

Project 1: Integrated Modeling and Assessment of Climate Change Mitigation Options in the North American Forest Sector		Operating Year(s): 2015–2016
Planned Budget for Two Years: C\$360,000 Year 1: C\$180,000 Year 2: C\$180,000		
Strategic Priority/Subtheme <ul style="list-style-type: none"> Climate Change Mitigation and Adaptation <p>The forest sector throughout North America is expected to be a major contributor to meeting domestic targets for reductions of greenhouse gas (GHG) emissions. This project will provide policy-relevant scientific information on climate change mitigation options in the forest sector by evaluating and assessing their impacts on GHG balances. Such options include improvements in forest and land management, reduction of deforestation and forest degradation, enhancement and conservation of forest carbon stocks, carbon storage in harvested wood products, provision of biofuels, and the benefits of displacing high-emission products like concrete and steel with harvested wood products. National and regional circumstances, including forest conditions and drivers of GHG emissions, differ among the three countries and the CEC will provide the mechanism to maintain the trilateral focus and coordination among the Forest Services of the three countries. This coordination will enable the project team to identify and analyze the most efficient GHG mitigation options and improve understanding about regional differences between the available mitigation options and their mitigation potentials. If implemented, they can make significant long-term contributions to reducing GHG emissions in each country.</p> <p>The forest and blue carbon projects of the CEC have similar objectives and have already started to coordinate activities regarding mangrove forests. Some of the carbon accumulating in aquatic systems originates from upstream land ecosystems, and their management, land use and levels of disturbance can affect carbon accumulation rates in blue carbon ecosystems. Both projects will create opportunities in the next two years for further cooperation and synergies among the two related land and aquatic sectors.</p>		
How will this project address the cross-cutting themes? <p><i>Learning from and assisting vulnerable groups and indigenous communities.</i> The implementation of forest sector mitigation options, including enhanced forest management, silviculture and protection efforts aimed at achieving forest sector climate mitigation benefits can create additional benefits particularly in rural communities throughout North America. For example, reducing deforestation and forest degradation, if well implemented, can improve the livelihoods of vulnerable groups and indigenous communities throughout North America. The information generated in this project, concerning forest dynamics, risks from natural disturbances, and ecosystem vulnerability to climate change, is relevant to the design of climate change adaptation strategies in the forest sector and the communities that depend on the forests. Thus, while the project primarily focuses on climate change mitigation, the project results will also inform adaptation research.</p> <p><i>Enhancing information sharing, transparency, capacity building and communication.</i> This project has already established a record of generating and sharing information, enhancing transparency and building capacity, both through the provision of data and tools and through training and communication. The project will further help build capacity among the three countries for data analyses of climate change mitigation options in the</p>		

forest and land-use change sector. Specifically, the project focuses on:

- generation of key input data, the development of tools and methods, and the harmonization of approaches required to assess and report GHG emissions and removals in the North American forest sector;
- collaboration with national institutions and experts, including those in the CEC projects on land-cover change and blue carbon, and academic networks, such as the Mexican Network of Intensive Carbon Monitoring Sites (RED MEX-SMIC) and the North American Carbon Program (NACP, CarboNA);
- integration of data into monitoring and reporting schemes;
- development of consistent datasets on forest carbon, land cover, and land-cover change;
- assessment of carbon in harvested wood products; and
- strengthened information sharing to improve efforts to address climate change and the transition to a low-carbon economy.

Project Summary (including a clear statement of project goal)

The forest sector is expected to play an important role in domestic GHG mitigation portfolios in all three countries. This project will help identify the most effective approaches in each country to achieve mitigation objectives in forestry sector. The specific goals are:

- (1) to advance the integration and validation of science-based decision support models with improved input data to quantify the impacts of current and alternative management options for forests and harvested wood products on the carbon balance of the North American forest sector;
- (2) to conduct analyses in support of policy and management decisions regarding climate change mitigation, including the reduction of emissions from deforestation and forest degradation, improved land management, and improved management of harvested wood products; and
- (3) to facilitate trilateral communication, information exchange, and capacity building, so that the scientific and policy communities can design, assess and potentially implement forest sector activities that will contribute to meeting national GHG emission reduction targets.

