Water Quality Trading:  
A Tool to Strengthen NPS Pollution Control 
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Introduction

During the 19th and 20th centuries, federal water policies were created to develop agricultural industries and to settle the western U.S. Currently, agriculture uses between 70 and 95 percent of water resources in western states. Although the Clean Water Act (CWA) has effectively improved point source pollution problems, there is much left to accomplish regarding nonpoint source (NPS) pollution generated from municipal storm water and agricultural runoff.

Current efforts to control NPS pollution involve state water quality monitoring, watershed planning and citizen education. States also provide technical assistance, in the form of Best Management Practices (BMPs), to farmers and ranchers to control NPS pollution on agricultural lands.

Total Daily Maximum Loads (TMDLs) are required for water bodies listed as impaired in CWA legislation, Section 303 (d). TMDLs provide a tool for assessing NPS pollution, setting goals for designated water uses of water bodies, and then estimating required amounts or daily loadings in pounds from NPS and point sources to achieve established water quality goals. The U.S. Environmental Protection Agency (EPA) also encourages the use of water quality trading as a potential innovative alternative to strengthen NPS pollution control.

What is Water Quality Trading?

Water quality trading is a market-based approach to improve water quality. A pollutant is treated as a commodity that can be purchased and sold to achieve and maintain water quality goals. The U.S. Environmental Protection Agency (EPA) has established a Water Quality Trading Policy consistent with mandates outlined by the CWA to guide states and tribes in attaining and preserving water quality standards. According to Section 303 of the CWA, quantitative and qualitative water quality criteria are established to protect beneficial uses and preserve water quality. TMDLs are required on waters listed as impaired. In addition to TMDLs and watershed planning, EPA’s Water Quality Trading Policy program aims to facilitate TMDL implementation further through lowering NPS pollution control costs, thereby encouraging watershed initiatives and voluntary pollutant reductions.
Long-term trading program goals are to create water quality credits that encourage investment in restoration of wetlands, floodplains and wildlife habitat. However, necessary conditions must exist in order to develop a viable trading program. These include: voluntary participation in a trading program; suitability of the pollutant to reduce through trading; physical characteristics of a watershed where trading takes place; individual pollutant control costs and; a method of facilitating transactions or trades.

Determining the Potential for Water Quality Trading

Some watersheds and some pollutants are more suitable than others for trading. Test projects to date indicate that nutrients such as phosphorous and nitrogen can be traded successfully. Additional pilot projects are exploring sediment and temperature. Pre-TMDL trading may occur as long as it achieves a direct benefit to the environment relating to specific causes of impairments. If pre-TMDL trading does not result in improving specific water quality standards, then a TMDL must be developed. A TMDL can include provisions of trading as part of a TMDL through watershed plans. EPA provides a four step checklist to determine trading suitability. These include:

- Type and form of a single pollutant;
- Impact of pollutant reduction and location where that reduction is purchased or used;
- Trade is timed so that purchased reductions occur during same period as produced;
- Quantity of pollutant traded should balance supply and demand of pollution credits, and;
- A TMDL and watershed plan should identify the pollutant(s) to reduce and therefore define the potential trading area.

The purpose of identifying type and form of a single pollutant is to determine whether sources are discharging a common pollutant that can be traded, such as phosphorus, sediments or temperature. In other words a common currency has to be established to consider potential trades and trade impacts. Questions to help determine a tradable commodity include:

- Is type and form of pollutant addressed in TMDL and are allocations provided for multiple pollutants?
- What are potential pollutant impacts and do impacts vary based on different forms of pollutants?
- What are watershed conditions that can aid or disrupt impacts of existing pollutant forms?

Another consideration for trading programs is if trades can occur between different forms of the same pollutant. Translation ratios can help determine if two forms of the same pollutant can be traded with the same effect on water quality.

