Middle Illinois Water Supply Planning

Phase II: Recommendations for a Sustainable Water Future

June 2021

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

North Central Illinois Council of Governments

ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

TRI-COUNTY REGIONAL PLANNING COMMISSION
PEORIA WOODFORD TAZEWELL

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Executive Summary

Planning for water quantity is necessary to understand the existing conditions, how different people and processes fit in the larger realm of water use, and which water needs and issues arise. While this information exists regionwide, it is not pieced together in a cohesive way to understand the region's water supply picture. Therefore, this report seeks to outline the previous water supply planning strategies, illustrate existing water quantity issues, and propose a set of goals and recommendations for the region to strive towards.

This document examines the Middle Illinois Basin, which comprises LaSalle, Livingston, Marshall, Peoria, Putnam, Stark, and Woodford counties in Central Illinois. This region is one of several throughout the state, split up by the Illinois Department of Natural Resources in response to a 2006 gubernatorial water supply planning directive. This document is Phase II of a three-phased process: Evaluating, Recommending, and Implementing water supply planning.

Between April 2019 and April 2020, the water supply planning team held seven meetings with a variety of presenters, speakers, and experts. These meetings alternated locations between Peoria and Oglesby, Illinois. While all meetings had virtual capabilities, meeting seven served as exclusively virtual due to the COVID-19 pandemic and the resulting stay-at-home order from Illinois' governor. After a brief hiatus, the planning group pivoted the outreach strategies to include individualized interviews with regional stakeholders to tease apart water supply issues. In early 2021, the team interviewed 22 people in 10 different sectors across five counties, the region, and the state.

Then, the planning team categorized the resulting interview responses into "codes," or key themes that emerged throughout the feedback. These codes were then boiled into seven key elements: 1) Infrastructure and Maintenance, 2) Environmental Aspects, 3) People and Planning, 4) Urban Water Management, 5) Agriculture and Rural Issues, 6) Too Much or Not Enough (Water capacity), and 7) Other Regions and Topics.

Further, the planning team transformed these into goals and recommendations, sorted into four themes: Environment and Capacity, Management and Maintenance, Agriculture, and People and Planning. Each theme has two to three goals and three recommendations each. Knowing these, the next phase of water supply planning will involve exploring the implementation process of these goals and recommendations.

Acknowledgements

The very nature of this planning process relies on the collaboration between the planning team, stakeholders, and interested parties. Without a group of dedicated individuals, this document will not hold water, so to speak. The planning team wishes to thank those who attended the water supply meetings, the presenters for those meetings, those who helped find and schedule the meeting locations, and all interested parties who provided feedback.

The planning team is also grateful for the time and effort put forth by the interviewees, who spanned a variety of fields and geographies. Their comments helped shape a significant portion of this document and bolstered this entire water supply planning process. A sincere thanks for those who volunteered their time and efforts to continue this initiative.

Planning Team & Water Supply Experts

Reema Abi-Akar, Tri-County Regional Planning Commission

Michael Bruner, Tri-County Regional Planning Commission

Kevin Lindeman, North Central Illinois Council of Governments

Wes Cattoor, Illinois Department of Natural Resources

Walt Kelly, Illinois State Water Survey

Jason Zhang, Illinois State Water Survey

…and all 22 interviewees in the region![1]

[1] Due to the sensitive or political nature of some interviewees' jobs, they will remain anonymous in this report.

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Acronyms

BMP	Best Management Practice
CDC	U.S. Centers for Disease Control and Prevention
IDNR	Illinois Department of Natural Resources
ISWS	Illinois State Water Survey
IVCC	Illinois Valley Community College (Oglesby, Illinois)
NCICG	North Central Illinois Council of Governments
OOS	Out of scope
SWCD	Soil and Water Conservation District
TCRPC	Tri-County Regional Planning Commission

Introduction

Since water is such a fundamental part of life, it can be easy to take it for granted—especially in Central Illinois, which tends to have few water quantity issues when compared to more extreme areas. The climate is not arid like the Southwestern United States or overly wet like the coastal areas. However, times of normalcy are in fact the ideal time to plan for water supply because there is no pressure to make urgent changes immediately. Planners can be more deliberate about understanding local water issues, collaborating with stakeholders, and creating a strategy for the future.

Therefore, in 2006, Executive Order 1 from Illinois Governor Rod Blagojevich "develop[ed] a comprehensive, statewide water supply planning and management strategy,"[i] overseen by the Illinois Department of Natural Resources (IDNR). The IDNR then split the state into several regions, as seen in **Figure 1**.

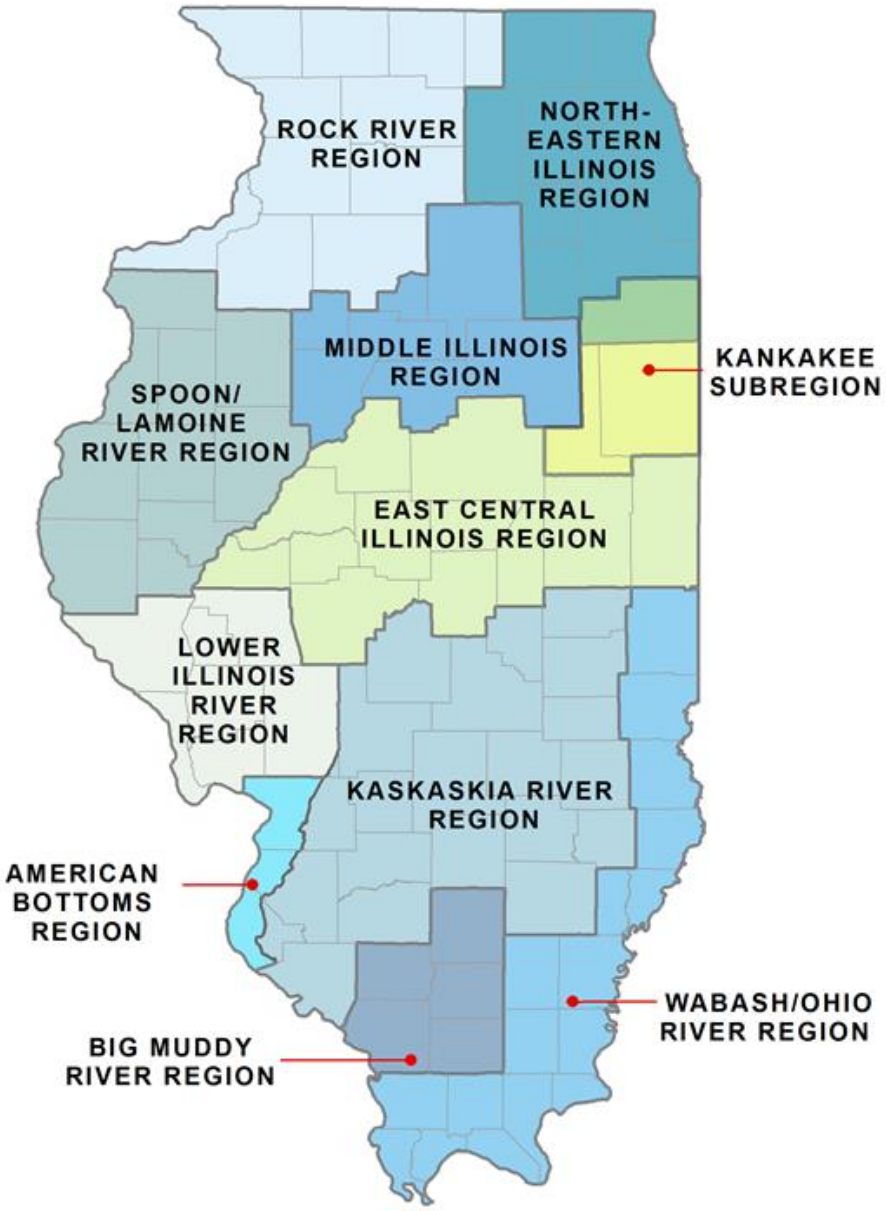

Figure 1. The water supply planning regions throughout the state.[ii]

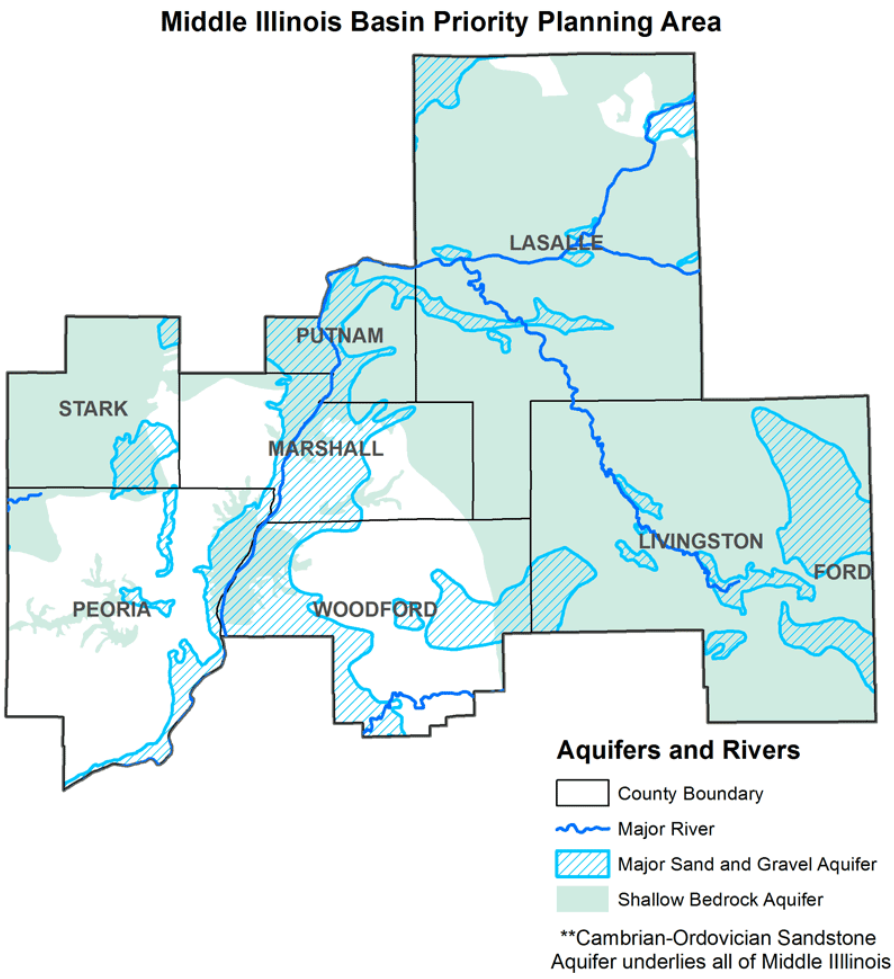

Figure 2. A close-up view of the Middle Illinois Region water supply region.[iii]

This report refers to the Middle Illinois Region, shown more closely in **Figure 2**. This region is made up of seven counties: LaSalle, Livingston, Marshall, Peoria, Putnam, Stark, and Woodford. The Middle Illinois Region planning team is made up of Tri-County Regional Planning Commission (TCRPC) and the North Central Illinois Council of Governments (NCICG), with technical assistance from the IDNR and the Illinois State Water Survey (ISWS).

