A joint initiative of:

Metropolitan Planning Council
Openlands

Recommendations Report
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Before the Wells Run Dry

Ensuring Sustainable Water Supplies for Illinois

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Collaborators

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Hala Ahmed, Chicago Metropolitan Agency for Planning

Christopher Burke, Christopher B. Burke Engineering Ltd.

Richard Carlson, Carlson Environmental, Inc.

Jim Bilotta, Aqua America

Mary Ann Dickinson, Alliance for Water Efficiency

Nancy Erickson, Illinois Farm Bureau

Molly Flanagan, Joyce Foundation

Gregory Furda, Sidley Austin LLP

Scott Goldstein, Teska Associates

Timothy Loftus, Chicago Metropolitan Agency for Planning

John McDonough, Sidley Austin LLP

James E. Mann, Illinois Clean Energy Foundation

David Rankin, Great Lakes Protection Fund

Joe Schatteman, Illinois Municipal League

Paul Schuch, Kane County

Karla Olson Teasley, Illinois American Water

Paula Wolff, Chicago Metropolis 2020

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Project Principals

Lenore Beyer-Clow, Policy Director, Openlands

Josh Ellis, Associate, Metropolitan Planning Council

Joyce O'Keefe, Deputy Director, Openlands

Project Team

Kim Grimshaw Bolton, Communications Director, Metropolitan Planning Council, Managing Editor

Mandy Burrell Booth, Asst. Communications Director, Metropolitan Planning Council, Media Outreach

Katherine Bucar, Communications Associate, Metropolitan Planning Council, Graphic Design

Kristi DeLaurentiis, Manager of Local Community Relations, Metropolitan Planning Council, Outreach

Elizabeth Frantz, Research Assistant, Metropolitan Planning Council, Research

Jessica Hyink, Research Assistant, Metropolitan Planning Council, Research

Stacy Meyers-Glen, Policy Coordinator, Openlands, Research

Jennifer Mullman, Development Director, Openlands, Development

Charles Mutscheller, Communications Director, Openlands, Media Outreach

Chrissy Mancini Nichols, Manager of Fiscal Policy, Metropolitan Planning Council, Research

Julie Peterson, Intern, Openlands, Research

Kirsten Powers, Development Director, Metropolitan Planning Council, Development

Peter Skosey, Vice President, Metropolitan Planning Council, Outreach

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COVER PHOTO: CENTER, KANE COUNTY; BOTTOM, FROM LEFT TO RIGHT JANE HORNSTEIN, OPENLANDS (TWO PHOTOS); ANDREA NEWBERRY; MILWAUKEE METROPOLITAN SEWERAGE DISTRICT

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PHOTO: ANDREA NEWBERRY

Executive Summary

A sustainable water supply is the lifeblood of thriving communities and regions. Access to clean water is a necessity for equity of opportunity and a high quality of life. Farms and factories require a dependable supply for economic production, while forests and wetlands need it for ecological integrity.

However, Illinois' water supply is challenged on many fronts. The single largest stress on Illinois' shared water resources is population growth. Economic development will fuel increased demand and create pressure on finite water sources. Aging infrastructure and overuse lead to wasteful losses of supply. Waste and inefficient use affect both supply and demand, and, left unchecked, could speed the onset of shortages in some communities.

Water waste is a problem we can solve through local conservation, regional consensus-building and planning, and state financial and technical assistance. Water scarcity is a crisis we must avert.

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Precipitated by recommendations from the Metropolitan Planning Council (MPC) and Openlands' 2005 *Troubled Waters*, a 2006 gubernatorial executive order established two pilot regional water supply planning groups. The order also promised the creation of a statewide framework for regional water supply planning to ensure future supplies will be sufficient to support a growing population, our economy, and the ecosystems upon which we rely. This report, the third joint set of recommendations from MPC and Openlands, outlines a framework built on two essential truths:

- **Water supply management is primarily local.** The needs and insights of public (typically municipal) and private water supply managers must continue to inform regional priorities and be reflected in more flexible and responsive state policy. At present, however, local communities often do not have the flexible resources they need to ensure enough water for future population growth, economic productivity, and healthy ecosystems, much less to implement regional strategies.
- **Water supplies are inherently regional.** Rivers, aquifers and pipes cross political borders, while rain falls where it will. The regional level is right for sharing data, setting common goals, and establishing consensus on sustainability strategies that match the scale of the supply in question. Illinois must continue the existing regional planning groups and establish additional groups to cover the remaining geography of the state.

Project Background

The Metropolitan Planning Council and Openlands have been vocal, visionary advocates of regional water supply planning as a means to statewide conservation of water resources for several years. This report is the most recent collaboration in this ongoing partnership. Previous activities include:

Changing Course (2003) — Examined the relationship between development practices and water quality and quantity in a 12-county northeastern Illinois region.

Troubled Waters (2005) — Urged the state to establish a statewide framework for regional water supply planning, based on data, integrated management of surface water and groundwater, and inclusion of water demand analysis in land use planning.

"Beyond Sprinklers and Showerheads" (2008) — A day-long conference to examine water supply planning as a conservation mechanism. The white paper prepared by Jack Wittman and Wittman Hydro Planning Associates for the conference was the basis for this paper. Dr. Peter Gleick, president of the Pacific Institute, delivered the keynote address.

Comprehensive research and forecasting, consensus-driven regional planning, and state support for local plan implementation can help avoid future conflicts and assure water sustainability for Illinois.

Illinois is piloting two regional water supply planning groups — one in 11-county northeastern Illinois and the other in the Mahomet Aquifer region of east-central Illinois. State agencies such as the Ill. State Water Survey (ISWS) have provided invaluable support to those planning processes, and recent state legislation will generate critical annual data on water use. As the initial regional planning cycle (established by the 2006 executive order) nears completion in late 2009, the value of a coordinated statewide framework for regional water supply planning is stronger than ever. However, the mechanisms to ensure implementation of the regional plans and consensus-driven choices remain elusive. The pilot groups and their lead organizations — the Chicago Metropolitan Agency for Planning (CMAP) and Mahomet Aquifer Consortium — have created models for future planning. Additional regional water supply planning groups must be established to cover the remainder of the state. New groups will inherit invaluable lessons from the pilot groups. Ultimately, all regional planning groups will need long-term support from the state and federal levels to encourage and reward communities that implement consensus-driven strategies from the regional plans.

This report recommends coordinated planning and implementation strategies that will capitalize on the work of the pilot regional planning groups, integrate regional plans with state and local practices, and ensure the long-term sustainability and efficient use of our finite, fragile water resources. A bottom-up approach supported by local management of water supplies is necessary to ensure state policies, programs and investments support the regional planning process, and coincide with local support of data-rich and stakeholder-driven regional water supply plans.

Roles in Sustainable Water Supply Management

The 2006 executive order that established the pilot planning groups also called for a new, statewide framework of regional planning to ensure conservation and efficient use of water. Illinois needs to create a process for water supply planning that coordinates responses to what are now fragmented issues (i.e. groundwater vs. surface water, water quality vs. water supply), and responds efficiently to potential water challenges.

The proposed framework below is intended to prevent water scarcity through goal-setting, regional planning, coordination, and incentives.

In particular, continued regional planning in northeastern Illinois is essential to the economic well-being of the region and state. The

long-term economic development of the region hinges on consistent and coordinated water resources planning which assures no communities experience water shortages. It is important to have a forum to equitably resolve water differences and disparities. The Northeastern Illinois Regional Water Supply Planning Group is the most effective and efficient means of ensuring local input, regional consensus, and responsive state financial and technical assistance.

State Role

The appropriate role for the State of Illinois is to facilitate sustainable water supply planning and management in a way that respects the regional nature of water supplies and local nature of water supply management.

- The State of Illinois should continue to support the efforts of existing regional water supply groups as they move from planning into implementation, and in subsequent rounds of planning. The state must dedicate funding to support regional water supply planning, increase the capacity of agencies such as IDNR and ISWS to provide data and technical assistance, and tailor its programs to meet unique local needs.
- By Jan. 1, 2011, the state should establish additional regional water supply planning groups to cover the remaining geography of Illinois. Comprehensive water supply planning needs to include every Illinois community.

The two existing regional planning groups can provide guidance, templates, and significant lessons to new groups, greatly enhancing the efficiency of new efforts.

- Once additional groups have been established, the governor and IDNR should convene a body to act as a water supply planning coordinating council. This non-regulatory, bottom-up coordinating group would provide a forum for local water supply managers and other stakeholders from throughout the state to discuss coordinated action for sustaining limited water supplies. The priorities of local water supply managers must be reflected in state financial and technical assistance, and state programs must respond to and be supportive of local and regional needs.
- This advisory coordinating council would meet on a biannual basis to review the state's financial and technical assistance programs, such as the revolving loan funds managed by IEPA. It also would provide recommendations to the governor, General Assembly, state agencies, individual regional planning groups, and other stakeholders on methods to facilitate implementation of stakeholder-driven regional water supply plans.
- This council would be comprised of representatives from each regional water supply planning group, which include local government officials and other stakeholders. Each regional group would determine its own representatives for the council, making all efforts to represent that region's distinctive water context fairly and equitably. Northeastern Illinois is the population center of the state, and grapples with distinct challenges to several water supply sources. As such, the representative cadre from this region

In 2005 — a drought year — Illinois lost an average of 588 million gallons of our allowable Lake Michigan diversion a day as stormwater runoff. We paid to treat every gallon of that runoff as if it were wastewater, and then sent it downstream to the Gulf of Mexico.

588 million gallons is nearly twice the total groundwater northeastern Illinois pulls from aquifers in a day. Inefficient use of our existing resources must be resolved collaboratively.

PHOTO: KANE COUNTY

PHOTO: LORI VALUS

should be proportionally larger than those of other planning groups.

- IDNR should continue to provide financial and technical assistance to the regional water supply planning groups, and prepare a comprehensive state water supply plan based on the regional plans. This state plan would be submitted to the water supply planning coordinating council for adoption, and identify overarching priorities of state-level concern and corresponding strategies to address them. Additionally, IDNR would continue to manage the Lake Michigan allocation system, with the explicit goal of maximizing the efficient, equitable use of the allocation.
- ISWS and the Ill. State Geological Survey (ISGS) should continue to provide timely research for water supply planning that evaluates and accounts for dynamic factors such as availability of water for population growth, and impacts of drought and climate change. The state should increase funding to ISWS and ISGS to ensure the highest level of comprehensive and timely data.
- IEPA should ensure the guidelines and goals of the revolving loan funds prioritize sustainable water supply management, as well as water quality. Local communities seeking state funding should be rewarded for making investments consistent with regional plan recommendations, cooperating across political boundaries on shared water issues, and simultaneously protecting water quality and supply. IEPA should prioritize sound state funding applications that have been recommended by regional planning groups.
- The state should designate an additional $3 million a year to fund the work of regional water supply planning groups and additional staff capacity at IDNR, IEPA, ISWS, and ISGS for research and technical assistance. Additionally, the state should designate $20 million a year to spur implementation of conservation, efficiency, infrastructure modernization, and other consensus-driven strategies from the regional water supply plans. Ensuring a sustainable water supply should be a priority of the State of Illinois. Research, planning and implementation are all equally necessary, and should be recognized as true costs of providing safe, abundant water.
- The state could signal its unequivocal commitment to sustainable local management and regional planning of Illinois' water supplies through an annual appropriation from the General Revenue Fund. However, given enormous pressures on that fund, additional resources may be necessary. In that event, the state should develop equitable, statewide revenue sources that encourage conservation while simultaneously generating funding to dedicate to water supply research, planning and implementation.

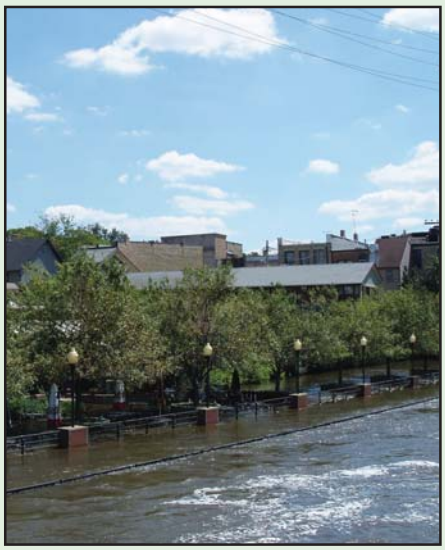
Regional Planning Group Role

While water supplies are managed at the local level, planning for supply conservation must be done at the scale of the resource. Regional planning and the resulting stakeholder-driven strategies, to be implemented by local governments or investor-owned utilities, should form the basis of sustainable water resources management in Illinois.

- To complement the work of the two existing pilots, the state should create additional regional water supply planning groups. Each would develop water supply plans with strong local input, and follow IDNR's guidance on appropriate process and content. These regional plans would form the backbone of a comprehensive state plan.
- Regional planning groups comprised of municipal leadership, county representatives, and stakeholders, with backgrounds in industry, agriculture, and environmental protection, should review local applications for state funding and recognize projects consistent with established regional plans.
- The regional water supply planning groups should take an active role in education, not only on the details of consensus-driven regional plans, but the most current data on supply and demand, conservation and efficiency strategies, and potential impediments to local and regional sustainability practices.

Local Role

- Units of local government should participate in regional planning and implement the resulting data and stakeholder-driven sustainability strategies, including integrating water supply analyses into their land use, zoning and comprehensive plans.
- Communities whose water supply management goals and plans are consistent with regional and state priorities should be rewarded with priority access to state financial resources.
- Municipal and county partnerships that address shared water concerns — such as rapid population growth, depleted water resources, and stormwater runoff — should be encouraged and rewarded by the state. Interjurisdictional, stakeholder-driven strategies, such as those in Kane, Kendall and McHenry counties, would lead to increased cooperation between local units of government, funding opportunities for municipalities, and, most importantly, conservation of shared water resources.



The Fox River, seen here flooding in 2007, is a valuable water supply resource for many communities in northeastern Illinois. Protecting its water quality, as well as ensuring water levels are sufficient to support both wildlife and public consumption, will require a coordinated, watershed-based effort. Coordinated stormwater management can help minimize the likelihood of flooding, reduce property damage, and mitigate contamination. PHOTO: KANE COUNTY

Recommended Strategies and Policy Initiatives

Different communities have different challenges. Many older, more urbanized communities struggle to maintain aging, less efficient water delivery systems. Some rapidly growing communities experience mismatches between the location of new development and availability of existing infrastructure and sufficient water supplies. Historically agricultural communities must balance traditional farming practices with the expansion of residential communities that have different water consumption patterns and needs.

Whatever a community's specific water circumstances, providing ample supplies for residents, businesses and ecosystems is a fundamental responsibility of good governance. Communities that share water resources — a river, aquifer, or even Lake Michigan and its manmade distribution system — must work together to manage those assets. Solutions must match the scale of the problem. The State of Illinois needs to support regional consensus-building, respond to local needs

Land use planning, design guidelines, and zoning codes can affect water supplies positively or negatively. Requirements or incentives for open space preservation, onsite stormwater management, and vegetation standards can help recharge aquifers and reduce strain on public infrastructure. The Prairie Crossing community in Grayslake, Ill., uses many of these strategies.

PHOTO: RICHARD MARINER

by rewarding communities for participating in these planning processes, and encourage implementation of resulting conservation and efficiency strategies.

In many ways, Illinois is moving in the right direction. Many communities are reinvesting in existing infrastructure, encouraging residents to use water more efficiently, and working with neighboring municipalities to protect shared resources. Illinois' per capita consumption of Lake Michigan water has dropped in recent years, and total consumption is now below our allowable limits.

However, considerable challenges continue to mount. Northeastern Illinois alone is expected to add 3.3 million people by 2050, with high levels of growth in areas without existing infrastructure to tap the state's allowable diversion of Lake Michigan water. Many communities throughout the state rely on dwindling groundwater and surface water resources, and much of Illinois faces the immediate challenge of costly, wasteful and inefficient use. The State of Illinois provides insufficient financial and technical assistance to communities and regions tackling water supply challenges. Furthermore, the state has not funded the regional water supply planning groups for FY2010 and beyond.

Water supply management is fundamentally a local concern, while water supply planning is inherently regional. The pilot regional water supply planning groups have shown that regional coordination and consensus is possible. Regional planning will need resources that encourage local management of water supplies to align with agreed-upon data, goals and strategies. Moreover, local and regional stakeholders must have regular opportunities to inform state policy and how it supports or hinders their sustainable management of shared water supplies.

MPC and Openlands believe the following strategies and policy initiatives will ensure regional coordination and local action to protect Illinois' finite water supplies as efficiently and effectively as possible: The State of Illinois must consistently provide financial support to regional planning groups, and ensure its investments in technical assistance to local communities are more responsive to local needs and adaptive to varying water supply contexts.

Manage Demand and Rethink Supply

Strategies that help communities manage demand for water, such as conservation pricing, can significantly reduce stress and strain on water supplies and infrastructure, often eliminating or delaying the need to develop of new water supplies or expand infrastructure capacity. Additional supply can be "created" by saving water through conservation strategies such as efficiency upgrades to infrastructure and rate structures that help end users account for the full cost of water delivery. As existing water supplies are further strained, it is essential that we look to alternatives. Techniques such as rainwater harvesting for indoor use in flushing toilets reduces strain on both existing water supplies and infrastructure.

- The State of Illinois and regional planning groups should encourage and support the development of demand management

strategies, and provide incentives for municipalities and utilities to implement these systems.

- Strategies such as comprehensive water meter installation, plumbing retrofits, and water supply trading should all be permissible and encouraged through the state revolving loans managed by the Ill. Environmental Protection Agency (IEPA).
- The state, regional planning groups, and local units of government should explore and expand strategies to harness rain water, reuse stormwater and treated wastewater, and otherwise expand supply.

Invest in Goal-Oriented Infrastructure

Decades of insufficient reinvestment and modernization — often due to rate structures that were artificially low and did not account for the real cost of water service — have created a backlog of repair needs. Implementing full-cost pricing would help to minimize future infrastructure issues. Substantial federal and state investment is needed to make up for historic shortfalls. There will need to be a period of transition from relying on loans or grants, to establishing efficient rate structures that will meet the cost of sustainable water supply management. In addition, the cost of repaying federal and state loans should be accounted for in water rates. Communities should not have to use unrelated revenue sources to repay those debts. Continuing to depend on infusions of federal and state capital, and then repaying those loans with revenues generated from property or sales taxes, does not encourage efficient use or conservation of finite water sources. Water bills should cover the actual cost of water service.

- To begin to resolve the backlog of needed infrastructure improvements, the State of Illinois, regional planning groups, and local communities should prioritize reinvestment in existing water infrastructure, with the goal of substantially increasing water efficiency. The state should encourage communities and water utilities to conduct comprehensive planning to establish and prioritize capital investment programs according to regional water supply goals.
- Communities need more flexible funding to meet the range of their water concerns; the state revolving loan funds' ranking criteria should explicitly encourage projects that are consistent state goals for water quality and regional strategies for sustainable supply.
- Because the state water revolving loan funds currently require repayment and, typically, a local match, many poorer communities struggle to access these funds. The State of Illinois should explore a new competitive grant program — with rigorous project selection criteria — so that innovative communities or interjurisdictional partnerships can access water funds that clearly advance sustainability goals.

Link Land Use and Water Availability

Land use patterns and water availability significantly impact one another, but this synergy is not always incorporated into policy or land use decisions. While comprehensive plans provide communities with

PHOTO: LORI VALUS

PHOTO: ILLINOIS AMERICAN WATER

Illinois' allowable diversion from Lake Michigan is 3,200 cubic feet per second. This does not mean that much is pumped out of the lake for public consumption. Other uses, such as navigation on the Chicago River, require lake water, and any stormwater that falls in the diversion area and does not re-enter the lake counts against the diversion limit. If we want to pump more water in the future, we will need to reduce the amount of water currently diverted for other uses.

PHOTO: TERRY EVANS

a vision for long-term sustainable growth, zoning and building codes have equally significant influence on water consumption.

- The state should encourage and provide incentives to units of local government to create or update comprehensive plans and zoning ordinances informed by current analysis of water supply and demand, and designed to make efficient use of existing water supplies.
- The state also should provide municipal and county partnerships with both incentives and the statutory authority to implement interjurisdictional water management plans should they choose to do so.

Optimize the Lake Michigan Diversion

Northeastern Illinois may be divided by distinct water supplies, but it is united by transportation networks, greenspace corridors, commuter flows, and more. In the eye of the global marketplace, it is a single economic unit. A scenario in which some parts of the region experience water shortages, while other areas waste finite resources, is not a recipe for long-term regional prosperity. The onus is on both current Lake Michigan communities to manage their allocations more efficiently, and current groundwater and surface water communities to conserve dwindling resources. The two are interrelated and should pursue planning together.

Conservation of Lake Michigan water is improving — in 2005 (the most current accounting report), Illinois diverted approximately 85 percent of its allowable total, down from 120 percent in 1993 (see sidebar on page 10). Higher efficiency standards for plumbing fixtures, reductions in stormwater runoff, and repairs to leaks in existing infrastructure all have played a part in reducing per capita consumption. However, with both anticipated population and business growth, as well as the potential for greater and more intense precipitation due to climate change effects, the need to build upon this momentum is clearer than ever. Lake Michigan water is a finite resource, and Illinois cannot continue to take it for granted.

Moving more groundwater-dependent communities onto the Lake Michigan allocation may be necessary, but should not preclude every reasonable effort to increase efficiency of delivery systems, encourage conservation by end users, and protect existing supplies. Illinois' current water infrastructure is already underfunded and insufficiently maintained — adding pumps and extending pipes only will exacerbate that need. However, should it become necessary to

significantly expand the Lake Michigan allocation area, doing so will require a coordinated effort by the state, region, and local governments. The City of Aurora, for instance, which currently gets half of its water from the Fox River and half from groundwater, already is exploring the possibility of working through the DuPage Water Commission to receive Lake Michigan water. This blending of supplies likely will be the norm going forward, and will require the same kind of foresight and dialogue with regional neighbors exhibited by Aurora's leadership (see sidebar on page 23).

A particular concern is, as of 2005, a full 27.7 percent of Illinois' current Lake Michigan diversion is lost as stormwater.[1] Before the reversal of the Chicago River, rain falling in the Lake Michigan diversion area ultimately flowed into the lake. However, the river reversal fundamentally altered the watershed. Now, much of that rain water ultimately flows to the Gulf of Mexico. In 2005, Illinois lost an average of 588 million gallons of our Lake Michigan diversion a day — nearly twice the amount of groundwater northeastern Illinois withdraws from aquifers every day. The percentage of the diversion lost as runoff varies annually with precipitation levels and is influenced by population growth and the amount of impermeable surfaces included in development. If more of that water re-entered the watershed and the lake, or was captured and reused, it would provide ecological benefits, expand our water supply, and reduce strain on existing infrastructure. Instead, it inundates sewer systems, resulting in overflows, release of untreated wastewater, and immense and wasteful consumption of money and energy.

- The State of Illinois, Northeastern Illinois Regional Water Supply Planning Group, and local governments should create policies and practices to reduce stormwater loss from the Lake Michigan diversion by 50 percent by 2020. Doing so will require multiple strategies — consumption of treated stormwater, greater infiltration into the ground, and return of water to the lake. Reduction of stormwater runoff would enable northeastern Illinois to withdraw additional water from Lake Michigan for consumption and assist in recharging lake levels.
- The Chicago Metropolitan Agency for Planning and Northeastern Illinois Regional Water Supply Planning Group should plan, coordinate and oversee a joint effort to reduce stormwater loss from the Lake Michigan diversion and optimize use of the newly available water.
- This plan should guide state, regional and local investment in the Lake Michigan diversion area, with strategies supported by capital investment, financial incentives, and technical assistance.

Metropolitan regions must employ a variety of both hard infrastructure, such as Milwaukee's deep tunnel system, and green infrastructure, such as protected wetlands. Cost-benefit analysis and established goals for water quality, supply and protection of natural resources should drive investment decisions.

