

PREFACE

Why water? The Indiana Chamber of Commerce has been asked the same question over the years regarding education and a few other topics.

The answer: Water, like the students in school who go on to become company leaders and comprise the future workforce, is a jobs and economic development issue. In Indiana, we build things. It takes plentiful supplies of water to do so. In Indiana, we want to continue to grow and thrive. Water is one of the necessary elements to support that growth.

Our state has an economic advantage right now with its water availability. Droughts, however, do happen – remember 2012 – and without proper management our water strength will become a liability.

The Indiana Chamber has called for a statewide water resource plan for a number of years. The task force that formed our *Indiana Vision 2025* economic blueprint identified it as one of the key goals in the plan. The time is now to begin what will be a long, but important, process to “ensure adequate fresh water for citizens and businesses.”

Thank you to Jack Wittman, Ph.D., of INTERA for his expertise and passion in preparing this in-depth report. Our appreciation goes to the advisory council members, listed on the first page, who shared their insights and dedication to this topic.

It will take a team effort going forward to achieve this much-needed statewide water resource plan. We hope this report will serve as a playbook in that critical game.

Indiana Vision 2025: www.indianachamber.com/2025

Water resource study (including county-by-county data):
www.indianachamber.com/water


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EXECUTIVE SUMMARY

Water is a valuable resource and Indiana, unlike many areas of the country, is fortunate to have abundant water resources. The state has the highest fraction (in the country) of its economy that requires abundant water supplies (Rosaen, 2014). We have built an economy that expects water when it needs it. While current high capacity users are accessing the resource, local shortages have and will continue to occur. Today, only with conservation and proper management, can the state's rivers, streams, lakes, and aquifers sustain current water needs. Future demands will increase with economic growth and industrial development, increasing the need for more formal and technical methods to meet our water supply needs.

Just as water supplies are based on natural conditions that vary from place to place, the demands for water fluctuate throughout a given year and are different between hydrologic basins. This report provides lawmakers, water consumers, and all Hoosiers with useful data that can guide the development of new laws to help manage critical resources and preserve and protect the many water assets of Indiana.

A NOTE TO THE READER:

This document is not a statewide water plan, but rather a background report that provides a basis for developing a plan. The work described here goes beyond data collection about water supplies and demands to include a survey of other states and the approaches they are using to address the emerging issues of water supply planning. Specific recommendations are offered that can help propel Indiana along a path toward a sustainable water future.

Recognizing that water and its many uses – including municipal, industrial, agricultural, and recreational – are critical to economic growth and sustainability, several states are already implementing plans that integrate the management of this resource on a statewide basis. The level of investment in these efforts reflects the specific needs of the state and the level of commitment to water management. States like Texas and Florida spend in excess of \$500 million each year on water supply planning, while others like Minnesota and Oklahoma spend around \$50 million each year on similar programs. Developing and maintaining a vibrant economy in Indiana means investing in the state's water infrastructure. An evaluation of the scope and magnitude of similar programs around the country and an analysis of available hydrologic data in Indiana suggests that water planning and analysis in the state will require substantial annual investments. If water is viewed as a priority, Indiana should begin drafting a comprehensive water plan. This report is a first step in that process.



Overview of Key Findings

The analysis of hydrologic data in Indiana results in the following key findings with respect to water supply, demand, and the planning process needed to effectively manage the state's water resources.

SUPPLY

North of the Wabash River, Water is Relatively Abundant

In and around the Kankakee River Basin in the northern part of the state, there are thick regional aquifers and reliable, drought-resistant streams. In general, this part of the state has relatively abundant supplies to support expected growth in irrigation and population. However, the recent increases in seasonal irrigation make collecting data on these aquifers and streams important to: 1) ensure future supply reliability; 2) manage the impacts on stream depletion; and 3) determine the sustainable uses in these basins. Since the Great Lakes Compact defines water availability and management in the Great Lakes Basin, it is not included as a factor in this analysis.

Central Indiana has Marginal Supplies

The water supply in Central Indiana is diverse. It includes diversions from the West Fork of the White River, storage in water supply reservoirs in tributary streams, and groundwater from shallow and deep aquifers. The diversification of the water portfolio reflects the fact that there is no single solution to water supply and growth in this portion of the state. Although utilities have identified the need and taken initial steps, supplies are limited and, without new sources, economic growth is at risk.

South of Indianapolis, Supplies are Only Locally Available

In Southern Indiana, local water resources are not always able to meet anticipated future public water-supply needs. Given that this portion of the state is poised for economic growth, it makes sense to provide incentives for developing more diversified supplies for these communities. This may mean targeting distant water supplies, including the large U.S. Army Corps of Engineer (USACE) reservoirs built in the 1960s, as sources that can supplement small community systems and accommodate growth.

