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## Outreach

### Stormwater in the City

#### Rain Gardens Blossom in the Urban Landscape

Stormwater management is a tough nut to crack for any community. In recent years, an increasing number of Connecticut towns have been turning to *low impact development* (LID) techniques, which largely rely on soil and vegetation to minimize or eliminate water resource impacts from new development. But does LID—the focus of which has been largely on suburban settings—have anything to offer our state’s cities?

The Center’s signature outreach program, *Nonpoint Education for Municipal Officials* (NEMO), has been working with Connecticut communities for almost two decades (see *Program Updates*, page 3). For the past two years, much of this work has been in some of the state’s largest urban centers. Stormwater management in these areas presents a number of challenges, the most obvious of which is that they are largely covered with “impervious surfaces” like cement, asphalt and rooftops that greatly contribute to the increased quantity and decreased quality of runoff. In addition, most of our larger urban centers are

in some phase of separating and/or mitigating combined sewer systems handling both sanitary sewage and stormwater. Thus cities like Bridgeport and Hartford are looking for any strategy that can help to



Participants of NEMO’s two-day rain garden workshop after completing a new rain garden at Bridgeport’s Beardsley Zoo.

reduce the amount of runoff getting into their combined sewers.

LID can help, but it must be used within a different framework in our urban centers. **Restorative redevelopment** replaces preventative planning as the framework for action, with an emphasis on things like stream restoration, enhancement of the

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## Research

### Riparian Areas and Agricultural Lands

Two new additions to the **Connecticut’s Changing Landscape** (CCL) Project have been added to the Center website. The CCL tracks changes to the state’s land cover over time, beginning in 1985 and running to 2006 (an update to 2010 is planned for this spring). In addition to the basic land cover change and CLEAR’s forest fragmentation analysis, the Center has added studies on land cover change in riparian (streamside) corridors, and over prime and important agricultural soils. An extremely brief summary of some of the highlights of the research follows. Readers interested in these studies are encouraged to visit the project websites, where research summaries and data, maps and charts are available.

**Riparian corridors** are known to be environmentally important areas critical to stream stability, pollutant removal, and both aquatic and terrestrial wildlife habitat. These areas are sometimes known as “buffers,” but are not to be confused with the regulatory review zones overseen by local land use commissions. CLEAR looked at land cover change during the 21-year project period for corridors 100 feet and 300 feet to either side of Connecticut’s streams, as determined by the state hydrography (waterways) data layer.

During the 1985-2006 period new development totaled about 5,100 acres in the 100-foot corridor, and about 19,000 acres in the 300-foot corridor. During that

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Connecticut Conference  
**ON NATURAL RESOURCES**  
*Many Resources, One Environment*

March 7th  
2011  
Details on the web  
[www.ccnr.uconn.edu](http://www.ccnr.uconn.edu)

# Stormwater in the City

## NEMO Conducts Rain Garden Workshops in Hartford and Bridgeport

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urban tree canopy, and low impact development “retrofits” installed during renovation and redevelopment of brown fields or existing developed sites. Some common suburban LID elements, such as engineered grass swales for road runoff, are not well suited for the tight confines of the cityscape. However, other LID practices can work well in these settings, like permeable pavements for parking lots and sidewalks, “green street” techniques, and cisterns and vegetated “rain gardens” that receive roof runoff.

**Rain gardens** are small vegetated depressions that collect runoff from a roof, road or other paved area, allowing infiltration of the runoff into the ground, and in the process also provide some renovation of the water through plant uptake and microbial activity in the soil. Although the first wave of interest in rain gardens has been from homeowners in suburban settings, the small size, relative ease of installation, and low cost of these small “bioretention” areas can be put to good use in the city. Ease of installation, however, does not mean that one can build a rain garden without training. As with all LID practices, proper design, construction and maintenance is key to making these practices work.

In the past six months, led by new NEMO Director Mike Dietz (see page 3), the NEMO program has conducted two rain garden workshops targeted at small contractors in urban areas looking to increase the range of services that they can offer to clients. These workshops combine a day of classroom teaching with a day of in-the-field training that results in the construction of a working rain garden. Two workshops have been conducted—and rain gardens built—in Bridgeport and Hartford. In Bridgeport, NEMO worked with EPA Region One, CT DEP, Rutgers University and Horsley Witten Associates to create a new rain garden at the Beardsley Zoo. The Hartford workshop,



(Above) Participants of NEMO's two-day rain garden workshop plant a new rain garden at Bridgeport's Beardsley Zoo. (Left) Participants of NEMO's second rain garden workshop in downtown Hartford on the grounds of the Classical Magnet School.

just this past November, involved the same cast plus the City of Hartford and Metropolitan District Commission (MDC) as partners. The resultant rain garden is in the downtown area on the grounds of the Classical Magnet School at 85 Woodland Street.

