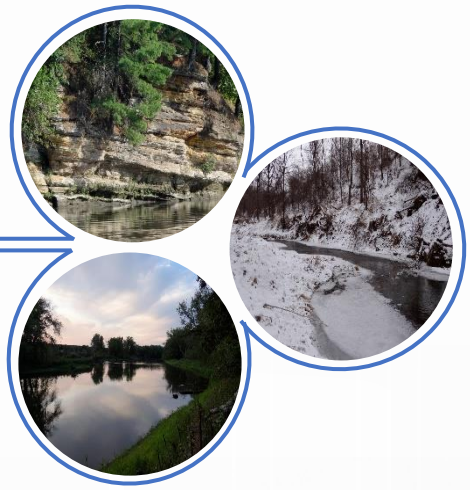
FEBRUARY 2023



Rock River Region Water Resources Planning

Scenarios for Northwest and North Central Illinois

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Contents

1. Introduction

The Rock River Region water resources planning area consists of eleven counties in northwest Illinois: Boone, Bureau, Carroll, Henry, Jo Daviess, Lee, Ogle, Rock Island, Stephenson, Whiteside, and Winnebago, involving four regional planning entities:

- Bi-State Regional Commission (BSRC) - Henry, Rock Island
- Blackhawk Hills Regional Council (BHRC) - Carroll, Jo Daviess, Lee, Ogle, Stephenson, Whiteside
- North Central Illinois Council of Governments (NCICG) - Bureau
- Region 1 Planning Council (R1PC) - Boone, Winnebago

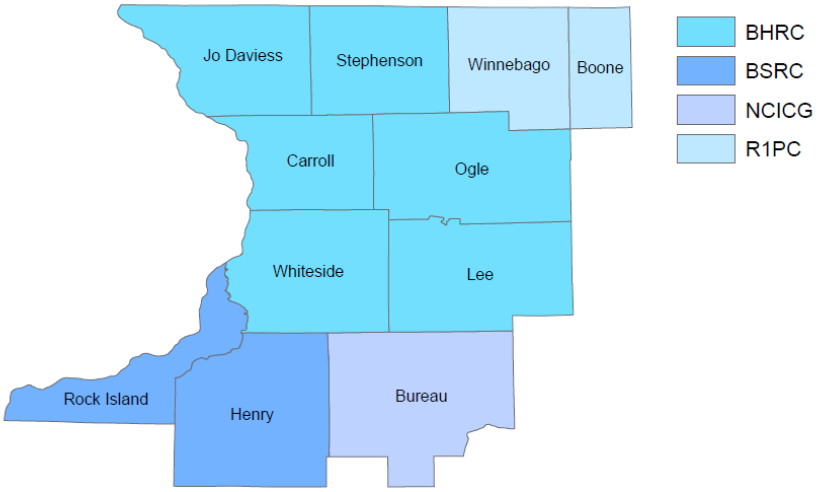


Image created in ArcMap using U.S. Census Bureau TIGER/Line Shapefiles: Counties (and equivalent), 2022. Accessed Feb 16, 2023.

BHRC and regional planning organization (RPO) partners began the Illinois Department of Natural Resources (IDNR)-funded water resources planning process in 2018, establishing an advisory committee, meeting with stakeholders, and surveying water users. That year the Illinois State Water Survey (ISWS) also released a report entitled *Water Demand in the Rock River Water Supply Planning Region, 2010-2060*. It examined current and future water demand in the area by five sectors – public supply; self-supplied domestic; self-supplied thermoelectric power generation; self-supplied industrial and commercial; and self-supplied irrigation, livestock, and environmental.

ISWS's report is a technical overview of water demand covering 2010-2060. To gather more information from local perspectives, BHRC worked with IDNR, ISWS, and RPO partners to add scenario planning to the planning process. Subregions where scenario planning was undertaken by RPOs included:

1) Boone and Winnebago counties (lead: R1PC)
2) Green River Lowlands/Whiteside, Lee, Henry, and Bureau counties (leads: BHRC, BSRC, NCICG)
3) Quad Cities/Rock Island and Henry counties (lead: BSRC)
4) *Driftless Area/Carroll, Jo Daviess, and Stephenson counties + Ogle County (lead: BHRC)*[a]

This report summarizes findings from each subregion's scenario planning effort.

[a] Currently incomplete. To be included in future scenario planning efforts.

2. Scenario Planning in the Rock River Region

"Will the Rock River Region have enough water to meet demand in 2060?"

Many factors often unpredictable in occurrence and severity influence water availability. Scenario planning enables diverse stakeholders to plan for an uncertain future by helping process participants imagine what might occur as well as how to prepare for, respond to, and, in some cases, encourage certain occurrences.

Normative and explorative approaches are the most common forms of scenario planning; the latter approach was featured in each subregion's process. Exploratory scenario planning illustrates comprehensible future end states. The scenarios described in this report were created using the most uncertain and important driving forces as determined by each subregion's stakeholders. After identifying scenarios, RPO partners developed pertinent strategies, indicators, and measures.

Finally, while process particulars varied across subregions, the following outputs/outcomes were common:

1) Scenarios outlining probable, though uncertain, futures for the region, subregions, etc.;
2) Strategies addressing each possible future should it arise;
3) Indicators monitoring strategy implementation;
4) Stronger ties and consensus building among stakeholders concerning the issues discussed.

3. Boone and Winnebago Counties Subregion

3.1 Introduction

3.1.1 Background and Setting

In December of 2021, R1PC began facilitating a series of water scenario planning workshops for Winnebago and Boone counties. While rivers run through both counties (the Rock River in Winnebago and Kishwaukee River in Boone), the majority of the counties' water supply comes from the Galena-Platteville and Cambrian-Ordovician aquifers. Winnebago County is home to Rockford, the largest city in the Rock River Region, which had a population of 148,655 as of the 2020 Decennial Census[1]. By land area, Boone County has the third-highest population in the study region. Public supply is the sector of highest water demand for both counties[2].

While the focus of these scenario plans is on water demand, quality (as noted by ISWS[2] and local participants) factors into availability. Rockford's groundwater resources are relatively plentiful, but there is a history of groundwater contamination due to poor industrial waste disposal practices.

3.1.2 Overview of the Scenario Planning Process

The water scenario planning process for Winnebago and Boone counties consisted of a pre-workshop webinar followed by four scenario planning workshops (three main workshops and one make-up workshop) facilitated by R1PC staff. Aside from the webinar and make-up workshop, all workshops were held in person at the R1PC office. Attendance varied but averaged approximately 15 attendees per session. After each workshop, a recap was sent to stakeholders for further review and feedback. After completing the last workshop, R1PC compiled the results into a final report.

3.1.3 Methods

One of the foundational ideas of scenario planning is engaging stakeholders collaboratively to determine holistic, sustainable decisions. As such, representatives from the agriculture sector, scientists, policy makers, industry professionals, and environmental groups were invited to participate in the workshop series.[b] Participants were challenged to think in terms of systems instead of silos and consider complex interconnections across sectors.

Throughout the workshop process, R1PC staff applied the framework of exploratory scenario planning, which asked participants to anticipate multiple scenarios and corresponding actions. Participants first identified and prioritized two driving forces, then used them to create a range of plausible scenarios. After identifying these, participants were challenged to brainstorm potential actions and strategies in the third and final workshop.

[b] A list of participants for each workshop is included in the Appendix.

3.2 Water Scenario Planning Workshops

3.2.1 Pre-Workshop Webinar

The pre-workshop webinar introduced invitees to the scenario planning process, addressed its utility, and covered what to expect. The webinar started with an overview of systems thinking. Systems thinking encourages participants to consider connections between seemingly disparate processes or things – in this case, industry sectors. Using systems thinking can lead to more sustainable and equitable results during planning and ultimately, implementation. With more than 40 attendees, there appeared to be keen interest in developing sustainable water management strategies.

3.2.2 Workshop 1 Process and Results

Visioning

A vision statement builds a foundation for scenario development and supports stakeholder collaboration. To develop the vision statement, stakeholders and staff split into teams of four, each drafting a statement for consideration. Examples were provided for additional guidance. Once the breakout groups reconvened, each statement was entered into and voted on using the online platform Poll Everywhere.

The highest-voted vision statement reads: "Protect, restore, and enhance our natural resources and infrastructure systems to maintain safe, reliable, and sustainable water resources for all current and future inhabitants through the use of green infrastructure and strategic policy development."

The other vision statements were:

- Protect our region's surface water and ground water by planning for the future to promote good, safe, plentiful drinking water for everyone by involving all sectors of the region.
- To provide a safe, reliable, high quality water supply, public engagement on the value or resource stewardship, and to protect all water resources for the future.
- A region composed of plentiful water resources of sufficient quality, for beneficial use as dictated by current and future public demand.

Themes

During the first workshop, stakeholders were also asked to identify key themes, resulting in the following:

- Infrastructure: Groups highlighted the growing number of aging water systems as well as increased contaminants found throughout wells in the region.
    - Out of 1,450 wells tested throughout Illinois, between 70 to 80 had detectable levels of Per- and Polyfluoroalkyl Substances (PFAS).
    - Aging water systems strain finances of homeowners' associations without cash reserves to pay for maintenance.
    - More than 20 percent of public water currently leaks through water mains (mostly into the Rock River).

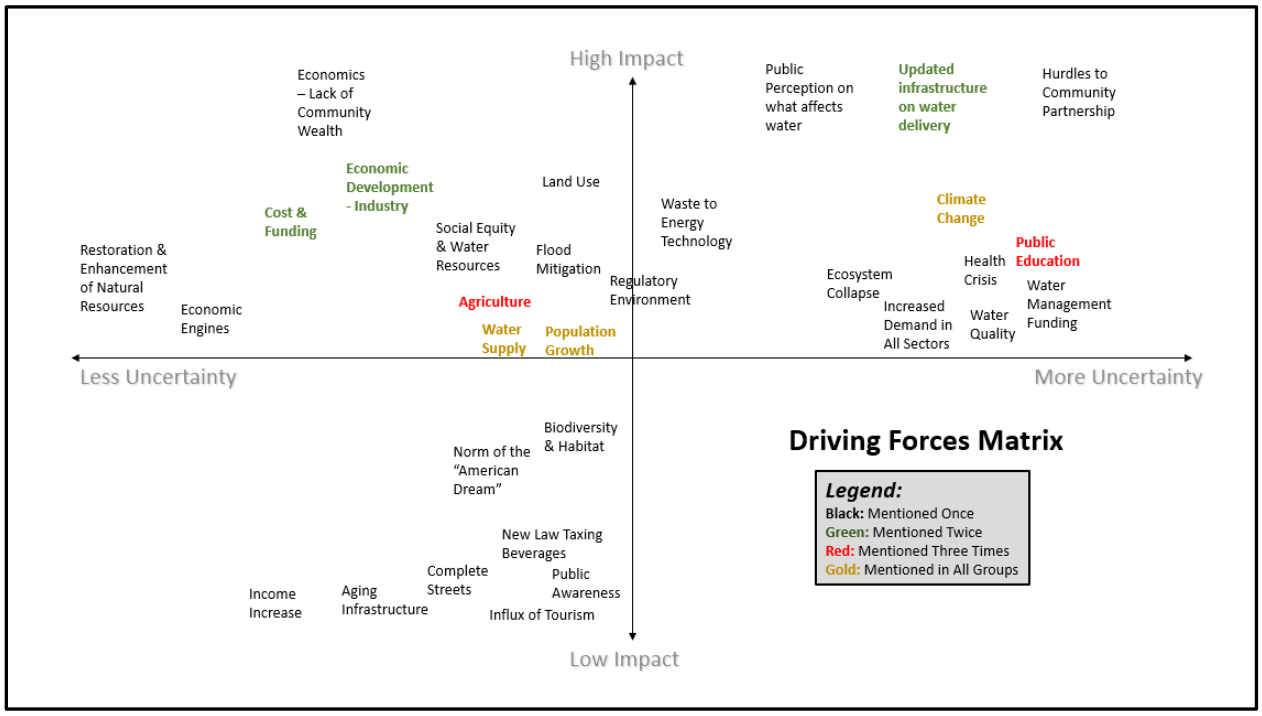
    - Past policy to keep water prices low has exacerbated maintenance and water quality issues in the region.
- Safe and Reliable: There was an emphasis on providing safe water as opposed to "clean" water, as the definition of clean can be subjective. Reliability is industry standard terminology meant to convey the importance of water users having a consistent supply to meet their needs.
- Relationship between Human and Natural Systems: Groups included natural systems and their outcomes in discussions on the future human consumption of water.
- Affordability: Affordability can mean different things to different people. The challenge is often in finding a balance between being able to distribute a safe and reliable source of water to users (through infrastructure maintenance and upgrades) at a rate that is cost effective for the utility and affordable to all users.

Driving Forces

For this portion of the workshop, stakeholders broke out into four groups to brainstorm and decide on two key driving forces in the region. Using a driving forces matrix of uncertainty and impact, groups listed potential driving forces by placing sticky notes within the matrix. The STEEP (Social, Technological, Economic, Environmental, and Politics) analysis tool was used to guide stakeholders on the drafting of driving forces. Groups then ranked and chose the final two driving forces, which they presented to all attendees. The driving forces were voted on, and the following two were picked:

1. Full-cost Economics/Financing (9 votes)
2. Climate Change (8 votes)

Figure 1 - Identified Driving Forces



Other discussion topics emerged from the group:

- Public Value of Water: Perceived as ever-changing due to external factors like drought, flooding, and public health issues. Because people can be unpredictable, uncertainty must be considered. The group also discussed water's true price with respect to marginalized groups.
- Water Use: Stakeholders discussed the wording behind water use/depletion and its overall connection to climate change.