PHOTO: TOP, MILWAUKEE METROPOLITAN SEWERAGE DISTRICT, BOTTOM, RICHARD MARINER

1 Unless otherwise noted, all references to the Lake Michigan diversion are based on U.S. Army Corps of Engineers' *Lake Michigan Diversion Accounting: Water Year 2005 Report*. Further details on Illinois' diversion and allocation can be found in IDNR's 2009 *Lake Michigan Water Availability: White Paper for the NE Illinois Regional Water Supply Planning Group*.

Lake Michigan Diversion vs. Allocation

Illinois' Lake Michigan diversion and allocation are related concepts, but not the same. Due to the reversed flow of the Chicago River, a defined portion of northeastern Illinois — the diversion area — now loses water that previously would have flowed into Lake Michigan (see map on facing page). A U.S. Supreme Court decision in 1967 set Illinois' diversion at 3,200 cubic feet per second (cfs).

The diversion includes rainfall — stormwater — that would have flowed into one of the region's streams or rivers, then to Lake Michigan. Any stormwater that is captured by the diversion area's sewer systems, gets treated, and is eventually released downstream, counts as water Illinois has taken out of the lake, despite the fact that it was never put to good use.

In 2005, Illinois diverted 85 percent of its allowable total from Lake Michigan. Pumpage for treatment and use, as well as stormwater runoff, account for the majority of the actual diversion. Other components of the diversion include water for navigation on the Chicago River, water that leaks from Lake Michigan into the locks, and of course, water that is pumped out for domestic purposes.

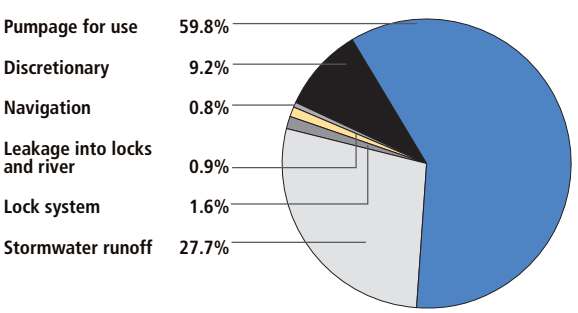
In the 1990s Illinois diverted as much as 120 percent of what is allowed. The decrease in recent years was an intentional effort to repay Illinois 'water debt' to the Great Lakes. Illinois' use of Lake Michigan water is improving, but more work needs to be done.

Reducing any one component of the diversion, in effect, increases the amount of water that could be used for another purpose or simply left in the lake. The converse also is true. In rainier years than 2005 (a notable drought year), the amount of stormwater increases, so that portion of the diversion grows. With population growth increasing the need for domestic pumpage, and climate change generating more frequent incidents of heavy rain, the ability of the Lake Michigan diversion to serve northeastern Illinois' needs will be tested. It will be essential to eliminate waste and inefficiency.

IDNR is responsible for allocating set amounts of pumped Lake Michigan water to communities in the region. The allocation (service) area is considerably larger than the diversion area, and changes as communities move onto or off of Lake Michigan water. It is, in essence, a network of pipes and pumps. Communities seeking to receive Lake Michigan water must apply to IDNR, prove it is the most economically feasible source of water, and show some evidence of their ability to manage the water responsibly.

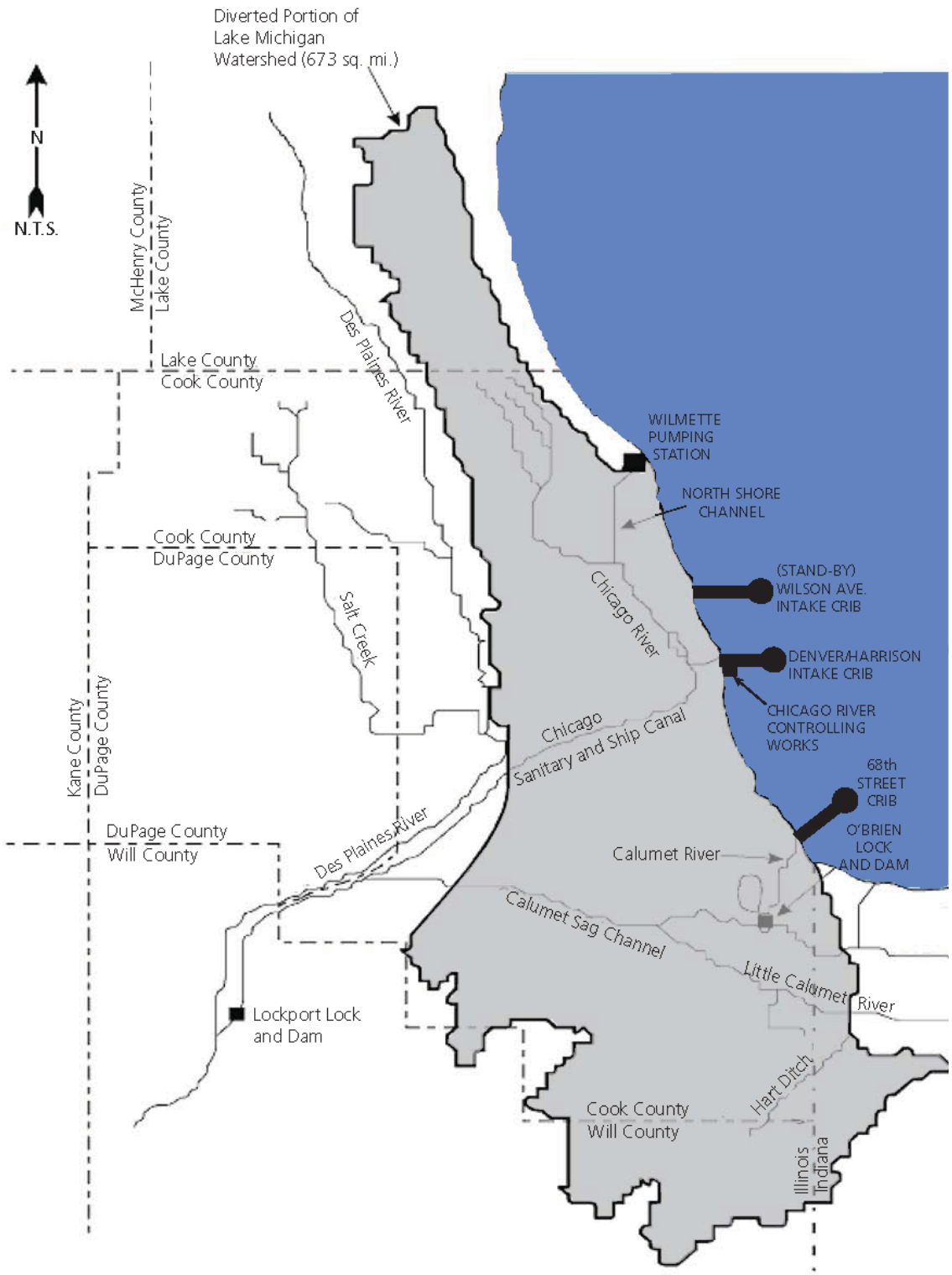
Illinois' diversion is set by federal statute and will not increase in the foreseeable future. Allocation of Lake Michigan water is much more flexible. Illinois is limited to its 3,200 cfs, but a greater portion of that could be used for domestic purposes such as drinking and landscaping irrigation. If measures are taken to reduce other portions of the diversion, more water may become available for future population growth or allocation to communities struggling with groundwater challenges. Given the defined limits of Illinois' diversion, conservation and efficiency of both the total diversion and individual allocations is paramount to long-term regional sustainability.

Breakdown of Illinois' Lake Michigan Diversion, Water Year 2005



SOURCE: U.S. Army Corps of Engineers' *Lake Michigan Diversion Accounting: Water Year 2005 Report*.

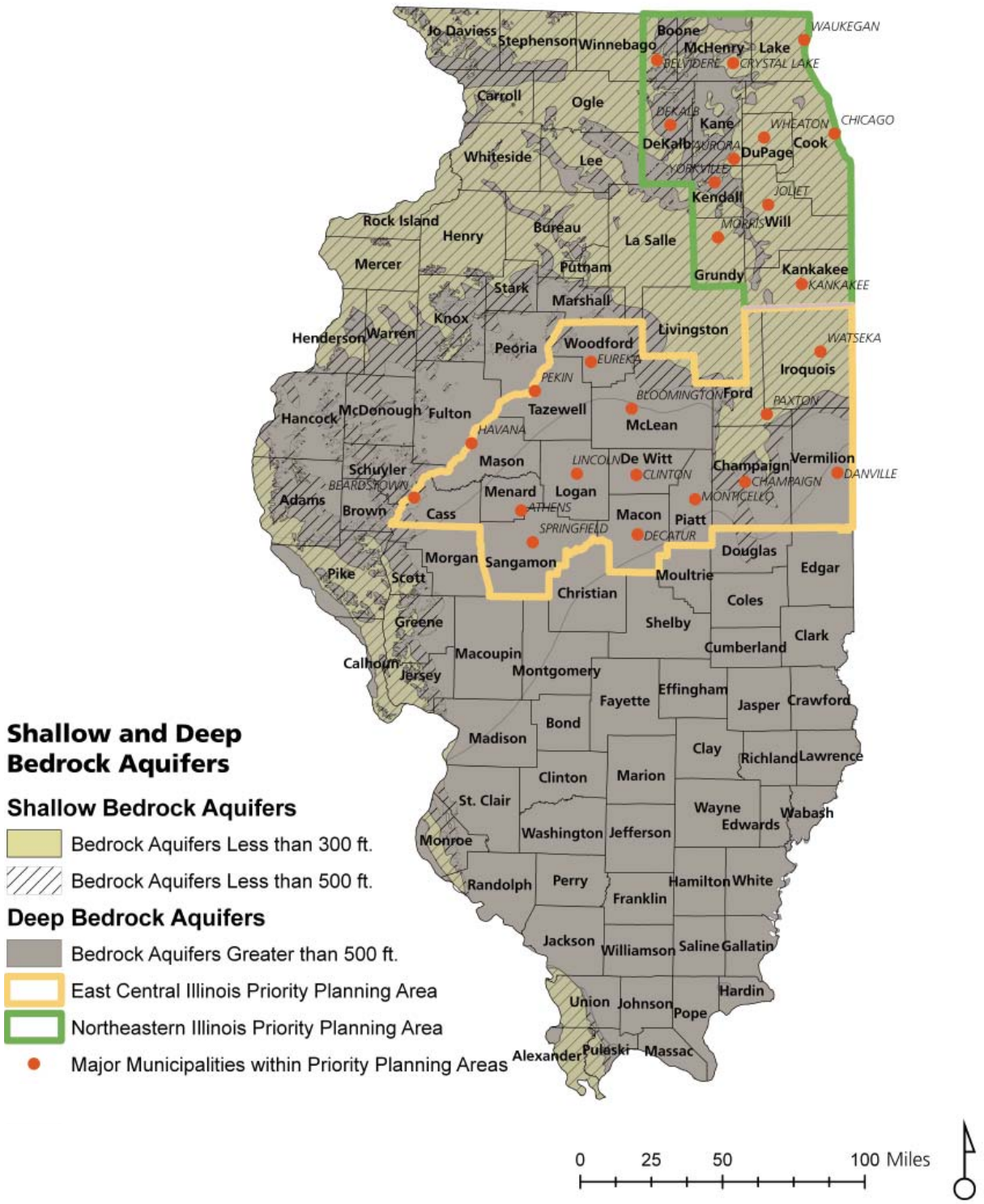
Illinois' Lake Michigan Watershed Diversion Area



SOURCE: Army Corps of Engineers' *Lake Michigan Diversion Accounting: Water Year 2005 Report.*

Illinois Water Supplies: Shallow and Deep Bedrock Aquifers

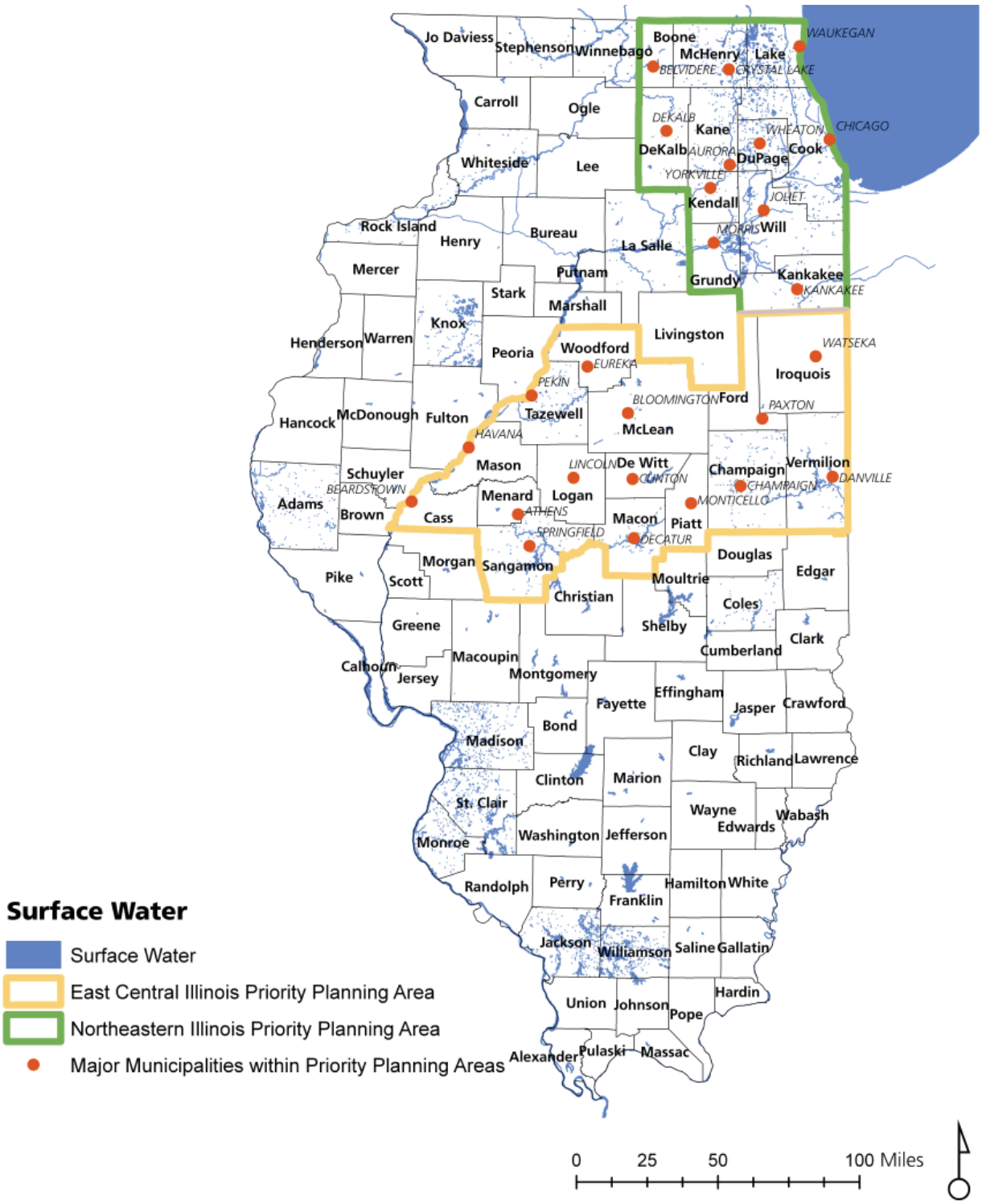
Deep bedrock aquifers lie underneath the entirety of Illinois, at varying depths greater than 500 feet. Most of northern and western Illinois also have access to shallow aquifers. Some areas in northern and western Illinois, such as Henry, Will and Winnebago counties, have access to multiple layers of bedrock aquifers. In contrast, the majority of central, eastern and southern Illinois has access only to the deepest bedrock aquifers. However, not all bedrock aquifers are able to provide quality drinking water equally. In general, the deeper the aquifer, the more likely it is to contain saline water, barium, radium, or other elements that increase treatment costs.



SOURCE: ILLINOIS STATE WATER SURVEY

Illinois Water Supplies: Surface Water

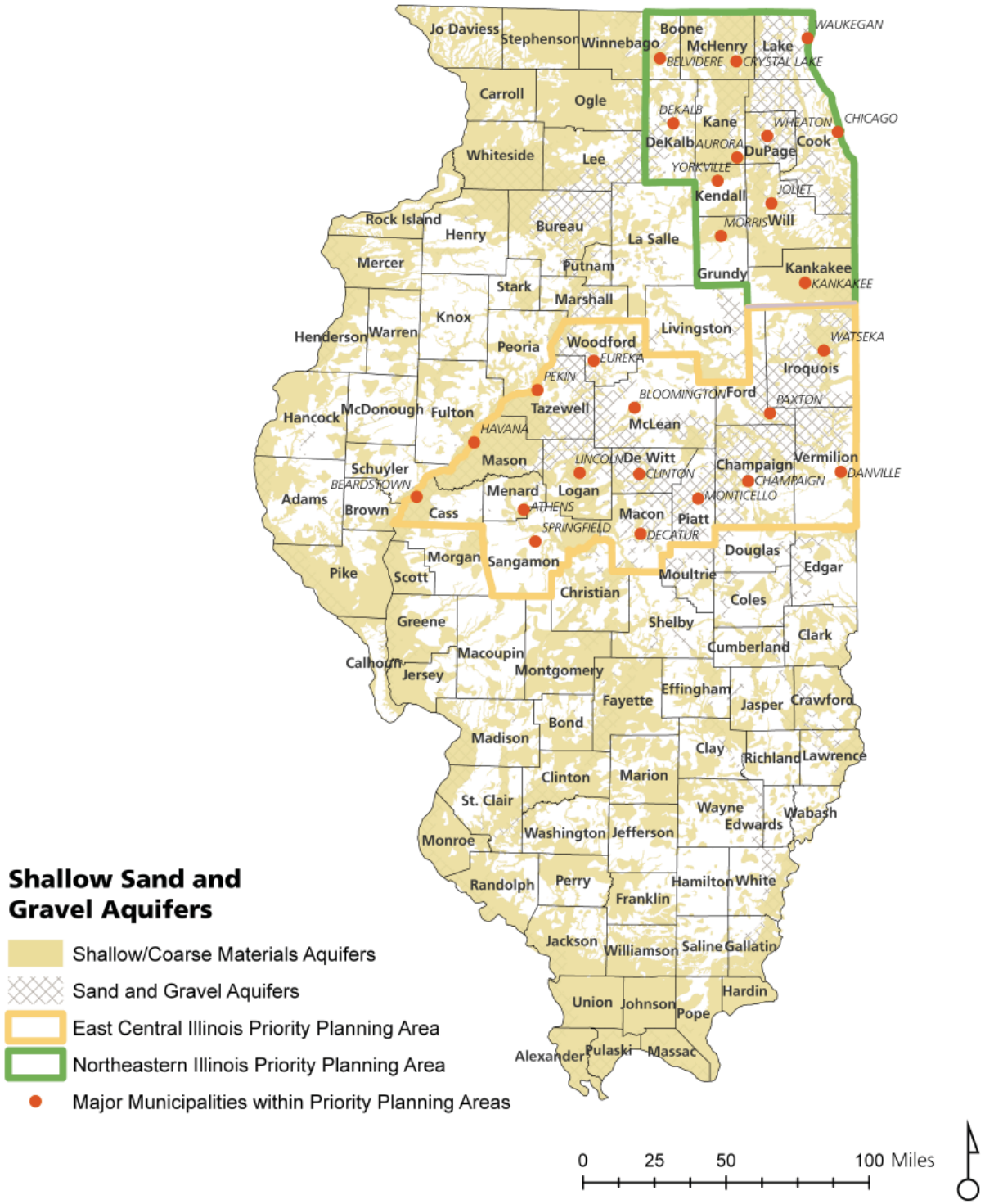
Most areas of Illinois have access to surface water, but not necessarily as a resource for public consumption. Over-consumption of surface water can negatively impact interconnected wetlands and shallow aquifers, harm wildlife, and lead to water quality problems. Moreover, many parts of Illinois rely on hydroelectric power, which requires stable and abundant instream flow to power turbines. Manmade reservoirs, which do not appear on this map, can store surface water and complement other resources, but are costly to build and maintain.



SOURCE: ILLINOIS STATE WATER SURVEY

Illinois Water Supplies: Shallow Sand and Gravel Aquifers

Shallow sand and gravel aquifers recharge faster than bedrock aquifers, but are interconnected with surface water and wetlands, which often exist directly above or proximate to these resources. The interior of Illinois has less access to these shallow resources, putting more pressure on deep bedrock aquifers, manmade reservoirs, and surface water.



SOURCE: ILLINOIS STATE WATER SURVEY

Principles of Water Supply Planning

Illinois' water supply must be efficiently used and conserved to ensure a vibrant economy, healthy ecosystems, and a high quality of life for all. To date, Illinois does not have a state water supply plan based on sound, current, comprehensive data; nor does it have water use and conservation goals for state agencies and other levels of government.

The State of Illinois, regional planning groups, and local units of government should adopt a coordinated and sustainable approach to water resource planning that is:

Conservation-oriented: Making better choices about how we use our current water supply is typically more cost-effective than expanding water supplies. Conservation pricing, infrastructure modernization and repair, efficient building design, and stormwater reuse are conservation strategies that will, help to increase available supply in Illinois.

Regionally-driven and stakeholder-informed: Water use, demand and supply differ throughout the state, so planning must be tailored to the water resources within each hydrologic region. Water resources cross municipal borders, often leading to competition, redundancy in planning, and inconsistency in conservation measures. Conservation and efficiency plans should be built from the ground up, integrating diverse concerns into stakeholder-driven regional plans that reflect local needs and pursue shared goals.

Better integration of land use decisions with water supply analysis is essential. Wide swaths of pavement and expansion of public infrastructure will affect water supplies, stormwater management, and government budgets. Illinois must take steps to ensure land use decisions take into account projected water supply and demand to ensure sustainability for future generations.

PHOTO: RICHARD MARINER

Proactive and responsive: It is far less expensive to adopt strategies that minimize the likelihood of water shortages and floods than it is to implement reactive solutions in moments of crisis. A regular schedule of planning creates effective water supply programs that adapt and adjust to new conditions and issues on an ongoing basis.

Fact-based: Sound water supply planning and protection requires current, comprehensive data on water consumption and source recharge. Where regional priorities are inconsistent with known science, the State of Illinois should intervene.

State-supported: Water supply planning must be an ongoing process, backed by a predictable stream of funding, and paired with incentive programs and technical assistance to reward and support local communities implementing regional plan strategies.

Consistent with the Great Lakes Compact: Section 4.2 of the Compact requires all states receiving Great Lakes water to create 'Water Conservation and Efficiency Programs.' The state water supply plan, regional plans, and the Compact-required program should be consistent, eliminate redundancy in planning, and prevent potential conflicts.

Integrated with land use planning: Land use patterns differ within and between regions, but the relationship between development and water supply is a constant. Land use policies affect supply and demand for water. As documented in MPC and Openland's 2005 report, *Troubled Waters*, while some counties recognize the need for water supply plans, most local land use plans in Illinois do not evaluate the water demand of proposed land uses. Better integration of water demand in land use planning is an absolute necessity, both to reduce the cost of new infrastructure and ensure future water availability.

Practical: Water supply planning needs to be grounded in specific implementation strategies and mechanisms. The implementation strategy must reflect the nature of the problem, and clearly target established sustainability goals.

Accountable and transparent: Water supply planning at any level — federal, state, regional, local — should be a self-reflective process that includes frequent monitoring and assessment of progress toward established goals. Project selection criteria employed at all levels will ensure public dollars are used to reach defined goals. Ongoing performance measurement will indicate whether water supply management decisions have been successful.

PHOTO: OPENLANDS

Before the Wells Run Dry:
Ensuring Sustainable Water Supplies for Illinois

Introduction

Illinois' water supply is challenged on many fronts: population growth and the spread of development, in addition to agricultural and industrial use, will fuel increased demand. The likely consequences of climate change also will challenge future supply. Waste and inefficient use affect both supply and demand, and left unchecked, could hasten water scarcity. To avoid future shortages, we must act now to promote and coordinate conservation and efficient use of shared water resources.

