

Sensible Water Strategies

By Ellen Shubart

"Water? That's not a problem. We live on the Great Lakes." Despite the region's seemingly unlimited availability of water highly visible Lake Michigan, rivers and streams, the Midwest faces severe water problems. There is flooding, deteriorating quality of its streams and rivers, depletion of underground water resources, and potential drinking water shortages — as well as the need for land to accommodate new housing and economic development. This ideas@work deals with the dual challenges of maintaining northeastern Illinois' water quality and quantity, and offers recommendations for action by residents, businesses and governments.

Water Conservation Challenges

Before European settlement in northeastern Illinois, the region was approximately 65 percent prairie, with pockets of forest and woodlands, and large marshes where water covered the land most of the year. Today, original vegetation is found only rarely, and the pristine water quality of the rivers and streams is declining or gone. While a significant portion of this natural landscape was lost to agriculture, changes continue to occur not solely from increasing populations, but from the patterns of growth that accompany them. Unplanned development is the largest



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Conservation developments are increasingly planning development around and limiting disturbances to precious water resources.

and fastest growing source of pollution of the area's water system. In contrast, well-thought-out patterns of development and land use can accommodate the metropolitan region's expected population increase, maintain the open space necessary for stormwater drainage and groundwater recharge, and aid in the reduction of water pollution in our streams and rivers.

The metropolitan area's

ideas@work is a series developed by the Campaign for Sensible Growth to showcase innovative solutions and best practices, particularly at the local level. The series covers issues such as:

- fostering transportation alternatives
- incentive packages for housing development
- innovative zoning strategies for sustainability

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For more information on ideas@work, see www.growingsensibly.org

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Rainwater gardens can be a simple solution to help control stormwater runoff and filter out pollutants.

surface water resources include Lake Michigan, inland lakes and waterways, and both deep and shallow aquifer systems. All these water resources depend upon rain and stormwater to be replenished, but impervious surfaces such as roofs, driveways, streets, and parking lots prevent water from being absorbed into the ground. That diminishes the recharge of aquifers and sends stormwater into streams and rivers without being filtered through the ground, which would slow the flow and remove pollutants.

Nonpoint source pollution such as urban stormwater runoff and erosion from construction sites, together with agricultural runoff, are the major sources of water quality impairment. Runoff from agricultural lands traditionally has been one of the largest causes of nonpoint source pollution in Illinois and continues to be a concern in rural watersheds. However, farmers are increasingly adopting environmentally friendly practices such as the installation of buffer strips along waterways, reduction of fertilizer, pesticide and herbicide application, no-till practices, and enrollment in programs such as the Conservation Reserve Program, all of which help to protect stream health.

Today almost 40 percent of Illinois' rivers and streams and 60 percent of the state's lakes suffer from "fair" or "poor" water quality. At the same time, greater demand is leading to supply shortages. Potential water shortages already have been identified in townships in each of the five collar counties of the Chicago metropolitan region.¹ A comprehensive approach to protecting the region's water supply will involve changes in land-use practices, as well as other

conservation strategies that can be applied at the neighborhood, municipal and regional level. While farmers work on specific rural-oriented methods to stem runoff and reduce pollution, in urban areas residents, corporations and governmental entities all have a stake in making those strategies work.

Solutions: Actions for Residents at Home

Water conservation is not solely an issue for governments. Simple steps taken by residents at home can make a difference in the region's water quality and quantity.

Natural landscaping

Native plants provide habitat for a variety of native wildlife species, and promote stormwater infiltration and aquifer recharge.² Native plants provide a hardy, drought-resistant, low-maintenance landscape. Once established, native plants save time and money by eliminating or significantly reducing the need for fertilizers, pesticides, watering, and lawn maintenance. The typical turf grass lawn requires significant amounts of water and costly maintenance to thrive. The deep root systems of many native midwestern plants increase the soil's capacity to store water, which minimizes flooding and water runoff. The Naperville-based Conservation Foundation's *Conservation@Home* program encourages homeowners to turn their backyards into native sanctuaries through natural landscaping, and certifies landscapes that incorporate native plantings.