DEMAND

Groundwater Use is Increasing

While industrial use, power generation, and mining operations continue to pump water from rivers and streams, over the last decade groundwater

withdrawal has increased more rapidly than surface water diversions. The aquifers of the state are becoming increasingly important as a means of satisfying seasonal demands while controlling costs of treatment and conveyance. The water use data reported to the Indiana Department of Natural Resources (IDNR) suggests that this trend will continue if the climate becomes less stable and regional shortages develop.

Irrigation is Expanding in Northern Indiana

Irrigation of row crops continues to be the fastest growing sector of water use in the state, even in some areas that have declining populations. This reflects the significant returns on investment provided by irrigation (primarily new high-capacity wells) and the increasing value of insurance against dry periods. Because most areas that are dominated by irrigation water use also have more prolific aquifers and more reliable water supplies, the primary impacts that require analysis are the seasonal rebound of aquifers from summer pumping, impacts on municipal or industrial neighbors, irrigation well spacing, and the need for additional groundwater monitoring. Actual irrigation water use, rather than numbers of wells, fluctuates according to seasonal rainfall. While additional wells may be installed in many locations, their use increases when there is a deficit of precipitation. This seasonality and annual variability are distinct characteristics of irrigation pumping relative to other users in a basin.

Public Supply Growth Drives Demand in Central Indiana

The population in Central Indiana is growing rapidly, and estimates of future demand suggest another 50 million gallons per day (MGD) of supply will be required to meet the needs of the region by 2050. (Only one third of the water delivered in a public supply system is not returned through the municipal wastewater discharge, National Academy of Science, 2012). As the water utilities in the middle of the state consider new well fields to satisfy growth, conservation and demand management will become standard policy in meeting seasonal peak demand for water. Limited groundwater and relatively low flows in streams limit available options. This part of the state will need to build new surface water storage capable of satisfying future demands or develop well fields in other watersheds. The latter alternative will require that water from distant well fields be piped in to meet the demands of population growth. Before using either alternative to meet the public water supply needs of a metropolitan area, it is important to determine the magnitude of consequences to downstream water users. It is equally important to understand the long-term impacts and risks of any proposed solution before making such an important investment.

Infrastructure Investment: Strategic, Not Opportunistic

The Interstate 69 expansion in Southern Indiana, along with continued funding of the Crane Division of the Naval Surface Warfare Center (Crane NSWC), creates a long-term economic growth opportunity in this part of the state. This growth depends, in part, on the availability of safe and reliable water supplies. Along I-69, water is either abundant or absent. There are few aquifers or perennial streams present immediately south of Bloomington. Further south, however, water is available from along the White and Wabash rivers. Continued development of these investment corridors means ensuring that businesses have access to adequate supplies of water. When new infrastructure is planned, water supply should be an important consideration in the siting process.

Power and Industrial Use May Locally Increase and Continue to Dominate Other Uses Statewide

Throughout the state, the largest surface water withdrawals are not increasing but they may add capacity as opportunities open for new development. Thermoelectric power generators have become more conservative as they switch from coal- to gas-powered plants and develop more efficient designs and operational methods for new facilities. While statewide use is less than prior years, new plants continue to be built. To avoid conflict, new generating stations are often located along the largest rivers to support the cooling water needs of the system. In previous decades industrial water use has steadily declined, and the use of surface water is correspondingly falling. New developments could shift this trend even though estimates of future use account for no increase in these sectors.

PLANNING

Conflicts Can Be Avoided

During the drought of 2012, domestic well owners in some locations sought assistance from IDNR to mitigate problems with their wells (e.g., dry wells or significantly declining water levels). In some cases, high capacity aquifer withdrawals could have been designed or managed to reduce well interference and eliminate impacts. Where these conflicts occur, the uncertainties associated with water supplies have negative impacts on the commercial sector, which relies on these supplies to manufacture products. For the most part, unanticipated water shortages can be avoided through better data collection on the aquifers, using regional water supply models of the hydrologic system, and improved planning that is designed to anticipate the effects of combined withdrawals.

Watersheds are Natural Planning Areas

The water supply planning process includes coordinating, among the various users, the management of limited water resources during times of shortage. By defining regions within a state, which generally coincide with major watershed boundaries, plans can be developed that represent regional water user interests and economic conditions. These regional plans can then be integrated into a comprehensive state water plan. There is currently no coordination of water use in Indiana's major river watersheds and, while implementing a regional/state planning process will require establishing rules and procedures, the cooperation among water users that this process establishes will enhance resource utilization and improve water supply reliability throughout the state.

