

Restoring the Long Island Sound While Saving Money

Lessons in Innovation and Collaboration

Total Maximum Daily Loads

TMDLs

at Work

in Connecticut and New York

Is it possible to make significant reductions in pollution while saving tax payers a large amount of money? Stakeholders in the Long Island Sound are demonstrating that it is possible, using innovative approaches and multi-state collaboration. The Sound's watershed is home to almost 9 million people with an area that includes most of Connecticut and portions of New York, Rhode Island, New Hampshire, Massachusetts, and Vermont. Pollutant sources associated with increased urbanization, including sewage treatment plants and stormwater runoff, have discharged excessive levels of nitrogen to the Sound leading to increased algal blooms and decreased dissolved oxygen (DO) levels.

As a result of eutrophication and hypoxia, large areas in the western portion of the Sound can not support aquatic life, recreation, and other important uses.

To address the water quality problems in the Long Island Sound, EPA created the Long Island Sound Study (LISS) in partnership with the Connecticut Department of Environmental Protection (CTDEP) and the New York State Department of Environmental Conservation (NYSDEC). Work conducted through the LISS helped to support the development of the nitrogen TMDL for the Long Island Sound. Innovative implementation strategies, including a nitrogen credit trading program for sewage treatment plants (STPs) in Connecticut and bubble permits for STPs in New York, have not only led to significant nitrogen reductions in Long Island Sound, but also significant cost savings.

How are TMDLs at work in Long Island Sound?

Years of research, monitoring, and modeling helped the LISS to identify nitrogen sources in the Long Island Sound and levels of nitrogen control necessary to improve DO levels and meet water quality standards. The analysis conducted by the LISS led to the adoption of a 58.5 percent nitrogen reduction target to reduce the extent and duration of hypoxic conditions in the Long Island Sound. Through the TMDL development process, CTDEP and NYSDEC were able to incorporate the 58.5 percent nitrogen reduction target into a regulatory and legal framework.

The Clean Water Act (CWA) requires implementation of pollutant load reductions through point source permits issued under the National Pollutant Discharge Elimination System (NPDES) Program. As a result, CTDEP and NYSDEC point source permit writers must develop permit requirements to implement the nitrogen reduction target. Without the TMDL, the nutrient reduction target established by the LISS after years of research and analysis would not have an enforceable implementation mechanism. In addition, the nitrogen TMDL for the Long Island Sound recommends flexible, innovative implementation approaches, including nitrogen trading.

What is a total maximum daily load (TMDL)?

It is a study or analysis that calculates the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. The TMDL establishes a pollutant budget and then allocates portions of the overall budget to the pollutant's sources. For more information on TMDLs, visit EPA's website at www.epa.gov/owow/tmdl.

TMDL at a Glance

Long Island Sound Nitrogen TMDL

(approved April 2001)

www.longislandsoundstudy.net/pubs/reports/Tmdl.pdf

Factors causing impairment

Aesthetics, fishing, and water contact recreation designated uses impaired due to reduced dissolved oxygen levels and excessive algal blooms

Sources contributing to impairment

Sewage treatment plants, combined sewer overflows, agricultural runoff, urban runoff, and atmospheric deposition

Restoration options

Attain a 58.5 percent reduction in nitrogen discharges to Long Island Sound from Connecticut and New York. Upgrade sewage treatment plants with nitrogen removal technologies, implement a nitrogen credit trading program, issue bubble permits to sewage treatment plants, reduce atmospheric deposition by controlling nitrous oxide emissions from vehicles, control polluted runoff through stormwater best management practices and growth management

Stakeholder involvement

Long Island Sound Study partners, including state and federal agencies, private organizations, and educational institutions; Connecticut Department of Environmental Protection; New York State Department of Environmental Conservation; municipalities along the Sound's shore throughout New York; municipalities in Connecticut; New England Interstate Water Pollution Control Commission; U.S. Environmental Protection Agency

Status of waterbody

Nitrogen loading to Long Island Sound reduced by 25 percent from the adjusted 1990 baseline load.

