Chesapeake Bay Nutrient Trading Program

In 2009, the President issued Executive Order 13508 (EO 13508) to address pollution issues in Chesapeake Bay.[1] EO 13508 created the Federal Leadership Committee to oversee the activities of agencies working on the protection and restoration of the bay. It also called for the committee to report on challenges facing the Bay, as well as strategies for addressing the pollution. The committee has issued annual action plans and progress reports, available at http://executiveorder.chesapeakebay.net/page/Reports-Documents.aspx. Since that time, several key steps have been taken. This case study sets forth key efforts on the road to incorporating the nutrient reduction services of oysters into the Chesepeake's TMDL program.

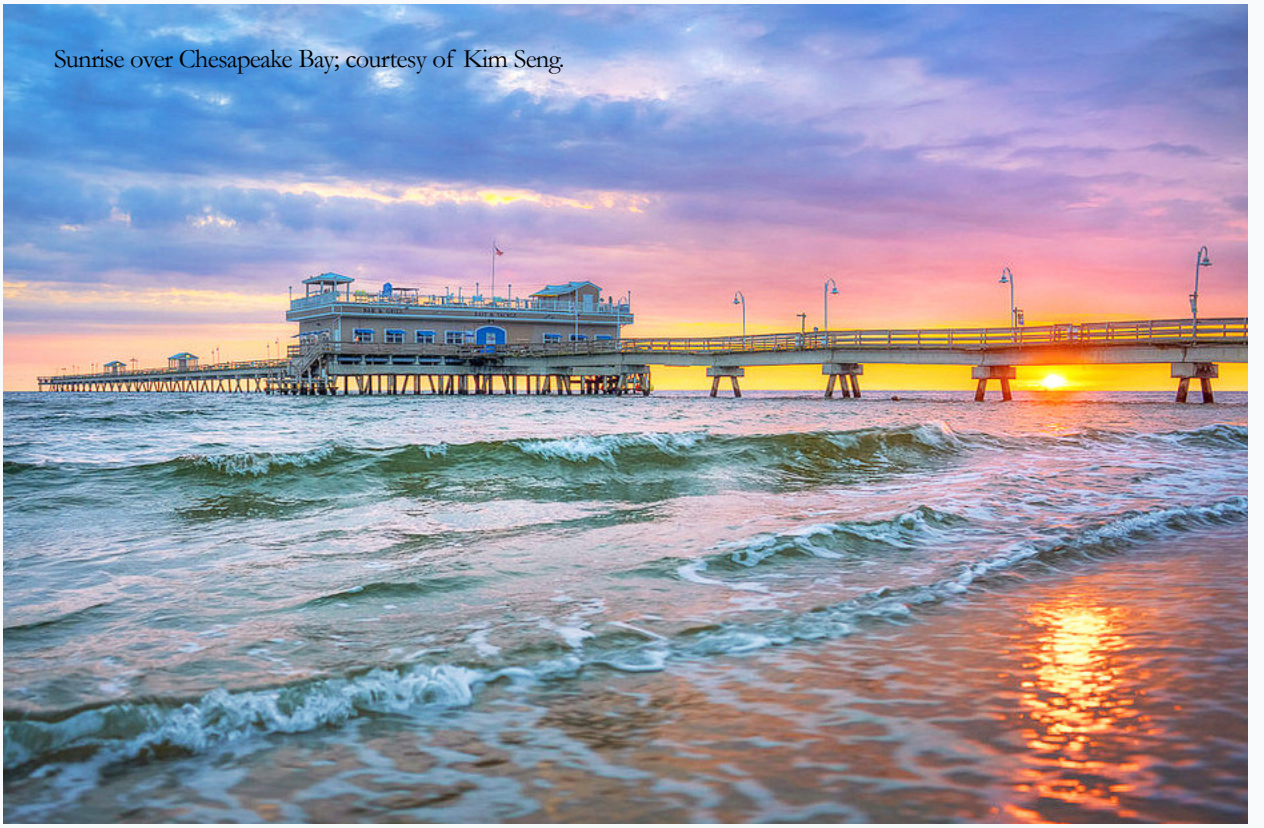
TMDL and Nutrient Trading

In 2010, the Environmental Protection Agency (EPA) established the Bay Total Maximum Daily Load (TMDL) to limit what pollutants could be added to the Bay. The TMDL jurisdictions cover parts of Maryland, Pennsylvania, Virginia, New York, Delaware, West Virginia, and the District of Columbia.[2] The ultimate goal of the TMDL is to have a 60% reduction in nitrogen, phosphorus, and sediment by 2017, with full restoration by 2025.

