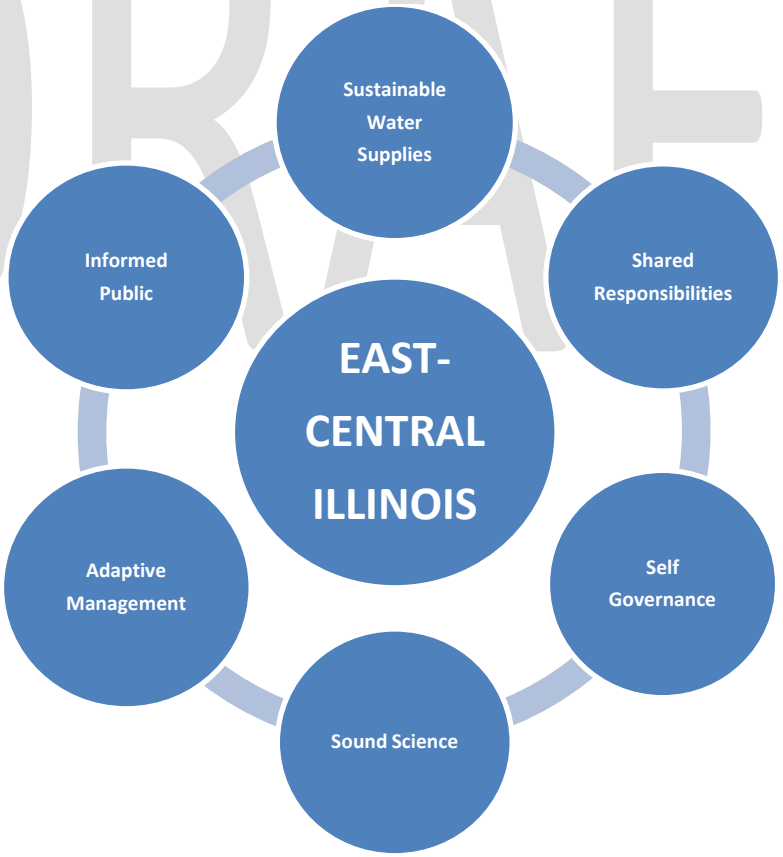
A Plan to Improve the Planning and Management of Water Supplies in East-Central Illinois

by

East-Central Illinois Regional Water Supply Planning Committee



June 2009

A Plan to Improve the Planning and Management of Water Supplies in East-Central Illinois

by

East-Central Illinois Regional Water Supply Planning Committee

Bradley Uken (Chair): Public
Jeff Smith (Vice Chair): Agriculture
Shannon Allen: Soil and water conservation
Morris Bell: Water authorities
Dwain Berggren: Environment
Robert Betzelberger: Small business
Frank Dunmire: Rural water districts
Jay Henry: Electric generating utilities
Evelyn Neavear: Counties
Mark Sheppard: Industries
Bill Smith: Municipalities
Steven Wegman: Water utilities

A report prepared for the Mahomet Aquifer Consortium
under contract to
the Illinois Department of Natural Resources, Office of Water Resources, Springfield, IL.

June 2009

Champaign, Illinois

DRAFT

CONTENTS

Appendices

Appendix 1

Appendix 2

List of Figures

List of Tables

Appendix 1 page

Acknowledgments

TO BE WRITTEN

All those who have contributed – participated in meetings, provided data and information, reviewed and commented on draft material.
Paul Berg (Municipalities) – first Chair
Brent O'Neill (Water utilities) – 2nd Chair
Tom Davis (Electric generating utilities)
Robbie Berg
MAC Exec Committee Members and Technical Advisers
Gary Clark
Debbie Stone
Ed Mehnert – web site
Ashley Tittle, Tazewell Department of Public Health
William F. Mullican III, P.G., Deputy Executive Administrator, Office of Planning, Texas Water Development Board
Derek Winstanley, Chief Emeritus of the Illinois State Water Survey, under contract to the Mahomet Aquifer Consortium, facilitated the Committee's preparation of the report.
Melinda Tidrick – website developer
Ellis Sanderson, Richard Schicht, William Walton – contributed to technical discussions