Since water quality impact is a critical determinant for a trading program, the location of the potentially tradable pollutant loading and the conditions of receiving waters determine if the trade impacts are the same if trading did not occur. Equivalence ratios are used to adjust for the fate of the water delivery system taking into account the effects of distance, withdrawals and hydrology between discharge areas of buyers and sellers. Equivalence ratios may also take into account the area of interest including zones of dissolved solids and dissolved oxygen. Equivalence ratios should be consistent with established TMDLs.

Timing of pollutant discharge is another factor to consider in trading programs. For example, during winter months, agricultural lands experience reductions of nutrient loading with substantial increases during summer months. Trading partners must time their trades to align with TMDL timings of seasonal and annual loadings and connect with other trading sources with similar timing schedules. In addition, nutrient loadings during the winter months have different impacts than those discharged during the summer months.

The supply and demand for pollution reduction credits must balance and reflect goals of the TMDL and water shed plan. Balancing supply and demand requires that current discharges be aligned with anticipated discharges as identified in a TMDL. So for each discharger participating, the current and future loads must be compared with target loads. Also, for each pollutant source, the ability to reduce pollutant loadings beyond TMDL allocations must be determined.

The fiscal attraction of trading is important in determining the potential for trading. This requires assessing the costs for reducing a pollutant either directly or through BMPs. Then a comparison of potential trading costs must be conducted. The financial attraction of water quality trading is determined by significant differences in individual pollutant control costs. The differences allow for improved water quality at lower costs overall by allowing individual dischargers who face comparatively higher control costs to pay...
dischargers with lower control costs to ‘over-control’ or reduce their pollutant discharge below the specified target.

Another fiscal consideration is the transaction cost of trade which represent those resources necessary to implement a trade including collecting information, negotiating terms, and monitoring the outcomes. Participation in a market solution also brings with some level of risk that can influence the willingness to trade. Pollutant trading requires that parties rely on other parties to satisfy agreed upon obligations. If pollutant reductions do not effectively result, the terms of trade are violated and the buyer can suffer legal and fiscal penalties. However, there are no guarantees that parties will fulfill obligations nor are there institutions in place to insure fulfillment.

Finally, the size of market is an important factor in determining trading potential. This is determined to some extent on the degree of reduction a buyer demands relative to existing technology to reduce the pollutant. This can work to increase or decrease the attraction to trading. If a discharger needs only slight reductions to comply but can only accomplish this through expensive control technology, thereby producing large reductions, then that discharger may be more willing to pay another party to reduce their loading by that slight amount.

Conclusions

Water quality trading is a market-based approach to water quality improvement that provides another tool to strengthen NPS pollution control. A NPS pollutant is treated as a commodity that can be purchased and sold to achieve and maintain water quality goals. The U.S. Environmental Protection Agency (EPA) has established a Water Quality Trading Policy consistent with mandates outlined by the Clean Water Act (CWA) to guide states and tribes in attaining and preserving water quality standards. Necessary conditions must exist in order to develop a viable trading program, however. These include: voluntary participation in trading; suitability of the pollutant to reduce through trading; physical characteristics of a watershed where trading takes place; individual pollutant control costs and; a method of facilitating transactions or trades. Some watersheds and pollutants are more suitable than others for trading.

If appropriate factors point to the potential for water quality trading, limitations may remain. First, the development of an effective market for trading pollution is complex and potentially costly. Most of the complexity and costs involve the challenges for sellers and buyers to find information, negotiate terms of trade and forge agreements that can be enforced. Applied research is needed to explore the development of such markets on a pilot case by case basis. Second, water quality trading programs require an ongoing supply of accurate information as well as monitoring and supervision to determine the extent to which trade agreements are implemented correctly and the results evaluated. State agencies who assume a role of overseeing trading programs will need additional staff and technical resources to accomplish these tasks.

Finally, there may be social resistance to a program that allows and in fact enables polluters to continue polluting, for a price. Timing of the introduction of a water quality trading program can also play a role in readiness to adopt trading as a tool. In theory, water quality trading may provide agriculturally dependent watersheds and large agricultural operations with an option to address water quality disputes through market-based approaches, provided that agencies willingly cooperate, the public participates and the administrative and transaction costs remain reasonable.

References


