

A photograph of a stream with vibrant autumn reflections on the water surface and rocks in the foreground. The water is dark blue with bright orange and yellow reflections. The foreground shows dark, wet rocks and fallen autumn leaves.

GREATER MILWAUKEE WATER QUALITY CONNECTIONS



INTRODUCTION

The waters of Southeastern Wisconsin have always been among its most important and cherished assets. Long before the first pioneers came, Native Americans depended on the abundant game in the watershed for food and trading. These early inhabitants gave the area the name “Milwaukee” which means “Gathering Place by the Waters.”

The first European immigrants were fur traders who recognized the strategic advantage of a fur trading post on the shores of Lake Michigan. As Milwaukee grew, so did the importance of water resources. The port of Milwaukee grew to be the largest in the state, helping the “Gathering Place by the Waters” become Wisconsin’s largest city. Breweries became famous partly due to the purity of the water supply. Upstream communities flourished within the basin, damming rivers for power.

The fast growth took its toll on our water resources. The once pristine streams and lakes were choked with waste that alarmed residents. In 1972, public indignation turned into action when Congress responded to their concerns about water pollution with the passage of the Clean Water Act, which promised to make waters “fishable and swimmable” by 1983.

More than 30 years have passed since the adoption of the Clean Water Act. We have made great progress, but still fall short of the goal of “fishable and swimmable” waters. Flooding, non-point pollution, and sewer overflows continue to degrade water quality. We now know that stopping factories from discharging waste into the rivers and upgrading sewage treatment facilities were only the first steps.

Land use also impacts water quality. The way we develop the land transforms natural landscapes into vast mosaics of roads, driveways, and parking lots. Natural areas that absorb rainfall and snow melt are lost to these paved surfaces. Stormwater runoff from urban and agricultural lands has been identified as the leading source of non-point pollution. Pollutants carried by stormwater from urban and agricultural land-use include: nutrients, heavy metals, bacteria, sediment, pesticides, and other toxic chemicals.

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GREATER MILWAUKEE WATERSHEDS

Pipes, channels, and ditches installed to prevent localized flooding inadvertently add to the problem by increasing peak flow of the receiving streams and rivers, transporting non-point pollutants and impairing the natural functions of our watersheds.

Many older neighborhoods with combined stormwater and wastewater sewer systems also add to the problem by increasing overflows during extreme weather events. Untreated, highly polluted stormwater bypasses treatment facilities and enters directly into our rivers and streams.

Today, we have a much better understanding of how our activities on the land affect our waters. We can fix many of our past mistakes. We can also do a better job of managing water that runs off parking lots, streets, and driveways. Some of the work will have to be done by our local municipalities, but much of the work can be done by each one of us. Our collective actions can have a major impact on the state of our waters.

This publication gives clear examples of communities and individuals that are initiating and implementing projects to improve water quality. These local efforts to curb polluted runoff have dual benefits; they help to cleanup our streams, rivers, and lakes while adding value to their communities.

The projects highlighted in this publication exemplify alternative practices that address stormwater and runoff. They utilize stormwater as a resource and address runoff at the source, rather than relying on traditional methods of conveyance and containment.

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Turning to Nature to Manage Non-point Pollution and Stormwater

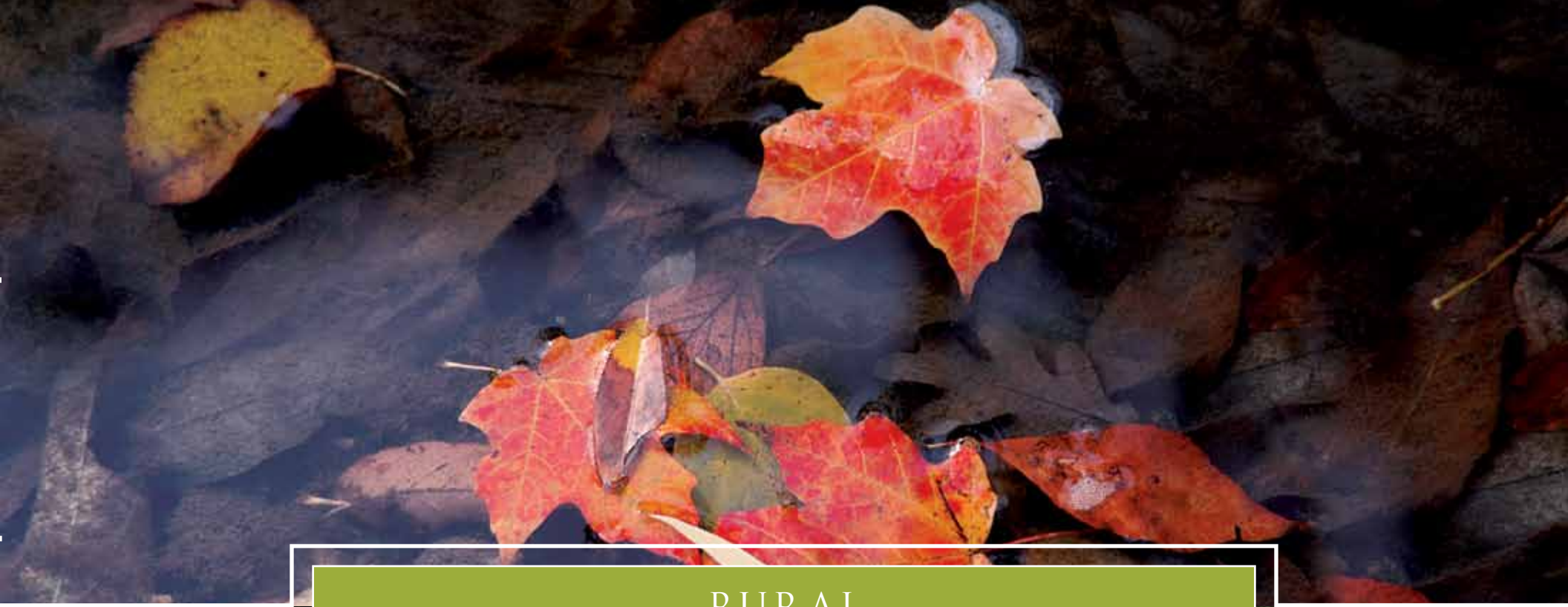
These practices use ecological processes as a model to address stormwater. They capture, detain, filter, and infiltrate stormwater on the site where it falls; before it enters receiving waters or pipes. The practices include both structural and non-structural approaches considered best management practices, or BMPs, and are often referred to as “green infrastructure.”

These practices include green roofs, rain gardens, vegetated swales, buffer strips, pocket wetlands, porous and permeable pavements, wetland restoration and reforestation, protection and enhancement of riparian buffers and floodplains, as well as harvesting rainwater for reuse with rain barrels and cisterns.

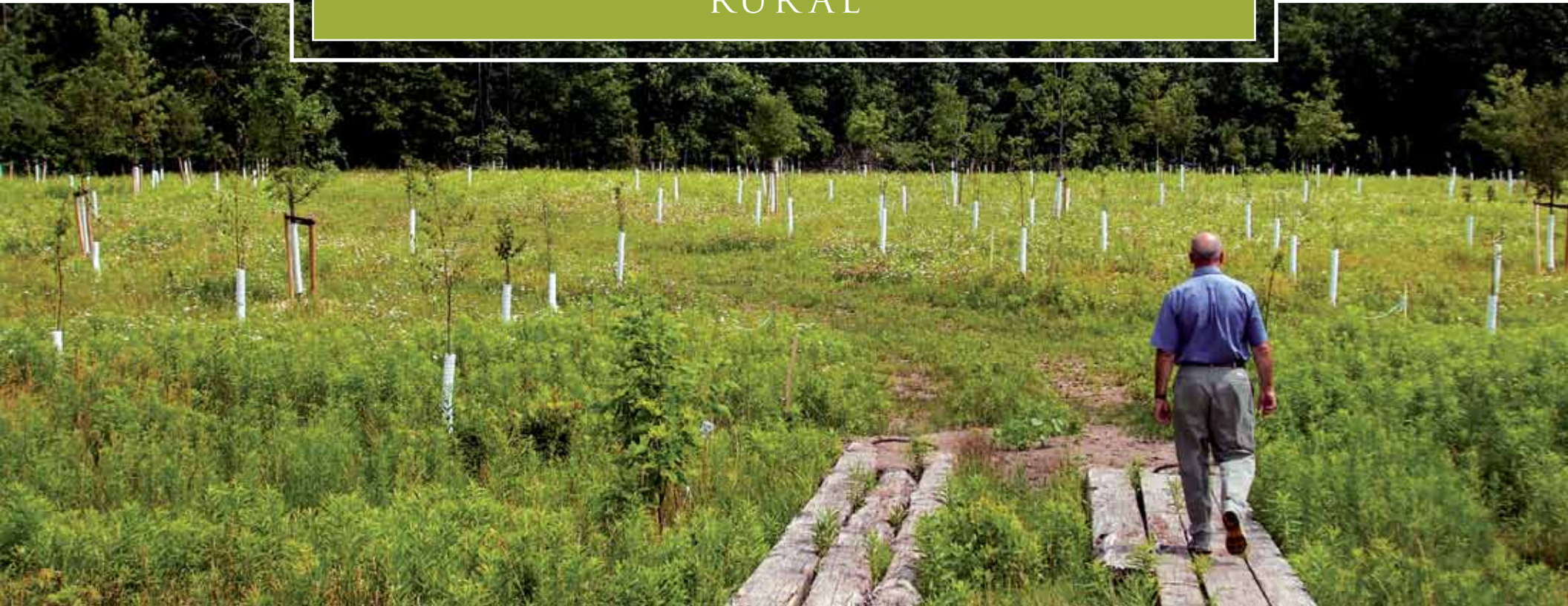
Green infrastructure practices can be implemented at various scales—site, neighborhood, region, and watershed. They are adaptive by nature and designed to fit the area where utilized. They can address localized problems or be applied in a wider management strategy. While a single technique may handle a limited amount of stormwater; collectively, these practices can have a significant impact on both the quantity of stormwater, and pollutant loading.

