



# Hazard Mitigation in a Changing Climate: Opportunities for Better Water Practices in Dane County, Wisconsin

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## Project Purpose

Dane County, Wisconsin counts significant ground and surface water resources among its greatest assets. However, the community is becoming increasingly aware of the need to manage both water quantity and quality. This poster addresses the ways in which Dane County's natural hazard mitigation planning process, which incorporated climate change for the first time, yielded strategies that also aid in water conservation and water quality improvements. The author was involved in this project as a graduate assistant and member of the planning team.

## Climate Change in Wisconsin

The Wisconsin Institute for Climate Change Impacts (WICCI) has modeled how the State's climate may change in the coming decades. While these projections cannot say exactly what the climate will be like in the future, they can give a good idea of the types of changes that should be expected.

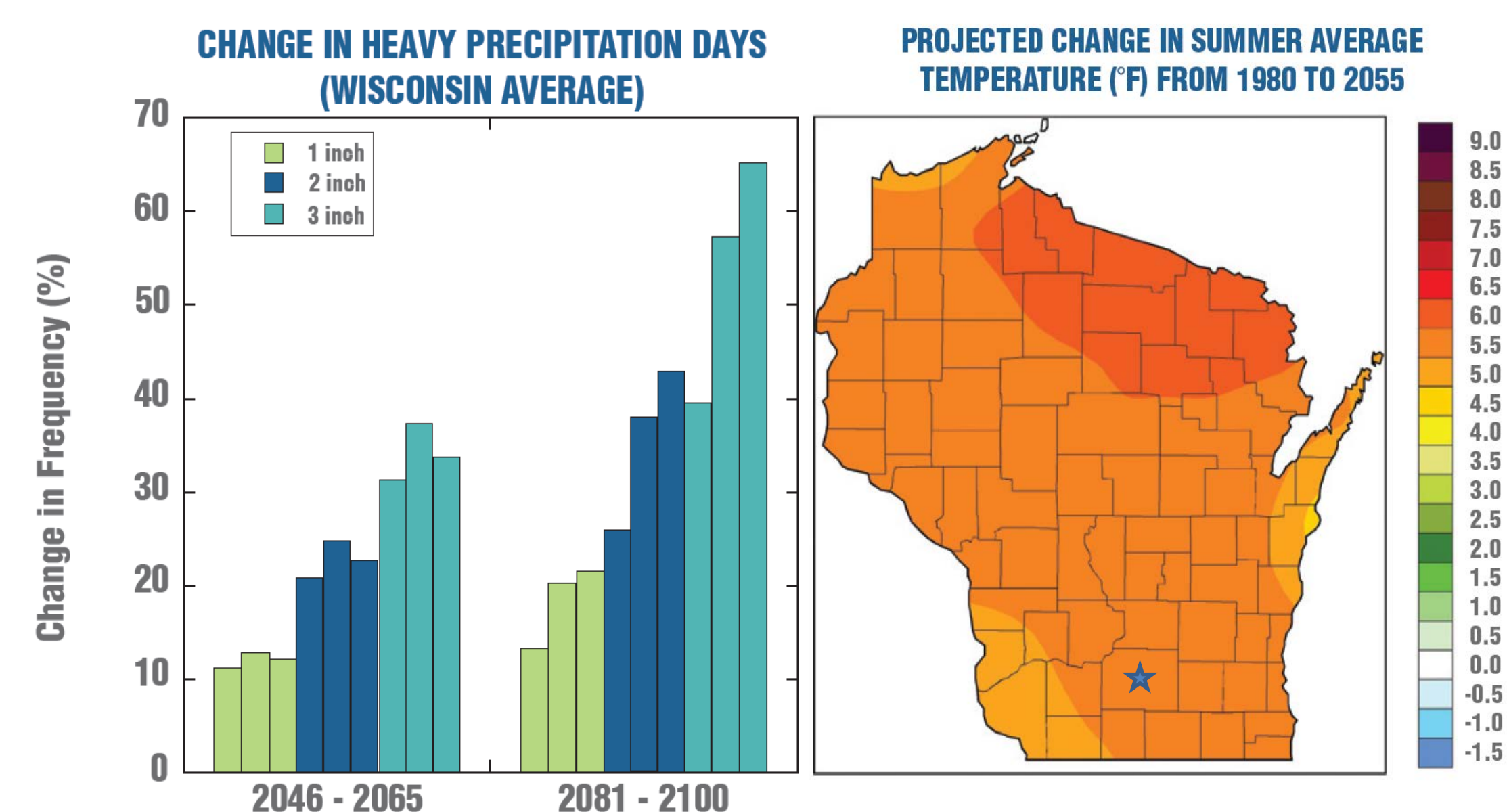


Fig. 1. From the 2011 WICCI Report, the graph on the left shows the projected change in heavy precipitation days under differing carbon emissions scenarios. The furthest left of each cluster represents the lowest emissions scenario and increases to the right. The map on the right shows the average projected temperature change across Wisconsin. In general, Wisconsin can expect to experience warmer conditions and larger rainfalls. Dane County is marked with a star.

## Natural Hazard Mitigation Planning

Natural hazard mitigation (NHM) aims to reduce disaster losses through lowering a community's risk to natural hazards. Risk is assessed through analysis of both the natural hazard itself, and the community's vulnerability to the hazard.



Fig. 2. Factors involved in determining natural hazard risk

## Changing Climate, Changing Risks

In past natural hazard mitigation plan updates, risk change was a function of vulnerability change only. Hazards were considered static and were evaluated for likelihood based solely on historical occurrence intervals. Hazards in a changing climate are dynamic, their likelihood and impact magnitude are changing. The table below shows several of the hazards that are projected to pose a greater risk to Dane County.

Hazard	Historical Likelihood	Likelihood Considering Climate Change	Climate Change Risk Rationale
Extreme Heat	Very Likely	Increased	Warming trends will likely bring more days above 90° Fahrenheit, leading to extended heat waves that may be exasperated in urban areas.
Flood	Moderately Likely	Increased	Projected increases in annual average precipitation amounts, and projected increases in storm intensity raise significant flooding concerns.
