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Nutrient Trading in the Chesapeake Bay Region: An Analysis of Supply and Demand Executive Summary



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Executive Summary

Just as economic capital provides steady financial returns, the natural capital of private farms and forests provides steady environmental, economic, and social returns in the form of ecosystem services. In fact, the public spends millions of dollars on technological replacements for services that these lands provide naturally—to reduce air pollution, minimize the impacts of flooding, and filter pollutants from drinking water and local waterways.

The importance of these natural services is playing a major role in the development of a new, market-driven approach to reducing water pollution in the Chesapeake Bay region. New trading systems have emerged that identify the sources of ecosystem services, quantify their contributions to water quality, and determine financial values. As a result, regulated entities will have new options for offsetting their nutrient discharges. A wastewater treatment plant, for example, could take a conventional route toward reducing nutrients by making on-site improvements to technology—or it could participate in the new market for nutrient trading. Instead of making costly on-site upgrades, the plant could fund equivalent nutrient reductions on lands that provide the same function through ecosystems services. In some cases, a wastewater plant could also purchase nutrient reduction credits from another plant or point source operation with nutrient reduction credits above and beyond their permit requirements.

This emerging nutrient trading market offers landowners additional financial incentives for maintaining farms and forests, as well as for using Best Management Practices (BMPs) and other conservation strategies. It provides permitted facilities with cost-effective tools for meeting discharge limits and simultaneously supports the regional effort to improve water quality in the Chesapeake Bay and its rivers.

This publication reflects the collaborative work of the Pinchot Institute for Conservation and World Resources Institute, funded by a generous grant from the Chesapeake Bay Trust, to examine the projected supply and demand of nutrient trading credits in the Chesapeake region. It includes analyses of:

- The existing and developing nutrient trading markets in the Chesapeake region,
- The potential demand for nutrient credits from point sources,
- The potential supply of nutrient credits from both point sources and nonpoint sources, and
- The implications of policy developments on nutrient trading.

1. Existing Nutrient Trading Programs in the Chesapeake Region

Four states in the Chesapeake region—Pennsylvania, Virginia, West Virginia, and Maryland—are in various stages of developing and implementing nutrient trading programs as a means of facilitating cost-effective compliance with permits, and as a means of offsetting growth from new and expanding wastewater treatment plants in coming years. In general, the state programs will become active in 2010 or later, once permit requirements for regulated entities become active.



- **Virginia:** The 2005 Chesapeake Bay Watershed Nutrient Credit Exchange Program provides wastewater treatment facilities in Virginia's portion of the Bay watershed with the opportunity to meet required nutrient reductions through trading. Existing plants that choose to participate in nutrient trading must purchase their credits from other point sources. Most point sources in Virginia have elected to join the Virginia Nutrient Credit Exchange Association, which will manage the exchange of credit sales between members.

New and expanding plants must be designed to the limit of technology for nutrient removal and obtain offsets for 100 percent of their nutrient discharge. Offsets must be obtained from nonpoint sources.

- **Pennsylvania:** Pennsylvania established a nutrient trading policy in 2006. Existing wastewater treatment plants may meet permit requirements through either point source or nonpoint source credits. To date, two wastewater treatment facilities have brokered trades for the purchase of nonpoint source credits. In addition, the Harrisburg wastewater treatment plant has issued a request for proposals to provide 150,000 credits annually for five years as part of its compliance plan. New and expanding facilities (regardless of size) must obtain offsets for 100 percent of their nutrient discharge.

- **West Virginia:** West Virginia recently submitted its final trading guidance for public comment. The guidance indicates that wastewater plants choosing to meet permit requirements through nutrient trading can purchase credits from either point or nonpoint sources. New and expanding facilities with discharges greater than 0.5 million gallons per day must offset 100 percent of their nutrient loads. Those that participate in nutrient trading can obtain credits from either point or nonpoint sources.

