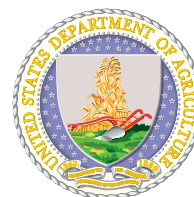


U.S. DEPARTMENT OF AGRICULTURE

Agricultural Research Service (ARS)
 Cooperative State Research, Education, and Extension Service (CSREES)
 Economic Research Service (ERS)
 Forest Service (FS)

Principal Areas of Focus

The U.S. Department of Agriculture (USDA) conducts and sponsors a broad range of research that supports the Climate Change Science Program (CCSP). USDA research focuses on questions that are relevant to decisionmakers at the Federal, State, and local levels. Areas of emphasis include evaluating risks to natural resources, estimating the role of forestry and agricultural activities in greenhouse gas emissions and carbon sequestration, and developing practical management strategies and approaches to manage emissions and adapt to changes. USDA's research program seeks to determine the significance of terrestrial systems in the global carbon cycle; promotes the capture and use of methane emitted from livestock waste facilities for on-farm power generation; assesses the potential of bioenergy as a substitute for fossil fuels; identifies agricultural and forestry activities that can help reduce greenhouse gas concentrations and increase carbon sequestration; quantifies the risks and benefits arising from environmental changes to agricultural lands and forests; and develops management practices that can adapt to the effects of global change, including potential beneficial and adverse effects.



Program Highlights for FY 2009

ARS's climate change research focuses on the carbon cycle and carbon storage; trace gas emissions and sinks; impacts of change on agricultural systems; and feedbacks among agriculture, weather, and the water cycle. During FY 2008, ARS began formulating its next 5-year national plan for global change research via a stakeholder-scientist workshop, creation of a national program action plan, and development of individual research projects. ARS research continues to build a scientific knowledge base for decision-support technologies. ARS global change research enables producers, land managers, and strategic decisionmakers to successfully mitigate the contributions of agricultural systems to climate change and successfully adapt agricultural systems to its potential effects. The **Greenhouse gas Reduction through Agricultural Carbon Enhancement network (GRACEnet)** project is being conducted at 30 locations across the United States, measuring greenhouse gas emissions from multiple agricultural management systems, and allowing the formulation of guidelines for mitigating emissions and optimizing carbon sequestration. The impact of elevated atmospheric carbon dioxide on agroecosystems, such as increased pressure from weeds and invasive species, will continue as a research component. Responses of the hydrologic cycle to climate change that may affect soil water availability for agriculture and other water supplies, such as drought, will be investigated. Development of environmentally friendly and economically feasible alternatives to stratospheric ozone-depleting methyl bromide as a treatment to control pests will continue. ARS participates in intragency and interagency working groups to ensure relevant and significant contributions to the understanding, response to, and mitigation of global change and its impact on production of food, fiber, bioenergy, and natural resources.

Appendix A

The CSREES Program on Global Change and Climate integrates research, education, and extension expertise with new approaches that are economically sound and environmentally advantageous. CSREES conducts its programs primarily in partnership with land-grant university scientists and cooperative extension faculty. Programs such as UV-B Monitoring and Research strengthen the Nation's capacity to address critical environmental priorities and contribute to improved air, soil, and water quality; fish and wildlife management; enhanced aquatic and other ecosystems; the sustainable use and management of forests, rangelands, watersheds, and other renewable natural resources; and a better understanding of global climate change, including its impact on the diversity of plant and animal life. CSREES efforts also demonstrate the benefits and opportunities of sustainable development, and contribute to the economic viability of agriculture and rural communities realizing the impact of environmental policies and regulations. The sustainability of agriculture, forest, and rangelands depends on understanding the factors that influence climate change, the mechanisms that may enhance or mitigate this change, and its effects on food and fiber production and natural resources. Program priorities are drawn primarily from the *Strategic Plan of the U.S. Climate Change Science Program* and include human dimensions. Competitive funding for Global and Climate Change Research is provided through the National Research Initiative (NRI) Competitive Grants Program, which is charged with funding research, education, and extension activities to address key problems of national and regional importance in biological, environmental, physical, and social sciences relevant to agriculture, food, the environment, and communities on a peer-reviewed, competitive basis. To address these problems, NRI advances scientific knowledge in support of agriculture, forestry, and related topics. The program also supports the integration of research, education, and extension to generate, translate, and transfer new technology and knowledge into practical applications focused on solving problems of national importance. Past Global and Climate Change initiatives include carbon cycle science, land-use and land-cover change, and invasive species.

Forest Service research is concentrated on three areas. First, mitigation research aims to increase the fossil-fuel carbon removed from the atmosphere by forests and by offsets to fossil fuels provided by forest products. Second, adaptation research aims to reduce emissions of forest carbon from major disturbances by developing and evaluating methods to increase ecosystem resilience to current and future climate stresses on forests and rangelands, also thereby maintaining ecosystem health and services (e.g., timber, water supplies, biodiversity). Third, creation of decision-support systems—including monitoring, reporting, and synthesis of information—supports land managers and policymakers in adopting these new research results for optimum management of forests and rangelands under a changing environment. Within these three areas, Forest Service research works at (i) expanding understanding of the global carbon cycle in forest and rangeland ecosystems, and the consequences and feedback from the management and use of these ecosystems as they interact with the atmosphere; (ii) improving accuracy and ease of analyses of U.S. forest carbon inventory, and other monitoring and analysis systems for carbon dioxide; (iii) enhancing understanding of climate change impacts on forest health, major disturbance regimes, and ecosystem services; (iv) integrating observation and monitoring networks with process studies to better understand, forecast, and manage relationships between forest and rangelands and climate; (v) accelerating the development of management technologies to increase carbon sequestration, provide fossil-fuel offsets, enhance forest productivity, and maintain environmental quality; and (vi) providing integrated prediction models of forest dynamics under expected future changes in climate and atmospheric chemistry.

Related Research

USDA remains active in the Climate Change Technology Program (CCTP) and related efforts. The Forest Service, Natural Resources Conservation Service (NRCS), ARS, CSREES, and the Rural Development mission area support improved measurement and accounting of greenhouse gases from agriculture and forestry systems, as well as energy initiatives and renewable energy systems such as biofuels and biomass-related research and development. NRCS and the Forest Service are cooperating in development of web-based assessment tools for agricultural producers to account for benefits accruing on carbon fluxes and greenhouse gas emission from conservation practices. In addition, NRCS and the Forest Service are developing new measurement technologies, analytical techniques, and information management systems related to spatial carbon distributions. USDA also is filling gaps in ecosystem information by continuing to collect data on land use, resource conditions, and climate through the National Resources Inventory, the Forest Inventory and Analysis Program, the Soil Climate Analysis Network, and the Snowpack Telemetry system. These networks provide critical data needs on the status and condition of land use in the United States in support of CCSP research.