STRATEGY *for a* GREEN CITY

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THE PENNSYLVANIA HORTICULTURAL SOCIETY

When it Rains, it Pours

There's nothing like a good summer thunderstorm. The air cools, the sky darkens, and the wind seems to come out of nowhere; then the thunder cracks and people run for cover as the rain rushes down. It's one of nature's big-ticket shows. But in urban areas, especially older cities with aging infrastructure, including Philadelphia, water from heavy rain storms can wreak havoc. Often, stormwater overwhelms the city's sewer systems, and the combined overflow of stormwater, waste, and creek water causes localized flooding or ends up as pollution in our waterways. In fact, *nonpoint source pollution* (precipitation that picks up contaminants from roads, parking lots, and other surfaces) is now considered the primary source of water pollution in many parts of the United States.

In Philadelphia, the Pennsylvania Horticultural Society's Philadelphia Green program has joined forces with the Philadelphia Water Department to minimize stormwater runoff through "Low Impact Development" or LID, an innovative approach that seeks to detain, filter, and infiltrate runoff by mimicking natural processes. By relying more on landscaping than on infrastructure, this approach works hand-in-hand with efforts to create and enhance open space in urban neighborhoods.

Understanding the Importance of Stormwater Runoff

Before & After:
A clean and green vacant lot at 2300 North 3rd Street. The lot has been re-graded to catch rainwater, and newly planted trees and shrubs take up additional water.

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"During heavy rains, the amount of stormwater flow can exceed the capacity that a sewer can carry or that the treatment plant can clean up. When that happens, those large flows are diverted...into the rivers or streams." — Glen Abrams, urban watersheds planner with the Philadelphia Water Department

The Good News (and the Not-So-Good News)

With the creation of the federal Environmental Protection Agency and the passage of the Clean Water Act in the early 1970s, laws banning the discharge of industrial wastes and municipal sewage have resulted in dramatic improvements in water quality and the return of aquatic life to many American rivers and streams. With the obvious pollution sources under control, federal and state regulations now focus on less visible sources, including stormwater runoff.

Many urban sewage systems are ill-equipped to deal with vast amounts of this runoff. Older areas of Philadelphia are served by *combined sewers*, which collect sewage and stormwater in the same pipe—a system that often cannot handle high storm flows. According to Glen Abrams, urban watersheds planner with the Philadelphia Water Department (PWD), "During heavy rains the amount of flow can exceed the capacity that a sewer can carry or that the treatment plant can clean up. When that happens, those large flows are diverted out of the system and into the rivers or streams." This phenomenon is known as a *combined sewer overflow*. In the Philadelphia system, there are about 200 locations where these overflows occur with varying frequencies, polluting the city's rivers and streams with significant amounts of bacteria and other contaminants.

Along with many other cities, Philadelphia is now under state and federal mandate to minimize the number of overflows and mitigate their effects. In response, the city has passed new regulations for developers and property owners that include specific criteria for water quality, stream protection, and flood control.

Newer parts of the city are served by separate sewers carrying stormwater and sewage in different pipes. The stormwater pipes lead to the nearest waterway; the sewage flows to treatment plants. It sounds like a good solution, but this approach is also fraught with complications. "The problem here is that as stormwater runs over rooftops, parking lots, roadways, and even across land, it picks up pollutants like motor oil, pesticides, fertilizers, trash, and other wastes," Abrams says.

What can be done? Simply put, the key to controlling stormwater pollution is to keep as much runoff as possible out of the sewers. Many cities are turning to costly infrastructure like large pipes and underground storage tanks that detain the flow and then slowly release it to treatment plants.

An Alternative Solution

In Fall 2003, PHS's Philadelphia Green program began a partnership with the Water Department's Office of Watersheds to develop models for stormwater management using five plots of vacant land in North Philadelphia. With funds from the PA Department of Environmental Protection's Growing Greener program, the sites were re-graded and fitted with "green infrastructure"—shallow trenches and berms that harness rainfall on the site where it is slowly absorbed back into the ground over a 24- to 36-hour period. Trees, shrubs, and plants installed on the sites take up additional water and release it back to the atmosphere.