Illinois' water supply is challenged on many fronts: population growth and the spread of development, in addition to agricultural and industrial use, will fuel increased demand. The likely consequences of climate change also will challenge future supply. Waste and inefficient use affect both supply and demand, and left unchecked, could hasten water scarcity. To avoid future shortages, we must act now to promote and coordinate conservation and efficient use of shared water resources.

Illinois and its communities need a stakeholder-driven system of water management focused on sustainability, i.e., sufficient water quantities and quality to meet the needs of humans and ecosystems both in the present and future. Prudent and efficient use of existing supplies should be the basis for sustainable water management, rather than costly expansion of supply. Our public policies should encourage these practices. Communities need the right tools and techniques for conservation, efficiency upgrades, and rehabilitation of aging infrastructure. Moreover, solutions must be planned at the appropriate scale. Water defies political boundaries, flowing from town to town, county to county, state to state. Interjurisdictional coordination, planning, investment, and implementation are vital for a sustainable water supply.

To ensure future water supplies will be sufficient to support a growing population, as well as our economy and the environment, Illinois needs a framework for regional water supply planning and local implementation. This framework should include state policies and incentives for water conservation, efficiency, and infrastructure investment. The state should reward local implementation of regional strategies and provide communities with flexibility in how they meet sustainability goals. Local insight, regional coordination, and state investment can guide decisions at all levels toward a set of common goals, but acknowledge geographic variations that require tailored approaches such as in the

Running sprinklers while it rains wastes potable water and strains sewers, some communities work to reduce this waste. Regional consensus and coordination on water use decisions will have greater impact than actions by individual communities.
PHOTO: ROSS UBER

Fox Valley Area, where riparian issues are compounded by groundwater concerns.

Such regional approaches are not without precedent. While most land uses decisions are made at the local level, municipalities and counties have successfully cooperated on stormwater management. As communities in quickly developing areas were forced to deal with flooding issues and impacts to water quality, local governments sought legislation to allow counties to develop county-wide stormwater plans and implementation ordinances. The 2005 Illinois Stormwater Management Act requires countywide stormwater committees to include equal representation of municipal and county participation. These communities developed one ordinance can be applied to set one standard for best management practices, mitigation requirements, natural resource and wetland protection, and permits. This understanding of the regional implications of stormwater management can be replicated in planning for an adequate water supply.

The regional planning process is important for sustainable water supply management in Illinois. Regions are the appropriate scale for building consensus-driven plans, given the interjurisdictional nature of water. Such a process provides local stakeholders and diverse user groups with the opportunity to assess comprehensive data on supply and demand to make informed decisions on the most appropriate strategies to protect future water supplies.

This report, the third from the ongoing partnership between the Metropolitan Planning Council (MPC) and Openlands, lays out a framework for ongoing regional water supply planning and sustainable local water supply management. This report builds upon the success of the two pilot regional water supply planning projects, and presents a series of recommendations for how Illinois can reform existing programs to support regional planning, increase the efficiency of investment in water-related infrastructure, and, ultimately, reward local management that conserves our shared water resources.

In other states, most notably Texas, that face water shortages on a region-by-region basis, regional planning has proven to be an effective means of encouraging data-driven local protection of water supplies. The recommendations in this paper are informed by a thorough assessment of models in other states to evaluate their appropriateness for Illinois. An advisory panel of water and policy experts, and input from MPC and Openlands' 2008 conference, "Beyond Showerheads and Sprinklers," also contributed to this report.

Interjurisdictional stormwater management is reducing flooding and pollution issues in several Illinois counties. It also serves as a template for cooperative efforts to protect and manage water supplies.
PHOTO: TOP, KANE COUNTY, BOTTOM, ILLINOIS AMERICAN WATER

The regional water supply planning process is of paramount importance for sustainable water supply management in Illinois. Regions are the appropriate scale for building consensus-driven plans, given the interjurisdictional nature of water supplies.

The Case for Regional Water Supply Planning

Compared to some states, Illinois is water rich, with an average annual rainfall of 37 inches, Lake Michigan, deep and shallow aquifers, and a network of rivers and lakes. However, the water supply is finite. Water demand is constantly increasing, primarily due to population growth, the reach of development, and agricultural and industrial expansion. Inefficiency and waste — e.g. excessive landscape irrigation, leaky pipes, and outdated plumbing — exacerbate the problem. The dichotomy of static supply and growing demand makes water supply planning imperative.

Illinois' Current Water Supply

The most recent assessment of Illinois' overall water use, in 2005, established a benchmark for supply and demand projection in the state (see chart below).[2] By 2025, it is expected that Illinois will consume approximately 3.3 billion gallons of water a day, up from 2.5 billion in 2000 (total use will be considerably higher, but power production is largely a non-consumptive use, as the water is used and released). Total public water demand is expected to increase by 31 percent, with upswings in the majority of Illinois' counties, between

2 For this statewide assessment, see *County-Level Forecasts of Water Use in Illinois: 2005-2025*, Southern Illinois University Carbondale, 2005.

Comparisons of 2000 Estimates and 2025 Projections of Illinois' Water Withdrawals and Use

Water Use Sector	Estimated, 2000 (million gallons/day, mgd)	Predictions, 2025 (mgd)	Changes 2000 to 2025 (mgd)	% Change, 2000 to 2025
Thermoelectric generation	13,272.2	16,888.5	3,616.3	27.2%
Public supply	1,677.6	2,205.6	528.0	31.5%
Self-supplied commercial and industrial	493.1	547.5	54.4	11.0%
Irrigation	153.9	288.6	134.7	87.5%
Self-supplied domestic	135.3	157.5	22.2	16.4%
Livestock	37.6	42.4	4.8	12.8%
Mining	22.9	68.4	45.5	198.7%
Total withdrawal and use	**15,792.6**	**20,198.5**	**4,405.9**	**27.9%**

Illinois' total water use is projected to increase approximately 28 percent between 2000 and 2025, compared to a 12 percent growth in population. Consumptive use is projected to increase 31 percent (power production is largely non-consumptive).

SOURCE: *COUNTY-LEVEL FORECASTS OF WATER USE IN ILLINOIS: 2005-2025*, SOUTHERN ILLINOIS UNIVERSITY CARBONDALE, 2005

Groundwater and surface water often are separated artificially. In reality, they are one connected system. Increased withdrawals from shallow groundwater sources can reduce the amount of water in nearby wetlands and rivers. Naturalized stormwater detention, seen here, can help recharge shallow groundwater and mitigate impacts on adjacent surface water.

PHOTO: RICHARD MARINER

2000 and 2025. Water consumption from agricultural and other irrigation is projected to grow by 87.5 percent. Overall, the study projected statewide growth in water use of approximately 28 percent by 2025, larger than the state's expected 12 percent population growth over the same period.

While our demand for water is growing, our supplies are not. The Great Lakes Compact reinforced limits on the amount of water Illinois can withdraw from Lake Michigan. In 2005, Illinois used approximately 85 percent of its allowable diversion.[3] Infrastructure repairs, demand management strategies, and improved stormwater practices could enable more people to use Lake Michigan water, but would require coordinated investment. Portions of the northeastern Illinois region are likely to experience water shortages over the next 20 years; ISWS data show significant depletion of deep bedrock aquifers. As water levels in aquifers drop it becomes more costly to pump water out due to drops in pressure, and there is a greater risk of encountering radium, barium and other health risks.

Conservative estimates indicate a 35.8 percent increase in consumptive water demand, and a 38.5 percent increase in population in northeastern Illinois between 2005 and 2050.[4] At the same time, demand for water in the Mahomet Aquifer region of East Central Illinois, not counting the pass-through demands of power production, is projected to increase 51 percent from 2005 to 2050, far outpacing the region's projected 29 percent population growth over the same period.[5] Without significant efforts to conserve existing groundwater and surface water supplies, East Central Illinois will need to invest significantly in reservoirs or other supply infrastructure.

Previous State Water Supply Planning

The State of Illinois has attempted to address water supply before, but with few long-lasting results. Effective water supply planning is inherently proactive, using data about consumption and availability, then adopting strategies to ward off shortages. In contrast, water law and management in Illinois historically have been reactive — resolving conflicts between riparian parties, responding to drought or flood conditions, or implementing federal policies.

Several past efforts made sound, innovative recommendations that were never translated or institutionalized into policy due to the following:[6]

- These efforts were not followed up by incentives or technical assistance to encourage implementation by local units of government.
- The planning process was top-down and did not reflect the regional nature of water systems nor local nature of water management.
- Stakeholder involvement was minimal.
- The data and analytical models to document the full scope of the state's water issues did not exist.
- An artificial fragmentation of groundwater vs. surface water, and water quality vs. water supply made a unified approach to water management impossible.
- The benefits of infrastructure repair and modernization, conservation, demand management, stormwater management, and interjurisdictional cooperation were not fully appreciated.

3 For Water Year 2005, Illinois diverted 2,771 cubic feet per second (cfs), out of an allowable 3,200 cfs.

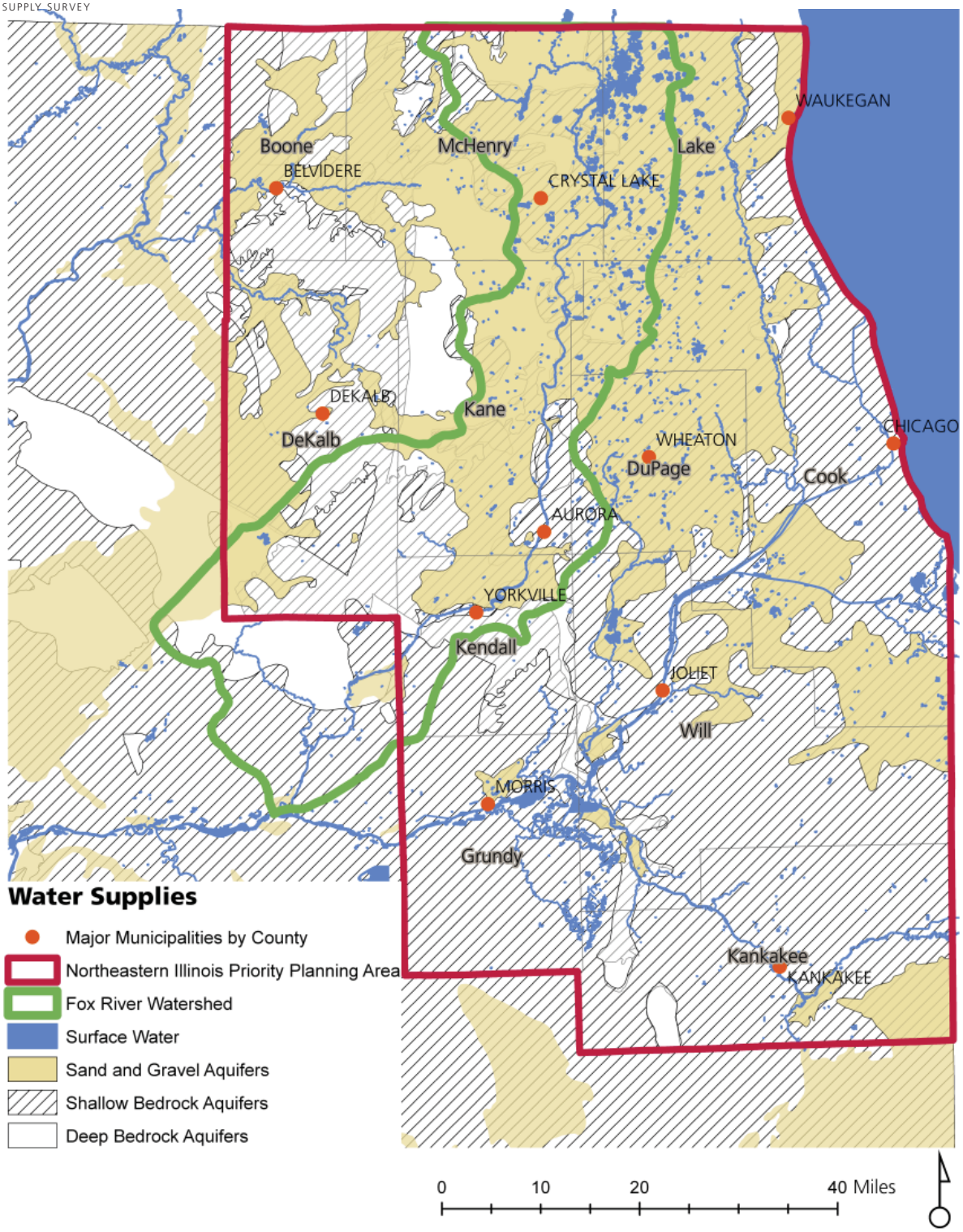
4 Unless otherwise noted, all references to water demand in northeastern Illinois cite *Regional Demand Scenarios for Northeastern Illinois: 2005-2050*, Dziegielewski and Chowdhury, 2008.

5 Unless otherwise noted, all references to water supply and demand in the Mahomet Aquifer region cite *A Plan to Improve the Planning and Management of Water Supplies in East-Central Illinois*, Mahomet Aquifer Consortium and the East Central Illinois Regional Water Supply Planning Committee, June 2009.

6 The State Water Plan Task Force (which produced a state water plan in 1984), Gov. George Ryan's Water Resources Advisory Committee, and the Interagency Coordinating Committee on Groundwater's Subcommittee on Integrated Water Planning and Management all issued plans or reports, supported by data and insight from IDNR and ISWS, which foreshadowed the current regional planning process and urged further, ongoing planning and conservation. For an assessment of past planning initiatives, see *Water Quantity Issues Facing Illinois: A Paper Presented to the 2002 Illinois Environmental Conference of the Illinois State Bar Association*, Ill. State Water Survey, 2002

Northeastern Illinois Priority Planning Area

The Northeastern Illinois Priority Planning Area was defined by ISWS, and is now the planning jurisdiction of the Northeastern Illinois Regional Water Supply Planning Group. Deep bedrock aquifers lie under the entire northeastern Illinois region. Shallow bedrock aquifers cover most of the region, although substantial portions of Kane and McHenry counties do not have access to them. Sand and gravel aquifers, which are just below the surface, cover large parts Boone, Cook, DuPage, Kane, Lake, and McHenry counties. SOURCE: ILLINOIS STATE WATER SUPPLY SURVEY



Linking plans to investment

In March of 2000, the Global Water Partnership, a collaboration of government agencies, public institutions, private companies, and others created to support countries in the sustainable management of water, declared that sustainability,

> "… requires an enabling environment and appropriate institutional structures that allow stakeholders to work together for effective water management. Financial practices should be realigned to support the sustainable use of resources."

Today, Illinois is at a critical juncture. Accurate data and sophisticated modeling of water supply and demand have improved dramatically. It is now possible to project future water supply and demand with great accuracy. With these technological advances comes the understanding that water supply planning requires regional and interjurisdictional cooperation, a reflection of the fact that water resources cross governmental boundaries. New supplies such as reservoirs, cisterns, water towers, and reclamation of stormwater and wastewater could be feasible options and deserve consideration. At the same time, local demand management and efficiency improvements are often more cost-effective than developing new supplies. Water saved is, in many ways, water created.

Past recommendations for a shift to regional planning did establish a process that encouraged local participation and implementation of water management strategies. Current and future water supply management efforts must be informed by past efforts; Illinois needs a data-rich and stakeholder-driven regional planning system, with consistent and significant support from the state to encourage goal-driven local implementation of conservation and other strategies.

Regional Water Supply Planning Pilots

Fortunately, Illinois has made substantial progress toward conservation and efficient use of its finite water resources. In January 2006, a gubernatorial executive order tasked IDNR with the creation of a statewide framework for regional water supply planning, and established two pilot regional water supply planning groups. The selected areas were identified as most at risk for water shortages and conflicts. These groups — the East Central Regional Water Supply Planning Committee (led by the Mahomet Aquifer Consortium) and Northeastern Illinois Regional Water Supply Planning Group (led by the Chicago Metropolitan Agency for Planning, CMAP) — have since studied the hydrology of their respective regions, explored potential conservation strategies, and perhaps most importantly, based their plans on sophisticated demand scenarios and supply studies to inform future decisions. The regional planning groups, which are comprised of municipal officials and staff, county representatives, and other stakeholder groups as industry, agriculture, and environmental conservation, also have created a template for future action.

IDNR, ISGS, and ISWS have updated and expanded the water resource information necessary for regional planning, supported the establishment of the planning process, and continue to monitor the planning initiative.

The designated planning areas were useful pilots for the regional water supply planning process and encompassed the need to address a variety of water sources, users and political jurisdictions.

Northeastern Illinois

The Northeastern Illinois Regional Water Supply Planning Group is focused on the deep bedrock aquifer system, shallow aquifer system and surface water of the Fox River watershed, and the Lake Michigan allocation. The pilot planning effort includes 11 counties: Boone, Cook, DeKalb, DuPage, Grundy, Kane, Kankakee, Kendall, Lake, McHenry, and Will.

Lake Michigan is the primary source of water for northeastern Illinois, providing approximately 77 percent of its water. Illinois is limited to a fixed annual diversion of 3,200 cfs of water, by a 1967 U.S. Supreme Court decree, a decision reinforced by the Great Lakes Compact in 2008. IDNR manages the allocation of Lake Michigan water. In recent years per capita consumption of Lake Michigan water has actually declined — perhaps as a result of increased conservation practices or infrastructure rehabilitation. However, there has been no thorough study to determine the ultimate causes of this in-

Sustainability in Action: Aurora's proactive, integrated water resource management

Recognizing that water supplies are limited in deep and shallow aquifers throughout the Aurora area, in 1992, city leaders built a water treatment plant for Fox River and other surface water. Aurora's earliest settlers were drawn to the lush banks of the Fox River. Now, more than 175 years later, the river continues to play in integral role in meeting the drinking, cooking and other needs of Aurora's 185,000 residents. From 2004 to 2008, river water, as a percentage of total supplies, increased from 47 to nearly 65 percent.

However, while Aurora decreased its dependence on aquifers, total water distribution continued to rise. In response, city leadership began adopting policies that recognize water as valued resource. In 2006, the city launched an ambitious public education campaign to encourage water conservation. For instance, through its Sustainability Plan, Aurora is extending conservation opportunities to residents through rebates on watersaving equipment. In spite of continued growth, Aurora's water distribution center went from pumping a record 6.5 billion gallons into the system in 2005, to 6.105 billion gallons in 2008 — saving enough water to fill more than 600 Olympic-sized swimming pools.

To preserve the quality of this water source, city leaders aggressively targeted illegal riverfront dump sites and pursued multiple public-private partnerships to clean-up brownfield areas along the Fox River.

The city partnered with IEPA, Natural Resources Defense Council, and CMAP to implement the innovative Rooftop to Rivers program — an initiative focused on naturally eliminating stormwater contaminants from reaching the river. Aurora also embarked on an ambitious sewer separation effort prioritizing more than $30 million dollars to reduce the incidence of sewer back-ups and flow of raw sewage into the Fox River during heavy rainfalls.

Today, Aurora is considering diversifying its water supply once again. Given the continued depletion of the deep aquifers, Aurora has approached the DuPage Water Commission about supplementing the city's current sources with Lake Michigan water. This proactive strategy will ensure Aurora's residents and businesses will have a dependable, sustainable water supply, but requires dialogue and coordination at the regional level. The prospect of Aurora or other communities transitioning to Lake Michigan for some or all of their needs hinges on efficient use of that resource by every community throughout the allocation area. Fortunately, city leadership plays an active role in the Northeastern Illinois Regional Water Supply Planning Group.

For more information: Carie Anne Ergo, Assistant Chief of Staff, City of Aurora, (630) 844-3612, or www.nrdc.org/water/pollution/rooftops/contents.asp

Recognizing its aquifer supplies were dwindling, Aurora now gets the majority of its water from the Fox River, and is exploring the Lake Michigan allocation process.

PHOTO: KATHERINE BUCAR

Lake Michigan aside, the Fox River, seen here flowing through Kane County, is northeastern Illinois' major source of surface water. While under pressure from rapid population growth, with effective management, it may have the potential to serve additional future demand. However, its connections to shallow groundwater sources are still being studied.

PHOTO: KANE COUNTY

crease in efficiency.[7] A considerable portion of Illinois' diversion is used for navigation and sanitation, while an even larger portion — 27.7 percent as of 2005 — is lost as stormwater runoff (see page 50).

Between 1983 and 1993, Illinois over-diverted water from Lake Michigan, taking between 3,376 and 3,841 cfs each year. The long-term average soared to 3,487 cfs. However, actual and estimated diversion has since fallen each year, and the long-term average is estimated at 3,173 cfs as of 2008 (85 percent). Since Illinois' long-term average has dipped below its allowable yield there is small water surplus. While this is positive, Illinois' long period of water debt, the Supreme Court decision, and the Compact's goal of "no new diversions" make it highly unlikely that Illinois' allowable diversion will increase in the foreseeable future. It is in the best interest of Illinois, and particularly the Chicago metropolitan region, to be as efficient as possible with this limited resource, in order to have sustainable water supplies for future population and economic growth.

7 Water cost is likely not a cause of this per capita decline in Lake Michigan water consumption. The average cost of Lake Michigan water increased from $2.99/1,000 gallons in 1995 to $3.65 in 2005, lower than the rate of inflation, so water became relatively less expensive over that period. According to the Consumer Price Index, what cost $2.99 in 1995 would cost $3.83 in 2005.

Groundwater supplies are often classified by the depth of wells that pump water to the surface. Deep bedrock aquifers are important sources of water across northeastern Illinois. Capped by a layer of mostly impermeable rock, these deep aquifers recharge very slowly. The aquifer system was created over thousands of years, but has been significantly drained in just decades. If pumping were to stop today, this system would eventually recharge, but over the course of many human lifetimes. It is, in effect, a non-renewable resource that is being 'mined.'

Shallow aquifers, which recharge more quickly, are tapped by thousands of wells, with minimal permitting or reporting requirements. They are directly tied to wetlands, rivers, and other surface waters; drawdowns of shallow aquifers can reduce flow into these natural assets, impairing their ecological integrity. Deep and shallow aquifers together supply approximately 19 percent of northeastern Illinois' water use.

Northeastern Illinois' surface water comes primarily from the Fox and Kankakee rivers, and amounts to 4 percent of the region's total water withdrawals. The future capacity of northeastern Illinois' rivers is variable and requires further study. The Fox River likely has some capacity to supply a greater population even during periods of low flow, but both it and the Kankakee require further study.

As part of the regional water supply planning process, Southern Illinois University Carbondale (SIUC) researchers conducted a study of three future water demand scenarios for northeastern Illinois — current trends, less resource intensive, and more resource intensive (see table on next page).[8] Principle drivers of demand included population, employment, power generation, irrigated acreage, etc. Variables that influence average rates of water demand included weather conditions, price of water, income and employment mix, as well as distribution of population growth. The study showed the total amount of water withdrawals in the 11-county region will continue to increase to meet the demands of a growing population and growth in the region's economy. Baseline conditions, as captured in the current trends scenario, indicate that by 2050 the amount of water withdrawn would increase by 35.8 percent. During that period, population is expected to increase by 38.5 percent or an additional 3,370,000 people. With increased conservation, 2.5 percent annual increases in water prices, and population growth concentrated in Cook and DuPage counties (typically denser communities, with more multifamily housing, and established water and transportation infrastructure), the

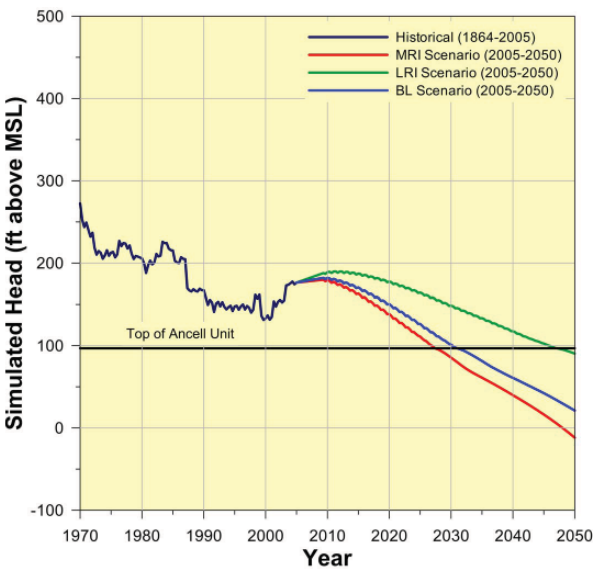
8 *Regional Demand Scenarios for Northeastern Illinois: 2005-2050*, Dziegielewski and Chowdhury, 2008.

