Adaptive Trading: Experimenting with Unlikely Partners

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I. CLEAN WATER ACT LEGACY

a. Point v. Non-Point Source Distinction in the CWA

i. Congress did not design the Clean Water Act to address diffuse or non point pollution with the same prescriptive standards and permits it required for point sources; instead, Congress relegated it to a largely voluntary, state-led approach.

ii. Section 502(14) of the CWA defines "point source" as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture."

a. Point sources are regulated with National Pollution Discharge Elimination System (NPDES) or state equivalent permits that apply water quality and technology standards, among other things.

iii. By contrast, "nonpoint source" is defined to mean any source of water pollution that does not meet the legal definition of "point source" in section 502(14). This pollution is diffuse runoff from land and can include manure, fertilizer, oil and grease, salt, bacteria, sediment, etc.

iv. A federal attempt to address nonpoint source pollution is found in the 1987 Clean Water Act Amendments, which added the section 319 Nonpoint Source Management Program, 33 U.S.C. § 1329, and the 1990 Coastal Zone Act Reauthorization Amendments, which added the Coastal Nonpoint Pollution Program,16 U.S.C. § 1455b. The Nonpoint Source Management Program authorizes the EPA to administer grants to states implementing management

programs to reduce nonpoint source pollution in navigable waterways. 33 U.S.C. § 1329(h)–(i) (2006). To receive funding, states must identify waterways that require a reduction in nonpoint source pollution to achieve and maintain water quality; identify categories of significant nonpoint source pollutants; outline the process for identifying best management practices; and identify state and local programs for addressing nonpoint source pollution. *Id.* § 1329(a)(1). Similarly, the Coastal Nonpoint Pollution Control Program administers grants to states implementing management programs to reduce nonpoint source pollution in coastal waters. 16 U.S.C. § 1455b(f) (2006). To receive funding under this program, states must identify land uses that contribute to the degradation of coastal waters or identify coastal waters threatened by "reasonably foreseeable increases in pollution"; identify critical coastal areas adjacent to those waters; and implement and continually revise management measures necessary to achieve and maintain water quality. *Id.* § 1455b(b)(1)–(3).

v. Federal law does not require states to implement the nonpoint program, nor does it authorize EPA to step in and promulgate a federal program in the absence of an effective state nonpoint program.[1]

b. **Water Pollution in the U.S.**

i. After more than 40 years of implementing the Clean Water Act, diffuse runoff is the single biggest source of water quality problems in the United States.[2]

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[1] Congdon, Young, & Gray, *Economic Incentives and Nonpoint Source Pollution: A Case Study of California's Grassland Regions*, 14 HASTINGS W.-N.W. J. ENVTL. L. & POL'Y 215, 221 (2008).

[2] According to the U.S. EPA:

> The United States has made tremendous advances in the past 25 years to clean up the aquatic environment by controlling pollution from industries and sewage treatment plants. Unfortunately, we did not do enough to control pollution from diffuse, or nonpoint, sources. Today, nonpoint source (NPS) pollution remains the Nation's largest source of water quality problems. It's the main reason that approximately 40 percent of our surveyed rivers, lakes, and estuaries are not clean enough to meet basic uses such as fishing or swimming.

http://water.epa.gov/polwaste/nps/outreach/point1.cfm

U.S. ENVTL. PROT. AGENCY, NATIONAL WATER QUALITY INVENTORY: REPORT TO CONGRESS 2004 REPORTING CYCLE 14-15, 18, 22 (2009), available at http://water.epa.gov/lawsregs/guidance/cwa/305b/upload/2009_01_22_305b_2004report_2004_305Breport.pdf. Of the assessed stream and river miles, 44% are impaired. *Id.* at 13. Nutrients and sediments are in the top ten "causes" of river and stream impairments, with nutrients

ii. Agriculture is the leading contributor to these nonpoint problems, making nutrients and sediments the most common pollutants fouling U.S. waters.[3] Agriculture is key to the nonpoint source pollution problem, which is to say *the* water pollution problem, and the solution to that problem.

c. **EPA and Some States Proposed Solution**

i. The EPA, some states and regulated point sources are pushing to bridge this regulatory gap. They could chose from a range of plausible solutions to the problem, including (not limited to): 1) regulations that require mandatory BMPs by farms, 2) targeting USDA funding to pay for BMPs on farms with water quality impacts, or 3) water quality trading between point sources and unregulated farms.[4] EPA has chosen to emphasize the third option.

