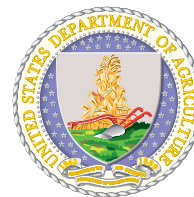


U.S. DEPARTMENT OF AGRICULTURE

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

Principal Areas of Focus

USDA conducts and sponsors a broad range of research that supports the 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 related to climate and other environmental change, 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. USDA is the lead agency responsible for preparing CCSP Synthesis and Assessment Report 4.3, *The Effects of Climate Change on Agriculture, Biodiversity, Land, and Water Resources*. USDA intends to complete the production of this report by December 2007.



Program Highlights for FY 2008

ARS's research on global change continues to focus on the carbon cycle and carbon storage, trace gas emissions and sinks, impacts of change on agricultural systems, and feedbacks among agricultural systems, weather systems, and the water cycle. During FY 2008, ARS will begin 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. The research will continue the approach of building a scientific knowledge base as foundation for the development of decision-support technologies. The emphasis of ARS global change research is on enabling producers, land managers, and strategic decisionmakers to successfully mitigate the contributions of agricultural systems to climate change and adapt agricultural systems to climate change. The Greenhouse gas Reduction through Agricultural Carbon Enhancement network (GRACEnet)—a project being conducted at 30 locations across the United States—will continue measuring greenhouse gas emissions from different tillage and cropping systems, and formulating guidelines for agricultural greenhouse gas emission control and 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

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environmentally friendly and economically feasible alternatives to the use of stratospheric ozone-depleting methyl bromide as a treatment to control pests will continue. ARS will participate 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 and bioenergy, and natural resources.

CSREES continues to support the USDA Ultraviolet-B Monitoring and Research Network Program. This program provides information on the geographical distribution and temporal trends of UV-B radiation in the United States. This information is critical to the assessment of potential impacts of increasing ultraviolet radiation levels on agricultural crops and forests. The program consists of both a research and climatological network. The research network provides state-of-the-art, high-resolution spectroradiometers to six sites, with cross-disciplinary use of the data. The climatological network uses less sophisticated instrumentation and will eventually total between 30 to 40 monitoring stations. Sites included in the research network enhance opportunity for collaborative research, and provide calibration benchmarks for the USDA climatological network as well as other CCSP agency ultraviolet radiation research efforts. CSREES continues to support global change research through the National Research Initiative (NRI) Competitive Grants Program and formula-funded programs. NRI includes programs for carbon and nutrient cycles, air and water quality, land-use and -cover change, ecosystems, agricultural waste management, and invasive species research spanning forest, rangeland, and agricultural ecosystems. Formula funds received through the Hatch and McIntire-Stennis Acts fund climate-related research at the land-grant universities and colleges and at multi-state institutions and state agricultural research experiment stations. CSREES is using the *CCSP Strategic Plan* in formulating priorities under the NRI program and in shaping specific grant announcements for research, education, and extension projects.

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 research efforts. The Forest 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.