MSU faculty members contribute to new book about potential impacts of climate change

EAST LANSING, Mich. – Julie Winkler, professor of geography at Michigan State University (MSU), is the lead editor of a new technical book titled “Climate Change in the Midwest: A Synthesis Report for the National Climate Assessment.”

The report, published in June by Island Press, also features contributions by several other MSU faculty members: Jeffrey Andresen from the Department of Geography; Janice Beecher, Institute of Public Utilities; and Sarah Nicholls, departments of Geography and Community Sustainability.

Julie Winkler, professor of geography, MSU

Prepared as an in-depth scholarly exploration for the U.S. National Climate Assessment, the book addresses the potential impacts of climate change on natural systems, human health and several important economic sectors in the Midwest.

“The diverse landscape of the U.S. Midwest and the natural processes, livelihoods and infrastructure associated with them are vulnerable to climate change,” Winkler said. “The challenge will be to design and implement creative and effective adaptation strategies to reduce the region’s vulnerability to climate change while capitalizing on potential co-benefits of mitigation policies.”
Coordinated by the Great Lakes Integrated Sciences and Assessments (GLISA) Center and the U.S. Department of Agriculture Agricultural Research Service, the technical report adds more detail to the conclusions of the National Climate Assessment, which listed the following key message for the Midwest:

"Extreme heat, heavy downpours and flooding will affect infrastructure, health, agriculture, forestry, transportation, air and water quality, and more. Climate change will also exacerbate a range of risks to the Great Lakes."

The peer-reviewed publication is intended to support education, including undergraduate and/or graduate teaching, and research conducted in the Midwest, and to help industry stakeholders make informed decisions on a variety of topics from energy regulation to managing water systems, Winkler said.

Some key findings of the report include:

- Annual mean temperature in the Midwest has warmed since approximately 1900, with annual precipitation generally increasing from the 1930s to present. Regardless of season, future intensification of high magnitude precipitation events is anticipated.
- Great Lakes surface water temperatures have increased over the past few decades. Continued warming will affect the timing and extent of thermal stratification, winter ice cover and the availability of dissolved oxygen.
- Adjustments to temperature change would necessitate rapid and perhaps unrealistic movement of plant and animal species if they are to maintain pace with expected shifts in habitat ranges.
- Forest ecosystems may be less likely to provide a consistent supply of some forest products, especially if the dominant species in those ecosystems are at the southern edges of their ranges.
- Changes in the variability, timing and amount of precipitation during the growing season will have a substantial impact on future crop yields and the number of workable field days.
- Warmer springs and falls will increase the attractiveness of such activities as camping, golfing and boating while perhaps adversely affecting winter sports.
- The region has a number of climate-sensitive diseases and health conditions, and, on balance, adverse health ramifications are anticipated to outweigh beneficial health outcomes.
Winkler became involved with the project primarily as a core team member of GLISA, one of 11 National Oceanic and Atmospheric Administration-funded centers that aim to build capacity to manage risks from climate change and variability.

She has studied many aspects of geography and climatology, including regional climate change and climate scenario development and evaluation. Research topics include heavy precipitation, nocturnal thunderstorms, low-level wind maxima, airflow within mid-latitude cyclones, and the possible impacts of climate change, particularly on agriculture. Much of her work has been conducted in the Central Plains and Great Lakes regions of the United States.

In addition to serving as lead editor, Winkler co-wrote the chapter “Climate Projections for the Midwest;” Andresen co-wrote “Historical Climate and Climate Trends in the Midwestern United States;” Beecher co-wrote “Climate Change and Energy;” and Nicholls wrote “Outdoor Recreation and Tourism.” Andresen was also an editor on the project.

“The Midwest papers are excellent and give a solid sense of the climate state for our region,” said Thomas Dietz, MSU assistant vice president for environmental research. “This collaborative effort was led by GLISA, which is a partnership between MSU and the University of Michigan – all prominent climate entities in the region. It is a very useful collection of papers that should serve many different sectors very well throughout the century.”

This is Winkler’s first experience editing a book. She grew up on a farm in North Dakota, where she became fascinated with weather at a young age. She came to MSU in 1987 after receiving her Ph.D. in geography with a specialization in climatology.