Figure 3. Three phases of water supply planning. This document is Phase II.

This is Part II in a three-part process surrounding water supply planning in the Middle Illinois Region (see **Figure 3**). Part one, Evaluation[2], provided a baseline to understand the issues, stakeholders, and general atmosphere surrounding water quantity across seven counties. The initial process began in 2015, when Tri-County received IDNR funding to start the initiative; however, the work was cut short due to statewide funding challenges. The funding was brought back in 2017-2018, and the full Phase I process was completed in June 2018. During this phase, the planning team held meetings, distributed a survey, and collected feedback from stakeholders and the public.

Participating stakeholders included a variety of sectors, including rural water districts, water authorities, electric generating utilities, environment, agriculture, municipalities, counties, and the public. The resulting data consisted of survey responses and stakeholder feedback from meetings. The planning team then sorted these into codes, or overlying themes, through qualitative analysis methods to reveal the most pressing topics in water supply planning. The most frequently mentioned codes were: Water quality, industry and development, and infrastructure and engineering.

While the Outreach report provided a solid introduction to water supply planning in the Middle Illinois Region, it served as a jumping off point for future work. As such, this Recommendations document built on this baseline to continue the larger planning process. This report illustrates the planning team's extended meeting schedule, further outreach, and pointed stakeholder collaboration to create a list of water supply goals and recommendations.

Finally, this planning process will end with Phase III, which is the Implementation phase. Using the outreach from Phase I and the recommendations from this phase, Phase II, the Implementation planning process will focus on the "how." It will explore the means of achieving the goals and recommendations in the future. Meanwhile, the rest of this document will explore those goals.

[2] Also called the Overview in this document.

Outreach Methods and Timeline

Because this phase of this project spanned two years, from July 2019 to late June 2021, the planning team utilized a variety of methods to conduct outreach and education in the region regarding water supply. Before the COVID-19 pandemic, a mix of in-person, group meetings meshed with virtual meeting capabilities. These virtual elements proved to be imperative during the COVID-19 pandemic. During this time, the planning team took a hiatus to rethink the strategies to collect water supply information from stakeholders. These new strategies of individualized virtual interviews proved to be an effective and attainable way to continue the planning work.

Water Supply Meetings

Throughout 2019 and early 2020, Tri-County's planning team held seven water supply meetings. These meetings served as multi-functional spaces to educate the community about water supply issues, introduce them to topics, give speakers a chance to present water perspectives, and request feedback on water supply planning. Table 1. List of meetings, dates, and presenters**Table 1** outlines the meeting dates, topics, and speakers:

#	Meeting date & location	Meeting topic	Speaker(s)	Organization(s)
1	April 30, 2019 (Peoria)	Kickoff	Reema Abi-Akar; Wes Cattoor; Walt Kelly, Daniel Abrams, Jason Zhang	TCRPC, IDNR, ISWS
2	June 25, 2019 (Oglesby)	Water Use Law & Regulations: Water Use Priorities	Gary Clark	Retired civil engineer
3	August 20, 2019 (Peoria)	Water and Power	Beckie Maddox	Exelon
4	October 22, 2019 (Oglesby)	Climate Change	Trent Ford	Illinois State Climatologist, ISWS
5	January 28, 2020 (Peoria)	Water Recharge Rates + Groundwater Supply & Demand	Daniel Abrams, Devin Mannix, Allan Jones	ISWS
6	February 18, 2020 (Oglesby)	Drought	Trent Ford	ISWS
7	April 21, 2020 (Virtual)	Low Flow	Jason Zhang	ISWS

Table 1. List of meetings, dates, and presenters.

TCRPC = Tri-County Regional Planning Commission
IDNR = Illinois Department of Natural Resources
ISWS = Illinois State Water Survey

The meetings alternated between Peoria, where they were held in a meeting room adjacent to Tri-County's office, and Oglesby, where meetings took place in a classroom at Illinois Valley Community College (IVCC). All meetings had both an in-person and a virtual element, except for Meeting 7, Low Flow, which was exclusively virtual due to the governor's Stay-At-Home order associated with the COVID-19 pandemic.

COVID-19 Pivot

On March 20, 2020, Illinois Governor J.B. Pritzker issued a Stay-At-Home executive order in response to the COVID-19 pandemic. While this did not prevent the water supply planning team from hosting the April 21, 2020 meeting virtually—and in fact, this group had a slight advantage, since these meetings had always been partially virtual—it did prompt a pause in the water supply planning process.

At that point, TCRPC extended the funding deadline through the IDNR by one year from June 30, 2020 to June 30, 2021. This gave extra time for the TCRPC planning team to explore a more effective means of public participation and outreach all while maintaining the US Centers for Disease Control and Prevention (CDC) guidelines of limited to no in-person gatherings (illustrated in **Figure 4**).

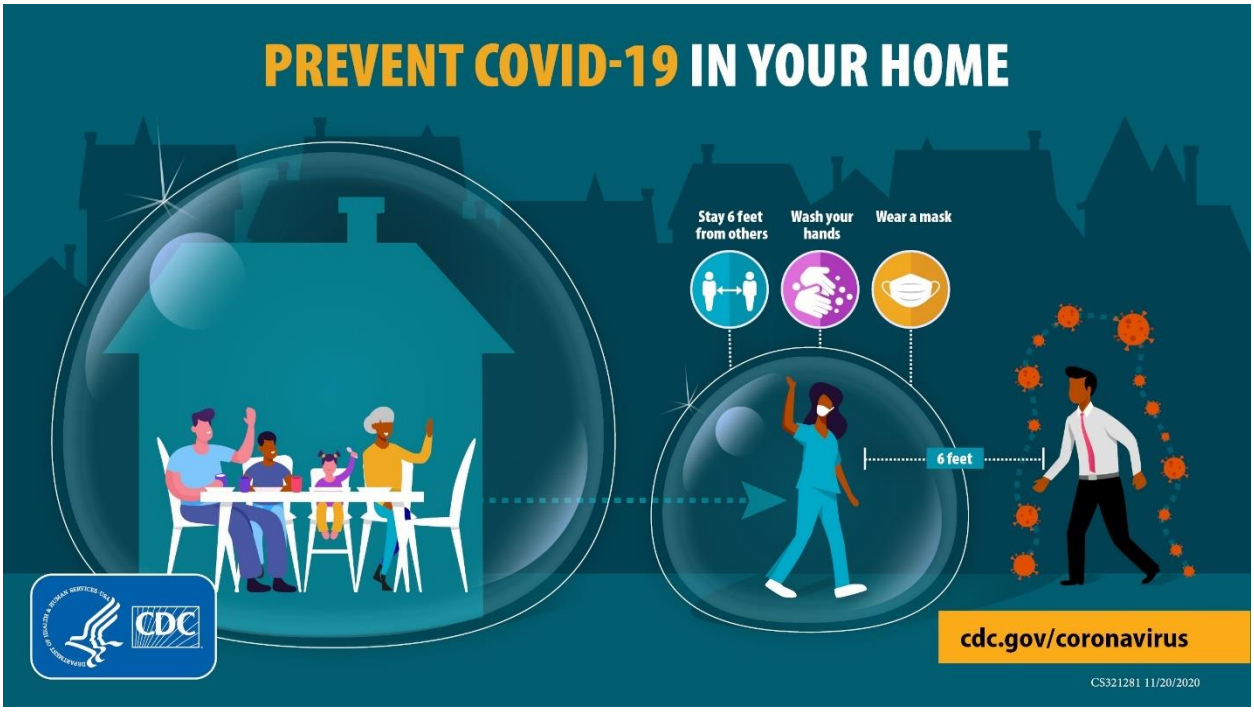

Figure 4. In early to mid-2020, the CDC recommended people to stay home to stop the spread of COVID-19.[iv]

Rethinking with Interviews

With the goal of pinpointing water supply recommendations, the planning team elected to interview select stakeholders rather than attempting to hold more virtual meetings. This shifted the outreach platform from education, which the past meetings had largely provided with presentations, to inquiry, which the interviews involved through pointed exploratory questions.

The goal of this interview method was to gather more pertinent, detailed information about water supply issues from select people. Doing so required a wider planning core group, so at this point, TCRPC reached out to North Central Illinois Council of Governments (NCICG), with whom TCRPC had worked in the past for this water supply project, to assist in identifying the stakeholders and conducting the interviews.

NCICG and TCRPC gathered a lengthy stakeholder list, narrowed it down to the most applicable individuals, and contacted them. Generally, TCRPC focused on the Peoria and Woodford county area, while NCICG's pool included Marshall, Stark, LaSalle, Livingston, and Putnam counties, though the lines blurred occasionally. These geographic boundaries aligned well with each regional entity's jurisdictions. Both TCRPC and NCICG interviewees utilized the same interview questions, which can be found in **Figure 5**.

1. From your perspective, what are the greatest water supply quantity issues or concerns in your area?
2. Where are these issues or concerns occurring?
3. Why do you think these issues or concerns are occurring?
4. How has the water supply issue(s) affected your operation or community?
5. If these issues or concerns no longer existed, what would be the benefits for the surrounding area?
6. How could these issues be solved or prevented in the future?
7. Do you have any other comments?

Figure 5. List of interview questions regarding water supply planning.

Ultimately, the planning team interviewed 22 individuals from 22 different organizations or entities. These included public, private, and nonprofit organizations, as well as members of the community. All interviews took place either by phone or through the GoToMeeting online platform in February and March of 2021.

Due to the nature and sensitivity of some interviewees' jobs, the planning team decided to maintain anonymity among these individuals. Although this limited the information that is shareable in this report, it increased the number of individuals who were willing to be interviewed, so ultimately it created a more positive result with more detailed information that would not have otherwise been included.

Results

The following section outlines the results achieved through each part of the water supply planning process, focusing on the meetings and interviews. The bulk of these results arose from interviewee comments, which are categorized below.

Meetings

Representatives from TCRPC, NCICG, IDNR, and ISWS attended nearly every meeting, putting them in the core group who helped put this planning process together. All meetings except Meeting 7 hovered around eight to nine attendees excluding members of the core planning group—this is counting both virtual and in-person individuals.

The least attended meeting was Meeting 7, which took place in a virtual format amidst the CDC's stay at home order during the COVID-19 pandemic. The most popular meeting by far, with 22 audience members, was Meeting 4, Climate Change, with a presentation by State Climatologist Trent Ford. See the Discussion section for more detail regarding these meetings.

