

NAVIGATING CLIMATE CHALLENGES IN THE QUAD CITIES

A Comprehensive Assessment and Paths to Resilience

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LAYOUT AND DESIGN

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EXECUTIVE SUMMARY

Amidst growing climate challenges, the Quad Cities must navigate evolving environmental, social, and economic impacts for a resilient future.

Nestled at the convergence of the Mississippi and Rock Rivers, the Quad Cities form a vibrant community that spans southeastern Iowa's Davenport and Bettendorf to northwestern Illinois' Rock Island, Moline, and East Moline. Home to nearly 400,000 residents, the region thrives as a hub of manufacturing, commerce, and transportation.

Because of its proximity to the Mississippi River, the Quad Cities are also highly prone to flooding and other extreme weather events, posing risks to public safety, infrastructure, and the economy. Future climate hazards like wildfires, tornadoes, droughts, and extreme heat may further intensify these challenges, disproportionately impacting the community. Vulnerable groups, including those with lower socioeconomic status, Black, Indigenous, People of Color (BIPOC) communities, renters, people experiencing homelessness, immigrants, and people with disabilities will likely bear an unequal burden, underscoring the importance of collective action and support.

The purpose of this assessment is to provide Quad Cities' local leaders, decision-makers, and community members with regionally relevant information about the impacts of climate change. The assessment aims to empower communities to identify and pursue strategic investments, including nature-based solutions as appropriate, to enhance community resilience, support local economies, and foster healthy natural systems.

The main objectives of this assessment are: 1) assess and summarize the latest information regarding predicted climate impacts, including the regional economic and environmental risks associated with climate change; 2) identify strategies to help communities mitigate and adapt to climate change risks; and 3) foster communication within communities to evaluate community risks, resilience needs, and nature-based solutions available for the region.

This assessment used a combination of quantitative and qualitative approaches, including downscaling global climate models to provide local climate projections, conducting interviews, facilitating public input sessions, and reviewing existing scientific literature and planning documents.

The assessment used a set of Coupled Model Intercomparison Project Phase 6 (CMIP6) models to project future climate conditions in the Quad Cities. To simulate the flooding in the region, a flood model was developed for an area extending 28 miles upstream and 7.5 miles downstream to simulate flows from the Mississippi River. Simultaneously, Quad Cities stakeholders were engaged through multiple outreach efforts to provide input on current climate risks and solutions within their respective communities. Approximately 30 interviews were conducted with regional natural resource professionals, conservation staff from city municipalities, various non-profit organizations, and community leaders.

In addition to the stakeholder interviews, three public input sessions were conducted to obtain feedback on the preliminary findings of the draft assessment and offer further questions, concerns, and recommendations. Dedicated efforts were made during the stakeholder engagement process to include representation from identified vulnerable communities, especially those representatives of lower socioeconomic and BIPOC communities.

Some of the key findings from the assessment are as follows.

Climate Risks

Major climate risks emphasized by community leaders during stakeholder interviews included both flash flooding and river flooding, as well as concerns for more extreme heat events in the future.

Precipitation changes and flood risks

As the climate warms, precipitation patterns have become more variable, leading to increased flood risk in some areas and prolonged dry periods in others. These changes can affect agriculture, water resources, and the environment. The local landscape, existing flood control infrastructure, land use decisions, and urban development will also shape future flood hazards. By using future emission scenarios, which envision “low” and “high” greenhouse gas emission rates, climate scientists can predict (to a certain degree of certainty) future climate change impacts. Flood model simulations from this assessment reveal that areas close to the Mississippi River are becoming more prone to river floods due to increased rainfall and higher stream flows, especially in downstream regions, like Rock Island. Heavy rainfall events in 2080–2090 could bring floodwaters close to the I-74 Mississippi River Bridge and the downstream area of Rock Island, drastically affecting pedestrian and commercial transportation and adversely affecting the local economy.

Extreme heat

As climate change continues, the Quad Cities are expected to see more hot days (when temperature increases above 95°F) and extremely hot days (temperature increases above 100°F). The number of hot days will increase from three days at present to anywhere between 28-58 days based on the rate of global greenhouse gas emissions. In addition to rendering ecosystems uninhabitable for certain species, the change in extreme heat is likely to contribute to health issues, including respiratory problems, thereby reducing resilience and increasing the community's overall social vulnerability.