NEMO has also taken the lead in the construction of rain gardens at two educational institutions, where student involvement and the day-to-day visibility of these practices will help to spread the word about LID. Again, the locations were in the Hartford and Bridgeport areas. With CLEAR partner CT Sea Grant in the lead, a rain garden was installed at the Vocational Aquaculture High School in Bridgeport. NEMO also collaborated with Bruce Morton at the Goodwin College in East Hartford to provide training and install another rain garden. At both locations, the rain gardens are placed at very public sites, and will become part of the teaching curriculum for courses on sustainability.

New ways for dealing with stormwater in the city are in their early stages, and the interweaving of LID, smart growth and environmental justice is still evolving. However, there is no doubt that LID has much to offer Connecticut's cities, and the NEMO Program hopes to continue to play a major role in making it happen. ●

# Program Updates

## ► NEMO Turns 20!

The Nonpoint Education for Municipal Officials (NEMO) Program turns 20 in 2011. When it was first developed in 1991,



NEMO's focus on land use planning and better site design as the principal strategies to protect water resources was

considered heretical, and its use of geospatial technology for outreach was unique. Twenty years later, "impervious surfaces" has entered the general lexicon (well, at least in our circles...) and GIS and remote sensing imagery are a part of everyday life. So, the world has changed, and of course so has NEMO. The program's first decade was spent largely on helping local officials to understand the land use/water resource connection. And, although we will never lose our focus on land use planning, our second decade has been increasingly about helping communities embrace low impact

development (LID). As noted in the lead article on page 1, the future of NEMO seems very likely to focus on working in urban communities, as well as continuing its work with as many Connecticut municipalities as we can serve. There is much work to be done, and we're glad that new NEMO Director Mike Dietz is here to lead the charge! **For more information contact: Mike Dietz, 860-345-5225, michael.dietz@uconn.edu.**

## ► The Land Use Academy

The Land Use Academy is soldiering on, despite the loss of state support and the retirement/departure of two of its CLEAR-based instruc-



tors. With partial support from our parent College of Agriculture and Natural Resources, CLEAR was able to hire Bruce Hyde, an experienced Connecticut land use planner, to keep the Academy doors open. Our partnership with CT Office and Policy and Management, Office of Responsible Growth continues. At present, we are conducting two full-day basic training courses per year, and are working on development of new courses, including one on affordable housing. The basic training has been revamped and is much more interactive than in years past. The new edition was tested out successfully at the November training, held at Central Connecticut State University (CCSU) in partnership with the CCSU Center for Public Policy and Social Research. In attendance were 77 commissioners from 39 communities. Many thanks to our major partners, the Connecticut Bar Association Planning and Zoning section and our sister CLEAR program



**New CLEAR members Mike Dietz, CT NEMO Director (top) and Bruce Hyde, Land Use Academy Director.**

the Green Valley Institute, for their essential contributions of instructional expertise.

**For more information contact: Bruce Hyde, 860-345-5229, bruce.hyde@uconn.edu.**

## ► National NEMO Network

CLEAR's National NEMO Network, a coalition of program in 30 states modeled after the Connecticut NEMO program, held its seventh national conference, NEMO U7, in Portland, ME Sept. 29 – Oct. 1. The conference was very well attended with over 100 registrants from 24 states, representing many diverse organizations



## Websites & Webinars

### 2011 CLEAR Webinar Series

The Center is rolling out a series of one-hour webinars that will cover a wide range of land use planning, land cover research, natural resource protection and geospatial technology topics. Beginning in February we plan to do one webinar a month. (They're free!)

- February 8 - **Riparian Corridors**
- March 15 - **Affordable Housing**
- April 19- **Rain Gardens**

Visit the website for more information and full schedule [clear.uconn.edu](http://clear.uconn.edu).

### CTView.org

The Center, along with MAGIC (UConn's Map and Geographic Information Center) was recently successful at gaining membership to AmericaView, a nationwide program that focuses on satellite remote sensing data and technologies in support of applied research, K-16 education, workforce development and technology transfer. A new website, [ctview.org](http://ctview.org), will soon be completed to promote the access and use of remote sensing imagery in Connecticut. Currently there are 37 states participating in the AmericaView program.