Range of Interviewees

The interview method proved to be especially successful to seek specific feedback from key regional water stakeholders. The following graphs and charts show a profile of the people interviewed for this planning process.

As seen in **Figure 6**, there was nearly an equal split among public and private agencies included in these interviews, with some individuals representing themselves or a nonprofit.

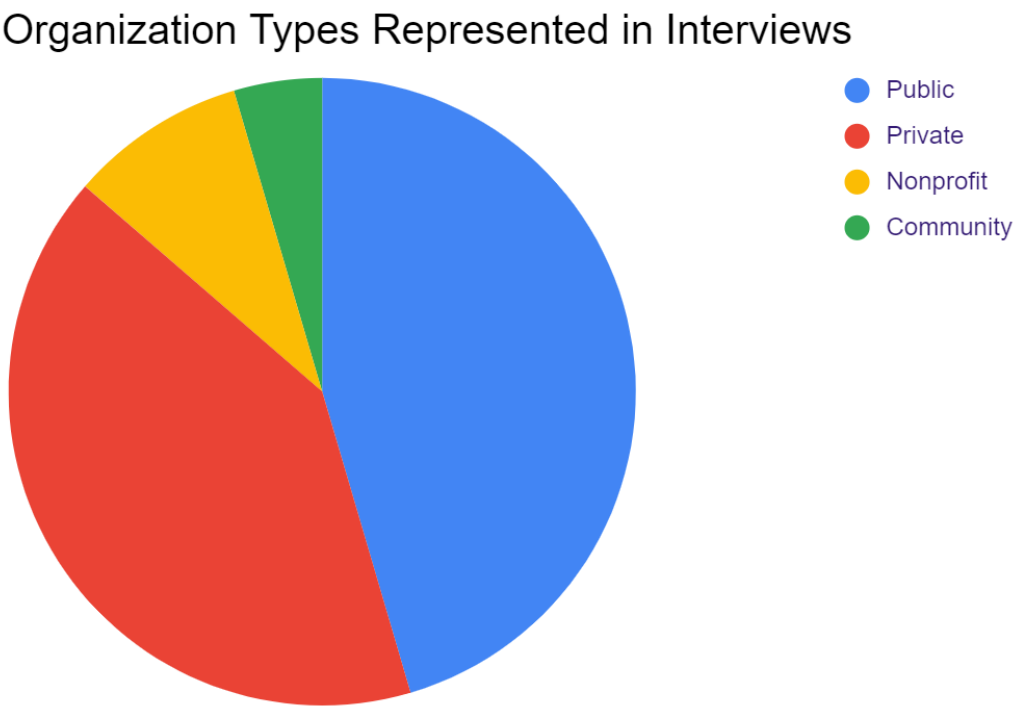

Figure 6. Types of organizations represented in water supply interviews. Note that in this graph, "Public" represents a public agency such as a city, and "Community" indicates an independent member of the public.

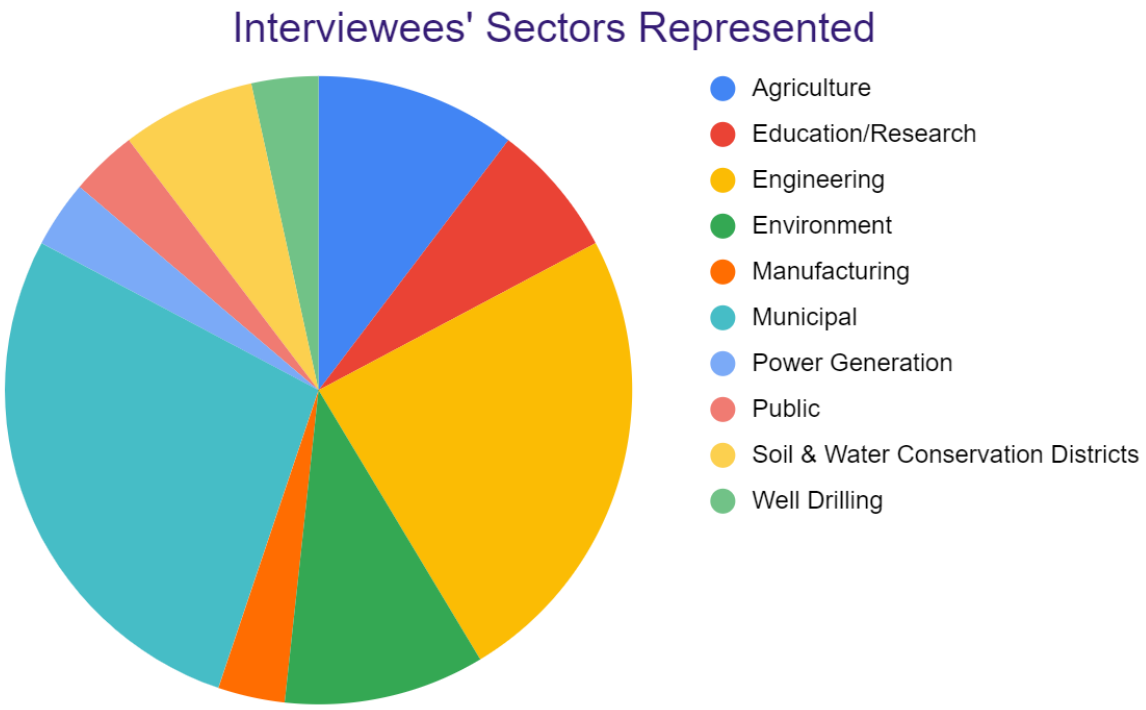

Figure 7. Graph of the variety of sectors represented across interviewees. Note that some individuals fit into more than one sector.

There were 10 sectors which the interviewees represented, shown in **Figure 7**. The majority were in the municipal and/or engineering sectors, followed by agriculture, education/research, and soil and water conservation districts (SWCDs). Some individuals fit in more than one sector, depending on the nature of their job. For example, a private contractor that assisted a city could fall into both the Municipal and Engineering sectors. In some cases, these individuals worked in water-specific fields, such as well drillers, but other interviewees wore many hats involving both water and non-water related work. Finally, there was also a range of expertise levels. Some individuals had worked in the water field for years or even decades; others were not as experienced.

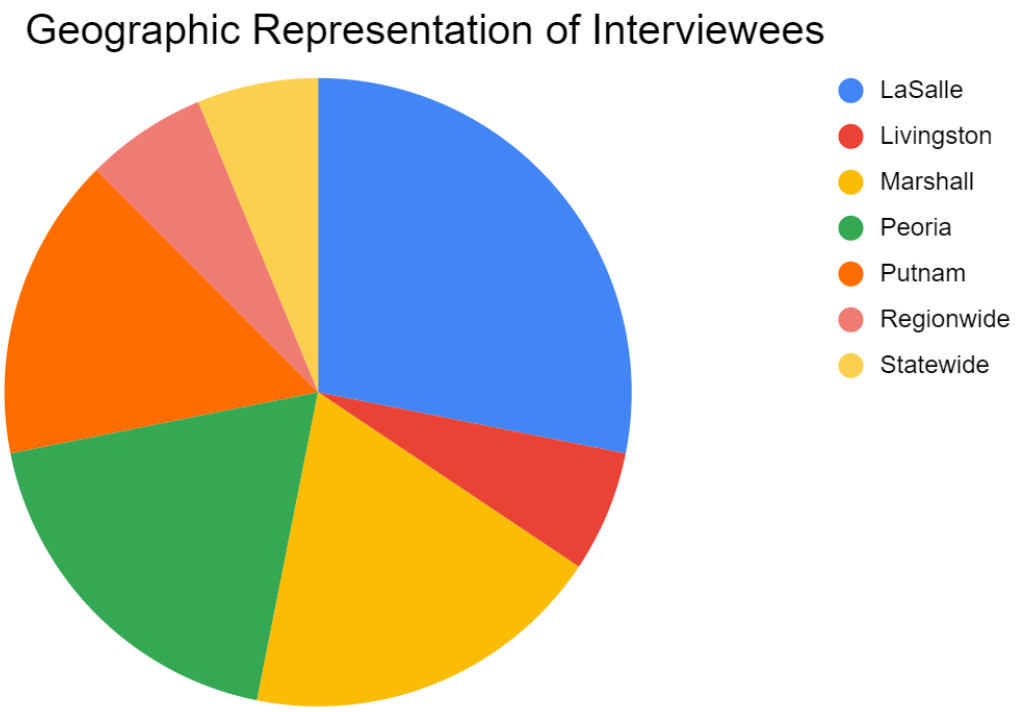

Figure 8. Graph showing the geography that interviewees represent. Note that some interviewees covered more than one county.

Finally, the geographic representation of the interviewees is shown in **Figure 8** shows a that five of the seven counties within the Middle Illinois region were specifically represented through interviewees' professions; however, Woodford and Stark are absent due to an inability to reach interviewees in these areas. Still, there are individuals who represented the entire region or even state to fill in these gaps.

Feedback from Interviewees

The planning team took extensive notes during the interviews and split these notes up into bullet points. Each bullet was considered one singular "comment." The team then conducted the process of "coding," which is a means of categorizing qualitative data into broad "codes," or topics. These topics arise naturally in reading through each comment. Coding is an iterative process that allows commonly mentioned issues to rise to the surface, showing major themes and key issues. This coding process was also conducted for the Middle Illinois water supply Phase I report.

From nearly 500 total comments, 42 codes emerged in the qualitative analysis. The planning team then sorted these into "child codes," then more broadly into "parent codes" – see **Figure 9** for a visual representation of this process.

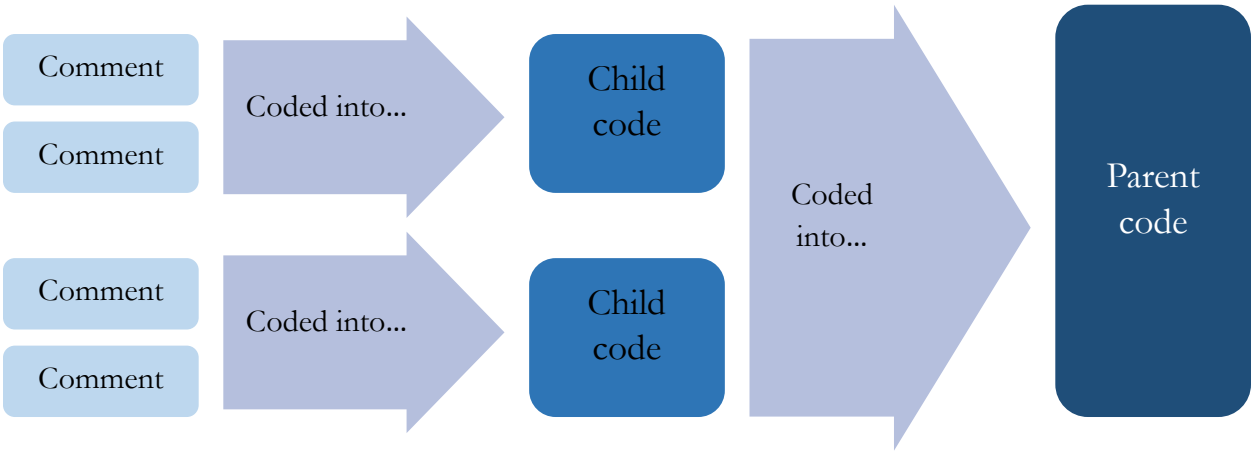

Figure 9. This graphic shows the process of coding comments into broader and broader code types, from comment to child code to parent code.

