

A scenic view of a large body of water, likely a lake or reservoir, under a bright sky. In the middle ground, a white speedboat with two people on board is moving across the water, leaving a white wake. In the foreground, a group of people are relaxing on several colorful inflatable rafts. The water is dark blue with many bright, shimmering reflections of sunlight. The background shows a dense line of green trees along the shore.

TAKING THE FUTURE BY STORM



URBAN DEVELOPMENT STRATEGIES ARE PRESERVING IOWA'S GREAT LAKES FOR TOMORROW AND BEYOND

[story by MARY GOTTSCHALK | photography by DAVID THORESON]

It's an all too familiar sight in Iowa — torrents of rainwater that close streets, inundate baseball fields, and flood basements before reaching the storm sewers. Few Iowans witness what comes next — stormwater runoff carried into our lakes, streams, and rivers month in and month out, year after year, even when light rains pose little threat of flooding.

For decades residents of Dickinson County saw the cloudy runoff streaking Iowa's Great Lakes every time it rained. As annual throngs of swimmers, boaters, water-skiers, and anglers flocked to the region's waters each summer, land around the lake communities was increasingly converted to roads, resorts, restaurants, and residences. With every rainfall, acres of motor oil, lawn chemicals, and pet waste washed off the surfaces of towns and cities and into the natural glacial lakes, fouling the water with harmful levels of chlorophyll, nitrogen, and phosphorus; endangering fish and aquatic plant life with higher temperatures; spoiling the view with oily brown plumes; and threatening the area's livelihood.

"Growing up on Spirit Lake, I watched thick algae blooms clog the lake's surface every summer," says Tom Gronstal, a longtime resident with a home near Spirit Lake.

Researchers and volunteers at Lakeside Laboratory (a Board of Regents educational facility located on West Okoboji Lake) began to track the pollution in 1999. The news was not good.

"The Great Lakes are our economic base," notes Dennis Daly, Okoboji city administrator. "We realized a decade ago that our tourism revenue — an estimated \$200 million a year — depends on high-quality, clean water. We had to do something."

RECLAIMING THE NATURAL WATER CYCLE

"Two centuries ago, when the Iowa landscape was dominated by prairies and savannas, not more than 10 percent of the annual precipitation became surface runoff," notes Wayne Petersen,



Urban Conservationist with the Iowa Department of Agriculture and Land Stewardship. “Even that was mostly in the spring from melting snow or falling rain on frozen ground.” The rest of Iowa’s rainfall, he says, was absorbed by the environment — evaporated into the atmosphere, consumed by plant roots, or seeped into groundwater over an extended period of time.

It’s dramatically different today. Surface runoff in Iowa’s commercial areas can be as high as 55 percent of a light rainfall. Even in residential areas with yards and gardens, runoff can be as high as 30 percent, particularly in housing developments where soil is compacted and absorbs little water. “Acre for acre, water pollution from urban stormwater runoff is much more serious than from rural areas because the contaminants are so concentrated,” says Petersen.

Despite today’s widespread development, surface runoff can be substantially ameliorated, according to Petersen, who has made a career out of educating Iowans on the benefits of a land management approach that incorporates the natural cycle of water circulation into urban planning and development. Low-impact development (LID) lets Mother Nature to do much of the heavy lifting by using

organisms in the ground to break down pollutants. The force of gravity directs water toward depressed ground areas — bioretention cells that encourage water to drain through a system of sandy soil, rock beds, and tiles. As water seeps, or percolates, through the ground, materials carried in it biodegrade and are safely incorporated into the soil. What doesn’t biodegrade gets trapped in the first few inches.

“At worst, we might have to replace the top five inches of a rain garden or biocell every 20 years,” says Petersen. Effective use of LID principles, he notes, prevents further deterioration of the state’s capacity to use rainwater as a natural resource. “We can’t undo the past, but sometimes, at the margin and under the right conditions, we can actually improve things.”

DICKINSON DOES DEVELOPMENT DIFFERENTLY

In 2007 the state of Iowa published its Stormwater Management Manual, providing local governments with urban planning and design guidelines for the control of stormwater quality and quantity. A year later the Department of Agriculture and Land Stewardship created an urban conservation team led by Petersen to provide information and technical assistance on soil and water conservation methods to land development professionals, city officials, government agencies, and private landowners across the state.

Dickinson County was way ahead of the game.

At the beginning of the decade, concerned area citizens — two local real estate agents, two lawyers, an environmental educator, a local conservationist, and a journalist — advocated for the creation of a fund to protect the region’s water quality. Their efforts propelled the creation of the Dickinson County Water Quality Commission (WQC), a collaboration among the county and all 10



of its municipalities, each committing annual funding to a grant pool to support water quality improvements. “[WQC] made it possible for communities to find a way to work together the way water flows,” says Iowa Lakeside Laboratory Education Coordinator Jane Shuttleworth, referring to the common final destination for storm-water runoff in the Great Lakes region. “Water respects watershed, not political boundaries.”

Initially aiming to address both agricultural and urban water pollution, WQC ultimately narrowed its focus to urban runoff in reaction to the rapid pace of tourism-related development. The tenets of LID resonated with an audience ready to reclaim its natural resources and economic future.

“Listening to Petersen flipped the way we thought about storm-water,” explains Shuttleworth, describing a paradigm shift fueled by Petersen’s 2004 series of monthly seminars for local officials, developers, scientists, and engineers on the practical application of LID principles. “It became a resource we need to conserve and protect rather than waste to be shunted off into our lakes.”