Reduction of overwatering

Average residential water consumption in the U.S. can be decreased dramatically with the reduction of typical overwatering of lawns and landscapes. Reducing watering by as much as 50 percent (which itself can account for 50 percent of total household water use in some states) not only saves water and yields lower water bills,³ it also produces healthier lawns.

Rainwater gardens and rain barrels

Rain gardens are shallow, wet areas in a yard that are planted with native plants and wildflowers that flourish with "wet feet." These shallow areas can be natural or dug out, and water can come from natural drainage,

downspouts or sump pumps. Rainwater gardens retain, detain and infiltrate stormwater runoff from individual lots and roofs. They need no watering, fertilizers or chemicals. Rain barrels, or vessels used to capture and temporarily store rainwater for various uses including landscape irrigation, are increasing in popularity. Some cities are encouraging developers and residents to put rain barrels under gutter downspouts, plant water-retaining rain gardens, and landscape parking lots to hold precipitation on site. Near Boston, the Charles River Watershed Association has designed a "SmartStorm" device for retrofitting homes with backyard tanks that can store 400 gallons of rainwater from gutters and filter out debris and contaminants. Some of that water is used to water lawns, while the rest is released to infiltrate into the ground.

Vegetated swales and bioswales

Vegetated swales are depressions planted with native vegetation or grasses designed to filter, retain and evaporate stormwater, primarily through their lengthy root systems. Vegetation enhances the filtration, cooling and cleansing of water to improve water quality. Bioswales typically include an infiltration trench below the vegetated swale to provide temporary storage to increase the volume of runoff water infiltration.

Solutions: Actions for Businesses, Commercial and Industrial Enterprises

Native landscaping

Natural landscaping is a viable option on any land that is not required to bear intense pedestrian or vehicular traffic. New development projects are prime for installation of natural landscaping at the site-design stage. Decreased costs for long-term maintenance heighten the incentives for this type of landscaping. At Prairie Stone, Sears Roebuck and Co.'s Hoffman Estates corporate headquarters, the company incorporated native plants into the main features of the 780-acre property for ornamental as well as functional reasons. Campaign for Sensible Growth Steering Committee member Openlands Project operates The Corporatelands Program, which helps corporations and large institutions design more cost-effective and environmentally friendly landscapes. Native plants, once established, save time and money by eliminating or significantly reducing the need for fertilizers, pesticides,



MILDA GRIGATE

A Chicago "green" home uses a grass crete on the ground level patio and driveway. Permeable pavers allow rainwater to naturally filter, rather than run off into storm sewers.

water, and lawn maintenance equipment — and provide businesses an environmentally friendly image within their local communities.

Green roofs

Rooftops can comprise as much as 35 percent of the total area of a village or city. Vegetated roof systems — or "green roofs" — capture, temporarily store, and aid in the evaporation of rainwater on rooftops. Green roofs are planted with drought- and wind-tolerant vegetation. They incorporate plants and soil into roof designs at a cost of between \$8 and \$15 per square foot, and can provide three advantages: lower roof temperatures, reduced cooling costs and lower urban temperatures in summer, and retention of 10 to 70 percent of stormwater. Two types of green roofs exist. Eco-roofs, with one to five inches of soil that are planted with shallow root systems, provide easy maintenance and absorb some stormwater. Roof gardens, with six to 12 inches of soil and 80 to 150 pounds per square foot, accommodate deeper-rooted plants, shrubs and trees. These require greater maintenance, but absorb more rainwater. Green plantings also extend the life of the roof by protecting it from weathering.

Porous/pervious pavements

Increasing the permeability of surfaces such as parking lots by using alternative paving materials is another way to reduce stormwater runoff. Permeable pavers, with spaces that allow for the infiltration of rainwater and the transmission of water through the surface into the ground, help cleanse and infiltrate stormwater and reduce runoff volume.

Solutions: Actions for Municipalities and Counties

Good planning includes long-term water conservation and accommodations for the protection of water quality, prevention of flooding, and the protection, use and

enhancement of water resources. The flooding of the Des Plaines River in the spring of 2004 illustrated the need for better planning: plans for water storage in the area had been put on hold for years, and building in the floodplain in some areas had not been limited.

