ADAPTING TO CLIMATE CHANGE
MIDWEST

EPA United States Environmental Protection Agency

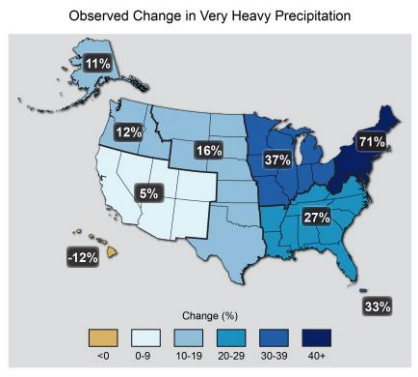
The Midwest is projected to experience higher temperatures, increased precipitation, and more frequent and intense storms. These projected changes pose challenges to communities as they protect the Great Lakes from algal blooms, protect water and waste infrastructure, and protect cold water fisheries. Many communities are building resilience to the risks they face under current climatic conditions. This fact sheet provides examples of communities that are going beyond resilience to anticipate and prepare for future impacts.

Moving Beyond Resilience to Adaptation

Climate change adaptation goes beyond resilience by taking actions to address future risks. Adaptation refers to how communities anticipate, plan, and prepare for a changing climate.

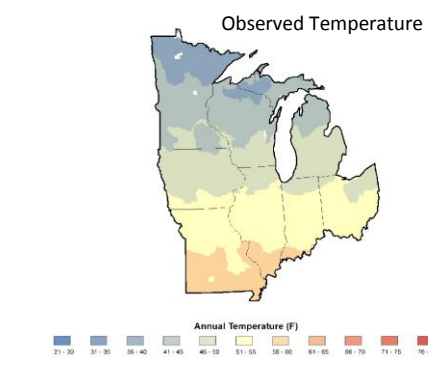
Observed and Projected Changes in the Midwest

Intense storms have increased



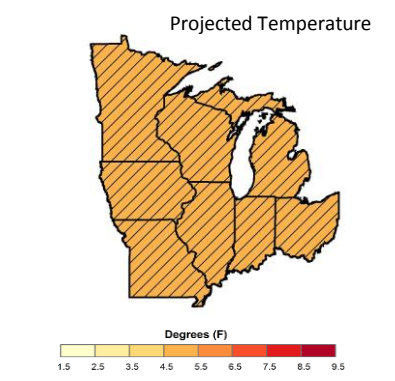
The Midwest experienced a 37% increase in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012.

Average Annual Temperature



This map shows the average annual temperature (°F) from 1981 to 2010 in the Midwest.

Average Annual Temperature Increases



The Midwest is projected to experience an increase in the average annual temperature (°F) for 2041 to 2070 compared to 1971 to 1999 under a high emissions scenario.

Protecting Against Harmful Algal Blooms in the Great Lakes

Harmful algal blooms in the Great Lakes have been increasing in frequency and magnitude as the climate changes. Algae thrive in warmer water and storms wash nutrients into waterways, setting the stage for such occurrences. When single-cell algae grow out of control, some can become toxic or, as they decay, consume the oxygen in waterways. Toxic algae can kill fish, mammals and wildlife, and cause human illness or death. Massive accumulations of algae can clog the gills of fish and contaminate drinking water. Public works personnel, utility operators, and public health officials will face challenges in providing continued services under these circumstances. Key vulnerabilities include:

- Higher water temperatures and more frequent and intense storms can cause algal blooms.
- Toxic algal blooms can affect human and animal health and the economies of communities where they occur.
- Harmful algal blooms can smother other aquatic vegetation, degrading water quality and clogging water treatment systems.

Adaptation in Action

The Great Lakes Restoration Initiative (GLRI), an interagency collaboration, promoted resilience by funding projects that reduced nutrient runoff, and increased education and awareness of climate change threats. GLRI modeled land use and nutrient runoff to identify areas that may be susceptible to harmful algal blooms. Recognizing that it lacked a comprehensive approach to climate adaptation, GLRI Action Plan 2 was updated in 2014 to require federal agencies to incorporate climate change adaptation criteria into project selection starting in 2017. GLRI will focus on reducing harmful algal blooms in three priority watersheds (Lower River, WI, Saginaw River, MI and Maumee River, OH) by reducing nutrients, thus protecting the Great Lakes, even as the climate changes.

Protecting Critical Community Infrastructure

Flooding from more frequent and intense storms throughout the Great Lakes threatens critical drinking and wastewater facilities and operations, and threatens waste disposal sites. Public works personnel, land use planners and utility operators will face challenges in providing continued services under these circumstances. Key vulnerabilities include:

- More frequent and intense storms may overwhelm operations and service capacity of water and wastewater systems, which could threaten drinking water availability, and lead to more sewer system overflows.
- Storms and flooding may cause the unplanned release of contaminants from Corrective Action sites, Superfund sites, brownfield sites and landfills.
- Sea level rise and storm surge may submerge and damage critical facilities.

Adaptation in Action

In 2008, Iowa City, Iowa was hit hard by some of the worst flooding in its history. The riverfront flooding, including inundation of a major riverside wastewater treatment plant, prompted the community to take action. Rather than restore the vulnerable North Wastewater Treatment Plant, Iowa City decided to decommission it and expand service at a facility located outside the floodplain (average daily treatment of 9.7 million gallons per day (gpd) with a design capacity of 24.2 million gpd). The city reduced the vulnerability of its wastewater services to future extreme storm events, which are projected to increase in the Midwest. By decommissioning the vulnerable wastewater treatment plant and converting the surrounding area into a public greenspace, the city is adapting to reduce the threat and impact of future extreme storm events.

Protecting Cold Water Fisheries

Coldwater fish, such as Wisconsin's native brook trout, are sensitive to changes in water temperature and other environmental conditions and are important ecological indicators of climate change. Coldwater fishing is a crucial element of the Midwest region's economy. Potential impacts of climate change on coldwater fish include changes in life history patterns, species distribution, and ecosystem community structure. Some climate change impacts may be beneficial. Climate change can affect coldwater fisheries in several ways:

- Streams in urban or severely eroded areas make cold water fisheries more vulnerable to climate change impacts.
- Increased precipitation in rural areas may make cold water fisheries more resilient to climate change impacts.
- These differences in rural and urban watershed conditions will affect cold water fish and their habitats.

Adaptation in Action

The Cold Water Fish and Fisheries working group of Wisconsin's Department of Natural Resources and the University of Wisconsin are developing climate change adaptation strategies to protect fragile cold water fish and fisheries. They are:

Triage: Classifying coldwater streams according to their potential to withstand climate change impacts. Stocking quotas and restoration money can be allocated to species and streams most likely to thrive under changing climate conditions.

Planning for extreme events: As large-scale flooding events become more common, watershed and natural resources managers can restore degraded streams to better withstand extreme and damaging weather events.

Create and enhance cold water refugia from high water temperatures: Cold water refugia are areas within a stream which are persistently colder than adjacent areas, and hence, can provide habitat for coldwater fish despite temperature changes in other parts of a stream. Narrowing and deepening stream channels, creating overhead cover and creating deep pools of cooler water can protect the fish, even as the climate changes.

For a comprehensive view of projected climate changes in your region, consult:

- ***Climate Change Impacts in the United States: The Third National Climate Assessment***
- ***EPA's Climate Change Adaptation Resource Center***

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