Development Can Produce Jobs Near Existing Reservoirs


The Brookville Reservoir was built by USACE in the early 1970s for flood control. Like many of Indiana's other reservoirs, the stored water in the Brookville Reservoir, absent other infrastructure and opportunity, is inadequate to attract new investment. Through proactive planning and the systematic renegotiation of priority of use and other issues with USACE, these reservoirs represent development opportunities. Establishing high-water-demand facilities such as bottling plants, breweries, and food processing operations in close proximity to some of Indiana's larger reservoirs offers the potential to add jobs through the use of these available and sustainable natural resources.

Instream Flows Should Be Understood

Generally, the term "instream flows" is defined as the amount of water set aside in a stream or river to ensure downstream environmental, social, and economic benefits are met. Maintaining adequate stream flows can contribute to the basic ecological integrity of the aquatic environment, support endangered species, and facilitate interstate compact compliance. Tourism and recreation also rely heavily on dependable stream flows. While there are definite benefits to maintaining stream flows in some streams and rivers, there are likewise valid concerns to consider, such as potential impacts to consumptive users due to reduced water availability, changes in the location of that availability, and related economic development implications. Regional water planning serves to prioritize instream flows among all other uses.

Conservation Plans are a Necessary Management Tool

Unless the primary source is a drought resistant supply (e.g., the Ohio River), establishing and implementing a conservation plan should be a normal part of every water utility's operations. Implementing conservation plans allows communities to reduce the cost of additional



infrastructure and saves customers money. Although these plans may not be able to provide protection from a chronic shortage, they are ideal for infrequent but expected dry spells that have occurred previously and will occur in the future.

Recommendations

While the Indiana Utility Regulatory Commission (IURC), the state legislature, IDNR, and the Governor's Water Shortage Task Force (Water Shortage Task Force, 2009) have all made useful recommendations over the past several years to modernize water supply planning in Indiana, these recommendations have been somewhat general in nature. This report identifies the geographic location of major water resources and future demands within the state to provide a new level of specificity to the water planning tasks that lie ahead. The recommendations that follow, based on the findings summarized above as well as the common elements of other state plans and processes, reflect the steps which need to be implemented within the next decade to set the appropriate course for effective water resource planning in Indiana.

CREATE AWARENESS ABOUT THE NEED FOR WATER SUPPLY PLANNING

Beyond flood conditions, Indiana has never before needed to actively manage water resources. That is no longer true. Changes in water use and natural limits on availability need to be explained to the public. The only way for Indiana to grow economically and demographically is to manage the critical resource that supports industry, power generators, ecosystems, agriculture, and drinking water supplies.

Failure to properly plan for increasing demands in growing parts of the state may create significant water supply challenges. Educating farmers, local government, conservation, and business leaders on the need for responsible water planning and use is a necessary step to long-term water security in Indiana.

Begin Public Outreach

The most important aspect of the water resource planning process is interaction with the public and high-capacity water users. Water supply planning succeeds when people at the local level – irrigators, public water supply operators, power plant operators, industrial water users, gravel and aggregate processors, and coal mine operators – all understand the many uses and long-term value of our water resources. These key stakeholders are generally informed about the local water resource issues. Other states have found that it takes up to three years to understand and

document how each region of the state differs in both supply and use. While the public process proceeds, initial analyses could be done to define the state planning regions and develop regional groundwater and surface water simulation tools to determine water availability. This is an investment necessary to define local needs and provide information that will guide the work. Outreach is critical to determining the most practical processes and geographies needed to manage technical data and models.

Conduct Statewide and Regional/Local Outreach

It is important to remind the public of the values that underlie the commitment of diverse stakeholders and government to responsible water resource planning. This could be initiated with a statewide symposium to focus on the importance of water to our economy and to listen to the many perspectives of forward-thinking water users. Local and regional meetings can be held to describe the water resources in each region and to record different concerns and questions that are offered by the public. These local and regional meetings should be professionally coordinated and conducted by a credible organization (e.g., a university) to ensure that information gathered is used to guide the decision-making processes embedded in planning.


CREATE CAPACITY TO COORDINATE EFFORTS

Establish Communication and Accountability Framework

To ensure long-term success, one state-level entity needs to be designated to lead planning efforts of the agencies and universities. The General Assembly should pass legislation that ensures agencies and universities work toward a common goal for water resource planning. There are many state and federal agencies in Indiana that currently play a role in water management. IDNR, IDEM, IURC, IGS, USGS, and state universities all collect data or implement programs that in some way or another protect our streams and aquifers. Collectively, the state relies on these agencies to manage a resource, but without coordination or focus. Sadly, when everyone is responsible, no one is responsible. Given the imperatives of growth, Indiana needs a dedicated team with the technical capacity to support local planning while providing rules, models and data for the broader regional planning process.