Local appointed and elected officials can lead by

Case Study

Rain to Recreation in Lenexa, Kansas

Children fish; families boat; residents stroll. One shining example of an innovative way to avoid sending polluted stormwater runoff into local streams and reduce flooding is a premiere recreation facility in Lenexa, Kan. The community's Rain to Recreation project is creating a 35-acre lake in the southwest of town, with 240 acres of parkland that includes preserved woodland, streamways, and three constructed wetlands. Three miles of trails connect the lake to surrounding neighborhoods.

The project is the result of Vision 2020, when the community identified objectives of balancing natural and man-made environments and preserving key natural features, while promoting quality growth and development. The earth moving began in January 2004 and recreational amenities are set to open in

2005. Its slogan is "Lenexa Cares About Clean Water." The project has three major goals: reduce flooding, improve water quality, and provide recreation and education.

The City of Lenexa's Watershed Management Program operates under policies adopted by the city council May 1, 2001, including:

1. promoting the coexistence of the natural environment and quality planned development;
2. recognizing that streams and stream ecosystems are valuable assets;
3. recognizing that effective stormwater management is best achieved through inter-local cooperation in the development of watershed strategies;
4. identifying limits of municipal responsibility in stormwater management;
5. demonstrating good management practices in all municipal functions;
6. encouraging its citizens and business community to be involved in the protection of water quality and natural stream systems; and
7. recognizing that stormwater management practices in developed areas may vary from those in undeveloped areas. In developed areas, stormwater practices should be geared to protect existing public and private investment, with consideration given to enhancing water quality, conserving the natural environment, and reducing drainage system deficiencies.

What has been produced is a massive recreation site, with a pedestrian footway over the dam and spillway. Streams in the area have been restored using natural approaches to stabilizing banks and renewing the streams' biological functions. Trails meander through the forest, wetlands and park; the lake will be used for fishing and boating. Adults and children will ride bike trails throughout the area – and, of course, the entire region gains from better water quality.

For more information: Watershed Manager, City of Lenexa, Kansas, 12350 87th Parkway, Lenexa, Kan. 66285; 913-477-7680.

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example. Protecting or installing natural landscapes on new and existing public sites is an excellent way to promote the use of native landscaping. Green roofs on city halls save money and illustrate sound conservation practices. The Village of Matteson has used these methods for two of its public buildings, the village hall and police department. The Naperville Park District is also "going green," with a vegetated roof, cisterns to collect rainwater, recycled building materials, and drought-tolerant plantings for the district's future south maintenance facility. The estimated \$4.5 million south maintenance hub is slated for completion in spring 2006 and includes such environmentally friendly features as bike racks and showers to encourage

employees to ride to work, energy-efficient insulation, stormwater management features, and windows designed to maximize natural light inside the building.

Native landscaping

Some municipalities have "weed laws" to prevent unsightly or poorly maintained property. Fortunately, many municipalities are responding to the current trend toward natural plantings, and residents have learned to appreciate the aesthetics of prairie flowers and native grasses. Some communities have modified their weed laws to allow natural landscaping; some also require a "setback" or buffer strip to make the landscape look

Biodiversity Recovery Plans: Chicago Wilderness and the Village of Schaumburg

In 1999, Chicago Wilderness, a coalition of 150 organizations interested in the restoration and preservation of the region's natural areas and resources, issued its "Biodiversity Recovery Plan."

The 195-page plan presented specific recommendations to local municipalities to restore and protect the flora, fauna, air, and water of the region. Among the recommendations: create a comprehensive plan; identify land with high conservation value; adopt restoration and management alternatives; and implement best management practices for stormwater management.

In 1996, the Village of Schaumburg, Ill., completed its comprehensive plan, which emphasizes the importance of preserving natural areas. To complement and augment its plan, in April 2004, the Village adopted its own Biodiversity Recovery Plan (prepared by Applied Ecological Services, Inc.) that provides specific guidance on maintaining, restoring and preserving the integrity of open space, and a framework for implementing the objectives of Chicago Wilderness' plan within Schaumburg. It is the first village in the six-county region to adopt such a plan, and village officials hope it will serve as a model to other communities.

