Climate Change: High Water Impacts and Adaptation

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Overview

Part 1
The historical record and future scenarios for temperature and precipitation

Part 2
High water impacts
Adaptation strategies
We’ve been measuring temperature and rainfall in Wisconsin since 1870
Statewide average 1.5°F warmer
The greatest amount of warming is occurring in winter and spring, especially in northwest Wisconsin.
Change in Growing Season 1950-2006

Increase up to 4 weeks
Historic Precipitation Trends
Change in Annual Average Precipitation 1950 – 2006

Statewide average 15% increase, but highly variable

Serbin and Kucharik 2009
Long-term Precipitation Record Also Variable

**Annual Total Precipitation**
**Madison 1869-2008**

![Graph showing annual total precipitation from 1869 to 2008](Graph showing annual total precipitation from 1869 to 2008)

Potter, et al.
Results of the Analysis of Historical Data

“The analyses of both yearly and intense event variations in the historic precipitation record indicate long-term variation in the magnitude and frequency of large daily rainfalls in Wisconsin…. 

… neither support or disprove the hypothesis that the magnitude and frequency of large rainfall events have increased in Wisconsin as a result of global climate change– WICCI Stormwater Working Group
Projected Climate Change 200-2100

What Global Circulation Models (GCMs) tell us:

Temperature:
- Warms by 2-6°C (3-10°F) by end of century

Precipitation:
- Less certain and seasonally dependent

Steve Vavrus, CCR
Change in Wisconsin monthly temperature and precipitation as predicted for 2090 by fifteen downsampled GCMs.

(Black line = Average of all models)

- January in the 20’s
- Wetter Spring
- Drier Summer (note uncertainty)
Projected Wisconsin Annual Temperature Change

Change in Annual Average Temperature
1980 - 2055

(°F)

Wisconsin will warm by 4 – 9 °F by mid-21st century

D. Vimont, UW-Madison
Projected Seasonal Temperature Change
1980 - 2055

Warming is most pronounced in winter.
Projected Change in Precipitation from 1980 to 2055

Change in Average Annual Precipitation 1980 - 2055

Probability Distributions of 14 Climate Model Projections by Month

Models predict winter and early spring will be wetter

Models uncertain about amount of summer rainfall

Source: Center for Climatic Research & Center for Sustainability and the Global Environment, Nelson Institute, University of Wisconsin-Madison

D. Vimont, UW-Madison
Projected Heavy Precipitation Events
Three CO₂ Scenarios

Increasing in frequency

Change in Heavy Precipitation Days
(Wisconsin Average)

<table>
<thead>
<tr>
<th>Change in Intensity of Annual Maximum Daily Precip Amount</th>
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<td>(Wisconsin Average)</td>
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Steve Vavrus
Intense rainfall is not predicted to increase substantially in frequency or magnitude.