What starts out as an effort to reduce runoff frequently ends up as a project that brings people together and improves the aesthetics of a neighborhood. An abandoned lot in an inner-city neighborhood becomes a community garden. A public beach on Lake Michigan is reestablished as a great swimming area. Rain gardens in residential areas improve property values. Attractive, natural landscaping in public spaces bring residents to newly established gathering areas.

These projects prove that we can restore the health of our rivers and lakes while also adding value to our communities. We hope these examples provide inspiration that lead you and others to curb polluted runoff and meet the goals of “fishable and swimmable” waters.



RURAL





Farm walk at K.T. Organic Farms in the town of Farmington, near Kewaskum

FIELDS, FARMS & HEADWATERS

Farmers and Landowners Working to Protect Water Quality

Wisconsin farmers are implementing best management practices (BMPs) to comply with the Wisconsin Department of Natural Resources rule NR 151. Created to protect water resources from non-point pollution, NR 151 establishes agricultural performance standards and other prohibitions relating directly to non-point pollution.

Stephanie Hofmann, Project Technician and Certified Crop Adviser for Washington County’s Land and Water Conservation Division, stated, “NR 151, created to protect surface and groundwater resources, ties into every component of every farm—from nutrient management, to barnyard runoff, to buffering the streams, to conservation and tillage.”

From Regulation to Practice

Driving by the Dobberphul Organic Farm, one sees the typical features of a small dairy farm—pens, sheds, feedlots, barns, and alternating fields of alfalfa, corn, and pasture lands. A farm walk with Tim Dobberphul, however, shifts the attention to the farming practices employed to protect water quality. Many agricultural BMPs employ green infrastructure practices such as bio-infiltration, stream buffers, and bio-swales, as well as other soil and cropping techniques that prevent erosion and runoff. These practices are integral to Dobberphul’s approach to farming.

A system of gutters, drains, and underground tile channels rainfall from the barn roof to Wallace Creek, keeping the clear water clean. Wastewater from the milking process is managed on-site with a staged, underground filtration system that empties gray water into a bio-infiltration strip. Runoff from the barnyard is discharged to a 3-acre, mixed-grass field for bio-infiltration. The new regulations provided Dobberphul an opportunity to continue to work in the direction he wanted to go. Dobberphul noted, “It comes back to what you were taught as a kid—leave it better than you found it, whether it’s a piece of equipment or the land itself.”



Engineered feedlot with bio-infiltration field at Dobberphul Organic Farms, located in the town of Farmington, near Kewaskum

“It comes back to what you were taught as a kid—leave it better than you found it, whether it’s a piece of equipment or the land itself.”

- Tim Dobberphul
Dobberphul Organic Farms

At neighboring K.T. Organic Farms, Kevin Thull points out the grass swale in a low-lying area of an alfalfa field preventing erosion. He uses other techniques to control erosion and runoff including strip cropping, cover crops, rotational grazing and leaving plant residue to increase the soil’s capacity to hold water.

Both men believe that the positive impact of BMPs on profitability needs to be better communicated to farmers. Thull commented, “Dollars. Dollars are the bottom line. Farmers need to know it’s going to save you more because your soil didn’t wash away and you’re going to have better crops.” This point of view was echoed by Dobberphul, “You don’t have to look far to see small farms disappearing. So they want to know from me—how are you doing it? Tying BMPs back to profitability really is the answer. That’s where you get their attention.”

Balancing Agriculture and Habitat

For George Roberts, a landowner in neighboring Ozaukee County, it’s about balance. Roberts stated, “I think it’s important that people look at their cropland and identify those acres best used for agriculture and those best served as habitat.” Roberts’s land drains to Sucker Creek and then to Lake Michigan. He believes that a healthy habitat is crucial to a healthy lake. He’s taken 210 acres of marginal agricultural land out of production by planting buffer strips and restoring wetlands and woodlands.

State and federal agencies provide technical and financial assistance to farmers and landowners like George Roberts, Kevin Thull and Tim Dobberphul, helping them incorporate new regulations into their farming practices and adopt conservation measures. Numerous federal and state programs have been established to help farmers and landowners do the right thing regarding conservation and resource protection.

Hofmann noted, “It’s our job to provide education, technical assistance, and funding. In the end, it doesn’t matter which agency funds the particular project or helps out. We’re working together to help as many farmers as possible and to get best management practices on the land to protect water quality.”



Tim Dobberphul
leading the farm walk

“By focusing on establishing partnerships, the Greenseams program became a cooperative, regional stormwater initiative.”

- Stephen McCarthy, Project Manager, MMSD



GREENSEAMS

Employing Natural Areas in Stormwater Management

Over 1,800 acres of land have been purchased for conservation through Metropolitan Milwaukee Sewerage District’s (MMSD) innovative Greenseams program. Through this program, the District acquires wetlands and lands with sponge-like soils as part of its comprehensive watershed approach to stormwater management. MMSD is the only sewerage district in the nation employing this strategy.

Not only innovative, Greenseams is visionary. Using census data and land-use projections, small watersheds are identified that will be subject to increased flooding in 20 years given current development trends. Through additional data and analysis, specific properties are identified for acquisition with all land purchases dependent on a willing seller.

By preserving environmentally sensitive land, MMSD ensures that these areas will retain their natural hydrological purpose—holding and infiltrating stormwater. Using natural processes of wetlands is a cost-effective alternative to expensive, traditional approaches of laying bigger pipes for conveyance and building larger detention basins.

Key partners have ensured the success of the program. The Conservation Fund, a nationally recognized land trust, is contracted by MMSD to implement the program. The Knowles-Nelson Stewardship Program provides grants for property acquisitions. U.S. Fish and Wildlife Service provides technical assistance and matching funds for restoration efforts. Stephen McCarthy, MMSD Project Manager, observed, “Greenseams’ strong track record has attracted financial resources from federal and state agencies to help reduce the risk of flood-related damage in local communities.”

ULAO CREEK PARTNERSHIP

Protecting the Watershed – Preserving Heritage

Ulaoc Creek Partnership began with a small group of families and landowners who had grown up around Ulaoc Creek. Many were descendents of early settlers living on farms passed down through generations. They were concerned about the changes in the watershed—a degradation of the stream corridor, increases in flash floods, and the encroachment of development around family farmsteads.

The Partnership turned concern into active stewardship and has become a widely respected voice for the Ulaoc Creek watershed. The members’ commitment and passion has attracted new members and professional expertise. Mike Grisar, board president, cited the development of a comprehensive restoration and stewardship plan for Ulaoc Creek and a stormwater management plan adopted by the Village of Grafton as major accomplishments of the Partnership.

The stormwater management plan emphasizes preserving and enhancing wetlands as well as requiring new developments to utilize, where appropriate, green infrastructure practices—including grass swales, porous pavement, streambank stabilization, wet-detention ponds, and constructed wetlands.