Under the Schaumburg plan, the community will conduct a detailed inventory of ecological areas and open space, looking for connectivity and

conservation development opportunities. It also will target specific high priority sites to make recommendations for site acquisition. Restoration and management of village-owned land is also a component of the plan. The Village will address residential and corporate applications of biodiversity, creating manuals on native landscaping. And, a wholesale rewrite of village codes and ordinances that impact biodiversity will be undertaken to make them compatible with the Chicago Wilderness Biodiversity Recovery Plan. Among those to be reviewed: a wetland protection overlay district; landscaping and screening; protection of existing trees, landscaping, parkway grading, and erosion control; and weeds/nuisance. Aquatic areas – the four streams and six open water and wetland habitats in the village – were rated for water quality and habitat, and degree of modification (change over time).

These steps are only the beginning. Goals for water and wetland restoration include reduction in reed canary grass and cattail coverage in wetlands, and improvement of the water quality entering the lakes, ponds and streams through stormwater management. But the village is far ahead of others, having already completed a species and water quality inventory and beginning to work on code and ordinance review.

Contacts: Chicago Wilderness, Catherine Bendowitz, Chicago Wilderness Program Administrator, 312.580.2137, cbendowitz@chicagowilderness.org; Village of Schaumburg, Planning Department, 101 Schaumburg Court, Schaumburg, Ill. 60193; Applied Ecological Services, Inc., 120 W. Main Street, West Dundee, Ill. 60118, www.appliedeco.com.

Definitions:

Aquifer

Underground layer of rock, sediment or soil that is filled or saturated with water, usually in large quantities.

Ground water

A technical term for supply of fresh water found beneath the surface of the earth, usually in aquifers that supply wells and springs.

Impervious

Quality or state of being impermeable; resisting penetration by water or plants roots, e.g. concrete and asphalt roads, that affect the quantity and quality of runoff.

Nonpoint source pollution

Primarily polluted stormwater runoff from roofs, parking lots, roads, farm fields, and lawns that runs into rivers and streams.

Recharge

Increase in groundwater storage from precipitation, infiltration from streams, or human activity (artificial recharge).

Runoff

Surface water entering rivers, lakes or reservoirs.

Surface water

All water on the earth's surface.

Watershed

Lands above a given point on a waterway that contribute to water runoff.¹²

planned. Wheaton-Warrenville South High School in Wheaton, Ill., incorporated native landscaping, planting 2.5 acres of prairie. The school's goals include reducing maintenance on unused lawn areas and time demands on limited staff, improving aesthetics, restoring native habitats, and creating a living laboratory for hands-on environmental education.

Green infrastructure

Green infrastructure is the interconnected network of open space, woodlands, wildlife habitat, parks, and natural features that supports native species, maintains natural and ecological processes, sustains air and water resources, and contributes to the health and quality of life of people and communities. Green infrastructure provides the strategic framework for both conservation and development. The designation of linear open spaces and/or natural areas as greenways is an aesthetically pleasing way to preserve significant natural features, accommodate recreational and/or alternative transportation uses, and provide for a community's green infrastructure. As communities grow, existing "hard" infrastructure (pipes, disposal systems or roadways) ages and requires repair or replacement, affording opportunities to consider green infrastructure alternatives. If existing pipes no longer can handle high runoff volumes, the use of a vegetated surface drain system can be installed to handle excess flow.⁴ Native trees, shrubs, grasses, and wildflowers, rather than concrete, allow stormwater to be retained on-site. In addition to greater

flexibility for managing stormwater, these techniques can increase property values adjacent to urban river stretches and open space.

Incorporating trees into development

Using trees in new developments conserves water. Trees

intercept rainfall and reduce stormwater runoff. In one study, a 32-foot tall tree reduced stormwater runoff, or absorbed, 327 gallons per year.⁵ Trees act as a cleansing agent against nonpoint source pollution. While sod and other ground cover hold only topsoil in place, tree roots penetrate deeply and spread out, anchoring large blocks of soil. Densely planted trees and shrubs can do additional duty by keeping bikes, foot traffic, and motor vehicles off slopes and fragile soils prone to wind and water erosion. Geneva, Ill., in April 2004, passed a tree protection ordinance for trees with 10-inch or larger diameter on or near residents' properties. Many other communities in the region have similar ordinances, frequently also requiring new plantings to replace trees removed in the development process.

