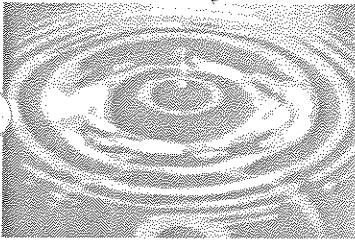


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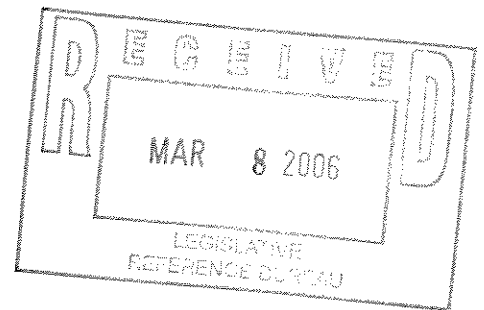


Clean Water, Healthy Future

A Framework for Achieving an Integrated Water Resource Management Strategy in the Milwaukee Region

Public Policy Forum
Water Policy Advisory Panel

February 2006



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moving the region forward

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The Public Policy Forum, established in 1913, is an independent, non-profit organization dedicated to providing timely, objective information on community issues for governments, businesses and citizens.

The program activities of the Forum link business, government, education and community leaders to solve common problems. Membership is open to businesses, non-profit groups, and governments. Leadership is provided by a 57-member Board of Trustees.

Water Policy Advisory Panel

The panel consists of stakeholders from across southeastern Wisconsin who represent the interests of policymakers, industrial water users, planners, scientists and engineers, farmers, environmentalists, legal experts, and citizens.

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Clean Water, Healthy Future:
*A Framework for Achieving an Integrated Water Resource
Management Strategy in the Milwaukee Region*

**Public Policy Forum
Water Policy Advisory Panel**

February 2006

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Clean Water, Healthy Future:
*A Framework for Achieving an Integrated Water Resource
Management Strategy in the Milwaukee Region*

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Clean Water, Healthy Future: *A Framework for Achieving an Integrated Water Resource Management Strategy in the Milwaukee Region*

Executive Summary

Clean and abundant water is a strategic asset -- central to the Milwaukee area's history and its future, and to the region's quality of life and global competitiveness. Unlike counties and states, however, water knows no boundaries, making management of water resources extremely complex. In addition, water resources must be managed whether the water is underground or in a pond, whether it is polluted or clean, or whether it is in a pipe in Milwaukee or a well in Waukesha. To manage precious water resources holistically and across political boundaries, an integrated approach is needed. Integrated water resource management is designed to achieve and measure the community-supported, positive environmental, social and economic benefits of clean and plentiful water for this generation and succeeding generations.

Findings

- Water is a key regional asset, central to industry, agriculture, and quality of life.
- Our region is facing immediate problems, such as dropping water tables and deteriorating water quality. Unless we change the way we manage the asset, the problems will worsen.
- Leaders must think strategically and regionally about managing the asset in the long term.
- Jurisdictional overlaps, policy gaps, and lack of a sound scientific database for decision-making hamper efforts to solve water problems within existing governmental and private institutions.
- There are multiple ways to change the way we manage the asset.
- The general public favors regional measures to protect and improve water resources and ensure we have fishable and swimmable surface waters.
- A strategic and integrated water resource management approach would strengthen the region.

Recommendations

Vision and Goals

- Acknowledgement that water resources of the region are finite and the natural systems that contribute to their replenishment and quality must be protected.
- Achieving fishable and swimmable waters for the entire region.
- Development and implementation of an integrated water resource management strategy that recognizes the relationship between surface waters, groundwater and water-dependent natural resources.
- Regional management strategy with a structure that addresses water quality and quantity issues on the basis of natural or hydrologic boundaries such as watersheds or groundwater aquifers.

- Direct linkage of the integrated water resource management strategy with other regional and community plans, including population, land use trends, economic development, transportation, housing and recreation development.
- Timely and integrated data collection on water quantity and quality to establish trendlines, and a method for coordinating various relevant scientific studies regarding water issues.
- As scientific data permit, movement toward a long-term goal of a “no-net loss” concept; that is, ensuring that the water we use is replenished.

Menu of Science-based Options

A variety of different options are available to communities that will help them achieve the region’s vision and goals and manage the water resources in an integrated fashion. These choices are available to assist communities in achieving water resource management goals for the region, because there is no one-size-fits-all solution to complex water issues.

Regional Water Management Models

All four models are options for achieving the visions and goals of integrated water resource management based on watershed or groundwater basin boundaries.

- Regional Water Resource Commission—A cooperative coordinating council of water resource managers appointed by each municipality and county in the region that meets semi-monthly or quarterly to create and implement regional water resource plans.
- Compact among Local Governments—A contractual compact binds local governments and specifies the goals agreed on, the actions to be performed in furtherance of those goals, and the funding mechanism for those actions.
- Wisconsin Department of Natural Resources—The state agency uses its authority, enhanced by state legislation to provide guidelines for local governments to achieve integrated water resource management strategies. Local governments shall adopt local plans and choose among models and options to comply with regional and state objectives.
- Regional Water Resource Authority – An appointed planning and enforcement body governs a professional staff that plans for water resources in the region, sets regional priorities to prevent environmental degradation, implements policies through rulemaking, and enforces municipal compliance.

Policy and Law

To achieve the regional vision and goals and implement policies, programs, and governance models to carry them out, it will be necessary to clarify certain laws, change others and create new state water laws as needed.

Next Steps

This advisory panel calls on state legislators to adopt a goal of integrated water resource management and to request a Joint Legislative Council study committee to address the panel’s recommendations. As an alternative, the role of the statutory Groundwater Advisory Committee could be expanded to include integrated water resource management.

Introduction

Clean and abundant water is a strategic asset—central to the Milwaukee area’s history and its future, and to the region’s quality of life and global competitiveness. The challenges of managing this world class asset are varied and complex. Southeastern Wisconsin has a history as a world leader in balancing the demands of its human and natural systems. Today that leadership is needed to build on past successes in managing water. Doing so requires a forward-looking shared vision for what we want our region to become, and a strategy to make it happen. The strategy needs to be *regional*—because our competition consists of regions around the world from Boston to Bangalore, from Seattle to Shanghai. And the strategy needs to be *holistic*—because quality of life and economic prosperity go hand in hand.

Early in 2005, the Public Policy Forum assembled a panel of leaders with various backgrounds from across southeastern Wisconsin in an effort to reach a consensus on how the region should manage its water. This report is the result of that effort. It is primarily about policy, but it is based on a solid underpinning of knowledge about the state of the science, technology and politics of water.

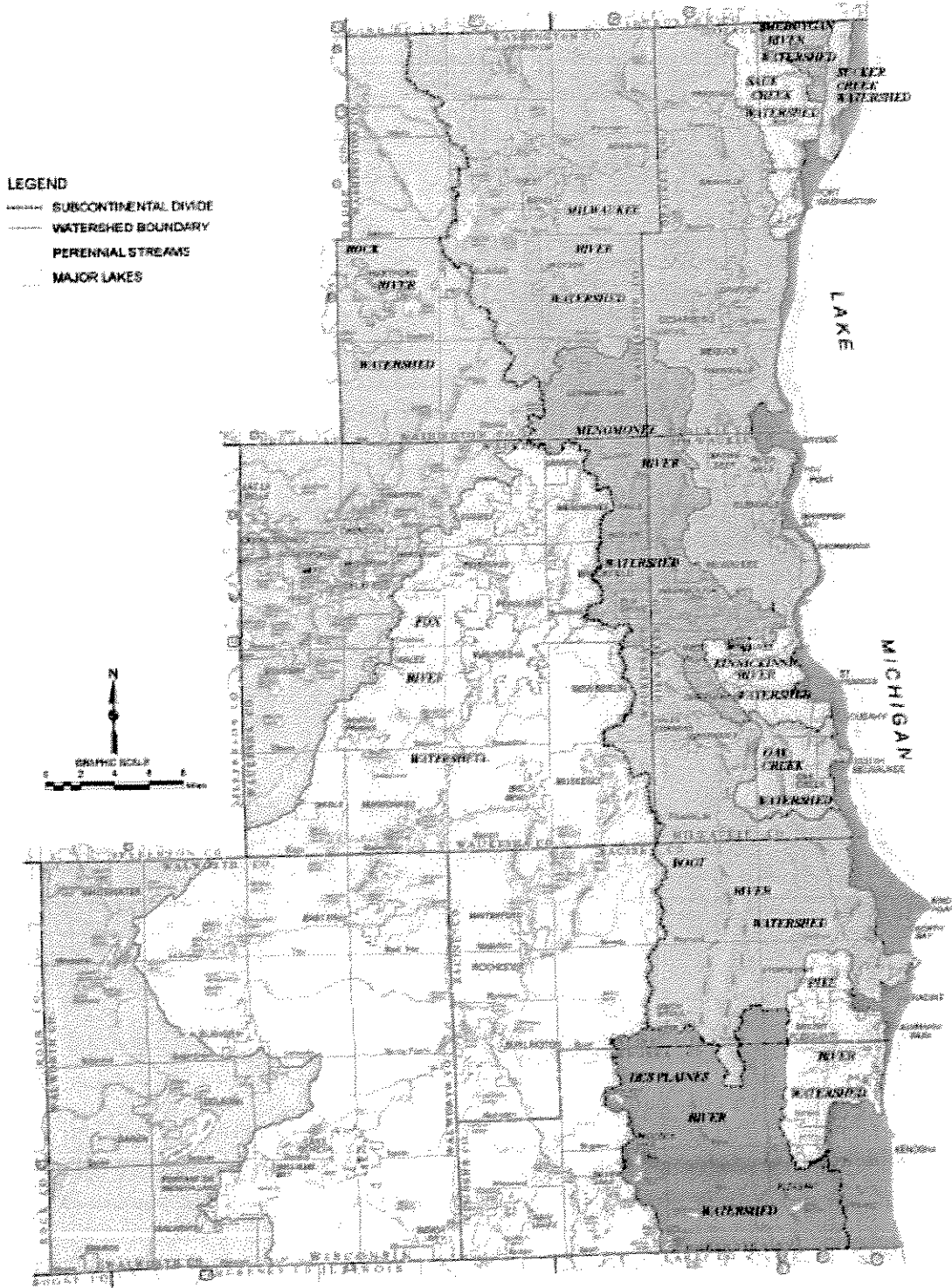
The report is organized into findings and recommendations. The findings are based on dozens of reports and presentations by scientists and technical experts; focus groups of regional stakeholders; several conferences on water resources, including one sponsored by the Public Policy Forum; and a comprehensive survey of citizens residing in the region. The recommendations resulted from the Water Policy Advisory Panel’s deliberations over a period of 12 months.

Core Concepts

Central to this report are two ideas which emerged from the answers to two core questions: What do we mean by region? And what are the boundaries of our region’s water?

- **Our Region** – Unlike counties and states, water knows no political boundaries. A sub-continental divide splits southeastern Wisconsin in half, with some of its water flowing toward the Mississippi River and the rest flowing into the Great Lakes basin. Therefore, we chose to define our region in political as well as hydrological terms. In political terms, southeastern Wisconsin consists of seven counties (Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington and Waukesha). In hydrological terms, the region includes watersheds in the Lake Michigan basin and watersheds tributary to the Mississippi River basin. Maps 1 and 2 depict the region’s watersheds and public water utilities.

Map 1: Surface drainage and surface water in the southeastern Wisconsin region



Source: SEWRPC

- **Integrated Water Resource Management** – Water is water, whether it is underground or in a pond, whether it is polluted or clean, and whether it is in a pipe in Milwaukee or a well in Waukesha. Even so, our region’s management of water issues tends to compartmentalize operations, treating *surface* water differently than *ground* water and water *quality* as distinct from water *quantity*. This report integrates water policy issues by acknowledging that water sources are linked and that quantity and quality concerns are two sides of the same coin. As a result, we focus on the concept of *integrated water resource management*. This means implementing a comprehensive strategy and principles, recognizing the interdependence of surface water, groundwater and water-dependent natural resources. Integrated water resource management is designed to achieve and measure the community-supported positive environmental, social and economic benefits of clean and plentiful water for this and succeeding generations.

Findings

The findings are detailed below. In summary, they are:

- **Water is a key regional asset, central to industry, agriculture, and quality of life.**
 - **Our region is facing immediate problems, such as dropping water tables and deteriorating water quality. Unless we change the way we manage the asset, the problems will worsen.**
 - **Leaders must think strategically and regionally about managing the asset in the long term.**
 - **Jurisdictional overlaps, policy gaps, and lack of a sound scientific database for decision-making hamper efforts to solve water problems within existing governmental and private institutions.**
 - **There are multiple ways to change the way we manage the asset.**
 - **The general public favors regional measures to protect and improve water resources and ensure we have fishable and swimable surface waters.**
 - **A strategic and integrated water resource management approach would strengthen the region.**
1. **Water is a key regional asset, central to industry, agriculture, and quality of life.**
 - *There is an emerging global fresh water crisis, and water knows no boundaries. Fresh water flows across political, state and national boundaries; between surfaces of the earth and beneath the ground.*

In a global context, water is emerging as the natural resource that is likely to define the 21st century in ways similar to the ways oil shaped the 20th century. According to the World Health Organization, there are 330 million cubic miles of water on earth. Of that, an estimated 3.5% is fresh water. A small fraction of the world's water—an estimated 0.34%—is readily available for human consumption. The remainder of the fresh water is stored in glaciers, beneath the ground, in plants and elsewhere.

