Proposed Agreement between California Energy Commission and The Regents of the University of California, Berkeley

Title: Enhancement to the Development of Forest Carbon Inventory and Monitoring Tools Using Remote Sensing
Amount: $400,000.00
Term: 36 months
Contact: Sarah Pittiglio
Committee Meeting: 1/18/2011

Funding

FY	Program	Area	Initiative	Budget	This Project	Remaining Balance	
09	Electric	EA	Global Climate Change	$4,323,000	$400,000	$0	0%

Recommendation

Approve this agreement with UC Berkeley for $400,000.00. Staff recommends placing this item on the discussion agenda of the Commission Business Meeting.

Issue

The Air Resources Board's (ARB) greenhouse gas (GHG) inventory for the forest sector is currently based on a California Energy Commission (CEC) research project which focused on a 1994 to 2000 time interval and a region of northern California. While the project developed estimates of CO2 uptake and GHG emissions for forest, range, and other lands, technology transfer of a method for repeated GHG inventory generation and improvement was beyond the scope of work. In addition, this work did not include estimates of emissions from decay of trees killed by disease and invasive pests, which have become an increasing threat to carbon stocks in forests over the past several years.

Unprecedented outbreaks of pine beetle have decimated millions of hectares of forests in the western United States and Canada. Not only are numerous ecosystem services affected, but the disturbance of such magnitude plays a critical impact on terrestrial ecosystem carbon storage and cycling as well as the fluxes of greenhouse gases (GHG). Infested forests have been found to have a 50% reduction in transpiration rates per tree, assimilate 63% less CH4 , and produced 133% more N2O. Prolonged local increases in greenhouse gas emissions are highly likely to transform infected forest ecosystems from effective sinks to sources of atmospheric C and N greenhouse gas compounds.

However, we do not clearly understand the magnitude of these changes. An estimate of the GHG emissions due to current and predicted beetle infestations in California is lacking. This important problem needs to be addressed in order to project large scale, regional-level ecosystem GHG budgets. These types of budgets are necessary to quantify the potential of California forests to generate offsets for energy producers in the form of sequestered carbon.

Background

The ARB is currently in need of new methods for GHG inventory updates for forests, range, and other lands. The methods will be developed in a collaborative effort by staff of the ARB, CEC and CalFire. The unified goal is to utilize continuous remote-sensing and ground-based data in combination to generate geo-referenced estimates of ecosystem carbon stocks, annual CO2 uptake and GHG emissions by disturbance processes. A statewide geo-referenced land use/land cover database will also be used to consistently represent key land categories and conversions between land categories over time. In addition, the ARB will be focusing on identifying methods by which fuel model selection and fuel loading assumptions in a wildland fire emission model may be harmonized with estimates of ecosystem carbon in the form of biomass and dead organic matter. The role of CalFire will be to provide estimates of annual CO2 uptake and GHG emissions from urban forests. Through this contract, the CEC will be assisting in development of the new methods to generate GHG inventories using remotely sensed data, by providing essential data on the specific effects of invasive pests, such as the bark beetle, on GHG emissions from forested lands.

Proposed Work

Work proposed here will enhance the development of the new greenhouse gas inventory methods for California, by developing methods to account for reduced CO2 uptake and GHG emissions from forest areas affected by disease/pest outbreak. Researchers will develop methods that will be data-driven with the primary data being plot-level and remotely sensed information. The satellite imagery provides both wall-to-wall spatial coverage and year-to-year temporal coverage. The researchers will use geo-referenced biometric data (field inventories) together with remote sensing data to generate geospatially explicit estimates of biomass, necromass, and carbon over time, which will be tested against independent estimates from sites across the state. In turn, these data together with geo-referenced data on disturbance processes will be used to generate new estimates of atmospheric CO2 removal and GHG emissions. The developed inventory method will have robust estimates of uncertainty and conform (at a minimum) to accepted international standards (IPCC) in terms of carbon/GHG accounting.

The effort will result in new estimates of carbon stocks, annual CO2 uptake and GHG emissions of forests, range, and other lands. It will also determine GHG emissions associated with forest pests, which is necessary for accurate accounting. This will be used to inform estimates of the potential for forested lands to generate offsets for the energy sectors.

Justification and Goals

This project "[will] advance energy science or technologies of value to California citizens..." (Public Resources Code 25620.(c)), and is part of a "full range of research, development, and demonstration activities that . . . are not adequately provided for by competitive and regulated markets (Public Resources Code 25620.1.(a)); and supports California's goal to support efforts by the California Climate Action Registry to collect data on facility-level and entity-wide greenhouse gas emissions per the Integrated Energy Policy Report 2005.

This project also supports the Air Resources Board to implement AB32

This will be accomplished by:

- Develop an operational method to repeat estimates of vegetation carbon density for the forest sector in California for 2005 and 2010.
- Estimate greenhouse gas emissions due to invasive forest pests and atmospheric CO2 removal in California for the period 2005 through 2010.