint sources:

- monitoring to verify load reductions;
- requiring greater than 1:1 trading ratios between point and nonpoint sources;
- using demonstrated performance values or conservative assumptions in estimating the effectiveness of nonpoint-source management practices;
- using site- or trade-specific discount factors;
- retiring a percentage of nonpoint-source reductions for each transaction or a predetermined number of credits.

The Fox-Wolf Basin differs from other examples because phosphorus, which is a primary target of point-to-nonpoint trades, has been regulated for municipal dischargers for many years as the result of the International Joint Commission Agreement to reduce phosphorus discharges to the Great Lakes. Most of the municipal dischargers have already installed the necessary processes and equipment to comply with a phosphorus effluent limitation of 1 mg/L. However, there are opportunities for phosphorus trades involving industries and some municipal dischargers either between point sources or between point and nonpoint sources. Studies conducted in recent years indicate that significant reductions in phosphorus are still required to achieve desired water quality in the Basin.[6]

What Needs to Happen

Stakeholders need to formally agree on the following items identified by the U.S. EPA as necessary for trading programs to be credible and successful:

- clearly defined units of trade;
- use of standardized protocols to quantify pollutant loads and reductions;
- provisions to address the uncertainty of nonpoint-source loads and reductions that are traded;
- accountability mechanisms for all trades;
- public participation and access to information;
- monitoring and program evaluation.

The Fox-Wolf Watershed Alliance has taken the lead and is already working closely with potential trading partners and other stakeholders. Most importantly, the Alliance is working on setting up and running the Soil and Water Assessment Tool (SWAT) model, a crucial component in linking discharges to water quality.

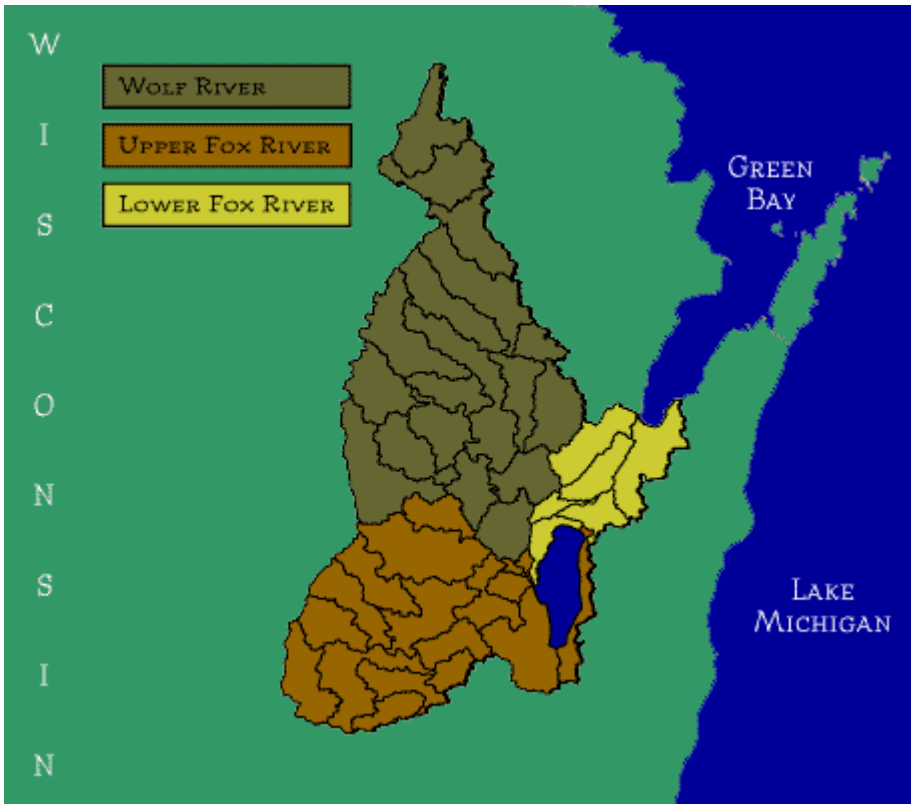
Performance Measures

Performance measures are crucial for evaluating the success of the program, and force stakeholders to articulate goals. Meeting those goals will be necessary to justify the costs of the program. Potential performance measures include:

- specific reduction targets, (e.g., phosphorus loads less than .3 mg/L);
- activity in trading market (e.g., certain minimum number of annual trades);
- cost of pollutant reduction (i.e., tracking what the costs of each incremental reduction in pollutant loads are, and comparing them to estimates of costs without trading);