Fund Water Research

In as much as Indiana needs to develop new ways to manage this precious resource, it needs to fund research in water resources engineering and policy development. Establishing and using a water



planning program to enhance water security means investing in the research needed to understand the state's particular hydrologic systems. Decisions that are being made today, such as how to decide whether to build the Mounds Reservoir upstream of Indianapolis, will impact the availability of water for generations to come. The data, methods, and tools created and developed through research should support the state to help it make the best possible decisions that both protect and promote our water resources.

CREATE A ROBUST SYSTEM FOR MONITORING WATER RESOURCES

Monitor Groundwater Availability

There is little information on total available groundwater in the state. Public and private efforts have been made to describe aquifer dimensions, water levels, well yields and recharge. However, the few clusters of monitoring wells in the aquifers of the state make it impossible to track trends, determine impacts, and provide the validation needed to avoid conflicts among users. An expanded network of groundwater monitoring wells should be installed around the state, beginning with areas of greatest concern, to collect aquifer data to optimize uses and increase short and long-term dependable yields.

Regularly Analyze Low Flow In Streams

The USGS has historically been funded by IDNR and IDEM to observe, report, calculate, and estimate low flow statistics of Indiana rivers and streams. While this information is needed to estimate surface water availability and drought yield, the funding for this work has been sporadic and unreliable. By monitoring flow trends, signals of drought will not be missed. Low-flow analysis can be extended to estimate storage properties of aquifers that discharge into gaged streams. Tracking how low-flow varies over time and within a basin would allow the state to calibrate recharge models and use engineering techniques to better manage supplies during shortage. This would leverage existing cooperative agreements for data collected between USGS and the state.

CREATE A STANDARDIZED SYSTEM FOR DATA ANALYSIS

Evaluate Aquifer Sustainability and Yield

Currently, there is no standardized technical framework for determining and describing the properties of aquifers in Indiana. IDNR, IGS, IDEM, and USGS all maintain data on water levels, flows, and hydrologic properties of aquifers. By developing water availability models for the most heavily used aquifers and river basins in the state, decisions can be made based on integrated assessments of the effects of all water uses. In addition to bringing together the hydrologic data collected by different agencies, the state can use this information to develop basin-scale estimates of aquifer

recharge that will inform water use and planning. A feasibility assessment of riverbank filtration well fields along large rivers in the state could also be performed. These well fields offer the potential to increase water yield while reducing some of the negative impacts associated with other types of large well fields.

CREATE SYSTEMS TO EFFECTIVELY MANAGE WATER RESOURCE

Optimize Reservoir Management


There are two different problems associated with reservoir management in Indiana: 1) each reservoir has a different priority of use that reflects the funding and mandate when it was built, and 2) operation of the reservoirs (outside of the Army Corps reservoirs) does not consider downstream uses. This means that a reservoir originally constructed 50 years ago for flood control is operated today in a way that reflects the original mission, regardless of whether the reservoir could be an important supplement to water supplies in some part of the state. Multiple reservoirs within a basin can be operated with an integrated understanding of the needs of all water users. The development and application of hydraulic models, using software codes such as RiverWare or OASIS, enable reservoir operators to manage drought by simulating and optimizing flows within the basin. Properly applied, these models can provide the information needed to make drought plans effective and practical.

Develop Water Demand Forecasts By Drainage Basin

As water resource planning begins across the state, detailed water demand forecasts are needed to account for the regional factors that affect growth and water use. Modeling future changes in demand for the largest surface water users (energy and industrial supply) will be an important part of planning in the southern portion of Indiana. Water demand forecasts provide an opportunity to use the planning process to educate the public about the effect of conservation while providing time frames for engineering and planning studies to fill supply gaps. Understanding the degree to which future demand is affected by prices or population or other economic factors will make predictions of future use more robust during planning. Water demand forecasts ideally reflect the interests of the communities being served and are one example of "home rule."

ALLOW THREE YEARS TO PREPARE FOR IMPLEMENTATION

As the state moves forward with developing a comprehensive water plan, someone needs to lead the way. The only way to evaluate proposals for interbasin transfers, infrastructure development and



maintenance, regulatory requirements, priority among different users, responsibility for impacts to neighbors, impacts to ecological flows, as well as public health and safety, is with the technical support provided by an appropriate level of oversight (i.e. state, regional and/or local) and a stable funding mechanism. Planning requires a responsible entity with appropriate levels of authority to provide the confidence needed. The work of an existing agency, organization or university could be expanded to fill this role. It is also possible that the General Assembly and/or the Governor could establish a new entity that has this responsibility. Some tasks may fall to regional or local planning teams put in place to manage their water resources. Whatever structure is created, it will be necessary that the direction of the state and the responsibility of the various parties are articulated in a statewide plan that is supported by the Governor and the General Assembly.