Today, about 30 countries are experiencing water shortages. Annually, roughly five million people die worldwide because of contaminated water. Over the past century, roughly half of the world's wetlands have vanished. In China, economic success is out of balance with its natural systems; 80% of China's rivers cannot sustain fish.

There is considerable scientific evidence that global water conditions will worsen. There are two fundamental causes for this: climate change and population growth. The earth is gradually getting warmer. The average global surface temperature is projected to be between 1.4 and 5.8°C higher by the end of the next century.¹ Anticipated consequences include lower agricultural productivity worldwide and greater water scarcity.

The earth's population, which has tripled to six billion since 1922, is projected to reach nine billion in 2048. United Nations scientists predict that widespread scarcity of water will affect three billion people worldwide by 2025 and as many as five billion by 2050. The UN Economic and Social Council regards water shortage as the major environmental and human health crisis of the 21st century.

- *Clean and abundant fresh water is one of southeastern Wisconsin's prime assets. The asset is not only Lake Michigan, but all surface and groundwater sources.*

The Great Lakes are the earth's largest system of fresh surface water. They contain 20% of all fresh water on the surface of the earth. Lake Michigan is the largest freshwater lake in U.S. territory, and the 5th largest in the world. It is 307 miles long, 118 miles wide, 923 feet deep, and contains nearly 1,180 cubic miles of water, enough to cover the U.S. to a depth of 1.5 feet.

Fifteen million people drink Lake Michigan water, triple the number in 1900. About 1.2 million of those people live in southeastern Wisconsin. The region's population could grow to 2.5 million by 2035 under the highest estimates.² In addition, industry has historically used and continues to use large quantities of Lake Michigan water.

Despite the vastness of Lake Michigan, about 40% of the residents of southeastern Wisconsin—and about two-thirds of the region's land—do not tap into Lake Michigan water. That is primarily because they reside west of the sub-

¹ Intergovernmental Panel on Climate Change, Third Assessment Report of Working Group I, Summary for Policymakers, January 2001.

² Southeastern Wisconsin Regional Planning Commission, The Population of Southeastern Wisconsin, Technical Report 11, 4th Edition, July 2004.

continental divide separating the Great Lakes basin from the Mississippi River basin. The basin divide running so close to the lake itself puts southeastern Wisconsin and Chicago in a unique situation among large metropolitan areas in the US; many residents reside within commuting distance of the lake, but are not supplied with lake water. Significant legal proscriptions against transferring water from one basin to another prevent all communities in our region from utilizing this resource.

Fortunately, a natural abundance of groundwater also exists in our region, allowing communities outside the Lake Michigan basin to grow and thrive. According to the Wisconsin Department of Natural Resources (DNR), in 1995 southeastern Wisconsin had 78 municipal community water systems and 244 privately owned community water-supply systems. Nearly 70% of the municipal water systems and all of the privately-owned community systems were supplied by groundwater. Public water supplies in Walworth, Washington, Waukesha, and Ozaukee counties are almost entirely supplied by groundwater.³

- *Because water is an integral part of the region's economic prosperity and quality of life, effective regional water resource management is fundamental to our region's economic prosperity.*

Every day, the region's businesses and two million residents use about 305 million gallons of water. If it were the price of gasoline, the water would cost \$250 billion a year. Of our region's total volume of water, about 60% comes from nine plants that draw water from Lake Michigan, 20% from 50 utility systems that pump groundwater from wells, and 20% from private groundwater wells. This water is the lifeblood of our region's economy and quality of life.

The drinking water of Kenosha, Racine, Oak Creek and Milwaukee is widely regarded among the highest quality in the nation. Although many parts of southeastern Wisconsin are experiencing problems with water shortages and contamination, there also is evidence of improvement in surface water quality of the region's rivers, streams, and near-shore waters of Lake Michigan.

Land uses governed by water policies and environmental preservation historically have been, and remain, key to our prosperity as a region. Balanced and planned growth can set our region apart from many other regions elsewhere in the country and the world, as fresh water increasingly gains prominence as a precious commodity.

Effective management of water resources acknowledges and even quantifies the true value of water; resolves conflicts across hydrologic, county and municipal boundaries; and encourages balanced wet growth development that respects the rights of property owners, the demands of both natural and human systems, and

³ Southeastern Wisconsin Regional Planning Commission & Wisconsin Geological and Natural History Survey, Groundwater Resources of Southeastern Wisconsin, Technical Report No. 37, June 2002.

legal realities. Farsighted water policy gives a region a long-term competitive advantage over other regions.

- *Our region is well-positioned to provide a groundbreaking leadership role in the emerging global water crisis and to be a worldwide center for fresh water science and technology.*

For decades, southeastern Wisconsin has been known for its wet industries, such as brewing and leather tanning, and for companies that play important roles in the water industry. Companies such as Miller Brewing and Badger Meter are leaders in the brewing and water resource monitoring technology industries respectively.

Increasingly, the region also shows promise as a center of fresh water science and technology, and for potential new ventures that could emerge from fresh water science. The Great Lakes WATER Institute plays a lead role in the development of fresh water science and has received Department of Defense money for water security research and development. Academic entities, as well as private corporations, have the capability of filling needs for better inventory of data about water, improved understanding of water resource processes, new monitoring technologies, methods to quantify the value of water and water management specialists. Fresh water science and technology are in their development stages. Southeastern Wisconsin can and is leading this development. For example, the research of Dr. Sandra McLellan of the University of Wisconsin—Milwaukee is groundbreaking in understanding the contributions of bacteria transport to beach closings.

Business leaders also are beginning to see fresh water stewardship as a key to economic development. For example, a symposium is planned for spring 2006 that aims to forge cooperation among the academic, business, environmental, industrial and regulatory communities in the region. Its focus is on promoting good science and rational decision making. Planned topics include opportunities for economic growth; using fresh water to create and attract new businesses; and strategies to protect freshwater as a marketing resource for the region.

The region also has an opportunity to grow in a balanced way. Unlike many regions, southeastern Wisconsin is a work in progress in the sense that the region remains mostly undeveloped. Despite rapid and sometimes unplanned growth in recent decades, nearly half of the region remains farmland. The region can organize future conversion of farmland in ways that both respect and protect the region's natural systems and honor the choices of farmers and other property owners.

2. Our region is facing immediate problems, such as dropping water tables and deteriorating water quality. Unless we change the way we manage the asset, the problems will worsen.

- *Emerging water supply and water quality problems are increasingly pitting landowners against landowners and communities against communities.*

- ***Water depletion.** Increasing numbers of communities in southeastern Wisconsin are experiencing conflicts over water supply as groundwater tables continue to drop.*

One potential solution is to budget the use of water in ways that would encourage conservation and recycling of water in concert with economic development. A water budget can help decisionmakers better understand the available water resources versus the water demand, thus reducing the risk of water depletion and shortages. A water budget addresses the regional aspect of the supply and demand assessment and provides a solid basis for actions that extend beyond local borders, such as support and direction of land use planning and coordinating how and where development takes place. In addition, a water budget helps manage both seasonal shortfalls and long-term discrepancies between supply and demand, potentially resulting in conservation measures such as watering prohibitions and block pricing. The city of Albuquerque recently passed a resolution to develop a regional water budget that details its water “revenue” (supplies) and “expenditures” (uses).⁴ The water budget is part of a larger effort within the region to re-examine its traditional approach to water. The University of Wisconsin-Milwaukee's Geosciences Department has recently begun collecting data as part of a broader research initiative to assist communities in southeastern Wisconsin in designing appropriate water budgets for their specific needs.

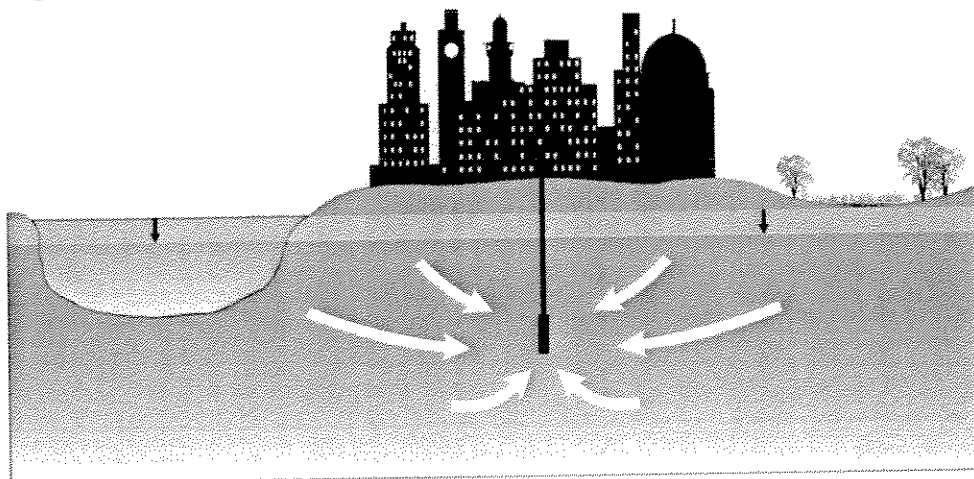
- ***Poor water quality.** Portions of the region are experiencing increasing concerns about water quality. The solution is to integrate water policy so that quantity and quality issues are managed together.*

Our region is facing emerging problems relating to water quantity and water quality. Unless we change the way we manage our water resources, the problems will become more difficult to control. The problems involve both groundwater and surface water and affect the communities in our region on both sides of the subcontinental divide.

On the west side of the subcontinental divide, communities within our region currently depend on groundwater, either from the shallow aquifer or from the deep aquifer. As shown in Figure 1, shallow wells have the potential to reduce the water elevation of surface water features such as wetlands, rivers and lakes. By their nature, shallow wells are more susceptible to water table fluctuations, due to droughts, and to contamination from spills and other activities on the land.

⁴ Environmental Protection Agency, “Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies,” January 2006. EPA - 230 -R - 06 - 001.

Figure 1 – Potential Impacts of Wells on Water Table Levels



Although the deep aquifer is more isolated from contamination and other immediate impacts of surface activities, and is less sensitive to fluctuations in precipitation, it faces challenges to the quality and quantity of water it contains. Radium is a naturally occurring radioactive element that is found in the deep sandstone aquifer in our region. The radium concentration is an issue for some communities that draw water from the deep aquifer. Immediate health risks from drinking water containing the current levels of radium are small, but consuming this water for a lifetime increases the health risks (based upon various studies by the federal Environmental Protection Agency).⁵

Several communities using the deep aquifer for drinking water are facing excessive levels of radium and are being required to look into alternatives to meet DNR and EPA standards. In some cases, like the village of Mukwonago, communities are installing wells in shallow aquifers to blend with water from their deep wells to meet the radium standard.

The quantity of water in the deep aquifer is a concern as well. As shown in Figures 2-5, since 1864 a large cone of depression has developed in the deep aquifer due to high capacity well pumping in our region. The maximum drop in groundwater elevation is over 450 feet and is centered over eastern Waukesha County.

⁵ Waukesha Water Utility Public Notice, February 25, 2004.

