Fourth National Climate Assessment, Vol II — Impacts, Risks, and Adaptation in the United States

Chapter 21 | Midwest

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National Climate Assessment

- Overseen by US Global Change Research Program
  
  ➢ 14 federal agencies
- Peer Review by National Academies of Science, Engineering and Medicine
- 29 chapters
- ~300 authors
Observed changes in precipitation, 1901-1960 to 1986-2016

Hannibal, May 1, over flood stage:
- 1879-1968: 11
- 1969-2018: 25

St. Louis, days per year>=1 inch precip:
- 1939-1968: 8.0
- 1969-2018: 10.9

Source: National Climate Assessment
Key Message #1

Agriculture

The Midwest is a major producer of a wide range of food and animal feed for national consumption and international trade. Increases in warm-season absolute humidity and precipitation have eroded soils, created favorable conditions for pests and pathogens, and degraded the quality of stored grain. Projected changes in precipitation, coupled with rising extreme temperatures before mid-century, will reduce Midwest agricultural productivity to levels of the 1980s without major technological advances.
Integrating strips of native prairie vegetation into row crops has been shown to reduce sediment and nutrient loss from fields, as well as improve biodiversity and the delivery of ecosystem services. Iowa State University’s STRIPS program is actively conducting research into this agricultural conservation practice. The inset shows a close-up example of a prairie vegetation strip. Photo credits: (main photo) Lynn Betts, (inset) Farnaz Kordbacheh.
Midwest forests provide numerous economic and ecological benefits, yet threats from a changing climate are interacting with existing stressors such as invasive species and pests to increase tree mortality and reduce forest productivity. Without adaptive actions, these interactions will result in the loss of economically and culturally important tree species such as paper birch and black ash and are expected to lead to the conversion of some forests to other forest types or even to non-forested ecosystems by the end of the century. Land managers are beginning to manage risk in forests by increasing diversity and selecting for tree species adapted to a range of projected conditions.
Fig. 21.4: Forest Diversity Can Increase Resilience to Climate Change

The photo shows Menominee Tribal Enterprises staff creating opportunity from adversity by replanting a forest opening caused by oak wilt disease with a diverse array of tree and understory plant species that are expected to fare better under future climate conditions.

*Photo credit: Kristen Schmitt.*
Biodiversity and Ecosystems

The ecosystems of the Midwest support a diverse array of native species and provide people with essential services such as water purification, flood control, resource provision, crop pollination, and recreational opportunities. **Species and ecosystems, including the important freshwater resources of the Great Lakes, are typically most at risk when climate stressors, like temperature increases, interact with land-use change, habitat loss, pollution, nutrient inputs, and nonnative invasive species.** Restoration of natural systems, increases in the use of green infrastructure, and targeted conservation efforts, especially of wetland systems, can help protect people and nature from climate change impacts.
Fig. 21.7: Wetland Restoration Projects Can Help Reduce Impacts

The Blausey Tract restoration project on the U.S. Fish and Wildlife Service’s Ottawa National Wildlife Refuge (Ohio) restored 100 acres of former Lake Erie coastal wetlands that were previously in row crop production. In addition to providing habitat for wildlife and fish, these wetlands help reduce climate change impacts by storing water from high-water events and by filtering nutrients and sediments out of water pumped from an adjacent farm ditch. This work was carried out by two conservation groups, The Nature Conservancy and Ducks Unlimited, in partnership with the U.S. Fish and Wildlife Service, and was funded by the Great Lakes Restoration Initiative.186,187 (top) Shown here is the Blausey Tract restoration site in early spring of 2011, prior to the restoration activities. (bottom) In the spring of 2013, just two years after the start of restoration, the site already was providing important habitat for wildlife and fish. Photo credits: (top) ©The Nature Conservancy, (bottom) Bill Stanley, ©The Nature Conservancy.
Human Health

Climate change is expected to worsen existing health conditions and introduce new health threats by increasing the frequency and intensity of poor air quality days, extreme high temperature events, and heavy rainfalls; extending pollen seasons; and modifying the distribution of disease-carrying pests and insects. By mid-century, the region is projected to experience substantial, yet avoidable, loss of life, worsened health conditions, and economic impacts estimated in the billions of dollars as a result of these changes. Improved basic health services and increased public health measures—including surveillance and monitoring—can prevent or reduce these impacts.
Minneapolis City Trees Program
Key Message #5

Transportation and Infrastructure

Storm water management systems, transportation networks, and other critical infrastructure are already experiencing impacts from changing precipitation patterns and elevated flood risks. Green infrastructure is reducing some of the negative impacts by using plants and open space to absorb storm water. The annual cost of adapting urban storm water systems to more frequent and severe storms is projected to exceed $500 million for the Midwest by the end of the century.
Fig. 21.11: Meramec River Flooding

This composite image shows portions of Interstate 44 near St. Louis that were closed by Meramec River flooding in both 2015 and 2017. The flooding shown here occurred in May 2017. *Image credit: Surdex Corporation.*
Cermak/Blue Island Sustainable Streetscape

- Stormwater Diversion
- Heat Island
- Solar-Powered Lighting
MSD Project Clear
Ozaukee Washington Land Trust
Great Rivers Habitat Alliance
Ducks Unlimited
Missouri/Mississippi Rivers Confluence Conservation Partnership
Stream Restoration

Kalamazoo
Arcadia Creek

Milwaukee Metropolitan Sewerage District
Kinnickinnic River
Ravine Restoration
Great Lakes Alliance
21 Key Message #6

Community Vulnerability and Adaptation

At-risk communities in the Midwest are becoming more vulnerable to climate change impacts such as flooding, drought, and increases in urban heat islands. **Tribal nations are especially vulnerable because of their reliance on threatened natural resources for their cultural, subsistence, and economic needs.** Integrating climate adaptation into planning processes offers an opportunity to better manage climate risks now. Developing knowledge for decision-making in cooperation with vulnerable communities and tribal nations will help to build adaptive capacity and increase resilience.
Recommended chapter citation


Read the full chapter

https://nca2018.globalchange.gov/chapter/midwest

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