INNOVATIONS

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A SFM TOOLBOX

For the past decade, more than nine million hectares of forests covering every major forest region of Canada have been the focus of one of the world's largest experiments in sustainable forest management (SFM). Scientists, foresters, environmentalists, Aboriginal leaders, government officials and others have been working hard to define what sustainability means in their model forests, and what can be done on the ground to achieve it.

This hard work has begun to pay off. Each model forest has developed and tested tools that have been adopted by forest managers, researchers and others, at home and abroad. Designed to meet the needs of diverse groups of partners, model forest tools tend to be more widely applied and readily accepted than those developed in isolation by only one organization.

Inside, you'll find some samples from the model forest toolbox, organized under the six criteria of SFM endorsed by the Canadian Council of Forest Ministers: conservation of biological diversity, maintenance and enhancement of ecosystem condition and productivity, conservation of soil and water resources, forest ecosystem contributions to global ecological cycles, multiple benefits of forests to society, and accepting society's responsibility for sustainable development.

Some of these tools can be put to use by forest managers across the country who are grappling with, for example, how to harvest in a way that protects biodiversity, promotes natural regeneration or minimizes soil disturbance. Others may be of interest to those working to protect rare species, determine and reduce the threat of wildfires, measure and track the sustainability of forest communities, incorporate traditional ecological knowledge

into forest management planning, include diverse stakeholders in forest management decisions, or bring carbon budget accounting down to the forest management unit level.

We invite you to take a look at some of the contributions model forests have made to the monumental task of achieving sustainability, and to find out more about the activities of the Canadian Model Forest Network.

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CONSERVATION OF BIOLOGICAL DIVERSITY

The more variability among forest species and the processes that support them, the better. Highly diverse forest ecosystems are productive and resilient, and can more quickly adapt to changing environmental conditions. Incorporating biodiversity into forest management decisions through enhanced research and effective monitoring will protect a diversity of forest values for future generations.

Model Forest Solutions

Model forests are working to conserve biodiversity at the ecosystem, species and gene level by, for example:

- creating models that predict bird assemblages, species richness and avian diversity based on several forest cover variables (Bas-Saint-Laurent)
- developing a suite of tools to assess the impact of different forest management regimes on ecosystem and species diversity and to guide decision-making relating to rotation period, silviculture intensity, patch size distribution, patch shape and the spatial layout of clearcuts in the landscape (Western Newfoundland)
- generating matrices that cross-reference wildlife species that overwinter or nest in the model forest with their special habitat needs (Eastern Ontario)
- using DNA-based molecular markers to assess the impacts of forest management on the genetic diversity of lodgepole pine (Foothills)

Featured Tool

Forest Management Guidelines to Protect Native Biodiversity in the Fundy Model Forest
— S. Woodley and G. Forbes, eds., 1997, bilingual

These guidelines were developed by the Greater Fundy Ecosystem Research Group, a Fundy partner, after considerable on-site research and a review of similar efforts.

The guidelines focus on landscape-level considerations that have been absent from most forest management guidelines, and are based on a belief that forest harvesting and biodiversity conservation can co-exist in the same landscape.

At the landscape level, the guidelines consider elements such as patch size, connectivity, stand age and protected areas. Site-level considerations include snag and cavity tree retention, coarse woody debris and special status tree species. The guidelines include best management practices, nine overarching principles of biodiversity conservation, and tips for applying the suggestions to private woodlots.

Many aspects of these guidelines have been incorporated into the management plans of the Fundy landowners. J. D. Irving, Limited, for example, is working to replicate natural disturbance patterns as recommended in the guidelines.

Selected Tools and Reports

Effects of Forest Management Tools on Biodiversity of the Bryophyte Community: Riparian Buffers and Tree Islands as Refugia.
— Fundy: K. Frego, 2000, English

Impacts of Forest Management on Genetic Diversity of Lodgepole Pine: Assessment Using DNA-based Molecular Markers.
— Foothills: S. E. Macdonald, B. R. Thomas, M. Hicks, D. L. Adams and R. B. Hodgetts, 1998, English

Old Growth Forests and the Biodiversity of the Lake Abitibi Model Forest — Project Information Note
— G. Kynman, 1999, English

Eastern Ontario Matrices Linking Wildlife to Habitat: A Biodiversity Management Tool
— Eastern Ontario: J. Bouvier and L. Howes, 1997, English

Wildlife and Forest Management Planning software
— Bas-Saint-Laurent: J. Ferron and R. Chassé, 1996, bilingual

CONSERVING SOIL AND WATER RESOURCES

Forest ecosystems thrive on clean, abundant water and soil with the right levels of oxygen, nutrients and organic matter. Poor harvesting, road construction and other forestry practices can compromise the quality and quantity of soil and water by causing soil erosion and compaction, siltation of aquatic habitats, flooding, and increased water temperatures.

