

Global food system faces multiple threats from climate change

December 2 2015



A farmer tills his field. Credit: Keith Weller, U.S. Department of Agriculture.

Climate change is likely to have far-reaching impacts on food security throughout the world, especially for the poor and those living in tropical regions, according to a new international report that includes three co-authors from the National Center for Atmospheric Research (NCAR).

The report, issued today at the Paris 2015 United Nations Climate Conference (also known as COP21) warns that warmer temperatures and altered precipitation patterns can threaten food production, disrupt

transportation systems, and degrade food safety, among other impacts. As a result, international progress in the past few decades toward improving food security will be difficult to maintain.

The report, *Climate Change, Global Food Security, and the U.S. Food System*, provides an overview of recent research in climate change and agriculture. Led by the U.S. Department of Agriculture and published under the auspices of the U.S. Global Change Research Program, it includes contributors from 19 federal, academic, nongovernmental, intergovernmental, and private organizations in the United States, Argentina, Britain, and Thailand.

"If society continues on a path of high emissions of greenhouse gases, there is no way around the fact that climate change is going to be a primary challenge for producing and distributing food," said NCAR scientist Claudia Tebaldi, a co-author of the report. "If society lowers emissions, climate change will still be a stressor on food security, but other factors such as socioeconomic conditions could be more critical."

Two other NCAR scientists—Caspar Ammann and Brian O'Neill—also served as co-authors. The report was produced as part of a collaboration between NCAR, the Department of Agriculture, and the University Corporation for Atmospheric Research, which manages NCAR on behalf of the National Science Foundation.

The report focuses on identifying [climate change impacts](#) on global food security through 2100. The authors emphasize that food security - the ability of people to obtain and use sufficient amounts of safe and nutritious food - will be affected by several factors in addition to climate change, such as technological advances, increases in population, the distribution of wealth, and changes in eating habits.

"Changes in society and changes in climate will both be critically

important to food security in the coming decades," O'Neill said. "This means we have to do a better job of anticipating possible changes in income, governance, inequality, and other factors, and a better job understanding how they interact with food security and climate change."

Among the report's key findings:

- The impact of climate change on crop and livestock productivity is projected to be larger for tropical and subtropical regions such as Africa and South Asia, although there will be regional variations. Wealthy populations and temperate regions are less at risk, and some high-latitude regions may temporarily experience productivity increases, in part because of warmer temperatures and more precipitation. However, if society continues to emit more carbon dioxide and other greenhouse gases that cause climate change, even those regions will face damaging outcomes during the second half of this century.
- Climate change has important implications for food producers and consumers in the United States. The nation is likely to experience changes in the types and cost of food available for import. It can also expect to face increased demand for agricultural exports from regions coping with production difficulties.
- Climate change risks extend beyond agricultural production to critical elements of global food systems, including processing, storage, transportation, and consumption. For example, warmer temperatures can have a negative impact on food storage and increase food safety risks; higher sea levels and changes to lake and river levels can impede transportation.
- Risks to [food security](#) will increase with a higher magnitude and faster rate of climate change. In a worst-case scenario based on high greenhouse gas concentrations, high population growth, and low economic growth, the number of people at risk of

undernourishment would increase by as much as 175 million by 2080 over today's level of about 805 million. This would reverse recent gains, as the number of people at risk of undernourishment has dropped from about 1 billion since the early 1990s.

- Society can take steps to reduce the food system's vulnerability to [climate change](#), ranging from more advanced growing methods to cold storage, improvements in transportation infrastructure, and other strategies. Such adaptations, however, may be difficult to implement in some regions due to availability of water, soil nutrients, infrastructure, funding, or other factors.

Provided by National Center for Atmospheric Research

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