Figure 2

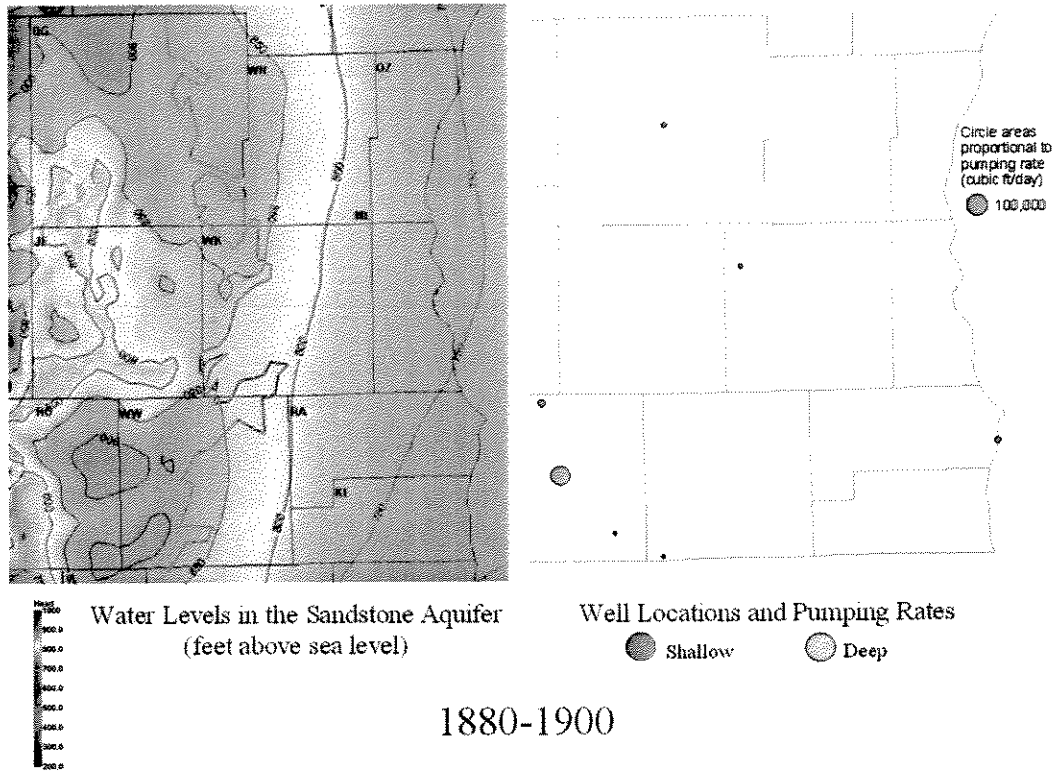


Figure 3

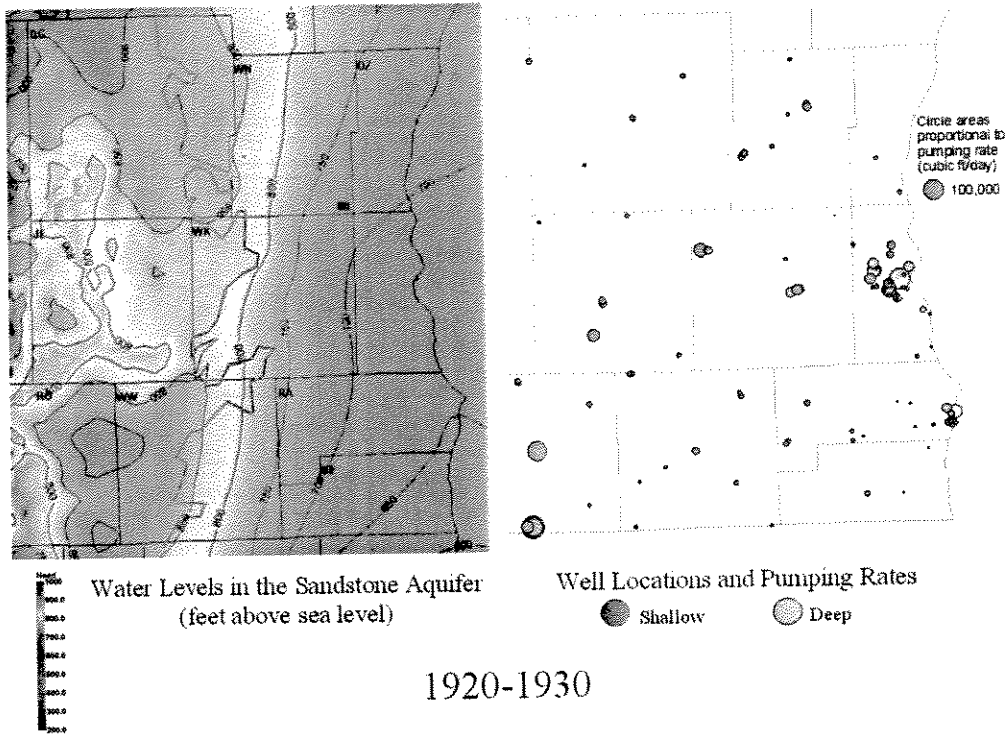


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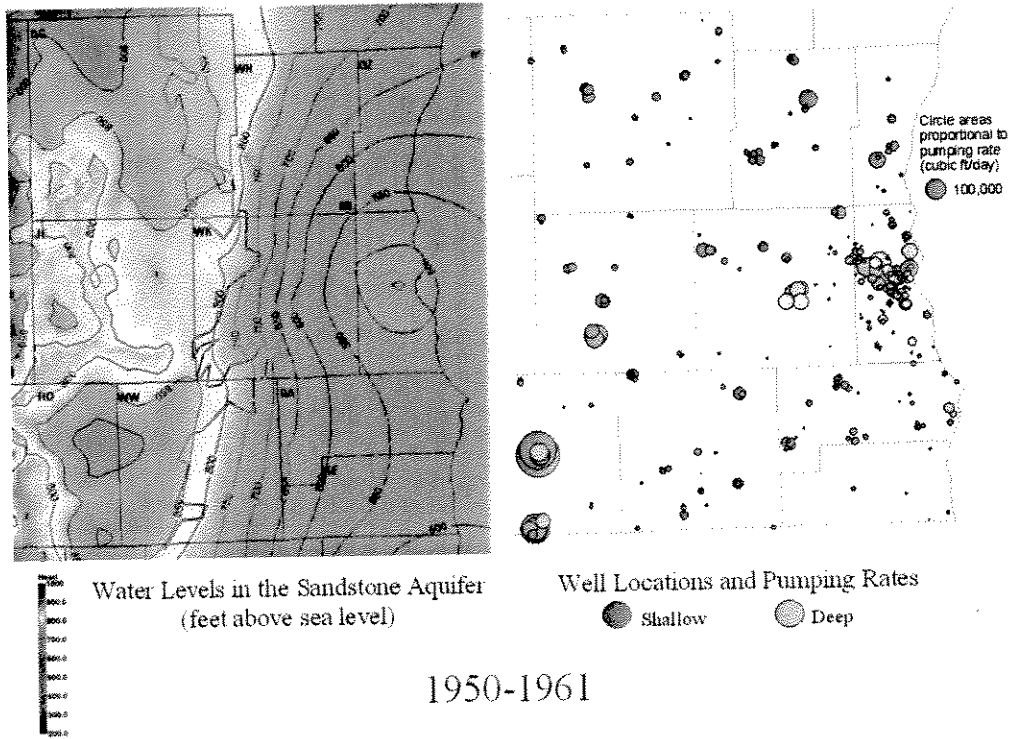
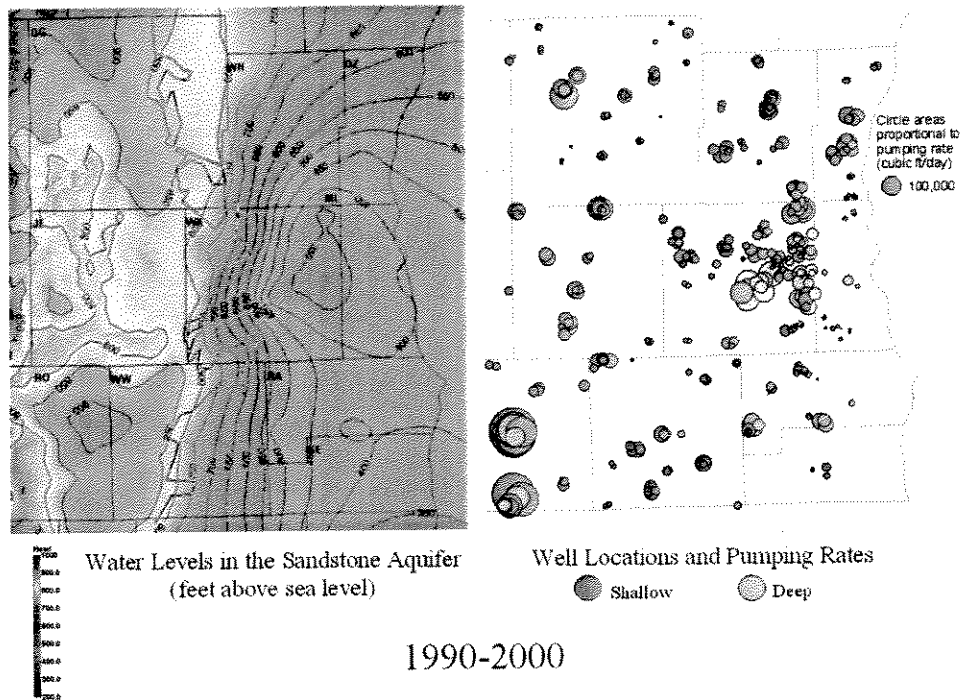


Figure 5



Source: SEWRPC

On the east side of the subcontinental divide, water quantity is not as great an issue. The majority of the communities east of the subcontinental divide obtain their drinking water from Lake Michigan surface water, and current regulations allow for the communities within the basin that do not currently use Lake Michigan surface water to supplement their groundwater supply or switch over to lake water. This is the case with communities like Mequon and Thiensville. However, across the entire region, as populations shift and grow and industries change and relocate, surface water quality and ground water quantity will continue to be a major issue.

Ground water quantity problems prompted the passage of 2003 Wisconsin Act 310, which directs a Groundwater Advisory Committee (GAC) to make recommendations to the state legislature regarding future ground water management needs in Wisconsin. The act designates as a "groundwater management area" all of Waukesha County and the surrounding area within which the water table is 150 feet or more below the level it would have been had there been no removal of groundwater. As shown in Figures 2-5 above, this area covers most of our region. The GAC, by December 31, 2006, must recommend legislation and administrative rules to address the management of groundwater in groundwater management areas to respond to the adverse effects of long-term groundwater withdrawal on water quality and quantity.⁶

⁶ Wisconsin Legislative Council, Act Memo: 2003 Wisconsin Act 310, May 7, 2004.

In terms of surface water quality, since the Clean Water Act⁷ was enacted in 1972, significant reductions in point source pollution from municipal sewage and industrial dischargers have been achieved.⁸ Although point sources remain a threat, the greater threat today is the significant nonpoint source pollution across our entire region. The rapid increase in impervious surfaces increases the amount of surface water runoff and the amount of pollutants that are washed into our waterways. Some farming practices, such as conventional tillage practices, conventional fertilizer application and the lack of barnyard runoff management and manure management add to the pollutant loading of our waterways. Although the DNR has recently enacted stormwater management requirements and new nonpoint source pollution controls have been implemented to reduce the impacts of current development and some agricultural practices, nonpoint source pollution continues to be a significant burden on the quality of our region's surface waters.⁹

Current stormwater management requirements under the Wisconsin Administrative Code (NR216 and NR151), numerous municipal stormwater management ordinances, and the MMSD's Stormwater and Surface Water (Chapter 13) rule, as well as current and planned flood management projects in our region, are helping reduce surface water quantity issues and flooding risks. Examples of recent significant flood management projects include Lincoln Creek, the County Grounds, Valley Park and Hart Park.

As our region faces water resources issues, communities and landowners are forced to look into options to resolve them. Currently, the most contentious issues, and arguably the most critical for the affected communities and landowners west of the subcontinental divide, are the issues with groundwater quality and quantity.

Solutions can lead to disagreements among landowners and communities. One common solution is to increase pumping from the shallow aquifer by adding more wells. Depending on their location, these shallow wells have the potential to impact nearby wells or surface water features of adjacent landowners or communities. A reduction in the shallow aquifer causes a related reduction in surface water resources. This reduction may manifest itself as lower stream level, a dried-up wet land, or the reduction of inland lake levels. A local example of this phenomenon and a resulting disagreement between landowners and a community is the proposed new high capacity well by the village of East Troy. Landowners along the nearby lakes and citizens with shallow wells are concerned that a high capacity well will draw down the available ground water level and also impact the lake levels. This continues to be a major issue for Lake Beulah and East Troy residents.¹⁰

- *The status quo with respect to water resource management is not acceptable because it likely will lead to serious problems such as those that other regions have experienced. Examples include:*

⁷ Gayle Killam, *The Clean Water Act: An Owner's Manual*, 2nd edition, The River Network, 2005.

