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North Carolinians Benefit from Water Pollution Credit Trading

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Maintaining high water quality standards ensures North Carolinians have access to clean drinking water, healthy fish, and safe recreation on the state's rivers, lakes, and beaches. But doing so is expensive, both through direct costs like pollution control technology as well as through limitations placed on land use or other production decisions. This article explores how water quality markets help North Carolina reduce the cost of protecting its waters, while also discussing challenges facing these markets and potential improvements.

Introduction

The costs of reducing water pollution are borne by industrial firms, municipalities, residential and commercial developers, as well as agricultural and forest producers. Each has a unique set of costs for reducing pollutants and as a result, standard regulations that ensure water quality through individual output limits or technological standards may be expensive.

To reduce costs and hasten the pace of pollution reduction, the North Carolina Department of Environmental Quality (DEQ) offers polluters a variety of methods to buy or sell the ability to pollute. Just like consumers respond to high electricity prices by shutting off their lights or buying efficient appliances, markets for water quality provide a direct financial incentive to polluters to reduce contamination.

Maintaining Water Quality Standards

Under the Clean Water Act (33 U.S.C. §1251), the Environmental Protection Agency develops standards to ensure the waters of the United States are suitable for a variety of purposes, such as drinking, swimming and fishing, and are not otherwise harmful to human and animal health. The job of achieving these standards is largely taken up by the states, and in North Carolina the task falls to the DEQ.

Achieving and maintaining water quality standards requires reductions in various pollutants, especially nutrients like nitrogen and phosphorous. Activities that discharge pollutants directly into waters, known as point sources,



require an operating permit. The National Pollution Discharge Elimination System (NPDES) permit limits the volume of each pollutant that may be discharged according to the standards in place for the receiving waters.

Securing an NPDES permit requires dischargers to pay for various pollution-reduction technologies and systems to meet permit discharge limits. Other activities that indirectly degrade water quality through runoff are known as non-point sources and do not typically require an NPDES permit. The land disturbance activities of farmers, forest landowners, and commercial and residential developers are

generally regulated, or exempted from regulation, as non-point sources.

When dischargers and landowners are required to meet water quality standards in a given basin or watershed, they all bear costs or forego potential economic opportunities. However, the cost of cutting back on pollution — what economists call the marginal cost of abatement — varies according to what activity is foregone. Some landowners or dischargers bear higher costs than others. For instance, consider a municipal wastewater treatment plant already emitting a relatively low level of phosphorus. The cost of upgrading the plant to remove additional phosphates is at least \$150/kg. Alternatively, a farmer can reduce the same amount of phosphate for as little as \$35/kg by implementing a set of best-management practices on her land.

Mandating equal cuts is potentially costly. If phosphate needs to be reduced by 1,000kg, allocating 500kg to each polluter leads to a total cost of \$92,500. Allocating all the cutbacks to the farmer would only cost \$35,000. However, allocating pollution reduction to the farmer is unfair; she bears all the cost while the plant continues business as usual. In effect, the farmer now subsidizes the pollution discharge of the wastewater treatment plant and the people it serves.

Market Based Remedies to Reduce Cost

To alleviate the disparate economic impact of abatement on individual firms and municipalities, North Carolina offers two market-based remedies for polluters:

- 1) Offsets: The purchase of a nutrient mitigation project
- 2) Cap-and-trade: The purchase or sale of nutrient discharge allowances

With either system, basin-wide or watershed pollution reduction goals remain the same. The firm, municipality, or landowner saves money through reduced abatement costs, or receives income. In aggregate, by offering choices to each polluter, offsets and cap-and-trade systems achieve the same pollution reduction at a lower cost.

Offsets

Pollution offsets are produced by the construction or improvement of riparian restoration projects. The price of each offset is based on its documented water quality improvements. Offsets are defined in terms of pounds of total phosphorus, pounds of total nitrogen, or buffer acreage for non-point sources, and buyers can credit their purchases towards their pollution reduction requirements. Offset markets are defined by basin or watershed. Polluters that seek to mitigate their pollution must purchase offsets produced in the same basin or sub-basin, often in close geographical proximity.

Cap-and-trade

Under this system, the regulator sets a pollution limit, known as the “cap,” for various pollutants in the regulated basin or watershed. Each pollutant, such as nitrogen or phosphorus, receives its own cap.

After the cap is established, the regulator allocates individual water pollution discharge allowances to polluters in the target area. While this can be done in a variety of ways, these discharge allowances are often set according to a discharger’s prior recorded use, type of use, classification of the waters they discharge into, and other political and regulatory considerations.