Model Forest Solutions

Model forest activities to protect soil and water resources include:

- a video of best management practices to protect water quality, just one tool to come out of the Hayward Brook Watershed Study, a multi-year, multi-disciplinary project that is testing the effect of riparian buffer zones of different widths and cuts on water quality and other variables (Fundy)
- calibration of the FORHYMS watershed model, which predicts water quality as a function of the amount of watershed area harvested and the width of buffer zones, from results of the Pockwock / Bowater Watershed Project (Nova Forest Alliance)
- a GIS database of the location and condition of more than 5200 stream crossings in Newfoundland to assist in road maintenance and in identifying potential fish habitat management issues (Western Newfoundland)
- a scientific study to determine whether the different riparian management zones proposed by the Scientific Panel for Sustainable Forest Practices in Clayoquot Sound and the Forest Practices Codes of British Columbia provide sufficient protection for coastal streams with seasonal flow (Long Beach)

Featured Tool

Minimizing Soil Disturbance in Forestry Operations: A Practical Field Guide for Resource Managers and Equipment Operators in Northeastern Ontario
— Lake Abitibi, 2000, bilingual

The Lake Abitibi Model Forest has developed this guide for managers and operators working in the Great Claybelt of northeastern Ontario. It will also be useful for people involved in harvest and silvicultural planning, and operational training.

The illustrated guide describes types of soil disturbance, how to identify sensitive sites and what to consider when planning an operation to minimize soil disturbance. It also provides examples of management practices that minimize soil disturbance, and tips on how to avoid damaging practices. Weather-resistant, this guide is designed to fit in the cab of a harvester or forwarder for easy reference.

A large number of operators in the Claybelt Boreal region of Ontario, including those with model forest partner Abitibi Consolidated Inc., are using the guide. Interest in the guide has been expressed by people across Canada and internationally.

Selected Tools and Reports

Watershed Assessment Model: GIS Application System Guide
— Foothills: The Forestry Corp., 1997, English

Forestry Best Management Practices and Water Quality, video
— Fundy: 1998, bilingual

Stream Crossing Inventory Project: Complete Manual
— Western Newfoundland: D. Jenning, 2001, English

The Ecological Requirements for Riparian Buffers Around Continuously Flowing, Seasonal and Ephemeral Headwater Streams in Clayoquot and Barkley Sounds
— Long Beach: A. Suski and B. Beasley, 1998, English

ACCEPTING SOCIETY'S RESPONSIBILITY FOR SUSTAINABLE DEVELOPMENT

This criterion looks at the role of people in the sustainable development equation. Are those most dependent on forests part of the decision-making process? Are our forest-dependent communities sustainable? Are our policy and planning decisions informed ones? Are we putting the social and cultural aspects of sustainable development on a par with the economic and environmental ones?

Model Forest Solutions

The social aspect of sustainable development is at the core of the model forest approach to SFM. Each model forest is a large-scale, living laboratory where diverse partners, supported by the most up-to-date science and technology, participate in decisions about how the forest could be sustainably managed.

Model forests have developed innovative ways to involve local stakeholders in defining SFM, incorporate the knowledge and needs of Aboriginal communities into decision-making, measure the sustainability of forest-dependent communities, and educate the public about SFM. The tools available include:

- Assisting community planning teams by providing practical tools and strategies for integrating criteria and indicators and non-timber values into a provincial planning template (Western Newfoundland)
- a methodology for determining local level indicators of community stability (Prince Albert)
- a process to incorporate Hahulthi — the traditional system of ownership and resource management of the Nuu-chah-nulth people — into forest management in Clayoquot Sound (Long Beach)
- a computer-based model that measures and analyzes the social and economic impacts of model forest activities on local non-Aboriginal and Aboriginal communities (Lake Abitibi)
- the Summer Institute for Environmental Education, which introduces teachers in Newfoundland and Labrador to forests and forest management (Western Newfoundland)

Featured Tool

SIMFOR: Socio-economic Indicators for the Model Forest Network

Visitors to the SIMFOR Web site (under "Local Level Indicators" at www.modelforest.net) can map and compare forestry-related socio-economic information for Canada's model forests. SIMFOR is a first step in providing access to the data needed to monitor the health of forest-dependent communities and target the issues affecting their long-term sustainability.