II. WATER QUALITY TRADING

a. Agency Focus on Trading

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impairing 38,632 miles and sediments impairing 35,177 miles. *Id.* at 15. Agriculture ("rop production, grazing, and animal feeding operations") is the number one "cause" of stream and river impairment, impairing 94,182 miles. *Id.* at 15 - 16. Municipal discharges/sewage is the 6th cause of impairment, impairing 35,301 miles. *Id.* at 16. For assessed lakes, a much higher percentage than rivers and streams were impaired: 64%. *Id.* at 16. Nutrients are the third "cause" of impairment, impairing 1,952,386 lake acres. *Id.* at 18. Agriculture is the third highest source of impairment, impairing 1,670,513 lake acres, while municipal discharges/sewage is the 7th highest cause of impairment, impairing 583,211 lake acres. *Id.* at 19. Of the assessed bays and estuaries, 30% are impaired. *Id.* at 20. Nutrients impair 1,047 square miles. *Id.* at 21. Unlike lakes, rivers and streams, agriculture is the 9th source of estuary/bay impairment, impairing 792 square miles; municipal discharges/sewage is the 3rd source of impairment, impairing 2,487 square miles. *Id.* 23. These data likely underrepresent the extent of the problems because 84% of the total U.S. river and stream miles, 61% of the total U.S. lakes and 71% of the total bays and estuaries are unassessed. Id. at 13, 17, 20.

[3] http://water.epa.gov/polwaste/nps/outreach/point1.cfm. However, municipal point sources are the second leading cause of impairment identified by the EPA. *Id.*; "Despite improvements since passage of the Clean Water Act, the Mississippi River today experiences a variety of water quality problems. Many of these problems emanate from nonpoint pollutant sources." National Research Council Committee on the Mississippi River and Clean Water Act, *Mississippi River Water Quality and Clean Water Act: Progress, Challenges, and Opportunities*, at 2 (2008) http://www.nap.edu/openbook.php?record_id=12051&page=1 [last visited Sept. 20, 2013]. For instance, approximately 10% of Mississippi River nitrogen loading is from point sources. *Id.*, at 6.

[4] This push in the area of water quality trading is just a subset of a larger emphasis on markets as a solution to achieving environmental goals, which has existed for the last three decades. Joseph W. Dellapenna, *Climate Disruption, the Washington Consensus, and Water Law Reform*, 81 Temp. L. Rev. 383, 399 (Summer 2008). Prof. Dellapenna laid bare the problems with water markets as a solution to water quantity problems, but did not address markets for trading water quality. *Id.*

i. EPA and some states are presenting trading as a key tool for addressing contemporary problems in major watersheds:
   1. Chesapeake Bay (largest estuary in the U.S.),[5]
   2. Ohio River Basin,[6] and
   3. Great Lakes.[7]

ii. In its overall plan for trading, the EPA envisions states adopting nutrient criteria and Total Maximum Daily Loads (TMDLs) that "embrace" water quality trading as a way to ultimately lead to meeting water quality goals.[8]

b. How Water Quality Trading Works in the Context of Agriculture

i. In theory, trading would allow regulated industries and municipal sewage plants (point sources) to pay largely unregulated farms (non point sources) to reduce nutrient pollution in lakes, rivers and streams.

ii. Although the EPA has been promoting it for almost three decades, and has had a water quality trading policy since 2003,[9] the number of water quality trading programs with actual trading has been very small: only 24 programs have traded, and vast majority do not involve trading with nonpoint agricultural sources.[10]