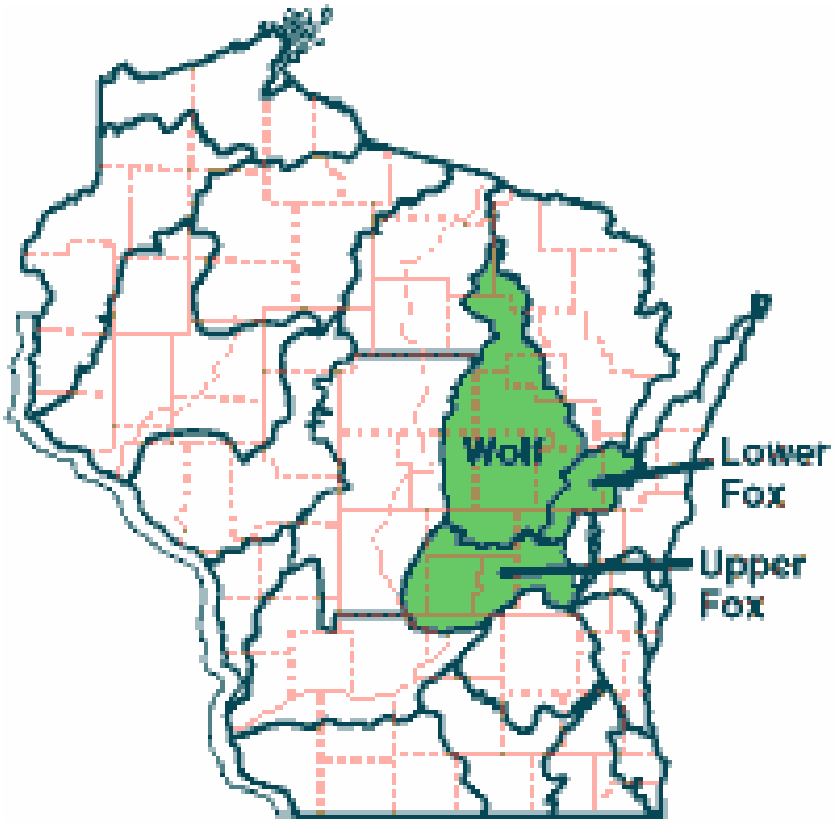
Appendix

Maps of the Fox-Wolf Watershed



Source: Fox-Wolf Environmental History Project
http://www.wisconsinwaterhistory.org/TimeRiver/select-map.html

The Fox-Wolf Watershed



Source: University of Wisconsin extension http://clean-water.uwex.edu/foxwolf/

About the Author

Michael De Alessi is Director of Natural Resource Policy for the Reason Public Policy Institute in Los Angeles. He specializes in water policy, marine conservation and wildlife issues and is former director of the Center for Private Conservation.

He received a B.A. in Economics and an M.S. in Engineering Economic Systems from Stanford University and an M.A. in Marine Policy from the Rosenstiel School of Marine and Atmospheric Science at the University of Miami. He is the author of *Fishing for Solutions* (London: Institute of Economic Affairs, 1998), and his articles have appeared in such publications as *New Scientist*, *International Herald Tribune*, *The Wall Street Journal Europe* and *The Asian Wall Street Journal.*

Related Reason Public Policy Institute Studies

Managing for Performance at the EPA, by Carl DeMaio, January 2001, http://www.rppi.org/epatrans.html.

Preparing for the Storm: Preserving Water Resources with Stormwater Utilities, by Barrett P. Walker, Reason Public Policy Institute, Policy Study No. 275, January 2001.

Rivers Among Us: Local Watershed Preservation and Resource Management in the Western United States by Michael Harrington and Christopher A. Hartwell, Reason Public Policy Institute, Policy Study No. 259, June 1999.

Endnotes

[1] Great Lakes Trading Network, "Fox-Wolf River, Wisconsin," www.gltn.org.

[2] James Boyd, *The New Face of the Clean Water Act: A Critical Review of the U.S. EPA's Proposed TMDL Rules* (2000), http://www.rff.org/CFDOCS/disc_papers/PDF_files/0012.pdf.

[3] *EPA Fact Sheet on Final Water Quality Trading Policy*, 2003, http://www.epa.gov/owow/watershed/trading/2003factsheet.html

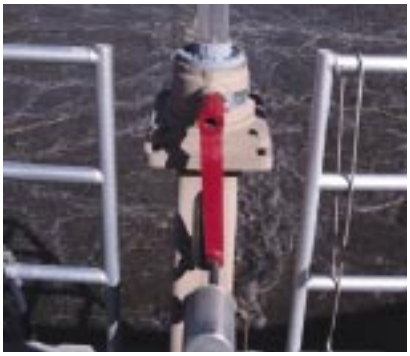
[4] Christine Todd Whitman, Administrator, U.S. EPA , Remarks (January 13, 2003), http://yosemite.epa.gov/administrator/speeches.nsf/.

[5] Source: Bruce Yandle and Brian Mannix, 2003. "Public Interest Comment on The Environmental Protection Agency's Proposed Water Quality Trading Policy," www.mercatus.org/waterquality.pdf

[6] Wisconsin Department of Natural Resources, http://www.dnr.state.wi.us/org/water/wm/nps/pt/index.htm.








Reason Public Policy Institute
3415 S. Sepulveda Blvd., Suite 400
Los Angeles, CA 90034
310/391-2245
310/391-4395 (fax)
www.rppi.org