Ultimately, the group decided to combine several of the top-voted driving forces. "Climate Change" was thought to be inclusive of "Water Depletion," while "Full-cost Economics/Financing" could be paired with the "Public Value of Water," leading the following final driving forces:

Driving Force #1: Climate Change/Water Availability

Driving force #1 reflects the anticipation of a less reliable source of water as a result of climate change. The proposed spectrums for this driving force were:

1. Hotter/Drier Climate: Summer and fall will see drier conditions. Spring will have more intense but less frequent rain events, while winters will have more rain and less snow. Overall temperature will be warmer across all seasons.
2. Hotter/Stormier Climate: There will be more intense and more frequent storms across the seasons. Overall temperature will be hotter across all seasons.

Driving Force #2: Funding/Social Value of Water

Driving force #2 is based on the ways water valuation drives funding opportunities. The proposed spectrums for this driving force were:

1. More Funding Available: Society places greater value on water, which promotes additional investment in water resources management.
2. Less Funding Available: People's perception of water value follows current trends, and there is no additional incentive to invest in improved management strategies.

3.2.3 Workshop 2 Process and Results

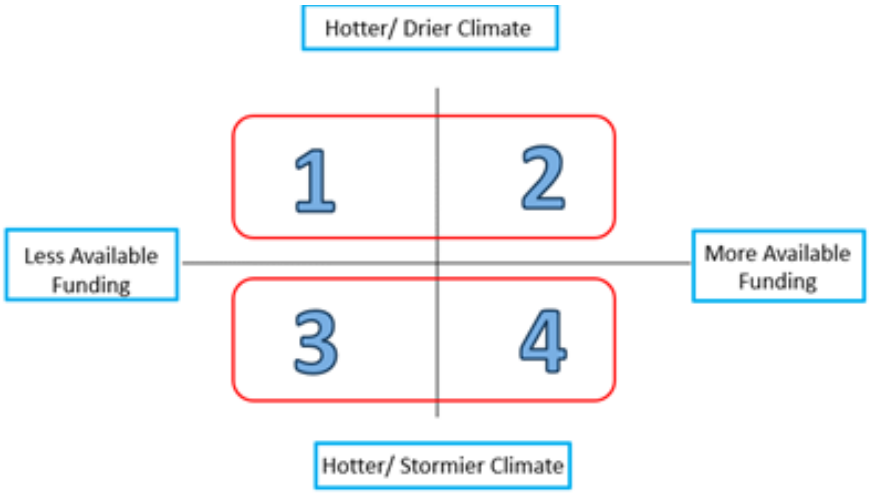
Impacts

Participants were assigned a number from one to four. Numbers represented a different scenario group as determined by the intersection of the two identified driving forces: Climate Change and Funding/Social Value of Water.

Figure 2 - Assigned Scenarios

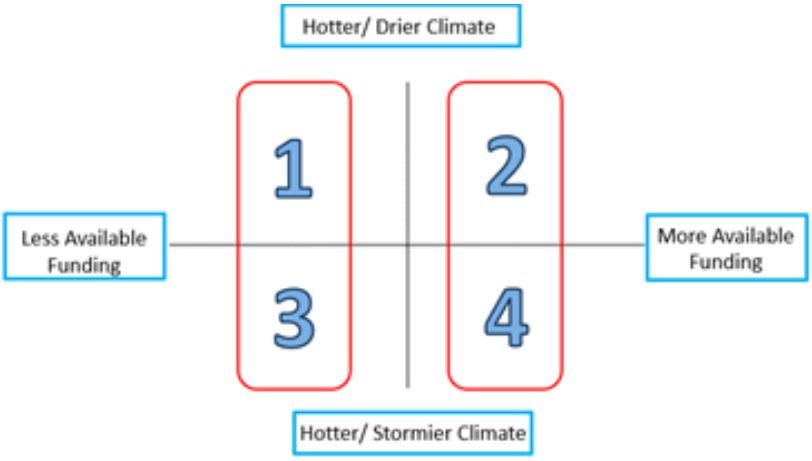
The goal of the first two breakout sessions was to challenge participants to think critically about stakeholder impacts from within their assigned driving force quadrant (Climate Change: Hotter/Drier vs. Hotter/Stormier; Funding Availability/Social Value of Water: More Funding vs. Less Funding). In breakout session 1, groups 1 and 2 addressed a Hotter/Drier Climate while groups 3 and 4 addressed a Hotter/Stormier Climate.

Figure 3 - Breakout Session: Climate Change



In breakout session 2, groups were rearranged to identify impacts that may result from the availability of funding/social value of water. Groups 1 and 3 addressed Less Available Funding, and groups 2 and 4 discussed More Available Funding.

Figure 4 - Breakout Session: Funding Availability/Social Value of Water



Results

The key impacts identified by stakeholders for each of the four driving forces is shown in Table 1.

Table 1 - Key Impacts

Hotter/Drier Climate	Hotter/Stormier Climate
• Stress on habitats/species • Decrease in crop yield • Increased crop damage and loss • Higher utility costs due to cooling needs • Increased risk of heat-related illness • Increased water demand	• Native species decline • Increased flooding • Increased soil loss/runoff • Increased demand for irrigation • Greater strain on stormwater and sanitary infrastructure • Production loss due to interruptions in workflow • Increased risk of power outages and property damage
Less Funding	**More Funding**
• Reduction in public demand for environmental protection • Loss of habitat restoration funding • Aging water infrastructure • Less funding towards research and data collection • Lack of implementation in reuse policies • Greater difficulty towards meeting water quality and safety compliance measures	• Expansion of conservation easements and habitat restoration projects • Implementation of green infrastructure practices in residential areas • Increased incentivization into cover crop and no-till farming practices • Expansion of public and recreational spaces • Water efficiency improvements across industrial scale

Impacts held across all scenarios were also identified and are listed here:

Stress on Habitats
Stakeholders identified that habitats and native species in the region will face increased pressures such as degradation through flooding, drought, increase in invasive species, soil runoff, lack of public demand to address existing issues, and loss of habitat restoration funding.

Increased Cost of Water
The cost of water will increase throughout the region from potentially higher irrigation use among farmers, limits among water-users in industry, or worsening water quality from increased runoff.

Increased Water Reuse
There will be an increase in strategies to conserve water while also increasing water reuse infrastructure.

Data Collection Availability
The availability of data in the region is imperative for effective decision-making on water resources and demand in the region, leading to an increase in data collection across all scenarios.

Scenario Development

After the completion of the driving forces impacts process, participants were split into four scenario groups. For 30 minutes, teams combined the results of breakout sessions 1 and 2 to draft a scenario. R1PC staff provided guidance to each group, along with additional questions for promoting discussion:

- How do these driving forces interact?
- Who are the winners and losers of these scenarios?
- What are the implications for our vision statement?

Scenarios

Scenario 1: Funding Dries Up

Hotter/Drier Climate and Less Available Funding

Regional drought has led to the drawdown of groundwater aquifers. With this significant reduction in water across the region, multiple sectors' operations are affected. For instance, local farmers begin to experience significant reduction in crop yields. In addition, the growing number of extreme heat days lead to an uptick in heat-related illness across the region, exacerbating public health resources for small periods of time.

With limited funding to address these issues, low-cost measures targeted towards water conservation and education are balanced with meeting existing water quality and safety compliance measures. Moreover, by reinforcing existing data collection methods, measures such as improving city metering, promoting water efficiency incentive programs, and increasing greywater and wastewater resources throughout the region have allowed for greater adaptation to the effects of climate change while increasing public knowledge.

Scenario 2: Adapting to Drought

Hotter/Drier Climate and More Available Funding

Longer periods of drought continue to limit water availability. These longer periods of drought continue to increase stress on existing habitats, with more recorded instances of damage and longer distances traveled for fauna. Farmers also face the effects of drought, including reduced yield in main crops, which leads to greater desire to improve farming practices.

With clear impacts affecting human and natural systems across the region, increased funding opportunities are made available. As a result, actions such as water reuse practices are implemented across multiple sectors in order to reduce demand for water. Steps are taken to expand the preservation of floodplains while building upon existing educational and recreational services. In addition, improved modeling and data collection practices within the implementation of a sustainable water supply plan increase the public's awareness of water in the region. For local farmers, steps are taken to build resilience such as the implementation of no-till practices and the additional planting of cover crops. Because of these changes across sectors, the region has adapted to overall reductions in water availability, allowing for existing quality of life to remain in the region.

Scenario 3: Flooded with Trouble
Hotter/Stormier Climate and Less Available Funding

Annual temperatures increase in tandem with the intensity of storms, existing flood and stormwater infrastructure deteriorate at higher rates, and there is a greater risk of damage and injury to vulnerable populations. These risks are exacerbated as a lack of funding has prevented major maintenance or even replacement of decades old-infrastructure, undermining existing water quality and health standards in the region. Increased intensity in rainfall has affected local farmers' ability to maintain crop yields with increased fertilizer running off into streams and damaging existing habitats.

With funding issues across all sectors, the region lacks the motivation to address core water issues, leading to the continual degradation of social systems and distrust in the government's ability to provide clean water to the public. The reduction of crop yields and health among the public has increased overall cost of living.

Scenario 4: Weathering the Storm
Hotter/Stormier Climate and More Available Funding

Increased intensity of precipitation has led to an increase in invasive species, native species habitats are reduced, and there is an overall greater sensitivity to acute water quality issues. In addition, increased rainfall intensity has heightened the risk to vulnerable populations living within flood hazard zones. When these intense periods of rainfall are replaced by hotter and longer periods of drought in the summer, farmers face a higher demand for irrigation to keep at pace with existing crop yields. With increasing annual temperatures, infrastructure in all sectors faces continued stress as some materials are used beyond optimal temperature ranges.

Due to these impacts and growing water demand throughout the region, more funding is made available to address key demand issues while building resilience in vulnerable areas. For instance, jobs are created towards the replacement of existing water infrastructure, with reuse systems implemented across the region. Greater focus is put on educating farmers about these issues and providing solutions, such as fertilizer reductions implemented in tandem with drip irrigation practices. With the expansion of water use reporting, targeted water efficiency measures are implemented to adapt to increasing water demand. As a result, the region has adapted to the growing constraints of climate change while addressing vulnerabilities in key sectors.

3.2.4 Workshop 2 Make-Up Meeting

A make-up meeting occurred on April 13, 2022, to gather additional comments from stakeholders who were not in attendance at the second workshop. During this meeting, stakeholders reviewed and provided additional comments on the driving force impacts listed above. A few of these additions (new or agreeing with a previously identified impact) are in Table 2.

Table 2 - Driving Force Additions

Hotter/Drier Climate	Hotter/Stormier Climate	Less Funding
• Increased stress on groundwater • Increased water demand • Increased stress on habitats	• Increased stress on existing infrastructure, leading to more power outages and property damage • Increased stress to existing storm sewer and sanitary systems	• Greater difficulty in meeting water quality and existing safety compliance measures • Greater difficulty in maintaining existing wells • Degraded soils with low productivity

3.2.5 Workshop 3 Process and Results

Revisions to Scenarios

To begin the workshop, participants were placed in groups of four with the task of reviewing the drafted scenarios from the second workshop. Participants had 20 minutes to add any changes and 10 minutes read out the revised scenarios. The revised scenarios are as follows:

Group/Scenario 1: Funding Dries Up
Hotter/Drier Climate and Less Available Funding

Regional drought has led to the drawdown of groundwater aquifers. With this significant reduction in water across the region, multiple sectors' operations are affected. For instance, local farmers begin to experience significant reductions in crop yields. In addition, the growing number of extreme heat days leads to an uptick in heat-related illness across the region, exacerbating public health resources for small periods of time.

With limited funding to address these issues, low-cost measures targeted towards water conservation and education are balanced with meeting existing water quality and safety compliance measures. Lawns are replaced with native or naturalized vegetation that can withstand drought. Moreover, by reinforcing existing data collection methods, measures such as improving city metering, promoting water efficiency incentive programs, and increasing greywater and wastewater resources have allowed for greater adaptation to the effects of climate change while increasing public knowledge.

Group/Scenario 2: Adapting to Drought
Hotter/Drier Climate and More Available Funding

Longer periods of drought continue to limit water availability. These longer periods of drought continue to increase stress on existing habitats with more recorded instances of damage and longer distances traveled for species. Farmers also face the effects of drought with reduced yield in main crops, leading to greater desire to improve farming practices.

With clear impacts affecting human and natural systems across the region, increased funding opportunities are made available. As a result, actions, such as water reuse practices, are implemented across multiple sectors in order to reduce demand for water. Steps are taken to expand the preservation

of floodplains and wetlands while building upon existing educational and recreational services. In addition, improved modeling and data collection practices within the implementation of a sustainable water supply plan increase the public's awareness of water in the region. For local farmers, steps are taken to build resilience such as the implementation of no-till practices and the additional planting of cover crops. Because of these changes across sectors, the region has adapted to overall reductions in water availability, allowing for existing quality of life to remain in the region.

Group/Scenario 3: Flooded with Trouble

Hotter/Stormier Climate and Less Available Funding

Annual temperatures increase in tandem with the intensity of storms, existing flood and stormwater infrastructure deteriorate at higher rates, and there is a greater risk of damage and injury among vulnerable populations. These risks are exacerbated as a lack of funding has prevented major maintenance or even replacement of decades-old infrastructure, undermining existing water quality in commercial and industrial operations as well as health standards in the region. Increased intensity in rainfall has affected local farmers' ability to maintain crop yields, with increased fertilizer runoff into streams damaging existing habitats.

With funding issues across all sectors, the region lacks the capacity needed to address core water issues, which leads to the continual degradation of social systems and confidence in the government's ability to provide clean water to the public. The reduction of crop yields and health among the public has increased overall cost of living.