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[5]U.S. ENVTL. PROTECTION AGENCY, CHESAPEAKE BAY TOTAL MAXIMUM DAILY LOAD FOR NITROGEN, PHOSPHORUS AND SEDIMENT at 10.2 "Water Quality Trading", 8-27 (allowing trading in Pennsylvania), 8-32 (allowing trading in West Virginia) (2010), *available at* http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html. This follows an earlier tributary strategy in Pennsylvania that identified a 27,000 lb of phosphorus shortfall in nonpoint source reductions in the Susquehanna basin and proposed nutrient credit trading by POTWs to make up the difference. Stephanie Showalter & Sarah Spigener, *Pennsylvania's Nutrient Trading Program: Legal Issues and Challenges*, White paper by National Sea Grant Law Center, at 5.

[6] Brydon Ross, *Indiana, Kentucky and Ohio sign largest credit trading program for water pollution*, KNOWLEDGE CENTER, COUNCIL FOR STATE GOVERNMENTS (Aug. 9, 2012, 3:55 PM), http://knowledgecenter.csg.org/kc/content/ky-and-oh-sign-largest-credit-trading-program-water-pollution.

[7] *See, generally*, SE. WIS. WATERSHEDS TRUST, INC., OUR WATERS: WATER QUALITY TRADING (2012), *available at* http://www.scribd.com/doc/137233107/Water-Quality-Trading-White-Paper-June-2012. The water quality trading approach allows producers of nonpoint source pollutants to choose between reducing the end-of-pipe pollutant concentrations or entering into trade agreements with other producers in the watershed to achieve the same result. *Id*. at 2.

[8]U.S. EPA Water Quality Trading Evaluation, at 1-4, Exhibit 1, "EPA Water Quality Trading Program Logic Model."

[9] EPA Water Quality Trading Policy: Issuance of Final Policy, 68 Fed. Reg. 1608, 1609 (Jan. 13, 2003)

[10] The first water quality trade was on Lake Dillon, Colorado, in 1986. U.S. Envtl. Protection Agency, List of all trading programs, http://water.epa.gov/type/watersheds/trading/upload/tradingprogramsinfo.xls (lasted visited Apr. 14, 2013); HANNA L. BREETZ ET AL., WATER QUALITY TRADING AND OFFSET INITIATIVES IN THE U.S.: A COMPREHENSIVE SURVEY (2004) (cataloguing development of trading programs); *see also* U.S. Envtl. Protection Agency, List of all trading programs, http://water.epa.gov/type/watersheds/trading/upload/tradingprogramsinfo.xls (lasted visited Apr. 14, 2013).

c. **Convergence of Water Quality Trading and Adaptive Management**

i. Adaptive Management: This is a theory, which promotes a continuous learning process for resource managers. According to adaptive management theory, agencies are encouraged to learn as they implement their programs; the understanding is that such learning would allow programs to come closer to achieving their goals by routinely incorporating new information.

ii. "The theory of adaptive management arose out of an approach developed by C.S. 'Buzz' Holling in the 1970s.[11] The crux of this theory was that ecosystems acted as dynamic, rather than static systems; therefore, traditional natural resource management approaches of 'attack[ing] environmental stressors in piecemeal fashion, one at a time,' and apportioning decisionmaking 'among a variety of mission-specific agencies and resource-specific management regimes' were inadequate.[12] Instead, a more effective response to dynamic systems would be one that focused on collecting, testing, and applying information in these dynamic systems[13] to shift from rule-based approaches of management towards strategies that emphasize continuous monitoring of circumstances and adjusting decisions accordingly."[14]

iii. A variety of water clean up plans (TMDLs) for major watersheds/basins include trading and adaptive management concepts. My research identifies examples from across the country:
   1. Chesapeake Bay,
   2. Ohio River,
   3. Wisconsin (impacting waters that empty into the Great Lakes and Mississippi River),
   4. Rogue River,
   5. Willamette River, and
   6. Lower Boise River.

In EPA's 2008 water quality trading evaluation, it noted that 25 trading programs have been launched, but "relatively few trading programs have been scaled up from pilot projects to permanent programs, and even fewer can claim to have had a significant impact in improving water quality or reducing pollutant control costs." U.S. EPA Water Quality Trading Evaluation, at 1-2 (2008).

