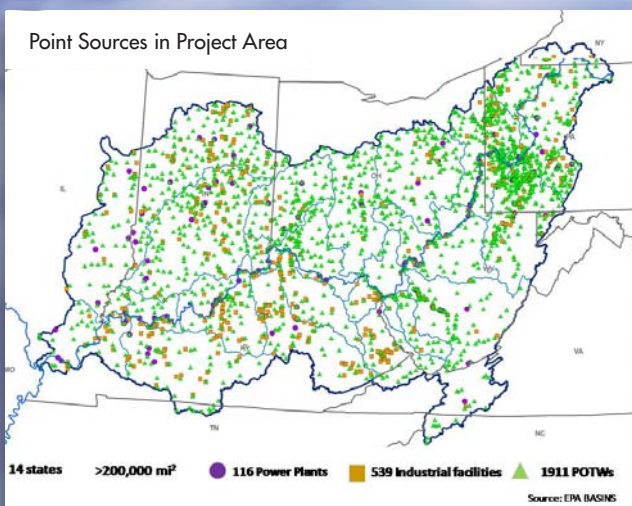
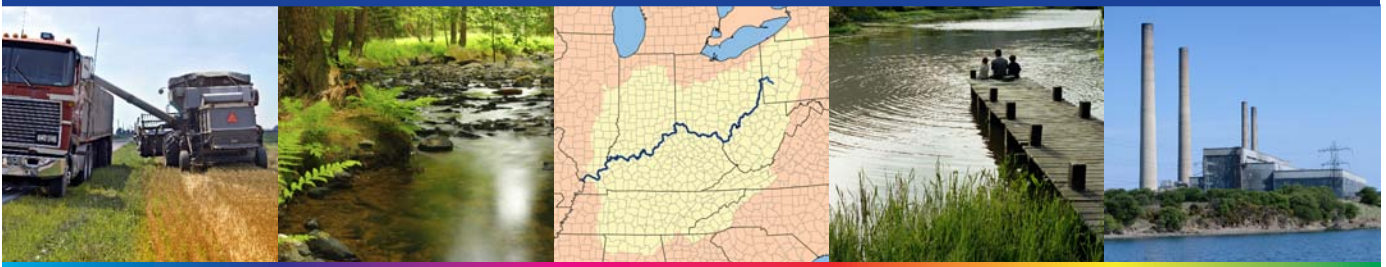


Regional Water Quality Trading in the Ohio River Basin



Introduction

Water quality trading is an innovative market-based approach to achieving water quality standards through programs that allow emitters to purchase pollution reductions from another source. Control costs for any one pollutant can differ from one emitter to another. A trading program enables facilities facing high pollution control costs to buy reductions from another facility with lower pollution control costs. The net effect is the same water quality improvements at lower, more efficient costs. Today, a few states have trading frameworks in place or in development but none of them operate on an interstate or regional basis. EPRI recently completed a feasibility study for a regional water quality trading program in the Ohio River Basin and is currently working with stakeholders and others to develop a working program.

PROGRAM SUMMARY

The Concept

Water quality trading (WQT) is a flexible tool offering a mechanism to achieve additional economic and environmental benefits when used in conjunction with traditional command and control approaches. A permitted discharger facing high costs to accommodate new growth or meet more stringent effluent limits can “trade” for discharge reduction credits generated by another source having lower costs (e.g., an agricultural producer implementing conservation practices). A portion of the reductions traded can be retired to address uncertainty or to create a net reduction of pollutants discharged to the receiving water (e.g., nitrogen, phosphorus and sediments).

To date, trading in the United States has focused on development of various bi-lateral trades, in-state watershed-based programs or state-based trading rules. Few, if any trading programs have successfully achieved, let alone attempted, trading at a regional or interstate scale. Trading at such a scale requires similar regulatory drivers or goals that create significant demand for fungible credits. As such, small-scale trading efforts have resulted in fragmented markets, high transaction costs, expensive program development, and limited trades. Collectively, these constraints have hindered opportunities across geo-political boundaries where far-field water quality impacts are in play. This particular dilemma has stymied large-scale trading opportunities in critical water resource areas such as the Chesapeake Bay. These same issues will confound efforts that target hypoxic conditions in the Gulf of Mexico if the concept of a regional trading framework is not first established.

The Issue

The Electric Power Research Institute (EPRI) recently completed a feasibility analysis for multi-state WQT in the Ohio River Basin. This effort presented a strong business case for coal-fired power plant participation in the development and promotion of a regional, interstate trading program. This business case revealed substantial benefits for management of nitrogen discharges associated with more restrictive wastewater discharge permit limits expected with forthcoming in-stream nitrogen standards. Nitrogen discharges to surface waters from power plants may increase as efforts to comply with more stringent air emission standards are implemented. New selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR) units, and flue gas desulfurization (FGD) systems are being installed to control air emissions. These new SCR/SNCR systems employ ammonia (or urea) as reagents in the deNO_x process to reduce nitrogen oxides (NO_x) to nitrogen. Reduction of NO_x (and specifically NO₂) may decrease some potential nutrient water discharges, however unreacted ammonia slip may be transferred to surface water discharges either in the fly ash pond or the FGD system. Efforts to control air emissions will likely impact water discharges (as well as other constituents) and in some instances, could lead to issues with effluent compliance.

Under current regulatory conditions, the only option power companies on the main stem of the Ohio River have for complying with stricter water discharge limitations will be investment in on-site treatment capacity. Similar constraints exist for Publicly Owned Treatment Works (POTWs) facing both nitrogen and phosphorus limitations with pending nutrient standards. WQT offers a cost-effective compliance alternative; purchasing discharge offsets to achieve and/or maintain National Pollutant Discharge Elimination System (NPDES) permit compliance with water quality based effluent limits.