Group/Scenario 4: Weathering the Storm

Hotter/Stormier Climate and More Available Funding

Increased intensity of precipitation has led to more invasive species, and native species habitats are reduced. There is also an overall greater sensitivity to acute water quality issues. In addition, increased rainfall intensity has heightened the risk to vulnerable populations living within flood hazard zones. When these intense periods of rainfall are replaced by hotter and longer periods of drought in the summer, farmers face a higher demand for irrigation to keep pace with existing crop yields, and community water systems may be required to deepen or replace wells. With increasing annual temperatures, infrastructure in all sectors face continued stress as some materials are used beyond optimal temperature ranges, including increasing demand for electricity.

Due to all of these impacts and a growing water demand throughout the region, more funding is made available to address key demand issues while building resilience in vulnerable areas. For instance, jobs are created and administration capacity increased towards the replacement of existing water infrastructure, with reuse systems implemented across the region. Greater focus is put on educating farmers about the issues they face with solutions such as fertilizer reductions implemented in tandem with drip irrigation practices. With the expansion of water use reporting, targeted water efficiency measures are implemented to adapt to increasing water demand. As a result, the region has adapted to the growing constraints of climate change while addressing vulnerabilities in key sectors.

Revisions to Themes

Following the scenario revisions, participants received previously drafted themes that were relevant across all scenarios. Under an open discussion format, groups reviewed these themes with the goal of

forming additional ones relevant across all scenarios. Participants used Poll Everywhere to vote. The revised themes are as follows:

Stress on Habitats
Across all driving forces, stakeholders identified that habitats in the region will face increased pressures. A few potential impacts that will affect wildlife are degradation to species and their habitats either through flooding or drought, an increase in invasive species, increased soil runoff, a lack of public demand to address existing issues, and loss of habitat restoration funding.

Increased Cost of Water
The cost of water will increase throughout the region, from potentially higher irrigation use among farmers, to limits on water use by industry, to degraded water quality from increased runoff.

Increased Water Reuse
There will be an increase in strategies to conserve water use while also increasing water reuse infrastructure.

Data Collection Availability
The availability of data in the region is imperative to effective decision-making on water demand and availability in the region, leading to an increase in data collection across all scenarios.

Communication Across Actors
Communicating actions across scale is necessary when considering the outcomes between the complexities of government, utilities, farmers and stakeholders.

Key Actors

After the theme discussion, participants were split into groups of three with the purpose of creating the actors, strategies, and actions for water demand and supply in the region. The brainstorming process was gamified. Groups could receive points for finishing the section (2 points), finishing first (4 points), and the top answer (5 points). The addition of game elements within collaborative brainstorming allows for greater participation while potentially increasing the quantity and quality of drafted ideas[3].

First, groups were asked to identify key actors needed to address water demand and supply in the region. Answers were codified in Poll Everywhere and voted on to determine point totals. The top responses were:

- Government Agencies (9 votes): Local Governments, IEPA, IDPH, ISWS, and USGS
- Water Utilities (5 votes): Nature, variety of agencies and other stakeholders (5 votes)
- Associations (4 votes): ISAWWA, IML, Rural Water, WEF, etc.
- Industry Professional Consultants (3 votes)
- Power Producers/Power Plants (3 votes)
- Agricultural Industries and Local Farmers (3 votes)

Strategies and Actions

After the discussion of the key actors, the group was asked to develop strategies. First, participants each listed a minimum of five short-term (5 to 10 years) strategies for addressing water demand and supply in

the region. Once short-term strategies were codified and voted on, groups then list a minimum of five long-term strategies (10 to 40 years), which were also voted on.

After the strategy session was completed, participants shifted focus towards creating actions for the strategies previously discussed. The same process used for brainstorming the strategies was applied, with 10 minutes allotted for creating five short-term actions and 10 minutes allotted for drafting a minimum of five long-term actions. Results were codified into Poll Everywhere and voted on to determine point totals for the game. Table 3 has a list of strategies and actions, organized by the following categories:

- **Strategies:** Strategies are a plan of action or policy created to complete a major or overall aim.
- **Actions:** Actions are specific items that can be implemented to complete a strategy.
- **Actors:** Actors are key stakeholders identified to complete a particular action.
- **Term:** Actions are divided into either Short Term (5-10 years) or Long Term (10-40 years)
- **Funding:** The amount of funding that will be needed to implement each action has been grouped into three divisions, signified below:
    - $: $0 - $20,000
    - $$: $20,000 - $100,000
    - $$$: $100,000 or more

Table 3: Strategy and Action Matrix

Strategy 1. Increase partnerships throughout the region.					
#	**Action**	**Actors**	**Term**	**Funding**	**Priority**
1.1	Promote the creation of a regional water authority to regulate and permit large capacity withdrawals.	Water Utilities, Associations, Local Farmers, Industry Professional Consultants	Long	$$	Medium
1.2	Update building codes to include water reuse and recharge guidance.	Government Agencies	Long	$	High
1.3	Explore the creation of a water utility consortium to increase data sharing and access to more expensive infrastructure.	Water Utilities, Water Associations, Government Agencies	Short	$	Medium
1.4	Develop and implement a regional best management practices (BMP) plan.	Government Agencies, Water Utilities, Local Farmers	Long	$$$	Medium
1.5	Partner with stakeholders across the region to lead strategic communication efforts.	Water Utilities, Industry Professional Consultants, Local Farmers, Government Agencies	Short	$	Medium
1.6	Establish comprehensive water conservation requirements that use best management practices (BMP).	Government Agencies, Water Utilities	Short	$	High
1.7	Partner with power producers/plants to reduce energy inefficiencies on site.	Government Agencies, Water Utilities, Power Producers	Short	$$	Low

1.8	Evaluate and consider changes to how a water supply and demand curriculum is taught at schools.	Government Agencies	Short	$$	High

Strategy 2. Collaborate with various stakeholders to fund demonstration projects.					
#	**Action**	**Actors**	**Term**	**Funding**	**Priority**
2.1	Promote drinking water from tap versus bottled water.	Government Agencies, Water Utilities	Long	$	High
2.2	Educate the public on the true cost of water.	Water Utilities, Government Agencies	Long	$	Medium
2.3	Promote water supply careers and educational opportunities.	Water Utilities, Industry Professional Consultants	Long	$	Low

Strategy 3. Increase funding and incentivization opportunities in the region.					
#	**Action**	**Actors**	**Term**	**Funding**	**Priority**
3.1	Evaluate and assess changes to current water pricing.	Water Utilities and Government Agencies	Short	$$	Medium
3.2	Provide financial incentives for agriculture metering.	Local Farmers, Water Utilities, Government Agencies	Short	$$	Low
3.3	Use increased fees and conservation pricing to improve water infrastructure.	Water Utilities, Government Agencies	Short	$$	High
3.4	Seek funding for the development of advanced treatment technology for non-conventional sources.	Government Agencies, Water Utilities	Long	$$$	Low

Strategy 4. Improve data collection capacity in the region.					
#	**Action**	**Actors**	**Term**	**Funding**	**Priority**
4.1	Establish a dynamic regional model to continuously monitor water use and demand.	Government Agencies, Water Utilities, Local Farmers	Long	$$	High
4.2	Integrate automated water use data reporting into current and future practices.	Government Agencies, Water Utilities, Local Farmers	Long	$$	Medium

4.3	Continuously integrate new water monitoring and conservation technologies into existing infrastructure.	Government Agencies, Water Utilities	Long	$$$	High
4.4	Reduce water loss through implementing Advanced Metering Infrastructure (AMI).	Government Agencies	Short	$$$	Medium

3.3 Conclusion

With the completion of the water scenario planning process, actions have been identified that were integral to the success of the workshops. First, engaging a wide range of stakeholders with multiple perspectives across the region made for informative, nuanced discussions on water demand and supply. As each workshop progressed, the amount of allotted time given to discussion was increased, which allowed for open reflection during the workshops. These reflections enhanced the interconnections made between plausible scenarios, highlighting greater nuance to potential actions in the region.

Secondly, the use of an exploratory scenario planning framework mitigated any potential facilitation challenges. Compared to a normative scenario planning framework, which involves greater nuance and facilitation to create one 'desired outcome,' exploratory scenario planning focuses on the similarities among multiple defined parameters that ultimately eased the need for a more experienced facilitator. As a result, future scenario planning workshops should consider applying an exploratory framework if there are institutional constraints.

Beyond the challenges, the creation of nearly 20 action items is a testament to the scenario planning process used for this effort. With these actions, stakeholders will be able to anticipate the challenges ahead and pursue the vision they identified.

4. Green River Lowlands Subregion

4.1 Introduction

4.1.1 Background and Setting

In February 2022, BHRC and NCICG began the water scenario planning process for the Green River Lowlands (GRL) subregion. The GRL is a watershed in Northwest Illinois that covers large areas of Lee, Whiteside, Bureau, and Henry counties. The region relies mainly on groundwater from the lower Sankoty Aquifer, which is separated by a clay layer from the upper Tampico Aquifer.

When ISWS released its 2018 report on water demand in the Rock River Region[2], two counties in the GRL stood out: Whiteside and Lee. They had the highest water demand in the GRL, the majority from self-supplied irrigation, livestock, and environmental sectors. According to the 2015 USDA Census of Agriculture, the irrigated area in the GRL increased from 27,684 acres in 1987 to 102,073 acres in 2012. Irrigated acreage further increased between 2012 and 2014 in response to the drought of 2012[4].

4.1.2 Overview of the Scenario Planning Process

The scenario planning process for the GRL, facilitated by BHRC staff, consisted of a pre-workshop webinar followed by two scenario planning workshops. A webinar was held after both workshops to give stakeholders an overview of what was discussed. Both workshops were held in-person at the BHRC office. Attendance for the workshops and webinars varied but averaged approximately 18 people. After the last workshop, a final report compiled the results.

4.1.3 Methods

Planning partners created a list of approximately 108 stakeholders. These stakeholders included city and county zoning commissioners, water and sewer districts, health departments, farming bureaus, and many more. Although they do not live or work in the GRL, BHRC stakeholders from Carroll, Jo Daviess, Ogle, and Stephenson counties were included in communications in case they had contributions. Of these 108 stakeholders, 19 attended the pre-workshop live webinar, 21 participated in the first workshop, 22 attended the post-workshop live webinar, and 10 participated in the second workshop. All webinars were recorded and posted to the BHRC website.

As the agricultural sector has the largest water demand for the GRL area, participants often focused on this sector. However, with such a diversity of attendees at the workshops, other areas, such as commercial and domestic water use, were covered. Throughout the workshop process, BHRC staff applied the framework of exploratory scenario planning. Participants were first asked to identify driving forces for water demand in the region, which were then used to fashion four scenarios. Once these plausible futures had been identified, participants were asked to brainstorm strategies, implications, and indicators for each scenario.

4.2 Water Scenario Planning Workshops

4.2.1 Pre-Workshop Webinar

On February 11, 2022, BHRC hosted a pre-workshop webinar to inform stakeholders about the background of the water demand planning process, give a brief overview of the ISWS 2018 report, and discuss the scenario planning process.

There were several questions, including whether the Illinois Irrigation Association would be contacted, concerns that the focus would be solely on agriculture and not on other areas, and how much technical data was available for measuring specific water uses in agricultural settings. Questions were addressed either in the webinar or via email prior to Workshop 1.

Prior to the first workshop, the GRL team created a worksheet of driving forces examples and emailed it to stakeholders in order to give participants a clearer understanding of what they would be doing in the workshop.

4.2.2 Workshop 1 Process and Results

Driving Forces

On March 16, 2022, the GRL team hosted its first workshop at the BHRC offices in Rock Falls, IL. Vlad Iordache, the ISWS's expert on the GRL, began by describing the strengths and weaknesses of the 2018 ISWS report as well as how the current irrigation reporting requirements can impede ISWS's work.

BHRC staff then gave a brief overview of driving forces, and stakeholders were provided printed copies of the emailed example worksheet. Attendees were divided into groups of 3-5 and had 40 minutes to brainstorm driving forces of water supply and demand in the region. Each group chose their top 5-7 and wrote them on sticky notes, which were then placed on large sheets of paper in the appropriate driving forces category. The individual groups came back together to consolidate and clarify the topics.

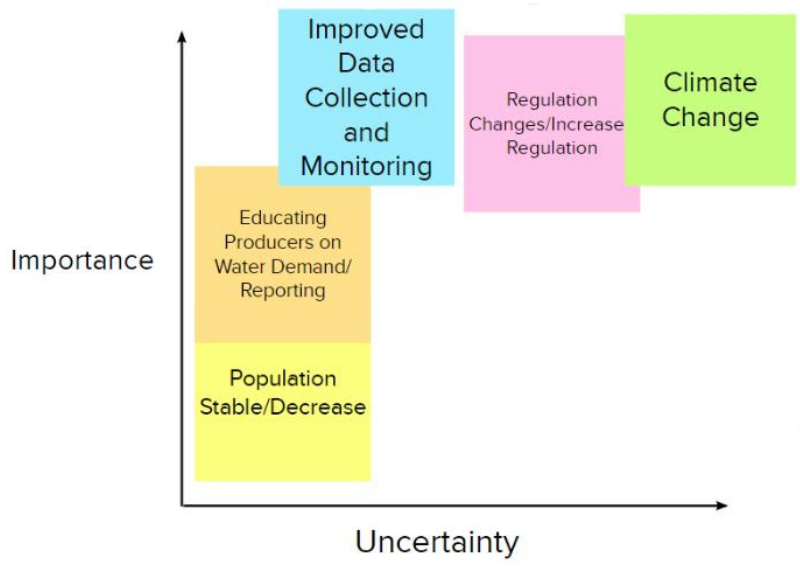
After the driving forces were agreed upon, each stakeholder was given three stickers and asked to vote on their top three driving forces. The results are shown in Table 4, which lists each driving force and the total number of votes it received. The top five are in orange.

