

Climate Change and U.S. Agriculture

A USDA Global Change Fact Sheet

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The issue of climate change is important for agriculture and forestry. The risks of climate change, such as higher temperatures, changes in precipitation, increased climate variability, and extreme weather events can result in significant impacts on agriculture, forestry, and rural areas. The risks posed by climate change and the substantial challenge presented by mitigation and adaptation strategies require a strong USDA commitment to global change issues.

What Is Climate Change?

Human activities can release greenhouse gases into the atmosphere. For example, carbon dioxide is produced when fossil fuels are used to generate energy or when forests are cut down and burned. Methane and nitrous oxide are emitted from agricultural activities, changes in land use, and other sources.

Climate change can affect growing seasons, precipitation and evaporation patterns, pest infestations, and weather variability all of which can affect agriculture. Past and current emissions have already committed the earth to some degree of climate change in the 21st century so some adaptation to climate change is likely. Adapting will require a good understanding of how agriculture responds to climate change so new farming methods can be developed.

Does Agriculture Contribute to Climate Change?

Yes. Agricultural activities contribute to emissions, both directly and indirectly. Direct contributions result from emissions due to deforestation, biomass burning, ruminant animals, decomposition of soil organic carbon from tillage practices, rice cultivation, fertilizer application, use of manure, and degradation of wetlands. Plowing or soil turnover is the major cause of carbon dioxide emissions from cropland. Indirect effects, which account for most agricultural emissions, are attributed to emissions of nitrous oxides and other gases from concentrated livestock operations and from microbial activities in soil and water following applications of fertilizers and manures.

Is Agriculture Affected by Climate Change?

Yes. Climate is a major determinant of agricultural productivity, defining to a large extent where crops and trees are grown. Weather aberrations cause significant losses in agriculture and can place a heavy burden on natural resources and the farm and forestry economies.

What Is Carbon Sequestration?

Atmospheric concentrations of carbon dioxide can be lowered either by reducing emissions or by taking carbon dioxide out of the atmosphere and storing in it terrestrial, oceanic, or freshwater aquatic ecosystems. A sink is defined as a process or an activity that removes a greenhouse gas from the atmosphere. The long-term conversion of grassland and forestland to cropland has resulted in historic losses of soil carbon

worldwide, but there is a major potential for increasing soil carbon through restoration of degraded soils and widespread adoption of soil conservation practices.

Improved cultural practices in agriculture have great potential to increase carbon sequestration in natural and intensively managed ecosystems and decrease the net emissions of greenhouse gases. These efforts also improve soil, water, and air quality and increase productivity in forests, croplands, and grazing lands.

What Is USDA Doing To Help Farmers Adapt to Climate Change and Reduce Emissions?

Since the 1930's, USDA has administered a broad range of conservation and environmental programs to assist farmers, ranchers, and forest landowners in conserving and improving soil, water, and other natural resources associated with rural land.

While there is much debate regarding the effect of greenhouse gases and their potential impact on climate change, there seems to be agreement among many that they could pose a threat to our environment. And, in an industry as climate sensitive as agriculture, this potential threat takes on greater significance: climate change can affect growing seasons, precipitation and evaporation patterns, pest infestations, and weather variability. Although agriculture contributes only 6 percent of total greenhouse gases, our industry can play a significant role in confronting the global change threat.

Not only can we consider ways to reduce our emissions and improve our energy efficiency, we can greatly reduce the potential for global climate changes. The good news? Activities many farmers and ranchers already practice like conservation tillage, residue and manure management, crop rotations, cover crops, and buffers all contribute to carbon sequestration, while accomplishing sustainable resource management goals.

USDA is committed to maintaining a strong research program on the many aspects of climate change, agriculture, and how they interact. We are making progress on improving nitrogen efficiency, which helps reduce nitrous oxide emissions, and we are reviewing our conservation programs to determine how effective they have been in helping farmers abate greenhouse gas emissions and sequester carbon. USDA is committed to the research and promotion of activities which, while based on sound science, will benefit farmers and ranchers and ensure the future of their livelihoods.

Challenges and Opportunities

Global climate change and natural resource issues pose both a challenge to agriculture and an opportunity. USDA is committed to help agriculture face the challenge with solutions that help the farmer's bottom line while at the same time reduce potential adverse impacts on the environment from agricultural production.

About the Global Change Program Office

The Global Change Program Office (Office) operates within the Office of the Chief Economist and functions as the Department-wide coordinator of agriculture, rural, and forestry-related global change program and policy issues facing USDA.

The Office also serves as USDA focal point for climate change issues and is responsible for coordinating activities with other Federal agencies, interacting with the legislative branch on climate change issues affecting agriculture and forestry, and representing USDA on U.S. Delegations to international climate change discussions.

The Office ensures that USDA is a source of objective, analytical assessments of the effects of climate change and proposed mitigation strategies.