A Plan to Improve the Planning and Management of Water Supplies in East-Central Illinois

by

East-Central Illinois Regional Water Supply Planning Committee

Bradley Uken (Chair): Public **Jeff Smith** (Vice Chair): Agriculture **Shannon Allen**: Soil and water conservation
Morris Bell: Water authorities **Dwain Berggren**: Environment **Robert Betzelberger**: Small business
Frank Dunmire: Rural water districts **Jay Henry**: Electric generating utilities **Evelyn Neavear**: Counties
Mark Sheppard: Industries **Bill Smith**: Municipalities **Steven Wegman**: Water utilities

A report prepared for the Mahomet Aquifer Consortium under contract to
the Illinois Department of Natural Resources, Office of Water Resources, Springfield, IL

June 2009, Champaign, Illinois

EXECUTIVE SUMMARY

East-Central Illinois is not facing an immediate water crisis, but the East-Central Illinois Water Supply Planning Committee (the Committee) is driven by a desire to avoid crises that sometimes plague other states and countries. A recent headline describes the water problems in the southeastern United States:

"Georgia Water Woes: Drought Leads to Widespread Water Shortages"

The Committee believes strongly that stakeholders in the region can shape the future, rather than allowing runaway events to take control and crises to occur. A regional plan – a framework for action and a series of action items – provides a means to shape the future. It is the Committee's belief that implementation of a regional plan can lead to more desirable headlines, such as:

"Sustainable Water Supplies for East-Central Illinois"

MANDATE

The regional plan has been developed by the Committee in compliance with Executive Order 2006-01 issued by the Governor directing the Illinois Department of Natural Resources, in coordination with the Illinois State Water Survey, to engage in regional water supply planning.

PLANNING PROCESS

To implement the Executive Order, the Office of Water Resources of the Illinois Department of Natural Resources signed a contract with the Mahomet Aquifer Consortium to complete over a three-year period specified tasks in a priority water quantity planning area for 15 counties in East-Central

Illinois: Vermilion, Iroquois, Ford, Champaign, McLean, Macon, DeWitt, Piatt, Woodford, Tazewell, Mason, Logan, Menard, Cass and Sangamon. The regional plan focuses on the Mahomet Aquifer System that underlies a large portion of the planning area together with the surface waters of the major river basins. Funding for the crucial third year was not provided and this caused some important tasks in the work plan to be curtailed.

Wittman Hydro Planning Associates, Inc. of Bloomington, Indiana, developed for the Mahomet Aquifer Consortium and the Committee scenarios of how much water may be needed in the region to 2050.

Using the water demand data provided by Wittman Hydro Planning Associates, Inc. and geological data and information provided by the Illinois State Geological Survey, the Illinois State Water Survey conducted analyses to evaluate how drought, climate change, water withdrawals and discharges affect streamflow, reservoir yield and groundwater availability. Most of this work was conducted under contract with the Office of Water Resources of the Illinois Department of Natural Resources. A final report from the State Surveys was not available for the Committee's use; therefore, the Committee relied upon preliminary results in the form of draft materials and PowerPoint presentations on climate scenarios, groundwater flow modeling results, and surface water yield analyses to form its recommendations.

From March 2007 through June 2009 the Committee held 31 public meetings, received public comments, was briefed on and discussed many aspects of water supply planning and management, and conducted outreach and educational activities.

The regional water supply plan builds on the Committee's findings: key findings are summarized after the recommended regional plan below. Major relevant features of the region, including a summary of the water demand scenarios, are described in Appendix 1 of the report. Appendix 2 provides an overview of water supply planning and management relevant to East-Central Illinois.

RECOMMENDED REGIONAL WATER SUPPLY PLAN

A FRAMEWORK FOR ACTION

The Committee selected a strategic planning framework within which to construct a plan. Within this framework, the Committee considered a multitude of interconnected economic, social and environmental factors. Given the time and resources available, the Committee focused on the impacts of withdrawing water from the Mahomet Aquifer System and the major river basins to meet water demand scenarios to 2050.