Table 4 - Driving Forces

Social and Demographic	Technology	Economics
Population decrease [13] Increase knowledge of conservation practices **[0]** Educating producers on importance of data collection **[8]**	Improved data collection **[8]** Technology advances in agriculture that increase efficiency and reduce irrigation **[0]** The rise of solar farms **[1]**	Economically feasible for producer **[4]** Agriculture industry can still grow **[0]** Confined animal feeding operations **[0]** Aging infrastructure of water/waste systems will limit growth at municipal level **[1]**
Environment	**Policy and Politics**	**Other**
Climate change **[14]** Water quality **[0]**	Changes in regulations **[10]** Future water rights issues **[0]** Corn to soy as biofuel demand shrinks **[1]** Commodity prices **[1]**	Efficiency of government operations **[2]** Public and not-for-profit land purchases **[0]** Processing facilities and new transportation methods **[0]**

As a group, participants ranked the top five-voted driving forces by uncertainty (or unpredictability) and importance regarding water demand. The online platform Mural was used for this exercise. Figure 5 shows the results of the discussion:

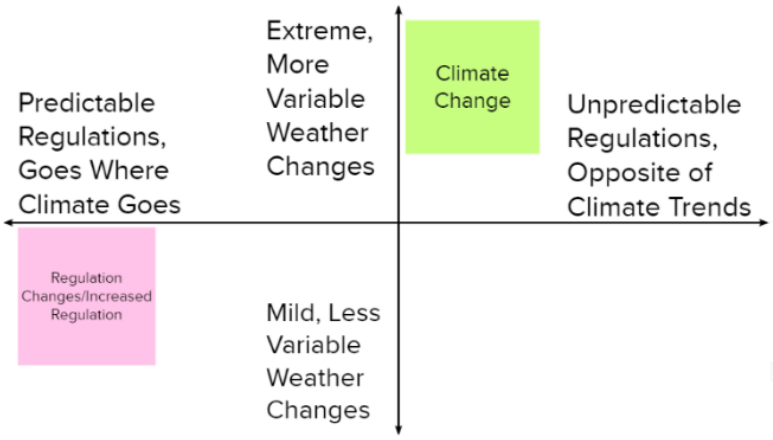
Figure 5 - Driving Forces Ranked



Critical Uncertainties

Climate Change and Regulation Changes/Increased Regulation emerged as the most uncertain and important driving forces. These driving forces were plotted on a graph, with climate change on the Y-axis and regulation changes on the X-axis. Attendees again worked in groups of 3-5 to determine the spectrums of each driving force. Figure 6 shows the results.

Figure 6 - Uncertainty Axes



While there was agreement on the spectrum of Climate Change, there was some further discussion on how Regulation Changes could be assessed, such as:

- Additional vs. Removed Regulation
- More vs. Less Regulation
- Predictability of Regulation

BHRC agreed to consider these factors and make a decision as the scenarios were written.

Post-workshop 1 Webinar

April 13, 2022, BHRC hosted a post-workshop webinar to give an overview of Workshop 1 to stakeholders who were unable to participate. There were no questions. The recording was emailed to all stakeholders and posted to the BHRC website.

4.2.3 Pre-Workshop 2 – Scenario Construction

Scenarios

The GRL team decided to write the scenarios in-house. This was done for the following reasons:

1. Retain Attendance at Workshop 2
    - The GRL team was already holding two 4-hour, in-person workshops, requiring multiple stakeholders to travel significant distances and take time to attend. Literature on best practices for scenario planning suggested a scenario-writing workshop would need to be 3-4 hours long in order to educate participants and thoroughly write and discuss four scenarios. Three workshops might have been one too many a commitment.
2. Dive Deeper
    - Not all participants are subject-matter experts in climate change or water regulations, and BHRC anticipated few would have the time for the necessary reading even if a list was curated.

The scenarios constructed by BHRC were emailed to Vlad Iordache of ISWS for feedback. He commented that, based on current responses to regulations already implemented in Illinois, an increase or decrease in regulations would affect the future less than whether people followed or did not follow those regulations. As a result, the final scenarios were adjusted so that the second driving force reflected not only a change in regulations but also the collective public response. The scenario document that was emailed to all stakeholders is shown on pages 23-24.

Pre-Workshop Meeting

Lauren Lurkins of the Illinois Farm Bureau was unable to attend Workshop 2 but asked to give feedback on the emailed scenarios. Abby Ebelherr and Daniel Payette met with her on November 8, 2022. Among other topics, Lurkins provided information on agricultural views of climate change, responses to planting specialty crops, and field-tile coordination efforts. These insights will prove helpful in future action planning.

WATER RESOURCES SCENARIOS FOR THE GREEN RIVER LOWLANDS PLANNING AREA

Apocalypse Plow

Extreme Climate Change + Passive Response

Days ≥ 100° F and nights ≥ 70° F are normal during summer months. Precipitation significantly increases in the spring and winter. As average global temperatures rise sharply and quickly, climate change's impacts are felt deeply on farms and in communities. Legal or regulatory mechanisms are not in place to address likely impacts. Consequences or realities include:

Economic

- Spring flooding significantly delays planting and leads to increased washouts, especially in Lee County, which has peat deposits at the surface
- Widespread erosion and higher temperatures lead to the loss of soil organic matter, rendering significant acreage unproductive for foraging and crops
- Staple crops such as corn and soybeans are far less productive
- Increased temperatures result in a longer growing season
- Irrigation use increases dramatically in rural and urbanized areas
- Drought and flooding limit recreation-based economic development

Environmental

- Algal blooms are common, including in freshwater lakes and rivers
- Flash or short-term drought events occur yearly, often in the same year with flooding
- New invasive species create public health, agricultural, and ecosystem challenges
- Trees are strained, and the canopies they create in municipalities are diminished
- Draining the aquifer during summers causes cementation, reducing aquifer size over time

Social

- In all four counties, water use exceeds supply in the summer
- Urban flooding (i.e., flooding not related to a river) occurs yearly throughout municipalities
- There is little coordination with respect to field tile installation; downstream impacts are not considered
- Incidents of drinking water contamination in public systems and private wells increase
- There are no restrictions on domestic water use for lawns and private gardens
- Industry and agriculture do not report on or regulate water use; research institutions are limited to reactive reporting
- No long-term engagement on issues or communications between stakeholders

Risky Agribusiness

Mild Climate Change + Passive Response

Days ≥ 100° F and nights ≥ 70° F are atypical during summer months. As average global temperatures rise gradually and slowly (or stabilize), climate change and its impacts are not felt deeply on farms and in communities. Legal or regulatory mechanisms are not in place to address potential impacts. Consequences or realities include:

Economic

- Spring flooding occasionally delays planting
- Localized erosion and higher temperatures somewhat decrease soil organic matter, reducing forage and crop quality
- Staple crops such as corn and soybeans are less productive
- Irrigation use may increase in rural and urbanized areas
- Drought and flooding may limit recreation-based economic development

Environmental

- Algal blooms occur but are less destructive
- New invasive species create public health, agricultural, and ecosystem challenges
- Longer growing seasons result in crops using more water over time and reduces the Tampico Aquifer's recharge time, which currently only occurs early October to mid-February
- Native trees are strained, but canopies remain relatively healthy

Social

- In Bureau and Whiteside counties, water use exceeds supply in the summer
- Urban flooding occurs in areas already prone to flooding
- There is little coordination with respect to field tile installation; downstream impacts are not considered
- Incidents of drinking water contamination in public systems and private wells increase
- There are no restrictions on domestic water use for lawns and private gardens
- Industry and agriculture do not report on or regulate water use; research institutions are limited to reactive reporting
- No long-term engagement on issues or communications between stakeholders

WATER RESOURCES SCENARIOS FOR THE GREEN RIVER LOWLANDS PLANNING AREA

How Not to Drain Your Flagon

Extreme Climate Change + Active Response

Days ≥ 100° F and nights ≥ 70° F are normal during summer months. Precipitation significantly increases in the spring and winter. As average global temperatures rise sharply and quickly, climate change's impacts are felt deeply on farms and in communities. Legal or regulatory mechanisms exist to address likely impacts. Consequences or realities include:

Economic

- Spring flooding significantly delays planting and leads to increased washouts, especially in Lee County, which has peat deposits at the surface
- Widespread erosion and higher temperatures lead to the loss of soil organic matter, rendering significant acreage unproductive for foraging and crops
- Staple crops such as corn and soybeans are far less productive
- Increased temperatures result in a longer growing season
- Irrigation use increases, but water use is reported; public funding is allocated towards data collection, auditing, and distribution, allowing researchers to release proactive reports
- Drought and flooding limit recreation-based economic development

Environmental

- Algal blooms occur but are less destructive; nutrient use and runoff are monitored in streams and other water bodies
- Flash or short-term drought events occur yearly, often in the same year with flooding
- New invasive species create public health, agricultural, and ecosystem challenges; some management occurs through control methods
- Trees canopies are diminished; municipal ordinances address upkeep and planting
- Aquifer overdraw happen but impacts are measured

Social

- In all four counties, water demand may exceed supply in the summer
- Urban flooding occurs in areas already prone to flooding
- Field tile installation impacts are considered and modeled when possible; permitting is required
- Significant water restrictions are implemented for industrial and domestic use during the summer
- Incidents of drinking water contamination in public systems and private wells increase; localities are required to treat for additional contaminants
- Fruitful and regular engagement between stakeholders

Greenfinger

Mild Climate Change + Active Response

Days ≥ 100° F and nights ≥ 70° F are atypical during summer months. As average global temperatures rise gradually and slowly (or stabilize), climate change and its impacts are not felt deeply on farms and in communities. Legal or regulatory mechanisms exist to address potential impacts. Consequences or realities include:

Economic

- Spring flooding occasionally delays planting
- Localized erosion and higher temperatures somewhat decrease soil organic matter, reducing forage and crop quality
- Staple crops such as corn and soybeans are less productive
- Irrigation use is moderate in rural and urbanized areas, and agricultural producers are required to report water used for irrigation; public funding is allocated towards data collection, auditing, and distribution, allowing researchers to release proactive reports
- Recreation-based economic development dependent on water use is relatively stable

Environmental

- Algal blooms are less common; nutrient use and runoff are monitored in streams and other water bodies
- Flash or short-term drought events may occur yearly; occasionally, flooding may occur in the same year
- New invasive species create public health, agricultural, and ecosystem challenges but are managed through control methods
- Trees are strained, but municipal tree canopies remain relatively healthy; municipal ordinances address upkeep and planting
- Aquifer overdraw is eliminated

Social

- In Bureau and Whiteside counties, water demand may exceed supply in the summer
- Urban flooding is less expansive
- Field tile installation impacts are considered and modeled when possible; permitting is required
- Some water restrictions are implemented for industrial and domestic use during drought conditions
- Incidents of drinking water contamination in public systems and private wells are present but not widespread; localities are required to treat for additional contaminants
- Fruitful and regular engagement between stakeholders

Data Sources:

- Abrams, D. B., Zhenxing, Z., Iordache, V., Kelly, W.R., Krasowski, M.P., Mannix, D.H., Healy, C., Wu, X., and Cullen, C., (n.d.): DRAFT - Water Supply Planning: Assessment of Water Resources for Water Supply in the Rock River Region. Illinois State Water Survey, https://www.blackhawkhills.com/naturalresources
- Wuebbles, D., J. Angel, K. Petersen, and A.M. Lemke (Eds.), 2021: An Assessment of the Impacts of Climate Change in Illinois. The Nature Conservancy, Illinois, https://doi.org/10.13012/B2IDB-1260194_V1.

4.2.4 Workshop 2 Process and Results

Implications and Strategies

The second workshop was held November 9, 2022, at BHRC's office in Rock Falls. Participation was lower for the second workshop, possibly due to the ongoing harvest season.

The second workshop began with an overview of Workshop 1. Participants were then divided into two groups. One group was given Scenario A - Apocalypse Plow, and the second was given Scenario B - Risky Agribusiness. Both groups had 40 minutes to discuss implications and strategies for their scenario, answering the following questions:

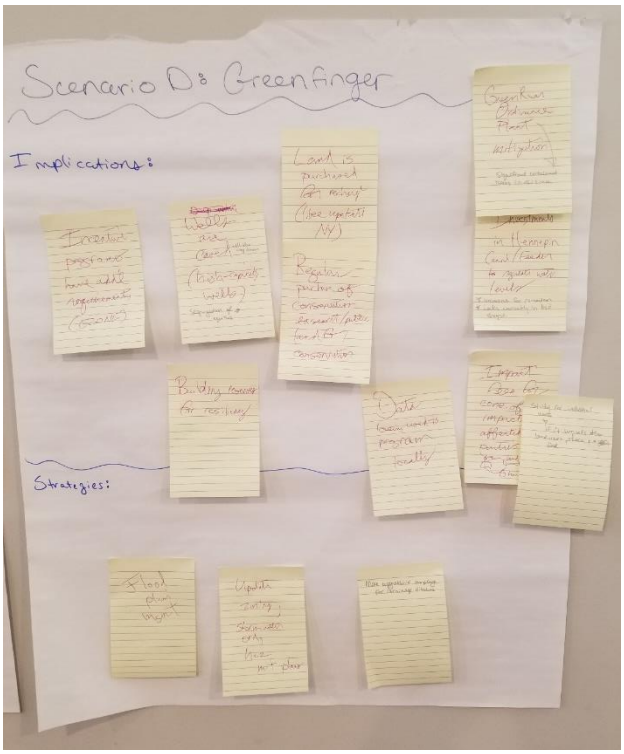
Implications

- What is likely to happen in each of these futures?
- What changes are agricultural producers likely to make?
- How is the public likely to react?
- What business will we lose?
- What business will we gain?
- How will ecosystems fare?