- **Maryland:** Maryland currently requires all existing major wastewater treatment plants to upgrade to Enhanced Nutrient Removal (ENR) technology, with a statewide sewer fee on households to finance the upgrades. The technology requirement covers the 65 major dischargers in Maryland. Facilities cannot trade to meet the technology requirement.

However, Maryland is developing an offset program for new and expanding wastewater treatment facilities. Portions of the guidance are finalized, but the section governing nutrient credit purchases from nonpoint sources is still under development.

Each state has established geographic trading basins—mostly based on major tributaries—that define where trades can occur. There are a total of eleven basins defined for the entire Chesapeake region. Trading between basins within a state is currently prohibited. However, West Virginia, Maryland, and Pennsylvania have stated that interstate trading will be allowed between basins that share the same river system (e.g., trading between Maryland's Potomac basin and Pennsylvania's Potomac basin). Virginia will also allow the Blue Plains wastewater treatment plant, located in the District of Columbia, to trade in Virginia's Potomac basin.

2. Supply and Demand

This analysis examines short-term and long-term demands for nutrient credits from wastewater treatment plants only, and the ability of point and nonpoint sources to generate credits that meet those demands.

Short-term demand will be generated by existing regulated facilities that need credits to meet permit requirements, but ultimately opt for technology upgrades or other types of permanent offsets. Long-term demand will be driven by population growth, and the related need to expand existing wastewater treatment plants or construct new ones. Key findings include the following:

- **All trading basins in West Virginia and Pennsylvania¹ will experience a short-term demand for nutrient credits, and credits from point sources alone will be unable to meet the need.** Most wastewater treatment plants will need to obtain credits from nonpoint sources, or use other offset options such as connecting local septic systems into the treatment plant or making technology upgrades.

- **Long-term demand from new and expanding wastewater treatment plants is expected.** By 2030, the wastewater plants in all but three trading basins (Maryland’s Everywhere Else², Pennsylvania’s Susquehanna, and Virginia’s Eastern Shore) are expected to exceed 80 percent of their existing design capacity. Four trading basins will have exceeded 100 percent of total design flow capacity by 2030 (Maryland’s Patuxent, Pennsylvania’s Potomac, Virginia’s York, and West Virginia’s Potomac).

- **The Maryland Patuxent, James Virginia, and Potomac Virginia trading basins will likely experience the greatest long-term demand for credits.** Demands by basin, from greatest to least, are as follows:

Table 1. Estimated Long-Term Nitrogen and Phosphorus Demand

Trading Basin	Projected Flow to be Offset (mgd)*	Total Nitrogen Offsets (lbs)**	Total Phosphorus Offsets (lbs)**
Patuxent, Maryland	-	-	-
Potomac, Maryland	53	583,614	39,880
Everywhere Else, Maryland ²	6	64,020	4,802
Potomac, Pennsylvania	4	49,091	6,545
Susquehanna, Pennsylvania	-	-	-
Eastern Shore, Virginia	-	-	-
James, Virginia	19	147,681	28,457
Potomac, Virginia	11	122,363	9,483
Rappahannock, Virginia	8	84,031	7,162
York, Virginia	8	310,752	17,409
Potomac, West Virginia	3	26,723	2,751

*This is projected flow that is in excess of 80 percent of current design capacity. mgd: million gallons per day

** Nitrogen and phosphorus offset demands are expressed in terms of delivered pounds. In order to express delivered pounds, a weighted delivery ratio was created for each trading basin based on the current distribution of wastewater treatment plants within the basin.

- **Nonpoint sources will supply the majority of nutrient credits,** along with other offset methods approved by the states (e.g., septic hook-ups, minor facility upgrades).

¹ Maryland does not permit existing wastewater treatment plants to purchase water quality credits to meet permit requirements; Virginia point sources anticipate meeting their own needs as members of a Nutrient Credit Exchange Association.

² A combined basin for Maryland’s Susquehanna, Eastern Shore, and Western Shore.