Algal Blooms	Likely	Increased	Intense rainfalls creating nutrient runoff in area watersheds paired with warming temperatures create ideal conditions for algal blooms in Dane County lakes.

Table 1. Three hazards likely to pose a greater risk to Dane County as climate change progresses. Extreme heat included due to its projected increase and potential to exasperate water quality and quantity issues.

## Implications for Water Management

The hazards listed in the table above all have some bearing on the water management strategy of Dane County. The most significant climate change impact considered by the planning team was the increase in heavy rainfalls. The rise in intense rainstorms has a direct impact on both flooding and algal blooms. Dane County is a mix of intensely urban areas and agricultural rural communities, the altered precipitation patterns have implications for both.



Fig. 3. Lake Kegonsa, in Dane County, in the midst of a harmful algal bloom. Photo Credit: Wisconsin State Journal

The implications of these patterns include:

- Less groundwater infiltration
- Increased groundwater pumping during periods of no rain and increased heat
- Nutrient pollution from both urban and agricultural non-point sources in local lakes and streams
- Local street flooding from overloaded storm sewers

While these events cannot be stopped, they can be mitigated.

## Adapting for the Future with Better Water Management

The strategies formed by Dane County for natural hazard mitigation are part of a broader strategy for the County to better manage its water resources and adapt to a changing climate. Figure 4 illustrates a few of these strategies. Table 2 outlines strategies outlined in the Dane County Hazard Mitigation Plan and their benefits.



Fig. 4. Water management strategies implemented in Dane County and encouraged in the Dane County Natural Hazard Mitigation Plan. Clockwise from top-right: rain barrel, effective rain barrel, street terrace rain garden, development with bio-swale.

Strategy	Hazard Mitigation and Water Management Benefits
Precipitation Capture	Rain barrels and cisterns capture and store water for future use, thereby preserving it for when it is needed and keeping runoff out of storm sewer systems.
Rain Gardens and Bioswales	Aid in stormwater volume control, water quality improvements, and groundwater restoration through increased infiltration of stormwater.
Stormwater Volume Control Policy Changes	Proposed policy changes to create a 100% pre-development runoff control and fee-in-lieu of programs would create more infiltration practices where practical and fund larger stormwater control and water quality projects.
Educational and Public Outreach Efforts	Public awareness about climate change impacts on water quality and quantity will ideally lead to individual efforts to conserve and control stormwater.

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