Strategies and Measures

- How do we respond (what projects, programs, policies, etc.)?
- Who responds?
- How do we know our strategies are succeeding?
- What are the outputs (quantitative)?
- What are the outcomes (quantitative and qualitative)?

Figure 7 - Implications and Strategies Poster



The two groups then came back together for 20-30 minutes to add to or comment on each other's results. The process was repeated for Scenario C - How Not to Drain Your Flagon and Scenario D - Greenfinger. BHRC refined the implications and strategies in Tables 25-26. All implications and strategies are grouped by active or passive response. Climate change is assumed for all.

Table 5 – Implications for Scenarios

Implications
Passive Response
• No action plans for how to respond to current or future events • Ineffective water resources outreach, education • No water conservation incentives or identified outcomes even if incentives are available • Natural hazards like flooding and erosion not dealt with proactively or systematically • Water availability diminished across industries, including manufacturing and recreation/tourism • Concerns about water under/over supply not communicated clearly, regularly, or effectively • Inability to effectively address large issues like requests for water from out-of-state businesses and governments or proposed major development in region • Limited coordination and relationships between water users, interest groups, governments, etc. • Little consideration for externalities with respect to water use • Overspend/underspend on infrastructure • Haphazard or no replenishment of natural systems and tree canopies
Active Response
• Water resources criteria added to building codes, zoning ordinances, stormwater management ordinances, floodplain management, etc. • Incentive programs (tax increment districts, enterprise zones, etc.) have additional requirements supporting responsible water use • Regular purchase of conservation easement and public land for conservation • Agriculture and industry have ample water supply throughout the year • Variety of important stakeholders are engaged in conversations about water conservation, water demand/supply • Water conservation as a habit in personal and professional endeavors • Systematic, long-term investment in built and natural environment related to water (reservoirs, delivery networks, streambanks, tree canopies)

Table 6 – Strategies for Scenarios

Strategies
Passive Response
<u>Measuring</u> • Track land use changes using assessor records, remote sensing data, etc. • Track conservation programs enrollment data (land trusts, state, federal, etc.) • Use NAICS/SIC codes, tax revenue, etc. to compare growth/decline in water-dependent industry   o Track water-dependent recreation/tourism growth/decline • Monitor use of central-pivot and other agricultural and industrial irrigation systems <u>Mitigating</u> • Many mitigation actions unlikely under passive response scenarios • Standard updates to land use and zoning maps/ordinances, storm water ordinances, and hazard mitigation plans • Floodplain management without monitoring, enforcement
Active Response

<u>Measuring</u>
• Aforementioned measurement strategies
• Track animal husbandry, crop production changes with voluntary local reporting
• Track water consumption in households using conservation subsidies
• Model selected stormwater flows and field tile drainage
<u>Mitigating</u>
• Water-focused updates to land use and zoning maps/ordinances, storm water ordinances, and hazard mitigation plans
• Support adoption of water reduction habits and measures through outreach, education, and incentives
  o Begin conservation outreach and education at a younger age
  o Develop programming along with public works, agricultural, and conservation groups
• Charge large water users appropriate rates and institute temporary higher rates in times of scarcity
  o Use additional revenue to support water conservation programs
• Provide water-use evaluations for homes and businesses
• Subsidize installation of low-flow fixtures and appliances
• Expand monitoring of central-pivot and other agricultural and industrial irrigation systems

- Incentivize agricultural producers to diversify crops planted and livestock reared (i.e., crops and livestock that consume less water)
- Expand training offerings for well drillers, public works workers, landscapers and other water professionals
- Tie business permitting and/or incentive programs to exceptional water management performance, impact fees
- Ensure that water use is part of business attraction RFI review process
- Infrastructure (natural or built) supports water reserves
    - Land is purchased for recharge
    - Water systems are measured and fortified
- Invest in Hennepin Canal Feeder infrastructure to regulate water level

Indicators

Finally, attendees were again divided into two groups, and each group was given two scenarios. Group 1 received both Extreme Climate Change scenarios (A and C), and Group 2 was given both Mild Climate Change scenarios (B and D). The groups had 30 minutes to discuss what indicators would help leaders decide when to employ the necessary strategies. The following questions were used as guidance:

- What are the indicators of each future?
- What qualitative or quantitative data do we use to establish each indicator?
- Who monitors each indicator?
- Contingent Responses - When should we respond to each indicator (that is, when should we implement a strategy)?
- Robust Responses - What strategies should we implement regardless of indicators?

Table 7 shows the responses of each group:

Table 7 - Indicators

Indicators for Climate Change	
Indicator	**Source**
# of crop insurance claims	USDA
# of flood insurance claims	FEMA
# of wind insurance claims	NOAA, NGOs
#of heat stroke deaths and waterborne illness	Health Dept.

Indicators for Regulations/Response	
Indicator	**Source**
# of complaints or petitions brought forth to municipalities	Survey of local gov't
# and types of permits	Survey of local gov't
# of well permits	Survey of local gov't
# of municipal ordinances on the topic of water resources	Survey of local gov't

# of average days above 100 degrees F and nights above 70 degrees F	ISWS, Weather Service
Changes in crop production over 5 years	Farm Bureau, NRCS
Dissolved oxygen levels of rivers, lakes, etc.	EPA, USGS
Water temperature of rivers, lakes, etc.	EPA, USGS
Flood stage frequency	NOAA
Hydroelectric output	n/a
Depth of freeze	Weather Service, NOAA
Tree canopy coverage/heat island analysis	NGOs

# and type of businesses coming and leaving	BEA, NGOs
Municipal water main breaks and water use restrictions	Survey of local gov't
Land acreage in conservation	IDNR, NGOs
General land cover data	Survey of local gov't
Municipal water use and discharge	Survey of local gov't, EPA, USGS, ISWS
Development in floodplain	Survey of local gov't

Post-workshop 2 Webinar

February 10, 2023, BHRC hosted a post-workshop webinar to give an overview of Workshop 2 to stakeholders that were unable to participate. There were no questions. The recording was emailed to all stakeholders and posted to the BHRC website.

4.3 Conclusion

The future of Illinois' water resources remains uncertain. While reports from ISWS[5] and The Nature Conservancy[6] hypothesize the state will likely have an abundance of water in the coming decades, the availability of that water will depend on multiple factors, such as season, ownership, population, and quality. Planning now will hopefully allow those who rely on the water in and resources from the GRL to quickly adapt to as yet unknown futures.

The scenario planning process has afforded RPOs working in the area a better understanding of threats to and opportunities for the region's water supply. While climate change was a primary driving force for all subregional scenario workshops, the GRL team would likely not have chosen regulation change as a secondary axis without input from regional stakeholders.

Equally as important, several workshop attendees asked for contact information to keep in touch with other attendees, strengthening water stakeholder networks in Illinois.

5. Lower Rock River Subregion

5.1 Introduction

5.1.1 Background and Setting

In June 2022, BSRC began facilitating a series of water scenario planning workshops focused on the lower Rock River region in the Quad Cities area. Unlike counties in other subregions, Rock Island County relies heavily on surface water from the Mississippi River to meet user demand. Thermoelectric power generation is the largest driver – typical of areas that have a power station[2]. The second highest demand is public supply, trailed closely by self-supplied industrial and commercial. In the Rock River study area, Rock Island County accounts for about half of all self-supplied industrial and commercial demand. In Henry County, the largest sector for water demand is self-supplied irrigation, livestock, and environmental followed closely by public supply.

5.1.2 Overview of the Scenario Planning Process

The process for this subregion consisted of a kick-off webinar and then a background webinar. BSRC hosted two in-person workshops – one for developing driving forces and another for creating a scenario matrix. A wrap-up webinar capped off the effort. Attendance for the workshops varied (15 at the first, 11 at the second). Subsequent to each workshop, a summary was emailed to stakeholders for further review and feedback. Following the wrap-up webinar, BSRC compiled a final report.

5.1.3 Methods

This scenario planning effort was undertaken to bring stakeholders together to build consensus regarding future water supply/demand. Representatives from the agriculture sector, cities, counties, recreation, and environmental groups as well as water and groundwater scientists and industry professionals were invited to participate. 20 attendees joined the kick-off webinar, 23 attended the background webinar, 15 attended the first workshop, 11 attended the second workshop, and 15 attended the wrap-up webinar. Both workshops were held at the Moline Public Library. Participants were challenged to think in terms of ecosystems, changing weather patterns, water demand, and public policy. Stakeholder diversity produced interesting dialogue regarding envisioned futures, pathways to investment, and regional goals.

Planning participants were asked to envision multiple scenarios and corresponding strategies. At the first workshop on driving forces, participants identified and prioritized two driving forces that later were used to create plausible futures at the scenario matrix workshop. After such futures were identified by those attending, potential strategies and action items were drawn out by facilitators.

5.2 Water Scenario Planning Workshops

5.2.1 Pre-Workshop Webinars

Kick-Off Webinar

The kick-off webinar for the Rock Island County area was held at the end of June 2022. It outlined the scenario planning process and explained the Rock River region supply/demand project dating back to 2018. More than 20 stakeholders attended.

Background Webinar

Following the kick-off webinar, stakeholders requested additional background on water supply demand for the Northwest Illinois region. Speakers from ISWS and the Rock Island County Soil and Water Conservation District (Rock Island SWCD) helped BSRC outline the planning framework and current efforts of the area's watersheds.

Daniel Abrams, Jason Zhang, and Walt Kelly of ISWS discussed water demand in the region, groundwater and surface water supply, water quality, and floodplain mapping efforts. The 2018 ISWS report that analyzed whether there would be enough surface and groundwater to meet projected use was referenced. Groundwater levels have actually increased since the 1990s and were characterized as stable for both shallow and deep sources. Mineralization affects water quality in the deep sources, while human and animal pollution sources impact shallow aquifers. Regarding surface water, data indicates slow changes in Rock River flow. On average, the Rock River flow is 9,000 cubic feet per second, and the flow has been increasing since 1970.

Rich Stewart of Rock Island SWCD provided an overview of the district's recent work with watersheds. He outlined projects in the Copperas Creek area, including the development of a watershed plan. The district is also taking lessons learned to develop a watershed plan for Mill Creek. These projects were funded to address non-point source pollution, including erosion. Examples of pollution control measures were illustrated, such as wetland restoration, streambank erosion control measures, and field tile bioreactor nitrate capture systems, among others.

5.2.2 Workshop 1 Process and Results

Driving Forces

At the end of August 2022, BSRC held the first of its two scenario planning workshops. The first defined driving forces for water demand and supply based on the focal question, "What does a sustainable and clean water supply (ground and surface water) for multiple users look like in the year 2060?". This set the foundation for the second workshop on the development of a scenario framework. BSRC staff presented an overview of the two webinars and goals for the workshop. Participants were split into three groups of five people. Each group included a mix of resource, public, not-for-profit, and private sector representatives.

Next, individuals were asked to create a list of driving forces that presently and may in the future impact water availability. Examples assembled into five categories of driving forces (social, technological, environmental, economic, and policy/politics or STEEP) were given. Groups shared ideas and picked two priority driving forces, writing them on sticky notes. The notes were added to a poster at the front of the room with STEEP categories outlined. All individuals were given four sticky dots and asked to place the dots on the most critical/important driving forces.

Table 8 shows the driving forces posted onto the STEEP poster and the number of votes each received.

Table 8 – Categorized Driving Forces

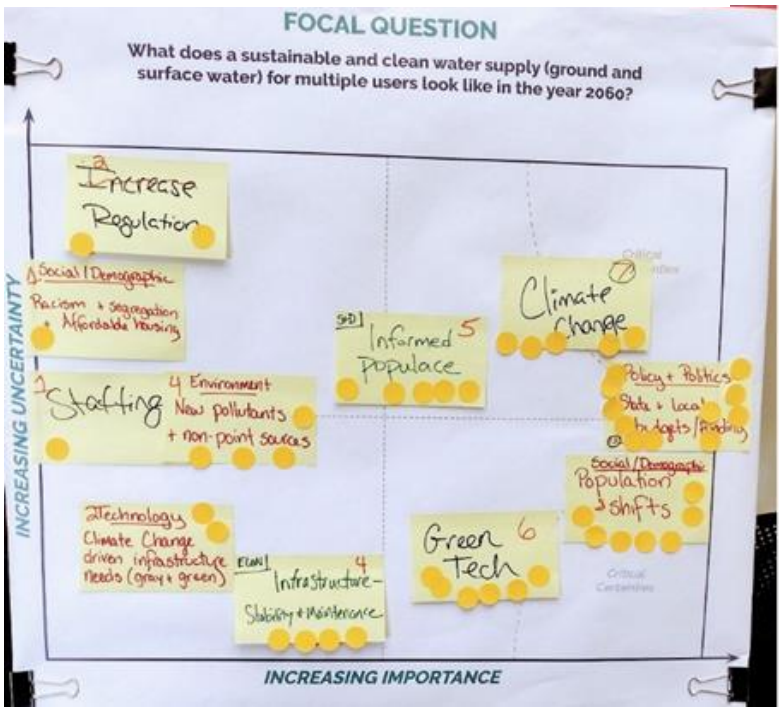
Social and Demographic	Technology	Economic
Informed Populace **[5]**	Green Tech **[6]**	Infrastructure Stability and Maintenance **[4]**
Population Shift **[8]**	Climate Change-driven Infrastructure Needs (gray and green) **[2]**	Fossil Fuels (e.g., costs and renewables) **[0]**
Racism/Segregation/ Affordable Housing **[1]**	Cost of Technology **[0]**	Risky Development (e.g., floodplains and levees) **[0]**

Environment	Policy and Politics
Climate Change **[7]**	Increase Regulations **[2]**
New Pollutants and Non-point Sources **[4]**	State and Local Budgets/Funding **[12]**
Extinction Crisis **[0]**	Staffing **[1]**

Critical Uncertainties

A second poster then introduced a matrix with "Increasing Uncertainty" on the Y-axis and "Increasing Importance" on the X-axis. All driving forces that previously received votes were moved to the new poster by consensus, and participants rated each driving force on where it fell on the matrix. Of the three driving forces of most importance, climate change was listed as the most uncertain, with state and local budgets/funding below it and pollution shifts at the bottom.