SIMFOR uses six socio-economic indicators (population, employment, income, education, poverty and real estate) that are common across the country and are measured in the national census — a readily available, accurate and broadly accepted source of information.

Users can create thematic maps, generate graphs and download detailed socio-economic profiles of selected model forest communities. Socio-economic information for regions outside the model forests also helps put the information into context.

Plans are in the works to develop SIMFOR as a clearinghouse of socio-economic information, with links to local publications, research journals and any sites that deal with sustainability in model forest communities or with socio-economic research in general. A Canadian Model Forest Network project, SIMFOR was developed by geomatics experts at Isosceles Information Systems Inc. with support from the CFS Socio-Economic Research Network and the GeoConnections program.

Selected Tools and Reports

Sustainable Communities: A Community Development Impact Model
— *Lake Abitibi: 1999, English*

First Nation Participation in Canada's Model Forest Program 1992–1997: Accomplishments and Opportunities
— *Hugh Walker Consulting Enterprises Ltd., 1998, bilingual*

Policies and Procedures Manual for Community-based Information
— *McGregor: ARIS Development Group, 1999, English*

Social Indicator Approaches to Assessing and Monitoring Forest Community Sustainability
— *Foothills: Dr. T.M. Beckley and T. Burkosky, 1999, English*

Locally Defined Indicators of Community Sustainability in the Prince Albert Model Forest
— *Prince Albert and Canadian Forest Service: J. Parkins, J. Varghese and R Stedman, 2001, English*

A Users' Guide to Local Level Indicators of Sustainable Forest Management: Experiences from the Canadian Model Forest Network.
— *Network: 2000, bilingual*

Criteria and Indicators of Sustainable Forest Management: A Practical Guide to Using Criteria and Indicators in Newfoundland and Labrador
—*Western Newfoundland: 1999, bilingual*

Sharing and Protecting Our Knowledge — A Nuu-chah-nulth Perspective, workshop proceedings
— *Long Beach: 1999, English*

WASWANIPI CREE MODEL FOREST

In 1997, to more fully explore sustainable forest management and the model forest approach from the perspective of Canada's indigenous peoples, the Canadian government established the Waswanipi Cree Model Forest, which encompasses more than 200 000 hectares of boreal forest in northern Quebec. Like many forest-based Aboriginal communities, the Cree First Nation of Waswanipi has been managing the forests of its ancestral land for generations. This model forest, through its partnerships, presents many exciting opportunities to demonstrate the benefits of integrating Aboriginal people's environmental knowledge and perspectives in the forest management planning process.

MODEL FORESTS AND CERTIFICATION

Like many in the Canadian forest community, model forest partners are looking at certification as a means of testing and demonstrating the sustainability of their forest management practices. From large forest products companies to small woodlot owners, in their efforts to achieve certification, model forest partners are drawing on the scientific expertise and broad base of interests in the model forests.

- Hinton Forest Resources, a division of Weldwood of Canada, recently registered its nearly 1-million-hectare forest management area to the Canadian Standards Association's Sustainable Forest Management Standard (CSA Z808/809) using local level indicators developed with the help of the Foothills Model Forest
- A group of small woodlot owners in the Eastern Ontario Model Forest plans to form a landowner organization with the aim of gaining Forest Stewardship Council certification
- Manitoba Model Forest partner Tembec – Pine Falls Operation used local level indicators developed by the model forest in its drive for registration to the ISO 14001 Environmental Management System
- Canadian Forest Products Ltd. (Canfor) is actively working towards certification of Tree Farm License 30 (TFL 30) under the CSA Standard. The McGregor Model Forest is participating in the CSA Public Advisory Group and the extensive data from the McMF, including the results of the "Scenario Planning Project on TFL 30", is being applied within the process
- Western Newfoundland Model Forest's partner Abitibi-Consolidated used the Training in Environmentally Sensitive Practices for Front Line Forest Workers developed by the model forest to become the first Abitibi-Consolidated woodlands division to achieve ISO 14001 certification and the first such certification in Newfoundland

MAINTAINING AND ENHANCING FOREST ECOSYSTEM CONDITION AND PRODUCTIVITY

A healthy forest can more readily recover from or adapt to insect attacks, fire, land-use practices and other stressors while maintaining its productivity. If pressed beyond its limits by such disturbances, however, it loses health and vitality and can no longer sustain its flow of services such as wildlife habitat, timber and clean water. For a forest nation like Canada, this degradation can threaten both ecological and economic stability.