Northeastern Illinois Water Demand Scenarios

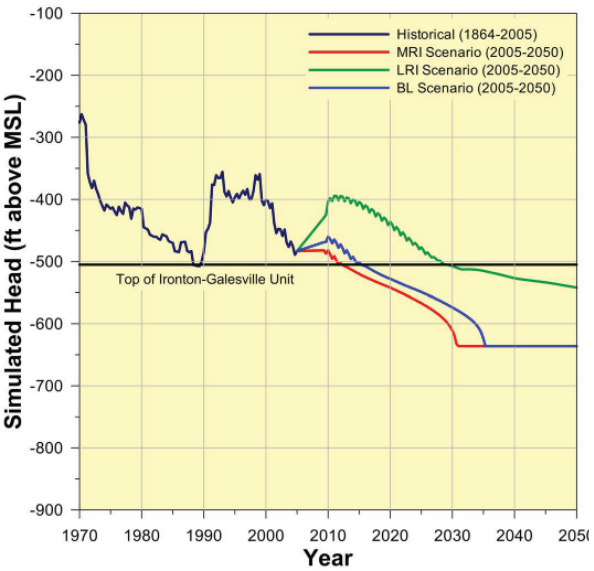
Scenarios	Normal withdrawals, 2005 (mgd)	Normal withdrawals, 2050 (mgd)	Change, 2005-2050 (mgd))	% Change, 2005-2050 change
Less resource intensive	1480.3	1587.5	107.2	7.2%
Current trends (Baseline)	1480.3	2010.7	530.4	35.8%
More resource intensive	1480.3	2429.4	949.1	64.1%

SOURCE: Regional Demand Scenarios for Northeastern Illinois: 2005-2050, Dziegielewski and Chowdhury, 2008

Montgomery Simulated Ancell Hydrograph, 1970 to 2050



Montgomery Simulated Ironton-Galesville Hydrograph, 1970 to 2050



The hydrographs and maps on the following pages illustrate the results of ISWS models on aquifer levels throughout the region. The data indicate that throughout northeastern Illinois, but particularly in the areas around Aurora and Joliet, significant drawdown of aquifers will occur by 2025 and continue into 2050. A drawdown is a cone-shaped depression in the groundwater level that indicates significant withdrawal. The greater the drawdown, the greater the depletion. Equally worrisome is that the available head — which gives an indication of upward pressure within the aquifer — also is decreasing rapidly. The hydrographs above are model results for wells near Montgomery, Ill., and show significant reduction in available head as soon as 2015. The three scenarios in each hydrograph correspond to the three demand scenarios, seen in the table above, that inform the regional water supply plan for northeastern Illinois.

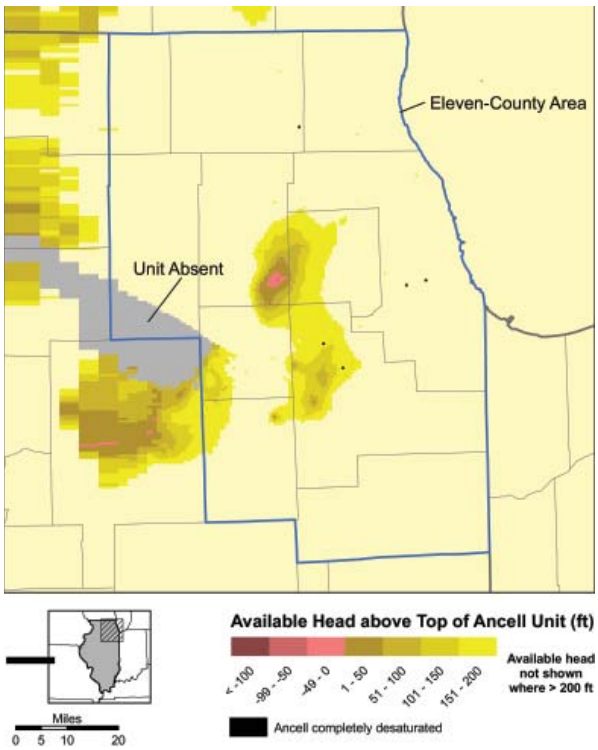
SOURCE: *REGIONAL GROUNDWATER MODELING FOR WATER SUPPLY PLANNING IN NORTHEAST ILLINOIS*, ILL. STATE WATER SURVEY, 2009.

less resource intensive scenario suggested a 7.2 percent increase in demand for water. The more resource intensive, which held prices static and concentrated population growth in Kane, Kendall, and McHenry counties, estimated a 64.1 percent growth in water demand.

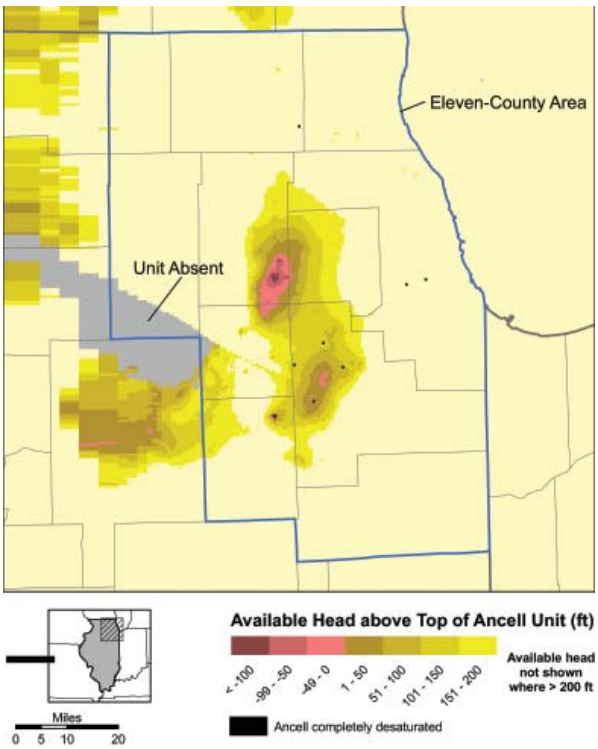
While demand can be projected from current use and informed assumptions can be made about future use, supply is more difficult to assess. Diversion and allocation of Lake Michigan water are relatively known quantities. IDNR makes long-term allocations so that community receiving Lake Michigan water can make needed infrastructure investments and policy changes to ensure conservation and efficient use. With groundwater and surface water, however, there is greater uncertainty.

Nonetheless, ISWS has been able to make some projections about groundwater. Rates of pumping from the deep bedrock aquifers greatly exceed recharge rates in

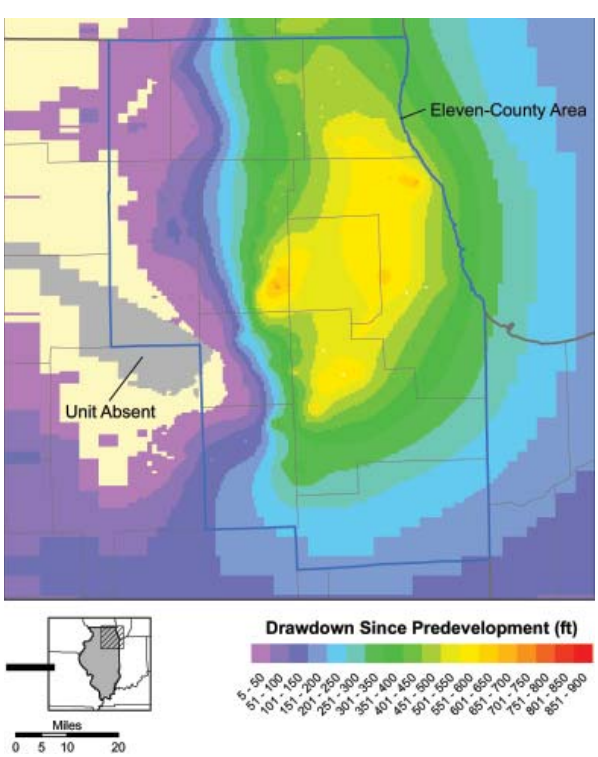
2025 Available Head above the Ancell Unit, Baseline Scenario



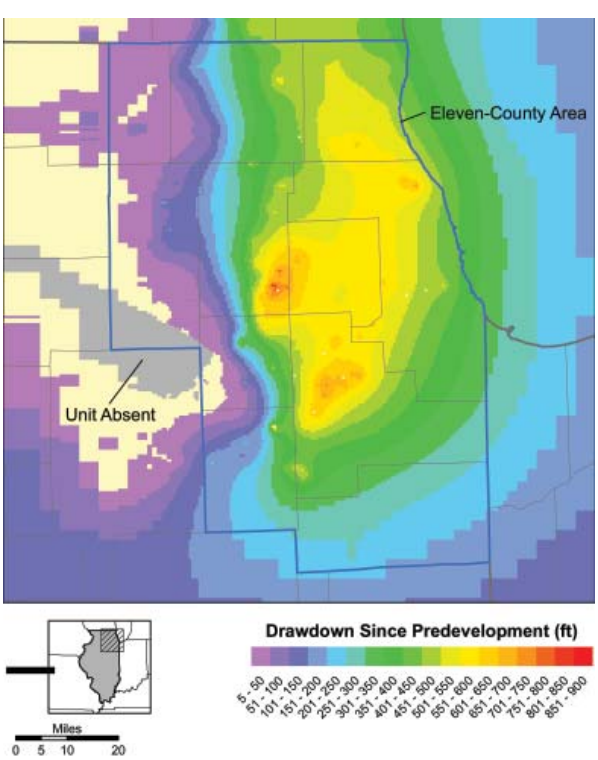
2050 Available Head above the Ancell Unit, Baseline Scenario



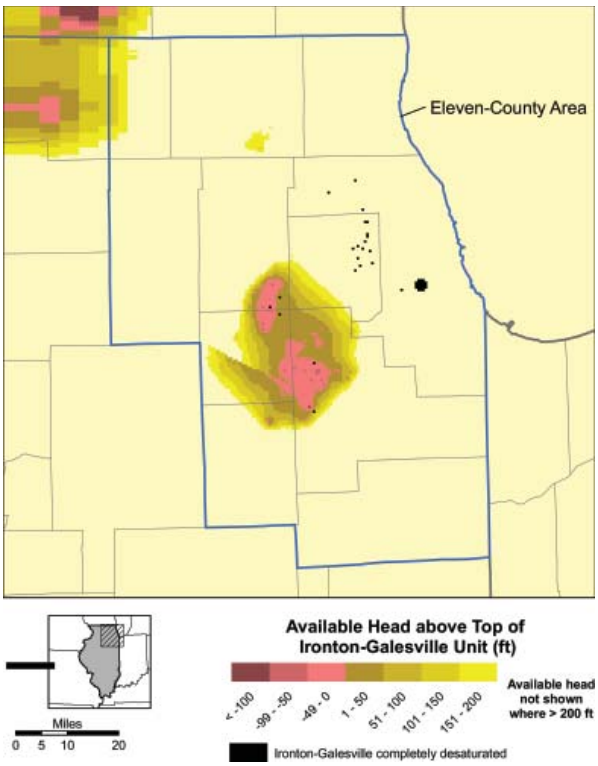
2025 Drawdown in the Ancell Unit, Baseline Scenario



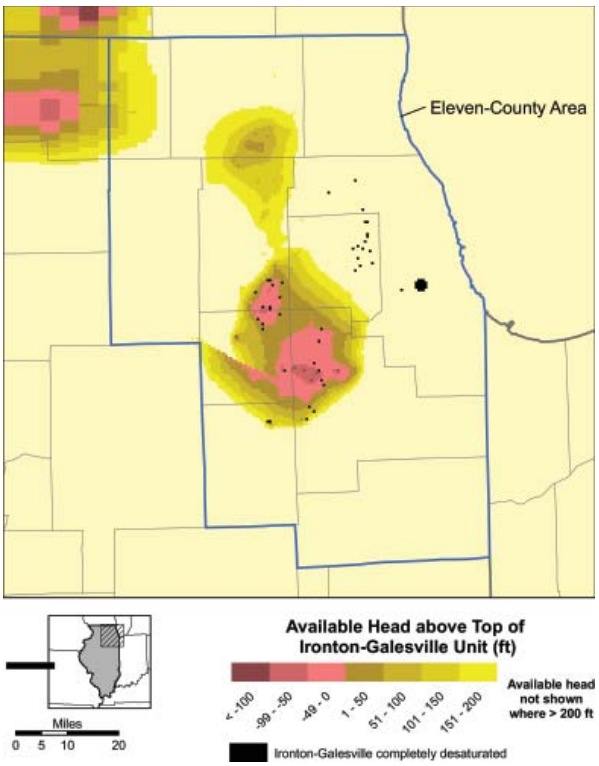
2050 Drawdown in the Ancell Unit, Baseline Scenario



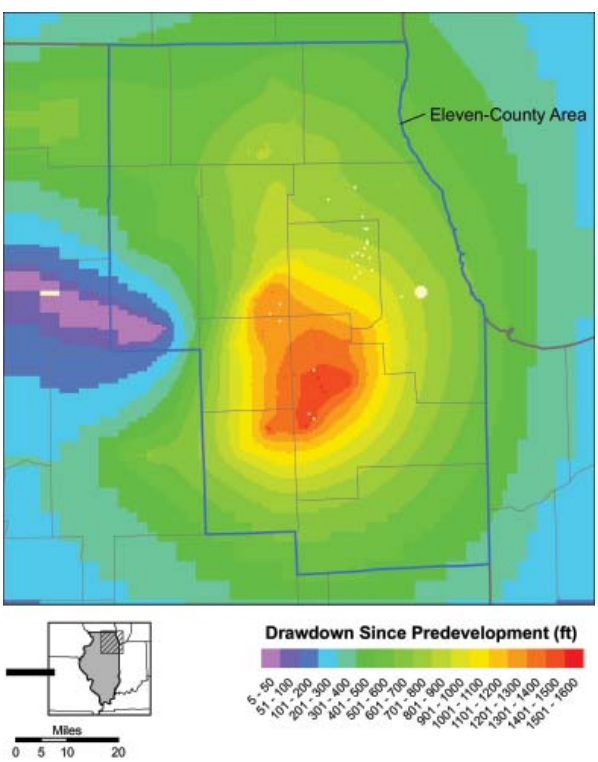
2025 Available Head above the Ironton Galesville Unit, Baseline Scenario



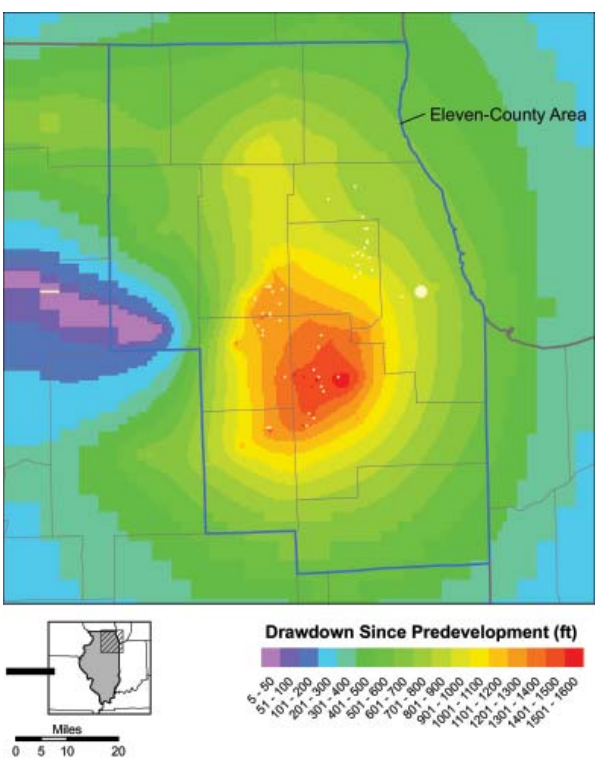
2050 Available Head above the Ironton Galesville Unit, Baseline Scenario



2025 Drawdown in the Ironton Galesville Unit, Baseline Scenario



2050 Drawdown in the Ironton Galesville Unit, Baseline Scenario



many places, particularly southeastern Kane and northern Will counties — the area from Aurora to Joliet. ISWS models for two layers of the deep bedrock aquifer system — the Ancell and Ironton-Galesville — show significant projected drawdowns and reductions in available head when compared with the demand scenarios conducted by SIUC. A drawdown is a cone-shaped depression in the groundwater level that indicates significant withdrawal. The greater the drawdown, the greater the depletion. Available head is a measure that indicates sustainable withdrawal from an artesian well. When the available head is above the top layer of an aquifer, water will flow from the well under its own pressure. When the available head is at or below the top layer, water will be depleted from an aquifer at a rate faster than it can recharge.

Results from ISWS modeling (shown in the hydrographs on page 25) show that under the current trends scenario, the available head in selected wells near Montgomery (on the border of Kane and Kendall counties) will drop below the top of the Ancell unit in approximately 2030, while the Ironton-Galesville limit will be hit in approximately 2015. Particularly alarming is that the same model suggests the Ironton-Galesville aquifer will be completely depleted, under the current trends scenario, in 2035 (as indicated by the trend line flattening to a zero slope). While pumping would likely stop before any well went totally dry (the costs of water delivery would outweigh the benefits), the severe depletion of these aquifers is a serious — and permanent — consequence.

The Fox Valley Area of southeastern Kane and northern Will counties is projected to experience significant aquifer depletion, which could increase pumping expenses, decrease yields, and potentially lead to quality concerns such as salts, radium, barium and arsenic beginning to infiltrate deep wells. Several wells, as seen in the available head maps, are projected to be depleted entirely. Additional ISWS data show noticeable drawdowns of shallow aquifers in the St. Charles-Batavia-Geneva corridor and near Woodstock. Increased pumpage of surface streams and rivers has led to further drawdowns of shallow aquifers. The preliminary conclusion of ISWS is that the "deep bedrock aquifers cannot be counted on to meet all future demand scenarios across the 11-county region."[9]

The potential for sustained growth, economic development, and quality of life in northeastern Illinois will hinge, in many ways, on decisions made about water supply in the years to come. Substantial increases in

9 *Regional Groundwater Modeling: An Update for Illinois*, presentation given to the Northeastern Illinois Regional Water Supply Planning Group, March 2009.

Sustainability in Action: Algonquin's water conservation plan

The Village of Algonquin, Ill., implemented a Water Conservation Plan in 2003, to address concerns about the quality and pressure of its water source, shallow aquifers. Under the constant threat of shortages, the village established a Water Conservation Committee to annually implement and revise the goals of the local Water Conservation Plan which include both water conservation and increased resident awareness goals.

While Algonquin has taken several measures to meet its goals, one of the most successful programs is the water system status alerts — which address restrictions on daytime landscape irrigation. Color-coded alerts are placed around the village to inform residents and businesses of outside water restrictions. **Green** 'conservation' signs indicate outside water use is permitted, but landscapes and lawns may only be watered before 9:00 a.m., or after 6:00 p.m. **Yellow** 'even/odd' signs indicate even addresses may water on even calendar days and odd addresses may water on odd calendar days, but only before 9:00 a.m., or after 6:00 p.m. **Orange** 'even/odd 6:00-9:00 a.m.' signs have the same even/odd schedule as Yellow, but only between 6:00 and 9:00 a.m. **Red** 'restricted' signs indicate no outside watering is allowed at any time. If a resident or businesses that violate these restrictions are fined $100.

Since implementation in 2003, the village has added 800 households and 300,000 sq. ft. of commercial space. Despite this growth, Algonquin's summer pumping volumes have decreased from 6 million gallons a day to 3 or 4 million gallons a day. For communities facing the need to adopt water conservation practices, Algonquin proves growth can still occur even when water use is restricted.

For more information: Katie Parkhurst, Senior Planner, Village of Algonquin, katieparkhurst@algonquin.org

conservation, efficiency, or source recharge, will be necessary to ensure groundwater and surface water can accommodate population growth in the near future. Some communities may need to explore the feasibility of reservoir construction, rainwater harvesting, water reuse, or other means of creating new supply options. Even so, it is possible that over the next 10 to 25 years more communities will need to shift to Lake Michigan water for all or some of their water needs. To do so will require substantial improvements in the usage of Lake Michigan water.

For example, the City of Chicago's current plans to repair water mains and comprehensively install water meters in homes are projected to 'create' enough water for an additional 700,000 people (see page 30). These repairs to increase availability of water are laudable, but also illustrate the amount of water currently being wasted.

In the years to come, IDNR will need to increase its efforts to encourage current and future recipients of Lake Michigan water to promote conservation and efficiency. Moreover, the Northeastern Illinois Regional Water Supply Planning Group will be an invaluable forum for data sharing, consensus building, and fostering collaborative decisions between local stakeholders on sustainable management of finite water resources. It is imperative for the Chicago region — which is a highly complex and integrated series of water supply, transportation networks, job markets, economic supply chains, and green space — that local water supply managers and other stakeholders come to informed, common decisions on water resources. Communities on groundwater and surface water may need Lake Michigan water to guarantee their individual futures; but at the same time, communities on Lake Michigan water need surrounding communities in order to ensure the global competitiveness of the Chicago metropolitan region. Balancing local decisions with a regional mind set requires data, common goals, the right tools for implementation, and most importantly, dialogue.

East Central Illinois

The East Central Illinois Regional Water Supply Planning Committee is focused on the Mahomet Aquifer system and Sangamon River watershed. The planning region includes 15 counties: Cass, Champaign, Dewitt, Ford, Iroquois, Logan, Macon, Mason, McLean, Menard, Piatt, Sangamon, Tazewell, Vermilion, and Woodford.

The primary concern for this region is one shared source of water — the Mahomet Aquifer. It supplies Decatur, Champaign-Urbana, and many smaller communities. The region's population is increasing, putting greater demand on water supplies, but uses within the region vary greatly. In some eastern counties, public water supply is the predominant use, while to the west, agriculture (with a recent increase in irrigation due to ethanol production) is more significant. It is unclear whether the regional aquifers and rivers will be able to sustain this combination of population growth and agricultural production.

Power production also is a major use in the region, and though the majority of water used in power production flows through the system, a certain threshold of streamflow is necessary to maintain both energy production and quality habitat. Streamflow, aquifer levels, and consumptive withdrawals are interconnected. When streamflow is too low, power production ceases so that public consumption can continue. In order to maintain constant power production, east central Illinois communities will need to ensure sufficient streamflow.

Wittman Hydro Planning Associates, the technical consultant for the regional planning process, projected demand scenarios based on population, employment, power generation, and irrigated acreage. Demand projections for east central Illinois were determined using a similar methodology to the northeastern Illinois report. Demand drivers included population, employment, power generation, and irrigated acreage. Variables that influence average rates of water demand included weather conditions, price of water, income and employment mix. The baseline scenario estimates the total water withdrawal to increase by 8.1 percent by the year 2050. Water withdrawals are expected to increase in all water demand sectors except power generation. However, because power generation withdraws an estimated 84 percent of the total amount of water used, and much of what it withdraws is immediately returned to its source, it is perhaps more illustrative to omit the power sector when examining demand trends.

Omitting power, the total increase in water withdrawals is projected at 51 percent from 2005 to 2050. Using the less resource intensive scenario, the number is reduced to 35 percent. In the more resource intensive scenario, the amount of water demand would increase 69 percent. Over the same period, population is expected to increase 29 percent, while acreage under irrigation is likely to expand between 20 and 40 percent, depending on the scenario. The biggest increase (both in absolute terms and as a percentage change) in water demand is most likely to come from the commercial and industrial sectors, which even in the less resource intensive scenario would increase demand to/by 82.4 percent.

Sustainability in Action: Chicago's water conservation and efficiency plan

The City of Chicago treats and pumps Lake Michigan water to approximately 5.42 million people — about 44 percent of Illinois' population — in 126 municipalities including Chicago and 48 others that border the city directly. It has more than 8,000 miles of distribution pipes, 47,600 fire hydrants, and 263,000 catch and value basins.

