Water Quality: Wading Into Trading

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For over 20 years EPA has been promoting water quality trading – with particular emphasis on nutrients and sediment – as a way to improve water quality at reduced costs. Trading is based on the simple proposition that if Party A can reduce a pollutant at a lower per-unit cost than Party B, who needs to reduce its discharges of that pollutant, it is more economically efficient for Party A to reduce its discharges below what is required by law, and sell the additional reduction, or "credit", to Party B. If the price is less than what Party B would otherwise pay and more than it costs Party A to make the reduction, B will save money and A will make money.

The focus is on nitrogen, phosphorus and sediment because these pollutants have for many years been leading causes of water quality impairment and, in the case of nutrients, adverse effects on human health when the resulting algae blooms release toxins and harmful bacteria. In 2016 EPA reported that nutrient-caused algae blooms were on the rise, causing fish kills, contamination of fish and shellfish, and beach closures, resulting in significant damage to local economies and impairments to human health. The biggest source of these pollutants is farming operations. Trading seems especially well-suited to help reduce polluted runoff from farms because their per unit cost of removing nutrients is far lower than for wastewater treatment plants. Finally, because farm runoff is a nonpoint discharge, it is not regulated under the Clean Water Act. Regulation is left to states. While many states require farms to have nutrient management plans, because the states have limited resources to inspect and enforce, finding incentives to stimulate a market-driven solution has obvious appeal.

So why are there so few trading programs in place? The GAO attempted to find the answers in its report Water Pollution: Some States Have Trading Programs to Help Address Nutrient Pollution, but Use Has Been Limited (October 2017). The report addresses (1) the extent to which nutrient trading programs are being used, (2) how EPA and the states oversee these programs, and (3) what factors affect participation in trading. As of 2014, eleven states had some form of trading programs: California, Connecticut, Florida, Georgia, Idaho, Minnesota, North Carolina, Ohio, Pennsylvania, South Carolina and Virginia. Most of the trading was being done in Connecticut, Pennsylvania and Virginia, so GAO focused primarily on these programs.

All three of these states established their trading programs through legislation and implementing regulations. All three allow point-source to point-source trading, but as of 2014 only Pennsylvania allowed non-point sources to generate credits. Virginia appears to be moving in that direction through pending regulatory amendments. Connecticut uses a general permit that allows 79 point sources in the Long Island Sound watershed to trade nitrogen credits through a Nitrogen Credit Exchange Program. Each year plants that are not meeting their discharge limits can buy credits from plants who are below their required limits.

Virginia allows trading of nitrogen and phosphorus credits between point sources. Most but not all sales are through a Nutrient Credit Exchange Association, which is privately run in consultation with the state, and provides tracking of credit generation and sales. Pennsylvania allows a point source to buy credits generated by nonpoint and point source dischargers. It has a credit exchange, PENNVEST, but most trades are outside it. The state keeps a registry of credits generated, sold and used. During 2014, there were 39 trades in Connecticut, 151 in Pennsylvania, and 31 in Virginia.

Trading programs are managed by the states, with oversight by EPA to be sure that both the elements of the trading program and individual permits that incorporate trades comply with the Clean Water Act. Those who buy credits said that the benefits of doing so include reduced cost of compliance, risk management (credits can be used to address plant failures which cause noncompliance), and flexibility in timing technology upgrades.

GAO cites two primary disincentives to trading. First, if water quality criteria are written in narrative form, permits are also often written in narrative form, so it is difficult to determine whether or when use of a credit might be helpful. While EPA has been pressing states to adopt numerical criteria for nutrients, GAO reported that as of 2017 only 6 states had them. I believe that this problem can be mitigated by including numerical water-quality based effluent limits (WQBELS) in NPDES permits even when the criteria element of a water quality standard is narrative. I don't know how widely this is done, but typically a total maximum daily load (TMDL), which is required for water bodies not meeting water quality standards, is expressed in numerical terms, and that provides the basis for WQBELs. GAO observed that the Ohio River Basin Interstate Water Quality Trading Project allows trading among sources in Ohio, Kentucky and Indiana, but almost no trading has occurred because there are no numerical limits in the water quality standards or a TMDL.

The second reason given by stakeholders to GAO for limited trading is the difficulty in determining the water quality benefits of a best management practice (BMP), which is what is installed on farmland to reduce runoff. Models do exist for converting the benefits of BMPs, such as vegetated buffers, no-till farming and cover crops, to numerical pollution reduction on an annual basis, but these are only estimates, and lack the precision that a point source discharger looks for in deciding whether to buy a credit from a farmer. EPA has recommended the use of an "uncertainty factor", such as 2:1, by which a buyer of 100 nitrogen credits would have to buy 200 credits. This could be modified upwards or downwards based on site-specific conditions. It is still an estimate, and any trading program will need to apply a dose of adaptive management if it wants nonpoint source trading to get up and running. The potential cost savings are sufficiently great that such an uncertainty ratio would not by itself, in most cases, discourage trading.

Several other factors, not discussed by GAO, also tend to discourage nonpoint source trading. There is the uncertainty of the buyer, who will rely on the credit to meet its NPDES permit terms: what if the BMP on which the credit is based fails? This is a particular concern for public utilities, whose managers and ratepayers may not want the utility relying for compliance on a set of BMPs over which the utility has no control. On the farmer side, what if the farmer invests substantial

sums in BMPs to generate credits, but there turns out to be little or no market for them? Several states and some financing institutions are exploring ways to create a market to jump start the process, and we will likely see more on that. Finally, there is an inherent reluctance to be among the first in what is still largely an experimental program – especially if it is being run by a government agency.

It is no coincidence that two of the three most active programs, Pennsylvania and Virginia, are in the Chesapeake Bay watershed, where a numerical multi-state TMDL has been in place since 2010. (That TMDL was discussed in my blog article EPA Issues Biggest TMDL Ever for the Chesapeake Bay Watershed, posted March 4, 2011.) At this writing Maryland, also in the Chesapeake watershed, is developing a trading program which will include nonpoint source trading and will be run jointly by the Maryland Departments of Environment and Agriculture. The only way the goals of the Chesapeake TMDL will be achieved is through major reductions of the nitrogen, phosphorus and sediment released by farms. In a future post, I will explore those three programs in more detail.