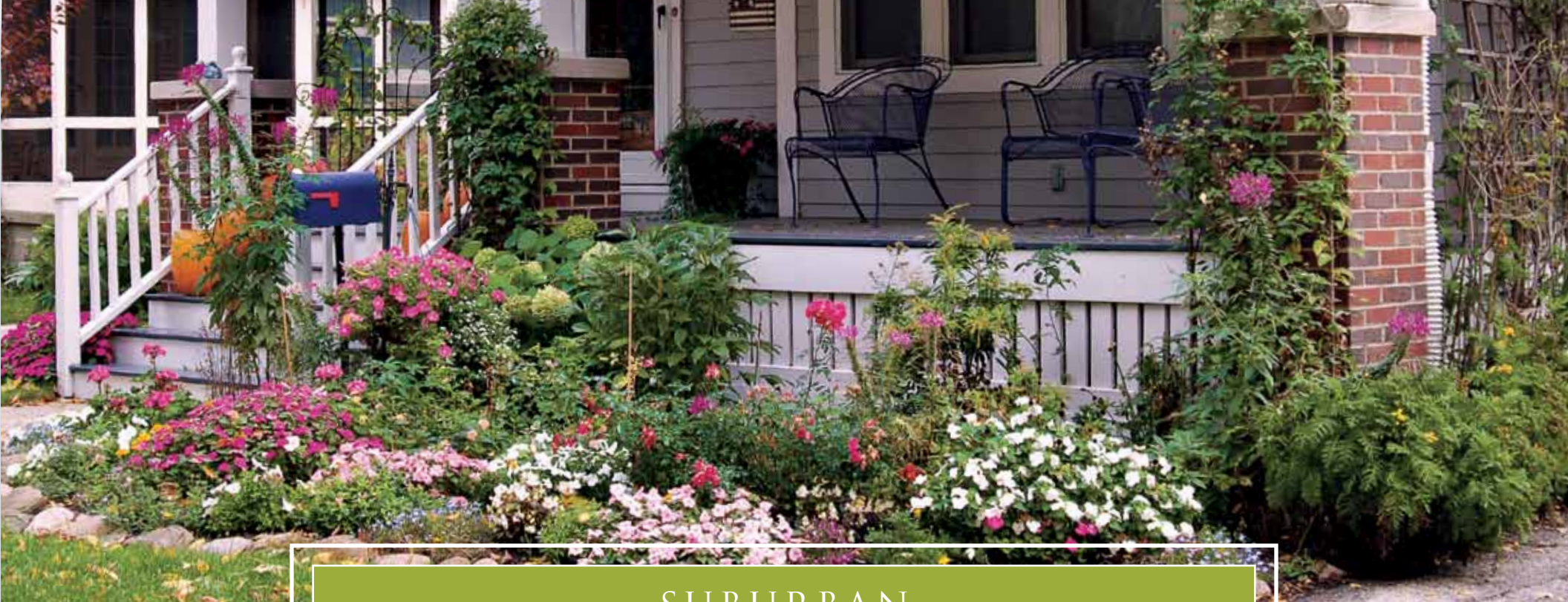
Grisar emphasized the importance of education, “Often people don’t think of education as a BMP, but sometimes it’s the most important BMP you have available.” From booths at the county fair, to barn dances and open houses, to swamp walks and new neighbor information packets—Ulaoc Creek Partnership is engaging its community in active stewardship through a renewed sense of place.



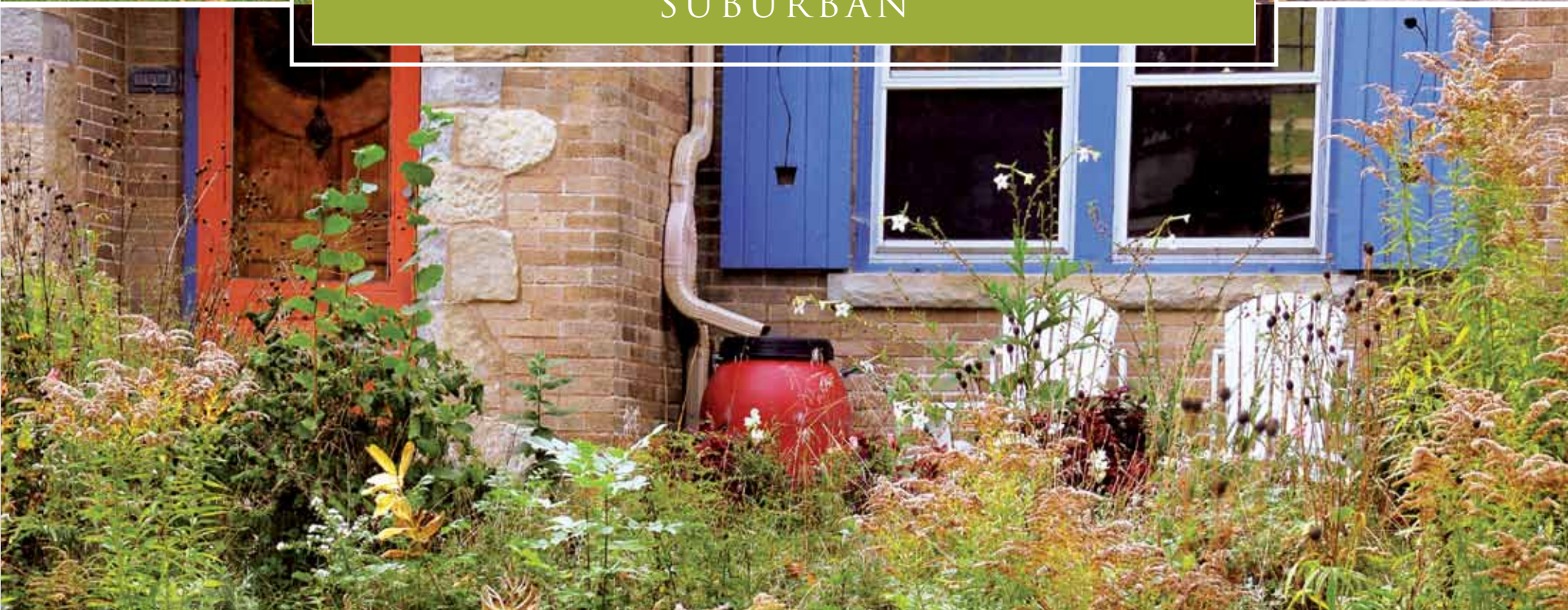
Restoration work at Ulaoc Creek Swamp near Grafton

“Certainly you can’t preserve everything, but if you can preserve the pieces that are needed to sustain the environmental corridor, then that’s what people should try to accomplish.”

- Mike Grisar, President of the Board of Directors, Ulaoc Creek Partnership



SUBURBAN





SHOREWOOD DISCONNECTS

Using Green Infrastructure to Reduce Overflows

The Village of Shorewood, one of Milwaukee’s older suburbs, encompasses roughly one square mile between the shoreline of Lake Michigan and the banks of the Milwaukee River. Shorewood’s natural amenities include riverside parks, tree-lined streets, bike paths, and a community beach.

High-achieving schools, walkable neighborhoods, and a 15-minute commute to downtown Milwaukee are other ‘quality of life’ amenities that draw people to Shorewood. With over 13,400 people, it has the highest population density of any municipality in Wisconsin.

Like several older, established communities in the Milwaukee area, Shorewood has an aging sewer system with almost half the village connected to a combined sewer system. Widespread flooding from wet weather events in 1997 and 1999 raised public concern and spurred action.

Village leaders and MMSD personnel explored options to address the problem. Engineering consultants for the Village from Bonestroo, Rosene, Anderlik & Associates joined the discussion. A complete overhaul of the system was not financially feasible. An innovative, cost-effective approach was needed.

Addressing Volume and Peak Flow

Leeann Butschlick, Shorewood Director of Public Works, commented, “At certain times the system becomes so overwhelmed that you can’t treat any of it. So in that case, if separation isn’t feasible economically, all you can really hope to do is manage that water and keep as much of the clear water out of the system as possible, especially during those very critical times like the first flush.”



“The reason this project resonates is that it’s aligned with the current thinking on clean water—rather than managing collected flows, we should concentrate on dealing with the rainfall where it lands.”

- Mustafa Emir, PhD, PE
Bonestroo, Rosene, Anderlik & Associates

Engineering consultant Mustafa Emir of Bonestroo, working closely with MMSD and the Department of Public Works, developed a comprehensive wet weather management plan that aligned with the goals of MMSD’s BMP grant program. The Bonestroo plan was approved by MMSD with the Village receiving partial funding for the project.

The goal of the Wet Weather Management Plan was to withhold stormwater from the system, reducing both volume and peak flow. The central component of the plan was the disconnection of residential downspouts in the combined sewer system area. Rain barrels, rain gardens, or simple infiltration over lawns would manage the rainwater in those neighborhoods. In addition, inlet restrictors and street storage would slow the flow from streets to pipes. In some areas sewer lines were upgraded, redirecting rain water to nearby storm sewers.

Reducing the Impact of Impervious Surfaces

The work progressed through five targeted project areas over five years. A concerted public information and education campaign supported the effort. Village meetings, flyers, and door-to-door visits yielded positive response and participation.

The goal of removing 50% of the roof area from the combined sewer area was surpassed with over 240 roofs and 985 downspouts disconnected—an equivalent of 11 acres of impervious surface. In addition, 61 rain gardens and 268 rain barrels were installed. Emir commented, “In communities where you are managing a combined sewer system and accepting all runoff from the built environment and running into capacity problems, there are more [options] than just adding capacity.”

Green infrastructure practices are taking hold in Shorewood with other projects planned or underway. These include beach bluff restoration to manage erosion, a strong shoreline ordinance restricting development along the Milwaukee River, a new high school athletic field that generates zero discharge, and a green-alley project. These actions are creating a new image for Shorewood, where “green” describes not only its landscape, but also Shorewood’s stewardship ethic.



HART PARK

A New Approach for Paved Surfaces

Swollen by runoff from impervious surfaces within the watershed, the Menomonee River and its tributaries had flooded the city of Wauwatosa with increasing regularity over the last decade. Following flooding in 1997 and 1998, MMSD and Wauwatosa began a comprehensive flood management plan for the Menomonee River.