Maintaining this vast system incurs significant costs for general upkeep, as well as decreasing water waste. Chicago's water rates are low compared to many other large cities (see chart on page 48), and as a result of state statute, residents of the 48 suburbs that directly border Chicago pay the same rate as city residents, despite the increased cost of pumping water greater distances. For metered customers, the 2010 rate will be $2.00 for 1,000 gallons of water. It is a flat rate, rather than one that increases with usage to encourage conservation. For non-metered customers, an annual assessment is based on width of the lot and building, as well as the number of stories and water fixtures. For these users, water bills have minimal relationship to actual water use. Beyond personal motivation and values, there is no incentive to conserve water. Inefficient rate structures result in inefficient water supply management.

It is not uncommon for water systems to lose 10 percent or more of their supply through leaks or unmetered use. Lost water wastes supply, but also energy and money. Reducing leakage through rehabilitation, modernization, and regular system monitoring should be a higher state priority.

PHOTO: ILLINOIS AMERICAN WATER AND THE MORIAH GROUP

Fortunately for the entire northeastern Illinois region, the city has several ongoing strategies to conserve water and decrease water pumpage. The two that will yield the most benefits are replacing aging infrastructure and shifting to comprehensive metering.

The bulk of Chicago's extensive water main system was installed between 1890 and 1940, and is now approaching the end of its useful life. The city plans to increase its replacement rate to 75 miles a year, on par with the original installation rate, and a significant increase over recent trends. These efforts are expected to save 40 million gallons a day by 2016, and eliminate enough leaks and loss to serve an additional 400,000 people, by completion.

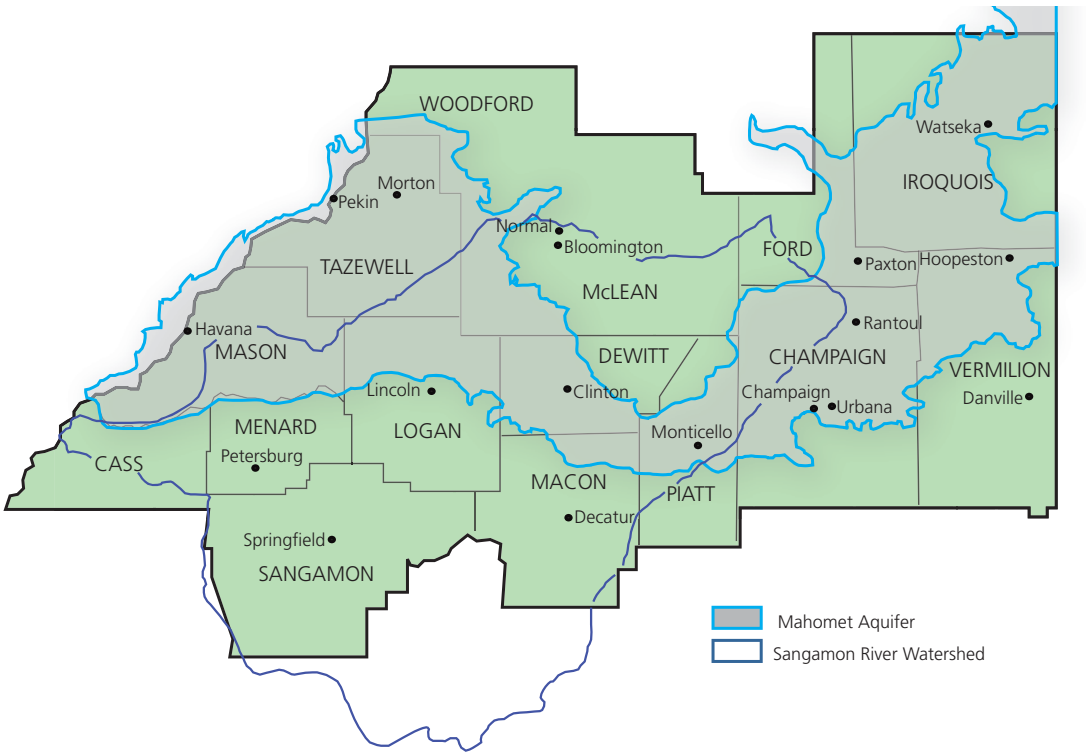
The meter installation program should have comparable benefits. Meter installation on single family and two-flat homes — the vast majority of which do not have meters — is expected to save 30 million gallons a day by project completion, conserving enough water to serve an additional 300,000 people. The city is encouraging voluntary participation by promising to freeze water bill increases for seven years. At the same time, the average customer's bill is expected to actually drop 17-33 percent.

Conservation and efficiency are working, but over time, could be overtaken by population growth. Chicago's direct consumption of water dropped 32 percent between 1990 and 2008, but total consumption dropped only 18 percent due to increased use in the suburbs. Between 2005 and 2050, the population of Chicago's service area is projected to grow to 6.77 million, by which time the split between suburban and city consumption will reach 50/50.

Chicago's impact on conservation and efficient use of Lake Michigan water is significant. However, the city has greater financial resources than many smaller communities, and is better able to tackle its infrastructure rehabilitation. Current state and federal investment assistance does not sufficiently assist ambitious conservation efforts, impeding local efforts to pursue projects comparable to Chicago's. Whether conserving groundwater supplies or improving efficient use of Lake Michigan water, communities need the right tools to ensure sustainable growth.

For more information: City of Chicago Dept. of Water Management, water@cityofchicago.org, (312) 744-4426

East Central Illinois Priority Planning Area



According to the completed regional plan, "withdrawing sufficient water from aquifers to meet demands in 2050 results in increasing drawdown of heads in wells finished in the aquifers, expanding cones of depression, a reversal of groundwater flow in some areas, and reduced baseflow in many streams. The bull's eye of concern is Champaign County."[10] Shallow aquifers are being increasingly depleted. Decatur, Danville, Springfield, and Bloomington rely on reservoirs, but these are stressed by increasing water demand and sedimentation. During even moderate droughts, water shortages are highly probable, while Danville could face deficits by 2050.

Lessons Learned from the Pilot Regional Water Supply Planning Groups

Regional coordination and local management is how Illinois will ensure a sustainable water supply for the future. An individual municipality or county cannot ensure the integrity of an aquifer that spreads beyond its borders. However, municipal, county and regional partnerships can ensure that integrity in the region.

The pilot regional water supply planning groups have been highly informative, identifying concerns, strategies and templates for future planning groups. Significant lessons include:

- The pilot groups underwent a time-consuming process to develop their own goals, planning models, and procedural guidelines. The resulting template can provide a useful foundation for future regional planning efforts.
- IDNR, ISGS and ISWS provided cutting-edge data analysis, modeling, and technical assistance. Comprehensive demand and supply studies were invaluable in informing planning decisions. However, the data required for thorough analysis of groundwater and surface water supplies is not often available due to funding and staff capacity constraints, limiting the ability to adequately quantify water demand and supply. Public Act 96-0222 requires reporting by high capacity water users and will improve data collection, but only partially. Data on shallow aquifers and consumption by low and moderate-volume wells (less than 100,000 gallons per day) will continue to be scarce.
- Throughout the pilot regional planning process, participants were unclear how the regional plan would impact local decision-making. The State of Illinois should resolve this ambiguity through incen-

10 *A Plan to Improve the Planning and Management of Water Supplies in East-Central Illinois*, Mahomet Aquifer Consortium and the East Central Illinois Regional Water Supply Planning Committee, June 2009.

tives and technical assistance to establish clear links between the consensus-driven recommendations of regional plans and local decisions about water supply management. To stave off water scarcity, communities need the right tools to address water waste and inefficiency, as well as a forum for determining collaborative action where appropriate.

- The many variables that affect water supply and demand — precipitation, aquifer recharge, streamflow, population growth, infrastructure performance, climate change, economic activity — necessitate ongoing research, adaptive planning on a regular schedule, and flexible tools for implementation. The State of Illinois needs to invest appropriately in the burgeoning regional water supply planning process, expand it to other areas of the state, and ensure it becomes the norm of sustainable water supply management.
- Above all else, moving forward, all water policies and investment, at every level, must account for and respect two truths: water supply management is primarily local, but water supplies themselves are typically regional, crisscrossing governmental borders.

The regional level is right for sharing data, setting common goals, and establishing consensus on sustainability strategies that match the scale of the supply in question. However, those strategies must address the needs of local water supply managers and other stakeholders.

Moreover, state tools like the revolving loan funds, which leverage federal dollars and provide invaluable financial assistance to local governments, need to be both more flexible so communities can use them to pursue both supply and quality concerns, but also more goal-oriented. State funding should reward communities integrating water supply analysis in their comprehensive plans and targeting the goals and strategies of regional water supply plans.

Advanced Water Metering Technology

Outdated metering systems bill consumers 60 to 90 days after use. Advanced metering, which integrates electronic communication between utility and customer equipment, registers multiple readings per day. Customers can view their water use trends for the past week, month or year. Advanced metering can also be integrated with leak detection devices to discover leaks that never reach the surface. For communities concerned with over-consumption of outside water use, advanced metering can provide a more exact measurement of water entering the wastewater stream.

Communities in northeastern Illinois already have started taking advantage of this emerging technology. South Elgin, serving 20,000 people, has benefited by correcting previously unread meters and improving its ability to find leaks and high usage. Oswego, serving 26,500 people, had been experiencing high bill complaints until advanced metering allowed the village to make six reads per day and generate reports of individual household use upon consumer request.

In Norridge, with a population of 14,600, advanced metering has reduced meter costs and eliminated field visits for final billings. Norridge also can identify violators of its water conservation efforts, which prohibit outdoor water use from 12 to 6 p.m.

As demonstrated by these communities, advanced metering improves water conservation measurement and monitoring by providing timelines of when and where water is used, as well as leak detection and service theft. This technology improves water conservation in communities facing scarcity. When consumers are given more information in a timely manner, they can make better water consumption decisions. A lack of knowledge leads to waste, but advanced metering easily and quickly communicates water use to consumers and utilities alike.

For more information: Kenneth Molli, Kenneth Molli LLC, Advanced Metering Consulting, Kenmeter@aol.com

Sustainability in Action: Barrington Area Council of Government's mapping and interactive 3-D modeling

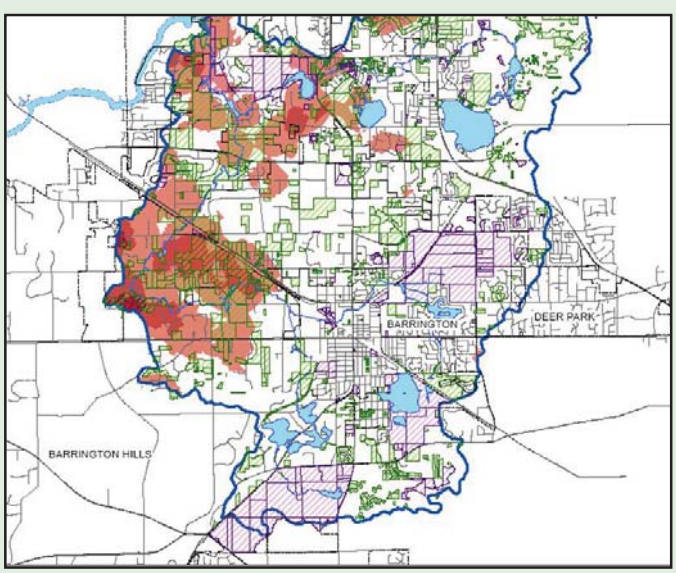
Following a four-year study of the shallow aquifer system in its area, the Barrington Area Council of Governments (BACOG) produced mapping products and a three-dimensional, interactive model. The project utilized the state's database of well-driller records, and classified the geologic soil descriptions contained in those records into simpler units that were mapped using GIS (computerized geographic information system). The resulting 3-D model estimates and maps the location/elevation and extent of the bedrock and drift aquifer units of the shallow aquifer system. The 600 sq. mile model can be viewed, manipulated and cut into cross-sections to help officials and the public visualize underground conditions and better understand water resources.

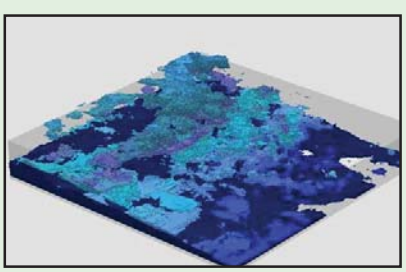
BACOG 's members are using the mapping products for practical applications, and they are expected to lead to new policies for natural resource protection. BACOG is using the model to investigate the best locations for new municipal wells, preliminarily assess well competition/interference, and study the potential for land uses or contaminant spills to affect aquifers. This groundwater science was used in the award-winning Flint Creek Watershed Management Plan, and will become a component of future environmental planning for the Barrington area. A significant accomplishment of the project is the groundwater recharge area map, which describes where the shallow aquifers are replenished from precipitation and stormwater. BACOG's Water Resources Committee, created in 2001, is currently considering policy ideas for recharge area protection.

The groundwater science developed by BACOG, and funded by its member governments, will support enhanced local and regional decision-making and public awareness. Other communities can replicate this tool or develop similar models to improve understanding of water resources in relation to natural replenishment of aquifers, potential limits on withdrawals, sustainable development, and protection of natural areas. Analyzing groundwater data in combination with other geographic information on a local level allows officials to make better decisions and communicate their impacts more effectively.

For more information: Janet Agnoletti, Executive Director, Barrington Area Council of Governments, j.agnoletti@BACOG.org

Open Parcels in Relation to Recharge Areas in the Flint Creek Watershed





These 2-D and 3-D maps will inform local and regional decisions on sustainable water supply management in the Barrington area.

Recommendations for a Statewide Framework for Regional Water Supply Planning

The initial regional water supply planning process for northeastern and east central Illinois is scheduled for completion in early 2010. To assure successful implementation of these regional planning efforts, the policy shifts and structure described below should be integrated into a comprehensive strategy for the future of Illinois' water supply planning.

The 2006 executive order that established the pilot planning groups also called for a new, statewide framework of regional planning to ensure conservation and efficient use of water. Illinois needs to create a process for water supply planning that coordinates responses to what are now fragmented issues (i.e. groundwater vs. surface water, water quality vs. water supply), and responds efficiently to potential water challenges.

The proposed framework is intended to prevent water scarcity through goal-setting, regional planning, coordination, and incentives.

State of Illinois

The pilot regional water supply planning process has created an informed and stakeholder-driven forum for collective action on shared water challenges. The process, openly and transparently accounts for the regional nature of water supplies and local nature of water supply management. The 2006 gubernatorial order established the planning process, state agencies supported the initiative through technical assistance and research, and, at the outset, state funding was provided to Chicago Metropolitan Agency for Planning (CMAP) and the Mahomet Aquifer Consortium to lead their respective regional groups.

To build on the momentum created by the 2006 gubernatorial order, the State of Illinois should continue to support the efforts of existing regional water supply groups as they move from planning into implementation, and in subsequent rounds of planning. The state must dedicate funding to support regional water supply planning, increase the capacity of agencies such as IDNR and ISWS to provide data and technical assistance, and tailor its programs to better meet unique local needs.

Text in blue denotes a policy recommendation.

When paired with strategies to manage demand, upkeep and maintenance of Illinois' existing water supply system, such as this treatment facility in Homer Glen, can reduce or delay the need for future capital expenditures.

PHOTO: ILLINOIS AMERICAN WATER AND THE MORIAH GROUP

These are appropriate roles for the State of Illinois to play in regional water supply planning and local water supply management. The role of the state should be to facilitate sustainable water supply management through:

- **Continued support of the existing regional water supply planning groups.**

Seen here in New Buffalo, Mich., permeable pavement is an increasingly common green infrastructure technology. Where possible and prudent, strategies to reduce stormwater runoff or conserve water supply should be incorporated into state investments in housing, transportation, and other economic development.

PHOTO: RICHARD MARINER

- **Creation of additional regional water supply planning groups.**
- **Creation of a comprehensive state water supply plan to balance regional priorities and ensure financial assistance spurs goal-oriented reinvestment in existing infrastructure.**
- **Sustained funding for regional water resources planning and local implementation.**
- **Research, modeling, data provision, and technical assistance.**

Continuation of the existing regional water supply planning groups is imperative. These initial regions were selected because of immense pressure on water resources from population growth, economic development, and agricultural use. The first round of planning has been educational and productive, but implementation must follow, as must subsequent rounds of planning to better integrate water quantity and quality concerns, account for climate change, and develop ideas for supply augmentation. Considerable time, energy, discussion and expertise already have been invested in the pilot regional water supply planning process; it must continue. The regional planning process has been a significant step toward sustainable, stakeholder-driven water supply management, and it must be the basis for future action in Illinois.

In particular, continued regional planning in northeastern Illinois is essential to the economic well-being of the region and state. Despite its diverse water sources, in the context of the global economy, northeastern Illinois is a single economic entity, linked by housing and job markets, open spaces, and the flow of goods. The long-term economic development of the region and state hinges on consistent and coordinated water resources planning. It is of paramount importance that there be a forum to resolve water differences and disparities equitably. The Northeastern Illinois Regional Water Supply Planning Group is the most effective and efficient means of ensuring local input, regional consensus, and responsive state financial and technical assistance. CMAP integrates land use, transportation, housing, and environmental planning, and has been able to inform the water supply planning process with that broader view. CMAP should be designated as the permanent lead for water supply planning in northeastern Illinois.

The two pilot regions were selected because of the critical nature of their water issues. While water supply concerns in other parts of the state may be less pressing today, the foresight of long-term planning may prevent water shortages. Therefore, additional regional groups are necessary to implement a truly statewide framework for regional water supply planning.

Creation of additional regional water supply planning groups will ensure that comprehensive water supply planning includes every Illinois community. By Jan. 1, 2011, the state and IDNR should establish additional regional water supply planning groups to cover the rest of Illinois. Each group would incorporate regional data-sharing, consensus-building, and the resulting water conservation and efficiency strategies. Appropriate facilitating organizations will need to be identified by regional leaders and supported by the state. To account for the changing dynamics of water supply and demand, once established, each regional group should prepare and adopt a regional water supply plan on a five year cycle.

In addition to delineating additional regional water supply planning areas throughout the state, IDNR should better define the regional planning process. At the outset of the pilot planning process,

substantial time was invested in establishing planning guidelines, principles and procedures. Subsequent rounds of planning should be more efficient, using the guidance, templates, and significant lessons from the pilot groups. IDNR should consult with the existing regional planning groups and issue guidelines for:

- Establishing timelines for development and ongoing updates of regional and state plans.
- Appointing and funding facilitating organizations for each regional planning group.
- Delineating criteria for active and inclusive stakeholder involvement and participation.
- Ensuring balanced representation of stakeholders on regional planning groups.
- Defining the required elements of a regional water supply plan.

Just as local land use should be better incorporated with water supply analyses, regional plans should be as well. As the State of Illinois establishes additional planning groups, it should appoint facilitating organizations that, like CMAP, are able to weave water supply planning together with other regional concerns.

Once additional groups have been established, the governor and IDNR should convene a body to act as a water supply planning coordinating council. The primary purpose and benefit of this non-regulatory, bottoms-up coordinating group would be to ensure that state policies and investments are responsive to the needs of local water supply managers, and that state resources can be deployed to target water supply solutions to the regional scale of water supplies. The priorities of local water supply managers must be reflected in state financial and technical assistance, and any state programs must respond to and be supportive of local and regional needs.

Through the coordinating council, the state's water supply planning groups would work together and provide local and regional input, guidance, and perspective on state policies covering shared conservation and efficient use of finite water supplies.

Our water inefficiencies and waste can be solved through our existing systems of local management, regional coordination, and enhanced state financial assistance. The most critical aspects of such a process are dialogue, education and consensus between levels of government and users of different supplies. A water supply planning coordinating council that acts as a representative and stakeholder-driven vehicle for such discussion is a critical piece of effective, long-term water supply solutions.

With population growth come car washes, sprinklers, lawns, pools, and other water uses. As of 2005, Illinois used only 85 percent of its allowable Lake Michigan diversion. Efficient use and conservation are essential to ensure the lake can provide sufficient water for future population growth.

PHOTO: L. KURNARSKY

This council would be comprised of representatives from each regional water supply planning group, which in turn are comprised of local government officials and other stakeholders. Each regional group would determine its own representatives for the council, making all efforts to represent that region's distinctive water context fairly and equitably. Northeastern Illinois is the population center of the state, and grapples with distinct challenges to several water supply sources. As such, the representative cadre from this region should be larger than those of other planning groups.

This advisory coordinating council would meet on a biannual basis to review the state's financial and technical assistance programs, such as the revolving loan funds managed by IEPA; and provide annual recommendations to the governor, General Assembly, state agencies, individual regional planning groups, and other stakeholders on methods to better facilitate implementation of stakeholder-driven regional water supply plans. IDNR would provide staff support to the coordinating council.

Water supply and quality responsibilities are currently spread over several state agencies, with insufficient coordination and inconsistent priorities. As currently configured, neither IDNR nor IEPA (the two most likely candidates to better coordinate water supply issues) is in a position to comprehensively address Illinois' myriad water issues. An advisory coordinating council would evaluate the state's many water-related activities and ensure local and regional stakeholders have the opportunity to shape state water policy.

As a result of years of underinvestment, substantial investment is needed to repair existing infrastructure, and

Sustainability in Action: Rolling Meadows' stormwater utility fee

Stormwater utility fees are like most fees: charges assessed for use of a service, with resulting revenues reinvested in the operation and maintenance of that service. Stormwater fees typically are assessed to a landowner based on a property's amount of impermeable surfaces (e.g. roofs, driveways, parking lots), encouraging a switch to permeable paving that allows for onsite infiltration of stormwater. Because it is a fee for service, and not a tax, property owners who adopt onsite stormwater management practices, and thus do not contribute to the municipality's stormwater load, are often exempted from payment.

Since 2001, the City of Rolling Meadows, Ill., has been assessing a stormwater utility fee to all property owners. At $1.65 per 3,604 sq. ft. of impervious area per month, the fee helps the city cover costs of providing services that includes 60 miles of underground storm sewer lines, five miles of open drainage ditches, 100 culverts, 3,000 catch basins and inlet structures, 1,500 storm sewer manholes, 43 outfalls, 11 miles of Salt Creek stream bank, and numerous detention and retention facilities. While other communities must find revenue to pay for infrastructure upkeep and operation, Rolling Meadows' residents and businesses pay directly for these services. At the same time, the city proactively educates property owners on steps they can take to reduce stormwater runoff.

For more information: Rolling Meadows Public Works Department, (847) 963-0500

to shift water management from a supply expansion to a demand management paradigm. The coordinating council would work with state agencies to establish a set of goals for integrated water resources management to address both quantity and quality concerns. Be it a new treatment facility or protected wetlands, reservoir construction or shift to conservation-oriented rate structures, the coordinating council would work to provide local and regional players with assistance to pursue state and regional goals, but also the flexibility to pursue the optimal means and strategies for their particular local circumstances.

Based on research findings and consensus from the regional water supply planning groups, the goals would be linked with measurable priorities, such as reduction of per capita water consumption. The coordinating council would ensure the State of Illinois, through the consensus-building work of its regional planning groups, meets or exceeds the water supply goals of federal, interstate, and international agreements.

The coordinating council would review regional plans, evaluate results of regional planning, and resolve interregional inconsistencies. The council would review regional plans to determine whether they meet established guidelines, and address known water challenges, and the goals for integrated water resources management described above. If the coordinating council found a regional plan unsatisfactory, it would propose remedies and a timeline for revisions. The coordinating council would identify conflicts between regional plans, and ask the respective regions to address them within a specified time frame.

Through the course of discussions it may become clear that state policy and investment do not sufficiently account for some local or regional priorities. For example, groundwater-dependent communities throughout Illinois may feel state incentives for infrastructure rehabilitation do not meet their needs. Another benefit of the coordinating council would be interregional learning and consenus-building. In seeking appropriate reforms, a unified message will be more effective than a fragmented one.

Creation of an overarching state water supply plan would target scarce state resources toward the priorities identified by the regional water supply planning coordinating council. The state plan would integrate regional plans, weigh regional priorities to identify state water priorities, and outline strategies for addressing them. It would incorporate a long-term planning horizon and assure the equitable distribution of benefits, responsibilities and costs among all water users.

