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

Research conducted and sponsored by USDA supports long-term studies to improve our understanding of the roles that terrestrial systems play in influencing climate change and the potential effects of global change (including climate variability and change, atmospheric composition, and UV-B radiation) on food, fiber, and forestry production in agricultural, forest, and range ecosystems, and developing management systems to maintain and enhance agriculture and forest productivity and function in changing environments.

USDA's research program is strengthening efforts to determine the significance of terrestrial systems in the global carbon cycle, to identify agricultural and forestry activities that can contribute to a reduction in greenhouse gas concentrations, to quantify risks and benefits arising from environmental changes to agricultural lands and forests, and to develop management practices that can take advantage of beneficial effects of global change and mitigate or adapt to adverse effects. USDA's research agencies support the Department in responding to the President's directive to develop accounting rules and guidelines for carbon sequestration projects. Contributions from USDA's research programs include new tools for accurately measuring greenhouse gases, methods for measuring and estimating carbon in ecosystems at different scales, and effective ways to sustain productivity in a changing environment.

Program Highlights for FY 2004 and FY 2005

ARS's national program on global change research addresses carbon cycle and carbon storage, trace gas emissions and sinks, impacts of environmental changes on agricultural systems, and feedbacks among agricultural systems, weather systems, and the water cycle. The program being implemented in FY 2004 and proposed for FY 2005 will: (1) serve to develop technologies, management practices, and decision support systems for storing carbon in natural soil and plants; (2) develop management strategies for natural resource decisionmakers to address the many diverse demands on U.S. rural water resources that may be caused by climate and other global changes; (3) develop environmentally compatible and economically feasible alternatives to the use of methyl bromide as a treatment to control pests; (4) continue to focus on developing information to assess possible impacts of climate and other global changes on agricultural ecosystems; and (5) improve the measurement of carbon fluxes from soils and vegetation in different land management systems at local, regional, and national scales.

CSREES will continue to support the USDA UV-B Monitoring Network. Information from this research network is combined with satellite-based measurements to provide an accurate climatological UV-B irradiance database. This database documents long-term trends and supports research and

assessment of the potential for damage to ecosystems. CSREES will continue to support global change research through the National Research Initiative (NRI) Competitive Grants Program and formula-funded programs. The NRI initiative includes programs for carbon and water cycles, land-use and -cover change, and managed ecosystem research. CSREES will use the recently developed *CCSP Strategic Plan* in formulating priorities under the NRI program and in shaping specific grant announcements.

The Economic Research Service will contribute applied economics research on greenhouse gas mitigation options in the context of USDA conservation policies.

The Forest Service has identified the following key issues for future program emphasis: (1) Improve observations of forest carbon stocks and flows based on development and deployment of improved field measurement techniques and measurements integration, and initiate a forest carbon-monitoring program based on the FS experimental forest network as a component of the interagency research effort on the North American Carbon Program; (2) integrate observations with process-level studies to better understand, forecast, and manage the relationships between forest and rangeland systems and climate; (3) develop and deploy forest management technologies that increase carbon sequestration, provide fossil fuel offsets, enhance productivity, and maintain environmental quality; (4) provide integrated prediction models of forest carbon dynamics; and (5) provide and improve greenhouse gas accounting rules and guidelines for forest systems. In FY 2005, the Forest Service will invest an additional $1.5 million to provide improved estimation and projection systems for carbon stocks and fluxes from forested systems and develop science-based carbon management systems. The Forest Service will compile estimates of carbon fluxes from forest lands, including trees, understory, forest soils, and wood products.

The Natural Resources Conservation Service will develop new measurement technologies, analytical techniques, and information management systems to measure the benefits of conservation practices on carbon fluxes and the emissions of greenhouse gases.

Related Research

USDA maintains an active program directed at improving the measurement and accounting of greenhouse gases from agriculture and forestry systems and developing technologies and practices to improve the utilization of biomass energy and bio-based products. The Forest Service, NRCS, ARS, CSREES, and the Rural Development mission area support biofuels and biomass-related research and development. These research and development activities are reported under the Climate Change Technology Program.