This project builds upon the successful results obtained during the previous CEC project, in which the project team developed the capacity to inform estimates of forest GHG balances using newly available and emerging scientific data, such as annual time series of 30-m resolution land-cover change and disturbance information. It will address the longer-term goals of the original project by applying the forest carbon assessment models to analyses of mitigation options in strategic forest landscapes in the three countries.

The three countries have worked together since 2011 with the support of the CEC and programs with similar goals (e.g., USAID Sustainable Landscapes, Reinforcing REDD+ and South-South Cooperation) to develop and implement empirical and process models and compare estimates obtained with them, assessing their contribution to monitoring and measuring GHGs in the forestry sector. This new project takes the next step: using the models to examine forest sector mitigation options to meet national objectives for GHG emission reductions in selected landscapes in Mexico, the US and Canada. It will enable us to quantify the impacts of various mitigation options on the GHG balance and consider how the data

and tools developed for carbon assessment might be used to support vulnerability assessments and adaptation responses, although detailed analyses of these topics are beyond the scope of this project and may be tackled in future years.

In the second year, carbon budget models will be applied for the analysis and projection of future GHG balance and climate change mitigation options in the North American forest sector in specific regions of high interest. Spatial information about the impact of natural disturbances, land cover, and land-cover change on forest carbon will provide decision-makers and land managers with the science-based analyses needed to support policy and management decisions. The assessment of mitigation options requires a systems approach that includes the assessment of changes in GHG emissions in forests, from the harvested wood products sector, and those associated with product substitution. The project will therefore develop methods to integrate carbon models to support comprehensive analyses of mitigation options in all three countries. The work will identify key elements of a monitoring system capable of assessing the magnitude of reductions in CO₂ emissions from forests, and increases in the removal of CO₂ from the atmosphere, relative to a projected baseline based on current/historical activities. The project will focus only on selected landscapes in all three countries: national-scale analyses of mitigation options will remain the responsibility of national agencies, but such analyses can be informed by the results of this coordinated research project.

Table 1 outlines examples of strategic landscapes and the potential mitigation options that could be analyzed in this project. The project initiation workshop will be used to solicit feedback from the policy and science community on the regions and mitigation options that will be examined in greater detail. Depending on data availability and complexity of the issues, the number of regions can be expanded beyond the preliminary examples provided here.

Table 1

Country	Region	Examples of Potential Mitigation Options
Canada	Central BC	Options for forest recovery after mountain pine beetle (<i>Dendroctonus ponderosae</i>) devastation; changes in forest management practices, increased emphasis on long-lived wood products.
Canada	Boreal Forest	Timber salvage operations after forest fires; changes in forest management practices, increased emphasis on long-lived wood products.
US	Northwest Region	Fire, fuel and insect management options, increased emphasis on long-lived wood products
US	Southeast Region	Reduction of deforestation rates, restoration of native forest ecosystems
Mexico	Yucatan Peninsula	Reduction of emissions from deforestation and degradation and forest management practices
Mexico	Northern Region, e.g., Durango and/or Sonora	Reduction of emissions from charcoal production, increased emphasis on long-lived wood products.

Sustainable forest management provides a continuous supply of timber, fiber and energy to meet society's demands. The increased use of harvested wood products leads to reduced carbon storage in forest ecosystems, but greater carbon storage in harvested wood products, and can contribute to reduced emissions in other sectors. For example substitution of steel, concrete, or plastics in the building sector, or of fossil fuels in the energy sector through the use of wood products can contribute to reduced emissions in these sectors. "Displacement factors" are used to quantify the reduction of emissions through the use of forest products and are necessary to complement the analyses of changes in carbon stocks in forests and harvested wood products. This project will research, quantify and develop displacement factors for different harvested wood product categories and biofuels derived from forest biomass and their use to reduce emissions in the three countries. Regionally differentiated "displacement factors" are required because the emissions-intensity of the substituted products can vary regionally. For example, the avoided emissions of using biomass to substitute energy from a coal-burning facility will be much larger than avoided emissions from the substitution of energy from a hydro-electric facility.

