Carbon Accounting at the Scale of Forest Management Operations

Forests and Climate Change

Canada's forests play an important role in the global carbon (C) cycle. The potential role of forests in helping to mitigate climate change is increasingly recognized. Forests are significant reservoirs of carbon, and activities that enhance carbon storage in forests remove carbon dioxide from the atmosphere for at least several decades.

The Role of Forest Management

Forest management activities implemented at the operational scale can have a significant impact on the C budget of Canada's forests, and forest managers will be expected to quantify the consequences of their actions on forest carbon stocks.

Consumer groups are demanding that forest activities do not adversely affect the atmosphere, and national and international reporting requirements, such as the Kyoto Protocol, are seeking information on forest carbon stock changes. Forest managers need a scientifically credible tool to assess the C stocks and C stock changes in their forests.

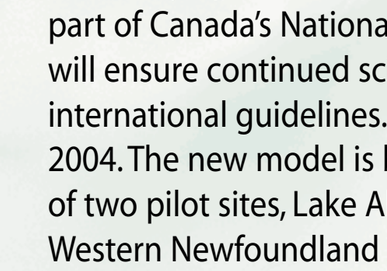
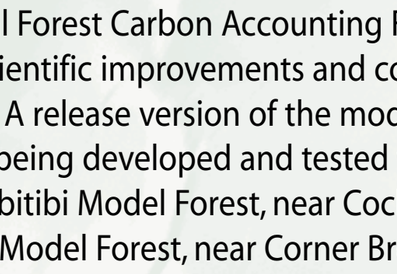
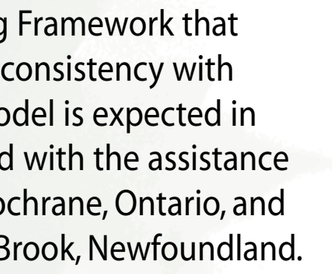
The Canadian Model Forest Network and its partners have identified a need for a forest carbon accounting tool at the operational scale. This tool is expected to help forest managers understand and evaluate the effects of management actions on carbon stocks and carbon stock changes.

A Model Solution

The Carbon Accounting Team of the Canadian Forest Service (CFS-CAT) and the Canadian Model Forest Network are collaborating on a project to develop, test, and implement an operational-scale version of the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS2). Originally developed for application in research, the tool is being equipped with user friendly interfaces, data pre- and post-processing tools, and modern data base infrastructures for use by operational foresters. The model is also being developed as part of Canada's National Forest Carbon Accounting Framework that will ensure continued scientific improvements and consistency with international guidelines. A release version of the model is expected in 2004. The new model is being developed and tested with the assistance of two pilot sites, Lake Abitibi Model Forest, near Cochrane, Ontario, and Western Newfoundland Model Forest, near Corner Brook, Newfoundland. The Canadian Model Forest Network and its extensive communications network will play an important role in the training and delivery of the model to a larger user community.

Model Data Needs

To be cost effective and efficient for use by forest managers across Canada, the model will make use of existing information on forest inventory, growth and yield, management activities, land use changes, and natural disturbances that forest analysts routinely use in their forest management planning activities and timber supply models. This readily available information will be augmented with additional data and modelling to estimate changes in those C pools that are not commonly included in forest inventories, such as C in dead organic matter associated with litter, coarse woody debris, and soil. Regional volume-to-biomass conversion equations and climate parameters such as mean annual temperatures and precipitation values for regions across Canada are being obtained and developed for inclusion in the model. The model will also be supplemented with information from national data bases that will be accessible through Canada's National Forest Information System (NFIS). Figure 1 below displays the general model inputs.

Some carbon pools found in the forest: standing timber, dead organic matter, and soils.




Examples of disturbances affecting forest carbon that can be accounted for by the operational scale carbon budget model: harvesting, fire, insects, and land use change.

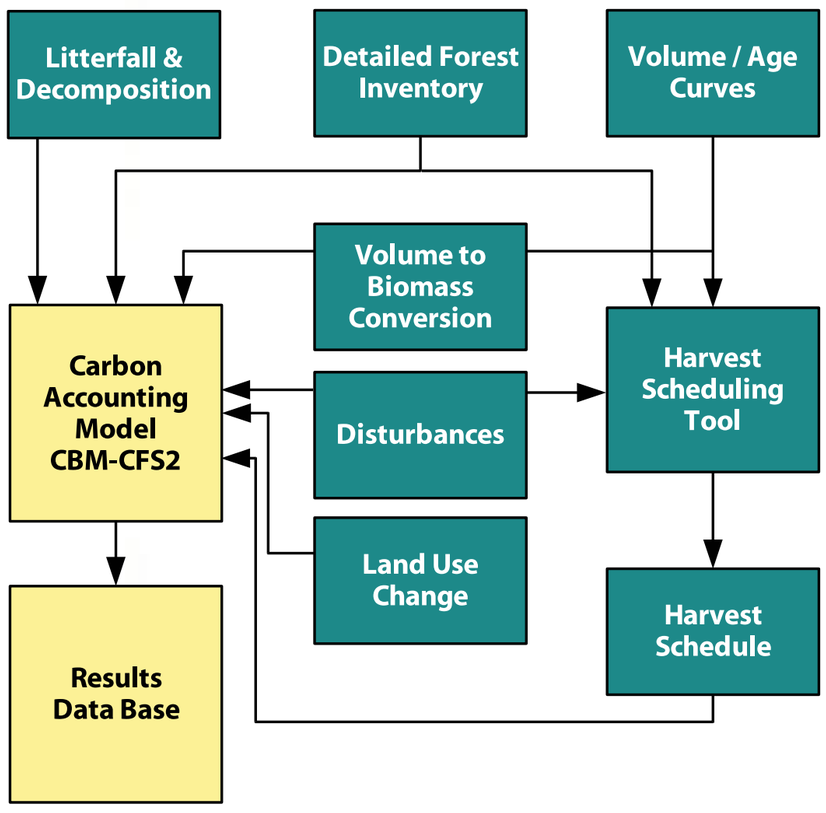


Fig. 1. Inputs to the operational scale carbon budget model.

Model Use and Capabilities

The carbon accounting model will

- be a generic model intended for use in the forest sector across Canada
- include all carbon stocks that are recognized by the Kyoto Protocol (above-ground biomass, below-ground biomass, litter, dead wood, and organic soil carbon)
- be operated by forest managers or other analysts to determine carbon stock changes in the past (monitoring role) or assess carbon stocks under various management scenarios in the future (planning role)
- be made publicly available
- be consistent with national accounting procedures, integrated across spatial, political, and managerial boundaries
- be consistent with international accounting rules and be modified as those rules are negotiated
- incorporate the best available science

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