Figure 8 - Important and Uncertain Driving Forces



Participants chose "climate change" and "state/local budgets/funding" as the two driving forces to focus on for Workshop 2. Later, BSRC staff would develop four scenarios from this information. BSRC also summarized the results of the first workshop and emailed information collected to stakeholders.

5.2.3 Workshop 2 Process and Results

Refining Narratives

The purpose of Workshop 2 was to review and comment on the four scenarios created from the driving forces and develop potential mitigation strategies. The workshop began with an overview of the work to date and an explanation of two driving forces chosen in Workshop 1:

- Climate Change – More Water or Variable Water Supply
- Funding – Low to High

Participants were asked if any options were missed in Workshop 1, but all agreed the chosen driving forces were optimal.

Attendees were divided into groups of 3 to 4 people to examine the scenario matrix. Again, each group included a mix of resource, public, not-for-profit, and private sector representatives. BSRC used the notes in Figure 9 to develop four credible, compelling, challenging, and diverging versions of the future. Participants were asked to review these notes and provide comment.

Figure 9 - Implications of Driving Forces

X- Axis: Climate Change.
Will climate change have an effect on having a sustainable and clean water supply based on climate trends of more variability between wet and dry periods?

No - (-X) More Certain	Yes - (+X) Less Certain
Water demand stable for towns	Water demand more sensitive for ag and industry
Precipitation overall increasing or in excess	Precipitation inconsistent and unpredictable over 30 years
Less need for storage capacity	More need for storage capacity in drought situations
More flooding – pollutant dispersal	Less predictable flooding and drought cycles – pollutant concentration
Emissions reductions are slow	Emission reductions are urgent
Temperature variability moderate	Temperature variability extreme
Inundation impacts on land use	Managing water-level uncertainty from year to year

Y-Axis: Funding Resources/Budgets – Local, State, and Federal/Public and Private

Will there be a shortage of funding resources to address water demand mitigation strategies as a result of climate change to sustain a clean water supply?

No - (-X) More Predictable	Yes - (+X) Less Predictable
Budgets allow more funded priorities	Budget priorities more competitive
Informed populace	Uninformed populace
Population growth/in migration	Population loss/out migration
Housing shortage/equity	Housing surplus/equity
Staffing capacity	Staffing shortages
Infrastructure expansion potential	Infrastructure contraction or no expansion
Maintenance stability	Maintenance instability
Resources for innovation (green tech)	Limited resources for innovation

Scenario Development

Each group received a summary of the scenario matrix narratives developed by BSRC staff and were assigned two to review. The scenarios are included in Table 9.

Table 9 – Water Supply Demand Scenarios Matrix

Springing to Action	Moving Muddy Waters
More Water **Funding Availability** Water demand is stable for towns and sufficient for industry/ag. Water is abundant. The lower Rock Region is seeing more frequent and longer duration flooding. Flooding contributes to increased sediment and pollution in the river. Emission reduction actions are limited or slow to be initiated. Inundation significantly impacts land use in the region, limiting farming and impacting homes/businesses. Resources are plentiful allowing for a variety of options and priorities to be funded.	**Water Variable (Highs/Lows)** **Funding Availability** Water demand is more sensitive to inconsistent and unpredictable precipitation, particularly for unreliable water levels due to fluctuations from wet to dry periods. More need for water storage, either physical storage units or wetland reserves. Dry periods concentrate pollutants and wet periods disperse pollutants. Temperature extremes of heat/cold create infrastructure and water distribution issues. Variability makes it difficult to use certain areas of the watershed. Funding is available, but priorities are not clear.
Rising Waters - No Paddle	**Water Ripples - No Boat**
More Water **Funding Limitations** Similar to "Springing to Action." Water is plentiful, but contributes to more frequent flooding and inundation of homes, businesses, and farm fields. Resources are limited to address the climate impacts on the lower Rock River. Infrastructure maintenance is not keeping pace with the impacts of flooding and more precipitation (rain or winter storms).	**Water Variable (Highs/Lows)** **Funding Limitations** Similar to "Moving Muddy Waters," climate created variability makes it difficult to predict and plan for unreliable water levels. In drought, there is higher water demand by ag for irrigation. In wet periods, there is crop loss and damage to building structures. Funding is limited and there are many needs left unmet.

Each group was tasked to choose three top uncertainties for their two scenario quadrants and then add the sticky note with those uncertainties to the appropriate matrix on a poster at the front of the room. The group then refined and clarified the scenarios based on all of the information. The feedback is noted as follows:

Springing into Action

- Flood impacts can be mitigated with increased funding

Moving Muddy Waters

- Variable events make it difficult to plan for events
- Variable events require larger and more expensive infrastructure to deal with larger extreme events

- Where is the funding coming from? Tax base increases, political will, or donations?
- Deeper water sources/sources to reach
- Variable events cause out-of-season flooding and drought events that impact agriculture

Rising Waters - No Paddle

- Partnerships/collaboration to pool/leverage resources better
- Tax incentives to businesses to create solutions and make changes
- Green infrastructure offsets conventional methods
- More federal programs dollars

Water Ripples - No Boat

- Public-private partnerships foster input and mutual benefits
- Turnover of public officials
- Finding common ground solutions to make biggest impacts
- Completing budgets

This exercise helped to refine the four scenarios and prepare the group for a discussion on mitigation strategies in Exercise 2.

Mitigation Strategies

The second exercise focused on discussion of mitigation strategies to address the four possible futures. As there were only three groups, each was assigned one scenario, and the fourth scenario was completed by all participants. After writing mitigation strategies on sticky notes, participants added the notes to the appropriate position on a scenario poster. Table 10 shows the mitigation strategies developed.

In scenarios where water is variable, participants focused on wetland restorations, updating construction stormwater standards, and staying updated on any floodplain changes and green technology as strategies for confronting those futures.

In scenarios where funding is ample, participants focused on infrastructure improvements and possibly making updates so both mitigation and storage are in one system. Participants included ensuring money is allocated for vulnerable populations and spending and data are transparent. The meeting participants suggested that funding limitations could be mitigated by creating public-private partnerships, enhancing volunteer efforts, and using public education systems to educate youth about the issues and improvements.

Participants also recommended the subregion should not only focus on the lower Rock River but also look at upstream impacts.

Table 10 - Mitigation Strategies

Springing to Action
• Prioritize infrastructure investment – sewage treatment for clean water • Wetland restoration and ecosystem protection • Review and update construction standards for improved stormwater management to address changing climate impacts • Shift existing floodplain land use to lower intensity land use – passive recreation • Advertise water abundance as a resource and asset
Moving Muddy Waters
• Invest in planning and data analyses • Ensure money is allocated to mitigate in areas where vulnerable populations are at risk for flooding and other detrimental impacts • Use transparency in funding and data decision-making • Update infrastructure in a comprehensive manner, including use of green infrastructure, removal of impervious surfaces, and use of other mitigation strategies and increased floodplain storage capacity • Use rainwater capture and storage for non-potable applications (landscaping and agriculture) • Invest in public outreach and education
Rising Waters - No Paddle
• Raise or relocate land uses to reduce loss of life and property damage (e.g., pursue FEMA dollars) • Develop more wetlands, cover crops, filter strips, bioswales • Adjust flood parameters • Incorporate green technology practices • Advocate for green public policy
Water Ripples - No Boat
• Forge public private partnerships to foster input and mutual benefits • Find common ground solutions that make the biggest impacts • Enhance volunteer efforts • Address turnover of public officials through on-going education and information-sharing • Set priorities to minimize competing budgets • Use public education curriculums to educate youth on climate and water resources management best practices

5.5.4 Water Scenario Planning Wrap-up Webinar

BSRC staff provided a review of the scenario planning effort based on studies completed for the Rock River between 2018 and 2021 as well as the results of Workshop 1 and 2. At the end of the presentation, there was a Q&A session. One participant asked whether crop insurance in a floodplain was possible (Answer: it is possible but not cost effective). Another question was raised on whether there were any common themes between the three planning areas – upper Rock River, Green River lowlands, and lower Rock River. Climate change was common among the three areas as an important

uncertainty to explore. No other questions or comments were raised, and no edits were made to the Workshop 2 input.

5.3 Conclusion

For the lower Rock River planning process, stakeholder participation was weighted to government and environmental organizations with some agricultural interest. There were few industry/commercial interests represented. The four plausible futures centered around the two driving forces of climate change – specifically more water or more variable weather – and funding availability.

In futures with more water, sufficient or increased funding produced strategies focused on infrastructure improvements and refining standards. Where there was less funding, strategies focused on advocacy and incremental integration of best practices, technology, and agricultural approaches. Under more precipitation variability, strategies surrounding mitigation practices, increasing floodplain storage capacity, and outreach prevailed. With more variability and less funding, strategies focused on partnerships and voluntary solutions. These all provide a framework for next steps.

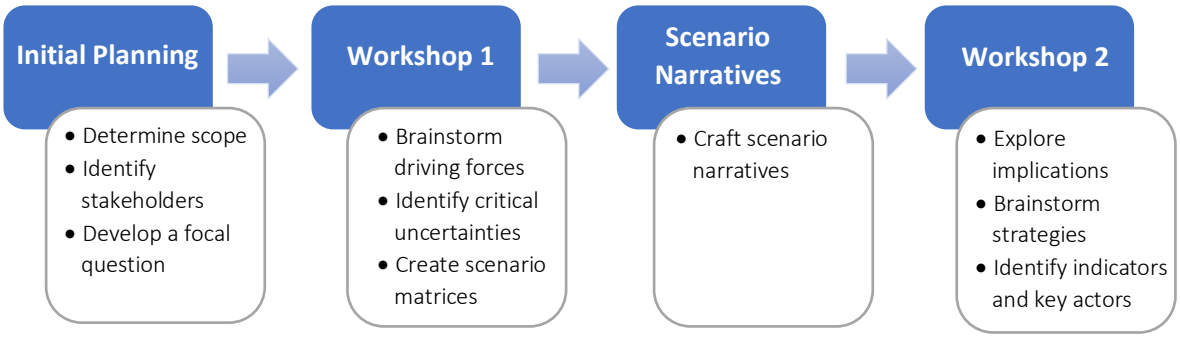
6. Summary

6.1 Workshops

6.1.1 Overview

A typical scenario planning process follows a structure resembling the following:

Figure 10 - Typical Scenario Planning Process



This structure was used by all three subregions. However, due to stakeholder location, staff capacity, and workshop timing, each process somewhat differed.

6.1.2 Stakeholders

Prior to the workshops, planning partners developed a stakeholder list. Attendees included those from public and private organizations such as soil and water conservation districts, park districts, county farm bureaus, and private water providers. All five workshops had at least one ISWS representative present; ISWS also spoke at two workshops.

Attendance was robust at initial workshops but declined with subsequent ones. BHRC had 23 unique attendees, 5 of which attended both workshops. BSRC had 20 unique attendees; 6 participants attended both workshops. R1PC had 27 unique attendees and 14 participants that came to at least two workshops.

6.1.3 Structure

Each effort included kick-off webinars to introduce stakeholders to the scenario planning process. BSRC held an additional webinar to give background information on the region. After each workshop, the organizers summarized findings for stakeholders. R1PC emailed written reports, BHRC held webinars, and BSRC emailed a written report after workshop 1 and held a webinar after workshop 2.