Section 10 of the Bay TMDL allows the jurisdictions to set up nutrient trading programs. Under these programs, the jurisdictions can allow credits to be generated for the removal of pollutants from the Chesapeake and its tributaries and then sold to offset pollutant-generating activities. Currently, the jurisdictions in Maryland, Pennsylvania, Virginia, and West Virginia have active nutrient trading programs.[3]

STAC Reports

The Chesapeake Bay Program is a regional partnership composed of federal and state agencies, local governments, and other organizations, such as non-profits and academic institutions. In September 2013, the program's Scientific and Technical Advisory Committee (STAC) issued a report reviewing the findings of a January 2013 NOAA



Sunrise over Chesapeake Bay; courtesy of Kim Seng.

Chesapeake Bay Office workshop on the potential use of shellfish for nutrient reduction and assessing possible applications of the workshop's findings to the Chesapeake Bay.[4] The report addressed oyster nutrient removal and possible guidelines for crediting nutrient removal by oysters in the Chesapeake.[5] The committee found that while oysters can be used to reduce nutrient loads, their effects have been highly variable and not currently possible to reliably quantify without direct measurement of individual reefs. The report concluded that offset credit was unsupported both for oyster aquaculture and for oyster reef restoration until reliable estimates of nitrogen removal become available.

Recent Developments In Research

While there is not currently an accepted valuation for the nutrient reduction services of oysters in any of the Chesapeake jurisdictions, recent studies are bringing science closer to offering sufficiently reliable estimates of the ecological and monetary value oysters provide. The National Centers for Costal Ocean Science (NCCOS) and the University of Maryland have collaborated on a project in the Bay, to be completed in September of 2015, evaluating the use of the Farm Aquaculture Resource Management (FARM) model to determine the value of ecosystem services provided by oyster aquaculture.[6] A December 2014 study by the NCCOS, the National

Marine Fisheries Service, and the New University of Lisbon successfully applied the FARM model to 14 locations across the world and estimated the over-all and site-specific ranges of nitrogen removal by shellfish aquaculture.[7]

By employing this model to oysters in the Chesapeake, the Chesapeake study aims to both quantify and value the nutrient removal services provided by Chesapeake oysters. In a similar study in the Long Island Sound and the Great Bay/Piscataqua regions, the NCCOS used four models, including the FARM model, to assess the economic benefit of shellfish nutrient filtering and the potential for credit generation in a water quality trading program.[8] The study, completed in January 2014, calculated the amount of nutrient removed by local shellfish aquaculture as well as value of the services based on the avoided costs of traditional water treatment. Similarly, the Chesapeake study hopes to provide the nutrient removal and value data that is necessary to include oyster growers in nutrient trading programs in the Chesapeake Bay area.

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1. Exec. Order No. 13508, 3 C.F.R. 235 (2009).
2. *Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment*, U.S. Environmental Protection Agency (2010). *Available at:* http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html.
3. Chesapeake Bay Program Scientific and Technical Advisory Committee, STAC Publ. #14-002, Critical Issues in Implementing Nutrient Trading Programs in the Chesapeake Bay Watershed 49 (2013). *Available at:* http://www.chesapeake.org/pubs/315_RIbaudo2013.pdf. West Virginia Department of Environmental Protection, West Virginia Water Quality Nutrient Credit Trading Program (2009), http://www.dep.wv.gov/news/Documents/NutrientTradingGuidance/WVDEP_Trading_Guidance_DRAFTDEP0815%2009.pdf.
4. M. Luckenbach, STAC Publ. No. 13-005, Evaluation of the Use of Shellfish as a Method of Nutrient Reduction in the Chesapeake Bay, Chesapeake Bay Program Scientific and Technical Advisory Committee, 65 (2013), http://www.chesapeake.org/pubs/307_Luckenbach2013.pdf. See M. Lisa Kellogg et. al., Quantifying Nitrogen Removal by Oysters Workshop Report (August 2013), http://www.chesapeakebay.noaa.gov/images/stories/habitats/denitrificationworkshopreport.pdf for the findings of the workshop.
5. *See* M. Luckenbach et. al., *Oyster Nutrient Reduction Potential Factsheet*, Chesapeake Bay Program Scientific and Technical Advisory Committee (2014), http://www.chesapeake.org/pubs/321_Luckenbach2014.pdf (a factsheet summarizing the findings of the report and the workshop).
6. *Project Details: Shellfish Aquaculture and Payment for Ecosystem Services in Chesapeake Bay*, National Centers for Costal Ocean Science, http://coastalscience.noaa.gov/projects/detail?key=250 (last updated February 3, 2015).
7. Julie M. Rose, Suzanne B. Bricker & Joao G. Ferreira, *Comparative Analysis of Modeled Nitrogen Removal by Shellfish Farms*, 91 Marine Pollution Bulletin, 185 (2015). *Available at:* http://www.sciencedirect.com/science/article/pii/S0025326X14008078.
8. *Project Details: Aquaculture and Eutrophication in Long Island Sound and Great Bay – Piscataqua Estuary*, National Centers for Coastal Ocean Science, http://coastalscience.noaa.gov/projects/detail?key=32 (last updated February 3, 2015).

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