The Menomonee River winds through Hart Park—a highly valued, community park in Wauwatosa providing athletic fields and courts, playgrounds, picnic areas, and other community facilities. MMSD utilized the park's proximity to the river to create a riparian floodplain to temporarily store floodwater. The park's size was increased from 20 to 50 acres which added additional area for floodwater storage as well as green space for the community. Community leaders then began planning a comprehensive redesign of the park in conjunction with MMSD's work.

MMSD saw the redesign as an opportunity to implement a demonstration project. They proposed that the parking lot and sidewalks be replaced with more porous materials. The city accepted MMSD's proposal and incorporated it into their plan. Asphalt and concrete surfaces were replaced with porous materials including porous pavers and blocks, porous asphalt and porous concrete.

David Fowler, MMSD Senior Project Manager, noted, "Wauwatosa has been pleased with the parking lot's functionality. In addition to decreased runoff during storm events, the city used less salt during the winter months due to the infiltration of snowmelt." He continued, "Stormwater BMP projects like this at Hart Park will provide future flood risk reduction."



ELM GROVE'S FLOOD PLAN

Creating Amenities While Addressing Flood Control

Underwood Creek flooded downtown Elm Grove in 1998 with four to six feet of water, leaving extensive property damage, and tragically, the deaths of two children. The flood and its consequences galvanized the community; a comprehensive plan to prevent future flooding was needed.

David De Angelis, Village Manger, outlined the problem, "How could we manage large storm events in a practical way and still have public amenities left over at the end of the day?" After review of alternatives, a multifaceted approach was selected. It required the village to incorporate its central community amenity, a much loved park, as a key component of the flood management plan.

The park, adjacent to Underwood Creek, would be completely redesigned to function as a primary stormwater facility: the pond enlarged from three to nine acres to hold overflow from the creek, pond embankments buffered with native plantings, in-line dry detention basins created, wooded floodplains preserved, and grass swales landscaped to slow runoff. A stormwater diversion pipe and box culvert would also be installed to slow the release of floodwaters.

Community buy-in was critical to the success of this controversial plan. Not only would the popular park be redesigned and rebuilt; it would also be taken out of use for 18 months. A concerted public information and engagement effort spanned two years, and included newsletters, special flyers, open houses, town meetings, design charrettes, and tours of other area projects. Public consensus was built. At the final hearing, no one spoke against the plan.

Community residents have embraced their new park. In addition to flood protection, they've gained a 2½ mile foot path, additional soccer fields, and a naturalized pond. De Angelis reflected on the project, "Our new park is not only practical and solves our problem, but it is also utilized by a far wider segment of the community. It has been a long process, but the rewards have far outweighed the difficulties."



Porous pavement demonstration in Wauwatosa

RAIN GARDENS FOR WAUWATOSA

Improving the Environment—One Garden at a Time

The community of Wauwatosa is keenly aware of the problems of stormwater. The Menomonee River and its tributaries have been the source of frequent floods. University of Wisconsin Cooperative Extension (UWEX) Basin Educator Gail Overholt commented, “With the impact of flooding on the downtown, parks, businesses and families; there was no way not to witness the devastation. It goes to the heart of the community and people want to help.”

A local resident, William Gonwa, proposed a community rain garden program to Wauwatosa’s Common Council and UWEX. Both groups gave full support to the proposal. The Common Council secured funding. The City provides administrative support for the initiative with city engineers offering technical assistance to residents. UWEX led the public outreach and education effort.

The program, widely promoted, drew positive community response. Overholt noted, “Residents learned about the initiative through the city’s newsletter and website; flyers posted at schools, the library, and city hall; and the local news. When promoted through all these venues, people started realizing—if they’re seeing this everywhere, rain gardens must be something they should be thinking about.”

Over 90 people attended the first information meeting; another 150 attended the Rain Garden Fair. Of the 75 rain gardens funded, 30 applications have been approved in the first year with the rest to follow in year two of the program. “In today’s economy, people want to do something like this, but they have to watch their dollars. This program has helped people take action,” Overholt observed. “People feel better about doing something they already love, knowing that at the same time they’re giving back to their community.”

“People are beginning to understand that you don’t have to live close to water to have an impact. You can make a difference to the waters you belong to, your ‘home-shed.’”

- Gail Epping Overholt
UW Extension Basin Educator



Rain garden tour



Community rain garden installation in the Village of Sturtevant

1,000 RAIN GARDENS Root-Pike Watershed Initiative Network (WIN)

The Root-Pike Watershed, actually comprised of 5 smaller watersheds, contains 5 major lakes, 450 miles of streams and rivers, 8,500 acres of wetlands, and many miles of Lake Michigan Shoreline. The Root-Pike WIN, a collaborative dedicated to restoring and sustaining those delicate resources, awards grants for projects within the watershed. Responding to widespread problems associated with stormwater, WIN launched its first project in 2008 with the goal of installing 1,000 rain gardens throughout the Root-Pike Watershed.

This ambitious initiative is attracting interest from master gardeners, native plant enthusiasts, and homeowners intrigued by the idea of working, functional gardens. In the first year of the initiative, 36 rain gardens were installed, which will keep approximately 314,400 gallons of rainwater out of the sewer system.

Rain gardens are designed to capture rain that would otherwise flow from a downspout into storm sewers. Rain from downspouts is redirected to a garden, planted with water-loving native plants, where it soaks into the soil rather than into the sewer system.

Susan Greenfield, executive director of Root-Pike WIN, remarked, “People have heard a lot of messages about damage to our environment. They are hungry to do something themselves, in their own backyards.” Greenfield believes the rain garden tours inspire participation. “People can tour a rain garden—walk around it, find out what it looks like, and how it works. The key message people come away with is that they can make a difference.”

Greenfield hopes to achieve another goal through the initiative—to convince municipalities to support the use of rain gardens and other innovative approaches to stormwater. Each new rain garden is an opportunity to start that conversation.



Installation of green roof at PieperPower Education Center

“We want the Preserve to be a premier location for environmental education and recreation—to be a place for people to see a significant restoration effort that demonstrates what is possible.”

- Christine Nuernberg
Mayor of Mequon

MEQUON NATURE PRESERVE

Water Quality Benefits through Wetlands Restoration

The Mequon Nature Preserve is a superb example of the natural amenities provided by green space. With the restoration of over 550 acres of farmland to its pre-settlement habitat of beech and maple forests and wetlands, the Preserve is a diverse and accessible site for environmental education and a destination for outdoor recreation.

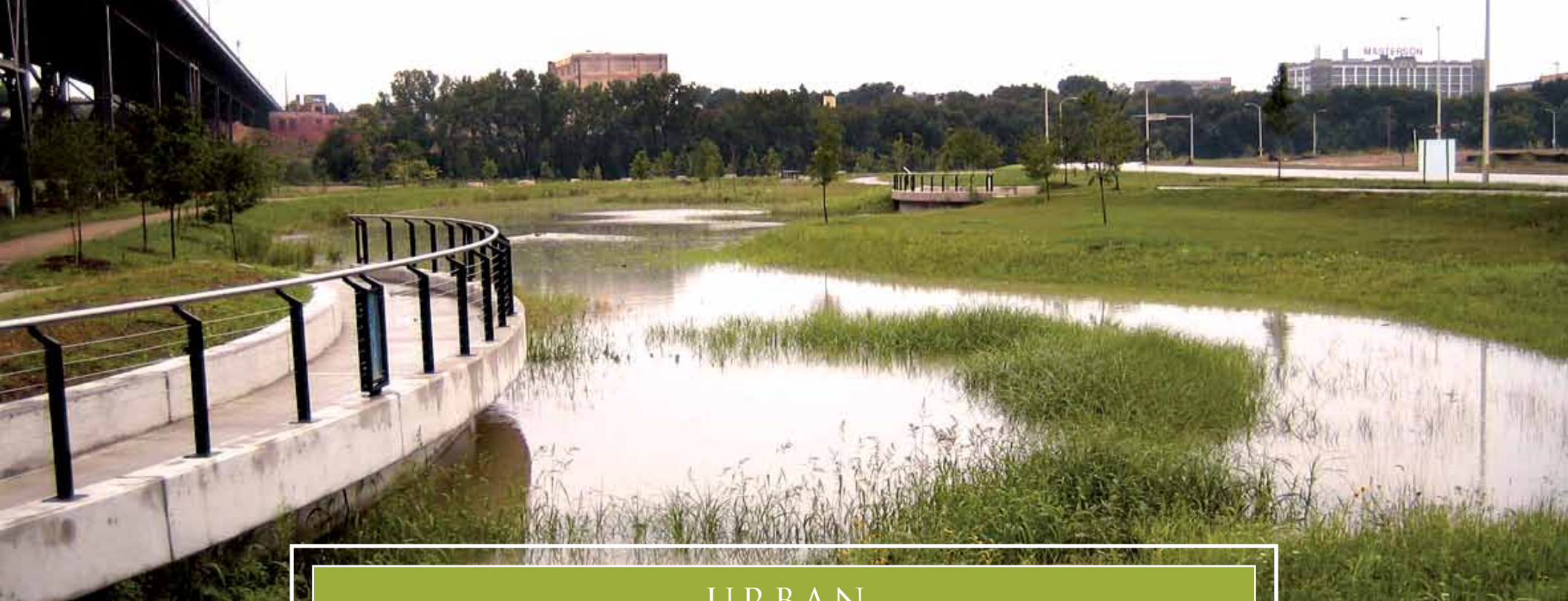
The Preserve’s PieperPower Education Center provides facilities for educational programs, meetings, and stewardship events. Three miles of winding trails connect the Preserve to both the Oak Leaf Trail and the Ozaukee Interurban Trail. Located on the border of Ozaukee and Milwaukee Counties, is within reach of 1.5 million people, including 40,000 students who live within five miles of the Preserve.

