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Crunch Time for Water Quality Trading

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Economists have been promoting water quality (WQ) trading for decades. Over the past few years, many political leaders and upper-level government officials have been joining them. Money has even started to flow from Washington to local trading organizations to help make WQ trading work. However, enthusiasm about WQ trading is based mostly on conceptual arguments about its potential to generate cost savings and ideological arguments about the superiority of market-based solutions over conventional regulatory programs. Experiences with actual WQ trading programs have been discouraging. Under current regulatory conditions, there is simply not enough supply or demand to support WQ trading. The critical question now is whether the regulatory conditions that are inhibiting trading will change any time soon.

According to a recent EPA-funded review, the number of WQ trading initiatives in the United States during 2004 was more than 70 (Breetz et al., 2004), which is up from around 25 just a few years earlier (Environomics, 1999; King & Kuch, 2003) However, this recent review, like previous ones, showed that WQ trading programs are frozen at an awkward pretrading stage of development—plenty of new guidelines, regional trading institutions, and computer simulations of trading, and even some well-developed WQ trading software and websites, but very little actual trading taking place. Most importantly, point/nonpoint[1] trading involving agriculture—the type that will be needed for WQ trading to have a significant impact in many watersheds and the type of trading that will be addressed in this article—has not materialized at all.

Advocates of WQ trading are putting their hopes on the anticipated establishment over the next few years of *Total Maximum Daily Loads* (TMDLs) for individual water bodies. These are a kind of total pollution budget that could be divided among pollution dischargers as individual discharge allowances that could be made tradable. The Clean Water Act of 1972 required each state to develop and implement TMDLs by 1979, but they are only now being developed in most parts of the country. Eventually, TMDLs may provide the market driver that is needed to make WQ trading work. (See Boyd, 2000.) However, establishing TMDLs will merely be the first of many steps that will all need to be taken quickly if WQ trading is to be given a fair chance to succeed. State and local WQ regulators, under increasing pressure to do something soon about growing WQ problems, are beginning to turn to familiar command-and-control methods and subsidy programs that often preclude the possibility of ever having meaningful WQ trading.

The three questions that even diehard trading advocates are beginning to ask are: Why are there so few WQ trading success stories? Why aren't the point and nonpoint sources who are supposed to benefit from WQ trading more supportive? What can be done to improve the situation?

Reviews of regional WQ trading programs reveal the most often cited problems inhibiting regional WQ trading, such as inadequate trading institutions, unclear scoring criteria, and high transactions costs of performing trades, are being overcome in most places (King & Kuch, 2003). What is preventing WQ trading is a simple absence of willing buyers and sellers. Under existing regulatory conditions, the supply and demand curves in fledgling WQ markets barely exist and certainly don't cross at any positive price. Moreover, those attempting to make regional WQ work are usually not in positions to change the situation. Tighter federal and/or state limits on individual dischargers will be required before there will be any commodities (rights) to trade in WQ markets; aggressive enforcement of those limits will then be needed to bolster supply and demand.

1. *Point sources discharge pollution from a single place, such as a pipeline outflow. Nonpoint sources discharge pollution from many places, such as along the edge of a farm or housing development.*

New Water Quality Trading Guidance

In November 2004, the Environmental Protection Agency (EPA) published a *Water Quality Trading Assessment Handbook* (EPA, 2004) to help regional organizations establish "the necessary conditions for successful WQ trading." This national guidance is very general and focuses on tasks such as developing trading institutions, measuring the equivalency of pollution discharges, establishing rules of exchange, setting baselines, assigning liability, and so on. Most of these tasks may be necessary for successful WQ trading. However, none of them will provide the buyers and sellers that are really needed for WQ trading programs to succeed. In fact, managers of the existing regional WQ trading programs that have been failing to produce trades have already completed most of the tasks recommended in these new EPA guidelines. What are needed beyond what is outlined in the EPA guidance are steps that will change the incentives and disincentives facing prospective buyers and sellers in ways that will make them want to trade.

Time Pressure

Developments in the Chesapeake Bay region, especially in the State of Maryland, illustrate why these steps need to take place soon, before WQ trading becomes impossible. More than three years of work by a partnership of state/federal resource agencies and stakeholders culminated in 2003 with a set of guidelines to support watershed-based WQ trading. At that time, it was generally assumed that TMDLs were just around the corner and that once trading guidelines were adopted, trading would take place with wastewater treatment facilities (point sources) that have relatively high discharge treatment costs purchasing WQ "allowances" from agricultural interests (nonpoint sources) with relatively low discharge reduction costs.

In early 2004, however, Maryland's governor and state legislature responded to public pressure to do something about WQ by establishing an innovative $2.50 per month "flush tax" on water and sewer users (mostly urban dwellers) to create a fund to subsidize the installation of state-of-the-art discharge treatment technologies at the state's wastewater facilities. A similar tax was levied on households on wells and septic systems (mostly rural dwellers) to subsidize the planting of agricultural cover crops and other agricultural "best management practices." Of course, the flush tax all but eliminated the expected demand for WQ credits by wastewater facilities; and the subsidization of agricultural practices all but eliminated the expected supply of low-cost agricultural WQ credits. With the stroke of the governor's pen, prospects for WQ trading any time soon in Maryland evaporated.