Says Abrams: "We hope to create a whole series of 'natural sponges' in the city that reconnect the urban land to the natural water cycle. What we've lost is a critical part of that cycle—infiltration, the water soaking down and recharging the groundwater."

"This new partnership offers important and innovative prototypes for watershed protection by demonstrating how urban community spaces can be designed to help manage stormwater," says Howard Neukrug, director of the Office of Watersheds at the Water Department.

Maitreyi Roy, a Philadelphia Green director, adds that the collaboration has been "a perfect fit" for both organizations. "The Water Department brings its technical, engineering know-how to the project, while Philadelphia Green offers expertise in greening and landscaping, as well as education initiatives and community organizing experience," she says.

Community Involvement

As in recycling, the combined effects of these stormwater projects can have a cumulative impact, which will ultimately lessen the burden on our sewer system, and residents need to understand how these sites can play an important environmental role. The strong relationship between PHS and the local community is crucial to this education process and to the long-term effectiveness of this approach.

"For us, it's not only about implementation," says Roy. "For these projects to succeed, we need a holistic approach that integrates each site into the life of the community." She notes that several sites have been quickly adopted by neighborhood residents, who use the newly created green spaces for ball playing and social gatherings. Going forward, some of these open spaces will become permanent community resources and, as such, should be incorporated into long-term plans for redevelopment of these neighborhoods.

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Top: **Trenches and berms harness rainfall on the sites, where it is slowly absorbed back into the ground over a 24- to 36-hour period.**

Bottom: **PHS staff members measure the infiltration rate on a vacant land site.**

RESOURCES:

For more information on Low Impact Development (LID), please visit *www.lid-stormwater.net*.

For information on Philadelphia stormwater regulations, visit *www.phillyriver.org*.

To read a summary of the Wharton School report on greening and property values, see *Strategy for a Green City, Summer 2005*, or visit *www.pennsylvaniahorticulturalsociety.org/phlgreen/seeinggreen.htm*.

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More than Just Water

Unlike pipes and storage tanks, green infrastructure brings with it, as an added benefit, all the positive effects of greening, including cleaner air, improved aesthetics, higher property values, reduction of the "heat-island" effect of large cities, habitat for small wildlife species, and a better quality of life.

There is a growing effort to quantify the value of these environmental benefits by documenting their impact on health care costs, violence, energy usage, and other factors. In a recent study by the Wharton School of the University of Pennsylvania, for example, Professor Susan M. Wachter showed that greening vacant land increases nearby property values by as much as 30 percent.

A Natural Solution

In some ways, constructing large underground storage tanks seems like the simplest solution to the stormwater runoff problem. One such tank, after all, might hold as much runoff as 1,000 vacant-lot sites. And, as long as it works, a large tank is a solution that the average person never has to think about. Like the sewer system itself, the tank is out of sight, out of mind.

But in the end, the invisibility of such infrastructure is at the crux of the problem. Most people don't know where their water comes from or where it goes. We turn the spigot and water comes out of the tap, but this is only the end of a long process that begins with those awesome summer thunderstorms. Using the landscape as part of the solution to the stormwater problem is a small beginning in repairing this rift with our environment, helping to reveal one part of a natural cycle that, whether we realize it or not, is the basis of life on earth.

Adapted from an article by Adam Levine that appeared in *Green Scene* (August 2005). Levine is an environmental historian whose specialty is urban sewer and stormwater drainage systems, as well as a garden writer whose books include *The Philadelphia Flower Show: Celebrating 175 Years*. His work can be viewed at his website, *www.phillyh2o.org*.

For more information, visit: ***www.pennsylvaniahorticulturalsociety.org*** and click on "Philadelphia Green."

The Pennsylvania Horticultural Society (PHS) is a not-for-profit membership organization founded in 1827. PHS produces the **Philadelphia Flower Show** and sponsors events, activities and publications for novice gardeners, experienced horticulturists, and flower lovers of all ages.

PHS's urban greening program, **Philadelphia Green,** works with community groups and residents in neighborhoods throughout the city to plan and implement greening projects. Philadelphia Green also partners with private and public organizations to landscape and maintain public spaces in the city's downtown. Proceeds from the Flower Show, along with funding from foundations, corporations, and government agencies, help to support its projects.

JANE CARROLL, EDITOR