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By Brydon Ross [1]

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An innovative approach to managing nutrient runoff and water quality is being implemented in Indiana, Kentucky, and Ohio by using the basic structure of the successful Acid Rain Program first implemented in the mid-1990s by the EPA. In essence, the program creates a water quality cap-and-trade program that allows an industrial facility or utility to substantially reduce its compliance costs under the Clean Water Act by providing financial incentives to agriculture operations to implement best practices to reduce nutrient discharges into water. This flexible approach to environmental stewardship is thought to be the largest project of its kind in the world.

About the Author

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Officials from Indiana, Kentucky and Ohio gathered on the morning of Aug. 9, 2012, for a signing ceremony that ushered in the nation’s largest clean water program—the Ohio River Basin Water Quality Trading Project. The voluntary, free-market program was developed by the Electric Power Research Institute, a nonprofit research consortium funded by the utility industry, as a flexible compliance method to reduce harmful discharges of nutrients found in agriculture runoff. The project essentially creates an interstate cap-and-trade program between farmers and participating industrial facilities like utilities.[1]

The pilot project has received plaudits from state, federal, local and agricultural stakeholder groups for providing an innovative way to manage water quality problems plaguing the river and its tributaries. “Although USDA has been involved with several interesting and successful ecosystem service market projects to date, the Ohio River Basin Water Quality Trading effort sets itself apart by proving a tremendous opportunity to bring water quality trading to scale and show broad benefits,” U.S. Department of Agriculture Undersecretary Harris Sherman said in a letter of support.[2]

With initial federal grants from the EPA and the Department of Agriculture, EPRI created the framework in the pilot program that gives financial incentives to farmers to implement best management practices on their land to mitigate fertilizer and manure runoff through planting cover crops, implementation of no-till practices, runoff barriers and other methods. In exchange, the farmer receives a credit for the amount of nutrient reduction achieved, and could then sell that credit to a utility or industrial facility to help offset its own pollution compliance costs.

Supporters of the pilot project contend it provides a more flexible and cost-effective way to address the substantial environmental problems caused by severe nutrient loads in water without a one-size-fits-all federal regulatory standard. The success of the pilot program, which runs through 2015, could lead to the project’s expansion to all eight states in the Ohio River basin. According to the EPRI, if just 5 percent of the region’s 230,000 farmers participated in the nutrient management program, more than 2 million acres of land would be protected with best management conservation practices.[3]

Nutrient Loads and Hypoxia
Nutrients like nitrogen, phosphorus and potassium are essential to the health of ecosystems. Without them, plants would not grow and organisms would lack the critical nourishment needed to sustain life. Eutrophication, however, is a high or excessive concentration of these nutrients and other organic materials in water, including nitrates and phosphates from fertilizer, agriculture operations and storm-water runoff that can cause harmful algae blooms or hypoxic zones. The Gulf of Mexico has a hypoxic or “dead zone” that is depleted of oxygen and nearly devoid of marine life and fish. A 2009 study by EPA and a group’s state clean water officials representing Connecticut, Delaware, Illinois, Kansas, Ohio, Oklahoma, Utah and Virginia, estimated that 78 percent of all coastal waters in the U.S. exhibited some signs of eutrophication and nearly one-third of all estuaries were identified as eutrophic.

Although there are naturally occurring hypoxic zones across the globe, the U.S. Geological Survey and other federal scientists believe the primary culprit contributing the most to the size and duration of the hypoxic zone in the Gulf is agriculture runoff. The agency estimated the average size of the dead zone in the Gulf from 2007 to 2012 was approximately 6,700 square miles—an area about the size of both Connecticut and Rhode Island. This area has declined significantly from the all-time high of more than 8,000 square miles that was measured by the federal government in 2002, but scientists from the National Oceanic and Atmospheric Administration believe that was in large part due to the historic drought conditions seen across the Midwest in the summer of 2012.

Hypoxia not only impacts aquatic environments, but it also threatens the valuable commercial seafood and fishing industries of the Gulf Coast. According to the National Marine Fisheries Service, the Gulf region generated more than $18 billion in sales impacts from commercial fishing and an estimated 3.2 million anglers took more than 23 million recreational fishing trips in 2011.