Beyond the ABCs of WQ Trading

In principle, establishing an emission trading program is a simple three-step process involving: (a) establishing an overall cap on pollution discharges, (b) allocating portions of the cap as allowances to individual discharge sources, and (c) allowing each source to meet its allowance by reducing its discharge or by purchasing credits from other sources that reduce their discharges below their allowances. As long as there are differences in discharge reduction costs, sources with high costs of meeting their allowances will purchase credits from sources with low costs, and a market will be born. This is the process that established the highly acclaimed and apparently successful air emission trading programs that helped reduce SO_2 emission (acid rain) problems (see Stavins, this issue).

However, the land and water use decisions by nonpoint sources that cause local water quality problems are very different than the point source smokestacks that cause regional air pollution problems. Most water emissions are difficult to measure, change with the weather, have different impacts depending on where they occur, and are the results of ever-changing locally made and locally regulated decisions. This is a complicated problem to attempt to address with trading. In fact, two areas of recent economic research suggest that in this type of situation a great deal of political and regulatory reform may be necessary to interest anyone in trading.

The first area of economic research won two economists—Finn Kydland of Carnegie Mellon University and Edward Prescott of Arizona State University—the 2004 Nobel Prize in economics. Kydland and Prescott (1977) explained why and how people "game" regulatory programs; that is, why and how they strategize to evade regulations and employ legal and political maneuvering to avoid, delay, and reduce penalties for violating regulations they cannot avoid. The second involves work in what might be called "environmental enforcement economics." This area of research also addresses how people "game" regulatory programs, but focuses specifically on that little benefit/cost calculation that each regulated entity performs to determine whether or not to comply with a regulation.

Market-based solutions to WQ problems, despite considerable rheto-

ric to the contrary, are not substitutes for regulatory solutions; they rely on and complement regulations. It is well known, for example, that the acid rain trading program succeeded because precise individual SO_2 discharge limits were established and strictly enforced with 100% monitoring and severe financial penalties for violators (see Stavins, this issue). For now, at least, most nonpoint water pollution dischargers are either unregulated or do not expect that violating regulations will be detected or will be very costly. As a result, they have little incentive to get involved in allowance trading. Many of them are also aware that accepting the notion that tradable discharge allowances (i.e., "pollution rights") can be neatly defined and assigned to individual entities could undermine their long-term political and legal strategies for fending off regulations. Asserting that they have a credible basis for earning money by selling WQ credits now, in other words, means that others will have a credible basis for justifying future restrictions on their emissions that could result in significant long-term costs later.

Based on the above-mentioned economic research, what is being observed in WQ trading programs, in other words, is exactly what should be expected. In the face of weak, rarely enforced emission discharge restrictions and penalties for noncompliance that are small and easily avoided, few dischargers are interested in buying WQ credits. Where there is no demand for WQ credits, there is no incentive for anyone to try to supply credits. This is a fairly simple conclusion, but it implies that strategies to improve point/nonpoint WQ trading should focus on demand-side and supply-side issues, rather than the institutional and technical issues that occupy the time of most WQ trading experts.

Demand-Side Issues

To appreciate what needs to be done to stimulate demand, it is useful to abandon the standard economist's operating assumption that a potential buyer's willingness to pay for a WQ credit is based on that entity's marginal cost of complying with nutrient discharge restrictions (e.g., dollars per pound of nutrient discharge reduction). Instead, assume that the correct measure of an entity's willingness to pay for a credit is the expected cost of *not* complying with a government-imposed discharge restriction. If the expected cost of not complying is lower than the cost of complying by purchasing credits, there is no economic incentive to purchase credits.

Virtually everywhere that WQ trading is being attempted, laws limiting nutrient discharges (on nonpoint sources at least) are weak, rarely enforced, and involve such low penalties that the expected cost of noncompliance is near zero. The corresponding willingness to pay for nutrient discharge credits, therefore, is also near zero. There is no "natural" demand in regulation-driven markets; demand always depends on what regulations are in place and how they are enforced.

The two 2004 Nobel-winning economists examined the deterrent effects of regulations in considerable detail and pointed out the impact of what they labeled "time inconsistency problems" with many regulatory programs. In case after case involving financial and real estate markets, flood insurance markets, and environmental compliance, they showed that people, acting alone and in groups, significantly discounted the expected cost (penalty) of not complying with a regulation if they believed that it would not be implemented consistently over time and could be influenced later. Kydland and Prescott's work demonstrated that people tend to believe that if government yields to one kind of political pressure to pass laws restricting their polluting behavior now, they can be expected to yield to other political pressure later that will prevent the enforcement of those laws or the imposition of meaningful penalties.

