Turning over a New Leaf

Municipalities use **green infrastructure** *to ease flooding and pollution.*

Nicole Reed; Groundswell: Field Reports from the Food Revolution
http://groundswellblog.wordpress.com/

NYSDEC/Karen Williamson

By Elaine Bloom and Karin Verschoor

It's happened to every camper: you've cleared your schedule, packed all the right equipment, ditched your cell phone, found the perfect campsite. Ahhhh...Paradise!

So, of course it rains. As you wrestle with your dripping tent, you notice that the leaves overhead soften the rainfall to a shower rather than a deluge. You look down: where the ground is compacted from cars and heavy use, the water is forming puddles, but everywhere else the rain is soaking gently through the deep layer of dead leaves and into the soil.

Now recall the last time you were caught in the city during a downpour. The driving rain hammered roofs and roads, then, because it couldn't soak through the pavement, it funneled furiously into storm drains, swirling with pet waste, trash and grease washed from the streets. The polluted runoff flooded streets and basements, eventually finding its way to local streams and lakes.

Cities and suburbs have spent billions on "grey infrastructure" like huge concrete holding tanks and underground drains to alleviate these flooding and pollution problems. Now, some communities are turning over a new leaf, using "green infrastructure" to solve an array of urban environmental problems. In the case of storm runoff, the aim is to handle it the way Mother Nature does: with plantings, natural landscaping and materials that allow rainwater and melting snow to filter into the ground and recharge groundwater aquifers.

In today's cities and developing suburbs, the ground's surface is largely sealed with impervious surfaces on streets, sidewalks, parking lots and rooftops, keeping water from sinking in. Asphalt and concrete are necessary on busy roadways, but not all paved areas need it. Low-traffic driveways, walkways and overflow parking areas can be converted to strong and attractive surfaces that draw rain into the soil below.

Besides absorbing rain, a rooftop garden bestows other benefits: lower heating and cooling bills, increased fire resistance, and protection from the elements...

The Albany Pine Bush Discovery Center, which has a "gold" rating from the U.S. Green Building Council, recently ripped out 750 tons of asphalt from unneeded parking lots and replaced it with native landscape beds. School buses now pull up in front of the Center on a surface of permeable paving blocks. Visitors make their way to the trailhead via a walkway of red brick pavers. These and other types of permeable paving allow water to seep into the ground.

The Center's trails and service roads, which need a firm surface for wheelchairs and trucks, are made of crushed stone mixed with limestone powder, topped with a layer of sand. This provides support for vehicles while remaining porous. Director Michael Venuti reports that the Center's green infrastructure has been very successful in reducing runoff.

It's not just roads and parking lots that contribute to runoff. Conventional rooftops shed water like a duck's back—but not the roof at the Golden

Arrow Lakeside Resort in Lake Placid. Called a "green roof," it blooms into a riot of lavender, yellow, white and pink in the summer. Roofs like this one are sponging up rain across the state: from a prison outside of Syracuse to a 6,000-square-foot commercial vegetable farm atop a Brooklyn warehouse.

The rooftop vegetation and soil capture rainwater, reducing the amount of runoff flowing from the roof. The typical green roof consists of a waterproof covering to protect the building and roof structure, followed by an absorbent material to hold water, and then topped with a layer of soil. Plants selected for a green roof need to be able to tolerate harsh rooftop conditions and shallow rooting depths.

The Golden Arrow chose hens-and-chicks, coral carpet, and herbs used in the hotel's restaurant: chives, mints and basil. "It goes along with our whole philosophy of living sustainably and gently," said Jenn Holderied, one of the hotel's owners. The resort—the only one in the U.S. to have earned the Audubon Society's "Five Leaf" environmental status—boasts a long list of green programs, starting with the roof and ending with a carpool incentive program for employees.

Besides absorbing rain, a rooftop garden offers other benefits: lower heating and cooling bills, increased fire resistance, and protection from the elements, which can extend the life of a roof up to 20 years. For Holderied, there's another benefit that can't be calculated in dollars: the educational value of this community conversation piece. "It's opened up a dialogue with guests and neighbors about finding a balance between comfort and sustainability."

Ground-level gardens are soaking up storm water and generating a buzz, too. At the Albany Shaker National Historic Site in the town of Colonie, what looks like an ordinary ornamental garden nestled in a shallow dip actually filters and absorbs runoff from nearby rooftops and a parking lot.

The runoff flows downslope into the garden, where it temporarily ponds—some of it seeping through mulch into the soil and a layer of gravel. The rest is taken up by the garden's native plants, eventually released through their leaves, and evaporates into the atmosphere. The garden is one of five installed by Albany County and its partners: Cooperative Extension Master Gardeners, the county Conservation District, the Stormwater Coalition of Albany County, and the city of Albany. "A lot of visitors are curious about our 'rain garden,'" said Starlyn D'Angelo, the site's director. "It's an opportunity to talk about land use and a 'green' lifestyle, which is wonderfully in keeping with Shaker philosophy."

It was the same way downstate when the Bronx River Alliance received part of the settlement from a pollution case to conduct a green infrastructure project. Volunteers, staff and other organizations joined in when the Alliance chose "rainwater harvesting systems"—a fancy name that includes rain barrels and cisterns.