The Preserve augments Mequon’s stormwater management plan by protecting the headwaters of the Milwaukee River and restoring natural wetlands. These restored wetlands and ponds now capture sediments while slowing the velocity and volume of stormwater draining into Trinity Creek, a tributary of the Milwaukee River. The wetlands have also alleviated some of the chronic flood problems in the Cedarburg Road corridor.

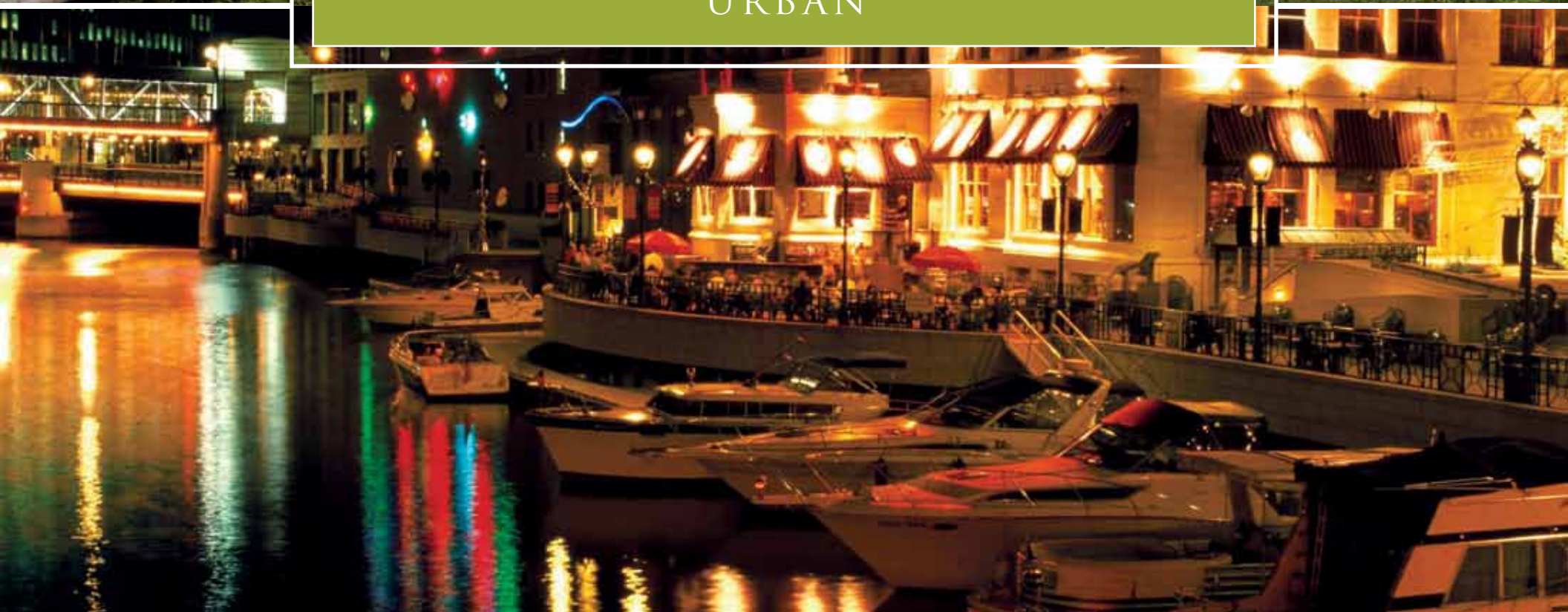
Mayor of Mequon, Christine Nuernberg, commented, “Each person that comes to the Preserve sees a different story. I have an idea of what the Preserve is all about, but the next person who comes along sees a different thing. A professional scientist may see one thing and a 20 year-old, something else. The Preserve accommodates all those different ideas and visions.”

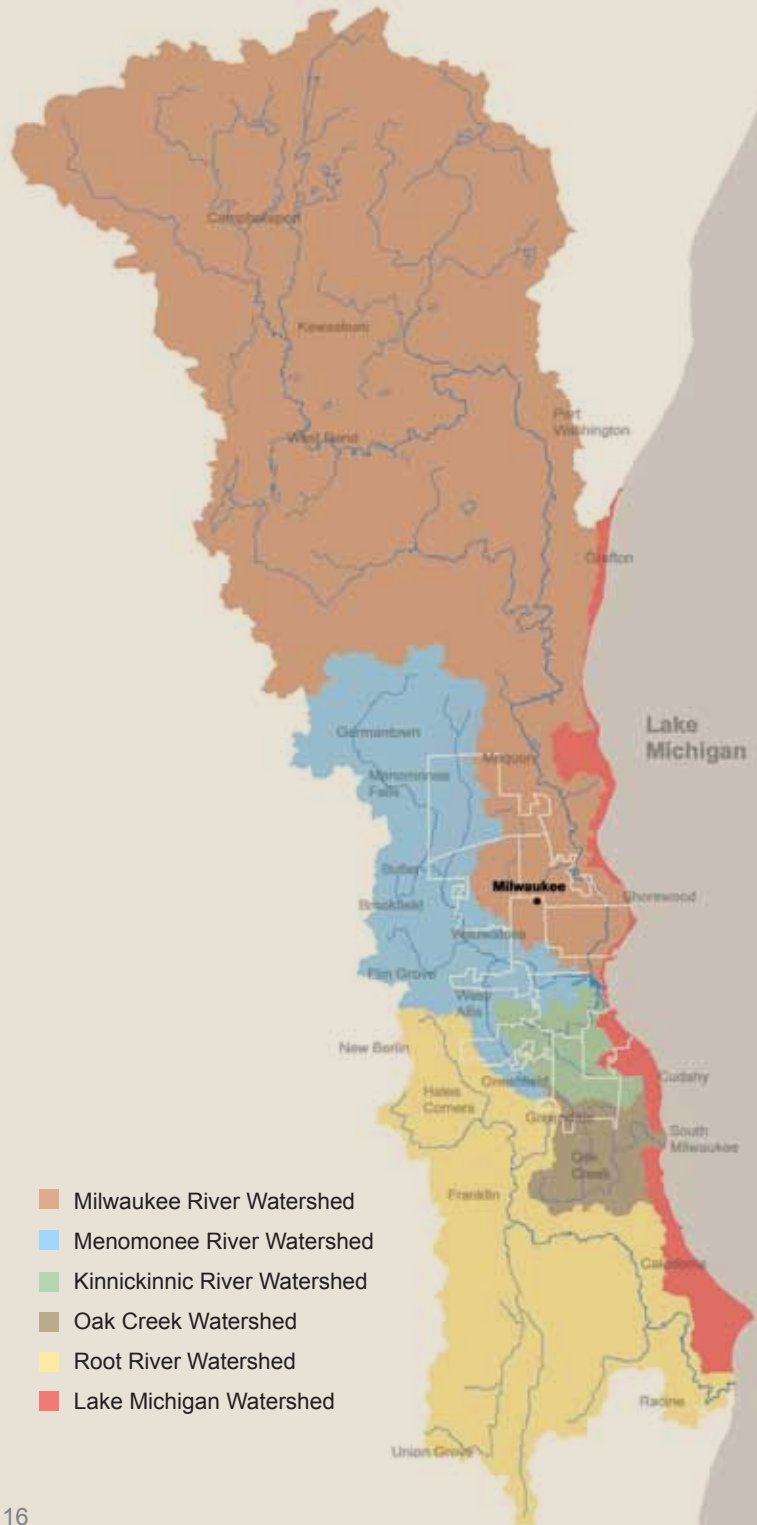


Restoring wetlands and ponds at Mequon Nature Preserve



URBAN





Rain garden in full bloom

WALNUT WAY CONSERVATION CORPORATION

Nurturing Neighborhoods through Environmental Stewardship

Returning to Milwaukee in 1997, Sharon Adams found the neighborhood of her youth had suffered the decay endemic to many urban neighborhoods. Once a thriving community, Walnut Way was littered with 100 abandoned lots and dumping grounds. Empty storefronts and boarded-up buildings reflected the devastating consequences of policies of disinvestment in urban neighborhoods.

Sharon and Larry Adams, along with a small group of committed neighbors, became catalysts for change. In 1998, they founded Walnut Way Conservation Corp. (WWCC), a resident-led, collaborative effort to revitalize their neighborhood. Their mission: the development of a sustainable, economically diverse community, is founded upon three principles—citizen engagement, environmental stewardship, and economic enterprise.

