NEMO

Nonpoint Education for Municipal Officials :
Using Geographic Information to Protect and Improve Water Quality

Success Stories

November 2000

Connecticut Department of Environmenatl Protection, 79 Elm Street, Hartford, CT 06106-5127 - Arthur J. Rocque, Jr., Commissioner

The Resource

Connecticut is a water-rich state, with an abundance of surface and ground water resources. The state receives an average of 44 inches of rain each year, and has large quantities of underground water (aquifers), numerous rivers, streams, lakes, ponds, wetlands, and about half of the area of Long Island Sound. Connecticut's water resources include approximately: 5,830 miles of rivers and streams; 64,973 acres of lakes and ponds; 510,000 acres of freshwater, non-tidal wetlands; 20,895 acres of tidal wetlands; and 612 square miles of marine waters. State residents rely on these abundant water resources for drinking water, recreation (fishing, swimming, and sightseeing), irrigation, waste assimilation, hydropower generation, and industrial

Environmental Problems

The Connecticut Department of Environmental Protection (CT DEP) estimates that approximately one-third of the state's rivers and streams, and three-quarters of the state's portion of Long Island Sound are impaired. Nonpoint source (NPS) pollution is the leading cause of poor water quality in Connecticut and the rest of the nation (see **Nonpoint Source Pollution** sidebar). NPS pollution is generated by land use, and most land use decisions in Connecticut are made at the local level by municipal officials and private landowners. In Connecticut, polluted runoff from urban and suburban areas and from construction sites is the most significant NPS problem. Federal and state NPS laws and programs established over the past 30 years have created a growing need for local officials to be more knowledgeable about the causes, effects, and management of polluted runoff.

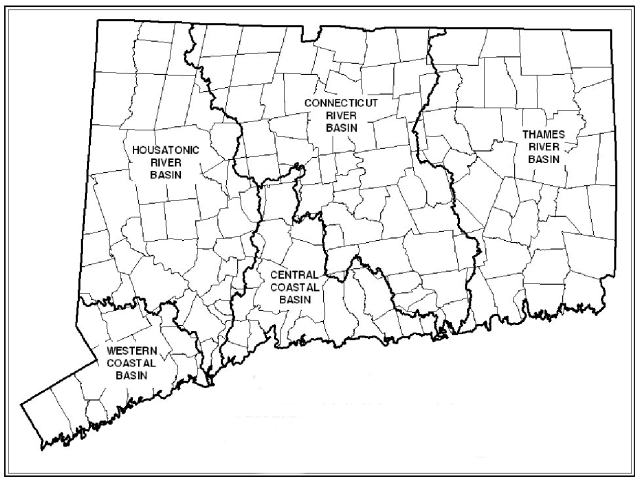
While many of the larger, more affluent communities have professional staff to assist with the land use planning and regulatory process, many others rely almost entirely on volunteer commissioners to make these important decisions. With 169 municipalities in Connecticut, the large number of local officials and the continual turnover of volunteer commissioners presents a challenge to those who want to educate land use decision-makers.

The Solution

In 1992, the University of Connecticut Cooperative Extension System (UConn/CES) created the Nonpoint Education for Municipal Officials (NEMO) Project. Founded on the principles that water quality is a function of land use, and that land use is locally controlled, NEMO uses geographic information systems (GIS) and other visual aids to provide decision-makers with the information necessary to better protect their local water resources.

Nonpoint Source Pollution

Nonpoint source (NPS) pollution is diffuse 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 take place over a wide geographic area. Pollutants usually find their way into waters 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 - physical disturbances to a water resource caused by filling, draining, ditching, damming, or otherwise altering wetlands and stream courses - is also considered a nonpoint source problem. Section 319 of the federal clean water act established a national program to control NPS and authorizes the U.S. Environmental Protection Agency (EPA) to award grants to states and tribes with EPA-approved NPS management programs.



NEMO delivers research-based, professional technical assistance to Connecticut's 169 municipalities through workshops, publications and the Internet. The basic NEMO presentation, *Linking Land Use to Water Quality*, provides training to local land use decision-makers on the connection between land use and water quality, particularly relationships between the amount of impervious surface and degree of water quality impairment. NEMO also provides advanced modules on open space planning and "state-of-the-art" best management practices (BMPs), which include reducing impervious surfaces, infiltrating runoff on-site, and maintaining natural features (e.g., native vegetation, wetlands) to the maximum extent practicable. These programs are delivered on a statewide basis, through targeted efforts in watersheds that are a high-priority for NPS management, and in coastal communities with a focus on Long Island Sound water quality. NEMO gained experience in watershed management through its leadership of the Chester Creek and Eightmile River watershed projects.

To gain financial support and improve coordination with other NPS management programs, NEMO formed partnerships with the CT DEP, the EPA, and the U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS). In 1997, CT DEP awarded Section 319 grant funds to NEMO to expand its provision of technical assistance for local officials.