Short-term Outcomes (at halfway point)

- Enhanced understanding in all three countries of carbon dynamics and GHG balances in forest ecosystems and harvested wood products (including landfills) and product substitution.
- Identification of possible climate change mitigation options and scenarios.
- The project initiation workshop will contribute to enhanced understanding among science and policy communities about the potential role of forest sector mitigation options.
- Tools and associated input data sets for selected landscapes in all three countries that will enable analyses of mitigation options in the forest sector.

Long-term Outcomes (by the end of the project)

- Application of carbon budget models for the analysis and assessment of future GHG balance and climate change mitigation options in the forest sector in specific regions of high interest in North America.
- Spatial information about the impact of natural disturbances, land cover, and land-cover change on forest carbon in specific regions of high interest in North America to provide decision-makers and land managers with some of the data needed to make policy and management decisions. Design of mitigation options requires an understanding of risks associated with natural and human-caused disturbances.
- Improved understanding and quantification of reducing emissions through use of forest products, which provides a more complete assessment of the effectiveness of forestry mitigation options.
- Facilitated trilateral communication and information exchange among the scientific and policy communities. Improved capacity to design, assess and potentially implement forest sector activities that contribute to meeting national GHG emission reduction targets.
- At the conclusion of the project, a workshop with science and policy experts will contribute to the communication of project results for all three countries and could provide the information for subsequent stakeholder consultations coordinated through the CEC.

Longer-term, Environmental Outcome (post-project)

- The implementation of forest sector mitigation options identified and quantified in this project can contribute to substantial long-term reductions in national GHG emissions.
- Analyses of the rates of deforestation and forest degradation in North America and associated emissions will improve the understanding of the impact of natural and human disturbances and quantification of mitigation options on national carbon budgets.
- Improved management of forests leading to sustainable provision of services beyond climate mitigation, such as timber production, water supply, and biodiversity.
- Improved utilization of wood products to meet the objectives of GHG emission reduction targets and transition to low carbon economies.
- Integrated approaches to mitigation and adaptation for terrestrial and aquatic (blue carbon) ecosystems.

Performance Measures (quantified SMART measures)

The project will present the results of analyses of forest sector mitigation options in reports, including peer-reviewed publications, maps, presentations, databases and documentation of the tools and methods with which these analyses were conducted. The project will compare forest sector mitigation options in the three countries. Intermediate products will be generated such as improved “activity” data (derived from time-series of land cover and land-cover change products), data processing and modeling tools, e.g., to represent carbon storage in harvested wood products and landfills, and databases that contain the relevant information that is used as input to these analyses, and can be improved and used to repeat the analyses in the future.

Outcome	Measure	Target	Indicator
Enhanced understanding among science and policy communities about carbon dynamics and GHG balances in forest ecosystems and harvested wood products (including landfills) and product substitution and possible climate change mitigation options and scenarios.	Number of strategic landscapes and possible mitigation activities selected for analysis by experts in the three countries	Appropriate information on forest carbon budget model components and mitigation activities developed for selected landscapes in each country	Increase in number of landscapes and mitigation activities analyzed by experts participating in CEC work
Application of carbon budget models for the analysis and assessment of current/historic and future GHG balance and climate change mitigation options in the forest sector in specific regions of high interest in North America.	Number and range of specific regions of high interest for which carbon budget models are applied	100% of required data collected and models applied	Increase in the number of mitigation options that are quantitatively analyzed for regions of high interest in North America
Spatial information about the impact of natural disturbances, land cover, and land-cover change on forest carbon in specific regions of high interest in North America to	Number and quality of forest characteristics and activity data, including data on harvested wood products, combined with land-cover	Target: 100% of available inventory and activity data from reliable sources are combined with geospatial	Increase in the availability of spatial information about the impact of natural disturbances, land cover and land-cover