[11] C.S. HOLLING, ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT (C.S. Holling ed., 1978).
[12] Bradley C. Karkkainen, *Bottlenecks and Baselines: Tackling Information Deficits in Environmental Regulation*, 86 TEX. L. REV. 1409, 1439 (2008).
[13] *See* J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems—With Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373, 1391 (2011); *see also See* J.B. Ruhl. *Regulation by Adaptive Management—Is It Possible?*, 7 MINN. J. L. SCI. & TECH. 21, 28 (2005).
[14] Melissa K. Scanlan and Stephanie Tai, *Marginalized Monitoring: Adaptively Managing Urban Stormwater*, 31 UCLA Journal of Env. Law & Policy 1, 8-9 (2013).

iv. **Highlight One Example:** largest estuary in the United States, the Chesapeake Bay
    1. The Chesapeake Bay has been at the center of watershed clean up efforts that have included adaptive management and trading elements.[15]
    2. In the Chesapeake Bay TMDL, for instance, Section 10 is entitled: Implementation and Adaptive Management. This section contains descriptions of offset and trading anticipated by the TMDL, but nothing that details the adaptive management approach indicated by the name of the section.[16]
    3. The most EPA includes is in the subsection on climate that commits EPA "to take an adaptive management approach to the Bay TMDL and incorporate new scientific understanding of the effects of climate change into the Bay TMDL, in this case during the mid-course assessment."[17] However, the details of how this should be implemented are left undeveloped.
    4. There is no indication in the TMDL and its appendix on offsets and trading that an adaptive management iterative process will be used. No water quality monitoring is required to inform adjustments in individual trades or offset, assess a bundle of trades on one segment of the watershed, or review the program as a whole.[18]

v. The examples show a lack of specificity and wide variety of conceptualizations of adaptive management in the water trading context.

vi. Given the reliance on trading as the main solution to persistent nonpoint water quality problems from agriculture and the reality that trading is still in its experimental phase, the tool could benefit

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[15] *Am. Farm Bureau Fed'n v. U.S. EPA*, No 1:1–CV–0067, 2013 WL5177530, at *97-98 (M.D. Penn. Sept. 13, 2013).

[16] U.S. ENVTL. PROT. AGENCY, CHESAPEAKE BAY TOTAL MAXIMUM DAILY LOAD FOR NITROGEN, PHOSPHOROUS AND SEDIMENT §§ 10, 10.1.2, 10.2, 10.5 (2010), *available at* http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html

[17] U.S. ENVTL. PROT. AGENCY, CHESAPEAKE BAY TOTAL MAXIMUM DAILY LOAD FOR NITROGEN, PHOSPHOROUS AND SEDIMENT §10.5 (2010), *available at* http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html

[18] U.S. ENVTL. PROT. AGENCY, CHESAPEAKE BAY TOTAL MAXIMUM DAILY LOAD FOR NITROGEN, PHOSPHOROUS AND SEDIMENT §§ 10.1.2, 10.2; Appendix S, Offsetting New or Increased Loadings of Nitrogen, Phosphorus, and Sediment to the Chesapeake Bay Watershed. EPA describes that it reserves the authority to review individual offsets, but expects its role to primarily be one of reviewing offsets at the broader programmatic level. *Id.* 10.1.4.

from applying adaptive management in a structured intentional manner.

III. ADAPTIVE TRADING

a. Why? It could increase the likelihood of understanding system dynamics and provide the transparency essential to deciding whether this regulatory tool is solving the problem presented by unregulated agricultural non point pollution.

b. Focus on Informed Experimentation

- **i.** Create an experimental framework that requires monitoring of BMP installation and maintenance at the farm level.
- **ii.** Couple that with water quality monitoring – taking measures at the field level and at the watershed level.
- **iii.** Create a defined process / feedback loop where this data informs responsive management.
- **iv.** Choices – could use data to inform credit accounting, enforcement, and/or overall analysis of the market mechanism to address the programmatic question: is this the tool we should rely on to address the largest source of water pollution in the U.S.