

# PROJECT facts

U.S. DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
NATIONAL ENERGY TECHNOLOGY LABORATORY

Carbon Sequestration

04/2008



## APPLICATION AND DEVELOPMENT OF APPROPRIATE TOOLS AND TECHNOLOGIES FOR COST-EFFECTIVE CARBON SEQUESTRATION

### Background

According to the Intergovernmental Panel on Climate Change (IPCC), deforestation accounts for about 20 percent of annual global emissions of carbon dioxide (CO<sub>2</sub>), the primary greenhouse gas (GHG). The IPCC estimates that 12–15 percent of the fossil fuel CO<sub>2</sub> emissions generated between 1995 and 2050 could be offset through slowing tropical deforestation, allowing these forests to regenerate, and engaging in plantation plantings and other forms of agroforestry.

There is great potential for such cost-effective carbon sequestration projects both in the United States and abroad. However, without the development and refinement of tools and technologies that allow accurate and cost-effective assessment of the amount of carbon sequestered, these approaches may not be recognized as credible means for reducing GHG. Through a cooperative agreement with the Department of Energy to explore the compatibility of carbon sequestration in terrestrial ecosystems with the conservation of biodiversity, The Nature Conservancy is participating in the ongoing development and implementation of carbon sequestration projects on a demonstration scale. The Conservancy's first involvement in assessing this approach came in 1994 with the development of the Rio Bravo Carbon Sequestration Pilot Project in Belize, in cooperation with several partners. Since then, several other projects have been initiated with a variety of partners.

This project will focus on gaining cost-effective, verified measurements of the long-term potential of various terrestrial carbon sequestration strategies and assessing land use practices that avoid emissions of CO<sub>2</sub>. The project will use newly developed aerial and satellite-based technology to study forestry projects in United States and Belize to determine their carbon sequestration potential and will also test new software models to predict how soil and vegetation store carbon at sites in the United States and abroad.



Nature Conservancy scientist Patrick Gonzalez measuring white fir tree in a high-carbon area of the Tahoe National Forest.

### CONTACTS

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### Primary Project Goal

The primary goal of this project is to refine the tools and methodologies for cost-effective, verified measurements of the long-term potential of various carbon sequestration strategies and assess land use practices that avoid emissions of CO<sub>2</sub>, using actual projects as proving grounds.



## PARTNERS

The Nature Conservancy (TNC)  
Winrock International Institute  
for Agricultural Development  
The Society for Wildlife  
Research (SPVS)  
Programme for Belize Comite  
de Defensa de la Fauna y Flora  
(CODEFF)  
Universidad Austral de Chile  
Los Alamos National Laboratory  
Colorado State University  
Stephen F. Austin State University  
Virginia Technical University  
Michael Lefsky  
Colorado State University  
UC Berkeley  
The Carnegie Institution  
of Washington  
California Department of Parks  
Stanford University  
USDA Forest Service  
ProNaturaleza  
Ohio State University  
Geographical Modeling  
Services, Inc.,  
WestWater  
Los Alamos National Laboratory  
Century Ecosystem Services

## PERIOD OF PERFORMANCE

07/11/2001 to 07/10/2008

## COST

**Total Project Value**  
\$3,139,60

**DOE/Non-DOE Share**  
\$2,511,680 / \$627,920

## CUSTOMER SERVICE

1-800-553-7681

## WEBSITE

[www.netl.doe.gov](http://www.netl.doe.gov)

## Objectives

- Improve carbon monitoring and lower its cost.
- Develop land use trend models to project potential CO<sub>2</sub> offsets.
- Evaluate and standardize carbon monitoring methods and procedures.
- Assess domestic land-use options for reducing greenhouse gases.
- Develop software for initial feasibility screening of potential domestic projects.

## Accomplishments

- Advanced digital videography has been tested in pine-savannah and closed-canopy forests in Belize and the Lower Mississippi Alluvial Valley in the United States. Work has commenced in California to test the ability of high-resolution satellites QuickBird and Light Detection and Ranging (LIDAR) to quantify aboveground forest carbon. Signs of altitudinal shifting of vegetation have been observed in California.
- Feasibility studies in seven different U.S. ecosystems have been completed to determine for which of these ecosystem types carbon sequestration is a viable option.
- A feasibility study has been initiated in the United States northeast region in collaboration with Regional Greenhouse Gas Initiative stakeholders to determine the opportunity for forestry to sequester carbon. This project seeks to assess the cost and potential of carbon sequestration benefits on a multi-state level and learn more about how conservation and carbon sequestration projects may or may not be compatible. Large carbon mitigation potential through alteration of terrestrial land management has already been identified in the northeastern United States.
- The GEOMOD spatial analysis tool has been used to determine and validate baseline analyses. An alternative baseline method developed by TNC, called the Forest Restoration Carbon Analysis (FRCA) method, has been further refined and developed in Peru. Both spatially explicit baseline models, along with the historical trend baseline method, have been compared for a site in Valdivia, Chile.
- Technical advisory panels have been organized to share research and address the issues associated with baseline and leakage estimates.
- A soil monitoring workshop was held in Brazil to discuss the ability to measure changes in soil carbon at existing carbon sequestration projects.
- A new project software-screening tool has been completed and launched.

## Benefits

This project will validate technology and develop protocols to measure carbon both in soils and in aboveground vegetation. The evaluation of sites both in South and North America make this project unique. Many of the existing voluntary exchanges and state initiatives allow for offset projects to occur both domestically and internationally.

## ADDITIONAL SUPPORT

American Electric Power  
Applied Energy Systems  
General Motors

KeySpan  
Mirant Corporation  
NiSource

PSEG  
Salt River Project  
Texaco