Model Forest Solutions

Model forests have devised tools to keep both natural and human-induced disturbances within the forest's ability to absorb them. They include:

- a Wildfire Threat Rating System that assesses the risk of large, intense wildfires and predicts how different land-use decisions will affect wildfire threat (McGregor)
- a manual, adopted by foresters in Manitoba, Ontario and Quebec, that demonstrates how to encourage natural regeneration by leaving a softer footprint (Manitoba, Lake Abitibi, Waswanipi Cree)
- for contractors and operators working in private woodlots, a manual of best management practices that describes how to develop landowner agreements, build roads, implement harvesting systems, protect wildlife habitat and conduct self-audits (Nova Forest Alliance)
- a code of forestry practice and companion woodlot inventory guide for landowners, contractors and operators (Eastern Ontario)

Featured Tool

Guide to Harvesting Practices to Regenerate a Natural Forest
— Manitoba: J. Ehnes and D. Sidders, 2000, bilingual

This guide stems from natural disturbance research done by the Manitoba Model Forest. It shows operators how to harvest in a way that mimics wildfire disturbance patterns common to the boreal forests of eastern Manitoba.

The operator is key to keeping the forest healthy while logging. The operator's goal is for cut-blocks to look, feel and return to a natural forest state as quickly as possible.

The guide introduces the concept of ecosystem-based management, explains the rationale behind the natural disturbance approach, and sets out harvesting and silviculture prescriptions. An audit sheet measures success by rating the results at each cut-block on a five-point scale.

Selected Tools and Reports

Contractors and Operators Best Management Practices Manual
— Nova Forest Alliance: 2001, English

Code of Forestry Practice
— Eastern Ontario, 1996, bilingual

A True Picture: Taking Inventory of Your Woodlot
— Eastern Ontario: 1997, English

Harvesting with Regeneration Protection: Planning and Operating Manual
— Lake Abitibi: 1998, bilingual

Manual for Environmentally Responsible Forestry Operations
— Manitoba, Lake Abitibi and Waswanipi Cree: 1999, bilingual

A Wildfire Threat Rating System for the McGregor Model Forest: Final Report
— B.C. Hawkes, J. Beck and W. Sahle, 1997, English

Mimicking Natural Disturbances: Workshop Proceedings
— Western Newfoundland Model Forest and Gros Morne National Park: 1999, English

Sustainable Forest Management Training for Front Line Workers, trainers manual
— Western Newfoundland: 1999, English

FOCUS ON NATURAL DISTURBANCES

Several model forests are looking at how to emulate natural disturbances — an approach to forest management that's gaining broader acceptance. The assumption is that creating disturbance patterns similar to those in nature will conserve biodiversity and maintain forest resilience.

The Western Newfoundland Model Forest drew stakeholders together for a preliminary investigation of the topic at a natural disturbance workshop in 1999. Natural disturbance research conducted by the Foothills Model Forest in Alberta is being used by the forest products company Weldwood of Canada Limited (Hinton Division) to modify its harvesting and reforestation practices, and by Jasper National Park to develop controlled fire strategies.

MULTIPLE BENEFITS OF FORESTS TO SOCIETY

Four of the six criteria deal with environmental processes; this one focuses on the multiple benefits we receive from our forests and the capacity of the forests to continue to provide them. We need to quantify these economic, environmental, social and cultural benefits to make better forest management decisions and to better protect all that we value in our forests.

Model Forest Solutions

Part of the rationale behind the model forests' inclusive approach to SFM is to move from calculating forest benefits in terms of timber only to assessing a forest's worth based on the diverse values of the model forest partners and other stakeholders.

Model forest tools to measure and protect the multiple benefits we derive from forests include:

- a handbook for preserving, replanting and regenerating black ash — a tree species used extensively in the economically and spiritually important traditional basket-making of Mohawks and other eastern First Nations (Eastern Ontario)
- a report assessing the potential for commercializing wild mushrooms, aromatic oils, and decorative twigs and branches (Lake Abitibi)
- a survey of campers to determine the values they place on forests and how they prefer campgrounds to be managed (Foothills)
- the development of an assessment framework to evaluate the relative merits of alternative forest management options (Prince Albert)

Featured Tool

Assessing the Economic Contribution of Forestry, Tourism, Recreation and Other Industries and Activities Linked to the McGregor Model Forest
— Deloitte & Touche Consulting Group, 1996, English

This report, prepared by the Deloitte & Touche Consulting Group, quantifies the economic contributions of industries and activities in the McGregor Model Forest: namely, forestry, fur trapping, sport fishing, guide outfitting and commercial recreation.

