



# Nonpoint Source Pollution and Long Island Sound

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## The Resource

Long Island Sound is an estuary, where salt water from the Atlantic Ocean mixes with fresh water from rivers and run off from the land. Estuaries are among the most productive ecosystems on earth, supporting a diversity of marine life. Long Island Sound is a vital resource, contributing an estimated \$5.5 billion to the regional economy annually. In 1994, the Long Island Sound Study (LISS) completed the Comprehensive Conservation and Management Plan (CCMP) that sets in motion key management initiatives critical to the health of Long Island Sound (see LISS sidebar)

## Environmental Problems

Low dissolved oxygen (hypoxia) is the priority water quality problem affecting the Sound, and excess nitrogen is the primary cause for hypoxia. The nitrogen spurs the growth of phytoplankton (algae) that ultimately sinks to the bottom of the Sound. As algae decays, oxygen is consumed and hypoxia occurs. This primarily happens in the late summer in sections of western Long Island Sound. Additional concerns include pathogens, toxic contamination, floatable debris, and the need to restore and protect living marine resources of Long Island Sound.

Nitrogen and other pollutants are divided into two source categories: point and

## The Long Island Sound Study

The Long Island Sound Study (LISS) is a cooperative effort involving researchers, regulators, user groups and other concerned organizations and individuals. These people are working together to protect and improve the health of the Sound by implementing the Sound's Comprehensive Conservation and Management Plan completed in 1994.

The Long Island Sound Study was established by a special act of Congress in 1985 to study and characterize water quality in the Sound. The 1987 Clean Water Act amendments created the National Estuary Program (NEP) and in 1988 the LISS became a charter member of the NEP. A Long Island Sound Management Conference, comprising of representatives from Connecticut and New York, the U.S. Environmental Protection Agency (US EPA), other government agencies, universities and citizens groups was established to oversee development and implementation of a Comprehensive Conservation and Management Plan (CCMP) for Long Island Sound. The CCMP describes the Sound's water quality problem and a series of actions to address and solve these problems.

nonpoint. Point sources include discharge from sewage treatment plants and industrial facilities that are relatively easy to identify, sample, monitor, and regulate. Nonpoint sources (NPS), also known as stormwater runoff, are more difficult to identify and regulate because they are broadly distributed and much more diffuse (see NPS sidebar)

## Nonpoint Source Pollution:

Nonpoint source (NPS) pollution is diffused in nature, both in terms of its origin and in the manner in which it enters surface and ground waters. It results from a variety of human activities that takes place over a wide geographic area. Pollutants usually find their way into water in sudden surges, often in large quantities, and are associated with rainfall, thunderstorms, or snowmelt. NPS pollution generally results from land runoff, precipitation, atmospheric dry deposition, drainage, or seepage.

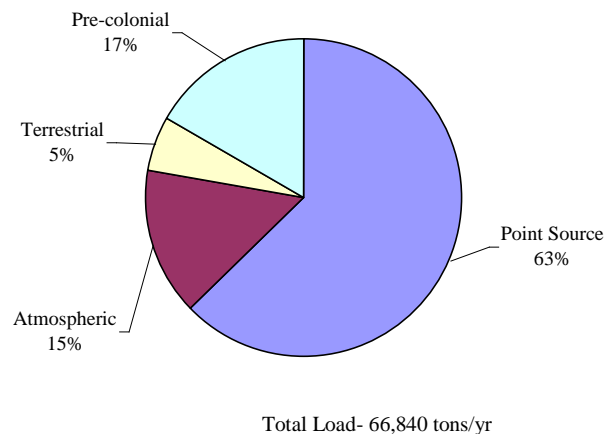
Hydromodification is a physical disturbance to a water resource caused by filling, draining, ditching, damming, or otherwise altering wetlands and stream courses. This is also considered a nonpoint source problem.



contributing to the hypoxia problem. When shellfish beds and bathing beaches become contaminated with bacteria, public health codes require that they be closed until bacteria concentrations drop to safe levels. Heavy metals, pesticides, and other toxic materials wash off streets, farms, and lawns harming marine life. Large amounts of sediment in the runoff can bury fish beds and shellfish habitat, fill marinas, clog municipal drainage systems and increase the need for dredging and disposal. Petroleum products spilled or dumped into Long Island Sound may be carcinogenic and can remain for long periods of time, accumulating in the tissue of fish and shellfish. Stormwater runoff can also increase the temperature if receiving waters during and after storm events. The cumulative effect can raise the normal temperature of a stream and force cold-water species, like trout, to seek cooler waters elsewhere.