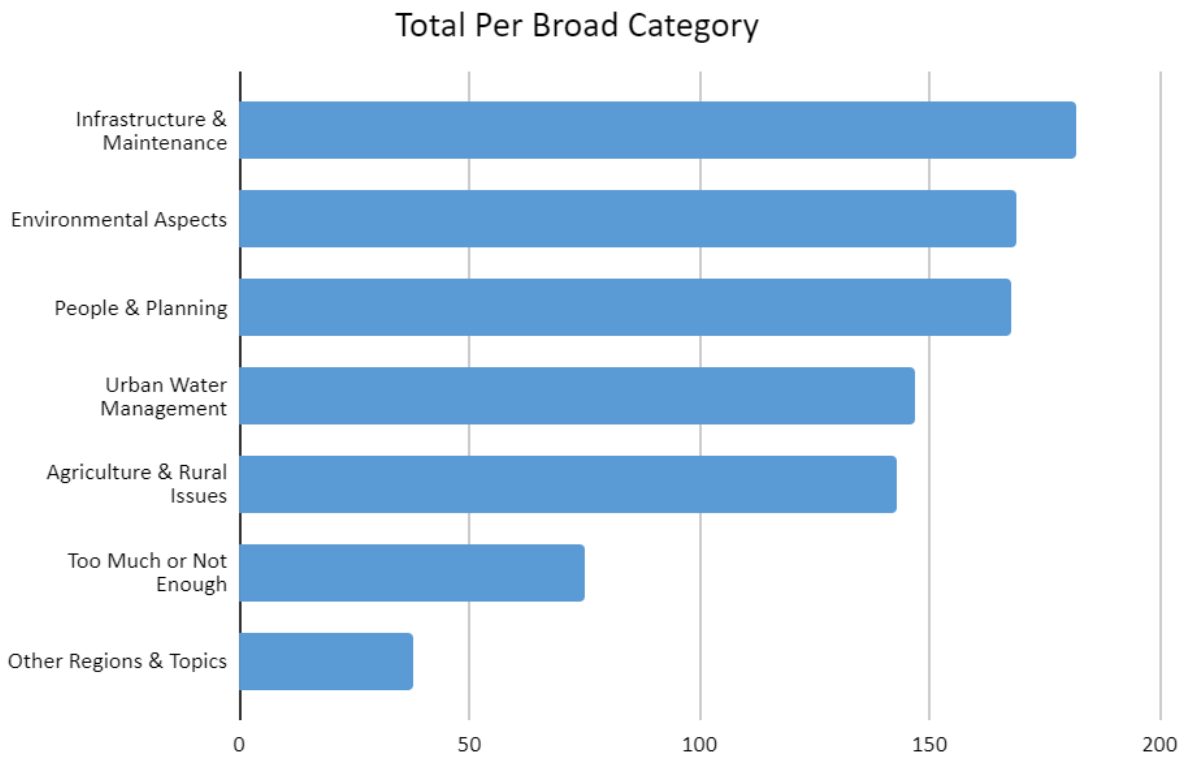

Figure 10. This graph outlines a list of the parent codes that emerged from the water supply interviews. Each parent code holds multiple child codes associated with it.

Figure 10 shows the breadth of parent codes. Each bar on this graph is a parent code, which in turn is broken up into its own child codes in the graphs to follow. The parent codes, in order of highest number of comments to lowest, were:

1. Infrastructure and Maintenance
2. Environmental Aspects
3. People and Planning
4. Urban Water Management
5. Agriculture and Rural Issues
6. Too Much or Not Enough (Water Capacity)
7. Other Regions and Topics

The following visuals, **Figure 11**, **Figure 12**, **Figure 13**, **Figure 14**, **Figure 15**, **Figure 16**, and **Table 2** show the detailed aspects of each of these parent codes, revealing the child codes that comprise them. Note that comments were frequently sorted into multiple child codes at a time (between one and six codes), as they usually related to a variety of topics at once.

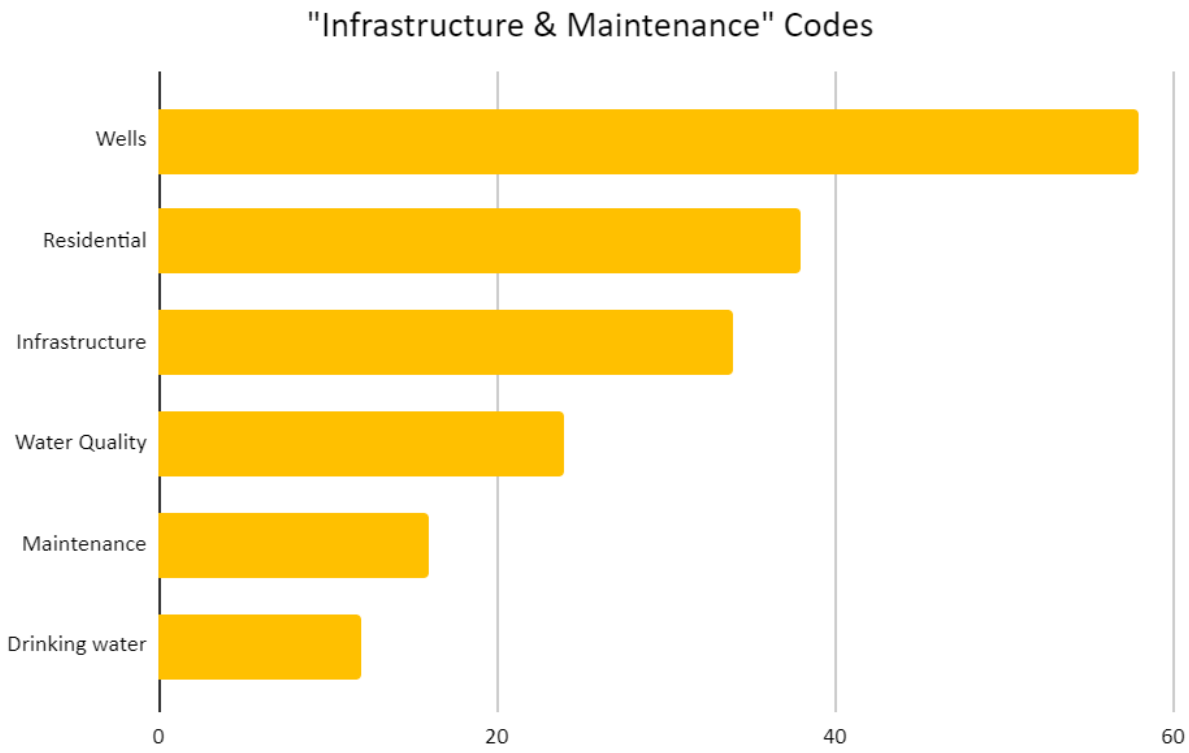

Figure 11. The child codes that comprise the Infrastructure and Maintenance parent code.

Figure 11 outlines the highest mentioned child codes within the Infrastructure and Maintenance parent code. This section topped the list of most frequently mentioned parent codes within the interviews, included comments relating to grey infrastructure, pipes, wells, and overall maintenance of this infrastructure. Wells were mentioned one third of the time in this parent code, where interviewees noted anything relating to either public or private wells. Some interviewees had personal knowledge of residential wells; some mentioned water quality as it relates to infrastructure, and the need to maintain not only this infrastructure, but also data and processes. See **Appendix A** for more detail.

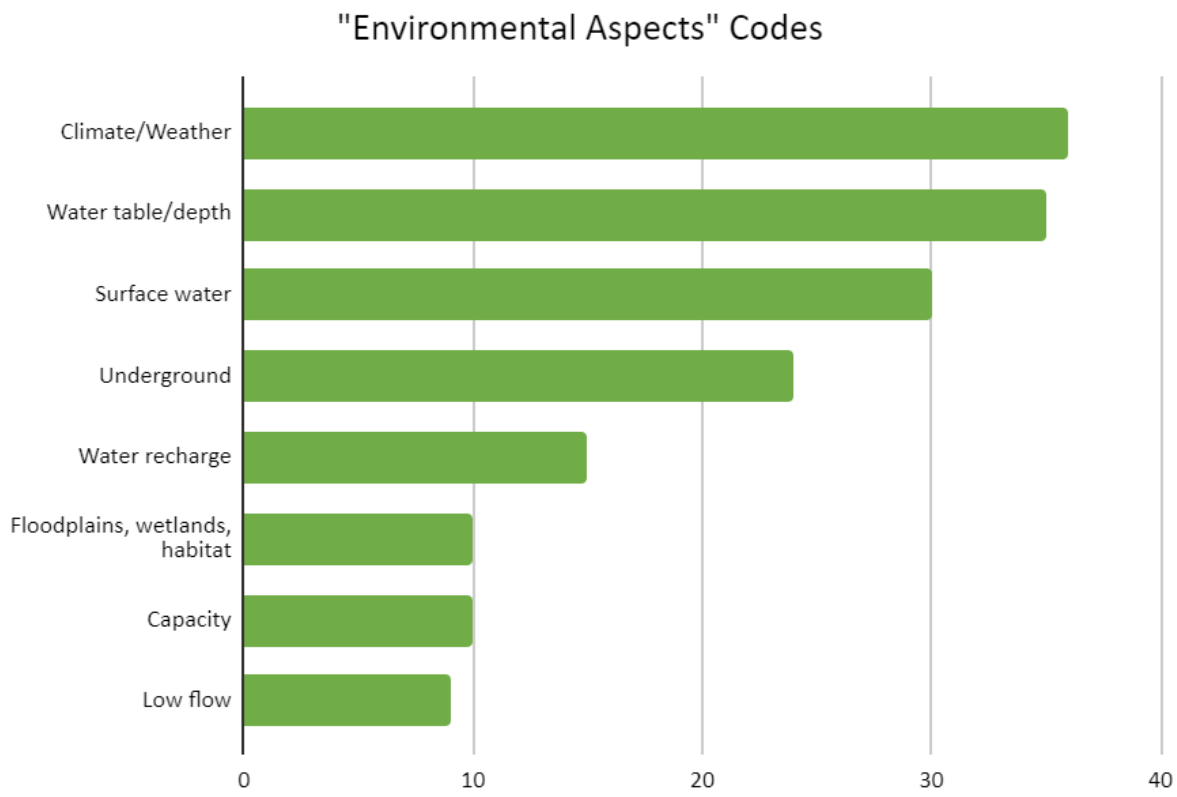

Figure 12. The child codes that comprise the Environmental Aspects parent code.