⁸ Environmental Protection Agency (www.epa.gov/owow/watershed/framework/ch4.html)

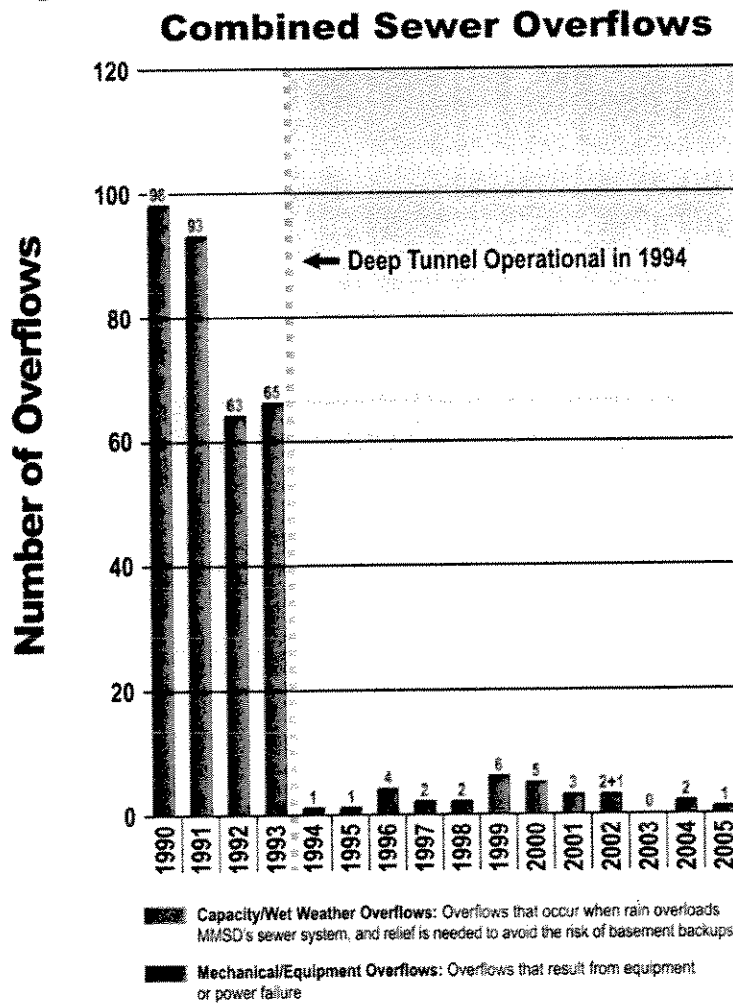
⁹ Milwaukee Metropolitan Sewerage District, 2020 Facilities Plan (draft), Water Quality Initiative. (www.mmsd.com/wqi/index.cfm)

¹⁰ Lake Beulah Protective and Improvement Association. (www.lakebeulah.org)

- Continuing nonpoint source pollution and sewer overflows, depletion of groundwater, and contamination of surface water

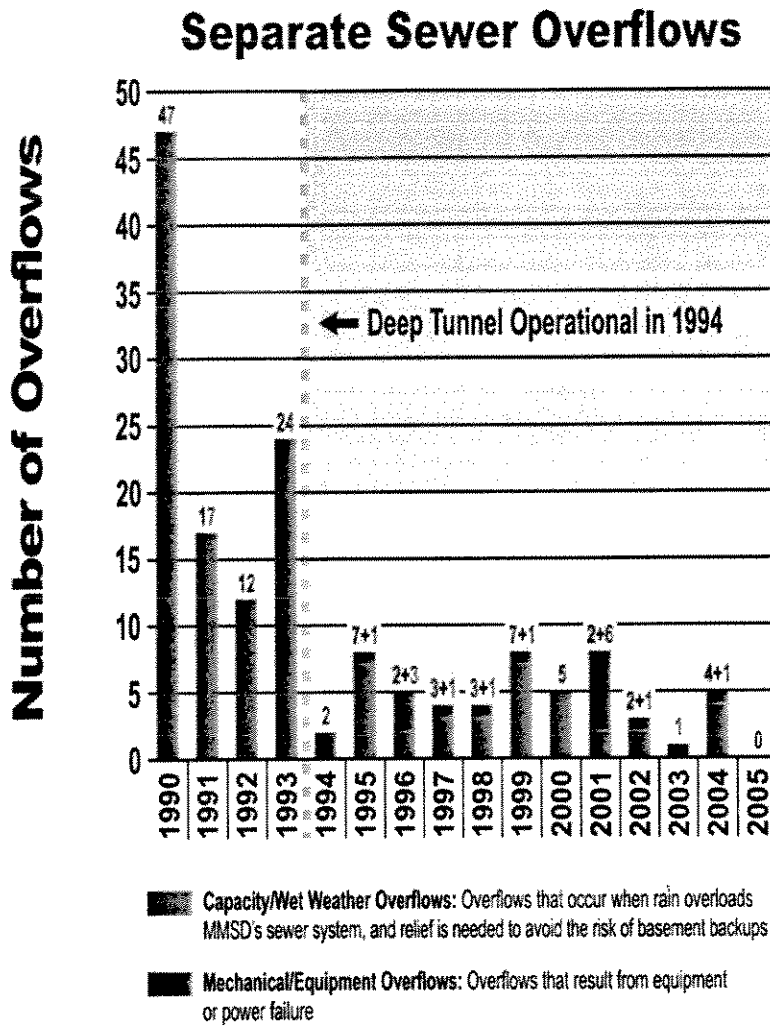
The EPA and DNR have taken steps to reduce surface water pollution from nonpoint and point source pollution with the implementation of the Clean Water Act and permitting processes. Sewerage agencies and many communities in our region have made significant improvements to their wastewater systems and have significantly reduced sewerage overflows. The MMSD has already reduced combined sewer overflows from an average of about 60 per year before 1994 to an average of 2-3 per year currently. Figures 6 and 7 show the improvement in the number of overflows after the inline storage system became operational in 1994.

Figure 6



SOURCE: MMSD (http://www.mmsd.com/wastewater/wastewater/csbcombined_sewers.cfm)

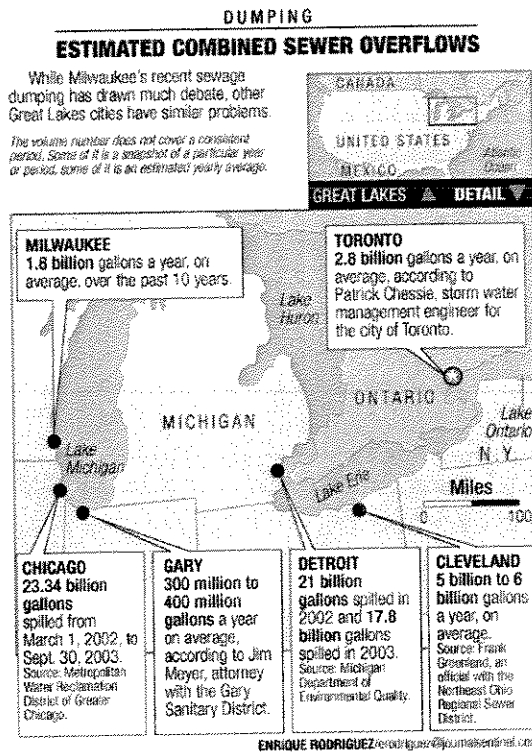
Figure 7



SOURCE: MMSD (http://www.mmsd.com/wastewatertreatment/separate_sewers.cfm)

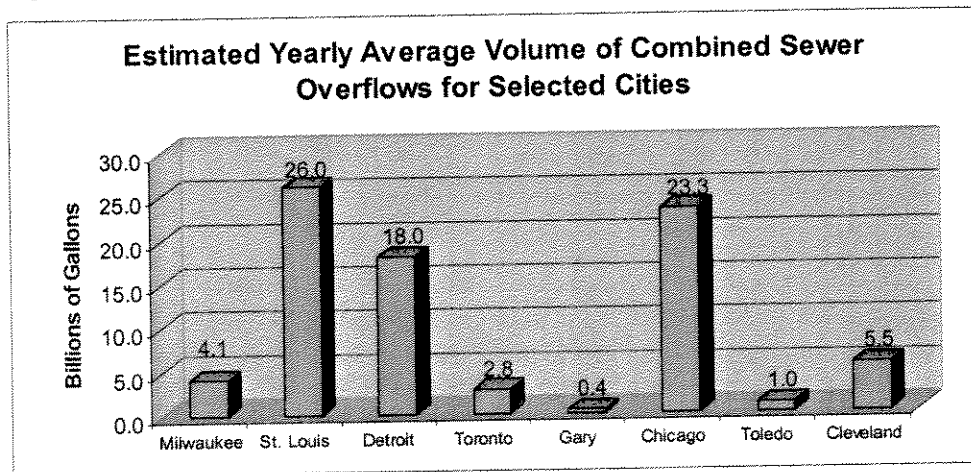
However, as existing sewers continue to deteriorate and new sewers are installed to accommodate development, the potential for clear water inflows to sanitary sewers grows, and thus so does the potential for overflows. Although from a feasibility standpoint total elimination of sewer overflows may never be achieved, failure to continue programs and projects that work to prevent overflows can lead to more frequent overflow events. Communities such as Detroit, MI; Chicago, IL; Indianapolis, IN; Atlanta, GA; Lansing, MI; and Miami-Dade, FL have all struggled with sewer overflows as a result of aging infrastructure. Figures 8 and 9 compare the estimated annual volumes of overflows that occur in Milwaukee versus other cities.

Figure 8



SOURCE: Journal Sentinel, 6/24/04

Figure 9



Nonpoint pollution is an additional threat to our region's surface waters. As local governments and the agricultural industry have implemented best management practices to curb nonpoint pollution, the rate of increase of such pollution has slowed. However, nonpoint pollution continues to be a significant threat to both Lake Michigan's water quality and that of the

numerous creeks, streams, and rivers which feed it. Preliminary results of MMSD's 2020 Facility Plan and SEWRPC's regional water quality management plan show that stormwater is the main source of bacteria and other pollutants that are impairing our waterways. Examples of other regions that have attempted to deal with significant surface water quality issues include the Rouge River Program in southeastern Michigan and a program including several states in the Chesapeake Bay watershed. Massive federally funded planning and educational efforts aimed at the implementation of watershed-wide capital projects and programs in both areas have resulted in the restoration and protection of the water resource.

- *Potential loss of industrial base and housing values in water-constrained areas*

A clean and reliable source of water is essential for daily living as well as certain industries. There is a strong possibility that a water-constrained community could lose wet industries and suffer reduced housing values. There has not yet been a wet industry that has left the community over the lack of a clean and reliable water source.

- *Potential public health problems*

If our water resources are not managed properly, there may be an increase in surface water and groundwater pollution, basement sewer backups, and overland flooding, all of which can lead to an increased risk of potential public health problems, not to mention property damage.

- *Wasteful and expensive use of existing capital infrastructure*

The region has invested billions of dollars in existing water and wastewater treatment plants, water distribution and wastewater collection systems, and stormwater and flood management facilities. In the MMSD service area alone, over \$3 billion has been spent since 1980. As our region develops, we need to think regionally and utilize the infrastructure we already have, especially when many communities are faced with limited budgets. Two examples of utilizing regional facilities to help reduce spending on capital infrastructure include the city of Milwaukee's water treatment system, which provides drinking water to several municipalities, and the MMSD's sanitary sewer system, which serves Milwaukee and its suburbs.

- *Ecosystem breakdown*

"In critical nearshore/tributary zones of the Great Lakes a chain reaction of adaptive responses to a suite of stresses is leading to catastrophic changes: ecosystem breakdown and potentially irreversible ecosystem collapse. Without at least partial restoration of these areas, the negative

symptoms being observed in the Great Lakes will likely intensify and could degrade irreversibly.”¹¹ One example of ecosystem breakdown has been the widespread and rapid decline in growth, condition and numbers of yellow perch, whitefish, and other valuable fish species in Lake Michigan.

o *Legal and political combat over the access and use of water*

Controversies and disagreements among communities, landowners and others may intensify if the region does not proactively change the way water resources are managed. Although western water law allocates water in ways that have sparked water disputes and lawsuits over many decades, the lands east of the Mississippi River are not immune from such disputes. There have been disputes between Georgia, Alabama and Florida over the Tallapoosa River; Virginia and North Carolina over the Roanoke River; Virginia and Maryland over the Potomac River (which has been resolved with a multi-state agreement); and Vermont and New Hampshire over the Connecticut River.¹² Unless our region manages wisely, we, too, could become entangled in such disputes. Current controversies, like those involving East Troy and Lake Beluah, may be the leading edge of a new, unsettling trend.

3. Leaders must think strategically and regionally about managing the asset in the long term.

- *A legacy of abundant water and the presence of Lake Michigan have led to complacency and the assumption that water resources are unlimited, even though parts of our region are experiencing scarcity in the face of abundance.*

To some, it may seem inconceivable that our region could face water quantity problems. Lake Michigan holds about 1,180 cubic miles (over 2.3 trillion gallons) of fresh water; there should be plenty to go around. In addition, our region appears to use less water than the rest of the country. The water use in the MMSD service area averages about 64 gallons per capita per day (gpcpd),¹³ which is lower than the national average daily indoor per capita water use of 74 gpcpd.¹⁴ How could water supply be an issue?

Actually, water supply is not a major concern with communities that use Lake Michigan as their source. Communities that rely on groundwater are the ones that are beginning to have significant issues. Although wells in the deep and shallow aquifers have operated for almost a century without major issues, widespread

¹¹ Jack Vails et al, Prescription for Great Lakes Ecosystem Protection and Restoration (Avoiding the Tipping Point of Irreversible Change), White Paper, December 2005.

¹² Tom Arrandale, Water—The Eastern Water Wars, *Governing Magazine*, August 1999.

¹³ MMSD Cost Recovery Procedures Manual, 2005.

¹⁴ American Water Works Association, 1999 Residential Water Use Summary. (www.awwa.org/Advocacy/pressroom/statswp5.cfm)

development, a lack of effective groundwater management and use, and emerging issues with radium are putting a strain on the groundwater supply for some communities in the western portion of the region.