During the first year, NEMO delivered its basic presentation through a series of ten regional workshops. Over 120 of the state's 169 municipalities were represented at the workshops, and many participants contacted NEMO to schedule follow-up meetings on specific issues or concerns. In 1998, each municipality received a map set (watersheds and land cover) to help educate local officials and facilitate NPS management at the local level. In 1999-2000, NEMO conducted regional workshops to teach local officials how to manage NPS pollution by addressing imperviousness through their land use planning and regulatory authorities.

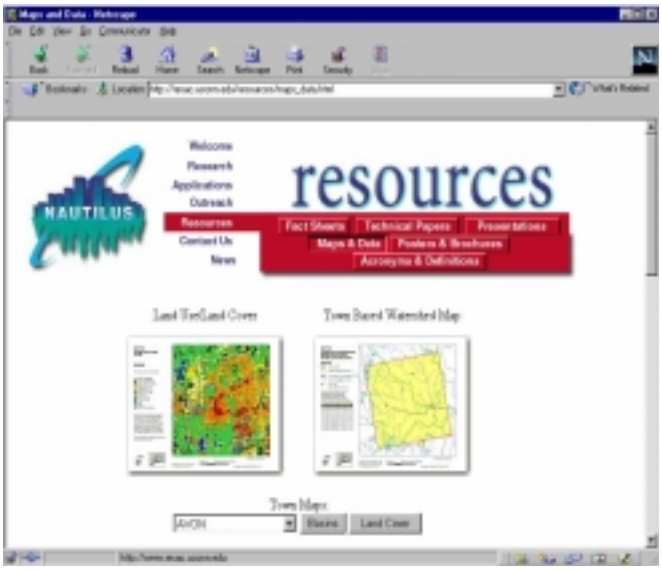
To supplement the information presented at the workshops, NEMO has produced a number of supporting publications, including: *"What is nonpoint source pollution;"* "*Strategies for Coping With Polluted Runoff:"* and *" Reviewing Site Plans for Stormwater Management.*" To see the NEMO publications list, go to: http://www.canr.uconn.edu/ces/nemo/npubsform.html.

Based on the success of the workshop series, NEMO received additional Section 319 funds to expand its program by adding research, watershed programming, and internet tools to its technical assistance effort. The research will improve the data used for NEMO's land use/water quality analyses, and uses GIS to measure the amount of impervious surface based on highly accurate land use data from four Connecticut towns. This research will improve our knowledge of how different types of development affect water quality. Information on the research project is available at: http://www.canr.uconn.edu/ces/nemo/gis/imperv.html .

As part of the Quinnipiac River Watershed Initiative, NEMO conducted targeted workshops for municipal officials from the eight major watershed municipalities on the impacts of land use on water quality and best management practices. The goal of this targeted effort is to encourage local land use officials to update municipal plans and regulations to address NPS pollution. More information on the Quinnipiac River NEMO Project can be found at: http://www.canr.uconn.edu/ces/nemo/ctpage/QUINNI.htm .

The Long Island Sound Study (LISS), part of EPA's National Estuary Program, provided funding in 1997 for a targeted NEMO program in support of the Norwalk River Watershed Initiative. Based on its success in the Norwalk watershed, the LISS awarded additional funds to expand the geographic scope of this targeted NEMO program to other Fairfield County and Westchester County, New York (NY) communities.

To enhance its outreach efforts, NEMO created an Internet resource for municipal officials with maps of the state's 169 municipalities (with some suggested applications). The Powerpoint presentations used during the workshops can be found at: http://www.canr.uconn.edu/ces/nemo/ctpage/ctwide.html.



NEMO Internet resource for municipal officials

- **Waterford**, located on Long Island Sound in southeastern Connecticut, was the first municipality to work with NEMO. In 1994, Waterford began requiring state-of-the-art "best management practices" for commercial/industrial development, which are monitored by the town for performance. The town has since incorporated concepts promoted by NEMO in its land use regulations and Conservation and Development (C&D) Plan (see Water Quality sidebar below).

Water Quality

Continue to protect and improve the water quality throughout Waterford. Waterford has been, and should continue to be, a leader in efforts to identify and address those activities that adversely affect water quality, The predominant problems affecting water quality are related to land use activities that increase the nutrient and sediment content of water resources.

Specific mechanisms that the Town can implement for improving water quality include:

- Adopting stormwater management regulations;
- Regular catch basin maintenance;
- Regular street sweeping;
- Minimum standards for stormwater treatment systems;
- Zero net increase in runoff;
- Zero net increase in total suspended solids;
- Storm drain stenciling projects; and
- The use of best management practices such as vegetative filters.

Results

After eight years of the NEMO Project, there is concrete evidence that Connecticut municipalities are giving greater consideration to water quality in their land use planning and regulatory programs.

In 1996, Waterford was selected as the site for a Section 319 National Monitoring Program project, the Jordan Cove Urban Watershed Monitoring Project. In 2000, the town completed a watershed management plan for the Jordan Cove watershed, and is now working with NEMO to implement the plan.