Since water is inherently part of earth's natural systems, environmental aspects are unavoidable when talking about water supply planning. **Figure 12** illustrates the child codes that make up the Environmental Aspects parent code. Climate and weather were the highest-mentioned code in this category, whether interviewees referred to seasonal fluctuations in water levels or long-term climate changes that should be expected. Next, interviewees discussed the water table, surface water, and aquifers, geological features, and groundwater (the latter three being categorized as "underground"). Next down the list is water recharge, or the ability for water to replenish itself due to the water cycle, followed by environmental elements relating to the land's natural state – floodplains, wetlands, and habitat. Finally, capacity and low flow issues rounded out this section, referring to how much water supply exists in an area at a certain specific time. See **Appendix A** for more detail.

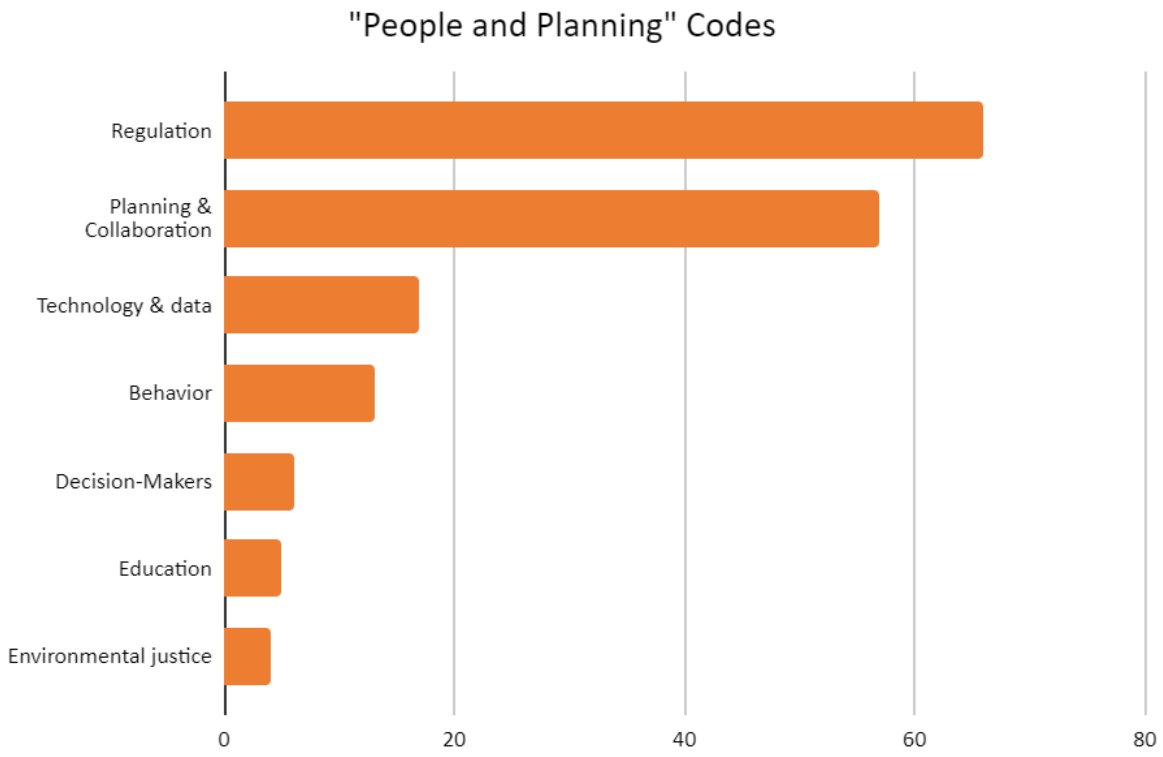

Figure 13. The child codes that comprise the People and Planning parent code.

Next, this section highlights the people involved in the water supply process and the need to plan for the future in a collaborative way. **Figure 13** outlines the People and Planning parent code and the child codes that nest within it. The highest mentioned child code in this section is Regulation – in fact, this was the highest mentioned child code throughout all interviewee comments. The Regulation code refers to any laws that either exist or could potentially exist, relating to water. Note that any mention of regulation, whether the interviewee was in favor of more regulation or less, was categorized here. The importance of planning was also a hot topic, followed by technology and data regarding water systems. Finally, some interviewees mentioned the social aspect of water supply planning, specifically the need for a behavior change on a human scale, the need for more education, effective management from a public or private standpoint, and considering environmental justice components when planning for water supply. See **Appendix A** for more detail.

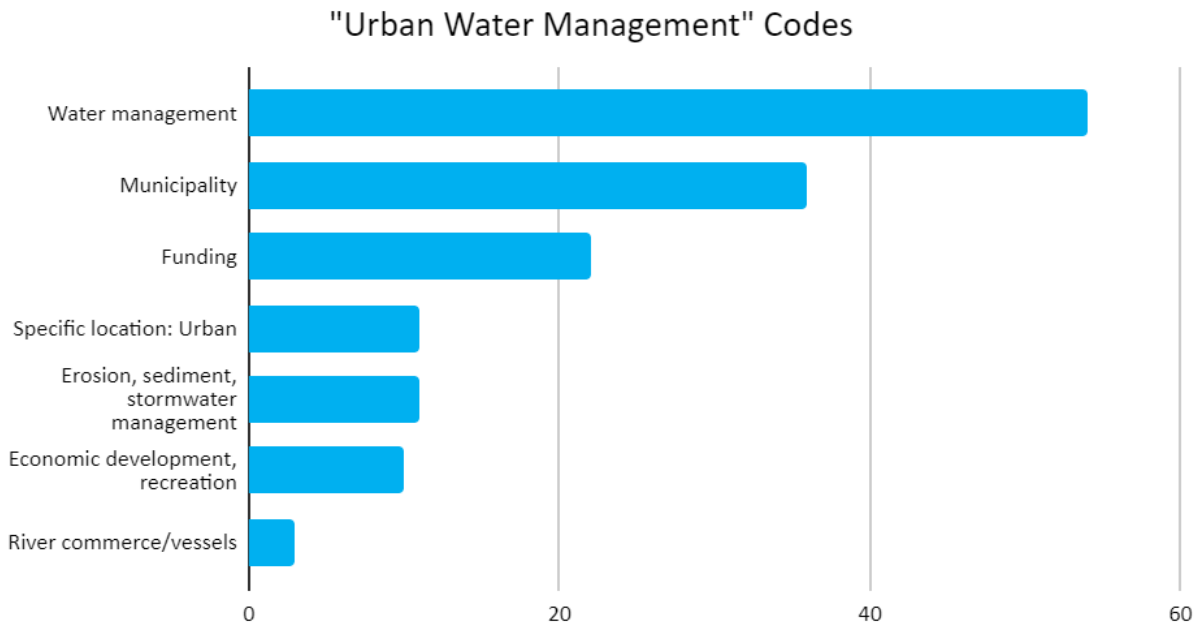

Figure 14. The child codes that comprise the Urban Water Management parent code.

Urban water management is imperative in all areas with grey infrastructure and roads. **Figure 14** provides a visual for the child codes that make up the Urban Water Management parent code. Although some child codes within this section can relate to rural or non-urban areas, they were included here as a general grouping. The highest mentioned code is water management – this is a broad term to collectively describe the management and sustainability of water systems, levels, quantity, and distribution. Next, interviewees mentioned municipalities and funding, which could go hand-in-hand in a planning process. Some environmental issues are mentioned here, often relating to urban areas: Erosion, sedimentation, and stormwater management. Finally, some interviewees discussed the relationship of water to economic development, recreation, and river commerce such as barge transport. See **Appendix A** for more detail.

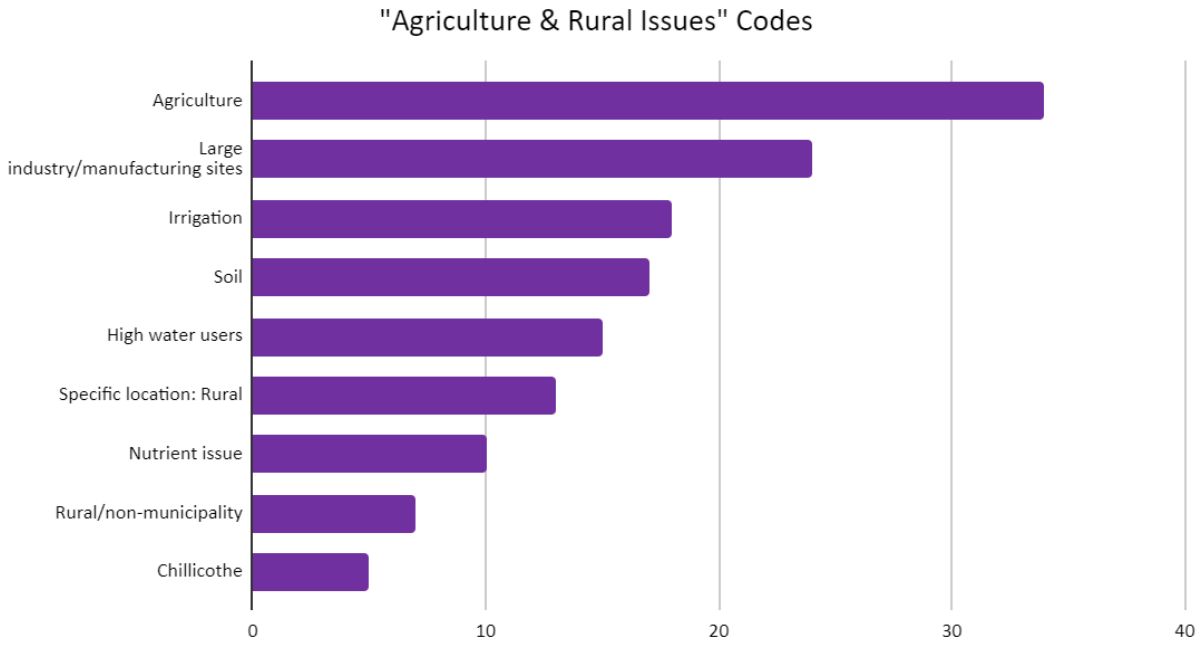

Figure 15. The child codes that comprise the Agriculture & Rural Issues parent code.

Large swaths of the Middle Illinois region are rural areas; therefore, the Agriculture parent code encompasses the largest breadth of land. **Figure 15** outlines the multitude of child codes that encompass the Agriculture and Rural Issues parent code. Large industry and manufacturing sites are often located outside of town, so they were lumped in this section. Irrigation was a hot topic, relating to both the Soil and High Water Users code — in areas of sandy soil, higher irrigation occurs (some interviewees mentioned parts of Chillicothe in Peoria County as having high levels of sandy soil and potentially higher irrigation). High water users can be agricultural, industrial, or other. Finally, nutrient issues also arose when interviewees discussed water percolation due to agricultural practices such as tiling. See **Appendix A** for more detail.