provide decision-makers and land managers with some of the data needed to make policy and management decisions. Design of mitigation options requires an understanding of risks associated with natural and human-caused disturbances.	data in regions of high interest in the three countries	data for the regions of high interest in North America	change on forest carbon in regions of high interest in the three countries
Improved understanding and quantification of reducing emissions through use of forest products, which provides a more complete assessment of the effectiveness of forestry mitigation options	New estimates of reduction in emissions resulting from the use of harvested wood products in North America, and results integrated in the analyses of mitigation scenarios	More complete assessment on mitigation options to inform decision makers and stakeholders.	Increase in the number and availability of information (specific new report and enhancements to others) to the three countries
Facilitated trilateral communication, information exchange among the scientific and policy communities. Improved capacity to design, assess and potentially implement forest sector activities that can contribute to meeting national GHG emission reduction targets.	Number and quality of reports, peer-reviewed publications and datasets	The information generated through the project is available through reports, peer-reviewed publications and datasets	Increase in the number and availability of information (reports, publications, and datasets) to the three countries
At the conclusion of the project a workshop with science and policy experts will contribute to the communication of project results for all three countries and can provide the information for subsequent stakeholder consultations coordinated through the CEC.	Number of participants at workshop and participating in CEC work by region/country, area of expertise and organization/agency, collaboration of scientists in the three countries	75% of experts identified by the three countries participate in CEC forest carbon workshop	Increase in the number of experts and organizations/agencies participating in the CEC forest carbon work compared with attendance at Forest Carbon workshops held under the Operational Plan 2013-2014.

Tasks necessary to reach the environmental outcome:

Four main tasks and their subtasks are outlined below. Many tasks will be conducted in parallel. These tasks build upon previous development and application of modeling tools in the Yucatán Peninsula of Mexico, the Nez Perce-Clearwater National Forest in the United States, and Prince George, BC, in Canada. At these sites, a forest carbon budgeting model (CBM-CFS3) was parameterized with locally-available data, and results compared with an ecosystem model (DNDC) to verify that the budgeting model parameters were in agreement with expected productivity and biomass estimates, and to explore how to fill in data gaps with modeled parameters where necessary.

- 1) Workshops to connect with stakeholders, prepare documentation, and communicate interim and final results.
 - a. Project initiation workshop to identify and select strategic landscapes with contrasting drivers of GHG emissions and a range of possible mitigation activities in the three countries (see Table 1).
 - b. Periodic conference calls and other communication to inform participating institutions about project status and interim results.

c. Final project workshop to communicate the results of the study to policy makers and the scientific community. Prepare reports, scientific peer-reviewed publications and presentations

2) Compile and validate input data including model parameters, activity data and harvested wood products data for each strategic landscape. Make recommendation for improving availability of critical data in the future.

3) Perform assessments of mitigation options and identify the most climate-effective options.

a. Develop and run carbon accounting models for ecosystems and harvested wood products with current/historic and improved activities.

b. Evaluate other factors to consider: product substitution, albedo (changes in surface reflectance that affect the energy balance and thus climate warming), etc.

4) Building on a small number of literature studies on displacement factors (emissions avoided through the use of harvested wood products), compile and develop new estimates of reduction in emissions resulting from the use of harvested wood products in North America (year 1) and combine these with estimates of changes in emissions from forests and harvested wood products in the analyses of mitigation scenarios (year 2).