Activating Civic Engagement

When the residents of Walnut Way learned that the neighborhood was located in the combined sewer service area, they saw opportunity for civic engagement. Sharon Adams stated, “We asked ourselves how could we be good citizens and respond to the problem of combined sewer overflows? A colleague of mine at that time with the city pointed out the opportunity for rain gardens and bio-retention areas. That was the beginning of WWCC moving closer to water [stewardship].”

Planning was already underway to plant community gardens on abandoned lots. Rain gardens were a natural extension of this plan, beautifying the neighborhood while addressing the problem of overflows. Stormwater became a resource for the proposed gardens. Adams explained, “It all ties [together], because if you have gardens, irrigation is an important aspect. Stormwater was our treasure and capturing it for irrigation was our desire.”



Community work day at WWCC in Milwaukee

“When it rains or snows, we’re concerned about water—where it’s going, where to install another garden, how to change our alleyways.”

- Sharon Adams
Co-founder of WWCC

Three 500-gallon cisterns were installed to capture rooftop runoff to irrigate community gardens. Forty rain gardens were established and downspouts were disconnected. A bio-retention area was built at Lloyd Street School to collect runoff from the hard-surface playground. When a new development was planned for Josie Heights, WWCC successfully lobbied that BMPs, such as bio-swales and porous pavement, be utilized.

Cultivating a Culture of Environmental Stewardship

The commitment to civic engagement developed a culture of environmental stewardship with water at its center. Rain gardens and their care are topics of conversation. Neighborhood youth are engaged in internship programs connecting them to the gardens and local water management. Projects at Walnut Way are incorporated into the curriculum of neighboring schools.

Adams commented, “We have a culture now that is environmentally focused whether that’s recycling, gardening, or water stewardship. We’re watchful. When it rains or snows, we’re concerned about water—where it’s going, where to install another garden, how to change our alleyways. There are conversations about how do we add solar power. It’s [a culture of] innovation and curiosity around environmental stewardship that’s as natural as it can be.”

“In the beginning,” Adams noted, “Whatever it took to make an isolated community connected is what we had to do—connections not based upon us being needy, but on how we participate in being citizens.” WWCC established key partnerships at different phases of the organization’s development related to technical expertise, funding support, youth involvement, and urban agricultural practices.

Successful community gardens have led to expanded backyard gardens, and the establishment of the “Gardens to Market (G2M)” program, in which community-grown produce is sold at the local farmers’ market. Established beehives produce honey for sale. An agriculture annex is planned to increase food production, to raise seedlings, to process honey, and to house a plant business. Water collection and reuse is an integral part of this expansion.

An environmental innovation center is also envisioned that will offer training, certificate programs, and support business development related to environmental opportunities and freshwater. Adams reflected, “This is such a precious moment for us. Imagine where we were in 1998 and where we are now. That in choosing to be good citizens, by choosing to be involved in the lift of rain gardens—imagine our joy in being an integral part of the lift of freshwater in our city.”



“There’s a sense of ownership in the neighboring community and a sense of place for businesses located in the Valley because of the comprehensive vision they feel part of.”

- Laura Bray
Executive Director, Menomonee Valley Partners



MENOMONEE VALLEY’S STORMWATER PARK

Public Amenity as Stormwater Facility

A bold vision drives the revitalization of the Menomonee River Valley—restoration of the environment, the creation of open space, the recruitment and retention of new businesses to the Valley, quality jobs for the surrounding residents and at the core, a commitment to sustainability.

Menomonee Valley Partners, a non-profit corporation, oversees and coordinates the redevelopment efforts. Laura Bray, executive director, stated, “The vision for the Valley is that we have to proceed with economic development and ecological restoration at the same time. They actually coexist in a symbiotic way; they reinforce each other.”

One of the first areas redeveloped was 1,200 acres at the west end of the Valley. As part of this development, a 70-acre park was created to serve as a natural stormwater facility. It acts as a public commons where stormwater is collectively managed, reducing the financial burden on individual businesses for stormwater management as well as the acreage needed for each business.

Stormwater controls designed into the park include a constructed floodplain, river bank stabilization, prairie and woodland restoration, and bio-retention areas. The mitigation of runoff from Stormwater Park has favorably impacted water quality along the adjacent reach of the Menomonee River.

This natural stormwater facility also functions as a community park and includes a significant portion of the Hank Aaron State Trail. Increased connections to bike and pedestrian paths and access to the river have given the residents in south-side communities much needed recreational areas and green space. Once a contaminated, industrial wasteland, the Menomonee River Valley has become a national model for brownfield reclamation, urban renewal, and innovative stormwater management.

MILWAUKEE COUNTY ZOO

Conservation Begins at Home

As a member of the Zoo and Aquarium Partnership for the Great Lakes, the Milwaukee County Zoo advocates for freshwater and promotes education about water resources in concert with other local science and environmental centers.

The Karen Peck Katz Conservation Education Center reflects the Zoo's commitment to conservation and environmental education. Designed with sustainability in mind, the building incorporates energy efficient technologies for lighting, green building materials, and a green roof.

The green roof, funded by grants from MMSD and WE Energies, was built as a demonstration project. Modular trays planted with varieties of sedum and gravel pathways were installed. The sedum absorbs the rain slowly releasing it through transpiration. Gravel increases the surface area aiding evaporation of the rainwater.

Runoff from the green roof and a control roof was monitored to gauge the effectiveness of the green roof to moderate volume and temperature of water discharging from the roof. The data proved positive on both parameters. To further reduce impervious surfaces at the Center, porous pavement rather than concrete was used for patio surfaces outside the classrooms.

Additional practices have been implemented throughout zoo grounds—including grass swales and buffers to control surface runoff at various animal exhibits, bank stabilization at Lake Evinrude, reduction of winter plowing and salting, and regular sweeping of parking lots and sidewalks. These practices advance the Zoo's mission of conservation through its day-to-day operations within the local watershed.



Varieties of Sedum are commonly utilized for green roofs.



Installation of modular trays for green roof



“We don't think of 'green' as this difficult piece of technology that you plug in. It's just common sense.”

- Glen Radford, Housing Production Supervisor, HACM

HIGHLAND GARDENS

Bringing Sustainability to Public Housing

The Housing Authority of the City of Milwaukee (HACM) is seen as a leader in building safe, affordable public housing. Under the leadership of executive director, Antonio Perez, HACM has also received national recognition for its efforts in incorporating “green” design into public housing.

Perez addressed the economics of affordable housing and “green” design, “Highland Gardens and Highland Homes introduce long-term energy conservation strategies, which—when amortized over time—repay initial up-front added costs, both to the Authority and those families that purchase our homes...[It also] benefits the broader community with immediate contributions to vexing problems such as stormwater management and the heat-island effect with applications such as green roofs, rain gardens, use of porous surfaces, and cistern systems.”

Highland Gardens was Milwaukee's first “green” public housing facility. Its 20,000 square foot modular green roof is the largest green roof, on any residential development, in the nation. In addition, an underground overflow tank slows the release of rainwater into the storm sewer, helping to reduce stress on the system during large storm events.

Glen Radford, Housing Production Supervisor, stated, “We want to give our residents the best product and environment to live in. ‘Green’ design is a part of how we achieve that. We don't think of ‘green’ as this difficult piece of technology that you plug in. It's just common sense.”

Radford continued, “A lot of water resources hit our roofs every day and go somewhere else. It overflows our sewer system. It floods our streets and our homes. We need to find affordable and smarter ways to first catch and use rainfall. This is just the first step.”



“The interest in green design and construction is exploding. People want to make changes.”

- Judy Krause
Director of Finance and Operations, UEC



URBAN ECOLOGY CENTER

Facility as Model and Message

The Urban Ecology Center (UEC), a vibrant environmental facility in the heart of Milwaukee, impacts thousands of youth through its innovative educational programs. Committed to enhancing urban communities through building connections to the natural world, UEC is recognized nationally as an exemplary model for urban environmental education.

The facility reflects UEC’s mission and values and has received numerous awards for its use of recycled and renewable materials. The building, a welcoming and evocative environment for programs, also serves as an educational tool embodying core messages and modeling sustainable design.

This is evident in UEC’s imaginative management of stormwater. The goal was to utilize every drop of rain that falls on the site. A unique system of capture and reuse was designed—including cisterns, rain barrels, rain gardens, a wet detention pond, a green roof, and porous pavement.

The slope of the driveway directs runoff to native plants rather than street sewers. Signage and intriguing interactive elements, such as the dual-flush toilets using collected rainwater and waterless urinals, enhance engagement.

Homeowners and businesses are turning to UEC to find out how to reduce their impact on water resources. Judy Krause, Director of Finance and Operations, observed, “We’re fulfilling a need in the community that we didn’t foresee when we built the center. The interest in green design and construction is exploding. People want to make changes. They want to find out how to do it. We’re seen as a resource to help them with those questions.”