Their research showed that the success or failure of regulatory systems (market based or otherwise) depends overwhelmingly on bottom-up microeconomic decisions regarding opportunities to game those systems, and far less on macroeconomic governmental decisions about how those systems are supposed to work.

Based on this research, it seems that bolstering the demand side of WQ markets will require mustering the political will to establish a credible system for enforcing individual allowances, and imposing meaningful penalties for exceeding them.

Supply-Side Issues

The gaming model (as opposed to the marginal cost model) also explains what is inhibiting the supply side of regional WQ trading markets. In watersheds where agricultural sources are significant, it is usually assumed that they will be the primary suppliers of WQ credits. However, the willingness of farmers to supply WQ credits depends in critical ways on how it might affect their ability to continue receiving agricultural subsidies and green payments and to fend off future environmental regulations. The main problems farmers face here (although they do not refer to them in these terms) are what in environmental trading circles have become known as *baseline/additionality* issues.

To protect the integrity of trading programs, trading guidelines nearly always prohibit farmers from selling credits for undertaking land use/land management changes that are legally required (e.g., by state regulation) or for which the farmer has already been paid (e.g., green payments). Setting the baseline for credits in this way reduces the ability of farmers in most watersheds to supply low-cost WQ credits. However, it has other impacts on farmers as well. It means producing WQ credits by implementing management practices that go beyond what they are already required to do will require farmers to somehow validate that these practices do, in fact, reduce discharge levels. The need to establish a baseline and show additionality poses two problems for farmers who are considering supplying WQ credits.

First, it requires that someone examine and document what farmers are already doing to meet their legal requirements in order to establish the baseline for measuring marketable WQ credits. Most farmers, for obvious reasons, are not interested in having government representatives or their agents examining, thinking, and talking about the legality of their on-farm land use/land management practices or their justification for green payments.

Second, farmers know that their discharges are not regulated as much as discharges from most other sources because, presumably, farm discharges are too difficult to control or measure, too dependent on the weather, too expensive for farmers to manage, and so on. Selling credits requires farmers to provide evidence to validate that, in fact, they can reduce their discharges and document the results. Many analysts have addressed validation requirements in terms of their potential to increase transaction costs associated with completing market trades and the likelihood that these higher costs could drive a wedge between buyers and sellers. However, a more important problem may be that if farmers show that they can validate the creditworthiness of their on-farm activities, it is bound to call into question whether they should be regulated any differently than other dischargers.

There are also other disincentives facing farmers. The price farmers will accept for WQ credits reveals their discharge control costs and shows the world that they are most certainly lower than the discharge control costs of those buying credits. This focuses attention on what many already believe are inequities in the way discharges are regulated and, perhaps, in the way allocations of discharge allowances are made to farmers and others. It also provides evidence that a better long-term cost-saving strategy for dealing with WQ problems might be to tighten restrictions on farmers with low treatment costs and relax them on other dischargers who have higher marginal treatment costs.

The sources of these disincentives on the supply side of WQ trading are similar to those on the demand side. Weak, vague, and largely unenforced discharge restrictions inhibit potential suppliers from engaging in trading, just as they inhibit potential buyers. However, the strategies that farmers can and will use to game market-based environmental programs are intertwined with their strategies for gaming other government programs, so supply-side problems appear to be more complex.

The Immediate Challenge

Careful observers of emerging WQ trading understand that this type of market-based solution is not an alternative to WQ regulations. However, this is still not fully understood by many political leaders and agency heads. One immediate challenge, therefore, is to convince those who are using the promise of market-based environmental solutions as a justification for relaxing regulations that this strategy cannot succeed. Another immediate challenge is to convince those who are introducing new WQ initiatives, such as mandatory engineering or discharge standards, that their decisions may make it impossible to have WQ trading or to realize potential cost savings from WQ trading. At the same time, it would be useful for those involved in developing regional WQ trading to perform what might be called a "WQ enforcement audit" in their region to determine how much political and regulatory reform will be needed to stimulate supply and demand and make WQ trading work.

The fact remains, however, that the regulatory context that provides the incentives and disincentives for buyers and sellers to participate in regional WQ trading is usually not within the control of the people who are attempting to make regional WQ trading work. One useful strategy, therefore, is for those people (and all the rest of us who want WQ trading to have a chance to live up to its potential) to work together to influence state and federal agencies and elected officials who set the legal and regulatory context for WQ trading. Such an initiative could focus on the following five tasks:

- Make sure the new EPA guidance is followed when establishing a WQ trading program;
- discourage command-and-control regulatory programs that inhibit WQ trading;

- encourage binding discharge restrictions on point and nonpoint sources;
- encourage meaningful monitoring and enforcement of restrictions with stiff penalties; and
- determine gaming strategies that point and nonpoint sources will use to limit regulation and avoid penalties and encourage countervailing public policies.

If these tasks are undertaken soon, the potential of WQ trading might be realized. If not, WQ trading will probably wind up in the overflowing dustbin of well-intentioned economic policies that attracted attention for a while but never delivered.

For More Information

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