- **There is likely to be a geographical mismatch between potential supply of nonpoint source credits and demand for credits within trading basins.** Several trading basins, especially in the case of phosphorus, cannot meet the predicted demand for nutrient credits through either point sources or nonpoint source agriculture. Meanwhile, other basins have the capacity to generate nutrient reductions in excess of their estimated demand.

- **The vast majority of nonpoint source credits for nutrient reduction will come from agricultural operations.**

- **Supply of agricultural nonpoint source credits greatly depends on agricultural baselines.** An agricultural baseline is the level of performance that an operation or individual field must meet before it can generate nutrient reduction credits through additional actions. The definition and level of performance for agricultural baselines currently varies by state. There is a general consensus that once the federal pollution limits known as Total Maximum Daily Loads (TMDLs) are set for the Chesapeake region, states will be obliged to set agricultural baselines at or near those levels called for in the TMDL. In the context of a TMDL, agricultural baselines will ensure that the reductions required by the agricultural sector to meet its load allocation are not traded away as offsets in other sectors; only reductions above and beyond the TMDL requirements can generate credits.

3. Policy Implications for Nutrient Trading

As nutrient trading programs emerge in the Chesapeake region, policy developments will affect the way these programs operate, and the potential for supply and demand of credits within the watershed.

- **The implementation of a Bay-wide TMDL in 2011 will affect the availability and price of credits.** Nutrient trading programs will need to set agricultural baselines at a level that complies with the TMDL, as described above. High baselines affect credit supplies in two ways:

- Fewer farmers, at the outset, will qualify to generate credits because only a minority of agricultural operations will initially meet baseline requirements; and

- The easy and inexpensive agricultural reductions will be in place before a farm becomes eligible for generating credits. Therefore, the reductions that can be achieved beyond TMDL obligations will be more difficult and/or relatively more expensive to attain.

- **A bill proposed by Senator Cardin (D-MD)—the Chesapeake Clean Water and Ecosystem Restoration Act of 2009**—calls for a federally mandated interstate program for water quality trading in the Chesapeake region. This could alleviate credit shortages within in a basin that would otherwise limit growth, and allow basins with excess credits to sell them in other portions of the Bay watershed.

4. Recommendations

In order to ensure that wastewater treatment plants can cost-effectively meet their permit requirements that the watersheds are able to sustain growth under a nutrient cap, we recommend the following:

- Facilitate the financing of practices that help farmers meet the agricultural baseline and qualify to participate in nutrient trading. State and federal funds are currently used to fund conservation practices on farms via programs like the Environmental Incentives Program (EQIP). In addition to traditional conservation programs, several opportunities exist to link farmers and forest landowners to funding streams available through environmental markets. Bay Bank, the Chesapeake's conservation marketplace, is helping farmers and forest landowners navigate these new opportunities.



- Encourage innovative practices for reducing nutrients. The supply of agricultural nonpoint source credits is based on maximum potential implementation of a limited number of agricultural practices. Innovative practices can create additional nutrient reduction opportunities that are not presented here. Some practices or technologies that have potential to generate additional nutrient reductions include precision agriculture, algal turf scrubbers, and oyster aquaculture.
- Allow for interstate-interbasin water quality trading. The proposed Cardin bill that, among other things, proposes to establish an interstate trading program, would allow for basins with greater supplies of credits to sell to basins where credit supplies are low, as long as local water quality standards are upheld. Interstate-interbasin trading may also:
 - Provide more certainty to a jurisdiction's ability to accommodate planned growth;
 - Help create a level playing field among the states for growth;
 - Minimize jurisdictional inequalities due to differing rules and requirements among the states;
 - Make the cheapest credits in the Bay watershed available to all buyers, not just those in a restricted geographical area;
 - Increase competition among credit sellers, leading to lower credit prices;
 - Preclude credit monopolies or artificially restricted supplies;
 - Create additional opportunities for generating credits; and
 - Produce a more stable and reliable supply of credits.

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