The newly created regional water supply planning groups will need two to three years to complete their initial planning cycles. By Jan. 1, 2014, IDNR should prepare a comprehensive five-year state water supply plan and submit it to the coordinating council for adoption.

The goal of the state plan is to ensure sustainable water

supply resources for all users today and in the future, and balance ecosystem and socioeconomic needs. The plan should explicitly align state action and support with regional and local action, consistent with statewide sustainability goals established by the coordinating council. It should link investment to measurable priorities such as reduction of per capita water consumption or leakage from public water systems. Infrastructure projects and government programs should be evaluated based on their progress toward these priorities. Moreover, the state plan would ensure consistency with Great Lakes Compact requirements in the allocation area, as well as other binding agreements and statutes. The plan also would identify the impact of water use on natural areas (e.g. wetlands, rivers, lakes) and comprehensive protection strategies for those resources.

IDNR also would develop a method for monitoring and evaluating the effectiveness of the state water supply plan and its implementation. At regular intervals, IDNR would conduct an evaluation and present its findings to the coordinating council. To account for the changing dynamics of water supply and demand, IDNR should update the state water plan on a five-year cycle.

Once the state water supply plan is established, the coordinating council would evaluate state programs, policies and investment strategies germane to water supply planning, and make recommendations to the governor, legislature, and relevant state agencies. The coordinating council would ensure consistent application of state water programs and policies on water supply, water quality, wastewater, stormwater, pollution control, and watershed protection. While the coordinating council would not duplicate or overstep mechanisms already in place, it would assure consistency in each of these areas. It would review other state programs (e.g. the Lake Michigan allocation guidelines, as well as transportation, housing, economic development, energy, and agriculture policies) for potential conflicts with water management goals.

Sustained funding for regional water resources planning and local implementation is essential to ensuring sustainable water supplies. Since 2006, when the pilot regional planning groups were established and began their work, state funding for water supply research and regional water supply planning has been tenuous. The $5 million designated to support regional planning over a three-year period was cut in the third year. Supplemental funding was cobbled together from various municipal and county sources. As of this report's writing, the State of Illinois has opted not to fund state or regional water supply planning in FY2010. The planning work to date should be considered a down payment on sustainability; with the planning done, the state must now fund implementation. Regional planning groups and state agencies need dependable funding if they are going to successfully protect Illinois' water resources. The State of Illinois should provide adequate funding to support regional water supply planning and plan implementation by local governments.

Data collection and analysis, planning, public education and outreach, cost-benefit analysis, and performance monitoring are all real costs of providing and protecting water supply in an efficient, equitable manner. Implementation of regional water supply planning recommendations also requires funding; dedicated revenue could greatly leverage other resources such as revolving loan funds. Reliable state support is necessary to protect water resources.

Ensuring sustainable water supply resources is a basic public good that is necessary to the quality of life of Illinois residents and businesses, and thus should be a consistent priority of state government. An annual appropriation from General Revenue Funds would signal the State's clear intention to sustain Illinois' water supplies. A $3 million annual appropriation would support the new regional water supply planning groups, cutting-edge research and modeling, and regional coordination. An additional $20 million would provide funding dedicated to implementation of conservation, efficiency, and sustainability measures. A return-on-investment analysis would demonstrate that these costs would be recouped over time in avoided infrastructure costs, reduced waste, and economic growth.

Recognizing that state funds are currently strained, additional revenue sources may be necessary to complement general revenues. User fees are effective, equitable means of managing demand and generating revenue for further planning, research and conservation. Any new taxes or fees should encourage conservation and efficient water consumption, and be dedicated solely — with great transparency and accountability — to the purpose of supporting water conservation and efficiency. Some ideas worth further exploration include:

- **Tax water-consumptive services.** Many services, from car washes to swimming pool installation and maintenance, consume or result in substantial consumption of water. Illinois, unlike many other states, does not tax many services. In 2009, a 5 percent service tax on pool-related services, car washes, and dry cleaning and laundering would

have generated approximately $72.9 million.[11] A portion of that money could be used to develop conservation and efficiency programs for the three services identified.

- **Provide incentives for water-efficient purchases.** The U.S. Environmental Protection Agency's (USEPA) WaterSense label can be found on thousands of water-consumptive goods such as toilets, bathroom fixtures, and even new homes. It designates that a product is highly water-efficient, much like the Energy Star program for appliances and electronics. Many states and communities — although none in Illinois — offer a rebate for purchases of WaterSense goods. An alternative approach to generate revenue and encourage conservation would be to establish a water inefficiency tax. For example, a 5 percent water-inefficiency tax on toilets alone, assuming an average cost of $300 per unit, would generate approximately $8 million a year in Illinois.[12] Consumers wishing to avoid the tax could opt for a WaterSense item, and a portion of the water-inefficiency tax revenue could fund a rebate program.
- **Develop a per-gallon surcharge on public water supply systems.** Public systems supply approximately 2 billion gallons of water a day statewide, so even a modest fee of 1 cent per 500 gallons would generate more than $12 million a year — or approximately $1 a year for every Illinois resident (given 2008 population). This fee would be assessed as a line item on water bills. New Jersey, as well as areas of Europe, fund water supply management programs through a similar surcharge.

Inconsistent past state support — most notably cutting funding for the pilot regional planning groups — prompts consideration of alternatives to direct state funding. An alternative approach worth considering is collecting this revenue at the local, county or regional levels, funding planning and implementation within the region, and then supporting state agencies and the coordinating council for the services they provide to regional planning. This approach would give regional water supply planning groups and their constituent communities greater control.

Four state agencies — IDNR, ISWS, ISGS, and EPA — would facilitate sustainable water supply planning through research, modeling data provision and technical assistance. IDNR would continue to manage the Lake Michigan allocation system efficiently

11 Inflation adjusted for 2009, based on 2002 revenues as reported in the U.S. Economic Census.

12 Average toilet cost based on market research and WaterSense market share data are from *WaterSense: 2008 Accomplishments*, USEPA, 2008.

A simple per-gallon surcharge on public water systems could generate revenue for regional planning and research, while simultaneously giving people an incentive to conserve water. Moreover, most people would pay only cents a day, and the surcharge could be easily collected through monthly water bills.

PHOTO: ILLINOIS AMERICAN WATER AND THE MORIAH GROUP

WaterSense

WaterSense is the U.S. Environmental Protection Agency's water-efficiency certification, similar to Energy Star. These savings lessen strain on drinking water and wastewater infrastructure, reduce energy to pump water, and save consumers money on their monthly bills. In 2008, WaterSense products saved consumers 9.3 billion gallons of water and $55 billion on utility bills.

Nationwide, dozens of cities, counties and utilities use rebates to spur residents and businesses to purchase these water-efficient products. For example, in and around Atlanta consumers can receive a $100 rebate for replacing an older toilet — which often use 3 gallons per flush or more — with one that uses 1.28 gallons or less. James City, Va., offers $300 to $500 to offset the cost of hiring a WaterSense-certified landscaping service.

In Illinois, as of 2009, no such rebates exist.

For more information: www.epa.gov/watersense.

and equitably. IDNR's allocation criteria and guidance to the regional water supply planning coordinating council and Northeastern Illinois Regional Water Supply Planning Group should explicitly promote and reward strategies to reduce the stormwater runoff portion of the Lake Michigan diversion, promote conservation and efficiency of water use, and enhance the performance of existing water infrastructure within the Lake Michigan allocation area.

IDNR's current allocation system gives communities insufficient incentive to rehabilitate underperforming or outdated water supply infrastructure. Most state programs offer little assistance to communities that would need to do so in order to meet more stringent requirements. More flexible infrastructure investment programs, such as the revolving loans managed by IEPA, should encourage infrastructure upgrades and demand management strategies to increase efficiency of current Lake Michigan usage and ensure the highest standards of future use.

Additionally, IDNR would:

- Provide staff support to the regional water supply planning coordinating council.
- Develop guidance documents and provide technical assistance to regional water planning groups.
- Using rigorous scientific analysis, coordinate with ISWS and IEPA to establish minimum standards for instream flows to protect stream quality and aquatic life.
- In coordination with ISWS and other entities, such as soil and water conservation districts, water authorities, or counties — and based on rigorous scientific analysis — establish aquifer-specific limits for sustainable withdrawals.

The ISWS and ISGS should provide modeling, data and analytical support to the coordinating council, IDNR, regional planning groups, and local units of government. ISWS and ISGS would conduct the timely technical research for water supply planning, evaluating and accounting for dynamic factors such as population growth and climate change. The research would be used for regional and statewide water plans and for local implementation strategies.

Modeling of water supply and demand needs to be done at least every five years to forecast water availability as conditions or inputs change. ISWS would update supply and demand models; the results would be incorporated by regional planning groups into demand and supply scenarios and resulting recommendations. Additionally, ISWS should perform a statewide analysis every five years. IDNR would make appropriate recommendations to adjust the comprehensive state water supply plan based on this analysis.

Current, comprehensive water use data is necessary to fully understand water consumption patterns. In Illinois, data on water use historically has been incomplete because reporting was voluntary and some areas of the state were exempt. There also are different standards for groundwater and surface water. As of August 2009, Public Act 96-0222 requires annual water usage reporting by all high-volume users in the state, a significant shift from past practice. While it is not a complete solution to understanding our water supply and demand (there are still many unaccounted-for lower-volume water users, often tapping the shallow aquifers that feed more directly into rivers, lakes and wetlands), this is a vital step toward data-driven water supply management planning. However, funding for ongoing research, regional water supply planning, and implementation remains in jeopardy. ISWS, now housed within the University of Illinois, will need a significant increase of staff and resources to collect and analyze the new data that will result from mandatory reporting. A portion of the state's $3 million annual appropriation would support this additional capacity.

IEPA oversees the state revolving loan funds and other incentive programs that are natural vehicles for local implementation of regional strategies. By federal statute related to the Clean Water Act and Safe Water Drinking Act, these programs currently prioritize water quality issues. However, separating quality from quantity is an artificial and problematic division. For communities to pursue conservation and efficiency strategies, federal and state funding needs to be more flexible. Additionally, the allocation criteria for the revolving loan funds, in particular, favor supply expansion and new infrastructure development — not rehabilitation or modernization of existing infrastructure. Providing funding for the expansion of drinking and wastewater infrastructure into a greenfield not targeted for development in a regional plan may meet the letter of the federal water quality statutes, but it may also bear unintended consequences — loss of open space, sprawl, and underinvestment in existing infrastructure — that could inadvertently stress limited water supplies.

IEPA should ensure the guidelines and goals of its programs encourage sustainable, integrated water resources management, to protect both water quantity and quality. Communities applying for state funding should be rewarded for implementing the recommendations of regional water supply plans, for co-

Federal and state investment in water infrastructure prioritizes projects that ensure compliance with the Clean Water Act. Communities seeking funding for water supply issues — even conservation programs consistent with the Great Lakes Compact — struggle to be competitive for funding under the current system. Federal and state infrastructure investment should fund water resources management solutions that integrate both water quantity and quality.

PHOTO: ILLINOIS AMERICAN WATER AND THE MORIAH GROUP

operating across governmental boundaries on shared water issues, and simultaneously advancing water quality and supply concerns. IEPA should give higher ranking to local applications for state funding that have been recommended by regional planning groups. IEPA should explicitly encourage conservation and demand management strategies, as well as reinvestment in existing infrastructure through the competitive allocation of IEPA funding.

Regional Planning Groups

While water supplies are managed at the local level, planning for supply conservation must be done at the scale of the resource. Regional planning and the resulting stakeholder-driven strategies, to be implemented by local governments or investor-owned utilities, should form the basis of sustainable water resources management in Illinois.

To complement the work of the pilot groups, the state should create additional regional water supply planning groups to develop water supply plans following IDNR and the coordinating council's guidance documents for appropriate process and content. These regional plans would form the backbone of a comprehensive state plan.

Each regional planning group would:

- Establish a planning process consistent with criteria established by IDNR and the pilot regional water supply planning groups.
- Develop a regional plan that meets statewide goals and guidelines for instream flows and aquifer yields, as established by the coordinating council, IDNR and ISWS.
- Identify the geography and scale of projected water deficits within the region, and develop strategies to meet demand.
- Identify regional priorities requiring interjurisdictional responses and facilitate coordinated imple-

Recommended elements for a regional water supply plan

- Active stakeholder input from municipal and investor-owned water managers, county governments, and interests such as agriculture, business, industry, environmental, land use planning, and education.
- Qualitative and quantitative description of current water resources for the region.
- Demonstration of how all areas in the region will meet future needs, highlighting specific areas with deficits and proposing solutions.
- Demand scenarios and supply projections for 25 and 50-year windows.
- Cost-benefit analysis of various proactive strategies to address potential shortages.
- Strategies to ensure compliance with instream flow and aquifer withdrawal standards, as established by IDNR and ISWS.
- Practical implementation plan, with clear action steps for local units of government and individual water users, and required state incentives or regulations.
- Education and public awareness activities regarding water supply and regional planning;
- Accountability and performance measures to determine the success of the plan and its consistency with state goals.
- Drought response strategy.
- Equity measures to ensure water is available at a reasonable cost to low-income individuals.
- Assessment of climate change impacts on regional water supply.
- External threats to successful plan implementation (e.g. activity in neighboring state or region) and possible responses.

Sustainability in Action: *Green River Pattern Book*

Seven communities along the Calumet River corridor in southern Cook County — Blue Island, Burnham, Calumet City, Calumet Park, Dolton, Riverdale, and Robbins, with support from the South Suburban Mayors and Managers Association — are working collaboratively to encourage sustainability and integrate innovative techniques into development policy.

A tangible outgrowth of that partnership is the *Green River Pattern Book*, a reader-friendly guide, prepared by Hitchcock Design Group, to promote environmental practices and techniques in development and redevelopment within corridor. Municipalities are encouraged to use the handbook as a reference as they review, revise and implement new zoning and development ordinances, that will support sustainable development in their communities.

Many of the practices in the *Green River Pattern Book* relate directly to stormwater management, water conservation, and efficiency. For example, dry wells are recommended as a means of onsite infiltration of stormwater. Downspouts from buildings flow into a perforated underground container that slowly releases water into the soil. Another strategy is drip irrigation, which reduces water loss from leakage or evaporation, and can be connected to rain barrels or other water reuse mechanisms, rather than using treated, potable water.

The seven communities are using the Green River Pattern Book both to attract sustainability-minded new businesses and to ensure new development has minimal negative environmental impacts. They are exploring incentive packages to reward developers for implementing the book's design patterns, as well as zoning overlays that would encourage their use.

For more information: Reggie Greenwood, South Suburban Mayor and Managers Association, reggie.greenwood@ssmma.org; or Joel Baldin, ASLA, Hitchcock Design Group, jbaldin@hitchcockdesigngroup.com

IMAGES COURTESY OF HITCHCOCK DESIGN GROUP

mentation of management strategies.

- Provide technical assistance to local units of government implementing regional plan recommendations.
- Educate regional stakeholders on the benefits of plan implementation.
- Select representatives for the regional water supply planning coordinating council, and provide that body with recommendations on state policy or investment reform.

The State of Illinois should provide local units of government with tangible incentives to pursue regional water supply plan recommendations. An additional responsibility of the regional groups should be to evaluate and recommend local applications for state and federal funding, contingent on their consistency with the regional plan.

Proposals endorsed by a regional water supply planning group should receive a higher ranking in state funding allocation processes. Rehabilitation and modernization of existing infrastructure, as well as demand management and conservation strategies, should be rewarded by regional groups. This would encourage and reward local participation in and coordination with regional planning. This recommendation would not be binding, but rather a 'stamp of concurrence' that the recommendation meets regional, consensus-driven goals.

Regional planning groups should play a large role in public education and outreach. Many water resources cross geopolitical borders; conservation or

In places where water supply considerations are interwoven with land use policies, native plantings often are used in landscaping. They typically require less water and are more tolerant to dry weather and drought.

PHOTO: OPENLANDS

other public awareness campaigns should reflect the scale of the particular challenge. Through the regional plans, web sites, public meetings, and other outreach media such as templates for school curriculum, the regional water supply planning groups should inform constituents of water supply challenges, and demand management and conservation strategies. Residents and businesses need to know that their local, regional and state leaders are working proactively to manage water supplies.

Local Government and Water Supply Managers

While municipal boundaries rarely match the contours of water supplies such as rivers or aquifers, the water supply infrastructure we rely on has historically been built, maintained, and managed by local units of government (or their designated investor-owned utilities).

The state's proper role is to facilitate regional planning, aid in goal-driven investment, and cutting-edge research/. Source protection, conservation, and demand reduction measures should be planned interjurisdictionally or regionally to match the extent of water resources. However, the context-specific demands of local water

Sustainability in Action: DuPage Water Commission's water conservation and protection program

In 2008, the DuPage Water Commission (DWC), serving most of DuPage County with Lake Michigan water since 1992, established a Water Conservation and Protection Program (WCAPP). The goal is a 10 percent reduction in overall per capita water use by DuPage Water Commission users within 10 years. To achieve this goal, DWC established four water conservation education programs: water conservation pledges; toilet leak detection and repair kits; rain gauge and landscape irrigation kits; and rain barrel education.

The initial focus of the program was on residential customers. Subsequently, DWC also implemented a program for utilities, the Utility Pledge Program, in July 2009, to supply the necessary tools for utilities to meet DWC's goal for water use reduction. DWC provides utilities with a list of best management practices, and helps them determine the annual volume and value of water lost through a simple calculation consistent with an IDNR model.

Although DWC does not mandate participation by utilities and residents, the information and outreach it performs establishes a clear mission of water conservation, and serves as a catalyst for residents and utilities to become stewards of their water supply. Because DWC serves several communities, it realizes that utilities should be encouraged to develop water conservation tactics that best suit their customers. The extent of DWC's outreach, depth of information it provides, and flexibility of its programs are models other organizations and commissions can easily follow.

For more information: Jenessa Nesbitt, Document Management Specialist, DuPage Water Commission, nesbitt@dpwc.org

Conservation tracking tool

The Alliance for Water Efficiency, a Chicago-based organization dedicated to efficient and sustainable use of water, has developed a new tracking tool for water utilities and municipal governments. It evaluates savings, costs and benefits of conservation programs, and can be tailored for any utility or community's specific population, water rates, and other variables.

The Excel-based tool includes a library of pre-defined conservation activities from which users can build their own programs, and run different scenarios to test which has optimal results.

It is free to Alliance members, and online at www.a4e.org/tracking-tool.aspx.

supply management require flexibility and stakeholder input that are only possible at the local level.

For instance, some groundwater-dependent communities may need assistance to determine recharge and depletion rates for deep and shallow aquifers, while some Lake Michigan-served communities may require support in determining leakage from delivery systems. Regional coordination and state leadership can provide those kinds of assistance, but that process requires significant input and collaboration from local units of government.

Illinois' immediate water problems — wasteful and inefficient use, insufficient demand management, aging infrastructure, division between land-use planning and water supply analysis — can be solved if local governments have the right data, resources, and technical expertise. Many communities already have the resources and tools in place to sustainably manage their water resources, but many do not. Moreover, the effectiveness of a single community's conservation efforts will hinge on its neighbors' ability or willingness to follow suit on protecting the same water supply.

Municipalities and private utilities obtain, manage and supply water for many Illinois residents, but historically have tended to operate independently. Government-owned systems that treat drinking water and wastewater typically serve customers in individual municipalities (in contrast, private utilities often serve customers in more than one community, sometimes acting as a regional water utility). Federal and state funds for the purposes of meeting Clean Water Act regulations and treating wastewater go to individual municipalities

Land use decisions affect water supplies. In general, per capita water consumption is inversely related to population density. At the same time, greater population density often means more impermeable surface and resulting stormwater issues. These relationships should be taken into account as communities plan for future growth. Design elements such as native plantings (above) or green stormwater curb extensions (below), can mitigate the impact of development on water resources, and should be chosen on a context-by-context basis.

PHOTO: TOP, OPENLANDS, BOTTOM, MILWAUKEE METROPOLITAN SEWERAGE DISTRICT

without significant incentive for interjurisdictional cooperation.

Local stakeholders should participate in county and watershed-based efforts, so that water supply management and the tools that support it fit the scale of the problem. Illinois does have models of interjurisdictional cooperation at the county level. Kane County, for instance, has invested more than $2 million dollars to address local water supply issues. This investment funded significant scientific research, planning, and stakeholder involvement. These county studies help inform decisions made at the regional level and provide significant input to that process. In addition, the municipal/county framework established in Kane, McHenry and Kendall counties may be a suitable method to implement the regional water supply

planning objectives. Federal and state funding should reward utilities and communities that implement regional sustainability strategies. This prioritization of local applications for federal and state funding that are consistent with regional plans will provide a significant benefit to counties and municipalities that participate in and coordinate with regional planning.

It is imperative that local units of government or designated investor-owned utilities participate fully in the regional water supply planning process, and that state policy and investment be responsive to local needs. Regional plans will only embody truly shared goals if the process is inclusive and participatory. While IDNR and the regional water supply coordinating council's criteria can ensure the process is open, units of local government and investor-owned utilities need to be at the table to shape state and regional priorities and vision. The composition of regional planning groups and the coordinating council must acknowledge and incorporate robust participation from local water supply management, and equitable representation from the communities dependent on varying water supplies within a given region.

Counties and municipalities make many decisions every day that significantly impact water supplies. While many local decisions protect water supplies, others can expose water supplies to contamination or put development in areas where water is scarce. Land use also can affect demand — there is a strong correlation between residential density and water consumption as well as residential density and infrastructure cost per capita. In general, single-family homes on large lots consume more water per capita than denser settlement patterns, and the cost to serve less dense areas is greater. At the same time, more urbanized communities often struggle with stormwater management and upkeep of aging infrastructure. In every community, land use, zoning and design decisions must account for development impacts on water supplies.

Development should occur where adequate, sustainable water supply exists. As documented in *Troubled Waters*, most land use plans and zoning codes in Illinois do not require evaluation of the water demand of a proposed land use.[13] Better integration of water demand in land use planning would reduce the true cost of new infrastructure and ensure future water availability.

Local units of government should integrate water supply analyses into land use policies, zoning ordinances, and comprehensive plans. Regional planning groups and state agencies can provide the needed data and technical assistance to do this, as well as facilitate and reward cooperative efforts to establish consistent land use policies for an entire water supply geography. As part of the development approval process, counties and municipalities should require developers to submit proof that local water supply is sufficient to meet the needs of the development without harming local or regional progress toward sustainability. Municipalities can either reject applications or proactively work with developers to mitigate negative impacts on area water supplies. However, consistency is essential — strategies to conserve water in one community will be futile if a neighbor is exploiting the same water supply. Interjurisdictional partnerships would provide the shared, common standards needed to alleviate this concern.

13 For more information, see *Troubled Waters*, page 8, as well as *Changing Course*, pages 9-17.

Implementation Strategies and Policy Initiatives

The state and regional water supply planning groups should facilitate this review through data provision and the creation of templates for water-mindful development review. Wisconsin, California and a handful of other states offer models worth further exploration.

The first step to ensure sustainable water supplies is the development of stakeholder-driven regional plans that inform and coordinate state investment and local implementation of conservation and efficiency measures.

As the regional water planning process continues in some parts of the state, and commences in others, all levels of government can pursue strategies that directly improve water supply management. Each of the strategies below would be enhanced by the recommended framework for regional water supply planning outlined above, but are not contingent upon it. These four strategies are highlighted because they provide immediate opportunity for shifts in policy or investment, and would save water, money and energy.

Link Land Use and Water Availability

The 2002 Local Planning Technical Assistance Act defined the required elements of a local comprehensive plan and called for state incentives for municipalities and counties creating or updating plans that met these criteria. No money was ever appropriated to the fund, and water supply considerations were not included in the required elements. Today, we know that water supply planning is a necessary element of any comprehensive plan.

To create an explicit link between land use and water availability, the Local Planning Technical Assistance Act should be amended to include a water supply study as a required element of a comprehensive plan. IDNR and ISWS should develop a methodology and provide data for local governments and private developers to measure water supplies, as well as estimate the water consumption of proposed developments. Proposals for future development should demonstrate whether anticipated water consumption is sustainable, given known local and regional water supplies. The state should appropriate funding for local planning assistance. The water-related revenue sources described above could also fund local planning for water supply.