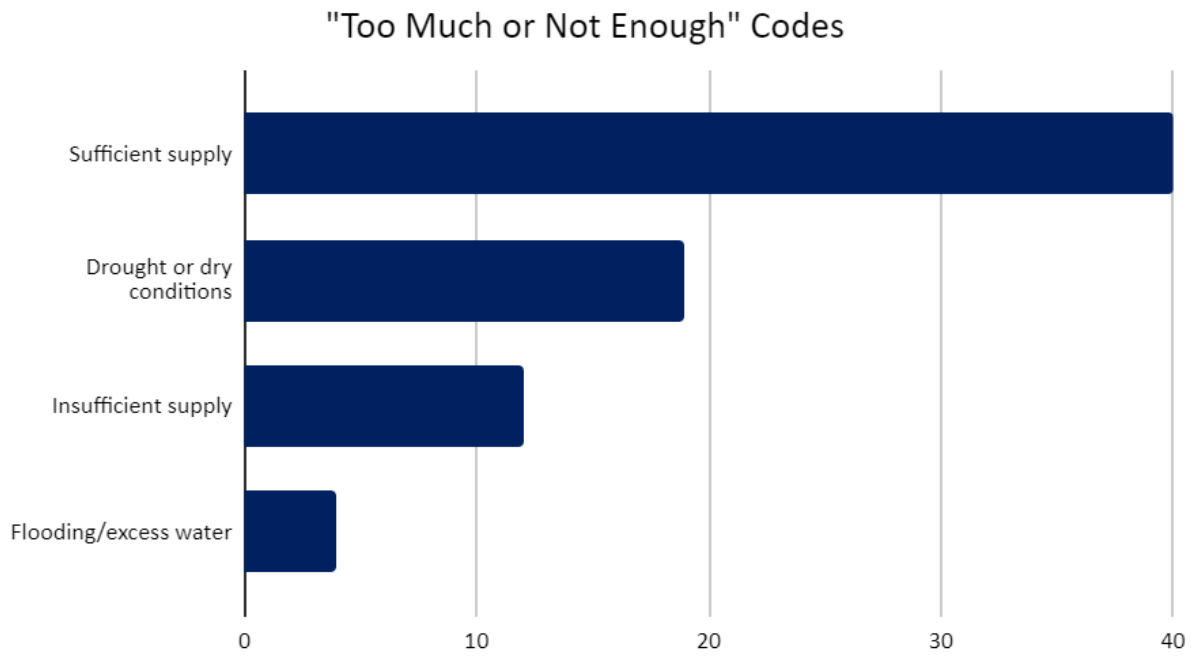

Figure 16. The child codes that comprise the Too Much or Not Enough (Water Capacity) parent code.

The "Too Much or Not Enough" parent code refers to the amount of water available or water capacity in a region or locale. **Figure 16** illustrates that over half of interviewees who commented on the amount of water in their area noted that there is a sufficient supply. About 40 percent of the responses in this category referred to insufficient supply, and less than half of those were related to drought or dry conditions. Only five percent of codes in this category noted that there is excess water in the region. See **Appendix A** for more detail.

Location	Comment Summaries
Joliet	We don't want to scramble for water like Joliet, which has only 10 years of water supply left – they are planning to connect with Chicago's water system from the Great Lakes.
Mason County	Mentioned a mobile home community with inadequate pumps for their wells.
Kankakee area	Irrigation caused wells in abutting neighborhoods to go dry – a committee worked on a grant to deepen wells. This solved the problem for a fraction of the price it would have taken to add regulations.
Kankakee River	There are drought periods, occasional low flow, and icing in the winter.
Will County	Specific locations have higher sensitivity to water issues relating to fish habitats.
St. John's River (Florida)	Creation of levees, drainage districts, and impoundments to manage water before areas were developed for residential or agriculture.

Table 2. List of the out of scope (OOS) locations mentioned by water supply interviewees, plus a short summary of what they said.

Finally, interviewees noted out-of-scope locations (coded as "OOS") as reference points. Any location far enough outside of the Middle Illinois water supply region was counted as OOS. These included: Joliet, Chicago, Mason County, Kankakee, Will County, and the St. John's River Basin in Florida. **Table 2** shows the out-of-scope reference locations and a summary of the comments associated with them.

Discussion

The following section examines the methods and outcomes of the meetings and interviews to create a more effective planning process for the final water supply phase. Planning *process* recommendations are listed in bold below.

Meetings

While meeting attendance level cannot be the sole gauge of a meeting's success, since there are several variables involved (location, presentation topic, format, time of day, and marketing/outreach), it is the main measurable data point of a meeting.

As mentioned in the Results section, the meeting with the lowest attendance was Meeting 7, which took place in April 2020 during the CDC's stay-at-home order. This drop in participation likely occurred due to complications with the COVID-19 pandemic – some agencies had their employees work from home, while others had to cease work entirely. Additionally, this made the marketing aspect less effective as well. Due to these complexities, it was unsurprising that turnout was low.

Conversely, the meeting with the highest participation by far, especially in-person attendance, was State Climatologist Trent Ford's talk, with 22 guests. This attendance spike likely occurred for three reasons:

1) Having the State Climatologist as the speaker drew interested parties;
2) Climate change is a hot topic, so to speak, especially on a college campus; and
3) The location and time—early afternoon on a weekday at a community college—made it convenient for students and local interested parties to join.

Additionally, this talk must have been shared separately on IVCC's website or bulletin boards since it drew a much more diverse crowd than normal water supply meetings.

Therefore, if in-person meetings or workshops are held in Phase III of this water supply planning process, **it may benefit both the process and the surrounding community to collaborate with a college or university.** This would provide a community meeting space well-equipped with audio/visual capabilities, spread the word about water supply planning, educate the public (especially young people in an education/research setting), and provide a broader outlet for feedback and outreach.

Interviews

The planning team was glad to have connected with 22 interviewees that represented a diverse list of sectors and geographies. However, not all sectors and counties were included in this process, despite the planning team's best efforts. When the planners reached out either by email or phone to several other individuals and agencies, these stakeholders either declined to comment or did not respond to interview requests. The planning team respected these wishes, though it created gaps in the interviewee sectors and geographies.

> One key point is that every potential interviewee who declined to participate would have been completely new to the process—they did not previously have a relationship or connection with the planning team or the process. This showed how crucial it is to **broaden the reach of this planning process from the beginning of each phase**. This could involve a larger outreach effort, more deliberate individual connections, or other ways of spreading the word. The more that people are aware of such an effort, the less hesitant they would be to take part.

Relation to Phase I Report

In June 2018, the Tri-County Regional Planning Commission produced the *Middle Illinois Basin Water Supply Planning: Public Outreach and Collaboration Report*[9], which was Phase I of this initiative. That initial outreach process included meetings, a survey, and feedback from water supply planning processes in 2015 and 2018. Like in this report, the results were categorized using qualitative coding analysis.

Similar themes emerged from Phase I to Phase II. For example, the Outreach report highlighted two codes: 1) Industry and Development and 2) Infrastructure and Engineering, as tied for most frequently mentioned in survey results[3]. In this Phase II report, both relate to the Infrastructure and Maintenance parent code, which also had the highest frequency of mentions. Agriculture, hydrological issues, and socioeconomic/planning issues came up in both reports. See **Appendix B** for a full comparison of Phase I to Phase II codes.

Ultimately, comparing the Phase I Outreach and this Phase II Recommendations report to one another strengthens the overall water supply planning process, showing that even as years pass, the same themes arise. These themes are then more critical to consider when creating recommendations and, eventually, implementing them.

Another thing to note is that more data was collected in Phase II than Phase I. This is because Phase II was briefly stymied by COVID-19, it took more time to complete, and therefore it allowed for more feedback. Phase II also introduced the interview process, which resulted in longer, more detailed comments.

[3] In the case of the Phase I Outreach report, the only two codes that were mentioned more frequently than Industry and Development and Infrastructure and Engineering were Water Quantity and Water Quality. For this Phase II report, the water quantity code was omitted in the coding process because it was too broad and vague to be its own code in this case; Water Quality was a child code within the Infrastructure and Maintenance parent code.

Goals and Recommendations

Based primarily on the results of the interviews, while taking account of the meeting presentations and feedback, the planning team compiled a set of broad goals and more specific recommendations for water supply planning moving forward. These goals and recommendations are split into themes, which result directly from parent codes. Note that these themes often overlap or relate to one another; that is by design. Since water issues are inherently interconnected, it makes sense for their goals and recommendations to do the same. The following goals and recommendations list is in no particular order:

Environment and Capacity

The Environment and Capacity theme emerged from a combination of two parent codes: Environmental Aspects and Too Much or Not Enough (Water Capacity). In these categories, interviewees discussed existing supply, climate and weather, water recharge rates, the water table, natural systems such as floodplains, and droughts or dry conditions, among other topics. The Environment and Capacity theme also relates to the Urban Water Management parent code, including erosion and water management topics. Using all of these as a guide, the planning team created the goals and recommendations shown in **Figure 17**.

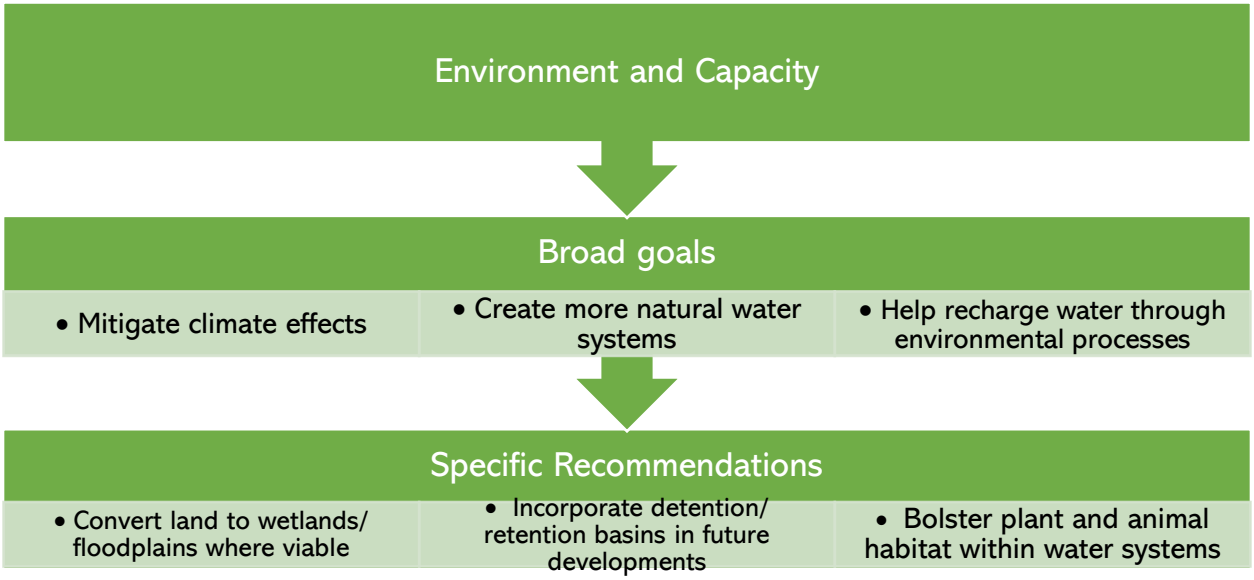

Figure 17. A layout of goals and recommendations relating to Environment and Capacity.