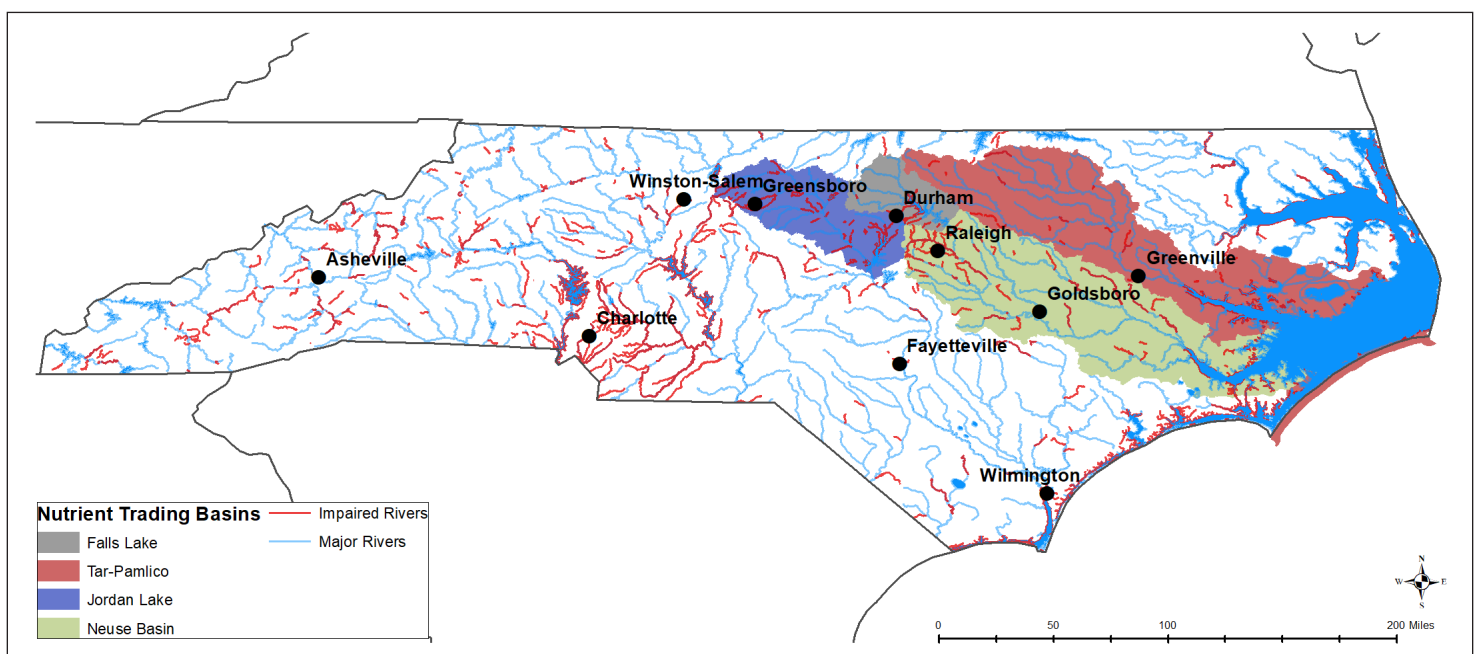
Because the allowances are tradable, polluters with lower reduction costs see financial benefit in selling their allowances to polluters with higher abatement costs. The resulting allowance market effectively establishes a price for pollution, and incentivizes the search for cost-minimizing abatement procedures by polluters. Any firm or municipality that can reduce pollution for less than the market price thereby experiences positive economic benefit.

In the above example, if the cutbacks are similarly allocated but the actors are allowed to trade, the wastewater plant would buy 500kg of pollution offsets from the farmer. The total cost to the farmer of implementing her 500kg cutback plus taking on all the required abatement for the plant is still \$35,000. However, the plant is willing to pay up to \$75,000 to the farmer (their original cost of abating 500kg).

When the parties agree to a price and the transfer is approved, then the farmer makes money, the wastewater treatment plant saves money, and pollution is reduced.

Offsets Credits North Carolina

The North Carolina nutrient offset program is established by state statute (N.C.G.S. §§ 143-214.26). Non-governmental buyers can directly purchase offsets from private mitigation banks (PMBs) or indirectly through the in-lieu fee mitigation (ILF) program offered by the Division of Mitigation Services. Typically, the ILF payment option is only allowed when other offsets are unavailable, and such payments are used to fund restoration projects.



Buyers seeking offset credits to meet their mitigation needs are required to contact North Carolina DEQ-approved PMBs to obtain them. The amount of pollution reduction credits received by a purchased offset at a particular bank is determined by the Division of Water Resources.

The predominant and most successful mitigation practice is the creation or enhancement of riparian buffers to reduce pollution. The entities, or credit providers, performing riparian restoration construction or improvements typically broker offsets available from PMBs.

Offset credit buyers are local governments, new and existing developers, point sources such as wastewater treatment facilities, and the agricultural sector. The pollution offset program in North Carolina is active, and the DEQ retains a list of approved mitigation banks.