Climate Impacts

The impacts of these projected climate change risks have the potential to cause detrimental effects on key resources and assets within the Quad Cities.

Projected Environmental Impacts

Climate change is likely to significantly impact ecosystems in the Quad Cities region. Because of warmer, wetter springs and hotter, drier summers, forests like Loud Thunder Forest Preserve located in Rock Island County may experience altered habitat suitability for different tree species, potentially leading to an influx of non-native species. Wetlands, like Nahant Marsh and the Quad Cities Conservation Alliance Wetlands Center, face challenges with disruptions in their water balance, due to more frequent droughts and flash floods. Fish and other aquatic life may also be negatively impacted by rising temperatures and extreme rainfall. Rising temperatures and altered precipitation patterns will also impact agricultural yields; while the number of growing days may increase, high temperatures and increased flood risk can negatively impact crop management and yields.

Water Quantity and Quality

Water quality and quantity will see impacts related to extreme rainfall, drought, and upstream water use, also adversely affecting communities, plants, and animals that depend on the river. The frequency and intensity of precipitation is expected to increase in the region, leading to an increased risk of flooding. Increased runoff, as a result of more frequent and intense rainfall, can degrade water quality by mobilizing pollutants, commonly known as nonpoint source pollutants. For example, agricultural runoff, containing sediment, excessive nutrients (nitrogen and phosphorus), pesticides and chemicals from agricultural and industrial sources, already threatens river resources – a persistent concern among the key stakeholders in the Quad Cities. In addition to agricultural sources, urban sources like lawn fertilizers and pesticides, deicing salt, sewage overflow during storm events, and pet waste are common contributors to poor water quality.

Economy and Public Health

Climate change-induced flooding threatens the economic viability of the Quad Cities region. Locations like Cargill AgHorizons, Isle Casino Hotel Bettendorf, and portions of the Rock Island Arsenal face direct future flood risks. These at-risk places also include tourist spots, major attractions, and gathering grounds, generating economic revenue as well as opportunities for social cohesion among community members. By 2090, the annual flood risk under the high emission scenario significantly impacts critical transportation, like major roadways and bridges. Rising temperatures and warming winters will also continue to impact the Quad Cities' agricultural sector. Heat and water stress may reduce corn yields by mid-century, with declining soybean yields to follow. Warming temperatures will also shift where certain crops can grow in the region. An increase in extreme heat events also poses significant health risks, increasing the occurrence of severe heat-related illnesses like heat exhaustion and heat stroke.

Socially Vulnerable Populations

Climate risks vary based on a population's geographic location and social characteristics. Residents living and working in floodplains in Moline and East Moline and downtown Davenport along the Mississippi and Rock Rivers are more susceptible to flood risks at present. Social vulnerability, defined as the susceptibility of a social group to the adverse impacts of natural hazards, plays a critical role in the region's resilience planning. Downtown Quad Cities locations along the Mississippi mainstem and areas in East Moline stand out as the most vulnerable within the metro area. Outlying urban areas in the broader region also exhibit areas of high social vulnerability.

Nature-Based Solutions

Nature-based solutions include conserving and restoring natural ecosystems, such as healthy wetlands, floodplains, and forests, as well as employing engineered systems designed to mimic natural system functions. Often interchangeable with the terms "natural infrastructure" or "green infrastructure", nature-based solutions offer reliable, cost-effective, and efficient solutions to risk reduction while also building community resilience. Nature-based solutions should always be tailored to their location, function, and used in a cultural context. Identifying and implementing solutions will depend on community needs, priorities, and concerns. This assessment analyzed the impact of site-specific nature-based solutions on flood risks in the Quad Cities, demonstrating a substantial increase in infiltration and reduction in flooding.

In the Quad Cities, where climate risks are compounded by additional factors, such as the amount of impervious surfaces, upstream land uses (e.g., agriculture), and urban development, several stakeholders emphasized the need to look upstream and implement large-scale solutions. Rock Island, for example, is predominantly impacted by water coming from upstream and local urban runoff; any nature-based solutions implemented there will be greatly impacted by upstream discharge. The region also contributes to downstream impacts due to its location and associated tributaries.