Task #1) Workshops to connect with stakeholders, analyze results, prepare documentation, and communicate results

Subtask	Project outputs	How does the subtask/output move the project towards the environmental outcome	Timing	Budget (C\$) (activities)
1.1 Engage science and policy experts from the three countries to identify and select strategic landscapes with contrasting drivers of GHG emissions and a range of possible mitigation activities	Agreement among agencies and experts on selected landscapes and mitigation options to evaluate in them	Provides the foundation for analyses and contributes to trilateral dialogue and coordination of activities	Year 1	Year 1: \$20,000 Year 2: \$0
1.2 Analyze results and write assessment reports. Conduct team meetings and prepare publications and website	Assessment and reporting of mitigation options in the forestry sector of North America. Technical reports published and all data and model outputs available on website	Provides the project management and coordination necessary to implement a trilateral project	Continuous throughout project	Year 1: \$10,000 Year 2: \$50,000

1.3 Final project workshop to communicate results and to deliver databases and other relevant information	Report about stakeholder information needs relative to project outputs	This is the second opportunity to engage directly with stakeholders	Year 2	Year 1: \$0 Year 2: \$20,000
Task #2) Compile and validate model parameters for each strategic landscape				
Subtask	Project outputs	How does the subtask/output move the project towards the environmental outcome	Timing	Budget (C\$) (activities)
2.1 Develop parameters and inventory input data for carbon accounting and ecosystem models	Parameters and inventory data for forest models required to run mitigation scenarios	Basic requirement in assembling the data necessary for using the carbon budgeting model	Year 1	Year 1: \$70,000 Year 2: \$0
2.2 Develop and compile time series for activity data	Activity data sets for selected strategic landscapes	This is a basic requirement in assembling the data necessary for using the carbon budgeting model	Year 1	Year 1: \$30,000 Year 2: \$0
2.3 Compile data for harvested wood product model	Databases of harvested wood products for North America and recommendations on decay rates of wood in use and in landfills	This is a basic requirement in assembling the data necessary for using the harvested wood products model	Year 1	Year 1: \$10,000 Year 2: \$0
Task #3) Perform assessments of mitigation options and identify most climate effective options				
Subtask	Project outputs	How does the subtask/output move the project towards the environmental outcome	Timing	Budget (C\$) (activities)
3.1 Run carbon accounting and ecosystem model(s)	Quantified impacts of mitigation scenarios on ecosystem carbon stocks	The models generate the quantitative estimates needed to	Year 1 and 2	Year 1: \$10,000 Year 2: \$70,000

	relative to a baseline, for selected landscapes in North America, as agreed to by responsible institutions in each country	assess mitigation options		
3.2 Run harvested wood products model	Quantified impacts of mitigation scenarios on harvested wood products carbon stocks relative to a baseline, for selected landscapes of North America as agreed by responsible institutions in each country	The models generate the quantitative estimates needed to assess mitigation options	Year 2	Year 1: \$0 Year 2: \$10,000
Task #4) Reducing emissions through use of forest products				
Subtask	Project outputs	How does the subtask/output move the project towards the environmental outcome	Timing	Budget (C\$) (activities)
4.1 Develop new estimates (displacement factors) of reduction in emissions resulting from the use of harvested wood products	User-friendly, standard estimates of benefits from substituting wood products for other materials and fossil fuels	More complete accounting for the full impacts of mitigation options	Year 1	Year 1: \$30,000 Year 2: \$0
4.2 Include displacement factors in mitigation analyses	More complete assessments of mitigation scenarios for North America	More complete accounting for the full impacts of mitigation options	Year 2	Year 1: \$0 Year 2: \$30,000

Explain how this project meets the selection criteria adopted by Council in the Strategic Plan (see below)

The goal of all projects funded by the CEC will be to support the efforts of the Parties to conserve, protect and/or enhance the North American environment. The following criteria will guide the Secretariat, Working Groups, Committees, and other appropriate officials of the Parties in considering cooperative activities for Council approval under operational plans. These selection criteria do not apply for activities to be funded through the NAPECA grant program.

- **How does the project contribute to achieving Council's strategic objectives as described within the current Strategic Plan, or as related to other priorities subsequently confirmed by Council?**

This project falls within the Climate Change Mitigation and Adaptation strategic priority. Understanding the responsible drivers and the distribution of sources and sinks across diverse geographical regions and over time, as well as considering different landowner objectives, is required to sustainably manage forests and produce harvested wood products that will make a larger contribution to climate change mitigation targets. This understanding forms the basis for the desired outcome of improved design and assessment of climate change mitigation portfolios in the forest and land-cover change sector in North America.