Conservation design for new development

Locally accessible open space makes a community an attractive location for existing and potential residents and raises property values. Studies are finding that Americans prefer a diversity of neighborhood types and a wide array of housing choices, including condominiums, duplexes or townhomes, and single-family detached housing.⁶ The desire for open space and diversity of housing choices points to compact building design — also called cluster design or conservation design — placing buildings compactly, leaving large areas of shared open space. This type of design significantly increases water quality, as it reduces the amount of impermeable surface and creates green infrastructure to absorb stormwater. In four regional conservation design locations — Coffee Creek in Chesterton, Ind.; Mill Creek in Kane County; Prairie Crossing in Grayslake, Ill.; and Tryon Farm in Michigan City, Ind. — available open space also is used for on-site detention, sedimentation control, and wastewater cleansing. New developments now under construction in Green Garden Township in Will County, Bull Valley in McHenry County, and West Dundee in Kane County, are all incorporating these principles.⁷ Preserving open space can help protect drinking water resources by filtering out contaminants and chemical pollutants before they enter the community's water system. Developers benefit as well. Maryland-based Low Impact Development Center calculates innovative designs can cut development costs 25 to 30 percent because builders spend less money clearing trees, grading slopes, laying pipes, and paving streets and parking lots.

Overlay districts/zones

Failing to act against nonpoint source pollution — primarily stormwater runoff from roofs, parking lots, roads, farm fields, and lawns — will consign lake and stream waters that are healthy today to severe and irreversible declines in coming decades.⁸ Conventional zoning, which divides a municipality into districts and establishes uses and dimensional regulations for each district, can contribute to the problem of nonpoint pollution by ignoring the impacts of nearby development on water bodies. Rather than conventional zoning, communities should consider a water protection overlay zone, a special zoning district designed to protect a stream corridor, lake or watershed. Overlay districts add additional requirements to the underlying district zoning. By creating a system of overlay zones that cross conventional zoning districts, communities can protect stream corridors, lakeshores and watersheds, thereby reducing the runoff of sediment and other pollutants into them. To enhance water quality, overlay districts also can be used to prohibit certain uses within an aquifer recharge area, such as waste disposal, animal feedlots, and road salt storage that could adversely affect the underground water.

Limiting impervious surface coverage, using buffers and setbacks

One of the main factors affecting water quality is the total percentage of land covered with impervious surfaces — buildings, pavement, and highly compacted soil. When more than 10 percent of the acreage of a watershed is covered in roads, parking lots, roof tops, and other impervious surfaces, the rivers and streams within those watersheds become degraded.⁹ Limits on impervious lot coverage can be adopted for any zoning district, and overlay zones may set an even lower level of coverage in specific areas. Reducing impervious surfaces can be done in a number of ways, including the clustering of lots in residential developments, reducing house setbacks to shorten the length of driveways, narrowing streets, creating shared parking facilities in commercial areas, and designing roads, walkways and trails for multiple uses as an integrated system. Bigelow Homes' HomeTown Aurora subdivision keeps houses close to sidewalks, reducing the impervious surface cover. Other zoning options include buffers and setbacks to restrict paving or building, or practices such as restrictions on mowing, grading, excavation, and the use of fertilizer and pesticides within specified distances of streams and rivers.

Solutions: Actions for the Region to Develop and Implement Watershed Management Plans

Geographical information systems (GIS) and satellite images are invaluable tools for inventorying and evaluating watersheds in order to make sound land use decisions. While individual municipalities and even some counties may not have the resources to take advantage of these new technologies, regional planning commissions and cooperative arrangements among communities can make these tools available. For the region to make progress on a water resources protection strategy, communities must take a series of steps:

- identify watersheds that are less than 10 percent impervious and maintain the most valuable of those in an undeveloped state;
- institute on-site stormwater practices, buffers, new paving techniques, reduced automobile dependency, and other reforms at the municipal or site levels in more developed watersheds;
- determine the best locations for new development and the locations in which development should be minimized; and
- develop incentives and adopt policies to carry out those plans.¹⁰ Watershed planning is key to working across municipal and county boundaries (see *ideas@work*, *Watershed Planning for Sustainable Communities*).

