



USDA Regional Climate Hubs: Managing your risk in a changing climate.



Climate Risks in the Midwest

What type of agricultural production is in the Midwest?

Midwestern states are often called the “Corn Belt”, but this region offers a diversity of agricultural and forestry production beyond corn and soybean. Agriculture in the Midwest represents one of the most intense areas of production in the world and reaches out to affect the global economy. In 2007, Midwestern states had a market value of crop and livestock products sold of over \$76 billion, encompassing corn, soybean, livestock, vegetables, fruits, tree nuts, berries, nursery and greenhouse plants and complex forest ecosystems. The Midwest encompasses forests that support local communities and provide clean water to millions of Americans.

How are climate change and weather variability affecting Midwestern producers?

The soil resources of the Midwest underlie the productivity of this region; however, shifting precipitation patterns and intensity of storms threaten its long-term stability. Increased weather variability in the Midwest is expected to alter soil water availability and temperature, which could decrease yield between 15-20 percent. Producers of perennial crops and vegetable crops are raising questions about how increasing variability in weather patterns will affect their production systems. For example, weather variation affects not only the production amounts of vegetables but also the quality of the produce and the ability to complete timely harvests. Examples of weather events that have been affecting production in the Midwest include:

- **Floods:** Rain can be a blessing, but too much at once can be a curse. In 1993, heavy spring and summer precipitation resulted in flooding and decreased production across the Midwest. More recently, in 2013, Iowa experienced excessive rainfall and cool temperatures in the early spring that delayed planting, and in some areas, prevented planting entirely. The shifting precipitation patterns have reduced workable field days in the April through mid-May period by 3.8 days.
- **Droughts:** At the other end of the extreme in precipitation events was the 2012 drought. The drought covered the entire Midwest and reduced grain production across all states, causing complete crop failure in some local areas. Though 2013 started off with flooding, this wet period was followed by an unusually dry summer and early fall, which decreased grain production.
- **Temperature Shifts:** The drought conditions of 2012 were accompanied by unusually warm spring conditions that caused perennial plants to flower earlier than normal; however, a late spring frost damaged those flowers on many apple and cherry trees across the Midwest with devastating yield consequences. Abnormal temperatures also affect livestock production, as demonstrated in 2010 and 2012 throughout the Midwest. High temperature events, particularly at night, increase stress on animals and reduce productivity. These temperature spikes are projected to increase.

What is USDA doing about it?

USDA has established the USDA Midwest Regional Climate Hub (MRCH) in Ames, Iowa. This multi-agency effort (Agricultural Research Service, Forest Service, Natural Resources Conservation Service) is being led by Jerry Hatfield, Laboratory Director and Supervisory Plant Physiologist with the USDA Agricultural Research Service. The Hub will deliver science-based knowledge and practical information to farmers, ranchers, and forest landowners that will help them to adapt to climate change and weather variability by coordinating with local and regional partners in Federal and state agencies, universities, NGO's, private companies, and Tribes.

The Hub will provide:

- Technical support for land managers to respond to drought, heat stress, floods, pests, and changes in growing season.
- Regional assessments and forecasts for hazard and adaptation planning.
- Outreach and education for land managers on ways to mitigate risks and thrive despite change.

Building on success stories

Soil Quality and Crop Resilience: The USDA Agricultural Research Service recently analyzed soybean yield variation across Iowa, Kentucky, and Nebraska and their relation to the National Crop Commodity Productivity Index (NCCPI), a soil quality assessment tool that is available from the Natural Resource Conservation Service. The study found that as soil quality increased, sensitivity to weather variation decreased. As producers are becoming more aware of the role that soil management plays in avoiding yield reductions due to a changing climate and weather variation within and among growing seasons, research and tools like the NCCPI can help them make decisions about how to adapt.

Decision Support Tools for Forestry: Forest managers face the challenge of integrating the uncertainties of a changing climate into decisions that often span large spatial and temporal scales. To address these challenges, the Forest Service launched a pilot project in 2009 called the **Climate Change Response Framework (CCRF)**. The CCRF creates and gathers credible scientific information relevant to forest management and climate, fosters close collaboration between scientists and managers, builds tools that support diverse management goals, and delivers products of these efforts in a timely and useful manner. The goal of this comprehensive program is to support "climate smart" decisions in meeting a wide variety of management objectives.

Outreach: Producers are requesting information on climate impacts on agriculture and forestry and potential adaptation strategies. Research information on climate impacts on agriculture is being presented through USDA and universities across the Midwest to producers and natural resource agencies through seminars and webinars. The demand for these materials is increasing across the Midwest with increasing awareness of the impact of weather and climate variation on agricultural production. MRCH will expand this type of media to spread information about adaptation to climate change in the agriculture and forestry sectors.

Need more information?

USDA Regional Hub Leader

Jerry Hatfield
USDA Agricultural Research Service
National Lab of Agriculture and the
Environment
Ames, Iowa
Jerry.Hatfield@ars.usda.gov
(515) 294 - 5723

USDA RegionalHub Partners

Jonathan Hempel
Natural Resource Conservation Service
Jon.hempel@lin.usda.gov
(402) 437-5389
Lincoln, Neb.

Christopher Swanston
US Forest Service
cswanston@fs.fed.us
(906) 482-6303 x20
Houghton, Mich.