- **Are the proposed objectives North American in scope? In other words, how are the proposed results relevant to protecting the environment in North America? (For example, what would Council members announce to the press at the successful completion of this project?)**

The Parties recognize that the trilateral engagement of experts working on developing consistent data and information-sharing on forest carbon can bring added value as most of North America's ecoregions span national boundaries. Such transboundary regions would benefit from consistent carbon analyses and reporting to aid respective national efforts to address climate change and effect the transition to a low-carbon economy. The project will supply data, information and tools that can be used to monitor and report on the development and implementation of appropriate initiatives to reduce GHG emissions from land use and forest management. The project will also facilitate a broad and readily accessible mechanism for the sharing and disseminating information among North American experts with a focus on scientific and technological best practices.

- **What specific, clear and tangible results will be achieved and how will progress toward each result be measured over time? Identify performance measures to be used to indicate success at reaching all outcomes and/or performance.**

This project will generate improved understanding of the role of the North American forest sector in climate change mitigation, the possible pathways to reducing emissions and increasing carbon sinks, and the magnitude and timing of these mitigation benefits. These results will be summarized in reports, including peer-reviewed publications, maps, presentations, and documentation of the tools with which these analyses were conducted. The project will also develop improved estimates of greenhouse gas emissions for selected regions of high interest (thus contributing to reporting obligations and the reduction of uncertainties in reported values), and estimates of carbon stocks in forests and, to the extent practicable, in harvested wood products. To enable these outcomes, intermediate products will be generated, such as improved activity data (derived from time-series of land cover and land-cover change products), data processing and modeling tools, and databases

that contain the relevant inputs to these analyses. Many of these intermediate products, such as land-cover information and the compilation of annual activity data (e.g., rates of disturbances and land-use change) will also be valuable to other user communities.

- **Explain why the CEC is the most effective vehicle for the Parties to use in undertaking this project, considering these points:**
 - **The value-added of doing it under the CEC cooperative program**
 - **Any other public, private or social organizations that work on such activities**
 - **Opportunities to cooperate and/or leverage resources with such organizations**

The CEC is the ideal body to facilitate cooperation among governmental institutions for projects with a scope on the North American continent. The CEC has been supporting the North American Carbon Modeling Group since 2011 and the North American Land Change Monitoring System since 2007. The latter group is a leader in assisting with the establishment of continental land cover and land-cover change data at the appropriate scale (250m) to support North American ecosystem carbon quantification and monitoring. Due to the trilateral nature of the work, the project is well positioned to support the collaboration of the Parties' experts in exchanging knowledge on best practices in modeling and assessing North American forest carbon dynamics and climate change mitigation options.

Other organizations working on similar activities include:

- The North American Forestry Commission, Atmospheric Change and Forest Inventory Working Groups;
- The North American Carbon Program (CarboNA), a trilateral research consortium coordinated by representatives of the three countries, including participants in this project (since CarboNA lacks independent funding, it merely provides a forum for information exchange through conference calls and bi-annual meetings);
- USAID/Mexico bilateral program on "Sustainable Landscapes," which is focused on several closely related tasks, including improving availability of field data, improving data management, disturbance mapping, and modeling of ecosystem response to disturbances and management;
- Canada/Mexico bilateral collaboration focused on developing national- and regional-scale modeling approaches to support needs for Monitoring, Reporting and Verification (MRV), but without independent funding; and
- Mexico/Norway initiative which is focused on developing the national MRV system for Mexico.

Opportunities to cooperate and/or leverage resources with such organizations include:

- The established collaboration among the various programs operating in the three countries, and their sponsoring institutions: particularly the three forest services (CFS, USFS, Conafor) and three geographical institutions (NRCAN, USGS, INEGI), among others. This collaboration is highly effective at coordinating efforts, avoiding duplication of effort, and taking advantage of synergistic opportunities.
- Some specific tasks in this project that will benefit greatly from leveraging the resources of other programs include: developing composite data about activities; mapping of stand age and disturbance; developing and testing empirical and process models; and analyzing mitigation options. Because of the limited budget, the CEC project members will aggressively seek to leverage resources in order to achieve the desired outcomes.