### Impervious Cover TMDL

Connecticut was the first state in the nation to base a Clean Water Act "Total Maximum Daily Load" (TMDL) program not on a specific pollutant, but on impervious cover. The Impervious Cover TMDL Project, a partnership of CT DEP, CLEAR's NEMO Program, UConn and the town of Mansfield, has been working its way through this new approach, and in the process breaking new ground on the use of low impact development practices. The project has an extensive website that can be found at: [clear.uconn.edu/projects/tmdl](http://clear.uconn.edu/projects/tmdl).

## Program Updates

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and national networks. The two primary leaders of NEMO programs, Sea Grant and Extension, both piggy-backed additional meetings on the conference. Conference sessions focused on urban low impact development retrofits, local climate change adaptations, hybrid approaches to land use planning, and innovative approaches to supporting local land use officials.

Learn more about the National NEMO Network at: [nemonet.uconn.edu](http://nemonet.uconn.edu). Follow the Network on Twitter at: [twitter.com/NEMOhub](https://twitter.com/NEMOhub) and/or on Facebook, search for the National NEMO Network.

### ► The Geospatial Training Program (GTP)

CLEAR’s Geospatial Training Program has also suffered a partial loss of staff



power, but is filling up its dance card with a new national training program funded by the USDA Water Program. The training

focuses on the use of “mashups,” a combination of GIS and internet technology that allows anyone to easily post geographically-specific information via the use of web browsers such as Google Maps and Google Earth. The applications for research, outreach, monitoring and evaluation are virtually endless. As a result of the USDA grant, in

between our Connecticut trainings GTP faculty have been busy traipsing all over North America training Land Grant and Sea Grant audiences on “Mashup Madness” (see photo). For more information contact: Cary Chadwick, 860-345-5216. [cary.chadwick@uconn.edu](mailto:cary.chadwick@uconn.edu). ●



GTP’s Cary Chadwick leads a geospatial training workshop at the National NEMO Network’s 7th NEMO University conference.

## Research continued from page 1

period, the percentage change in new development appears to have occurred at a slower rate in the 100-foot corridor than the 300-foot corridor, with both being slower than the rate for the entire state (Figure 1). At the town level, the amount of development in riparian areas was less than that for the overall town, but was also seen to vary closely with the overall town average. More can be found at: [clear.uconn.edu/projects/riparian](http://clear.uconn.edu/projects/riparian).

The Agricultural Fields and Soils study looks at land cover change over areas designated by the USDA Natural Resources Conservation Service (NRCS) to have *prime or important* farmland soils (“ag soils”). The CCL project’s major land cover categories include developed land, forest, turf/grass, and agricultural fields (derived from satellite imagery).

During the 21-year study period Connecticut lost approximately 31,000 acres of agricultural field overlying ag soils. Forest was by far the most common land cover on ag soils throughout the period, but by 2006 the developed land cover category had replaced the agricultural field category as the second-most common land cover on ag soils.

Figure 2 compares the 2006 land cover

breakdown of the entire state versus that of the land overlying prime or important agricultural soils. As might be expected, important ag soil areas had more of the agricultural fields land cover category than the state as a whole. However, ag soil areas

Study Area	Percent Developed Land 1985	Percent Developed Land 2006	Change in Percent 1985-2006
100 ft corridor	12.7%	14.4%	+1.7%
300 ft corridor	14.5%	16.8%	+2.3%
state, all areas	16.0%	19.0%	+2.9%

Figure 1. Percent of developed land in 100 and 300 ft riparian corridors, compared to state.

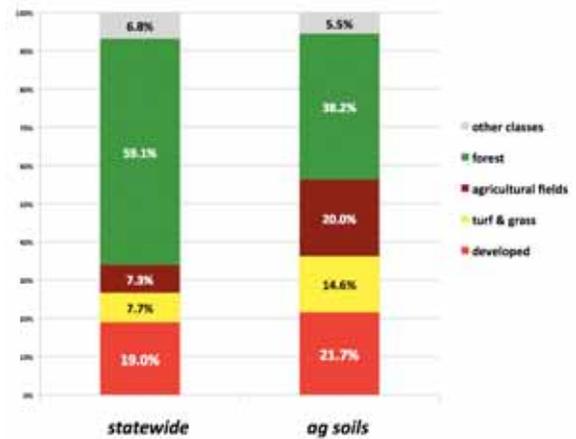


Figure 2. 2006 land cover breakdown over ag soils (right), versus entire state (left).

also had more development, more turf/grass, and less forest than the state overall. This might also be expected, since many soils well suited for agriculture, being relatively flat and well-drained, are also well-suited for development. More can be found at: [clear.uconn.edu/projects/ag](http://clear.uconn.edu/projects/ag). ●

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