Water Quality Trading in the Non-Tidal Passaic River Basin: A Win-Win Solution

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I. Passaic River Basin and TMDL Impacts

Approximately ¼ of New Jersey's population (i.e., two million people) lives in the non-tidal portion of the Passaic River basin. The watershed, which includes the Wanaque Reservoir, is a major source of drinking water for New Jersey residents both inside and outside the basin. The New Jersey Department of Environmental Protection (NJDEP) 2004 Integrated List of Waterbodies identified 17 segments, affecting over 200 stream miles, in the non-tidal Passaic River basin as impaired for phosphorus. In-stream phosphorus concentrations in these segments were greater than the 0.1 mg/l New Jersey Surface Water Quality standard for total phosphorus. Excessive phosphorus is a concern because it can cause algal blooms, decreased levels of dissolved oxygen, taste and odor problems in drinking water, and even fish kills. As a result, NJDEP is developing a Total Maximum Daily Load (TMDL) which will set phosphorus load allocations for point and nonpoint sources in the watershed. The most immediate impacts will fall on 24 of the largest wastewater treatment plants (WWTPs) in the basin, 19 of which are permitted for greater than one million gallons per day (MGD) of flow. Most WWTPs will likely have to significantly reduce phosphorus effluent concentrations to meet anticipated TMDL waste load allocations. The traditional regulatory approach towards implementing the TMDL via the state's pollution discharge elimination permit may result in the need for an affected WWTP to upgrade its phosphorus removal process to meet its waste load allocation, which could be very expensive for the WWTPs involved.

II. Basics of Water Quality Trading

Water quality trading offers a cost-effective method to implement the TMDL. Trading is a watershed-based and market-based approach to meeting and exceeding water quality goals. The United States Environmental Protection Agency (USEPA) supports water quality trading and issued policy guidance in 2003 on trading (USEPA, 2003). Trading is based on the premise that sources in a watershed can face very different costs to control the same pollutant. A trading program allots a certain number of pollution credits to sources in the watershed – the number of credits typically corresponds to their TMDL allocation, and can be adjusted for fate and transport effects as the pollutant moves downstream. The sources can either discharge under their limit and sell their credits, or discharge over their limit and purchase credits. The net effect will be to improve water quality in the watershed, at a lower cost than making each individual pollutant source upgrade its equipment to comply. Trading can occur among point sources and nonpoint sources. Depending on the structure of the program, sources can trade directly or indirectly with each other. Several water quality trading programs are underway nationwide, and some have been very successful, including nitrogen trading in Long Island Sound and nutrient trading in the North Carolina Tar-Pamlico River Basin. These programs are saving taxpayers hundreds of millions of dollars while significantly improving water quality (Green and Blount, 2003; Breetz *et al.*, 2004).

III. Potential for Water Quality Trading in the Non-Tidal Passaic River Basin

Rutgers University is the recipient of funding from the USEPA Targeted Watershed Grant Program to develop a water quality trading program to implement the phosphorus TMDL for the non-tidal Passaic River watershed. The situation in the non-tidal Passaic River basin is a classic example of a watershed scenario where trading makes sense. Some WWTPs will find it more affordable to meet the anticipated phosphorus reductions than others. Moreover, the NJDEP and the WWTPs are open to trading as a win-win solution that will assuage a potentially conflict-ridden command and control approach. The conditions are ideal for point to point trading of phosphorus between WWTPs. Opportunities for trading with municipal separate storm sewer systems (MS4) systems will also be examined, since MS4s are now subject to New Jersey Pollutant Discharge Elimination System (NJPDES) permitting. Rutgers University and Cornell University faculty, with expertise in water quality modeling, wastewater treatment, environmental policy, and environmental economics, will work together with USEPA, NJDEP, the Passaic River Basin Alliance, local municipalities, and environmental non-governmental organizations (NGOs) to design, implement, and evaluate a phosphorus trading program for the non-tidal Passaic River basin. The project design phase has been running since September 2005, and the implementation and evaluation phases will extend through August 2008.

IV. Challenges and Benefits of Water Quality Trading

Water quality trading holds many challenges and potential benefits. Although the concept is straightforward, making it work can be complex. Over 40 water quality trading projects have been launched nationwide, but only a few have executed actual trades. Different programs have struggled with various issues: unclear guidelines on trading, lack of willing

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participants, complicated approval processes, and lack of a regulatory driver such as a TMDL are the most often cited difficulties. Critics of trading raise concerns about Clean Water Act (CWA) compliance, 'hot spots' (i.e., a credit buyer might cause a zone of high pollutant concentration), and environmental justice inequities (i.e., market-based trading will exploit disadvantaged communities). Strategies to ensure the avoidance of hot spots and strategies to address environmental justice issues have been proposed by USEPA and other experts (USEPA, 2004; Hall and Biorn-Hansen, 2005; Johnson, 2006). Advocates of trading note that trading must comply with the CWA because trading will only be allowed if it improves water quality beyond the effect of command and control regulation (USEPA, 2003).

Notwithstanding these challenges, successful trading projects like the Long Island Sound and Tar-Pamlico programs have proven just how beneficial water quality trading can be. Both of those programs have realized water quality goals faster and cheaper than would have occurred without trading. The two programs have saved an estimated total of $250-$300 million dollars when compared to the costs of command and control regulation (Green and Blount, 2003; Breetz *et al.*, 2004). As trading gains interest and momentum nationwide and stakeholders move up the learning curve, more programs are likely to succeed, as illustrated by the more recent Neuse River (North Carolina) and Lower Minnesota River trading programs (NCDENR, 2004; MPCA, 2005).

Every watershed is unique, and there is no one-size-fits-all formula to make water quality trading work. In addition to addressing the issues raised above (e.g., trading framework, hot spot avoidance, environmental justice protection), the non-tidal Passaic River watershed possesses special circumstances which a trading program must address. The periodic surface water diversions to the Wanaque Reservoir, the large income gap between upstream and downstream residents, and the need to protect multiple endpoints to ensure water quality standards are met in the Wanaque Reservoir and throughout the watershed are all watershed-specific challenges of the Passaic trading project.

Meeting these challenges is a worthwhile endeavor. The potential beneficiaries of the Passaic trading project extend beyond local stakeholders and residents who will enjoy improved water quality at lower costs. All of New Jersey stands to gain from this project because this is the first trading project in the state that will implement a TMDL. Thus a successful trading program will serve as a model for other watersheds subject to TMDL constraints. In addition, the Passaic trading project is unique in that a university team is spearheading the design. The Rutgers/Cornell team is a neutral party working to develop a solution that will be based on solid data and research and will provide benefits to all the stakeholders. In January 2006 a kickoff meeting was convened with the project partners to discuss key science, policy, and economic issues associated with the project. The meeting presentations are available at the Passaic trading project website:http://www.water.rutgers.edu/Projects/trading/WQTrading.htm. Detailed maps of the watershed, references, and case studies of other trading programs are also available on the website.

V. Next steps

The next step in the Passaic trading project is to identify various trading scenarios and perform water quality modeling and economic modeling for each scenario. The advantages and disadvantages of each scenario will be evaluated, and then trades will be recommended. In parallel, a trading framework and permitting structure will be developed to ensure trades are made efficiently and with proper accountability.

Look for more Passaic trading project updates in future editions of the AEA newsletter, as well as at the May 2006

NJWEA conference in Atlantic City, New Jersey, where several team members will speak about water quality trading and the Passaic trading project.

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