The business case identified potential opportunities for reducing costs associated with NPDES permit compliance under several conditions. These conditions included:

- **Long-term Participation in WQT** – A discharger could engage in long-term compliance options using WQT when costs are significantly less than upgrading in-house treatment operations.
- **Short-term Participation in WQT** – Permitted facilities could choose to participate in WQT for a short duration at locations where upgrade facility planning and construction schedules are longer than otherwise might be stipulated in a NPDES compliance schedule.

- **Partial Compliance Use of WQT** – A WQT program provides the opportunity to avoid upgrading treatment capacity for compliance excursions of maximum discharge concentration despite average effluent concentrations remaining in compliance.
- **Total Maximum Daily Load (TMDL) Allocations** – A WQT program provides allocation capacity for new or expanding discharges in areas with fully allocated TMDLs that would otherwise preclude the permitting of new loads.
- **Generating Credits** – A WQT program can provide economic opportunities for selling surplus nitrogen or phosphorus reductions when a permitted facility provides treatment beyond permit requirements.

The EPRI study also identified robust and diverse stakeholder interest and willingness to participate in regional trading program development for the Ohio River. High demand for WQT credits is anticipated from several sectors of NPDES dischargers including power companies and POTWs. An ample supply of low cost credits from agriculture appears achievable. Existing WQT successes at the local scale in the basin (i.e., the Great Miami River trading program) portend immediate opportunities to move forward with regional trading as most of the traditional roadblocks have been overcome. Regulatory agencies find trading attractive for informing key decision-making processes in the next five years, along with the ability to achieve water quality goals through flexible permitting options. These attributes are the necessary and foundational elements for advancing a regional WQT program in the Ohio River Basin. As such, an interstate coalition of stakeholders in the Ohio River Basin is now forming to pursue the development of a regional trading program.

In a related study, EPRI funded the implementation of the WARMF (Watershed Risk Management Framework) model, which is a publicly available watershed-scale water quality model, for two watersheds within the Ohio River Basin. The study evaluated the point and non-point sources of nutrient loading within each watershed as well as along the nearby downstream section of the Ohio River. The WARMF model was also used to evaluate potential trades among various sources, at the local and regional level, evaluating the benefits of trading with regards to improving water quality. The model will provide an ecological basis for informing the structure of the trading program, including avoiding hotspots, assessing trading organizations, and providing credit ratios.

The Program Design

Developing a regional trading program in the Ohio River Basin will require participation by multiple stakeholders and other trading entities. Traders will likely include power companies, POTWs, farmers, regulators, and other non-point sources. Other key stakeholders will include, but not limited to conservation and environmental organizations as well as constituent interest groups. Program design will require intensive stakeholder involvement over three to five years. Critical design considerations for a properly constructed program will involve crafting a wide range of elements that govern all aspects of program administration, execution of transactions between credit buyers, credit sellers, third-party aggregators and interactions of all parties with regulators.

The design of the trading framework will be shaped by several attributes that will constrain the overall program. These will include consistency with The U.S. Environmental Protection Agency (EPA) trading policy and developing trading ratios or other factors to account for the position of the buyers and sellers over a large project area as well as for pollutant equivalency. Arrangements will need to be made between state regulatory agencies, the Ohio River Valley Water Sanitation Commission (ORSANCO) and EPA to address how interstate trading will occur. Development of trading zones (or districts) and rules governing where buyers may purchase credits are two possible methods that will need to be developed to account for geographic scale. The design of the Ohio River Pilot program will also need to consider existing Ohio trading rules, Pennsylvania trading policy, a burgeoning West Virginia trading framework and existing watershed trading programs such as in the Great Miami River watershed. Interactions and interrelationships between these programs will need to be carefully developed and established. Program successes at the regional scale in the Ohio River could be scaled to other sections of the Mississippi River Basin.

The WARMF model will be extended to the entire Ohio River Basin with a number of discrete watershed models. This will provide the ability to inform the implementation of the program by modeling the ecological outcome of trades, evaluating the ecological impact of different trading and different trading zones, and tracking progress towards achieving nutrient reduction goals. The model will serve to implement an adaptive management strategy, as revised model predictions over time provide additional information to decision-makers and program participants.

The immediate next steps to develop and institute a viable trading program in the Ohio River Basin will include two primary efforts: 1) engagement of high level regional, state and selected local participants to identify and secure support; and, 2) derivation of a broader regional trading analysis of supply and demand in the basin focusing on both nitrogen and phosphorus. These two steps will serve to solidify the need for trading and secure high level commitments necessary at the buyer, seller and regulator levels. Subsequent steps will focus on program design elements that will take two to four years to develop. These will include broad stakeholder program promotion, development of trading framework elements, and construction of trading program infrastructure to facilitate trades.

This effort to develop a regional WQT program in the Ohio River Basin is being led by EPRI (www.epri.com) . It is supported by strategic collaborations including:

- Kieser & Associates, LLC (www.kieser-associates.com)
- American Farmland Trust (www.farmland.org)
- Hunton & Williams LLP (www.hunton.com)
- Ohio River Valley Water Sanitation Commission (www.orsanco.org)
- The Miami Conservancy District (www.miamiconservancy.org)
- University of California at Santa Barbara (<http://www2.bren.ucsb.edu/~keller/>)

EPRI members including American Electric Power and Duke Energy are concerned about water use and quality and are participating in the development of this project.

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

Access to public reports, project updates, upcoming events, and funding announcements, can be found at www.epri.com/ohiorivertrading.

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