Pollution and Nutrient Levels in the Ohio River Basin

More than 30 million people live in the Ohio River basin and more than 5 million people depend on the river for drinking water. The region’s industrial past has contributed to significant water pollution problems and many environmental advocacy groups have expressed significant concern with the current status of the river’s health. Environment America, an environmental group based in Massachusetts and Washington, D.C., considers the Ohio River America’s most polluted river based on the 32 million pounds of toxic discharges released by industrial facilities in 2010. The group contends the river’s tributaries receive nearly 26 million pounds of released toxic discharges from industrial and chemical companies, which would account for approximately 25 percent of all releases in the country. The 2008 Gulf Hypoxia Action Plan, produced by the EPA’s Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, found the Ohio River was the largest source of nitrogen and phosphorus nutrients contributing to the persistent dead zone in the Gulf.

Water pollutants and excessive nutrient loads can enter the environment through a host of pathways including, but not limited to, industries, municipal water systems, stormwater and urban runoff. The Federal Water Pollution Control Act of 1972 requires facilities that directly convey discharges, or a point source in regulatory parlance, to obtain a National Pollutant Discharge Elimination System permit from the EPA that is based on technology and water quality standards. Although significant amounts of nutrient pollution can be attributed to agriculture runoff, farms, for the most part, are not regulated under this program and are referred to as nonpoint sources. Other examples of nonpoint sources include irrigation, rainfall or snowmelt that transports pollution into ground or surface water. In total, there are 800 permitted discharges into the Ohio River—49 from power plants, 180 from municipal wastewater discharges and more than 300 from industrial facilities.

Genesis of an Idea

Existing EPA requirements for states in the Ohio River basin to reduce nutrient loads found in impaired waters and another pending rulemaking by the agency to tighten power plant water discharge requirements created a scenario that demanded new thinking. According to an EPA database, Indiana, Kentucky and Ohio alone have more than 3,400 bodies of water that are designated as impaired under the Clean Water Act making compliance a potentially unwieldy and expensive proposition.

The Electric Power Research Institute (EPRI) offered a new twist on an existing idea by proposing a market-based trading framework similar to the one used to successfully reduce the acid rain causing air emissions of sulfur dioxide and nitrogen oxides. The approach of the EPA Acid Rain Program was different than typical command and control regulatory proceedings because it created a compliance program offering financial incentives for the private sector by creating an allowance-trading program to reduce air pollution rather than just a firm regulatory limit. The cap-and-trade program reduced the overall amount of acid rain causing emissions through an increasingly stringent standard, but it provided covered utilities with the ability to buy, sell or bank credits or “allowances” that could be used to pay for technology installation, energy efficiency improvements or other conservation measures to reduce compliance cost. In essence, a company that had a difficult time meeting an emission standard could buy credits from those that did not have...
the same challenges. It drove down compliance costs in a more efficient manner by offering greater flexibility than a rigid permitting program allows. The Government Accountability Office estimated the EPA’s emissions trading system for acid rain, using the proper management and oversight principles, saved more than $3 billion in compliance costs from traditional command and control air regulation, while still improving the environment.13

Under the program framework developed by EPRI, the principles of the Acid Rain Program could be applied to mitigate the excessive nutrient loads being discharged into the Ohio River. Many of the region’s numerous coal-fired power plants employ scrubbers on their smokestacks to control and filter air emissions. The chemical reaction from the ammonia used in the scrubbing process, however, creates wastewater discharges that contain nutrients like nitrogen. Dealing with the effluent is a major regulatory undertaking requiring significant investment by electric utilities to comply with federal clean water guidelines.

One of the country’s largest investor-owned utilities, AEP, estimated that it would cost the company $52 million to install nutrient control technology and $3 million a year in operating costs at just one of its facilities near Brilliant, Ohio. Once the cap-and-trade program envisioned by EPRI is in place, the utility could purchase a credit from a livestock farmer that uses best management practices on a farm to reduce the same amount of nutrients from the river for only $100,000.14 The potential for such dramatic cost savings has garnered not only the interest of AEP, but also other major utility players in the Ohio River area, including Duke Energy, the Tennessee Valley Authority and Hoosier Energy Rural Electric Cooperative.

In order for the program to be successful, a substantial amount of buy-in and trust was needed from the agriculture community to ensure there would be enough available credits to show meaningful reductions in nutrient discharges. EPRI conducted more than 200 stakeholder meetings and developed collaborations with local farm bureaus and the American Farmland Trust, an advocacy organization that provides technical assistance to farmers on land use and conservation efforts. EPRI found that in order for any water quality trading program to have wider success in the agriculture community, it must have:

- Minimal paperwork and any contracts must be one to two pages in length with plain English explanations;
- Mechanisms put in place to avoid wild swings in credit valuation and prices;
- Access to technical assistance for producers;
- Best management practices that include information on impacts to crop yields;
- Conservation efforts that fit into existing cost-share programs;
- Trusted intermediaries to manage credits and monitor/verify best management practices; and
- Consistent and transparent rules.15

Verification and Certification—How Does the Credit Trading Program Work?