NPS pollution enters Long Island Sound from throughout its drainage basin, or watershed. The Sound's drainage basin is very large, extending from southern Canada to Long Island Sound and includes all of the streams and rivers that carry water to it. It also lies within the most densely populated region in the country. Because the system is large and heavily developed, the potential for contamination from runoff is significant and of serious concern. For example, 33% of the total nitrogen load to the sound is attributed to runoff and atmospheric deposition (see Nitrogen Loads pie chart). NPS pollution contributes nutrients, bacteria and pathogens, sediments, toxic material and litter to Long Island Sound. Human activities, such as lawn fertilization, fossil fuel combustion and disruption of natural nitrogen removal functions in wetlands, have increased the nonpoint nitrogen load well above the natural conditions,

### Long Island Sound Basin Nitrogen Loads



### Sources and Solutions

Stormwater runoff is water that hasn't seeped into the ground after a rainstorm. This water flows over the ground picking up soil, fertilizers, pesticides and animal waste before reaching the nearest stream, river or

ocean. Nonpoint sources are organized into several major categories, based on land use activities. The types of pollutants a nonpoint source may generate are often specific to the activity (e.g. pesticides and fertilizers associated with agriculture, or road sand and bacteria with urban runoff). These activities can adversely affect the environment, but there are actions that people can take to help reduce NPS

pollution and improve Long Island Sound water quality (see NPS Pollution and Solutions). The Connecticut Department of Environmental Protection in association with the U.S. EPA has a long history of NPS management throughout its NPS program. Recently, a coastal NPS program has been developed with direct benefits for Long Island Sound.

### Nonpoint Source Pollution and Solution

Category	Types of Pollutants	Nonpoint Source	Impacts	Solutions
Urban Runoff	Nutrients (nitrogen and phosphorous), bacteria, sediment, metals, pesticides, petroleum products, litter, and temperature	Automobiles, power plants, failed septic systems, pet feces, littering, impervious surfaces (roads, parking lots, buildings)	Eutrophication, shellfish and bathing beach closures, sedimentation, fish consumption advisories, floatable debris	Car pools, composting, reduced fertilizer and pesticide use, maintenance of septic systems, clean up after pets, perform regular street cleaning and catch basin cleaning, recycle used oil, encourage litter control
Atmospheric deposition	Oxides of nitrogen and sulfur	Automobiles, power plants, and factories	Eutrophication, fish consumption advisories	Stricter emissions control, car pools, energy conservation
Agriculture	Nutrients, sediments, bacteria, pesticides	Improper cropping practices, fertilize and pesticide use, animal waste, loss of riparian vegetation	Eutrophication, sedimentation of aquatic habitats, shellfish and bathing beach closures, toxic contamination	Plant row crops along contours, plant cover crops, compost manure, reduce fertilizer and pesticide use, create stream buffers.
Construction	Sediments, petroleum products, nutrients	Poor erosion and sediment control practices, leaky vehicles and containers, excessive fertilizer use	Sedimentation of aquatic habitats, toxic contamination, eutrophication	Proper erosion and sediment control, perform frequent vehicle maintenance, and properly contain chemicals
Marinas and recreational boating	Nutrients, bacteria, petroleum products, litter, and anti-fouling paint	Vessel waste discharge, accidental spills, littering, vessel maintenance	Shellfish and bathing beach closures, eutrophication, toxic contamination, floatable debris	Vessel waste pump-outs, no discharge areas, used oil collection, enclosed maintenance areas, use of non-toxic paints, litter control
Hydromodification	Not applicable	Dams, wetland filling, dredging, stream channelization, removal of riparian vegetation, water withdrawals	Restricts migratory fish passage, contaminated sediment disposal, destroys wildlife habitats, alters natural stream flow, increases water temperature	Remove dams or provide fish passages, protect remaining wetlands, restore degrading wetlands, preserve stream buffers, implement water conservation
Natural	Nutrients, bacteria	Wildlife feces	Eutrophication, shellfish and bathing beach closures	Wildlife exclusions or control

These NPS management programs and agencies promote implementation to solve NPS problem using many approaches: best

management practices (BMP); monitoring and assessment; demonstration projects; technical assistance; public education and

involvement, and watershed management. These activities often involve watershed management initiatives designed to comprehensively address a wide range of NPS problems. Implementation programs, project and practices are aimed at improving Long Island Sound water quality.