The Committee has identified a set of guidelines for regional water supply planning and management based on the following six foundations:

Self governance;	**Adaptive management;**	**Shared responsibilities;**
Sustainable water supplies;	**Sound science;**	**Informed public.**

The sustainability of water supplies is defined as the provision of dependable and adequate supplies of clean water to meet the demands of all users in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic, or social costs.

KEY COMPONENTS

Vision of the future

In the years ahead, others will view East-Central Illinois as a model for regional water supply planning and management. This is because future generations will inherit a legacy of responsible water supply planning and management that will allow them to continue to be good stewards and managers, rather than inheriting diminished resources and chronic problems. The provision of dependable and adequate supplies of clean water for all users at reasonable economic and environmental cost will enhance public health and the quality of life, reduce conflict, and preserve and enhance economic, agricultural and environmental resources and opportunities.

Goal

The goal is to make recommendations that will be adopted and implemented by stakeholders to improve the planning and management of water supplies in East-Central Illinois.

Planning and management standards

In order to protect aquifers, surface waters and ecosystems while allowing for the development of water resources, the Committee recommends a number of voluntary standards for water supply planning and management.

- Water supplies should continue to be planned and managed to meet demand in compliance with existing laws, regulations and property rights, with due determination and consideration of acceptable and/or unacceptable impacts.

- Water supplies should be planned and managed with enhanced regional cooperation and coordination to address shared responsibilities and the interests of future generations. Enhanced regional cooperation and coordination should be achieved through voluntary efforts in the spirit of self-governance.

- Withdrawals from the confined Mahomet Aquifer should be managed so that head in any well (pumping or non-pumping) finished in the confined Mahomet Aquifer does not fall below the top of the aquifer. i.e., there is no loss of saturated thickness. It will be important to monitor heads in pumping and non-pumping wells and provide a water-level watch for all stakeholders.

- The earlier evaluation of the sustainability of pumping to capacity by Illinois American Water (51.1 million gallons per day (mgd)) should be reevaluated to include additional withdrawals

from the Mahomet Aquifer by other communities and industries out to 2050, with consideration of drawdown in pumping and non-pumping wells.

- The transition zone between the confined and unconfined parts of the Mahomet Aquifer should be defined and an appropriate standard(s) be developed to protect the aquifer, surface waters and ecosystems, while allowing for groundwater development.

- A standard(s) should be set to protect shallow confined aquifers, surface waters and ecosystems, while allowing for groundwater development.

- In the unconfined parts of the Mahomet Aquifer in the Havana Lowlands, a standard(s) should be developed and implemented to limit the reduction of saturated thickness in the unconfined aquifer and protect surface waters and ecosystems, especially in summer during drought conditions, while allowing for groundwater development.

- The Committee recommends that key aquifer recharge areas, key stream reaches, and ecosystem-sensitive stream flows be identified and preserved and/or restored.

- Water supply facilities should be designed, constructed and operated in a manner that prevents unacceptable impacts to surface waters, including streamflow and water levels in lakes, wetlands and aquatic and riparian ecosystems, while providing sufficient water to meet demand. Unacceptable impacts need to be defined.

- Criteria and standards to protect the aquifers should be reevaluated when criteria and a standard(s) are developed to protect surface waters and aquatic and riparian ecosystems from possible unacceptable impacts of groundwater withdrawals, once unacceptable impacts are defined.

- Public water supplies should be managed to provide dependable and adequate supplies of water during, at a minimum, recurrence of the multi-year droughts-of-record similar to those that occurred in the 1930s and 1950s. A 90 percent confidence level should be used for yields. Bloomington, Decatur and Springfield urgently need additional sources of water and/or need to reduce water demand to be able to provide adequate supplies of water during a drought-of-record, which can recur at any time. Emergency response plans for all water supply facilities should be updated or prepared to provide adequate supplies of water in low-probability situations in which adequate water supplies cannot be provided through normal operations and capacities.