Figure 11 - BHRC Scenario Planning Process

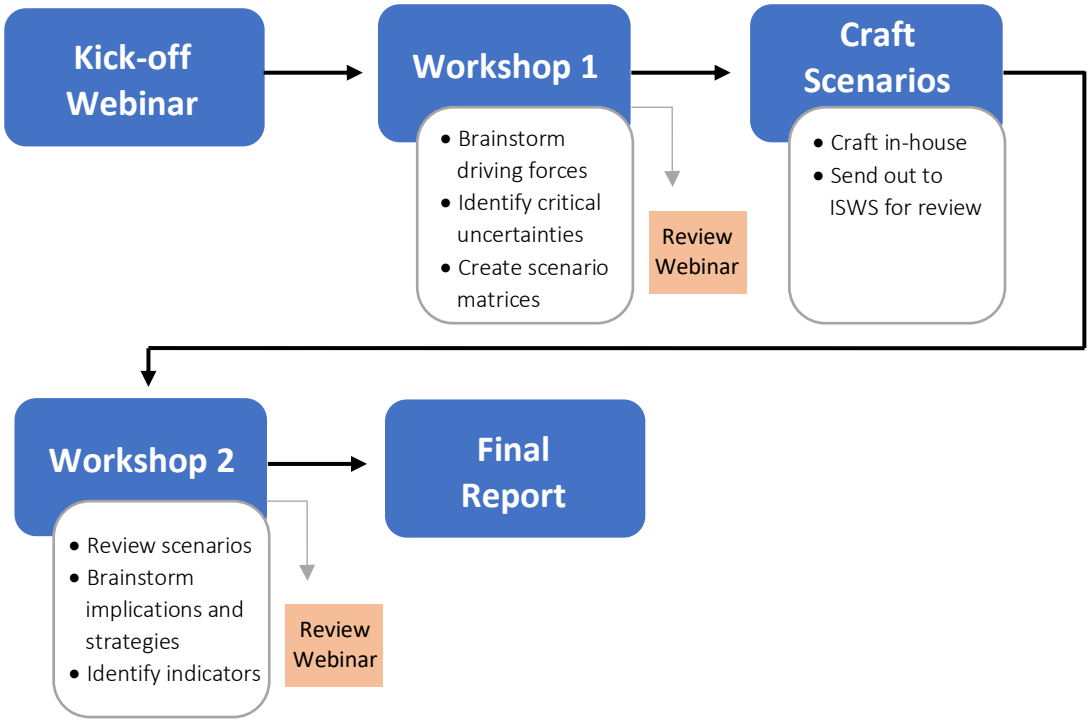
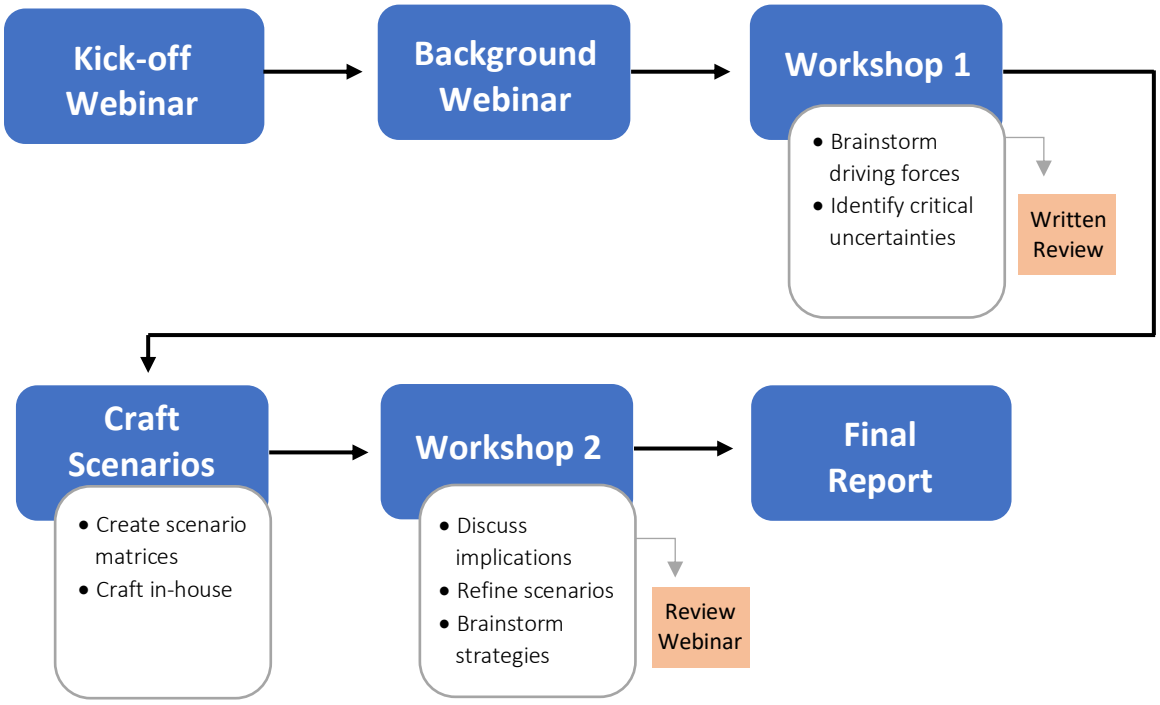
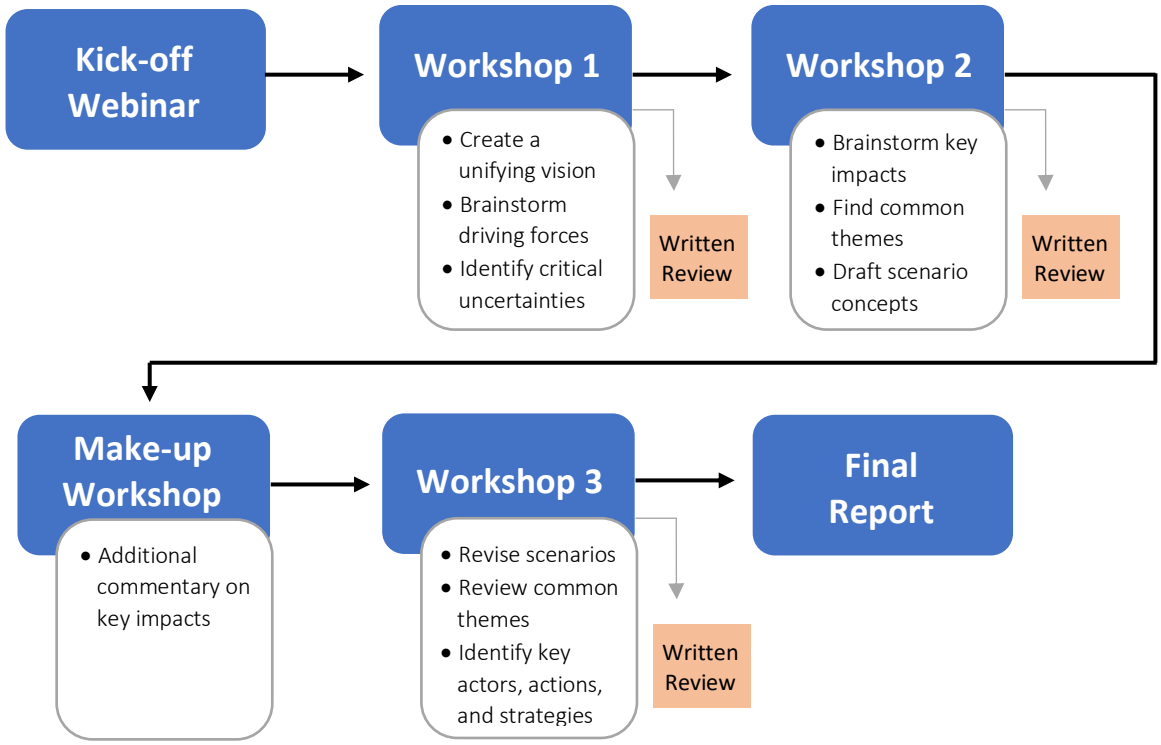


Figure 12 - Bi-State Scenario Planning Process



Both BHRC and BSRC decided on a two-workshop approach. Driving forces for water demand were identified in the first workshops, and two of these driving forces were identified as critical uncertainties to be used in scenario creation. Staff created the scenarios. The second workshops focused on refining the scenario narratives and identifying strategies to address each scenario. BSRC divided its time between these two objectives; BHRC focused most of its second workshop on strategies. For these reasons, BSRC had narratives with stronger community input, and BHRC had more data for implementing strategies.

Figure 13 - R1PC Scenario Planning Process



R1PC held three regular workshops and one make-up workshop. As with BHRC and BSRC, R1PC's first workshop concentrated on identifying driving forces and critical uncertainties. Workshop 1 also included a visioning process. Workshop 2 focused on developing participant-led drafts of the four scenarios, which R1PC staff later refined. The final workshop reviewed these narratives before turning to strategy development.

R1PC and BSRC workshops were 2.5 hours long; BHRC workshops were 4 hours. The majority of R1PC's participants were located in the same city as R1PC offices, enabling more frequent, shorter workshops, which may have contributed to higher participation rates in the subregion.

6.2 Driving Forces

6.2.1 Overview

Though each effort covered different geographies – a large county with a metropolitan population, a heavily irrigated agricultural area, and a two-county region with one of Illinois' largest cities – there were many similarities among the suggested driving forces.

Table 11 - Common Driving Forces

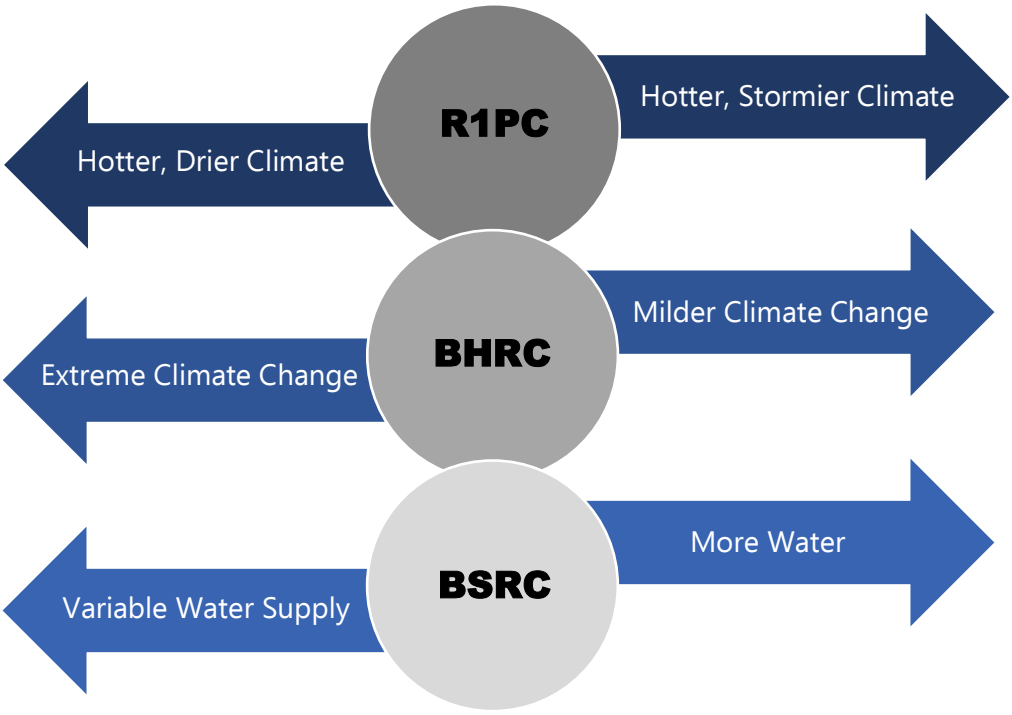
Common to All	
• Climate Change • Informed Populace • Aging and Updated Infrastructure • Population Changes • Water Quality	• Regulatory Environment • Funding and Effectiveness of Government • Green Technology

R1PC and BHRC	R1PC and BSRC	BHRC and BSRC
• Economic Development in Industry and Agriculture • Community Wealth • Restoration and Enhancement of Natural Resources	• Social Equity and Water Resources • Flood Mitigation • Ecosystem Collapse	• Fossil Fuels

6.2.2 Climate Change

In all three planning processes, participants identified climate change as a critical uncertainty. It consistently placed high in the categories of uncertainty and impact on water demand. Each process defined extents differently – apparent testimony to climate change's uncertainty.

Figure 14 - Climate Change Extents

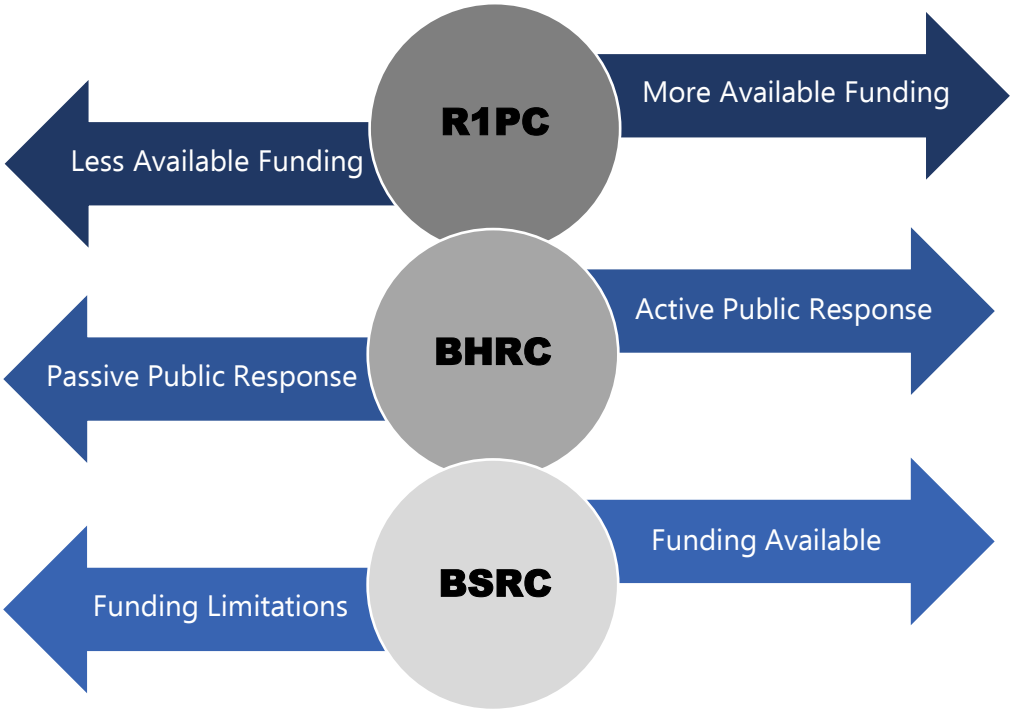


R1PC and BSRC had the most similar climate scenarios: one extreme indicated more variability in precipitation across the seasons, and the other suggested more precipitation all year. Both of BHRC's climate scenarios agreed with the drier (R1PC) and variable (BSRC) scenarios, but BHRC did not have a scenario with a wetter future year-round. BHRC's two poles looked at the extremes of climate variability. Both R1PC and BHRC agreed that temperatures would rise regardless of the scenario. BHRC went into greater detail, proposing that in one possible future, temperatures would rise rapidly and extreme temperature days would occur with more frequency. BSRC mentioned that temperatures would swing between hot and cold extremes in its variable water supply scenarios.

6.2.3 Public Response

While the second driving force differed between the three groups, all were concerned with public response. R1PC and BSRC both focused on the availability of funding to address water demand, whereas BHRC took a broader view on reactions to water regulations.