Photo courtesy of Stan Zaremba

Installation of pervious pavers at the Jordan Cove national Monitoring Project site in Waterford

- **Lyme, East Haddam, and Salem**, as a result of the Eightmile River Watershed Project, signed the "Eightmile River Watershed Conservation Compact," which commits the towns to work together to protect natural resources from new development. As a result of this cooperation, local land trusts and The Nature Conservancy have protected over 1800 acres of open space in the watershed. In addition, UConn/CES foresters have worked with landowners to develop forest stewardship plans on almost 500 acres and provided information that's being used to manage another 2500 acres of forestland. The project also was instrumental in helping build a fish ladder to restore access to upstream habitat for alewives and blueback herring for the first time since the early 1700s.

- **Chester,** as a result of the Chester Creek Watershed Project, adopted stricter stormwater management regulations, developed an open space plan, and revitalized the local land trust, which has since purchased open space along the Creek.

- **Wilton** has used the *Norwalk River Watershed Action Plan* to guide development away from the river, reduce impervious surfaces, and improve stormwater management. The plan, completed in 1998, measures success by the level at which "municipal land use commissions use knowledge gained through NEMO/CT DEP training to improve development proposals by reducing impervious surfaces and stormwater runoff."

- **Greenwich** updated its Plan of Conservation and Development and is reviewing land use regulations following NEMO guidelines in the fact sheet, *Addressing Imperviousness in Plans, Site Design and Land Use Regulations*, and is developing engineering and maintenance policies for stormwater management. The town is working with NEMO to develop an open space plan, and is establishing an open space acquisition fund.

- **Branford** created an official "NEMO Committee," with representatives from all land use boards and commissions, to improve town policies, plans and regulations for managing stormwater. The committee developed an NPS "action plan" that defines roles, specific tasks, and coordination among municipal boards, commissions, and departments. The town allowed the installation of a demonstration rain garden (319-funded) to manage stormwater in the police station parking lot, and requires developers to consider pervious surfaces for roads and parking lots.

- **South Windsor** formed an "Impervious Surface Task Force" as a subcommittee of their planning and zoning commission. The Task Force is revising town regulations as suggested in *Addressing Imperviousness in Plans, Site Design and Land Use Regulations.*

- **Watertown** has required grass swales and narrow curbless roads in two new subdivisions.

Photo courtesy of NEMO

Engineered grass swale used in Watertown subdivision.

- **Preston** requires pervious surfaces for some parking areas in its village district.

NEMO is also having an impact on regional and statewide land use and water quality planning and management.

- **Central Naugatuck Valley Regional Planning Agency**, in cooperation with NEMO, conducted an impervious surface build-out analysis to be incorporated into an update of the regional growth plan in 2001.

- **Litchfield Hills Council of Elected Officials** is working with NEMO to incorporate an impervious surface build-out analysis and associated recommendations into its updated regional growth plan.

- **CT DEP's Nonpoint Source Management Program and Coastal Nonpoint Pollution Control Program** (developed pursuant to Section 6217 of the Coastal Zone Act Reauthorization Amendments) incorporates impervious surface reduction strategies promoted by NEMO and references NEMO as an important technical assistance program.

- The **Connecticut Office of Policy & Management** addresses the use of pervious surfaces and other NEMO strategies in the 1999 *Conservation and Development: Policies Plan for Connecticut*. The plan also recommends that the next phase of CT DEP's stormwater discharge permit program focus on training all towns on stormwater management issues, and references NEMO as an example.

As a result of NEMO's success in Connecticut, 34 other states have either established or are planning to establish technical assistance programs based on the NEMO model.

Future Plans

Based on the success of the first several years of this partnership, CT DEP anticipates continuing its Section 319 funding support for NEMO, and now considers NEMO an integral part of the state's NPS Management Program. In 2001, NEMO will continue its technical assistance programs and impervious surface research. NEMO will conduct two workshops – *Linking Land Use to Water Quality* and *Getting the Gray Out* — at each of three regional locations for newly elected or appointed land use officials. NEMO also will conduct targeted educational efforts in five municipalities (one in each of the five major river basins). The purpose of this effort is to give land-use decision-makers from these five municipalities the tools necessary to address NPS problems specific to their local watersheds. In addition, NEMO is planning to complete the impervious surface research and initiate a multimedia education program for local officials on how to protect water resources from the impacts of new development. The program will involve development of another web page and a CD ROM for statewide distribution.

Project Partners and Funding

Funding and institutional support have been provided by CT DEP, EPA, and USDA:

- $233,664.00 from an EPA Clean Water Act Section 319 grant awarded by CT DEP to support statewide, regional, and watershed NEMO technical assistance and research efforts.
- $194,000 from EPA Long Island Sound Study (National Estuary Program) grants to support the targeted NEMO program in Norwalk River watershed, Fairfield County, Westchester County (NY), and Long Island (NY).
- $510,000 from an USDA grant.
- $488,000 provided by the UConn/CES.
- Volunteer time and funding to coordinate workshops provided by regional planning agencies, watershed associations, and other sponsoring organizations.

Clean Water Act, Section 319 established a national program to control nonpoint source pollution. Section 319(h) authorizes the U.S. Environmental Protection Agency (EPA) to award grants to states and tribes with EPA approved NPS management programs.

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CT DEP and EPA websites
http://dep.state.ct.us
http://www.epa.gov/owow/nps/education.html

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