One of the earliest applications of the new mind-set took place in the parking lot of the iconic 84-year-old Arnolds Park, home of The Legend. In 2005 the WQC contributed funds to reengineer the path of rainfall runoff from the amusement park’s three-acre-plus asphalt slab. To take advantage of the lot’s grade, porous concrete and pervious paver walkways and a series of rain gardens were installed along the parking lot’s north and west sides, capturing and pulling runoff through five feet of topsoil, compost, sand, and washing rock — and dramatically reducing flow into the storm sewer system that eventually discharges into Smith’s Bay.

That same year, the WQC combined its dollars with public and private funds to enable the purchase and conservation of land along the Spirit Lake shoreline. “The goal was to preserve the last large natural bulrush bed in the Great Lakes,” explains Tom Gronstal,

Ugly plumes (like the one earlier marring West Okoboji Lake, opposite left) signaled not only environmental but also economic distress in the Great Lakes. LID principles — including those applied to Arnolds Park’s parking lot (opposite right) and developer August Scheppmann’s Lakes Business Park (above left) — are supporting water quality improvements. Lakeside Laboratory’s Jane Shuttleworth (above right) can see the difference. Dickinson County aims to continue attracting tourists to boat, float, and play (pages 34-35) with high-quality, clean water.

URBAN SOURCES OF WATER POLLUTION

- Sediment from yards, construction sites, and stream corridor erosion
- Excess lawn chemicals and fertilizers, including phosphorus
- Pet waste/bacteria
- Oil, grease, and antifreeze
- Refuse (cigarette butts, paper wrappers)
- Construction debris (sawdust, cement, paint, turpentine)
- Sand and salt from snow and ice control
- Heavy metals
- Thermal pollution from hot runoff

Source: Polk County Soil and Water Conservation District



Iowa's Great Lakes region in Dickinson County (Silver Lake, to the west, not shown).

a contributor to the Angler's Bay project. "Those bulrushes filter rainwater runoff and also provide a nursery for small fish."

Soon after these early projects, the town of Okoboji became the first community in Iowa to enact LID zoning ordinances. "We were staking out new territory," boasts Daly of stormwater guidelines stricter than those ultimately adopted by the state. "We wanted to lead by example." Okoboji's LID guidelines, published in 2006 as recommendations, became mandatory in 2009 and require that any new development project in excess of 500 square feet be designed and constructed "to cool, treat, and filter the first 1.25 inches of rainfall from all impervious surfaces." Similar ordinances followed in several area communities.

Improvements targeted existing development as well. Okoboji's 2007 routine upgrading of several residential blocks on the east side of West Okoboji Lake employed LID principles, using specially designed breaks in the curbing to channel the first 1.25 inches of rainwater into 15 rain gardens created in front yards along the roadside. That same year, East Okoboji Beach began reconstruction of 10 blocks of a steep residential road system that had long poured contaminated stormwater into East Okoboji Lake. Today bioretention cells and rock filtration chambers along the sides of the road eliminate runoff for any rainfall less than 1.25 inches.

To date WQC has raised \$1.6 million in local funds, matched by more than \$15 million from federal, state, and other sources — enough to fuel 71 projects in the region, including water monitoring programs, control of invasive marine species, restoration of wetlands, lakeshore revegetation, and introduction of bioswales and rain gardens. In recognition of the county's efforts in improving water quality, the National Association of Conservation Districts voted Dickinson County the "best urban conservation district in the nation" in 2008.



Kayakers on Spirit Lake (opposite left) and sailors on and divers in West Lake Okoboji (above left) may not realize that their recreation has been aided by collaborative efforts, including Barb Mendenhall's residential rain garden (opposite right) and Tom Gronstal's conservation efforts along the Spirit Lake shoreline (above right).

FORCES UNITE FOR CHANGE

The private sector has taken on the challenge as well — in one case advancing stormwater management long before LID guidelines were in place. Regional developer August Scheppmann installed detention ponds in 1996 to capture and filter runoff from roofs and parking areas in an industrial park near Spirit Lake. More recently he designed new roads within a residential project with boulevards that serve as infiltration trenches, channeling any overflow into rain gardens and grassy waterways. “I’ve been using LID principles for 30 years. Good environmental practices — because they are good for the community — are good for my business,” stresses Scheppmann, who was honored by the Iowa Association of Municipal Utilities in 2007.

Rain garden installations around private homes have also contributed to water quality improvement. At least 100 private gardens across the county are now reducing stormwater runoff. One of the first belongs to Barb Mendenhall, a longtime member of the Okoboji Planning and Zoning Commission who lives near West Okoboji Lake. “I wanted to put my money where my mouth was and have a beautiful garden at the same time,” says Mendenhall, describing a 50-foot-wide swath of dogwood, hosta, lilies, and ajuga that captures runoff from the street in front of her home.

The Dickinson County success story is defined by a unique combination of forces: observable bodies of water, identifiable sources of runoff-based pollution, and a community whose economic success depends on safe, clean water. While scientists and tests and engineers and backhoes have transformed urban development and stormwater management, LID has simultaneously transformed mindscapes and landscapes.

The Great Lakes today remain safe and appealing for swimming, fishing, and boating, and tourism continues to drive Iowa’s water recreation capital. But LID’s impact extends beyond water

quality. Visitors to Arnolds Park may never notice rainfall percolating beneath the surface as they park their cars and make their way toward the park entrance. However, they can’t miss the 4,500 square feet of coneflower, rudbeckia, prairie clover, little bluestem, and some two dozen other native flowers and grasses that greets them.

Today Gronstal sits on his porch overlooking Spirit Lake and surveys the sparkling surface of the water. “Area residents realize how lucky we are to live in this beautiful area,” he says. “We owe it to future generations to not only preserve but improve this special place.”

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