The key here is to use natural, environmental systems to regulate water in the region. Before humans entered the picture, water would self-regulate and naturally flood and recede. While these exact processes cannot be viably replicable within today's built environment, it is possible to use these ebbs and flows as a reference point moving forward.

One example of such process is wetland banking. This involves creating, restoring, or enhancing wetlands to make up for those that have been destroyed or developed[vi]. This process can ensure more regulated water levels:

> *Wetlands function as natural sponges that trap and slowly release surface water, rain, snowmelt, groundwater, and flood waters. Trees, root mats and other wetland and waterside vegetation slow the speed of flood waters and distribute them more slowly over the floodplain.* ***This combined water storage and braking action lowers flood heights and reduces erosion***[vii]*.*

Ultimately, wetlands, floodplains, and other tactics such as detention and retention basins provide many benefits in controlling water flow using natural means. Thus, a more natural system could provide the region with a more sustainable and perhaps predictable water supply picture.

Management and Maintenance

The Management and Maintenance theme blends two parent codes: Infrastructure & Maintenance and Urban Water Management. These parent codes included issues such as wells, water management, residential, municipality, funding, maintenance, and economic development. The Management and Maintenance theme also relates to the People and Planning parent code (education and data collection) and the Agriculture and Rural Issues code (rural/non-municipal locations). All these topics combined to form the goals and recommendations listed in **Figure 18**.

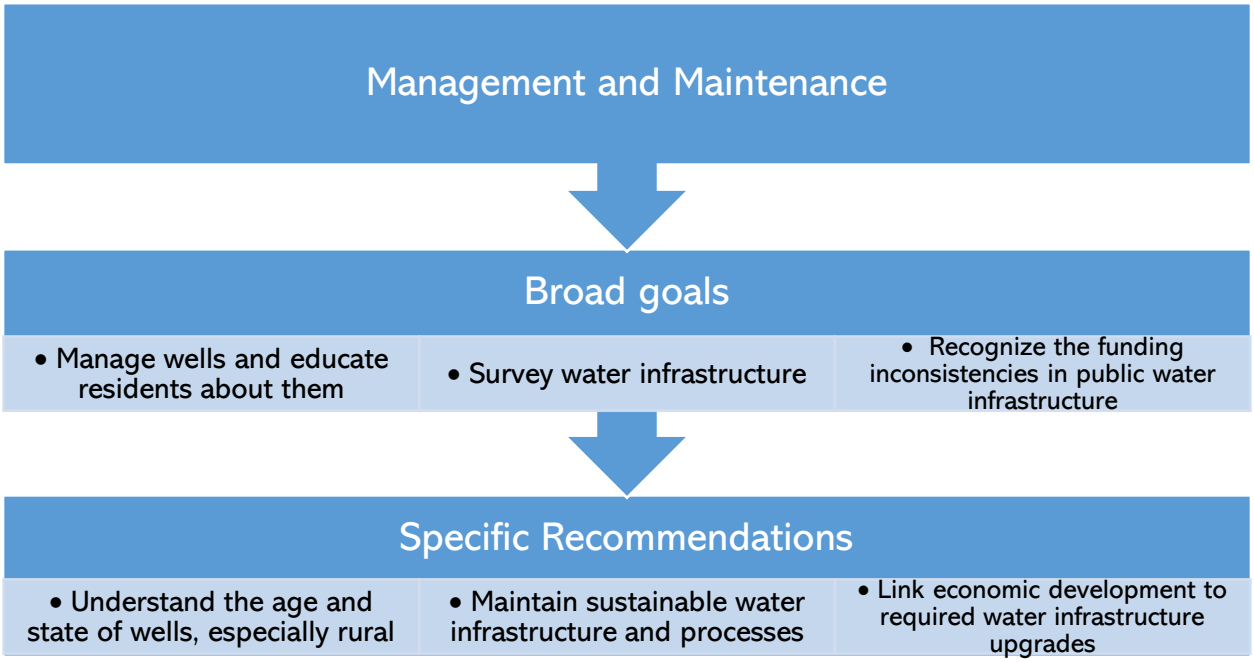

Figure 18. A layout of goals and recommendations relating to Management and Maintenance.

Multiple interviewees talked about wells, some noting that municipal and residential wells can sometimes be old, in need of repair, or installed improperly (these issues often occurred in rural areas). Therefore, one goal is to educate about wells, whether that involves subdivisions, municipalities, or other well users. Adding to that process, it would also be beneficial to survey water infrastructure in general and collect data about the age of this infrastructure. Knowing the age, planners, researchers, or municipalities could then calculate the funding required to fix the infrastructure, understand the funding available, and recognize the gap between these two numbers.

Finally, to maintain sustainable water infrastructure in the long term, municipalities could link funds gained through economic development (perhaps relating to recreational water usage) and funnel those monetary resources into water infrastructure management. Therefore, water-based tourism could directly fund the maintenance of water system infrastructure, including wells.

Agriculture

The Agriculture theme emerged from the Agriculture and Rural Issues parent code. This parent code included child codes such as: Large industry/manufacturing, irrigation, soil, high water users, and nutrient issues. From these topics, the planning team created goals and recommendations related to agriculture, as see in **Figure 19**.

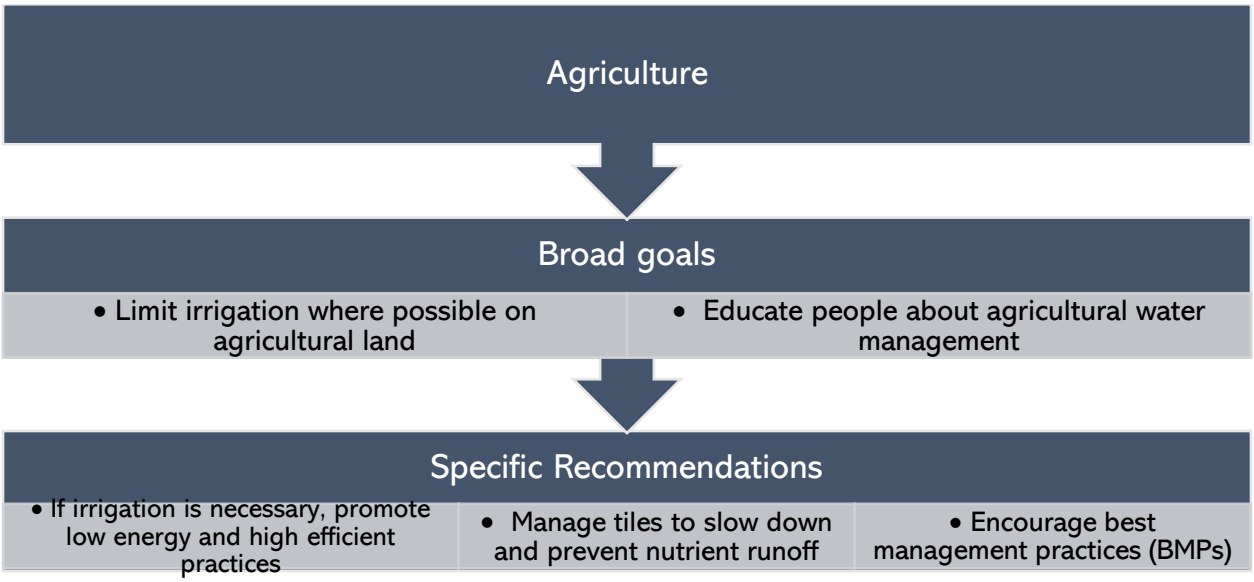

Figure 19. A layout of goals and recommendations relating to Agriculture.

Since interviewees noted that irrigation could potentially result in low water levels in neighboring wells, one goal is to limit irrigation where possible on agricultural land. Without creating new legislation, it is not necessarily possible to regulate the number of landowners who conduct this practice. However, it is possible to promote high efficiency and low energy irrigation practices. If a landowner wishes to irrigate, for example, they could use drip irrigation, which delivers small amounts of water directly near the plant's root, limiting runoff and evaporation[viii]. Using this less water intensive practice, or others that work well in that geography or soil type, could then limit the landowner's effect on the surrounding water table.

Some agricultural fields have tiles, which are underground perforated plastic or clay pipes that collect water and guide it off the field. Unfortunately, this can also carry nutrients such as nitrogen and phosphorus from fertilizers into adjoining waterways, and the flow of water from tiles can also be higher, potentially affecting neighboring land and waterways[ix]. Therefore, one recommendation notes that tiles should be managed in a way to prevent this runoff.

Furthermore, other types of agricultural best management practices (BMPs) can potentially affect the regional water supply. These BMPs could include conservation tilling, use of cover crops, and farming types. Several county Farm Bureaus already advocate for and educate their consumers about these BMPs, which are sustainable efforts in the long run. This document recommends continuing this education process and spreading it to other formats, groups, or contexts.

People and Planning

The People and Planning theme was taken directly from the People and Planning parent code. This code included regulation, planning and collaboration, technology and data, behavior, decision-makers, and education. All these child codes fed into the creation of the goals and recommendations listed in **Figure 20**.