The Alliance team installed rain barrels with a combined capacity of nearly 1,500 gallons throughout the Bronx River watershed, on sites that include a public housing site, community centers and a private residence. The systems collect and hold the rain that falls on rooftops, preventing it from adding to the torrent rushing into sewers during a storm. Most of the water is then used

Photo courtesy of Bronx River Alliance

Rain barrels, like the one being installed here, are a great way to collect rain for later use.

Susan Shafer

The green roof at the Golden Arrow Lakeside Resort in Lake Placid absorbs rain and reduces energy costs.

Going Green
to Protect Onondaga Lake

Onondaga County Executive Joanne M. Mahoney has launched an innovative green infrastructure program to protect Onondaga Lake and its tributaries that engages the community through education, grants, and new design standards for building projects from homes to highways.

Instead of building several expensive, large-capacity wastewater treatment plants, the county is developing a new storm water management system that relies on vegetated roadside basins, green roofs, tree plantings and rain gardens to infiltrate and clean polluted runoff from roads and sewer overflows. These new techniques will not only absorb and process storm water in ways that mimic nature, but will also beautify and revitalize neighborhoods throughout the City of Syracuse.

Onondaga County's nationally recognized initiative grew out of an extraordinary partnership between DEC, Onondaga County, the City of Syracuse and the Onondaga Indian Nation. As part of this effort, the County has developed "Save the Rain," a unique community-wide campaign to employ natural solutions to capturing rainfall. The campaign uses a website (**www.ongov.net/savetherain**), traditional media and neighborhood outreach to promote the use of rain barrels, roof-gutter collection cisterns, reforestation and vegetation planting in home and business properties. For example, one program for property owners offers free rain barrels to those who attend community workshops to learn about green improvements for homes.

Photo courtesy of SUNY-ESF

Green roof on Walter Hall at the SUNY ESF campus in Syracuse.

The county is also working with the City of Syracuse and other partners to incorporate green technologies in a variety of projects improving streetscapes, parking lots, sidewalks, and building roof tops to capture more storm water and improve the water quality of Onondaga Lake and its tributaries. This year the county established a green infrastructure fund to provide financial assistance to businesses and not-for-profit agencies to encourage them to incorporate green infrastructure on their properties.

"All the residents of Onondaga County can be proud that we have changed the course of the Onondaga Lake cleanup," said County Executive Mahoney, "and now have a tremendous opportunity to combine lake protection with neighborhood restoration—a great solution for our community."

www.ongov.net/savetherain

Photo courtesy of NRCS

A rain garden can help absorb rainwater that would otherwise run into storm drains.

to irrigate gardens on the sites, reducing the demand on the city water supply and lowering water bills.

The public is intrigued with the rain barrels, reports the Alliance's executive director, Linda Cox. One of the Alliance's goals for the project is to "prime the pump," as Cox likes to say, sharing the concept and simple technology with others. In the heavily developed Bronx, a few rain barrels don't make that much difference, but Cox envisions an eventual neighborhood full of rain barrels and other green infrastructure. It will take a community-wide effort and incentives for property owners to install rain barrels, rain gardens, and other innovative ways to capture runoff before it goes to waste down the drain, she says.

Far to the north and west, the city of Syracuse is becoming a center for green infrastructure research and development (see page 11). The impetus is Onondaga Lake, a 3,000-acre waterbody just outside the city limits. Once known as the most polluted lake in the nation, the city has made tremendous progress addressing both toxic waste beds in the lake and polluted overflows from the city's combined storm and wastewater systems. Green infrastructure is an important part of the community's solution.

The city is using a DEC urban forestry grant to plant more trees and train professionals to install green infrastructure. The city also boasts multiple examples of all varieties of green infrastructure, as does the campus of the State University of New York College of Environmental Science and Forestry. The college offers an extensive curriculum on green infrastructure.

Experts caution that these human-built slices of nature work best in conjunction with the real deal: natural green infrastructure. So, right alongside the effort to imitate nature, proponents push for development that preserves existing forests, wetlands, parks and streamside greenbelts within our communities.

Green infrastructure is taking root across New York State. The payoff will be better flood control, plentiful groundwater, cleaner water and air, and cooler urban settings. Can we have it all? Green infrastructure advocates say yes. All we have to do—to co-opt a classic Joni Mitchell song—is unpave paradise and "green up" the parking lot.

Elaine Bloom is a contributing editor to *Conservationist*. **Karin Verschoor** works for DEC's Division of Lands and Forests.

Greening Your Home

Since many green solutions are comparatively low-tech and inexpensive, you can have the satisfaction of making your own individual contribution to green infrastructure in your community.

- **Catch that rain and use it to water your garden!** Rain barrels are widely available and easy to hook up.
- **Stop the runoff!** Many attractive porous pavement alternatives work as well as conventional pavement on home driveways and walks, yet let rainwater soak gently into the ground instead of flooding off the surface.
- **Green your home with plants!** Shading walls with a vine-covered trellis keeps buildings cool and adds beauty. Use wall trellises for climbing vegetables, or try modular green wall panels for salad greens. For a green roof, consult a licensed engineer or architect.
- **Send that rain underground!** Instead of letting the water run into the storm drain, divert it to a low area so it can slowly sink into the soil. Build a rain garden underlain by gravel to rapidly absorb water, and plant moisture loving plants that take up water quickly. Or, direct your downspout to a mini-rain garden in a planter. Placing it on the lawn or soil will ensure any water not taken up by the plants is absorbed into the ground.

For more information about green infrastructure explore DEC's website at **www.dec.ny.gov**