TEUTONIA AVENUE TOGETHERNESS

A Holistic Approach to Urban Redevelopment

The corner of West Center and North Teutonia in Milwaukee is the site of a dynamic redevelopment project, Teutonia Avenue Togetherness. The project is led by Melissa Goins, CEO of the Maures Development Group. A graduate of Marquette University’s program, Associates in Commercial Real Estate, and the Wisconsin Housing & Economic Development Authority’s Mentor-Protégé program, Goins wanted to apply her new skills to the revitalization of Milwaukee’s urban neighborhoods.

Goins elaborated, “While we focus on the brick and mortar part, we bring different partners to the table to address social, human, and environmental resources associated with development to bring the whole vision into reality. Looking at this block as a whole, we want to be respectful of the environment and to empower people simultaneously.”

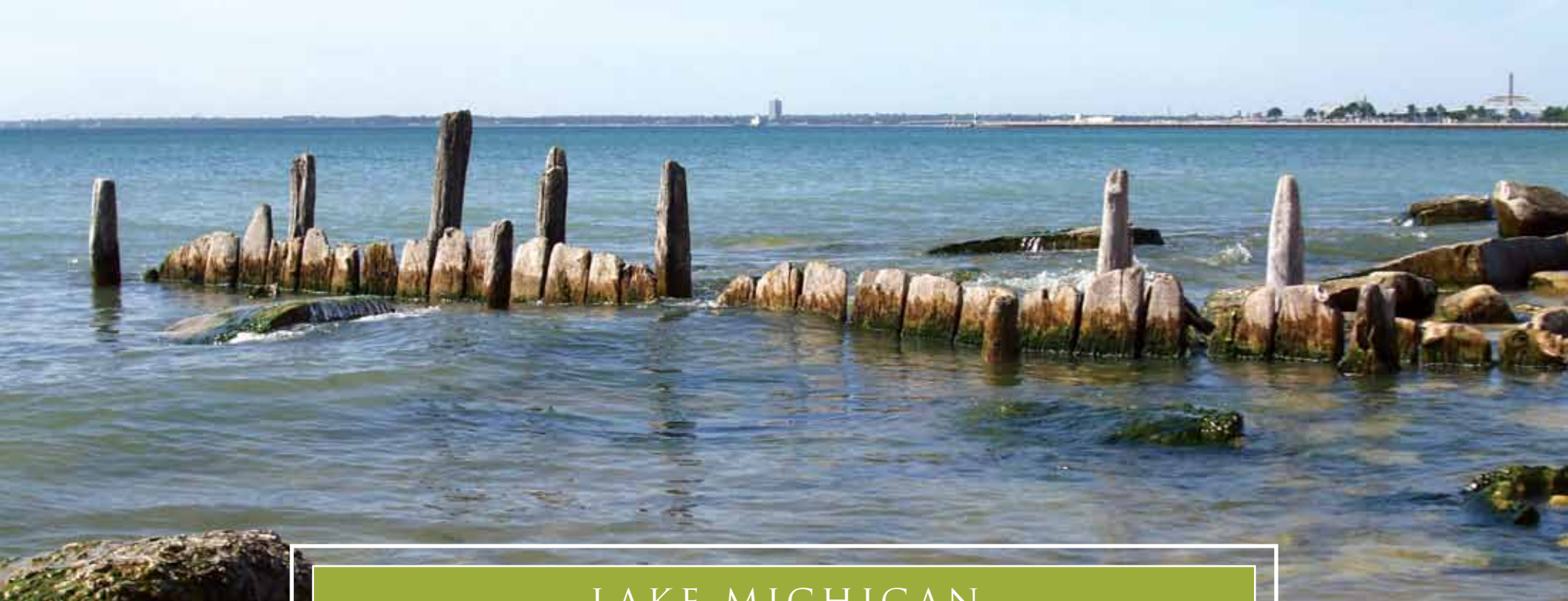
To meet stormwater regulations, an underground cistern was installed to capture roof runoff. Two overflow tanks slow the release of water into the combined sewerage system. The water from the cistern is used to irrigate an urban agriculture project led by Michael Fields Institute of Agriculture, in partnership with Elaine’s Project and the Academy of Learning and Leadership.

Goins explained the next phase of the project, “Moving forward, we’re planning from day one [to incorporate green infrastructure] such as bio-retention ponds, rain gardens, and green alleys. If we can find money to bury tanks in the ground, we can find money to build a really wonderful green roof. It’s aesthetically pleasing and it’s smart.”

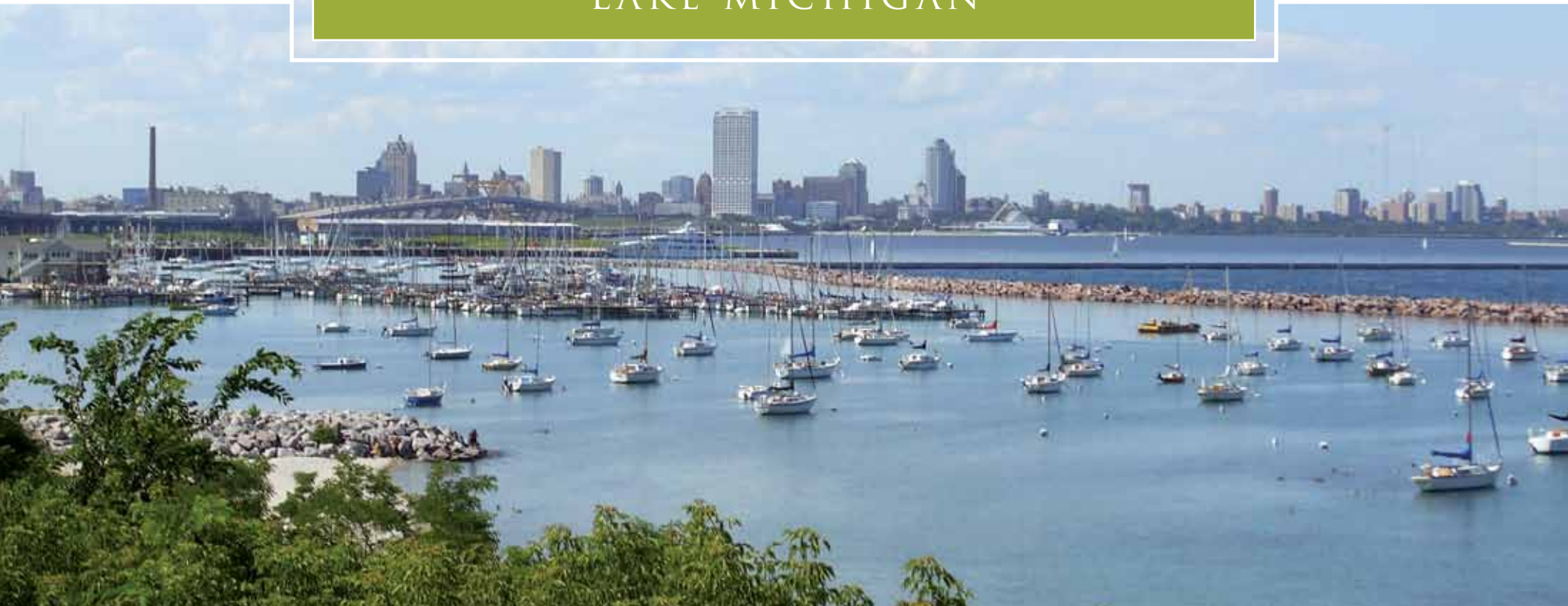


“Being respectful of water, the environment, and people is being respectful of the future—being conscious about our decisions today and the impact they’ll have on others.”

- Melissa Goins, CEO, Maures Development Group



LAKE MICHIGAN





THE RENAISSANCE OF BRADFORD BEACH

Building Beach Health through Green Infrastructure

Bradford Beach, with its panoramic view of Lake Michigan, is Milwaukee’s largest public beach and a destination for people from all over the city. In recent years, however, the beach was plagued with decaying piles of lake algae and bacterial contamination. The stench and frequent beach closings had driven most people away. Dr. Sandra McLellan and her team at the University of Wisconsin-Milwaukee Great Lakes WATER Institute identified the primary sources of beach contamination: discharge from eight stormwater outlets along the beach and gull feces.

Sue Black, director of Milwaukee County Parks, reported, “Representatives from all the jurisdictions sat around the table; not to point the finger but to come up with a solution together. We had the city of Racine, University of Wisconsin-Milwaukee, the politicians, MMSD, and Milwaukee County Parks working towards a common goal—to win the Blue Wave certification for Bradford Beach. The plan we came up with was based on sound scientific study provided by Dr. McLellan and her students.”

Fitting Practice to Site

The research triggered the development of site-specific strategies to address the contamination at the outfalls. There was no one-size-fits-all approach. A diverse set of practices were employed: bio-swales, infiltration basins, rain gardens, a physical solids separation device, ravine slope stabilization, and catch basin filters.

Specific practices were determined by the characteristics of the site. Steve Keith, Managing Engineer for the County’s Department of Public Works Environmental Services Division, explained, “The selection can be affected



“As more people use the beach, they’ll start realizing we’ve got to do something about our water quality.”

- Chuck Ward
County Parks Chief of Operations

by a lot of different site characteristics such as the amount of space available, soil types, land use, the kind of foot traffic in the area, and the volume of stormwater you are dealing with.”