Quad Cities community leaders are actively thinking about ecosystem restoration and nature-based solution opportunities. Solutions that were frequently mentioned during input sessions and interviews include:

Increase green space

Using old and newly vacant spaces in Davenport for green space, in particular the old YMCA location between Gaines and Second Street in Davenport and the recently vacant lot on North Main Street from an apartment building collapse. These alleys and vacant lots can be transformed into a green infrastructure network, providing access to nature and equitable open space for recreation.

Ravine restoration (through conservation easement), specifically in Rock Island, Moline, and East Moline

Restoring ravines by removing invasive species, re-establishing appropriate native species, and conserving these ecologically vital areas through easements will enhance their ability to perform ecosystem services, such as enhancing corridors for wildlife, managing stormwater circuits for heavy rainfall/flash flooding, and instilling environmental stewardship among residents.

Providing equitable access to the river

River access for communities of lower socioeconomic status or those within BIPOC communities is often lacking or viewed as unsafe. Projects such as developing a river path to connect East Moline (Watertown) to the river and exploring ways to make the river more accessible to those with disabilities was recommended by several stakeholders.

Natural infrastructure to curb “heat islands”

Extreme heat is one of the key concerns highlighted by the community members in the Quad Cities and with the number of extreme heat days increasing, conversations have steered towards decreasing heat islands. Increasing tree coverage, especially in communities significantly affected by lower tree equity scores, could not only enhance the biodiversity of a city, but also help curb the effects of extreme heat.

Conclusion

The Quad Cities’ climate is changing. Climate models predict wetter, hotter conditions, leading to an increased risk of extreme events, like flooding and intense heat. In addition to environmental detriments, critical transportation infrastructure, public health, and the economy are directly threatened by climate change-induced flooding and heat.

This climate assessment aims to inform Quad Cities’ communities and leaders about local climate change impacts, empowering them to pursue resilient solutions, including nature-based projects where appropriate. While nature-based approaches are not a one-size-fits-all solution, they are a valuable tool for addressing climate change impacts. Modeling has shown their effectiveness at reducing high flow and increasing water retention and infiltration into the ground, which can help reduce flood risk. It is critical, however, to co-create and implement all solutions with community members, tailoring projects to local needs and desires.

Community members are interested in understanding and addressing climate change impacts in the region. During the public input sessions, stakeholders identified several potential uses for this climate assessment:

- Utilizing findings to apply to grant funding or advocate for resilience and nature-based solution initiatives in their communities.
- Communicating with policy and decision-makers about the urgency of implementing nature-based solutions as part of a comprehensive solution.
- Understanding how city infrastructure and future business developments will further exacerbate climate risks and how these impacts will affect surrounding communities.
- Advocating for the creation of jobs specific to nature-based solutions (i.e., ensuring qualified contractors are available to assist homeowners and businesses with nature-based solutions).
- Serving as an educational resource that emphasizes the opportunity for nature-based solutions within various communities, businesses, and media outlets.
- Supporting a broader analysis that looks upstream to rural and agricultural impacts and opportunities.



Aerial view of the Quad Cities. (Shutterstock)

Historically, not all communities have been included in planning, designing, and executing projects impacting their resilience. If not implemented with careful community engagement, even nature-based projects, while environmentally beneficial, can have unintended negative consequences, like gentrification and displacement of primarily socially vulnerable communities.

Increased participation of and partnership with local stakeholders as community experts at every stage of planning - including project implementation and stewardship - lead to more equitable outcomes that align with local preferences. The Mississippi River Equity Vision¹ is an example of a Quad Cities-crafted document that seeks to align stakeholders in the pursuit of a clean and sustainable Mississippi River, focusing on the lived experience of underrepresented and historically marginalized community members.

While the region faces complex and growing climate challenges, the opportunities are palpable. Ongoing efforts, from community- to regional-driven plans, are working hard to address these challenges. This assessment can serve as an additional resource in leveraging science and community to build and maintain more resilient communities for all who call the Quad Cities home.

¹ Centering the Lived Experiences & Voices of Communities of Color: Community-Informed Mississippi River Equity Vision & Final Report, 2023, Iman Consulting, LLC.