- *Southeastern Wisconsin has not developed a vision of water resource management that provides clear guidance and goals for long-term policies and programs.*

As a region, southeastern Wisconsin has little sense of region. That was one of the findings of a public awareness survey conducted as part of the research for this report. The survey found that residents of the seven-county area generally do not think of themselves in a regional context.

In the survey, most citizens from our region said that -- when traveling (hypothetically) in Florida -- they would identify their residence as Wisconsin rather than metropolitan Milwaukee or southeastern Wisconsin. In a second hypothetical instance, those surveyed were asked whether each of the seven counties would be included if they were speaking to someone from Boston or Los Angeles about southeastern Wisconsin. A clear majority considered only Milwaukee County to be part of the region. About half also included Waukesha County, but most respondents did not include Racine, Kenosha, Ozaukee, Washington or Walworth counties. Partly because the region has no shared vision, southeastern Wisconsin has a weak identity.

- *Although water resources are linked to our regional economy and quality of life, water policy is not adequately tied to comprehensive economic and community planning.*

Examples of the missing link between water resource management and planning are:

- **Land Use:** Typical planning, zoning, and subdivision regulations operate on a "go/no go" approach to housing development. Areas are either approved for development or off limits because of natural resource features (such as floodplains and wetlands) that need to be preserved. Regulations might be crafted to recognize varying resource management goals. For example, some areas might require more stringent stormwater management because of drainage patterns that connect the land to especially vulnerable and high quality streams or wetlands. Other areas might require careful management of impervious surface and surface drainage patterns to prevent reduction in natural infiltration of rain water to aquifers. Finally, communities might look at their land use and zoning regulations in relation to the future demand for water. Large-lot zoning and minimum square footage requirements on homes result in greater consumption of water—and other resources—per household.
- **Transportation:** In highway transportation, almost invariably, "if you build it, they will come." However, highway expansion has natural resource impacts. In addition, increasing access to high value natural

resource areas—whether wetlands, recharge areas, or environmental corridors—invites development that degrades those resources. At the scale of individual developments, planning also should consider the way that transportation infrastructure affects water resources. Requiring traditional “curb-and-gutter” infrastructure for streets that drain into stormwater detention basins or waterways disrupts the hydrologic cycle. Transportation planning is capable of identifying areas in which the infrastructure can be engineered with bioswales and infiltration beds to capture and slowly release stormwater over a wide area, mimicking natural rainfall patterns.

- **Business and workforce development:** Sources of clean water are becoming increasingly scarce around the world. At the same time, other resources, including energy and clean air, are also either declining or under stress. By the middle of the 21st century, businesses that reduce waste and inefficiency in the use of these scarce resources are predicted to be more successful than those that continue 20th century business-as-usual. In addition, business development in the growing resource management technology and services industries could create jobs in southeastern Wisconsin, but only if our economic development plans promote growth in these “green” industrial sectors.
- **Public health:** The idea of planning originated, in large part, to protect the public health and safety. We now know that storm run-off from our streets, parking lots, lawns, and farm fields flushes great quantities of harmful substances into our streams, lakes, and water supplies, and thus contributes to high bacteria counts, beach closings, and fish consumption advisories. Yet planners have been slow to recognize the role that land use planning could play in reducing these impacts. Stormwater management, although sometimes imposed by an agency such as the DNR, is *routinely* integrated with a community’s land use plans and development regulations in cases of new developments only. Older developments and urban centers lack adequate stormwater management. Carefully planned stormwater management can achieve better results in cleaning and infiltrating stormwater and minimizing flooding, and could provide additional benefits, such as creating green space that enhances the urban experience. Finding ways to retrofit existing developments is a more difficult task.

4. Jurisdictional overlaps, policy gaps, and lack of a sound scientific database for decision-making hamper efforts to solve water problems within existing governmental and private institutions.

- *There are important gaps in water resource policies, laws and programs.*

The lack of a cohesive and integrated water policy in our state is a theme echoed by many stakeholders. Wisconsin water policy does not explicitly take into account the entire hydrologic cycle, ecosystems, water uses, and water pollution

impacts.¹⁵ Midwest Environmental Advocates has recently identified specific gaps in Wisconsin's water law and regulations in the areas of conservation, reclaimed water, groundwater protection, utility rate structure, and cooperation among local governments.¹⁶ The Wisconsin Academy of Science, Arts, and Letters puts it another way, "[Wisconsin's] policies have historically served mainly to address a particular use, activity, or impact, or one part of the hydrologic system, rather than to manage for the overall health of Wisconsin's watersheds and water resources."¹⁷ The Groundwater Coordinating Council, created by the state legislature in 1984, has determined that Wisconsin's approach to groundwater management and protection should "rethink traditional distinctions between quality and quantity, surface water and groundwater, land use and water use, and watershed and aquifer," in contrast to the current management practices.¹⁸ The consensus among stakeholders is that the current regulatory system is neither integrated nor forward-thinking.

- *Southeastern Wisconsin lacks coherent and consistent water conservation policy and programs.*

The most recent analysis of the state's water conservation policies indicates that Wisconsin's laws and regulations not only fail to require sufficient conservation, but that many, in fact, encourage waste. Midwest Environmental Advocates found that no state law currently requires *implementation* of specific conservation measures, although several do require the development of water conservation plans. In addition, the single state law that includes language requiring conservation practices is triggered only when a new or increased water withdrawal exceeds two million gallons per day. This threshold has been too high to result in legislatively required water conservation of any significant measure.¹⁹

- *Water resource management is difficult and complex because we have 254 taxing authorities in our region, and coordination among local governments is limited.*

Water policy in our state is made at various levels of jurisdiction and is governed by numerous state, local, and federal agencies. Federal law, including the 1972 Clean Water Act; international law, including the Great Lakes-St. Lawrence River Basin Compact agreement; and the sovereign rights of Wisconsin's tribal people dictate certain state-wide decisions. State agencies make decisions about water as a natural resource, an essential route of commerce, an input for agriculture and manufacturing, and a source of recreation and fishing. Local governments and

¹⁵ Wisconsin Academy of Sciences, Arts, and Letters, *Waters of Wisconsin: The Future of our Aquatic Ecosystems and Resources*, 2003, p. 104.

¹⁶ Midwest Environmental Advocates, *Protecting Wisconsin's Water: A Conservation Report and Toolkit*, October 2005.

¹⁷ Wisconsin Academy of Sciences, Arts, and Letters, *supra* note 15, p. 104.

¹⁸ Wisconsin Groundwater Coordinating Council, *Sharing Our Buried Treasure: Directions for the Protection and Management of Wisconsin's Groundwater*, A Summary of the 2001 Groundwater Summit, September 2002, p. 3.

¹⁹ Midwest Environmental Advocates, *supra* note 16.

regional bodies make land and water use planning decisions, treat and manage wastewater, and supply drinking water.

In addition, water decisions are impacted by decisions made in other policy areas, including land use, energy, transportation, agriculture, public health, economic development, and taxation. Each of these policy areas also has a complex system of policies, regulations, and governing agencies.

- *Regional collaboration that has the potential to integrate and streamline water resource decision-making has been limited.*

A common theme heard in all the focus groups we sponsored was that regional cooperation and collaboration are the preferred ways to approach water policy decision making. Frameworks for regional collaboration do exist, both formally and informally. For instance, both the Milwaukee Metropolitan Sewerage District (MMSD) and the Southeastern Wisconsin Regional Planning Commission (SEWRPC) are regional bodies with governing boards having representation from many municipalities. The two agencies are working together to prepare *A Regional Water Quality Management Plan Update for the Greater Milwaukee Watersheds*. (See Appendix.) By combining efforts, the two agencies will develop a sound and workable strategy for the abatement of water pollution, through an integrated analysis that will identify the facilities, programs, operational improvements, and policies necessary to achieve the water resource goals inspired by the public and comply with regulatory requirements. The cooperative effort is using a comprehensive watershed planning approach that considers pollution originating from outside the SEWRPC region and outside MMSD's planning area. The approach is characterized by a geographic focus that utilizes nature's boundaries, the application of strong water quality science, and integrated public involvement partnerships. In addition, a set of state-of-the-art models that utilize data gathered by the U.S. Geological Survey (USGS), DNR, SEWRPC and MMSD will be generated. These models will determine causes and sources of both point and nonpoint pollution. If the models are maintained and updated they can be used by future decision makers to solve complex water resources problems.²⁰

Other notable examples of regional cooperation are the multi-jurisdictional comprehensive plans being prepared under the state Smart Growth law. A multi-jurisdictional plan is two or more local governments working together to prepare a plan that includes the nine following elements: issues and opportunities, housing, transportation, utilities and community facilities, economic development, intergovernmental cooperation, land use, and agricultural, natural and cultural resources, as well as implementation of all the above. Six counties in the region have initiated multi-jurisdictional planning programs that will produce a comprehensive county plan and companion local plans for participating cities, towns, and villages.²¹

²⁰ Milwaukee Metropolitan Sewerage District, *supra* note 9.

²¹ Southeastern Wisconsin Regional Planning Commission (www.sewrpc.org/smartgrowth/pdfs/comp_plan_status_se_wi.pdf)

- *State law with respect to groundwater is underdeveloped and, in the absence of updating, likely to lead to seemingly endless litigation over water rights.*

In Wisconsin, navigable surface waters are governed by the public trust doctrine, which establishes that these waters are owned by all the state's citizens and allows the state to govern and manage them in the citizens' interests. The state has implemented this doctrine by protecting the rights of citizens to access and use. The use is limited to reasonable use that does not cause harm to other users.

In contrast, groundwater is governed by common law, which treats water use similar to other property rights. The state does regulate certain property rights, including groundwater use. For the most part, the regulation of groundwater use has been limited to a reasonable use standard for those uses which would directly or indirectly impact the connected surface water.

Thus, the answer to the question, "To whom does water belong?" differs depending on whether surface or ground water is at issue. Because we now know that ground and surface waters are interconnected as part of the larger hydrological cycle, these two different legal doctrines must be reconciled. Currently, this is done on a case-by-case basis as property owners conflict with each other or with citizens seeking to enjoy reasonable use. A recent example of such a conflict was a proposed high capacity well in Mequon, which would have been used to water a country club's golf course. Neighboring homeowners objected to a high capacity well for this purpose, calling it an unreasonable use, and voiced their concern that it would impact the water quantity and quality of their private wells. The conflict was resolved when the city of Mequon granted a franchise to We Energies to provide Lake Michigan water to its citizens.

- *Water geography is not the same as geopolitical boundaries.*

Water itself contributes to the coordination problem, as aquifers, rivers, lakes, watersheds, and other geographic features do not heed political boundaries. Not only do the contours of the features cross political jurisdictions, but their part in the hydrologic cycle may impact more than one jurisdiction. For example, the recharge areas of an aquifer in Waukesha County may actually be located in Jefferson County. To further complicate matters, watershed boundaries for surface and groundwater can and do differ. In addition, groundwater divides are slowly but continually changing as more or less groundwater is pumped out of the aquifer.²²

Local governments in Wisconsin are extremely limited in their ability to regulate beyond their boundaries.²³ Nor can they reliably predict the future decisions of neighboring jurisdictions that may impact the water supply or quality within their own boundaries. This is also true for more regional entities like the MMSD. MMSD established a stormwater rule (Chapter 13) for the 28 communities within

²² Jim Krohelski, USGS, National Assessment of Water Availability and Use: Great Lakes Basin Pilot, presented at Solving the Water Puzzle, Brookfield, April 27, 2005.

²³ Midwest Environmental Advocates, *supra* note 16.

its district to reduce the risk of future flooding. However, the MMSD district boundaries do not follow surface water drainage boundaries, and the rule does not apply to any community outside of the district, limiting its potential effects.

- *A rigid federal regulatory structure governing surface water quality has hampered priority-setting. Limited resources are best spent where science tells us we will obtain the best results.*

Our focus group of scientists felt strongly that, in many instances, local decision making was influenced more by stringent federal water quality rules than by local scientific evidence. An example would be the millions of dollars spent locally to meet the federal requirement of zero separate sewer overflows, when science tells us nonpoint pollution sources have much greater potential to permanently damage water quality in local rivers and lakes.

- *Our region is not promoting responsible use of groundwater because of a lack of agreement on the rules governing groundwater.*

In 2001 the state's Groundwater Coordinating Council convened a summit of 135 stakeholders representing an array of interests, including farmers, water utilities, environmental groups, industrial water users, water scientists, and state, local, and tribal officials. The participants were in agreement that long-term management of water quantity and quality is of primary concern, but "there was not a consensus on how to accomplish this or which approach was best suited for Wisconsin."²⁴ Even within the committee of attorneys specializing in environmental issues assembled for this project there was disagreement as to whether certain legal doctrines applied to groundwater.

- *Because of the lack of strategic thinking about water, appropriate data about our sources and uses of water are underdeveloped. Policymakers and the general public need and demand better information and education about water resources in our region.*

To make sound, cost effective decisions about our water resources, we need a solid foundation of data and information so our decisions can be based on science and facts and not assumptions, false premises, politics or emotions. Engineers and scientists need good data to make accurate calculations and create accurate models to describe the problems and propose solutions. Policymakers and the general public need to be informed so they understand the problems and can make informed decisions. In general, the news media are ill-informed about water resource issues and only add to the public's misunderstanding.