- Efficiencies of water withdrawal, treatment, distribution and use, and use of water from alternative sources (such as reused water, detained stormwater, and conjunctive use of surface water and groundwater) should be increased. This should include obtaining maximum feasible efficiencies in all existing, committed and planned water supply facilities, which should be supplemented with additional facilities only as necessary to serve anticipated water supply needs. Identification and uniform implementation of best management practices for water supply facilities, where feasible, will help minimize the sum of water supply system operating and capital investment costs and increase water use

efficiencies and sustainability. Examination of water pricing policies and practices may lead to identification of additional strategies to reduce water demand.

- Water supply facilities should be designed for staged or incremental construction, where feasible, to permit maximum flexibility to accommodate changes in population and economic growth, changes in technology for water supply management, new scientific understanding, and possible new or revised management standards.

- A continuous process for water supply planning should be implemented and regional and local water supply plans should be reviewed and updated at least every five years.

- All water supply managers and other stakeholders in the region should be encouraged to review a regional plan, suggest modifications, and become partners in regional water supply planning and management.

ACTION ITEMS

The main recommendation is to establish a permanent process and structure for regional water supply planning and management involving a diverse set of stakeholders.

The Committee recommends that the Mahomet Aquifer Consortium retool to provide leadership, administrative structure and process to fulfill an expanded role for regional water supply planning and management in East-Central Illinois.

- The mission should be broadened to include leadership and coordination of regional water supply planning and management activities – for surface water as well as groundwater – in the 15-county region.

- Membership of the Board of Directors and its Technical Advisors should be broadened to include the type of stakeholder and geographical diversity represented on the Regional Water Supply Planning Committee.

- The Mahomet Aquifer Consortium should establish a continuous process and structure for regional water supply planning and management to implement a regional plan, including an appropriate committee structure.

- Engage in a continuous process of regional water supply planning and management and implement a regional plan.

- Broader participation in Members' meetings should be encouraged and meetings rotated throughout the region.

- To be effective, the Mahomet Aquifer Consortium will need a permanent staff and appropriate financial and operating resources.

While encouraging the Mahomet Aquifer Consortium to identify its own means to implement the regional plan, the Committee recommends two strategies to the Mahomet Aquifer Consortium, the Illinois Department of Natural Resources, and the University of Illinois at Urbana-Champaign.

- As a critical early step, the Mahomet Aquifer Consortium is encouraged to identify its resource needs and to take action to secure them. Stable and adequate funding from state government and local entities is needed to support efforts to implement the regional plan. Federal funds also should be pursued as a possible source.

- The University of Illinois at Urbana-Champaign is encouraged to consolidate and strengthen its important role as a partner in regional water supply planning and management.

KEY FINDINGS

- Demand for water and water withdrawals will increase. Using different combinations of assumptions, a plausible range of increases in total surface water and groundwater withdrawals in the region by 2050 (excluding electric power generation) is about 220 to 420 mgd more than modeled, normal-weather withdrawals of about 340 mgd in 2005. This range of increase would be about 100 to 300 mgd above 2005 reported and estimated withdrawals of about 460 mgd, which was a drought year in parts of the region. Withdrawals for electric power generation (the large majority of which are non-consumptive) could decrease by 7 percent to about 1,218 mgd or increase by 2 percent to about 1,342 mgd.

- Under normal weather conditions, groundwater withdrawals from the Mahomet Aquifer are reported to increase from about 220 mgd in 2005 to 260 mgd in the Less Resource Intensive (LRI) scenario in 2050, 280 mgd in the Baseline (BL) scenario, and 300 mgd in the More Resource Intensive (MRI) scenario. Withdrawals would be much higher in a drought year, especially for irrigation, and would increase with some climate change scenarios.