- **Does the project propose a clear timeline for implementation of the activities, including a target end-date for CEC involvement? Where applicable, describe how the work will continue after CEC involvement ends.**

The tasks in this project will put in place strong continental networks and will provide data, maps and information. By project end, these activities should be integrated into the regular work programs of the trilateral land cover and carbon monitoring programs already well-established at USGS, USFS, Natural Resources Canada, Environment Canada, Conafor, Conabio, INECC and INEGI. Outputs will allow carbon accounting initiatives in North America to be monitored. In addition, the project will support the scientific collaboration of experts from each country in producing and sharing this information. The CEC funding will put in place a strong collaborative framework that will continue after the CEC involvement through the bilateral and trilateral work of the forestry services and the North American Land Change Monitoring System.

The project proposes a clear and well-coordinated timeline: in year 1, the focus of the activities is on model development for forest ecosystem and harvested wood products modelling, testing and the acquisition of relevant input data both at the continental and regional scales (e.g., activity and land cover information). In year 2, the focus is the ongoing data processing and application of models and decision support tools to quantify the climate change mitigation potential of the North American forest and land-use change sector. The project will put into place improved monitoring capacity, and decision support tools with the required documentation to ensure that experts in all three countries will be able to continue the use of these tools for reporting and analyses after completion of the CEC-funded phase of the project.

- **Where applicable, identify with reasonable specificity:**
 - **Linkages with other relevant CEC projects, past or present, in order to create synergies, capitalize on experience, or avoid duplication**
 - **The target audience, as well as its receptivity and capacity to use the information that may be produced as a result of the project**
 - **The beneficiaries of capacity building activities that the project may include**
 - **The relevant stakeholders, with particular attention to communities, academia, NGOs and industry, and their involvement and contribution to a successful outcome**

This work was previously part of the Climate Change—Air Quality cluster of projects that supported measuring emissions and quantifying carbon sinks, mapping ecosystem carbon, and developing approaches to mitigate black carbon. This new project builds upon work begun during the previous operational plan. It will complete the integrated modeling and assessment project by applying the carbon assessment models to strategic landscapes in the three countries.

Canada, Mexico, and the United States have worked together since 2011 under the sponsorship of the CEC and in programs with similar goals (e.g., USAID Sustainable Landscapes, Reinforcing REDD+ and South-South Cooperation) to identify the potential role of models and their contribution to monitoring and measurement of GHG in the forestry sector. This new project takes the next step in using the modeling tools to examine forest sector mitigation options to meet national objectives of greenhouse gas emission reductions for selected landscapes in North America.

Past work supported by the CEC that will contribute to this project includes:

- (1) Results from the North American Land Change Monitoring System (NALCMS), which generates data on land cover and land-cover changes across North America. In cooperation with experts from NALCMS, we are adding value to these CEC products by using the output from the project (time-series of land cover changes) as input to our modeling tools that can translate land-cover change information into policy-relevant information about past GHG emissions resulting from deforestation, degradation, forest management and other disturbances. In addition to information from CEC projects, data from other sources (e.g., in Mexico the MAD-MEX system) will inform the analyses in the proposed project.
- (2) Implementation and testing of carbon accounting models that can process data from NALCMS and other sources, such as national forest inventories, into estimates of emissions and removals, and that can then be used to estimate future carbon emissions and removals for analyses of policy scenarios.
- (3) Analyses of ecosystem carbon dynamics using a process model to determine the ability of process-models (i.e., models that use climate data and other information) to fill data gaps in areas where forest inventory information is incomplete or inaccurate. This model has been applied in test landscapes in all three countries and results are being compared to other sources of information, including the empirical modeling approach.