The Act also authorized the State of Illinois to give priority in its spending programs to those communities that have adopted comprehensive plans in accordance with the Act. The state should reward local units of government that create or update comprehensive plans to include an analysis of water supply, by granting additional points in the competitive application process for water-related state grants and loans such as the Clean Water and Drinking Water Revolving Loan Funds. The regional water supply coordinating council should identify other spending programs through which to reward municipalities for integrating water supply analyses into land use planning.

While comprehensive plans provide communities with a vision for long-term sustainable growth, zoning and building codes significantly influence water consumption. IDNR should work with IEPA to develop and disseminate model zoning ordinances such as conservation overlay districts or conservation design ordinances, and provide technical assistance to communities working to implement them. The State of Illinois should initiate a review of existing building and plumbing codes and other regulations to determine whether significant conservation or efficiency benefits can be garnered through updates and modernization of those regulations. State funding should reward communities for adopting these measures.

Water supply trading

Market-based solutions to resource issues are increasingly common and effective, and have been successful in managing consumption of renewable resources and reducing pollution. Cap-and-trade systems, in particular, have been used to address acid rain — from 1980 to 2007, sulfur dioxide levels dropped by 50 percent nationwide, after the creation of an emissions trading system — and volatile organic compounds.

While cap-and-trade systems most often factor into climate change discussions, the basic concept could work for water supply protection as well, and deserves further exploration. Permits are issued for specific amounts of water consumption, and then bought or sold on an open market. Over time, the total volume for which permits are issued drops until an environmentally sustainable level of consumption or pollution is reached. Users of a shared water supply system such as an aquifer, river, or public water supply could be allocated a certain amount of water for immediate use or long-term storage. More efficient users could sell excess water, and less efficient users could buy it. In some ways this already occurs with Lake Michigan water, though in many situations a buyer has only one potential seller — the next community toward the lake — rather than an open market.

Water supply markets exist elsewhere in the U.S., particularly in the arid western states. In the case of the Mimbres River Valley of New Mexico, the trading is done in real time using a computer interface, comparable to online stock trading. Permit holders can buy or sell whenever it makes the most sense for them. Moreover, the Mimbres model accounts for hydrologic changes along the river. As water is consumed and evaporates upriver, and as pollution and groundwater affect water quality, its value is affected downriver; a sophisticated modeling program adjusts the price accordingly. The system, which is still in development, "leads to a water system that is much more efficient than a situation where trading isn't allowed," according to Don Coursey, the University of Chicago professor spearheading the project.

Illinois needs to consider all alternatives as it tackles its water supply concerns. The state, IDNR, and regional planning groups should explore water supply trading as a possible demand management strategy and piece of the conservation puzzle.

Manage Demand and Rethink Supply

Demand management strategies such as conservation pricing can significantly reduce stress and strain on water supplies and infrastructure, often eliminating or delaying the need for development of new water supplies or expanded infrastructure capacity.

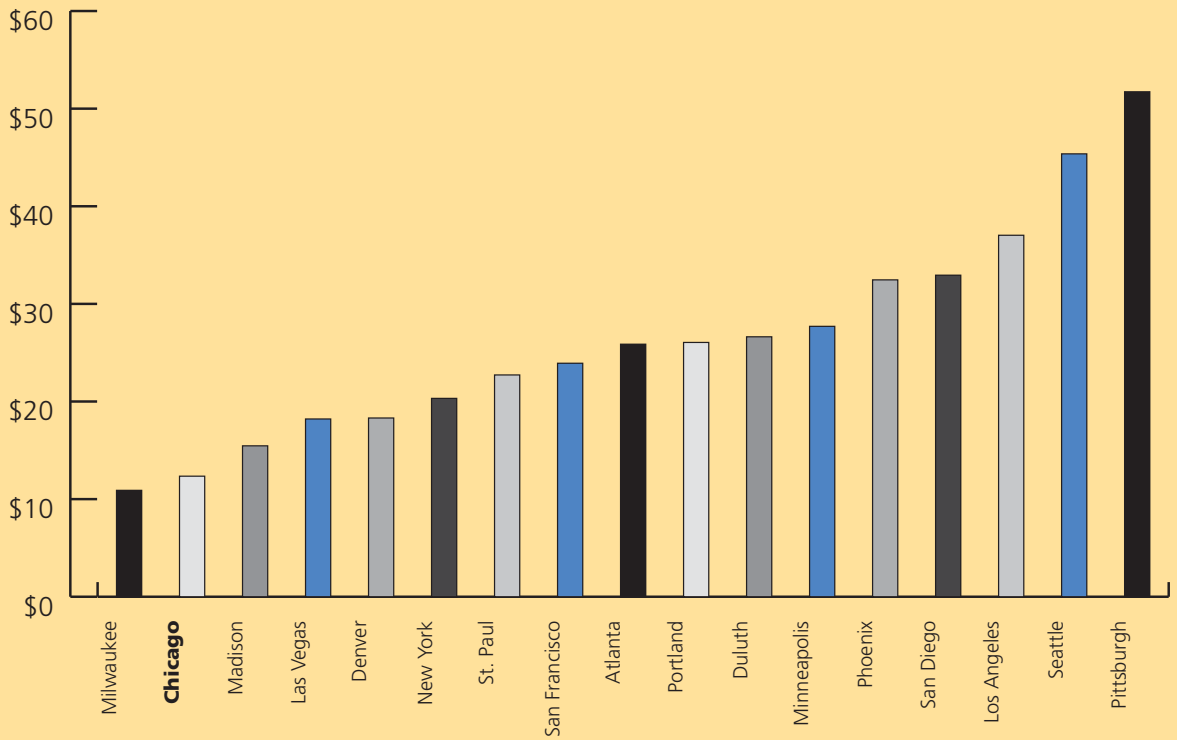
Demand management is one means of "creating" new water supply through strategies such as efficiency upgrades to infrastructure and rate structures that help end users account for the full cost of water delivery. Moreover, heretofore underutilized water supplies such as stormwater can supplement consumption of finite groundwater and surface water resources, often in very cost-effective ways.

However, at present, there is minimal technical or financial assistance available to a community opting to reduce demand rather than expand supply. For instance, if a shift in rate structures would lead to greater conservation or efficiency of use than some other means, then state financial assistance to local governments should support it — that is the nature of goal-oriented investment.

Water rates are a particular concern. Many consumers do not pay the true cost of what it takes to provide drinking water or wastewater service, so some local units of government do not have the necessary funds to maintain or renew existing infrastructure. Additionally, water rates almost never reflect the costs of measures to protect and sustain water resources such as rivers or aquifers. Likewise, water rates do not account for the inherent value of water itself; water is arbitrarily undervalued, unlike other natural resources such as oil, coal and gravel.

Current water rates in many Illinois communities actually encourage wasteful consumption, and often do not generate sufficient revenue to cover the full cost of providing safe, abundant water. Investor-owned utilities are required by the Illinois Commerce Commission (ICC) to reflect the full cost of service in their utility bills. Public utilities, in contrast, have greater leeway in determining water rates. Water rates in communities with private utilities are often somewhat higher, but they are also more "real." The utility is able to recoup the necessary revenue to provide necessary services and maintain infrastructure, and consumers have an incentive to ex-

Comparison of 2004 water rates in selected U.S. cities



The City of Chicago's 2004 water rate was $12.35 per 10,000 gallons, well below the rate of many other cities. Water rates should reflect the full cost of resource management, infrastructure upkeep, treatment, and delivery. When rates do not keep pace with those costs, infrastructure deteriorates and inefficient consumption increases.

SOURCE: *WATER DEMAND AND PLANNING IN THE TWIN CITIES METROPOLITAN AREA*, METROPOLITAN COUNCIL, 2004.

amine their own water use and make informed choices about efficient consumption.

The ramifications of artificially low water rates bear costs in themselves. In general, if a community does not generate enough revenue from water service to pay for capital and operations, it is forced to:

- Divert money from some other source (usually property or sales taxes, which then diverts money from things like schools and fire protection).
- Secure federal and state loans to subsidize costs, particularly for infrastructure development.
- Use bonding authority to secure funding for capital improvement (which is often financed against future water use, creating a disincentive for conservation efforts).
- Delay or forego maintenance and/or improvements to the system.

Because water prices typically do not cover all water-related costs, many government-owned utilities rely on federal and state spending programs to subsidize infrastructure construction or rehabilitation. However, these federal and state programs focus on water quality, wastewater treatment, and new construction, rather than rate issues, efficiency upgrades or maintenance. They also require repayment by the borrower, meaning costs are merely deferred, not avoided.

The lack of full-cost pricing hinders local efforts to use pricing as a means to conserve water.

Low water rates currently are used by some communities as an economic development incentive, sometimes at the expense of sustainable water supply management. The result is underinvestment, and inefficiencies that lead to water shortages. Businesses and residents need to know water supplies will be safe and abundant for the long-term. Rather than compete for the lowest rates, communities should compete for the most efficient and sustainable management of finite water resources. U.S. EPA has designated pricing at the full cost of service as one of its four pillars of sustainability, so that consumers better recognize the true value of the water resources they utilize. Full-cost pricing will

Sustainability in Action: Conservation pricing

Conservation pricing can take many forms — rates that increase in dry seasons, during peak periods of the day, or as specific tiers of use are reached. While conservation pricing benefits utilities (by reducing strain on infrastructure and avoiding expansion costs), consumers (efficient users do not subsidize inefficient consumption by others), and society as a whole, it is an uncommon practice in Illinois.

As of 2005, only 15 Illinois communities used some form of conservation pricing. These communities serve as models to others seeking to conserve water in an equitable, efficient, manner:

Berwyn	Matteson	Park Ridge	Westmont
Burr Ridge	Merrionette Park	Round Lake Park	Willowbrook
Ford Heights	Morton Grove	Stone Park	
Hometown	Orland Park	Streamwood	
Leyden Township	Palatine	Waukegan	

SOURCE: CMAP, 2008. REVIEW OF LAKE MICHIGAN COMMUNITIES WITH INCREASING RATE STRUCTURES COMPLETED AS PART OF RESEARCH ON WATER PRICING FOR THE NORTHEASTERN ILLINOIS REGIONAL WATER SUPPLY PLANNING GROUP.

enable better maintenance of existing infrastructure, greater efficiency of delivery systems, and ultimately, better water resource management.

The State of Illinois should level the playing field by requiring full-cost, conservation-oriented pricing for publicly managed water supplies, as it does for investor-owned utilities. This shift would lead to an increased revenue base for municipalities to rehabilitate aging infrastructure, protect water supplies, and manage demand effectively.

Conservation-oriented pricing provides the consumer with a further reason to save water. There are many approaches to creating variable rates that increase in dry seasons, at peak periods, or as specific thresholds of "efficient" use are passed. Conservation pricing is effective at saving water, equitable, and inexpensive to implement — but also rare (see sidebar on facing page).

IDNR and the regional planning groups should work in concert with government and investor-owned utilities to develop rate structures that simultaneously encourage efficient use and generate sufficient revenue to maintain existing infrastructure. Rate structures should encourage conservation without stifling economic activity or unfairly burdening one group of water users over another. In addition, tariff designs must reflect the need for utilities to recover their full cost of service, including the substantial cost of invested capital that exists independent of volumetric water use. **The coordinating council and IDNR should develop mechanisms to reward government and investor-owned utilities for pursuing state water supply management goals through rate structures.** This is an effective means of encouraging energy utilities to embrace efficiency and conservation, and would work for water resources as well.

Ultimately, water bills should be sufficient to pay for water supply infrastructure and operations. Decades of insufficient reinvestment and modernization — often due to rate structures that were artificially low and did not account for the real cost of water service — have created a backlog needed repairs. Implementing full-cost pricing would help to minimize future infrastructure issues, but substantial federal and state investment to make up for historic shortfalls is also necessary. There will need to be a period of transition from relying on subsidies, such as loans or grants, to relying on efficient rate structures that will meet the cost of sustainable water supply management. Moreover, the cost of repaying federal and state loans should be accounted for in water rates. Communities should not have to divert other revenues to repay those debts. Continuing to rely on infusions of federal and state capital, and then repaying those loans with revenues generated from property or sales taxes, does not encourage efficient use or conservation of finite water sources.

Beyond pricing strategies, other demand management systems sustain water resources, and merit further exploration for their applicability and benefit in Illinois. Notably, for instance, water supply trading systems encourage efficient use of shared water resources. Like a cap-and-trade program for airborne emissions, water

supply trading systems allocate a certain amount of water to users based on various criteria including use, geography, and known pressures on supply. Individuals can then choose to use less of their allotment, in which case they are able to sell the remainder on the open market. Long-term conservation is assured by allocating water at a declining rate over time. This basic model has worked on river systems in New Mexico, and has proven to be an effective means of curbing acid rain and greenhouse gas emissions. IDNR and the regional planning groups should explore water supply trading, and develop pilot programs to test its effectiveness in different Illinois contexts (see side bar on page 47).

As existing water supplies are further strained, it is essential that we look to alternatives. According to Robert Glennon, professor of law at the University of Arizona, the U.S. only drinks 10 percent of its "drinking" water, using the rest to wash cars, water lawns, and other uses that do not require potable water. Techniques such as rainwater harvesting for indoor use in flushing toilets reduces strain on both existing water supplies and infrastructure. For Lake Michigan water in particular, use of these systems would reduce the amount of lake water being flushed down the toilet, and reduce the stormwater runoff component of the diversion. Similarly, Illinois communities such as Algonquin and Barrington (see case studies on pages 28 and 52) make treated effluent available for use in outdoor irrigation, further extending the life of water supplies. The state, regional planning groups, and local units of government should learn from and expand upon these strategies.

Invest in Goal-Oriented Infrastructure

While inefficient rate structures are largely responsible for a shortage of funds to maintain infrastructure, the allocation criteria for federal and state funding dictate which projects are supported with the limited government assistance available. The State of Illinois must ensure that its finite resources are being used as effectively and efficiently as possible to achieve established goals for water quality and sustainable supply.

The federal government provides some guidance for use of the state revolving loan funds, but states set their own criteria for selecting projects. In Illinois, water conservation projects do not fare well in the application process for the revolving loans, largely because there are few points awarded for demand management or efficiency upgrades. Solutions that do not require infrastructure expansion, such as the adoption of conservation-oriented pricing structures, are not common. Historically projects that simultaneously address water quality, conservation, or efficient use of water supply have not been prioritized for funding. Green infrastructure mechanisms such as permeable paving and vegetated swales are cost-effective means of reducing stormwater runoff, but typically are not favored by the current ranking system.

Congress is expected to reauthorize the Clean Water and Drinking Water Revolving Loan Funds in late 2009, with reforms that encourage communities to conserve water, increase efficiency, and develop green, innovative infrastructure. Funds for such improvements were initiated in the American Recovery and Reinvestment Act (ARRA), and may become permanent as part of the reauthorization process. Illinois should position itself and its communities for investment. State funds for conservation projects, incentives for implementation of regional plan strategies, and technical assistance on conservation and green infrastructure would ensure future rounds of federal funding have the most impact on protecting our water resources.

Illinois' unsatisfactory experience with the ARRA funds for green infrastructure — the short timeline hindered most communities' abilities to prepare and propose efficiency or green infrastructure projects that met the spirit of the federal initiative — illustrates the need for the state to develop clear guidelines and state funding matches to leverage new federal funding opportunities that advance shared sustainability goals. Communities need assurance they will be rewarded for pursuing innovative, green strategies.

Rather than designate special pots of money for gray infrastructure, green infrastructure, demand management, and various other means of protecting water supplies, the State of Illinois should prioritize reinvestment in its existing water infrastructure, increased efficiency of use, and cost-effectiveness. Investment should be made according to established goals, allowing flexibility in the project type. The state should encourage communities and water utilities to conduct comprehensive planning studies to establish and prioritize capital investment programs according to regional and state goals. Moreover, state funding should encourage projects consistent with goals for water quality and sustainable supply.

Finally, smaller and lower-income communities often cannot afford the repayment terms of government loans. This means they often struggle to meet Clean Water Act conditions or ensure efficient use of water supplies. The State of Illinois should explore new competitive grant programs, with rigorous project

Sustainability in Action: Stormwater management lessons from Milwaukee

The Milwaukee Metropolitan Sewerage District (MMSD) provides water reclamation and flood management services for 28 communities in the greater Milwaukee area, serving 411 square miles that cover all or segments of six watersheds.

A 1975 study found half of the district's water pollution stemmed from combined sewer overflows — because stormwater flowed into the wastewater system and heavy rains often overwhelmed treatment facilities, forcing the release of untreated effluent. Many urban areas, including northeastern Illinois, have similar problems. Through the construction of three deep tunnels, which store excess wastewater underground until there is capacity to treat it, MMSD significantly reduced its overflows — from a pre-tunnel average of more than 7.5 billion gallons a year to approximately 1.3 billion gallons a year. In doing so, MMSD reduced total pollution into its watershed by approximately 50 percent.

In 2000, a new study showed urban stormwater runoff was responsible for 68 percent of the district's water pollution. While the deep tunnels reduce combined sewer overflows, they do not efficiently address the issue of urban stormwater runoff. MMSD determined green infrastructure investments — such as open space protection, permeable paving, bioswales, rain gardens, green roofs, waterway naturalization, and rain barrels — would be the most efficient approach to the problem at hand. Since then, MMSD has sold more than 12,500 rain barrels and 11,000 native plants to district residents, and worked with the Conservation Fund to permanently protect more than 1,800 acres of open space and wetlands.

As northeastern Illinois tackles its own stormwater issues, Milwaukee's process of source assessment, goal-oriented investment, and decentralization is a model to follow.

For more information: Karen Sands, Manager of Sustainability, Milwaukee Metropolitan Sewerage District, ksands@mmsd.com, (414) 272-5100

selection criteria, to enable innovative communities to access funds that advance sustainability goals. For example, strategies to encourage regionalization and consolidation, where maintaining separate utility systems are not viable, could vastly improve sustainability. Communities should be rewarded for cooperation and leveraging of financial resources. Grants, however, are a one-time infusion of funding (in contrast to revolving loans, which cycle and recycle investment dollars for future use). Any state competitive grants for communities struggling to meet loan program requirements must ensure a high rate of return in the form of water conservation or efficiency benefits.

Optimize the Lake Michigan Diversion

By law, Illinois may divert 3,200 cfs of Lake Michigan water. In any given year the actual diversion may be below or above that total — it is the state's running 40-year average that is reviewed for compliance with the law. In 2020, however, the long-term average will cease to be relevant, and the 3,200 cfs annual limit will be realized. The 40-year span, established in 1980 by the U.S. Supreme Court, enabled Illinois to pay back its historic water "debt" to the rest of the Great Lakes

Sustainability in Action: Barrington's non-potable water program

The Village of Barrington, Ill., has proven it takes water efficiency seriously by enacting a water conservation ordinance in June 2006, and a non-potable water program in July 2009. While the water conservation ordinance restricts outside water use by address on an even-odd system, with use further restricted to specific times, the non-potable water supply program reuses treated effluent to provide an alternative outside water source to individuals and organizations. This program complements Barrington's conservation ordinance by reducing stress on the village's water supply (primarily shallow aquifers) and promoting conservation practices through reuse.

Subject to requirements set by the IEPA, the Village of Barrington Wastewater Treatment Facility provides non-potable water for use in hydration, equipment cooling, or soil stabilization only. (While safe for human handling, effluent water is not suitable for human use or consumption, including the hydration of plants intended for human consumption.) Individuals and organizations interested in using non-potable water must register with the village's Public Works administrative office and pay an annual fee of $100. Each registered participant is trained on non-potable use and restrictions. After the training, participants may pick up their non-potable water anytime between the hours of 7:00 a.m. and 3:00 p.m., Monday through Friday, from April 1 through Nov. 1, at the Barrington Wastewater Treatment Facility.

While Barrington's non-potable water program is too new to quantify benefits, advantages already can be seen. Treating wastewater for effluent discharge into the water supply costs the wastewater treatment plant. Through the non-potable water program, Barrington now receives payment from users such as golf courses and landscapes who require alternative water sources during the months when outside water use is restricted. Other Illinois communities, such as Algonquin, have decided to allow free non-potable water pickup to encourage even more businesses to conserve potable water. Whether the community charges for non-potable water use, adopting a non-potable water program alleviates stresses on diminishing water supplies and promotes efficiency through water reuse.

For more information: Dennis Burmeister, Director, Village of Barrington Public Works Dept., VOBPW@barrington-il.gov, (847) 381-7903

community. In every year from 1983 to 1993, Illinois diverted significantly more than its allowable total (1993 was the high point, at 120 percent). Starting in 1994, however, Illinois has diverted less than its allowable share, and as of 2005, had paid off its debt.

In 2005, as determined by the U.S. Army Corps of Engineers, Illinois diverted only 85 percent of its allowable total. The chart on page10 illustrates the breakdown of the actual 2005 diversion by use. Any portion of the allowable diversion we do not actually divert stays in the lake and helps to recharge lake levels (in 2005, this was approximately 15 percent of Illinois' allowable total). The total actual diversion figure changes annually, affected by the amount of rainfall and stormwater runoff, domestic consumption, and other factors. Moreover, the ratio of uses within the total diversion changes as well. If, for example, the amount of stormwater increased substantially in any given year, that would consume some or all of the 15 percent that went unused in 2005, making no additional water available for other purposes. Population and business growth in the existing Lake Michigan service area, as well as the prospect of moving some groundwater-dependent communities onto lake water, will most likely lead to increases in the domestic use portion of the diversion, even with conservation and efficiency gains. In order to ensure additional lake water is available, it is imperative to reduce, or at least hold steady, the amount of water diverted for other uses.

As of 2005, 59 percent of the actual diverted water was pumped for public consumption. This is water used in our homes and businesses. Another 9 percent is "discretionary" and is used to maintain "reasonably satisfactory sanitary conditions" in the Chicago Sanitary and Ship Canal. IDNR anticipates that "discretionary" diversions will decrease by more than half in or around

2015, when the Tunnel and Reservoir Plan (TARP) is expected to be complete. TARP will store combined stormwater and wastewater in large underground reservoirs until treatment capacity is available, As that 9 percent decreases, the percentage of our unused diversion will increase. As a result, Illinois will be able to divert a higher percentage of its 3200 cfs for public consumption, which could enable additional groundwater-dependent communities to tap Lake Michigan resources.

An even larger opportunity lies in the stormwater runoff that would, before the reversal of the Chicago River, have flowed into the lake. In 2005, approximately 28 percent of the diversion — 588 million gallons a day — was wastefully captured, treated, and ultimately diverted out of the watershed to the Mississippi River. It should be noted that 2005 was a drought year, with less rainfall, and thus less stormwater, than in other years. Any rain falling in the diversion area — the gray area on the map shown on page 11 — counts as water Illinois has taken out of the lake. If that water makes its way back to the lake (by seeping into the ground, or by being filtered and returned), it does not count against the diversion. However, a sizable portion of the diversion area's stormwater is captured in sewer systems, where it mixes with wastewater, putting an immense strain on existing infrastructure and leading to combined sewer overflows during even moderate storms. While the TARP should eliminate a majority of the pollution issues that arise from combined sewer overflows, it does nothing to reduce the volume of stormwater flowing into the system. Rain is the only water that is delivered free of charge. Rather than harness that water somehow, we instead pay to remove it, treat it, and then send it down the river to the Gulf of Mexico.

There are two main questions to answer when it comes to this 28 percent — how do we reduce the stormwater runoff component of our current diversion, and how do we put that water to better use?

This lost water neither serves our consumption needs nor recharges the lake. Instead it flows into the region's sewers.

Because of the unique nature of the Lake Michigan diversion rules, this is both a stormwater and a water supply issue. Strategies to encourage stormwater infiltration directly into the ground, to capture and use stormwater for non-potable needs like flushing toilets, to treat runoff to potable levels, or to filter storm water and return it directly to Lake Michigan (as occurs on Chicago's south Lake Shore Drive and at McCormick Place) could significantly reduce the amount of loss. As the stormwater runoff portion of the diversion declines, the amount of water the region could theoretically pump from Lake Michigan for domestic purposes increases. It is very likely that this water will be necessary to accommodate future population growth in northeastern Illinois without further drawing down aquifers or rivers. Whether the water is treated and sold as drinking water or not, simply reducing stormwater runoff would also greatly reduce wastewater treatment costs and could encourage some water to reenter the Lake Michigan basin.