- An extreme climate scenario for water supplies would be a decrease in mean annual precipitation, a recurrence of severe multi-year droughts, and an increase in temperature. The probability of such a scenario occurring is unknown. However, severe multi-year droughts are likely to recur and pose a great threat to water availability and some water supplies in the region, especially those from surface waters and shallow aquifers. Building capacity to be prepared for severe multi-year droughts also would provide protection against the adverse impacts of possible climate change.

- Even during periods of drought and with possible climate change, there is sufficient water in the region to meet the future water demand scenarios considered, provided that adequate infrastructure and drought preparedness plans are developed and implemented and economic and environmental costs can be tolerated.

- Withdrawing water from rivers and aquifers, storing, treating, distributing water, and discharging waste water have social and economic benefits and economic and environmental

costs. Determining how much water is to be withdrawn from different sources necessitates balancing and weighing benefits against costs and risks.

- Reservoirs are the prime sources of water supply for Decatur, Danville, Springfield and Bloomington. Bloomington's current use is about 12 mgd and the 90 percent estimate of yield in a drought-of-record is 11.0 mgd. Decatur currently uses about 37 mgd and the 90 percent yield estimate is 34.6 mgd. Springfield uses about 32 mgd and its 90 percent yield estimate is 23.4 mgd. Due to increasing water demand and increasing sedimentation, all three cities will have increasing water supply deficits in the future unless additional sources of supply are developed and/or demand is reduced. By 2050, Danville will have a water supply deficit with the Baseline water demand scenario and a greater deficit with the More Resource Intensive water demand scenario.

- Withdrawing sufficient water from aquifers to meet demands to 2050 results in increasing drawdown of heads in wells finished in the aquifers, expanding cones of depression, a reversal of groundwater flow in some areas, and reduced baseflow in streams. The bull's eye of concern is in Champaign County, where drawdown could lower head in some wells to less than 50 feet above the top of the Mahomet Aquifer in some scenarios. Some shallow aquifers increasingly are dewatered locally, wells finished in these aquifers go dry, and water levels in other wells drop below the pumps and will require pumps to be lowered to sustain yields.

- The possibility of a slight increase in water withdrawals for electric power generation does not appear to create a problem, although projections of future electricity demand and associated water withdrawals are highly uncertain.

- The concept of the sustainability of water supplies is not uniformly or comprehensively integrated in water supply management plans in the region.

- Water supplies in East-Central Illinois are planned and managed largely in piecemeal manner by individual managers and local and sub-regional authorities. There is no planning and management process or structure for comprehensive water supply planning and management across the region.

- The University of Illinois at Urbana-Champaign, through the Illinois State Water Survey, Illinois State Geological Survey and other departments, provides valuable technical assistance for water supply planning and management

- The public and many local decision makers have limited understanding of water supply issues and often are misinformed.

Based on the above findings, the Committee concludes that improvements in regional water supply planning and management are needed to continue to provide benefits and to reduce costs and risks for current and future residents of East-Central Illinois, those outside the region who depend on goods and services produced in the region, and the environment.

CONCLUSIONS

Many of the building blocks of sound water supply planning and management already are in place. We need to strengthen the blocks, add a few new ones, and reinforce the cement between the blocks. Adding planning and management at the regional level is the cement that can improve communication and coordination among stakeholders. The Committee recommends to today's stakeholders a regional water supply plan that will allow them to realize the potentials of the water resources in the region, shape their own future, and provide a worthy inheritance for future generations.

In the absence of improved water supply planning and management, the Committee believes that future generations in the region face increased threats of water conflicts, crisis management, degradation of the environment, and threats to public welfare and economic development. These threats can be avoided or minimized by implementing the recommended regional plan.

The Foreword to the 1967 state water plan began with the assertive statement that "Illinois must plan the long-range development of its water resources, if the state is to meet the needs of the future." Forty two years later, that challenge remains.

A plan with no new laws or regulations and voluntary participation is perhaps more challenging to implement than having to comply with new laws or regulations. Self-governance requires stakeholders' participation and all to maintain open-minded, informed, just views of our personal, community and common welfare.