



ERS is a primary source of economic information and research for USDA. ERS produces objective research with the aim of informing public and private decision making on economic and policy issues involving food, farming, natural resources and rural development. ERS' climate change research program will predict responses of farmers to mitigation options, analyze the impact of mitigation options on domestic and global land and water use, and evaluate adaptation by farmers to a new climate regime through use of alternative technologies. The ERS Climate Change research program builds on extensive expertise on the economics of land use and land management, technology adoption, conservation program design, economics of biofuels, and value and dissemination of public investment in research and development.

### **Research on Implications of Biofuel Production on Greenhouse Gas Emissions**

The rapid increase in grain-based ethanol production and the potential use of cellulosic materials as an ethanol feedstock affects agricultural markets, local communities, consumer prices, and environmental quality. ERS information products include current estimates and projections of commodity supply, demand, and retail food prices in light of biofuel expansion. Further information and analyses will describe how bioenergy development will affect land use, rural communities, and the environment, including greenhouse gas emissions from crop production. Global potential for biofuel production under different economic, technological and policy assumptions, including economic and environmental (land use, water use and greenhouse gas) tradeoffs across countries, regions, and producers/consumers will also be explored.

### **Research on the Potential Response to Greenhouse Gas Offset Markets**

This project will study potential economic implications of options for farmers' participation in carbon offset markets. Because these markets would be voluntary, specific design details may influence farmers' participation decisions, practices/land use options they would offer, and subsequently, the economic efficiency and environmental performance of the offset market. This project would consider reductions in greenhouse gas emissions that can be achieved by adopting soil management practices on cultivated land and methane destruction on livestock operations. These two avenues for climate change mitigation provide a stark contrast because, although methane destruction provides more certain, permanent and verifiable benefits, it can be much more expensive than sequestering carbon on cropland. The project will assess different aspects of policy design, including steps to control leakage and reduce transaction costs, as well as exploring potential interactions with existing conservation programs.

### **Research on the Returns to Investment in Public and Private R&D under a Changing Climate**

Public and private investment in research and development may produce new technologies (e.g., seed varieties) or production practices that are better suited to changing climate conditions. ERS research on trends in R&D investment, the value of public agricultural R&D, and determinants and patterns of uptake of new technologies by producers form a foundation for understanding the potential returns to R&D investment associated with a new climate regime. Future research efforts may examine the benefits and costs of development and uptake of technologies that can facilitate adaptation by farmers to weather conditions that may be more variable, hotter, and dryer. New seed varieties and technologies that help U.S. farmers adapt to a changing climate may also be beneficial to farmers in other countries, and global adoption could lead to potential shifts in global production and trade patterns. To the extent that global proliferation of technologies is a tenable hypothesis, this research effort will examine whether, and to what extent, global production, prices, and trade are affected by global adaptation to a new climate regime.