Figure 15 - Public Response Extents



While BHRC's scenarios do not explicitly mention a financial aspect, an active response (e.g., purchasing land for conservation and incentive programs) would necessitate increased funding. In two of R1PC's scenarios, funding increased as a reaction to the clear impacts of climate change, suggesting an active response. Across all groups, the active response or more funding scenarios permitted an increase in the number of programs and activities, stronger data collection measures, and strengthened infrastructure. Strategies that dealt with bolstering regional alliances and prioritizing available funds were used in passive reactions and scenarios with limited funding.

6.3 Strategies

6.3.1 Overview

Scenario planning often includes strategies that are common to all scenarios and those unique to individual scenarios. Common-to-all strategies can be implemented regardless of which future occurs, whereas unique strategies tend to be implemented based on indicators for a particular scenario.

Both R1PC and BHRC consolidated their strategies. BSRC's unique strategies are noted in Section 5.2.3. We have distilled the strategies from the various workshops into a limited list of regional action items. The development of more complete action plans, especially those focused on subregions, by the RPOs is recommended.

6.3.2 Strategies

Category 1. Partnerships and Regional Efforts		
#	**Strategy**	**Actors**
1.1	Explore the creation of a regional water authority to regulate and permit large capacity withdrawals for industrial and commercial use	Water Utilities, NGOs, Agricultural Producers, Consultants, Local Governments
1.2	Explore the creation of a water utility consortium to expand data sharing and access to funding for more expensive infrastructure	Water Utilities, NGOs, Local Businesses and Agriculture, Consultants, Local Governments, Government Agencies
1.3	Create a regional water group that facilitates collaboration with regional organizations for communication, monitoring, and data sharing	Water Utilities, Consultants, NGOs, Local Businesses and Agriculture, Government Agencies
1.4	Enhance volunteer efforts by water stakeholders at all levels	NGOs, Educational Institutions, Water Utilities

Category 2. Planning		
#	**Strategy**	**Actors**
2.1	Develop and implement a regional plan of best management practices that can be used to establish comprehensive water conservation requirements	Government Agencies, Consultants, Water Utilities, NGOs
2.2	Using the best management practices plan in 2.1, make water-focused updates to established plans such as: • Land use plans as well as zoning, subdivision, and storm water ordinances • Hazard mitigation and floodplain management plans • Building codes • Design and construction standards	Local Governments, Planning Organizations
2.3	Assess floodplain land with high intensity uses and switch to lower intensity land use if necessary	Local Governments, Planning Organizations
2.4	Set priorities through efforts such as capital improvement plans to minimize competing budgets and ensure money is allocated to areas where vulnerable populations are at risk	Local Governments, Planning Organizations

Category 3. Local Government		
#	**Strategy**	**Actors**
3.1	Advocate for sustainability-minded public policy and back regional and local organizations in water planning and conservation efforts	Local Governments
3.2	Assist home and business owners with water conservation efforts by: • Providing water-use evaluations • Subsidizing installation of low-flow fixtures and appliances	Local Governments, Government Agencies, Water Utilities, NGOs
3.3	Be transparent in funding and data decision-making to maintain public trust in and support of conservation efforts	Local Governments

Category 4. Business and Economy		
#	**Strategy**	**Actors**
4.1	Partner with power producers to reduce energy inefficiencies on site	Government Agencies, Water Utilities, Power Producers
4.2	Tie business permitting, incentive programs, and/or impact fees to exceptional water management performance	Government Agencies, Local Government, Economic Development Organizations
4.3	Highlight businesses that meet best practice standards as outlined in 2.1	Government Agencies, Local Government
4.4	Evaluate and assess current water pricing, charge users rates based on use, and institute temporary higher rates in times of scarcity	Government Agencies, Local Government, Water Utilities
4.5	Make water management practices a part of the request for information review process for business attraction	Local Government, Economic Development Organizations
4.6	Incentivize agricultural producers to diversify crops planted and livestock reared	Government Agencies, Local Government, Agricultural Producers
4.7	Support voluntary reporting among agricultural producers to track local changes	Government Agencies, Local Government, Agricultural Producers, NGOs
4.8	If current trends continue, water abundance may be marketed as an asset	Local Government, Tourism, and Economic Development Organizations

Category 5. Infrastructure		
#	**Strategy**	**Actors**
5.1	Use increased fees from any water rate hikes and conservation pricing to improve water infrastructure	Government Agencies, Local Government, NGOs
5.2	Update infrastructure in a comprehensive manner, including: • Use green infrastructure such as cover crops, filter strips, and bioswales • Reduce the extent of impervious surfaces • Increase floodplain storage capacity • Enhance existing and restore depleted wetlands • Update wastewater treatment facilities as well as public water supply and disposal systems	Government Agencies, Local Government, NGOs

Category 6. Education		
#	**Strategy**	**Actors**
6.1	Communicate true cost of water production and treatment; address cost impacts of past and potential future deferred maintenance	Government Agencies, Local Government, NGOs, Educational Institutions
6.2	Promote conservation habits among the public such as: • Reducing imported (e.g., bottled water) consumption • Rainwater capture and storage for non-potable purposes such as landscaping and agriculture • Demonstrations of comparative water use	Local Government, NGOs, Educational Institutions
6.3	Evaluate and develop water supply/demand curriculum in local schools and at other educational venues (e.g., community colleges, libraries, and park districts)	Educational Institutions, NGOs, Government Agencies, Consultants
6.4	Introduce water-supply careers and related educational opportunities in schools	Educational Institutions, Government Agencies
6.5	Expand training offerings for local water professionals, including public officials	Government Agencies, NGOs, Educational Institutions, Consultants

Category 7. Technology and Data Collection		
#	**Strategy**	**Actors**
7.1	Reduce water loss through implementing advanced metering infrastructure	Government Agencies, Local Government, Water Utilities
7.2	Model selected stormwater flows and field tile drainage	Government Agencies, NGOs
7.3	Continuously integrate new water monitoring and conservation technologies into existing infrastructure	Government Agencies, Local Government, Water Utilities
7.4	Incorporate advanced treatment technology for emerging contaminants and non-conventional sources of water	Government Agencies, Local Government, Water Utilities, NGOs
7.5	Track or improve data tracking in the following areas: • Land use changes • Conservation programs enrollment • Growth/decline in water-dependent industries • Use rates/aquifer levels related to central-pivot and other agriculture and industrial irrigation systems • Water consumption in households	Government Agencies, Local Government, Water Utilities

Category 8. Hyper-Local Projects		
#	**Strategy**	**Actors**
8.1	Invest in Hennepin Canal Feeder infrastructure in the Green River Lowlands to regulate water level	County and Municipal Governments, Government Agencies, Local NGOs

7. References

7.1 Endnotes

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7.3 Photography

- Cover photos provided by Andrew Shaw of Blackhawk Hills Regional Council

8. Appendices

8.1 Workshop Attendees

8.1.1 Region 1 Planning Council

Workshop 1

R1PC Staff

- Shelby Best, Sustainability and Resiliency Coordinator
- Caitlin Eastman, Water Resource Specialist
- Austin Powell, Sustainability Project Associate

Attendees

- Kelly Saunders, North Park Water District
- Jamie Rott, City of Rockford
- Abby Ebelherr, BHRC
- Michael Groves, Forest Preserves of Winnebago County
- Walt Kelly and Daniel Abrams, Illinois State Water Survey
- Wei Han, Illinois Department of Natural Resources
- Tim Holdeman, Engineering Enterprises, Inc.
- Jim Groose, WaterSurplus
- Kerry Leigh, Natural Land Institute
- Tim Bragg, Rockford Park District
- Jas Bilich, Winnebago County Regional Planning
- Scott Kuykendall, McHenry County Planning and Development
- Dennis Anthony, Winnebago County SWCD
- Neeley Erickson, Illinois Realtors
- Dan Obert, Rockford Area Convention and Visitors Bureau
- Teagan Duffy, Boone County SWCD
- Don Daniels, Rockford Chamber of Commerce
- Sean Van Bergen, Winnebago County Highway Department

Workshop 2

R1PC Staff

- Shelby Best, Sustainability and Resiliency Coordinator
- Caitlin Eastman, Water Resource Specialist
- Austin Powell, Sustainability Project Associate

Attendees

- Kent Cox, Illinois Rural Water Association
- Dan Kane, Boone County Conservation District
- Mike Groves, Winnebago County Forest Preserve

- Abby Ebelherr, BHRC
- Dan Obert, Rockford Area Convention and Visitors Bureau
- Dennis Anthony, Winnebago County SWCD
- Therese Thill, City of Rockford
- Daniel Abrams, Illinois State Water Survey
- Scott Kuykendall, McHenry County
- Brent Anderson, City of Belvidere
- Pamela Lopez-Fettes, Growth Dimensions
- Teagan Duffy, Boone County SWCD
- Todd Marshall, Winnebago County Health Department
- Justin Krohn, Boone County

Workshop 3

R1PC Staff

- Shelby Best, Sustainability and Resiliency Coordinator
- Austin Powell, Sustainability Project Associate

Attendees

- Wei Han, Illinois State Water Survey
- Scott Kuykendall, McHenry County
- Brent Anderson, City of Belvidere
- Teagan Duffy, Boone County SWCD
- Todd Marshall, Winnebago County Health Department
- Isamari Mandujano, Boone County Planning
- Tim Holdeman, Engineering Enterprises, Inc.
- Jim Groose, WaterSurplus
- Kelly Saunders, North Park Public Water District
- Jamie Rott, City of Rockford
- Walt Kelly, Illinois State Water Survey
- Tim Bragg, Rockford Park District
- Neeley Erickson, Illinois Realtors

8.1.2 Blackhawk Hills Regional Council

Workshop 1

BHRC and NCICG Staff

- Abby Ebelherr, BHRC Regional Planner
- Kevin Lindeman, NCICG Executive Director
- Daniel Payette, BHRC Executive Director

Attendees

- Vlad Iordache, Illinois State Water Survey
- Ashly Whaley, Ogle County Health Department
- Marcia Heuer, Ogle County Board
- Dee Duffy, Lee County Zoning
- Kent Cox, Illinois Rural Water Association
- Chuck Ewen, Illinois Rural Water Association
- Kaleb Baker, Illinois Audubon Society
- Matt Lillpop, Whiteside County Farm Bureau
- Suzy Stickle, Whiteside County Building and Zoning
- Don Meyer, Illinois Farm Bureau
- Ed Juracek, Carroll County SWCD
- Anna Kubas, Illinois American Water
- Harold Albrecht, Albrecht Well Drilling
- Beckie Maddox, Constellation Energy (Exelon)
- Alex Stuedemann, TPC Deere Run
- Walt Kelly, Illinois State Water Survey
- Randi Kohlbauer, City of Freeport
- Danelle Burrs, Lee County Farm Bureau
- Wei Han, Illinois Department of Natural Resources

Workshop 2

BHRC and NCICG Staff

- Abby Ebelherr, BHRC Regional Planner
- Daniel Payette, BHRC Executive Director
- Andy Shaw, BHRC GIS Mapping and Enterprise Zone Specialist

Attendees

- Vlad Iordache, Illinois State Water Survey
- Jennifer Bizarri, BSRC
- Suzy Stickle, Whiteside County Building and Zoning
- Gena McCullough, BSRC
- Larry Russell, Whiteside County Board
- Dee Duffy, Lee County Zoning
- Ed Juracek, Carroll County SWCD
- Harold Albrecht, Albrecht Well Drilling

8.1.3 Bi-State Regional Commission

Kick-Off Webinar

Attendees (representatives from the following organizations)

- BHRC
- City of East Moline
- City of Moline
- City of Rockford
- Environet Midwest
- Illinois Audubon Society
- Illinois Department of Natural Resources
- Illinois State Water Survey
- NCICG
- North Park Water District
- Riverstone Group
- Rock Island Arsenal
- Rock Island SWCD
- Rock River Trail Initiative
- US Fish and Wildlife Service
- Village of Milan

Background Webinar

BSRC Staff

- Gena McCullough, Assistant Executive Director/Planning Director
- Jennifer Bizarri, Planner

Attendees (representatives from the following organizations)

- American Rivers
- BHRC
- City of Moline
- Environet Midwest
- Illinois Corn Growers Association
- Illinois Department of Natural Resources
- Illinois State Water Survey
- NCICG
- Natural Land Institute
- River Action
- Rock Island County Farm Bureau
- Rock Island County SWCD
- Rock River Trail Initiative
- TPC Deere Run
- University of Illinois Extension

- Village of Milan

Workshop 1

BSRC Staff

- Gena McCullough, Assistant Executive Director/Planning Director
- Jennifer Bizarri, Planner

Attendees (representatives from the following organizations)

- American Rivers
- BSRC
- BHRC
- City of East Moline
- City of Moline
- Illinois State Water Survey
- Living Lands and Waters
- River Action
- Rock Island County Farm Bureau
- Rock Island County SWCD
- U.S. Army Corps of Engineers

Workshop 2

BSRC Staff

- Gena McCullough, Assistant Executive Director/Planning Director
- Jennifer Bizarri, Planner

Attendees (representatives from the following organizations)

- BSRC
- BHRC
- City of Moline
- Illinois Department of Natural Resources
- Illinois State Water Survey
- River Action
- Rock Island County Farm Bureau
- Rock Island County SWCD
- Rock River Trail Initiative

Wrap-up Webinar

BSRC Staff

- Gena McCullough, Assistant Executive Director/Planning Director
- Jennifer Bizarri, Planner

Attendees (representatives from the following organizations)

- BSRC
- BHRC
- City of East Moline
- City of Moline
- Corn Growers Association
- Farm Bureau
- Illinois Department of Natural Resources
- Illinois State Water Survey
- NCICG
- River Action
- Rock River Trail Initiative