Keith continued, “We also wanted to minimize annual operating costs. We looked at our staff availability and asked, ‘what are they good at doing?’ We already have staff that do landscape maintenance. We don’t have staff that know how to operate a disinfection system with chemicals and pumps and those kinds of [devices]. We do have people that understand plants.”

As the outfall plan was implemented, the County’s Bradford Beach Revitalization Plan was activated. Herding dogs were employed to address the gull problem. The Milwaukee Conservation Corps raked and bagged algae. The frequency of beach grooming was stepped up to remove debris and inhibit bacterial growth. A new vendor took over the Bradford Beach House, providing food and coordinating recreational activities and special events throughout the summer. Lifeguards returned to the beach. The implementation of this comprehensive plan delivered the prize—in June 2009, Bradford Beach was awarded Blue Wave certification by the National Clean Beaches Council.

Building Momentum through Public and Private Support

Growing momentum at Bradford attracted private and corporate donations including a major multi-year donation from Miller/Coors Brewery in support of the beach revitalization plan and continued research by the WATER Institute; the gift of a beach groomer from WE Energies and MMSD; and underwriting of the lifeguard program by, businessman, Sheldon Lubar. Wisconsin Coastal Management Program as well as other corporations and businesses joined the effort.

Chuck Ward, County Parks Chief of Operations, observed, “We’ve done a great job bringing it back and revitalizing the beach. Now we’ve got to maintain and sustain what we’ve done. We can also heighten the awareness about what’s going on in Lake Michigan. As more people use the beach, they’ll start realizing we’ve got to do something about our water quality.”

The Bradford Beach stormwater outfall project continues. The controls are evaluated during and after rain events to determine their success at capturing and infiltrating the stormwater, and then, adaptively managed. The summer crowds and lively beach scene prove the success of the County’s comprehensive restoration plan. Keith concluded, “We had the opportunity to introduce and utilize a more natural process with the problem. The stormwater controls are blending in and not getting in anyone’s way. It’s satisfying that our work has been part of the resurgence of the beach.”





Tour of green roof



“The green roof has had a big impact on getting people to change how they think about green infrastructure.”

- Sandra McLellan
Associate Scientist, UWM
Great Lakes WATER Institute

STORMWATER FULL CYCLE FROM BEACHES TO GREEN ROOFS

UWM Great Lakes WATER Institute Green Roof Initiative

Dr. Sandra McLellan and scientists of the Bacterial Genetics Lab at UWM Great Lakes WATER Institute are working to identify sources of contamination in stormwater runoff and its impacts on water quality. This research has led her upstream from beaches to stormwater entering Milwaukee’s rivers.

McLellan explained, “Once we started measuring stormwater, it really hit home for us how dirty stormwater is. It’s untreated and going into the rivers and eventually into Lake Michigan. We asked ourselves, ‘What can we do about urban stormwater?’ That naturally led us to green infrastructure.”

The large flat roof of the WATER Institute was an ideal site for the installation of a green roof. Not only would it implement an on-site strategy to reduce roof runoff but also establish an outdoor lab and demonstration project.

The green roof has drawn wide interest from the general public, administrators, city planners, developers, visiting scientists, and UWM students. Each semester students from UWM’s Service Learning program engage in hands-on projects with the green roof. McLellan noted, “When these students go out in their careers down the road, we’re hoping that green roofs are on the forefront of what they think about.”

NORTH BEACH RESTORATION

Naturalizing Remediation

North Beach, like many beaches along the shores of Lake Michigan, was plagued with declining water quality in near-shore waters. Beach advisories increased. In response, the Department of Public Works launched a stormwater management study while the Health Department, led by research scientist, Julie Kinzelman, initiated research to determine sources of the contamination.

Scientists from UW-Milwaukee Great Lakes WATER Institute, UW-Parkside, US Geological Service, National Park Service, Wisconsin Department of Natural Resources and the Environmental Protection Agency joined the effort. The problem was caused by the complex relationship between wind, waves, stormwater, beach topography, and gulls. Stormwater and gull feces were identified as primary sources of contamination and the first to target.

The storm sewer pipe emptied directly onto the sand contaminating near shore waters. To address this problem, nine wetland cells were constructed and planted with native plants. Stormwater is directed into two underground, primary treatment systems then through the wetlands providing retention and filtration of pollutants aided by the native plants. To the casual observer these constructed wetlands are part of the natural environment along North Beach.

Altered beach grooming, a public information campaign, and adoption of an ordinance forbidding the feeding of gulls address contamination from gull feces. The slope of the beach is maintained to drain standing pools of water inhibiting bacterial growth.

The impact of these practices is dramatic. Beach advisories dropped from 62 in 2000 to 1 in 2008. In addition, North Beach was awarded the coveted Blue Wave certification from the National Clean Beaches Council. Scientific research, the foundation for the restoration of North Beach, continues to advance our understanding of the complex nature of beach health and water quality.

“Using findings from scientific research can give an application more bang for the buck.”

- Julie Kinzelman
Racine Health Department,
Research Scientist



Constructed wetlands



SHARED VISIONS AND RESPONSIBILITY FOR OUR FUTURE

We hope that the stories and projects in this publication inspire you to become more actively engaged in the work of protecting our water resources and creating a sustainable future for our region.

You can visit many of the projects highlighted in the publication and see first-hand innovative approaches that address stormwater and non-point pollution. The people involved with these projects are committed to advancing a sustainable future for our water resources, aquatic habitats, and natural areas. They welcome your interest and questions.

There are many other exemplary projects and initiatives in our watershed. Those we've highlighted are starting points and will lead you to other projects and people who are making a difference in our region.

If you have a question about a particular project, the issues facing our watershed or interested in joining these efforts, please contact one of the partner organizations listed in the resource page.

We also invite you to join the Southeastern Wisconsin Watersheds Trust (SWWT)—a partnership of independent units of government, districts, agencies, organizations, and individual members working together with the goal of making measurable progress toward improving water resources in the region. You can find out more about SWWT at www.swwtwater.org.

This effort complements other initiatives striving to develop the Milwaukee region into a hub for water-related businesses, research, and education, including the work of the Milwaukee 7 Water Council and the UW-Milwaukee Great Lakes WATER Institute.

The next steps in securing “fishable and swimmable” waters are ours to take. Addressing the collective problem of non-point pollution will require collective actions throughout the Greater Milwaukee Watersheds.

Each of us can be a positive voice for change within our own spheres of influence—helping our region become a model for innovative, sustainable solutions to water quality protection and watershed restoration.



Barbara J. Miner



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Rain Gardens for Wauwatosa

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Elm Grove Flood Management Plan

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North Beach Restoration

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Water Environment Research Foundation
www.werf.org

Center for Watershed Protection
www.cwp.org

The Conservation Fund/Green Infrastructure
www.greeninfrastructure.net

The Green Infrastructure Center
www.gicinc.org

The Low Impact Development Center
<http://lowimpactdevelopment.org>

Trust for the Public Land
www.tpl.org

Environmental Protection Agency
www.epa.gov/owow/nps/lid

Cities for New Technologies
www.cnt.org

Non-point Education for Municipal Officers
<http://nemo.uconn.edu/>

The Stormwater Center
www.stormwatercenter.net

National Conservation Resource Service
www.nrcs.usda.gov

Wisconsin Department of Natural Resources
www.dnr.state.wi.us/runoff/stormwater

University of Wisconsin Extension Water Resources Education
<http://clean-water.uwex.edu>

Milwaukee Metropolitan Sewerage District
www.mmsd.com

Milwaukee 7 Water Council
www.milwaukee7-watercouncil.com

PARTNER ORGANIZATIONS WORKING TO MAKE A DIFFERENCE

Milwaukee Riverkeeper
www.mkeriverkeeper.org

River Revitalization Foundation
www.riverrevitalization.org

Clean Wisconsin
www.cleanwisconsin.org

River Alliance of Wisconsin
www.wisconsinrivers.org

16th Street Community Health Center
www.sschc.org

Midwest Environmental Advocates
www.midwestadvocates.org

1000 Friends of Wisconsin
www.1kfriends.org



SOUTHEASTERN WISCONSIN WATERSHEDS TRUST



The Southeastern Wisconsin Watersheds Trust (SWWT) is a collaborative effort to achieve healthy and sustainable water resources throughout the Greater Milwaukee Watersheds.

SWWT is a non-governmental, non-taxing, voluntary partnership of independent units of government, special purpose districts, agencies, organizations and members-at-large that share common goals and have come together to achieve these goals through coordinated collaboration and cooperation within the Greater Milwaukee Watersheds.

Goals

- Make measurable progress toward improving the water resources in the region
- Identify and support land use practices and designs that enhance/improve water resources and promote and restore ecological benefits
- Forge and strengthen relationships to leverage funding and recommend policies to assist in the implementations of projects to produce lasting water resource benefits and cost savings throughout the Greater Milwaukee Watersheds and near-shore Lake Michigan
- Implement cost-effective projects that result in measurable improvements in water quality and water resources

SOUTHEASTERN WISCONSIN WATERSHEDS TRUST

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TheJoyceFoundation

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