Water infrastructure comes in many forms, from massive pumping stations to rain barrels that store stormwater. Federal and state investment currently tends to prioritize expansion and new construction of heavy infrastructure over maintenance of existing assets, demand management, or green infrastructure.

PHOTO: ILLINOIS AMERICAN WATER AND THE MORIAH GROUP (LEFT), MILWAUKEE METROPOLITAN SEWERAGE DISTRICT (RIGHT)

Lake Michigan is the single most important source of water for Illinois. Optimizing the allowable diversion should be a state priority. The State of Illinois should aim to reduce its runoff 50 percent by 2020, an aggressive but achievable goal.

To do so, the state should request that CMAP and the Northeastern Illinois Regional Water Supply Planning Group begin planning, coordinating and overseeing a joint effort to reduce stormwater loss from the Lake Michigan diversion and optimize use of the 'new' water. CMAP can ensure the stormwater plan is integrated into regional transportation, housing, economic development, and open space planning. This plan should guide state, regional and local investment in the Lake Michigan diversion and service area. Many of the most relevant stakeholders — particularly the City of Chicago and Metropolitan Water Reclamation District (MWRD) — are already on the Northeastern Illinois Regional Water Supply Planning Group, making it the ideal forum to coordinate this process.

A wide array of Best Management Practices exists to reduce stormwater runoff — from hard investments such as rain barrels and green roofs, to policy solutions such

The cost of stormwater runoff from the Lake Michigan diversion

588 million gallons a day (mgd) is a lot of water. In a perfect world, all of that water would soak into the ground or flow into ponds and rivers, ultimately recharging Lake Michigan. Because it does not, and instead is captured by storm sewers, it counts as part of Illinois' diversion.

Based on a treatment cost of $0.00053 per gallon, the region spends approximately $112 million a year to treat that much wastewater — money that, like the wastewater it pays to treat, literally runs down the drain. Strategies to diminish runoff volumes would lower utility costs, reduce strain on wastewater infrastructure, and simultaneously help recharge the lake.

Illinois currently uses only 85 percent of its allowable diversion, so for the immediate future, it is unlikely this averted runoff would be used for public consumption. At the same time, the region's population is growing and its other water sources — aquifers and surface rivers — are feeling the pressure. It is possible that in the years to come, even with advances in efficiency and conservation, Illinois will need to pump a greater portion of its allowable diversion out of Lake Michigan to meet its needs. In that scenario, an additional 588 mgd would be a major benefit. By reducing the amount of stormwater runoff entering sewers, or by capturing, treating and reusing it, Illinois could maximize the potential of this invaluable resource. Based on a treatment cost of $0.00067 per gallon of drinking water, and a sales price of $2.00 per 1,000 gallons, the revenue from an additional 588 mgd would net $282 million per year.

In 2009, we are losing $112 million a year to this problem. If we do not do anything about it, in 2019 or 2029, that total could be closer to $400 million in treatment costs and foregone revenue. The State of Illinois and Chicago region need to address those hard choices regarding water supply from Lake Michigan.

Treatment and revenue values derived from City of Chicago Fiscal Year 2008 Budget and Metropolitan Water Reclamation District Fiscal Year 2009 Budget.

as on-site retention standards and impermeable surface fees. These can be employed by individuals, businesses, and other water users as appropriate. The State should provide tax or rebate incentives for individuals and businesses implementing these strategies, and revise the state revolving loan criteria to encourage their adoption.

MWRD, the City of Chicago, and other municipalities should use bonding authority to undertake more substantial projects to reduce or treat stormwater runoff, repaying investors with the revenue earned from selling off any 'new' potable water and the money saved from avoided wastewater treatment that results. Large infrastructure projects — retrofitting alleys and parking lots with permeable paving, separation of sewer and stormwater systems, reengineering of roadways (as was done with south Lake Shore Drive), or greater onsite retention — will require substantial capital costs, while demand-oriented measures such as a permeable surface fee might achieve the same results at lower cost. The State of Illinois should match local capital funding directed explicitly at reducing Lake Michigan stormwater runoff.

The second issue regarding this 'new' water source is how to use it. While moving communities off of dwindling aquifers is likely a necessity, to do so would require significant investment in new water delivery infrastructure. Our existing water infrastructure is already old and maintenance grossly underfunded. Substantial expansion of infrastructure would only increase that burden. A highly competitive allocation process — based not on ability to pay, but capacity to use Lake Michigan water as efficiently as possible and consistently with regional growth plans — would help compensate for some of these negative consequences. Communities should provide a plan for maintaining or even reducing demand. The State of Illinois should develop accountability and incentive mechanisms to ensure those communities rigorously conserve and manage this 'new' water.

Lake Michigan is Illinois' most precious natural asset. The future prosperity and sustainability of northeastern Illinois may be determined by the decisions we make today. Stakeholder-driven regional consensus on use of Lake Michigan should be informed by the most current and comprehensive data, backed by state policy, and implemented by local units of government and investor-owned utilities.

Sustainability in Action: Bannockburn's alternative stormwater best management practices

Conventional methods of stormwater management direct runoff mainly through drainage and storm sewer infrastructure. When those methods can no longer handle runoff, streets and yards can flood, resulting in costly maintenance repairs and polluted drainage systems. To alleviate these stresses, the Village of Bannockburn, Ill., implemented several Alternative Stormwater Best Management Practices to keep rain water closer to the source, by using wetlands preservation, encouraging pervious surfaces, naturalizing detention ponds, and installing rain gardens, bioswales and native plantings. The village (supplied with Lake Michigan water) recognized the volume and rate of stormwater discharge affects areawide watershed water quality, as well as local property values.

In 2009, Bannockburn put its best management practice strategies into place by restoring 1000 sq. yards of wetlands in unvegetated drainage areas, creating bioswales by enhancing approximately 700 linear ft. of existing unvegetated drainage swales, building two rain gardens, and planting these areas with native plants. Bannockburn chose these sites based on local drainage patterns, Lake County wetland inventory maps, and soil maps from the Natural Resource Conservation Services. The village completed this work on public property to set an example for the community. More recently, Bannockburn has installed two additional rain gardens and a 100 foot bioswale on village property, and plans to install an additional 12 bioswales within road rights of way.

Bannockburn has reduced stormwater runoff by 15 to 25 percent in areas draining to a rain garden or bioswale. In May 2010, the village will ramp up its stormwater reduction efforts further by sharing in the construction cost of private rain gardens. It will supply a deer resistant plant list and diagram on how to construct a rain garden. The village also will offer design assistance in proper location and plant selection. Other communities can replicate Bannockburn's Alternative Stormwater Best Management Practices to alleviate stress on the environment, improve stormwater quality, and reduce property damage and roadway maintenance caused by runoff and flooding.

For more information: Maria Lasday, Village Manager, Village of Bannockburn, MLasday@villageofbannockburn.org.

Conclusion

The recommendations in this report build off the success of recent efforts to start developing a statewide framework for regional water supply planning, and the commitment and interest of local stakeholders in the pilot regional water supply planning groups. A state water plan built on regional plans and quality data would encourage goal-oriented investment and implementation by units of local government and investor-owned utilities. Water supply planning and management is necessary if Illinois hopes to accommodate future population and economic growth, provide a high quality of life for all, and protect the integrity of the natural environment.

Research, planning and investment should be coordinated and directed toward the goal of balancing Illinois' water budget. Illinois' experience with the two pilot regional water supply planning groups has set the stage for achieving that goal, and should be reinforced through reformed state and federal programs. Illinois needs to create a process for water supply planning that is based on the regional nature of water supplies and local nature of water supply management.

A historically significant drought sparked the 2006 executive order that initiated the regional planning process and called for a statewide framework. Rather than wait for the next crisis to compel reform and long-term planning, Illinois should make informed, prudent decisions now to avert future challenges to a clean, adequate water supply.

PHOTO: ILLINOIS AMERICAN WATER

Illinois needs to create a process for water supply planning that is based on the regional nature of water supplies and local nature of water supply management.

Appendix A: Comparison of water supply planning process in other states

	California	Florida	Georgia	Kentucky	Pennsylvania	Texas	Virginia
Year Authority Defined	1852	1970	2003	1988	2002	1957	2005
State Coordinates Regional Planning?	Yes	Yes	Yes*	Yes	Yes	Yes	Yes
Top Down (TD)/ Bottom Up (BU)	TD	TD	BU	BU	BU	BU	BU
State Board?	Yes	Yes	TBD	Yes	No	Yes	Yes
State Funding Tied to Regional Plan Implementation	Yes	No	Yes	Yes	Yes	Yes	Yes
Conservation as Priority	Yes	No	Yes	Yes	Yes	Yes	Yes
Fastest Growth in Water Use	Public supply	Public supply	Public supply	Public supply	Public supply	Public supply	Public supply
Incentives/Penalties for Pursuit of State Goals	Incentives	Incentives	TBD	Both	Incentives	Both	Both

* regional group established in 2008

Appendix B: Regional water supply planning in Texas

Texas faces projected water shortages in the near future. Increasing population and economic development stress the state's water supplies. Significant regional differences in water supply and demand make statewide, centralized planning unwieldy and historically unsuccessful. The geological and hydrological diversity of Texas means political boundaries often do not correspond well to water availability. State-level planning often resulted in conflict between neighboring users, whose unique demands were not accounted for in aggregate assessments. The Texas Water Development Board, (TWDB), responsible for statewide planning from 1957 until 2001, often faced poor participation from users and communities, whose input often was not incorporated into statewide plans.

Texas has moved from a centralized to regional system with broadened participation. Regional stakeholders assess their demands, supplies and needs, then draft plans in accordance with guidelines established by the TWDB.

Facts and challenges:

• The Texas legislature revamped the TWDB, and mandated it coordinate a regional water planning process. Plans are revised at the regional level every five years, then adopted by the TWDB as the statewide plan. The first plans were adopted in 2001.
• The 2000 population of Texas was roughly 21 million. It is projected to grow to 45.5 million by 2060.
• As of 2005, groundwater and surface water supplies were projected to be inadequate by 2050.
• As of 2005, water supplies amounted to 15.8 billion gallons of water each day, and are projected to decline by 18.5 percent, to 12.9 billion gallons, by 2050.
• As of 2005, water demand was 15.1 billion gallons of water each day, and is projected to increase by 21.6 percent, to 19.3 billion gallons, by 2050, resulting in a deficit of 6.4 billion gallons a day.
• The resulting gap is projected to cost Texas 7.4 million jobs, the emigration of 13.8 million people, and 38 percent less state income ($238 billion).
• Texas relies on aquifers and other groundwater for almost 60 percent of water use. Surface water accounts for almost 40 percent, while wastewater reuse is marginal and decreasing.

Principles and benefits of the Texas model:

• Effective management and conservation, for all users, requires stakeholders to decide how water supplies and demands are balanced in their own regions.
• Coordinated regional planning, with broad community participation, accounts for the unique demands, demography, and environments of specific regions, and generates greater public involvement. Implementation of water management strategies is more efficiently tailored to contextual realities.
• Cooperation between regions is encouraged, to map management strategies to water availability, and circumvent future conflict.
• Water plans must account for demand and supplies in the event of a "drought of record," and for near-term (30 year) and long-term (50 year) capabilities.
• Water use is defined in six ways: municipal, manufacturing, irrigation, livestock, mining, steam-electric. Communities of 500 individuals or more are considered a municipal water-user group, and other users are aggregated at the county level. Membership in the planning process is voluntary.
• Coordinated regional planning, according to set guidelines established by the TWDB, is the most responsible and responsive means of protecting economic development, scarce resources, and environmental integrity. The TWDB states the benefits of this model are five-fold:

1. Broad-based growth of public knowledge of water resource issues.
2. Fostering a direct link between water planning and implementation.
3. Enhanced cooperation between different interest groups and regions.
4. Improved relationships between environmental and development interests.
5. Implementation of water management strategies.

Roles and responsibilities in the Texas model

Texas Water Development Board:

• Delineates the regional planning areas, according to hydrological, socioeconomic, political, and infrastructure criteria. TWDB has established 16 regions.
• Drafts a State Water Plan every five years that incorporates regional plans, resolves interregional conflicts, provides additional analysis, and makes policy recommendations.
• Provides technical assistance, in terms of water supply and demand models, and suggests the parameters for water management strategies, which are then assessed at the regional level for applicability. These strategies include conservation, reuse of wastewater, new supply development, reallocation of reservoir storage, and subordination of existing water rights through voluntary agreements.
• Provides financial assistance for the construction of water and wastewater projects through the Clean Water State Revolving Fund and Drinking Water State Revolving Fund. Financial assistance programs are funded by state-backed bonds, through a combination of state and federal grant funds or limited appropriations.
• Administers the Texas Water Bank, which facilitates the transfer, sale, and lease of water rights throughout the state.
• TWDB membership is by executive appointment, with five-year terms.

Regional planning groups:

• Each region has a planning group, which represents the interest of the area and is responsible for drafting the regional plan. Each group adopts its own by-laws, and often designates a political subdivision to administer planning. Many of the regions have hired technical consultants.
• The process for plan creation demands possible environmental and economic impacts of strategies be assessed and accounted for, and strategies accord to the guidelines established by the TWDB. The process has seven steps:

1. Describe the planning area, including current providers and use, as well as the regional economy, summaries of local water plans, and agricultural and natural resources.
2. Quantify current and future population and water demand for the six categories: municipal, manufacturing, irrigation, livestock, mining, and steam-electric.
3. Evaluate and quantify current supply. Supply includes usable water with established rights and infrastructure, and of suitable quality.
4. Identify surplus and need for near and long term.
5. Evaluate TWDB-suggested management strategies and prepare plans to meet "drought-of-record" needs. Submit this plan to TWDB for approval.
6. Recommend any regulatory, legislative, or administrative changes.
7. Adopt the plan, with TWDB comment, and generate public participation in implementation.

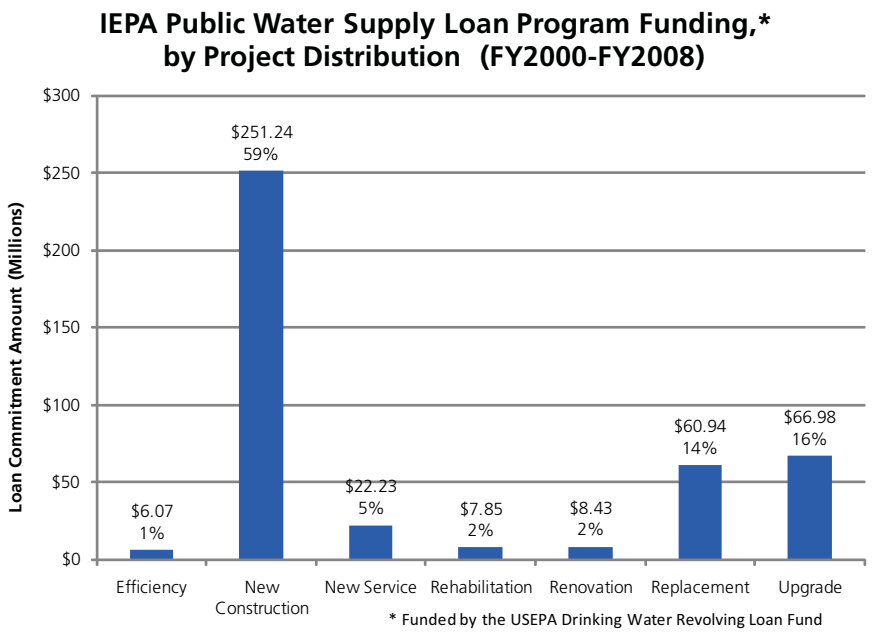
Users and local units of government:

• Water user groups, defined according to the six categories above, project their own demands and supply for the near and long term. In case of projected deficits, they also must propose strategies to meet those needs.
• Local units of government and user groups are encouraged to participate in the regional planning process, and relied upon for implementation of the statewide and regional plans, projects and policies. Financial assistance from the TWDB is available only for projects consistent with regional water plans.

Appendix C: Breakdown of Illinois' recent investment in local water infrastructure

The federal government awards funds to Illinois through USEPA's Clean Water and Drinking Water State Revolving Loan Funds. Illinois uses these investment dollars to capitalize its own loan funds — IEPA's Water Pollution Control Loan Program (for waste water) and Public Water Supply Loan Program (for drinking water). Eligible recipients — most often municipalities — receive below-market rate loans for approved projects that ensure compliance with the federal Clean Water Act and Safe Water Drinking Act.

A breakdown of recent usage reveals new construction and expansion are the predominant uses of these loans, while efficiency improvements, rehabilitation, and other upgrades are rare.



Efficiency: These projects replace or rehabilitate equipment or facilities to correct system deficiencies.

New Construction: These projects maintain continued service within existing service areas through the construction of facilities, water mains, and equipment. These projects also include treatment facilities (i.e. radium treatment) to meet water quality requirements.

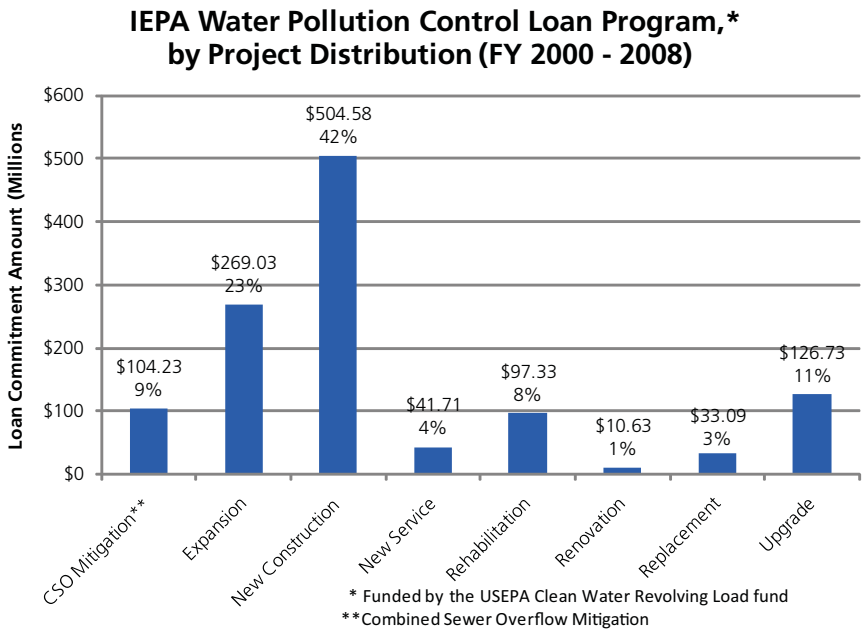
New Service: These projects provide or extend service to new developments, subdivisions, or previous well water users.

Rehabilitation: These projects include repairs to facilities and equipment within existing service areas, but do not improve capabilities.

Renovation: These projects restore existing facilities, but do not improve capabilities.

Replacement: These projects replace existing equipment, water mains, and facilities due to dilapidation. These projects also include the relocation of existing water mains due to road/highway construction.

Upgrade: These projects improve system capabilities and capacities within existing service areas.



Combined Sewer Overflow Mitigation: These projects provide combined sewage transportation or treatment, and include combined sewer rehabilitation and replacement, in addition to combined sewage separation projects and combined sewage detention projects.

Expansion: These projects not only provide additional sewage transportation or treatment, but also extend existing service. This may include additional facilities, sewage main extensions or even equipment additions within facilities.

New Construction: Unlike expansion projects, these projects include increased transportation and treatment within the existing service area. These projects also may include relief sewers, in addition to facility or equipment construction.

New Service: These projects provide sewage collection systems and sewage treatment plants to unsewered municipalities.

Rehabilitation: These projects include structural repairs and improvements to existing service areas, but do not improve capabilities.

Renovation: These projects restore and modify existing sewage transportation and treatment, but do not improve capabilities.

Replacement: These projects maintain existing wastewater needs through substitution of facilities or equipment, but do not improve capabilities.

Upgrade: These projects improve the capabilities of wastewater transportation and treatment within existing service areas.

Cited and Additional Resources

Publications

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Lake Michigan Diversion Accounting: Water Year 2005 Report, U.S. Army Corps of Engineers Chicago District, 2005

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Water Quantity Issues Facing Illinois: A Paper Presented to the 2002 Illinois Environmental Conference of the Illinois State Bar Association, Ill. State Water Survey, 2002

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Online

Alliance for Water Efficiency
www.allianceforwaterefficiency.org
Located in Chicago, the Alliance serves as a North American advocate for water-efficient products and programs, and provides information and assistance on water conservation efforts.

Center for Neighborhood Technology
www.cnt.org
CNT is a creative think-and-do tank that combines rigorous research with effective solutions. CNT works across disciplines and issues, including transportation and community development, energy, natural resources, and climate change.

Chicago Metropolitan Agency for Planning
www.cmap.illinois.gov
Formed in 2005, CMAP integrates planning for land use and transportation in the seven counties of northeastern Illinois. CMAP's strategy papers for the GoTO2040 regional plan include information on stormwater, wastewater and waterway management.

East Central Illinois Regional Water Supply Planning Committee
www.rwspc.org
This is one of two pilot regional water supply planning groups in Illinois. This web site contains links to all aspects of tits planning process, including supply assessments and demand scenarios.

Illinois State Water Survey
www.isws.illinois.edu/wsp
Housed at the University of Illinois at Urbana-Champaign, under the Institute of Natural Resource Sustainability, ISWS is the primary state agency concerned with water and atmospheric resources. This web site provides access to raw data, ISWS reports and analysis, and other information germane to the regional planning process.

Mahomet Aquifer Consortium
www.mahometaquiferconsortium.org
This consortium is concerned with the long-term viability of the Mahomet aquifer in central Illinois, and is the facilitating organization of the East Central Illinois Regional Water Supply Planning Committee.

Metropolitan Planning Council
www.metroplanning.org/water
Since 1934, the Metropolitan Planning Council (MPC) has been dedicated to shaping a more sustainable and prosperous greater Chicago region. As an independent, nonprofit, nonpartisan organization, MPC serves communities and residents by developing, promoting and implementing solutions for sound regional growth.

Natural Resources Defense Council
www.nrdc.org
NRDC publications, policy statements and resources on green infrastructure and sustainable water issues.

Northeastern Illinois Regional Water Supply Planning Group
www.cmap.illinois.gov/watersupply/default.aspx
This is one of two pilot regional water supply planning groups in Illinois. This web site contains links to all aspects of their planning process, including all iterations of the draft regional plan, which is scheduled for completion in late 2009.

Openlands
www.openlands.org
Founded in 1963, Openlands protects the natural and open spaces of northeastern Illinois and surrounding region to ensure cleaner air and water, protect natural habitats and wildlife, and help balance and enrich our lives.

WaterSense
www.epa.gov/watersense
Launched in 2006, WaterSense is a partnership sponsored by the U.S. Environmental Protection Agency to promote water-efficient products and practices.

Before the Wells Runs Dry, the third report from the ongoing partnership between MPC and Openlands, lays out a framework for regional water supply planning and sustainable local water supply management throughout Illinois. This report builds upon the success of the two pilot regional water supply planning projects, and presents a series of recommendations for how Illinois can reform existing programs to support regional water supply planning, increase the efficiency of investment in water-related infrastructure, and, ultimately, reward local management that conserves our shared water resources.

For more information:

Metropolitan Planning Council
140 South Dearborn Street
Suite 1400
Chicago, IL 60603
Phone: 312.922.5616
Fax: 312.922.5619
metroplanning.org

Since 1934, the Metropolitan Planning Council (MPC) has been dedicated to shaping a more sustainable and prosperous greater Chicago region. As an independent, nonprofit, nonpartisan organization, MPC serves communities and residents by developing, promoting and implementing solutions for sound regional growth.

Openlands
25 East Washington Street
Suite 1650
Chicago, IL 60602
Phone: 312.863.6250
Fax: 312.863.6251
openlands.org

Founded in 1963, Openlands protects the natural and open spaces of northeastern Illinois and surrounding region to ensure cleaner air and water, protect natural habitats and wildlife, and help balance and enrich our lives.

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