Following back-to-back floods in 1986 and 1987, the Illinois General Assembly granted special floodplain management powers to the five collar counties around Chicago — Lake, Kane, McHenry, DuPage and Will. Thus far, Lake, Kane and DuPage have adopted ordinances to establish Stormwater Management Commissions to coordinate stormwater protection activities; Will and McHenry are scheduled to follow soon. These agencies provide technical assistance to coordinate flood damage reduction, flood hazard mitigation, water quality enhancements, and natural resource protection. Strict county floodplain standards, where they exist, supercede any less-restrictive federal and state standards and should be encouraged.

Outside of the six-county region, soil and water conservation districts work to conserve land, water, forests, wildlife, and related natural resources. Their

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sources — public and private, local, state and federal — in an effort to develop locally driven solutions to natural resource concerns. Conservation districts help:

- implement farm conservation practices to keep soil in the fields and out of waterways;
- conserve and restore wetlands, protect groundwater resources, and plant trees and other land cover to hold soil in place, clean the air, provide cover for wildlife, and beautify neighborhoods; and
- help developers and homeowners manage the land in an environmentally sensitive manner.

Water systems today are far better understood than in the past. Water's use is complicated, linked as we are by physical infrastructure systems and an increasing regional economic interdependency. New water supplies are limited, and Midwesterners, like Americans in general, are profligate water consumers." The role of protecting our waterways and water supply belongs to everyone — homeowners, businesses and communities. Understanding the linkages between the causes and effects of impaired water quality and declining quantity is important for those making land use decisions — local elected and appointed officials. The public also needs to become more aware of the issues and how they can help.

Protecting the region's water quality and quantity enhances our communities by providing desirable amenities, including drinking water, economic expansion, recreational facilities, and increased property values. Each constituency must play its part in developing practices and policies that encourage water conservation and discourage conventional actions that have resulted in the decline of our lakes and streams. Failing to act condemns our rivers and streams; acting sensibly will lead to development that not only accommodates our growing population, but also provides the necessary safeguards for our precious water supply.

Endnotes

- 1 Grafton and Algonquin townships in McHenry County; Rutland, Dundee, St. Charles, Geneva and Batavia townships in Kane County; Hanover and Rich townships in Cook County; Naperville Township in DuPage County; and DuPage and Joliet townships in Will County.
- 2 U.S. Environmental Protection Agency, "Landscaping with Native Plants," Chicago: USEPA Region 5, March 2002
- 3 David Stauffer, "Emerging Water Shortages are No Mirage," *Planning Commissioners Journal*, No. 54, Spring 2004, p. 4
- 4 Philadelphia is spending \$54 million to correct combined sewer overflows, much of it on treatment improvements. The city also is using state grants to promote innovative landscaping to keep precipitation from ever reaching sewer grates. Tom Arrandale, "Making the Most of a Rainy Day," *Governing*, Dec. 2003, p. 56
- 5 U.S. Department of Agriculture Agroforestry Center, "Working Trees for Communities," Lincoln, Neb., 1995, p. 2
- 6 Smart Growth Network, "Getting to Smart Growth II: 100 More Policies for Implementation," Washington, D.C.: 2004, p. 11
- 7 Woodstock, Ill.: The Sanctuary at Bull Valley, Jack Porter, developer; Green Garden Township, Will County, Ill.: Canterbury Lakes, James Paul, Alps Development, developer; West Dundee, Ill.: Carrington Valleys and Timbers, Pulte Homes, developer.
- 8 Dana Beach, "Water and Smart Growth: The Impacts of Sprawl on Aquatic Ecosystems," *Funders' Network for Smart Growth and Livable Communities*, No. 14, 2004, p. 2
- 9 Beach, *Funders' Network*, p. 6
- 10 Beach, *Funders' Network*, p. 10
- 11 David Stauffer, "Energy Water Shortages are No Mirage," *Planning Commissioners Journal*, No. 54, Spring 2004, p. 2. The World Health Organization reports that people in rich countries use 10 times as much water per capita as people in poor counties.
- 12 Stauffer, *Planning Commissioners Journal*, p. 2



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