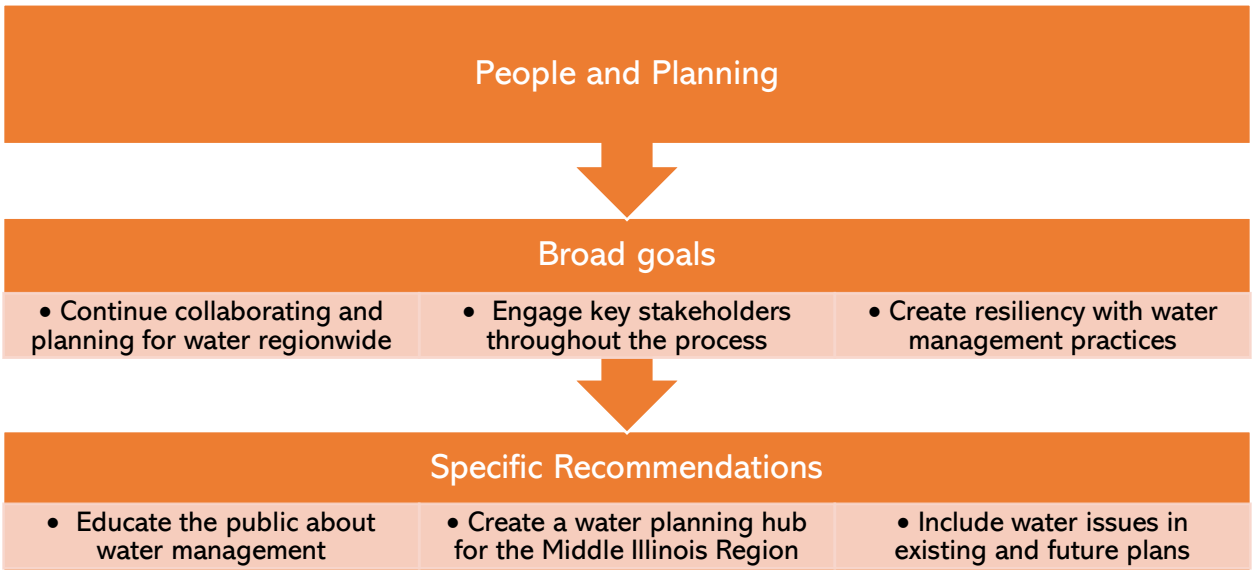

Figure 20. A layout of goals and recommendations relating to People and Planning.

To complement the analysis and modelling work that the Illinois State Water Survey has conducted[x, xi], and will conduct in the future, about the Middle Illinois Region, it is imperative to include a planning element. Collaboration and stakeholder engagement are at the center of this process, and with each additional person involved in outreach, more information is gathered, creating a more holistic and effective initiative.

Therefore, these goals and recommendations double down on this collaboration element, including both water experts and the public. A water supply planning hub for the Middle Illinois region, currently included on TCRPC's website, can provide an informational, educational space. To continue the water supply planning process even after these three phases are complete, TCRPC and other planners can strive to include water issues in existing and future plans. This will ensure a linkage between water and other key issues regionwide.

Next Steps

The third and final phase of the water supply planning project is Phase III: Implementation. This phase, pending future funding, will bring together the outreach from Phase I and the Recommendations from Phase II to understand how to implement these initiatives moving forward. This could include searching for grants and funding options; identifying organizations, people, and agencies who can conduct these strategies; and pinpointing a long-term timeline for water supply planning.

Appendix A: Child Code Descriptions

The chart below shows all 42 child codes, with columns showing the parent codes they are sorted into (one of seven, shown in **Figure 10**), the number of times they were mentioned within the 491 comments, the percentage of the total child codes, and a description of what each means. Note that each comment was sorted into 1-6 child codes, hence the increased sum shown in bold at the bottom of this chart.

Child code	Parent code	Child sum	% from total	Describe this child code
Regulation	People & Planning	66	7.16%	Laws and rules to be put in place at a government level
Wells	Infrastructure & Maintenance	58	6.29%	Wells in any capacity
Planning & Collaboration	People & Planning	57	6.18%	Requiring regional cooperation and a prior planning process
Water management	Urban Water Management	54	5.86%	The practice of continuously managing water in a sustainable way
Sufficient supply	Too Much or Not Enough	40	4.34%	Enough water
Residential	Infrastructure & Maintenance	38	4.12%	Any reference to residential water
OOS	Other Regions & Topics	38	4.12%	Out of scope; mention of any other regions far away from ours
Climate/Weather	Environmental Aspects	36	3.90%	Any mention of climate or weather affecting water
Municipality	Urban Water Management	36	3.90%	A city, small town, or village -- local government
Water table/depth	Environmental Aspects	35	3.80%	Height of water table or depth
Infrastructure	Infrastructure & Maintenance	34	3.69%	Civic infrastructure -- "grey" infrastructure
Agriculture	Agriculture & Rural Issues	34	3.69%	Relating to agriculture in any capacity

Child code	Parent code	Child sum	% from total	Describe this child code
Surface water	Environmental Aspects	30	3.25%	Relating to rivers, lakes, streams
Water Quality	Infrastructure & Maintenance	24	2.60%	Relating to water quality
Underground	Environmental Aspects	24	2.60%	Aquifers, geological features, groundwater (not including wells)
Large industry/manufacturing sites	Agriculture & Rural Issues	24	2.60%	Specific mention of large industry or manufacturing sites
Funding	Urban Water Management	22	2.39%	Questions of money or cost
Drought or dry conditions	Too Much or Not Enough	19	2.06%	Too little water
Irrigation	Agriculture & Rural Issues	18	1.95%	Relating to irrigation in any capaicty
Technology & data	People & Planning	17	1.84%	Discussion of technology/data -- also includes modeling
Soil	Agriculture & Rural Issues	17	1.84%	Relating to soil in any capacity
Maintenance	Infrastructure & Maintenance	16	1.74%	The need to maintain infrastructure, data, or processes
Water recharge	Environmental Aspects	15	1.63%	The ability of water to be recharged due to the water cycle
High water users	Agriculture & Rural Issues	15	1.63%	Entities that use high amounts of water
Behavior	People & Planning	13	1.41%	Talking about people's lifestyles or maintaining/changing the status quo

Child code	Parent code	Child sum	% from total	Describe this child code
Specific location: Rural	Agriculture & Rural Issues	13	1.41%	A specific issue occurring within a rural/non-urban area
Drinking water	Infrastructure & Maintenance	12	1.30%	Specifically relating to drinking water
Insufficient supply	Too Much or Not Enough	12	1.30%	Too little water
Erosion, sediment, stormwater management	Urban Water Management	11	1.19%	Environmental elements frequently occurring in urban areas
Specific location: Urban	Urban Water Management	11	1.19%	A specific issue occurring within an urban/non-rural area
Capacity	Environmental Aspects	10	1.08%	The holding capacity of a well retention pond, or similar
Floodplains, wetlands, habitat	Environmental Aspects	10	1.08%	Environmental elements: Relating to the natural state of the land
Economic development, recreation	Urban Water Management	10	1.08%	How water affects economic development or recreation
Nutrient issue	Agriculture & Rural Issues	10	1.08%	Relating to nutrients -- nitrogen, phosphorus, etc.
Low flow	Environmental Aspects	9	0.98%	Temporary low water levels in a body of water
Rural/non-municipality	Agriculture & Rural Issues	7	0.76%	Mention of rural areas (or those not in a municipality)
Decision-Makers	People & Planning	6	0.65%	Decisions made from higher ups when it comes to water management

Child code	Parent code	Child sum	% from total	Describe this child code
Education	People & Planning	5	0.54%	Educating people about water -- usage and infrastructure
Chillicothe	Agriculture & Rural Issues	5	0.54%	Specific location: Chillicothe
Environmental justice	People & Planning	4	0.43%	Water availability, quality, accessibility
Flooding/excess water	Too Much or Not Enough	4	0.43%	Too much water
River commerce/vessels	Urban Water Management	3	0.33%	Barges, any other commercial river entities
Total code mentions		**922**	**100.00%**	

Appendix B: Phase I and Phase II code comparison

The following chart compares the codes from the Phase I Outreach water supply report (left column) to the codes from this Phase II Recommendations report (middle and right columns). The Phase I codes are in order of frequency of mentions.

Phase I code	**Phase II child code(s) equivalent**	**Phase II parent code(s) equivalent**
Water quantity	(All)	(All)
Water quality	Water quality	Infrastructure & Maintenance
Industry and Development	Large industry/manufacturing sites	Agriculture & Rural Issues
Infrastructure and Engineering	Infrastructure	Infrastructure & Maintenance
Agriculture	Agriculture	Agriculture & Rural Issues
Political/socioeconomic, procedural	Planning & Collaboration; Decision-makers	People & Planning
Waterways and hydrology	Low flow; Floodplains, wetlands, habitat; Water recharge; Underground; Surface water; water table/depth	Environmental Aspects
Residential/civic use	Residential; Municipality	Infrastructure & Maintenance; Urban Water Management
Existing facilities	High water users; Large industry/manufacturing sites	Agriculture & Rural Issues
Education	Education	People & Planning
Analysis	Technology & data	People & Planning
Potential local changes	(no equivalent)	(no equivalent)

Endnotes

[i] Ill. Exec. Order No. 2006-1 (Jan. 9, 2006), https://www2.illinois.gov/Pages/government/execorders/2006_1.aspx
[ii] Illinois State Water Survey. (2021). Illinois Water Supply Planning. https://www.isws.illinois.edu/illinois-water-supply-planning.
[iii] Illinois State Water Survey. (2018). Middle Illinois Region. Illinois Water Supply Planning. https://www.isws.illinois.edu/illinois-water-supply-planning/middle-illinois-basin.
[iv] United States Centers for Disease Control and Prevention. (2021). Protect your home from *COVID-19*. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/protect-your-home.html.
[v] Middle Illinois Basin Committee. (2018). Middle Illinois Basin water supply planning: Public outreach and collaboration report. Tri-County Regional Planning Commission. https://tricountyrpc.org/wp-content/uploads/Mid-IL-Basin-Water-Supply-Planning-Outreach-Report_6.28.18.pdf
[vi] United States Department of Agriculture Natural Resources Conservation Service. (n.d.). Conservation compliance and wetland mitigation banking. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbill/?cid=nrcseprd362686.
[vii] United States Fish and Wildlife Service. (2019). The value of wetlands. Mandalay National Wildlife Refuge, Louisiana. https://www.fws.gov/nwrs/threecolumn.aspx?id=2147604739.
[viii] United States Centers for Disease Control and Prevention. (2016). Types of agricultural water use: Irrigation vs. rain-fed agriculture. Other Uses and Types of Water. https://www.cdc.gov/healthywater/other/agricultural/types.html.
[ix] Moore, J. (2016). Literature review: Tile drainage and phosphorus losses from agricultural land. *Lake Champlain Basin Program*, 83, 2-65. http://www.lcbp.org/wp-content/uploads/2017/01/83_TileDrainage_LitReview.pdf.
[x] Kelly, W. R., Abrams, D. B., Knapp, H. V., Zhang, Z., Dziegielewski, B., Hadley, D. R., Roadcap, G. S., Mannix, D. H., Lian, Y., Meyer, S. C., Thomason, J. F. (2018). Water Supply Planning: Middle Illinois Assessment of Water Resources for Water Supply Final Report. *Illinois State Water Survey*, 1-116. http://hdl.handle.net/2142/101848.
[xi] Meyer, S. C., Dziegielewski, B., Zhang, Z., Abrams, D., Kelly, W. R. (2018). Water Demand in the Middle Illinois Water Supply Planning Region, 2010-2060. *Illinois State Water Survey*, 1-184. http://hdl.handle.net/2142/102366.