- < **Best Management Practices** are methods for controlling, reducing or eliminate NPS pollution by design, construction, or maintenance methods. BMPs can range from seeding or mulching a site to engineered structures like control basins. Structural BMPs include stormwater treatment devices, detention basins, and infiltration systems; restoring vegetative buffers around wetlands and watercourses; innovative septic systems; and agriculture waste storage systems. Non-structural BMPs include: street sweeping and other "housekeeping" practices; reduced fertilizer and pesticide use on farms and suburban lawns; ordinances to restrict impervious surfaces in new developments, project riparian buffers and wetlands and require homeowners to properly dispose of pet waste. The main goal of BMPs is to prevent pollutants from reaching the water.
- < **Monitoring and Assessment** identifies water quality impairments resulting from NPS pollution, pinpoints the specific sources, and measures the effectiveness of BMPs at controlling these sources.
- < **Demonstration Projects** test BMP removal of nitrogen and other pollutants and habitat restoration techniques, and promotes the use of those that provide effective. Connecticut has conducted demonstrative projects for storm water treatment devices to remove sediment, bacteria and nutrients; innovative septic

system designed to remove nitrogen; wetland and fish habitat restoration techniques; riparian buffer restoration to reduce erosion and polluted runoff; and agricultural practices to reduce nutrient, sediment and pesticide loads.

- < **Technical Assistance** on NPS management is provided to those most responsible for controlling NPS pollution. Useful information includes: the importance of different NPS, pollutant removal efficiency and cost effectiveness of BMP; construction and maintenance of BMPs, and compliance with non-structural BMPs. BMPs and other technical manuals, training workshops and field demonstrations, and other outreach programs are developed and disseminated. NPS programs have provided information on: fertilizer and pesticide management, land use planning, erosion and sediment control practices and stormwater management.
- < **Public Education and Involvement** to be successful must change attitudes and behavior that contribute to NPS pollution. In many respects, NPS pollution is a "people problem". The educational programs promote an understanding of water quality issues, NPS pollution, and how people can become a part of the solution. These programs are delivered through schools, distribution of fact sheet and through the media. Public involvement means motivating people to become involved in trash clean ups, water quality monitoring, storm drain stenciling, and canoe trips to foster their appreciation of local water resources and increase their awareness of how their actions contribute to NPS pollution. Without public involvement and the willingness

to undergo life style changes, progress will be minimal.

< **Watershed -Based Planning**

These guidelines promote the use of Section 319 funding for developing and implementing watershed-based plans to protect unimpaired waters and restore impaired water.

Required components of a watershed-based plan include:

- a) Identify causes and sources of impairment
- b) Estimate expected load reductions
- c) Describe needed NPS management measures
- d) Estimate needed technical and financial assistance
- e) Public information and education
- f) Implementation schedule for NPS management measures
- g) Measurable milestones
- h) Performance criteria
- i) Monitoring plan

< **Watershed Management** involves working with municipalities and other watershed stakeholders to comprehensively address NPS pollution. This can be done through the implementation of BMPs, demonstration projects, technical assistance, public education, and monitoring and assessment. You can help by joining your local watershed association.

**Program Partners and Funding**

The Connecticut NPS Management Program is administered and funded by the Connecticut Department of Environmental Protection (CT DEP) in cooperation with the U.S. EPA. Also, the USDA Natural Resources Conservation Service (NRCS), the University of Connecticut Cooperation Extension System, the soil water conservation districts, watershed

associations, and federal, state, regional and municipal government agencies.

**Contact**

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CT DEP, US EPA and NRCS websites:

<http://dep.state.ct.us>

[www.epa.gov/owow/nps/education.html](http://www.epa.gov/owow/nps/education.html)

[www.ct.nrcs.usda.gov](http://www.ct.nrcs.usda.gov)

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