Benefits to stakeholders

Reduced nitrogen loads, cost savings, funding, partnerships

What is the current status of the Long Island Sound as a result of the TMDL process?

Increased DO levels, resulting from reduced nitrogen loads, should decrease the number of days and the extent of hypoxia in the Sound during the critical summer months. According to the LISS environmental indicators, the extent of hypoxic conditions during 2007 was 162 square miles; the seventh least severe year since 1991. Hypoxia in the bottom waters lasted 58 days, one day above the average from 1987 through 2007. As discussed in the final TMDL report, attaining the DO water quality standards will require further nitrogen reductions from both in-basin and out-of-basin sources.

How did local stakeholders benefit from the TMDL process?

Implementing innovative nitrogen reduction approaches, including nitrogen trading and nitrogen load reallocation under bubble permits, has helped point sources in Connecticut and New York make significant progress toward achieving the 58.5 percent nitrogen reduction goal for 2014. It is anticipated that these improvements, coupled with nitrogen reductions from out-of-basin sources, will improve DO levels and reduce hypoxic conditions in Long Island Sound over time.

In addition to water quality benefits, the TMDL process and the innovative approaches for achieving nitrogen load reductions promoted through the TMDL have benefitted stakeholders in several ways.

- **Increased cost savings while achieving nitrogen reductions.** Upgrading STPs is an expensive endeavor. During 2003–2007, Connecticut has upgraded 19 STPs for a cost of \$56.5 million. However, through Connecticut’s Nitrogen Credit Exchange Program, the upgrades generated \$10.5 million worth of nitrogen credits in five years. This program is expected to save between \$200 and \$400 million in wastewater treatment construction costs over the next ten years. Figure 1 shows an aeration tank installed at the Stratford (Connecticut) STP as part of the facility’s upgrade to implement a biological nutrient removal technique. New York’s bubble permits for management zones are expected to save money as well. For example, New York City is expected to save \$660 million in STP upgrade costs.



Figure 1. Stratford aeration tank.

- **Improved water quality for recreation activities important to the regional economy.** Based on a 1992 study, recreational activities in the Long Island Sound are estimated to contribute an annual revenue of more than \$8 billion (inflation adjusted) to the regional economy. As water quality improves, tourists are more likely to use the Long Island for swimming and boating, generating more cash flow.
- **Increased access to funding.** LISS partner agencies and organizations contribute funding to support implementation activities that will achieve nutrient reductions and achieve DO water quality standards in the Sound. Connecticut has provided hundreds of millions of dollars in grants and loans through its Clean Water Fund to implement nitrogen reductions. New York targeted \$270 million in grant assistance for Long Island Sound in the 1996 Clean Air/Clean Water Bond Act.
- **Increased local, state, and regional partnerships.** The LISS is a highly effective bi-state partnership that involves state and federal agencies, concerned organizations, and individuals. Through the TMDL process, the network of partnerships has grown. Individual STPs collaborate with the states and other STPs to achieve nitrogen load reductions. States north of Connecticut collaborate to establish out-of-basin nitrogen reduction targets and identify strategies to achieve those targets. The public participation processes for the TMDL process and the subsequent permitting activities also generate partnerships within the Long Island Sound watershed.

For more information on the Long Island Sound nitrogen TMDL, contact Mark Parker, Connecticut Department of Environmental Protection, mark.parker@ct.gov, (860) 424-3276
Sarah Deonarine, New York State Department of Environmental Conservation, sndeonar@gw.dec.state.ny.us, (631) 444-0467

For more information on the Connecticut TMDL Program, visit www.ct.gov/dep/cwp/view.asp?a=2719&q=325604&depNav_GID=1654
For more information on the New York TMDL Program, visit www.dec.ny.gov/chemical/31290.html



December 2009
EPA 841-F-09-002D