Climate-Smart Agriculture Analytics

RTI International provides independent, interdisciplinary analysis to help guide policies and interventions in "climate-smart agriculture," an integrated approach aimed at addressing the complex and interrelated challenges of food security and climate change. RTI's modeling and research capabilities deliver science-based, customized, and actionable analyses. Our work supports policy development and implementation efforts that affect the agricultural sector at every decision-making level, helping to build more productive, resilient, and efficient agricultural systems.

Overview

Food security and climate change are linked in complex ways that must be addressed holistically. There is an urgent need for policy makers and program implementers to address these challenges within agricultural systems using science-based approaches to increase productivity, adapt and build resilience to climate changes, and reduce greenhouse gas (GHG) emissions.

RTI's Climate-Smart Agriculture (CSA) Analytics program has three primary objectives:

- Improve knowledge of productive, resilient, and low-emission agricultural systems through policy and project-relevant research and analysis
- Enhance the ability of policy makers and program implementers to make informed decisions on CSA through the development of customized tools, decision frameworks, and data resources
- Build capacity for stakeholders to conduct CSA analyses, strengthening local institutions and fostering enhanced food security in the face of climate change.

Areas of Expertise

RTI is an international leader in economic and environmental modeling; food security and risk assessment; technology development and evaluation in the agricultural, forestry, and land use sectors; and more broadly in economy-wide impacts of climate change and mitigation/adaptation policy. RTI's survey development and statistical expertise has been employed in international contexts.

Our suite of models and decision support tools are flexible and can be tailored to the unique challenges of CSA analytics by combining geographic information systems, biophysical data, and a variety of empirical modeling techniques. These tools serve to inform national- and subnational-level agricultural and climate initiatives, including development of adaptation strategies, low emission development strategies, and design of carbon offset programs.

Focus Areas and Capabilities

- Climate change adaptation and mitigation analytics for the agricultural sector, including low emission development strategies for the agricultural sector, emission inventories, water resource management, and vulnerability assessment
- Economic and biophysical modeling:
  - Agriculture and forest-sector optimization combined with advanced geospatial analytics to estimate the environmental, economic, and social impacts of land use changes resulting from the adoption of CSA practices and policies
  - Cost impacts of technology change on farming practices and projection of GHG emission reductions from technologies over time
  - Balance, fate, transport, and impacts of nitrogen
- Quantification and valuation of the benefits of carbon sequestration via ecosystem and landscape services
- Assessment of social and behavioral barriers to adoption of CSA practices
- Biofuels research, development, and outreach for farm-level implementation
- Technology development for agriculture, including sensor-based applications and renewable energy production from agricultural waste
- Program implementation, evaluation, and strategic planning, from modeling and analysis to interventions in the agricultural sector

Recent Accomplishments

Mitigation Analysis—Through the Mexico Low Emission Development Strategies (LEDS) and Uruguay LEDS Capacity Building Projects, RTI provided cutting-edge techniques for climate policy and mitigation analysis. We facilitated best-practice exchange workshops and strengthened local capacity through focused trainings on modeling techniques.

Water Resource Management—RTI developed hydro-economic modeling approaches for food-energy-water (FEW) nexus research applications in Laos, UAE, and Brazil. These help policy makers better manage water resources to improve efficiency and welfare while meeting food and energy security goals. FEW modeling is particularly useful in the context of a changing climate, where water availability is increasingly unpredictable and scarce. The framework is flexible, and RTI hydrologists and economists collaborate with partner country institutions to adapt to local contexts.

Agricultural and Forestry Land Use Change—RTI resource economists developed a forestry, agriculture, and land use change model to help navigate trade-offs between agricultural production and negative environmental impacts in China under different climate scenarios. The model also predicts China's future demand for agricultural products.

Building the Evidence Base—Since 2010, RTI researchers have published over 30 peer-reviewed articles on the climate change impacts of agriculture and forestry, GHG emissions, land use change, water, and mitigation strategies. Visit www.rti.org for an inventory of our publications.

More Information

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