Currently, there are five major studies being done that together represent a once-in-a-generation opportunity to examine and plan comprehensively for water resource quantity and quality on a multi-watershed regional basis.

²⁴ Wisconsin Groundwater Coordinating Council, supra note 18.

- 1) "Regional Water Quality Management Plan Update," SEWRPC
- 2) "MMSD 2020 Facilities Plan," MMSD
- 3) "Regional Water Supply Plan," SEWRPC
- 4) "Watercourse Corridor Study," USGS and MMSD
- 5) "Pathogens Source Identification/Bacteria Source, Fate and Transport," UWM Great Lakes WATER Institute and MMSD

These studies have resulted in extensive databases for our region. The databases contain information such as:

- ✓ influent and effluent data for MMSD's treatment plants;
- ✓ sources of pathogen/bacterial contamination;
- ✓ hydrologic, geographic, physical, biological, and chemical data for perennial streams and selected intermittent watercourses, including the Milwaukee harbor estuary; and
- ✓ groundwater inventories, including existing water use and land use and natural features throughout the seven counties served by SEWRPC.

These databases are used to develop mathematical simulation models to assess the existing, as well as anticipated, water resource conditions and the implications of such conditions on committed or proposed water resource management actions. These databases and the related mathematical models should be kept current and updated as new data become available. Acquiring new water resource data across the region will be needed to help manage our water resources better and deal with impending issues. For instance, outside of Milwaukee County there is a lack of water quality data for the Milwaukee and Root Rivers.

5. There are multiple ways to change the way we manage the asset.

There are several possible methods of accomplishing effective management of our water resources.

- *Integrated water resource management, either through cooperation among existing jurisdictions and authorities; a new, watershed-based authority; or expanded enforcement powers by state agencies.*

Integrated water resource management has been defined as the following by consensus of the Forum's Water Policy Advisory Panel:

Integrated water resource management (IWRM) implements a comprehensive strategy and principles, recognizing the interdependence of surface water, groundwater issues and water-dependent natural resources. IWRM is designed to achieve and measure the community-supported positive environmental, social, and economic benefits of clean and plentiful water for this and succeeding generations.

IWRM recognizes and acknowledges the value of complex linkages and interrelationships between factors such as land

use, zoning, transportation, water resource infrastructure, socio-economic conditions, and the aquatic ecological cycle within a watershed context, and those entities that control these factors.

The goal of integrated water management is both fishable and swimmable water and “no net loss,” defined as municipalities, counties and the region as a whole working together to ensure consumed water is replenished whether originally from surface or underground sources. “No net loss” would keep the water levels of lakes and aquifers within historic variations due to drought or wet years. Any downward trend in water levels that surpasses those natural variations is to be avoided.

- *A market-driven approach, which does not typically allow for public input and may or may not result in scientifically sound policies.*

A municipality’s purchase of land outside its boundaries for purposes of protecting headwaters or aquifer recharge areas, or for placing new wells, is a market-based approach. In addition, the structure of water pricing can be modified to send signals that, for example, encourage conservation. Market drivers are integral to any sound integrated water resource management program; this approach needs to be guided in the right way, not discouraged.

- *An administrative model with required public participation in policymaking, such as administrative appeals processes, public hearings, public comment periods, and sunshine or transparency requirements. These requirements do not guarantee all stakeholders will be heard or that science will inform decision-making.*

This model is closest to the current governance methods in use in Wisconsin, where local and state agencies promulgate and enforce rules, permit and/or license certain water users or utilities, and hear administrative appeals. These agencies’ powers and responsibilities are limited to certain water uses; as noted previously, there is a lack of integration and coherence across agencies.

- *Other models that include aspects of integrated water resource management, but are not fully integrated, including reliance on legislative oversight and/or reliance on courts to resolve disputes on a case-by-case basis.*

The legislature and courts play a significant role in water resource management in Wisconsin. Currently the only regional groundwater management efforts in the state are those in Waukesha and Brown counties, created by a new state law. Legal disputes among property owners are common, as noted above.

6. The general public favors regional measures to protect and improve water resources and ensure we have fishable and swimmable surface waters.

For this project, we conducted a systematic survey of 600 adults in southeastern Wisconsin (Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington and Waukesha counties). Participants were selected at random and interviewed by telephone in July and August 2005. For a survey of this size, the sampling margin of error is four percentage points. (See www.publicpolicyforum.org for the full survey.)

The key findings:

- *94% agree we should do more to protect our water resources.*
- *55% disagree that threats of water shortages are exaggerated (44% agree).*
- *98% say we need to do whatever it takes to make sure our lakes, rivers and streams are fishable and swimmable.*
- *67% say a regional agency is needed to ensure that cities and towns are following regional guidelines for development.*
- *A small majority (52%) disagrees we worry too much about environment and not enough about jobs and the economy (47% agree).*
- *Citizens are evenly divided on whether people who own land should have the right to use its water however they want.*
- *72% favor creation of a watershed district to oversee water resources for the entire region.*

7. A strategic and integrated water resource management approach would strengthen the region.

- *Our region's decision-making processes may not lead to the best water resource management decisions because the administrative infrastructure for decision-making is not integrated; we have overlapping regulatory authorities and management and planning agencies, such as the DNR, MMSD, EPA, SEWRPC, counties, municipalities and the federal government.*

See discussion of finding #4, above.

- *Public money spent to ensure healthy and sustainable water resources is not always allocated in a manner that maximizes efficiency and impact. Protecting and improving our water resources in an era of increasingly limited natural resources and financial means requires a more efficient management of our resources.*

Currently, there are few incentives for communities to work together to manage our water resources on a regional level. Communities and facilities are each required to meet certain permit requirements, regardless of their impact on water resources. There are few incentives for communities to pool their resources to

address the most critical issues, regardless of their location in the region, which would be a more efficient use of resources.

- *Our current water governance structure is neither integrated nor adaptive. An integrated and adaptive governing structure includes coordinated efforts among independent agencies and policymakers and results in policies that can evolve as science advances.*

Adaptive governance utilizes effective representation of stakeholders and the public in a deliberative process based on scientific learning. As a result, the public is educated about the science and the decision process and the process produces an efficient, equitable, and sustainable solution. Adaptive governance is appropriate when there is general agreement as to policy goals, but no consensus as to the appropriate means to achieve these goals. Scientific data may then help solve the debate as to the most effective and desirable means.

- *Regardless of how the region chooses to manage its water resources, there will be difficult political challenges.*

As it is always valuable to have local and county governments buy into a regional strategy based on sound public policy and implementation, there are two types of challenges. To embed the administration of the policy and authority to oversee water resource management in a existing, or newly created, regional entity will fuel the natural animosity, or at least suspicion, towards such an entity that could control local compliance.

To expect local governments to reach a voluntary consensus and fund the implementation of integrated water resources across a region is also difficult. Local governments have limited staff and financial resources to accomplish this task, which would be absolutely necessary to bring elected officials from diverse communities to an agreement on self-governance.

- *A regional strategy to manage our water resources in an integrated fashion would strengthen our region's competitiveness and quality of life.*

See discussion of finding #1, above.

- *Because water issues differ across the region, there is no one-size-fits-all solution to our water management problems; rather, an array of options is needed to manage water resources in context with local and regional needs.*

Allowing for local flexibility enables municipalities and counties to prioritize their actions and plan for future actions strategically. The specific techniques a locality can use to meet regional water policy goals are varied. Our focus groups felt that certain techniques, such as conservation and stormwater management, need to be implemented in every municipality, while other tactics, such as aquifer

storage and recovery, are only appropriate where the natural geographic conditions and/or political reality so allow.

One example of local flexibility occurs in the communities of Mequon and Thiensville. Historically, both communities either used private or public wells to supply drinking water. As water quality and quantity problems occurred in portions of both communities, the elected officials worked with a private company, We Energies, to supply Lake Michigan water to those areas having problems. As new developments occur, the elected officials have the option to request the manner of water supply that best fits the conditions.

- *There are models of creative water resource management in and near southeastern Wisconsin that could be replicated elsewhere in the region.*

There are models of creative water resource management in and near southeastern Wisconsin that could be replicated elsewhere in the region to help address some of the emerging water resource issues. These include:

1) Lake Geneva wastewater effluent infiltration – One million gallons per day of wastewater effluent is infiltrated back into the shallow aquifer using eight seepage cells. The cells are located in an old gravel pit and require minimum maintenance. This system may work well for another community that has an abandoned gravel pit or similar natural feature that can be used; however, getting approval from DNR may be difficult with current groundwater regulations.²⁵

2) Oak Creek aquifer storage and recovery – This relatively new system will allow Oak Creek to store up to 42 million gallons of excess drinking water in the deep aquifer when demand is low and then withdraw it for use when demand increases. This allows the city to operate the treatment plant at a more constant rate, which makes it easier to consistently provide high quality drinking water. The system also helps maximize the use of existing infrastructure and saved the city about \$500,000 that they would have spent to expand the plant. One potential issue with this type of system is the possibility of liberating manganese, arsenic or radium. Other concerns that need to be addressed include optimizing the operation and ensuring the water pumped into the aquifer meets the groundwater quality standards.²⁶

3) Town of Richfield – This town of 11,000 people is taking the initiative of protecting the groundwater resource that lies below. They have developed a groundwater ordinance that requires a groundwater impact study and includes drawdown limits for all new wells. They are also developing a protocol for quantifying the groundwater budget. The residential lot sizes are predominantly three acres and all residents are on private wells and septic systems. However, this

²⁵ Gerry Novotny (DNR), Rob Leber (City of Lake Geneva), phone conversation 9-6-05

²⁶ City of Oak Creek news release, October 26, 2004

model will not work for populated areas with central water and sewer service.^{27, 28, 29}

4) Richmond, IL – The city of Richmond is in the process of constructing a new wastewater treatment plant. With it, they plan to install a force main so they can reuse the effluent from the wastewater treatment plant to irrigate golf courses and public parks. This is a relatively simple process that could be more widely practiced.³⁰

5) USGS Model – GFLOW – The Rock River Coalition and the USGS are working together to implement a basin-wide groundwater flow computer model called GFLOW. The model simulates the surface water and groundwater systems and how they interact. Currently, the project is in the promotion and fund raising stage, so the Rock River Coalition has been meeting with municipal and county leaders to identify their communities' concerns and possible methods of funding. Several communities are experiencing high levels of nitrates, bacteria and other contaminants in shallow wells. Others are having problems with radium and arsenic in deep wells. They hope the model will help determine the best course of action to manage these issues.^{31, 32}

6) Village of Mukwonago/Vernon Marsh - The village of Mukwonago proposed a high capacity well system near Vernon Marsh to blend water from the shallow aquifer with their existing water supply to alleviate radium issues. A study was conducted between September 1999 and August 2002 to document the water levels in the Vernon Marsh Wildlife Area. The basic conclusion of the study was that natural water level fluctuation was greater than the maximum measured drawdown in response to the pump tests performed. This model could be used in other areas facing elevated concentrations of radium or other water supply issues; however, the location of the new high capacity well needs to be thoroughly investigated in order to minimize impacts on nearby surface water features or other shallow wells.³³

7) Maximize use of existing infrastructure – The Milwaukee Water Works provides Lake Michigan drinking water to the city of Milwaukee and 14 neighboring communities as well as Milwaukee County Grounds and We Energies Water Services. The Water Works operates two treatment plants - Linnwood and Howard Avenue. Combined, the rated peak capacity of the treatment plants is 380 million gallons per day. In 2004, the treatment plants provided 44.3 billion gallons of drinking water, which is approximately 121

²⁷ Professor Doug Cherkauer, UW-Milwaukee, meeting 8-31-05

²⁸ Town of Richfield 2025 Comprehensive Plan

²⁹ SEWRPC land use map, 2005

³⁰ Tim Savage (Village Administrator, Village of Richmond), phone conversation 9-21-05

³¹ The Rock River Reflections, published by UW-Extension, Jefferson County and the Rock River Coalition, Winter 2006, Vol. 9, No. 1.

³² Orson Tingey (Rock River Coalition Communications Specialist), email from 9-21-05

³³ DNR, Report of Investigation, Ground Water and Surface Water Interaction, Vernon Marsh State Wildlife Area, September 2003

million gallons per day. This is about 250 million gallons per day less than the rated peak capacity. Given this excess capacity, other communities east of the subcontinental divide could switch their drinking water supply from private or municipal wells to Lake Michigan surface water to maximize the use of existing infrastructure and reduce the demand on both the shallow and deep aquifers.³⁴

Recommendations

1. Vision and Goals

The citizens and leaders of southeastern Wisconsin need to be fully committed to protecting and restoring the region's world class water resources to sustain a vibrant economy, a high quality of life and enhanced natural ecosystems for this and succeeding generations.

