USDA Cooperative State Research, Education, and Extension Service Global Change and Climate Program

CSREES global change and climate projects focus on determining and adapting to the effects of global change and climate on land-based systems and on identifying agricultural and forestry activities that can help reduce greenhouse gas concentrations. Research identifies, describes, and quantifies processes involved in the cycling of organic and inorganic carbon in soil. Extension programs focus on technologies and practices to reduce carbon in the atmosphere and risk management practices to anticipate natural and human impacts on agricultural ecosystem dynamics. Education and extension activities provide robust scientific information for learning and decision support systems for citizens and public officials to evaluate the environmental and socioeconomic impacts of policy options for sustainable resource management.

Global Water Cycle
Current and future CSREES-funded research projects on the global water cycle focus on how natural and human activities influence the distribution and quality of water within the Earth system, whether changes are predictable, and the effects on human systems of variability and change in the water cycle.

Land-use and Land-cover Change
Current and future research projects on land-use and land-cover changes focus on: 1) the processes that determine temporal and spatial distributions of land-cover and land-use at local, regional, and global scales; and how and how well land-use and land-cover can be projected over time scales of 5 to 50 years; and 2) how changes in land-use, management, and cover affect local, regional, and global environmental and socioeconomic conditions, including economic welfare and human health, taking socioeconomic factors and potential technological change into consideration

Human Contributions and Responses in Agroecosystems
Current and future research projects on human contributions and responses in agroecosystems focus on: 1) how natural and human-induced environmental changes interact to affect the structure and function of ecosystems (and the goods and services they provide) at a range of spatial and temporal scales, including those ecosystem processes that influence regional and global environmental changes; and 2) how society can enhance and sustain desirable ecosystem goods and services, in the context of still uncertain regional and global environmental changes.

Decision Support
As our climate continues to change, science-based decision support tools must be developed to determine the options for agriculture to respond and adapt so as to minimize the impacts from such changes. In the area of climate mitigation related to agriculture and forestry sectors, decisions require a better understanding of key mechanisms, optimization strategies, and projected capacity of agriculture, rangelands and forests to reduce climate stressors through processes such as carbon sequestration in both soil and biomass and reductions in methane, nitrous oxide and other greenhouse gases.

Environment and Natural Resources Enterprise
CSREES has created a new initiative called the Environment and Natural Resources (enr) Enterprise. This agency-wide initiative seeks a more integrated understanding of the complex interactions among human societies, ecosystems of working lands, and natural areas. The Enterprise goal is to change the way working lands are managed. Working lands are defined as lands used to produce agricultural, natural and forest resource goods and services. The enr strategy in achieving this goal is to use our understanding of coupled human-natural systems to enable people to be better informed in their personal and professional endeavors about working lands and ecosystems. This brings together the natural sciences, engineering, mathematics, business, social and political sciences, economics, and education to achieve a system science view of agricultural and forestry production and sustainability.