Water Quality Markets in North Carolina

An alternative option, available to point sources, is nutrient allocation trading. To trade pollution allowances, entities mutually obtain permit modifications from the DEQ. Two basins and two watersheds currently possess nutrient credit markets in North Carolina. The Neuse River Basin, the Tar-Pamlico River Basin, the Jordan Lake Watershed, and the Falls Lake Watershed. The markets in these areas consist of nitrogen and phosphorus credit trading. These nutrients pollute water by increasing algae growth and depleting oxygen to levels that damage ecosystem function, kill fish and cause the release of toxins — a process known as eutrophication.

Under the Clean Water Act and the EPA's 2003 Water Quality Trading Policy, North Carolina allows allocation trades if they occur in the same watershed; involve Total Nitrogen, Total Phosphorus, or sediment loads; and are justified by water quality standard attainment. A total of seven allocation trades have occurred in North Carolina since 2004, with prices ranging from \$291 to \$495 to discharge a pound of nitrogen each year. The last trade occurred in 2012.

Barriers to Nutrient Credit Utilization

The current nutrient trading framework is not as frequently used as might be expected, given the large potential cost savings. There are two key barriers to greater utilization:

First, offset credit producers may overestimate or underestimate the mitigation capabilities of their credit-generating project, thereby increasing credit valuation uncertainty. When the value and amount of offset credits available is uncertain, sellers have more difficulty valuing their pollution credits.

Uncertainty increases the difficulty of buyers and sellers reaching an agreement on price, thus increasing the cost of trades and reducing their likelihood. This issue is prevalent in the creation or enhancement of agricultural riparian buffers, the primary method of offset credit production in North Carolina.



Second, entities who possess offset credits or the capability of producing them are unwilling to trade credits that they may need at a later time to comply with their own nutrient reduction requirements. This reluctance to trade is amplified by expectations that programs may increase nutrient reduction requirements over time. This is known as ratcheting, and it occurs when regulators create a more ambitious pollution reduction target after achieving an initial goal.

For example, the Falls Lake Nutrient Strategy's first phase calls for nutrient reduction in the lower lake alone and an overall nutrient reduction of 50%, while its second phase aims to achieve reductions in the upper lake in addition to achieving all of the strategy's nutrient reduction goals. Under such a scheme, an incentive to stockpile credits for future reductions can arise.

Collaborative Cooperation to Address Regulation

Instead of purchasing or exchanging offset credits to meet individual caps, multiple polluters can cooperate to satisfy a group cap. This practice is called joint compliance, and it allows polluters to form and govern cooperative groups with the primary goal of jointly meeting regulatory requirements. Each polluter still has an individual cap; but those individual caps matter only if the group cap is exceeded, in which case penalties for group exceedance are levied upon members who have exceeded their individual caps.

Four joint compliance associations exist in North Carolina: the Neuse River Compliance Association (NRCA), the Tar-Pamlico Basin Association, Jordan Lake One Water, and an association in the Charlotte area. The majority of association members are local governments.

A notable example of effective joint compliance is the NRCA. Founded in 2002, the NRCA consists of 14 local governments, two county governments, and five point sources, all jointly bound by an agreement that includes self-policing processes for offset trading and pollution exceedances.

According to its most recent NPDES permit, NRCA's wastewater facilities share an annual Total Nitrogen (TN) load of 1,187,213 lbs. Through this cooperative approach, the NRCA has successfully facilitated water pollution mitigation in the Neuse River Basin, overseeing a reduction from 797,991 lbs. of Total Nitrogen in 2002 to 491,822 lbs. in 2017.

Joint compliance also enables members to circumvent NPDES pollution permit modification processes when trading within an association. This allows association members to avoid the costs associated with finding a trading partner and modifying permits. This reduction in costs is important for incentivizing credit trading within associations, where credit prices have ranged from \$4 to \$9 per pound of Total Phosphorus or Total Nitrogen.

The success of joint compliance is due to the ease with which transfers of pollution credits can be made. Conversely, for regular nutrient allocation trading, both buyers and sellers are required to undergo complex permit modifications; this may impede trades.

Markets also require coordination among buyers and sellers, and work better when more parties are involved. The Environmental Finance Center at the University of North Carolina-Chapel Hill recommends a more direct role for the DEQ in facilitating these markets. The Center's work suggests that the Division of Mitigation Services could act as a central directive body through which trading is publicized and processed, which could reduce transaction and information costs statewide.

Additional Reading

US Government Accountability Office. 2017. "Water Pollution: Some States Have Trading Programs to Help Address Nutrient Pollution, but Use Has Been Limited." GAO-18-84. <https://www.gao.gov/assets/690/687755.pdf>.

N.C. Division of Water Resources. 2017. "North Carolina's Nutrient Trading Framework: Discussion Draft." <https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Nutrient%20Scientific%20Advisory%20Board/Nutrient%20Trading%20Framework%20discussion%20draft%20Sept%201%202017.pdf>

U.S. Environmental Protection Agency. "Water Quality Trading." www.epa.gov/npdes/water-quality-trading