To achieve this vision, the region's citizens and leaders need to be guided by a set of principles and goals that include:

- Acknowledgement that water resources of the region are finite and the natural systems that contribute to their replenishment and quality must be protected.
- Achieving fishable and swimmable waters for the entire region.
- Development and implementation of an integrated water resource management strategy that recognizes the relationship between surface waters, groundwater and water-dependent natural resources.
- Regional management strategy with a structure that addresses water quality and quantity issues on the basis of natural or hydrologic boundaries such as watersheds or groundwater aquifers.
- Direct linkage of the integrated water resource management strategy with other regional and community plans, including population, land use trends, economic development, transportation, housing and recreation development.
- Timely and integrated data collection on water quantity and quality to establish trendlines, and a method for coordinating various relevant scientific studies regarding water issues.
- As scientific data permit, movement toward a long-term goal of a "no-net loss" concept; that is, ensuring that the water we use is replenished.

³⁴ Milwaukee Water Works 2004 Annual Report
(<http://www.mpw.net/Pages/water/docs/2004AnnualRpt.pdf>)

2. Menu of Science-based Options to Help Communities Achieve the Region's Vision and Goals

A variety of options are available to communities that will help them achieve the region's vision and goals and manage the water resources in an integrated fashion. These choices must be available to assist communities in achieving water resource management goals for the region, because there is no one-size-fits-all solution to complex water issues. These would include:

- Measures all communities should be required to embrace, choosing from a menu of best practices for each:
 - Education of citizens and policymakers about water resource issues
 - Education of local media to counter myths and incorrect data
 - Water conservation
 - Construction site erosion controls
 - Protection of groundwater recharge areas, open space, wetlands and prime farm lands
 - Point source pollution controls
 - Control of separate sewer and combined sewer overflows
 - Non-point pollution control in rural and urban areas
 - Storm water runoff controls
 - Flooding controls
 - Invasive species controls
- Other possible actions available for communities to use:
 - Green design
 - Discharging wastewater effluent to infiltration beds
 - Deep aquifer well fields including treatment plant
 - Siting of shallow aquifer well fields based on speed of aquifer recharge
 - Gray water reuse/recycling
 - Maximizing treatment facility capacity by using aquifer storage and recovery
 - Lake Michigan water diversion with water returned after treatment to required water quality standards to Lake Michigan basin
 - Lake Michigan diversion with wastewater returned to a designated wastewater treatment system, such as the MMSD treatment system
 - Maximizing groundwater recharge through the use of stormwater utility ordinances
 - Use of cost/ price structures that create incentives for water resources management and water conservation

3. Regional Water Management Models

Effectively managing water resources in the regional interest has never happened, as more than 200 governments (federal, state, regional, county and municipal) currently make water resource management decisions in southeastern Wisconsin. The solution is creating a mechanism to integrate water policy and management. This could be accomplished through cooperative agreements among the governments, state legislation, creation of a regional water resource management entity, or a combination of these to integrate the use and protection of the waters in southeastern Wisconsin.

Whatever the governance method, we found consensus among stakeholders on our advisory panel and in our focus groups that a water resource management goal must be established. The long-term goal suggested by our advisory panel is “no net loss” of ground or surface waters in the region, as well as fishable and swimmable water quality. “No net loss” is defined as keeping the water levels of lakes and aquifers within historic variations due to drought or wet years. What is to be avoided is a general downward trend in water levels that surpasses those natural variations. Debate over an appropriate statewide goal is anticipated to be among the policies and regulations included in the state’s implementation plan for the Great Lakes – St. Lawrence River Basin Compact (commonly called Annex 2001). Now is an opportune time for policymakers to come to consensus on a goal, while acknowledging that science is not yet able to tell us the most efficient and effective way to achieve that goal.

It must be noted that the lack of scientific evidence as to the best methods or tactics for local governments to utilize in striving for “no net loss” cannot be considered a reason not to establish a “no net loss” objective. Many public policies are adopted before science has caught up. For example, policymakers at both the state and federal levels are committed to closing the academic achievement gap between white and minority students; however, there is no consensus among policymakers or educators as to the best way to accomplish this goal. As a result, numerous types of education reform are at work in school districts across the state and nation, and sometimes several are implemented in one district at the same time. This willingness to experiment is required in water resource management policy as well, and is the reason our previous recommendation includes a menu of options that local governments may attempt.

To achieve the no net loss/fishable and swimmable goal, governments must practice efficient, equitable and sustainable water resource management. To do so, it will be necessary to organize decision making along both natural resource and political boundaries—similar to what is being done under MMSD’s 2020 Facilities Plan and SEWRPC’s Regional Water Quality Management Plan Update. Because both natural and human systems are involved, our region needs “adaptive” governance to generate policy through coordinated efforts among independent governments and agencies.

Adaptive water resource governance must be *representative* because of the competing and sometimes conflicting constituencies involved; *nimble* in light of rapidly evolving water science; and *responsive*, considering the long-term consequences of

squandering our natural resources. In addition, an adaptive governance structure should provide the necessary incentives and resources to achieve its goals.

We have identified four collaborative models for achieving adaptive water resource governance. These models are not mutually exclusive; elements of each can be utilized in conjunction with other models. All four models depend on local units of government—municipalities and counties—and their water resource agencies to make independent decisions based on regional objectives that focus on all or parts of 10 or more southeastern Wisconsin counties, following natural watershed and groundwater recharge boundaries. All models require local officials to be educated on water issues and water science, but rely on the technical expertise of scientists and engineers to guide and advise the implementation process. All models strive to achieve the vision and goals by allowing local governments to utilize, at their option, the most appropriate water management method(s) from among the menu of options we recommend above.

- **Model 1. Regional Water Resource Commission**—A cooperative coordinating council of water resource managers appointed by each municipality and county in the region that meets semi-monthly or quarterly to create and implement regional water resource plans. The meetings allow local officials to inform one another of their current efforts and future plans, as well as facilitate collaborative efforts among the represented governments. This model relies on the commissioners to work together informally and keep their elected officials informed to achieve regional goals. Enforcement of the regional objectives could be coordinated by existing enforcement agencies or an independent staff established by the commission.

Pros: Similar to current regional structure for recycling

Commissioners could sit on more than one council if their jurisdiction is part of more than one watershed

Regional council improves integration

Municipalities may designate a county to represent their interests on the council

Potentially funded within local government budgets

Cons: Municipalities may perceive loss of local control (if every community has one seat on the council, the governing body would be quite large in some watersheds)

Local governments may not have technical expertise on staff to serve as commissioners.

Regional plans require compromise and may not meet all local demands

- **Model 2. Compact among Local Governments**—This model depends on binding legal authority to ensure the parties to the compact perform as they have agreed. A compact specifies the goals the parties agree on, the actions they are to perform in furtherance of those goals, and the funding mechanism

for those actions. The compact must be ratified by every government bound to its provisions. In addition to local governments, the bound parties may include stakeholder groups. Non-performance would incur penalties as established under the compact.

Pros: Compact results from a meeting of the minds of local officials and stakeholders

Negotiations result in representation of every party

Financial incentives and/or cost sharing can be built into financing mechanism

Cons: Lone hold-out during negotiations could derail entire process

Requires good-faith negotiating despite uncertainty of current water science

Amendments to the compact reopen negotiations and may not be timely

- **Model 3. Wisconsin Department of Natural Resources**—The state agency uses its authority, enhanced by state legislation, to provide guidelines for local governments to achieve integrated water resource management strategies. Local governments shall adopt local plans and choose among models and options to comply with regional and state objectives. The DNR currently enforces the “no net loss” principle over time and uses the authority of the state to prevent environmental degradation, but an integrated management scheme would require their duties be more comprehensive. DNR policies that are not currently linked together would be integrated for a holistic approach to natural resource management.

Pros: Infrastructure of agency already in place

Local plans provide flexibility, while regional objectives provide integration

Plans could be revisited as scientific knowledge advances

Potentially funded by the state

Cons: Requires legislative action to expand DNR powers.

Municipalities may fight a state decision that triggers the requirement to create a local plan

- **Model 4. Regional Water Resource Management Authority**—An appointed planning and enforcement body governs a professional staff that plans for water resources in the region, sets regional priorities to prevent environmental degradation, implements policies through rulemaking, and enforces municipal compliance. The most politically viable model would not levy new taxes (and would therefore be dependent upon the state or region for funding) but it would have enforcement powers.

- Pros:** Opportunity to establish representative regional infrastructure
Funding comes potentially from local governments according to formula established by either the state or the governments themselves
- Cons:** If authority is limited to watershed boundaries, then this would require more than one authority to be in operation in southeastern Wisconsin
Municipalities may perceive loss of local control

Yet to be determined in each of the four models above are the particulars of representation, enforcement, and financing. For example, shall the representation of local communities in a particular governance model be determined by population or some other method? Perhaps each community gets one seat on the governing board, or perhaps those communities with more land area get more seats. In addition, to what extent do these governing bodies have the ability to enforce their decisions? Shall they be able to levy fines, institute moratoriums on new wells, etc? Finally, how will these governing models be financed? The governing body could be a regional taxing authority, or could be state-funded, or could be funded by the represented local governments themselves.

The discussion, up until this point, has focused on the big picture of developing a new form of integrated and adaptive governance. The details of design and the nuances of implementation must wait until consensus has been achieved regarding the general model to be utilized.

4. Policy and Law

To achieve the regional vision and goals and implement policies and programs to carry them out, it will be necessary to clarify certain laws, change others and create new state water laws as needed.

An effective relationship between policy and law is essential to implementing integrated water resource management in the region. Sound science, collaboration, and comprehensive planning, although critical, by themselves will not ensure sustainable use and protection of water resources. State laws and administrative codes must require implementation of plans that define environmentally sound, cost effective facilities, programs, and best management practices. This can be accomplished by requiring that proposed water resource actions requiring regulatory approvals and/or state funding be in compliance with the approved plans. This approach has been effectively used by the state of Wisconsin for over 30 years in the management of point source pollutions.

Additional legal analysis needs to occur with probable legislative action needed in the following areas:

- Water supply and diversion issues
- Water conservation measures

- Clarification and expanded application of reasonable use and public trust doctrines to groundwater of the state
- The circumstances under which the reuse and recycling of water to accomplish water balancing objectives are desirable and permissible
- The extent to which mandated water quality activities can be reordered to give greater priority to non-point measures that would have greater impact on improvements to the region's water quality.
- Methods of identifying and defining water-constrained areas using watershed or sub-watershed boundaries to the maximum extent feasible.
- Gaps in the authority of the DNR or local governments to effectively provide oversight to ensure integrated water resource management in our region.
- Development and implementation of regulations that are driven by documented results and measured improvements toward achieving water resource goals. This encourages prioritizing use of scarce financial resources to actions that result in the greatest return in water resource management.

Next Steps

To achieve the Water Policy Advisory Panel's goals and recommendations, the state of Wisconsin must act. While this report is focused on southeastern Wisconsin, all the waters of Wisconsin require integrated management. The state will need to provide the necessary legal framework and support for addressing the advisory panel's substantive recommendations.

Fortunately, now is an opportune time for action. Over the next several months, the Wisconsin legislature will craft legislation to implement the Great Lakes-St. Lawrence River Basin Water Compact. This legislation is expected to include a number of water regulatory and management provisions as well as requirements to strengthen the scientific basis for water resource management decisions. The legislation could serve as the vehicle through which the state and region adopt an explicit goal of achieving integrated water resource management as defined by this report.

To facilitate state-level goal-setting, the Joint Legislative Council is encouraged to establish a study committee to address those recommendations of this report that require additional analysis, including:

- Completing a comprehensive review of the current administrative rules and legislation relating to water resources, identifying gaps and inconsistencies and recommending changes, additions, and improvements.
- Integrating the various water resource-related plans and studies currently underway in southeastern Wisconsin and coordinating with the ongoing work of the Groundwater Advisory Committee established under 2003 Wisconsin Act 310.
- Developing a science-based approach to managing water resources at a regional level.

- Developing an integrated water resource management structure at a watershed or groundwater recharge area level, and proposing potential financing mechanisms and enforcement authority.
- Developing a single state-level point of responsibility to promote integrated water resource management and to coordinate current and future studies and land use (Smart Growth) plans.

The work of the Legislative Council study committee might also inform the rulemaking process that will take place after the enactment of the Great Lakes-St. Lawrence River Basin Compact enabling legislation.

An alternative to establishing a Legislative Council study committee to address the Water Policy Advisory Panel's recommendations would be to expand the role of the Groundwater Advisory Committee, currently slated to report to the legislature by the end of 2006.

In addition, the Water Advisory Panel plans to work with groups of local elected officials and the general public to raise awareness about water quality and scarcity issues throughout the region and to present the findings and recommendations of this report to municipal and county boards.

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Regional Clean Water Summit. 23 September 2004

Solving the Water Puzzle. Brookfield, WI. 28 April 2005.

Straddling the Divide Conference. Water Supply Planning in the Lake Michigan Region Chicago, IL. 15 February 2005.

Watershed Officials Forum. Milwaukee, WI. 13 September 2004.