Although stakeholders and supporters tout the overall environmental benefits of the water quality trading program, the concept does have skeptics. Advocacy organizations like the Floyds Fork Environmental Association in Kentucky question the efficacy of cap-and-trade programs for nutrients in water because of the potential to create hot spots around industrial facilities that would result in concentrations of very high levels of pollutants. The association’s spokesperson, Teena Halbig, expressed her skepticism in the Louisville Courier-Journal, “This (trading program) shifts pollution from one spot to another.”16 EPRI says computer modeling can prevent the accumulation of hot spots and the pilot program specifically prohibits credits from being used for a project that would exceed any state’s water quality standard or law, or have an adverse localized impact, including the protection of threatened or endangered species.17

Other critics of cap-and-trade programs contend they subsidize good behavior and practices that already should be in place, and that projected environmental benefits can be inflated or difficult to track without dedicated monitoring. For states considering an interstate water quality trading program it raises an important question: How are results validated and verified?

A quick tutorial on the mechanics of the program is necessary to understand how the certification process works. During the pilot phase, the generation of credits will be focused primarily on agriculture operations, or nonpoint sources. One credit will be generated for each pound of nitrogen or phosphorus that is prevented from being discharged at the edge of the farm field. Credits are valid for a minimum of 12 months upon validation and may be renewed for successive terms as long as verification continues.

To determine if real reductions are occurring, operators must provide three years of data showing past practices to establish a baseline of current farm conditions. A best management practice to reduce nutrients will generate a credit only after its installation and confirmation of proper maintenance and operation is conducted. This work will be verified by a
state agency or inspector, typically an official with the department of natural resources. Any credits generated by industrial facilities, utilities or point sources will be measured at the end of the pipe or discharge source. In order for a point source to receive a credit, the facility must prove that it is reducing the total amount of nitrogen or phosphorus below its current regulatory or permit limit. Again, point source credits would be subject to independent verification and inspection by a state agency.

Two sources will be used in the methodology for the issuance of credits for farms. The first is a model utilized by EPA’s Region 5 (Great Lakes) Office to determine actual nutrient reductions at the edge of the field. The other is a complex, EPA peer-reviewed Watershed Analysis Risk Management Framework developed by EPRI to predict the in-stream responses to nutrient load reductions between credit sellers and credit buyers. In short, the model has been used in 15 different watersheds in the U.S. and internationally by giving an accurate prediction of actual nutrient rate reduction that can account for various geographic and meteorological conditions, varying characteristics of pollutants, changing hydrology assumptions, and the individual features of a watershed. The pilot program also includes incentives for early and voluntary participation for point sources to buy credits by providing preferred access to the most attractive projects, lower administrative costs, potential eligibility for more flexible permitting compliance timelines, and the creation of a reserve pool of additional credits to ensure the availability of offsets and to manage future uncertainty in the marketplace. EPRI and partner states will conduct audits of the pilot program each year; those audits will then be made public to ensure the economic and environmental benefits of participants are being actualized.

Timelines and Future Actions
Although transactions are not expected until the end of 2013, EPRI estimates that 45,000 to 60,000 pounds of nitrogen and 15,000 to 20,000 pounds of phosphorus will be reduced each year during the pilot phase of the program. Contracts and agreements within the pilot program require Indiana, Kentucky and Ohio to establish acceptable best management practices in order to generate credits, and then any requests for proposals to farmers must be developed before any actual transactions can begin. Ohio appears to be the furthest along in setting up its governance and oversight standards of the trading program when it issued its new regulations in November 2012. According to EPRI, participating states do not have to establish their own specific water quality trading guidance and the underlying agreement generally follows Ohio’s regulatory framework. Supporters hope to expand the program across the entire Ohio River basin and build on lessons learned by states in the pilot phase. The federal funding received to set up the credit management system is designed to gradually transition into a fully functioning market that will no longer be managed by EPRI.

Notes
15. “Barriers and Solutions for Farmer Participation in the Ohio River Basin Water Quality Trading Program.” Electric Power Research Institute, September 2011, p. VII.
17. Pilot Trading Program 1.0, EPRI, p. 3.
18. Ibid., pp. 3–5.
20. Pilot Trading Program 1.0, EPRI, pp. 7–8.
22. Water Quality Trading, Ohio Environmental Protection Agency Division of Surface Water.

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