It also looks at quantifying the economic value we place on benefits provided by the forest that have nothing to do with human activities — such as nutrient cycling or the provision of habitat that sustains wildlife — and suggests how to incorporate these intrinsic values and that of forest-related activities into McGregor's decision support system. This information, combined with other activities of the McGregor Model Forest, has been used in the development of indicators and monitoring procedures for the model forest and in the CSA certification bid by Canadian Forest Products Ltd (Canfor) for Tree Farm License 30.

Selected Tools and Reports

Commercialization of Special Forest Products in the LAMF and Region: Final Project Report
— Lake Abitibi: Arborvitae Environmental Services Ltd., 1997, English

Handbook for Black Ash Preservation, Reforestation/Regeneration
— Eastern Ontario: L. Benedict and R. David, 2000, English

The Harvest, Market and Availability of Special Forest Products in the Manitoba Model Forest
— M. Mitchell and Associates, 1997, English

Forest Social Values and Management Preferences of Campers in the Foothills Model Forest
— B. L. McFarlane and P.C. Boxall, 1998, English

Economic Assessment Procedure for Forest Management Options in the Prince Albert Model Forest Region
— S. N. Kulshreshtha, 1995, English

FOREST ECOSYSTEM CONTRIBUTIONS TO GLOBAL ECOLOGICAL CYCLES

Climate change has drawn attention to the role of forests in the carbon cycle. According to the Carbon Budget Model developed by the Canadian Forest Service (CFS), Canada's forests (and related resources such as soils, peatlands and forest products) were a carbon sink from 1920 until the second half of the 1980s, when they became a carbon source, releasing about 45 million tonnes of carbon each year. Managing Canada's forests so that they are sinks — not sources — of carbon may mitigate climate change by reducing the amount of CO_2 and other greenhouse gases in the atmosphere.

Model Forest Solutions

Climate change is a global problem, but increasing the ability of Canada's forests to store carbon will depend on action taken at the local level.

As well as increasing their knowledge of the role of forests in the carbon cycle, forest managers need to measure how much carbon their forests are absorbing and releasing, and determine the influence of different management practices on carbon dynamics. Model forests are well suited to assist with these tasks.

Work done by the Foothills Model Forest and the Canadian Forest Service has already demonstrated that the CFS Carbon Budget Model can be modified to use local instead of national data. Foothills modelled carbon storage from 1958 to 2238 under different management scenarios (including an "unmanaged" scenario with no harvesting).

Plans are taking shape to host a series of strategic workshops across Canada in the coming months to increase understanding and better define user needs and data requirements for a locally based, user-friendly carbon budget model.

Featured Tool

Carbon Budget Accounting at the Forest Management Unit Level: An Overview of Issues and Methods *— Network: Martin von Mirbach, 2000, bilingual*

Prepared for the Canadian Model Forest Network by consultant Martin von Mirbach, this report surveys the tools available or in development to track changes in carbon storage in forests at the local level. It defines key concepts and describes how to go about the three tasks involved in carbon budgeting: obtaining baseline measurements, estimating carbon fluxes, evaluating the likely effect of management activities on the forest's ability to serve as a carbon reservoir and incorporating that knowledge into the decision-making process. It also includes some practical measures that forest managers can take to improve the ability of forests to store carbon.

CANADA'S MODEL FOREST PROGRAM

The Government of Canada, through the Canadian Forest Service, launched Canada's Model Forest Program in 1992 to address the challenge of balancing the extensive range of demands we place on our forests today with the needs of tomorrow's generations. A network of model forests representative of Canada's diverse forest ecosystems has since been established to bring together, through partnership, individuals and organizations striving to make the goal of sustainable forest management a reality.

Each model forest in the Canadian Model Forest Network provides a unique forum where partners can gain a greater understanding of other stakeholders' views, share their knowledge, and combine their expertise and resources to develop innovative techniques, tools and approaches to sustainable forest management. Model forests act as giant, hands-on laboratories in which these leading-edge techniques are researched, developed, applied and monitored. The network also has the mandate to transfer the knowledge and techniques it develops so the benefits derived from its work can be shared with other forest sector stakeholders.

This newsletter contains just a small sampling of the activities undertaken by Canada's model forests. For more information:

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