Glossary of Acronyms

- **DNR** The Wisconsin Department of Natural Resources is responsible for implementing the laws of the state and, where applicable, the laws of the federal government that protect and enhance the natural resources of our state. The DNR's mission is to preserve, protect, effectively manage, and maintain Wisconsin's natural resources.
- **EPA** The U.S. Environmental Protection Agency works to develop and enforce regulations that implement environmental laws enacted by Congress. The EPA is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance. Where national standards are not met, the EPA can issue sanctions and take other steps to assist the states and tribes in reaching the desired levels of environmental quality
- **GAC** The Wisconsin Groundwater Advisory Council was created by 2003 Wisconsin Act 310. The GAC, by December 31, 2006, must recommend legislation and administrative rules to address the management of groundwater in designated groundwater management areas to respond to the adverse effects of long-term groundwater withdrawal on water quality and quantity.
- **IWRM** Integrated Water Resource Management is designed to achieve and measure the community-supported positive environmental, social and economic benefits of clean and plentiful water for this and succeeding generations.
- **MMSD** The Metropolitan Milwaukee Sewerage District is a regional government agency providing wastewater treatment and flood management services for 28 communities and serves 1.1 million people in a 420 square-mile service area. Established by state law, the district is governed by 11 commissioners and does have taxing authority.
- **SEWRPC** The Southeastern Wisconsin Regional Planning Commission is the official area-wide planning agency for the highly urbanized southeastern region of Wisconsin: the seven counties of Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha. The commission was created to provide the basic information and planning services necessary to solve problems which transcend the corporate boundaries and fiscal capabilities of the local units of government comprising the southeastern Wisconsin region.
- **USGS** The U.S. Geological Survey is the nation's largest water, earth, and biological science and civilian mapping agency. USGS collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems.

Appendix

SEWRPC Regional Water Quality Management Plan Update

In 1979, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) completed and adopted a regional water quality management plan. The plan was designed, in part, to meet the Congressional mandate that the waters of the United States be made "fishable and swimmable" to the extent practical. It is set forth in SEWRPC Planning Report No. 30, *A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000*, Volume One, *Inventory Findings*, September 1978; Volume Two, *Alternative Plans*, February 1979; and Volume Three, *Recommended Plan*, June 1979.

The regional water quality management plan, as well as the update currently under preparation, provides recommendations for the control of water pollution from such point sources as sewage treatment plants, points of separate and combined sewer overflow, and industrial waste outfalls. It also recommends controlling such nonpoint sources as urban and rural stormwater runoff. In addition to clear and concise recommendations for the control of water pollution, the plan provides the basis for:

- Continued eligibility of local units of government for Federal and State loans and grants in partial support of sewerage system development and redevelopment;
- Issuance of waste discharge permits by the Wisconsin Department of Natural Resources (WDNR);
- Review and approval of public sanitary sewer extensions by the WDNR; and
- Review and approval of private sanitary sewer extensions and large onsite sewage disposal systems and holding tanks by the Wisconsin Department of Commerce.

Subsequently, SEWRPC completed a report documenting the updated content and implementation status of the regional water quality management plan as amended over approximately its first 15 years: SEWRPC Memorandum Report No. 93, *A Regional Water Quality Management Plan for Southeastern Wisconsin: An Update and Status Report*, March 1995. This status report also documents the extent of progress which had been made toward meeting the water use objectives and supporting water quality standards set forth in the regional plan.

Reference: SEWRPC, 2006 (<http://sewrpc.org/waterqualityplan/background.asp>)

MMSD 2020 Facilities Plan

The Milwaukee Metropolitan Sewerage District's (MMSD) 2020 Facilities Plan addresses needed and ongoing water pollution abatement for MMSD's planning and sewer service area through the year 2020. The plan is a long-range comprehensive planning effort that identifies improvements to all relevant systems so that these systems can accommodate regional growth and protect water resources through the year 2020. The purpose of the 2020 Facilities Plan is to identify the facilities, policies, operational improvements, and programs necessary to achieve the water resource goals inspired by the public as well as those set forth by the WDNR regulations and the EPA regulations established and enforced by the Federal Clean Water Act.

The planning effort was a response to a court-ordered stipulation between MMSD and WDNR (May 29, 2002), which required that MMSD complete the 2020 Facilities Plan by June 30, 2007. Consistent with evolving U.S. Environmental Protection Agency (EPA) policy, MMSD utilized a watershed approach in developing the 2020 Facilities Plan. The vision of the EPA's new Watershed Rule is to provide a framework that advances state and local efforts in achieving the highest attainable uses of waters of the United States by promoting flexible, effective watershed approaches.

Reference: MMSD WQI Website, 2006 (<http://www.mmsd.com/wqi/>)

Relationship between MMSD 2020 Facilities Plan (2020 FP) and SEWRPC Regional Water Quality Management Plan Update (RWQMPU)

SEWRPC is the designated area-wide planning agency for the southeastern region of Wisconsin. SEWRPC serves seven counties; portions of five of these counties are within MMSD's planning area. MMSD provides planning for land use, public works systems and environmental issues (i.e. flooding and water pollution). After MMSD began the watershed-based facilities planning process, MMSD and SEWRPC began discussions that resulted in SEWRPC preparing the RWQMPU. As noted above, the primary purpose of the RWQMPU is to develop a sound and workable strategy for the abatement of water pollution within the Greater Milwaukee Watersheds. The RWQMPU will result in the reevaluation and, as necessary, revision of the three major elements that comprised the original regional water quality management plan: land use, point source pollution abatement, and non-point source pollution abatement.

The development of the RWQMPU and MMSD's 2020 FP is being conducted in separate but coordinated and cooperative work efforts. The two planning efforts are interfaced and coordinated for many of the work elements, and selected work elements are being jointly carried out.

The approach to cooperatively and simultaneously conduct MMSD's 2020 FP planning program and the RWQMPU program is endorsed and approved by WDNR, MMSD, and SEWRPC. The approach was formalized under a February 19, 2003 WDNR/MMSD/SEWRPC Memorandum of Understanding.

The collaboration between MMSD's 2020 FP planning program and SEWRPC's RWQMPU program will result in an integrated watershed water quality planning approach for the watersheds within the greater Milwaukee area that incorporates a facilities planning program for MMSD sewerage systems. This coordinated approach is the key to achieving the most cost effective and workable plan for the abatement of water pollution within the Greater Milwaukee Watersheds while illustrating sound public planning and administration.

Reference: MMSD WQ1 Website, 2006 (<http://www.mmsd.com/wqi/>)

SEWRPC Regional Water Supply Study

The Southeastern Wisconsin Regional Planning Commission (SEWRPC) has initiated the conduct of a regional water supply study for the Southeastern Wisconsin Region. That study will lead to the preparation and adoption of a regional water supply system plan. The preparation of the regional water supply plan represents the third, and final, element of the SEWRPC regional water supply management program. The first two elements, comprising the development of basic groundwater inventories and the development of a groundwater simulation model for the Southeastern Wisconsin Region, were completed over the past several years. These elements involved interagency partnership programs with the U.S. Geological Survey, the Wisconsin Geological and Natural History Survey, the University of Wisconsin-Milwaukee, the Wisconsin Department of Natural Resources, and many of the water supply utilities serving the Region.

The regional water supply plan is intended to include the following major components:

- Development of water supply service areas and of forecast demand for water use.
- Development of recommendations for water conservation efforts to reduce water demand.
- Evaluation of alternative sources of supply, culminating in identification of recommended sources of supply for each service area and in recommendations for development of the basic infrastructure required to deliver that supply.
- Identification of groundwater recharge areas to be protected from incompatible development.
- Specification of any new institutional structures found necessary to carry out the plan recommendations.

- Identification of any constraints to development levels in subareas of the Region that may emanate from water supply sustainability concerns.

The regional water supply plan will be based upon a design year of 2035. A new regional land use plan for 2035 will be completed in the summer of 2005 and will serve as a basis for the development of the water supply plan. It is expected that the regional water supply plan will be completed by the end of 2006, with plan adoption and documentation following early in 2007.

Reference: SEWRPC, 2006 (<http://sewrpc.org/watersupplystudy/>)

MMSD Corridor Study

The MMSD Corridor Study is being compiled as part of a collaborative project between the MMSD, the WDNR, SEWRPC, the University of Wisconsin Milwaukee, Marquette University, Wisconsin Lutheran College and other organizations to ascertain the current state of water quality and ecological health in the streams corridors of the MMSD planning area.

The U.S. Geological Survey (USGS) constructed and maintains the Corridor Study database. Data is compiled from various local, state, and federal agencies for the purpose of providing a centralized database of water chemistry, macroinvertebrate, fish, habitat, and GIS information. The database is controlled by the MMSD. Combining data sets from agencies that follow different data management procedures as well as data collection methods that differ within an agency create challenges to providing a coherent data warehouse that accurately maintains the integrity of each individual database. Many of the Water-Quality Data Elements from the list compiled by the National Methods Comparability Board and the National Water-Quality Monitoring Council were incorporated into the design of the data warehouse to best enable users to confidently compare surface water datasets from one agency to another. The data were collected and analyzed over an approximate 30-year period. The database provides data and tools with which to assess the potential success of future projects and monitor the water quality and habitat of area stream corridors.

References: Schenieder, Morgan. *The Milwaukee Metropolitan Sewerage District Corridor Study: A Case Study in the Compilation of Surface Water Related Datasets from Multiple Local, State, and Federal Agencies*. USGS

Southeastern Wisconsin Regional Planning Commission, RWQMPC, Technical Report #39. *Chapter III Data Sources and Methods of Analysis*.

UWM-GLWI/MMSD "Pathogens Source Identification/Bacteria Source Fate and Transport

The UWM Great Lakes WATER Institute (GLWI) and Milwaukee Metropolitan Sewerage District have been in collaboration on a study to differentiate sources of bacterial contamination that contribute to beach closings and other negative water quality impacts in the Milwaukee area. A major component of this project was the production of a hydrodynamic model of the Milwaukee Harbor and nearshore region of Lake Michigan. The purpose of this modeling effort was to identify the transport mechanisms and ultimate fate of bacteria in these freshwater systems. This project was initiated by MMSD in an attempt to evaluate the impact of stormwater and combined sewer overflows on bacteria levels in local waterways, including Milwaukee County beaches.

Reference: GLWI, 2006
(http://www.uwm.edu/Dept/GLWI/ecoli/milwaukee_harbor_hydrodyn_model.html)

Robust Region

Water quantity and quality both matter

Clean and abundant water is central to southeastern Wisconsin's quality of life and global competitiveness. Water, however, knows no boundaries, making its management complex. Also, it must be managed whether it's underground or in a pond, polluted or clean, in a pipe in Milwaukee or a well in Waukesha. Consequently, water's quantity and quality must be managed together.

Water policy consensus

- 1) Vision and goals
 - Protect quality and quantity of region's water.
 - Achieve fishable and swimmable waters.
 - Integrated water resource management of surface waters, groundwater and water-dependent natural resources.
 - Regional management that addresses quality and quantity based on natural or hydrologic boundaries, such as watersheds or groundwater aquifers.
 - Link integrated water management with plans involving population, land use trends, economic development, transportation, housing and recreation.
 - Data collection on water quantity and quality and a method for coordinating relevant scientific studies on water issues.
 - Movement toward a long-term goal of "no-net loss" to ensure that the water we use is replenished or replaced.
- 2) Science-based options to reach visions and goals
 - Communities required to embrace ...
 - Education about water resources
 - Conservation
 - Protection of groundwater recharge areas
 - Erosion controls
- 3) Regional water management models
 - Regional water resource commission - Cooperative coordinating council of water resource managers appointed by each municipality and county to create and implement regional water resource plans.
 - Local compacts - Compact of local governments to specify goals agreed on, actions to be performed, and funding.
 - Wisconsin Department of Natural Resources - Greater authority to provide and enforce guidelines for local governments to achieve integrated water resource management.
 - Regional water resource authority - Appointed planning and enforcement body that does water resource planning, sets regional priorities, implements policies, and enforces municipal compliance.

Key concepts

Integrated water resource management (IWRM) implements a comprehensive strategy and principles, recognizing the interdependence of surface water, groundwater issues and water-dependent natural resources. IWRM is designed to achieve and measure the community-supported positive environmental, social, and economic benefits of clean and plentiful water for this and succeeding generations.

"No net loss" is defined as keeping lake and aquifer water levels within historic variations due to drought or wet years, with the objective of avoiding a downward trend.

For the complete water resource management study, please visit www.publicpolicyforum.org

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Making the case

- Water is a key regional asset, central to industry, agriculture, and quality of life.
 - Southeastern Wisconsin faces immediate problems, such as dropping water tables and deteriorating water quality.
 - Water must be managed in the long term.
- Jurisdictional overlaps, policy gaps, and lack of a sound scientific database for decision-making hamper water resource management.
- Various ways exist to change current water resource management.
- Support exists for regional measures to protect and improve water resources.
- Integrated water resource management would strengthen the region.

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- | | | |
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