THE STATE OF

British Columbia's Forests

2006

BRITISH COLUMBIA
The Best Place on Earth

Ministry of
Forests and Range

Library and Archives Canada Cataloguing in Publication Data
Main entry under title:
The state of British Columbia's forests, 2006

Previously published by Ministry of Forests, 2004.
ISBN 0–7726–5628–2

1. Sustainable forestry – British Columbia. 2. Forest conservation – British Columbia. 3. Forest ecology – British Columbia. 4. Forest policy – British Columbia. 5. Forests and forestry – British Columbia. I. British Columbia. Ministry of Forests and Range.

SD387.S87S72 2007 333.7509711 C2006–960182–8

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Cover photo – Location: Quaal River Protected Area, Northern Coastal B.C.
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Chief Forester's Message

This report on the state of British Columbia's forests is designed to inform both general and technical readers about our forests from a particular viewpoint – that of sustainability.

As chief forester, it is my role to advise government and inform the public on sustainable forest management. Currently, many sources provide factual information on parts of this complex topic, however few if any provide an overview that is both accessible and comprehensive. In addition to providing factual information, this report presents assessments of sustainability by Ministry of Forests and Range staff.

I hope that both the facts and the assessments will encourage informed, constructive discussion. A periodic review of our forests, including environmental, economic, social and governance aspects, can show us how far we've come and help us decide where future actions would be desirable.

New pressures such as climate change and the mountain pine beetle epidemic affect all aspects of our forests and therefore require holistic responses. One example, begun in 2005, is the Future Forest Ecosystems of British Columbia initiative, which aims to maintain and enhance the resilience of the province's forest ecosystems.

This report presents 24 indicators based on international and national frameworks of indicators for assessing sustainable forest management. It emphasizes issues important to British Columbia. The six indicators published in the 2004 edition are repeated, four of them with changes and updated data. New, detailed information is provided for six additional indicators. Overviews are provided for the remaining 12 indicators that will be fully developed in future editions of the report.

Your feedback on this report's approach, format and level of information is welcomed and will help us improve subsequent editions.

With two-thirds of British Columbia covered by forests, British Columbians have a real stake in, and many opportunities to contribute to, sustainable forest management. Using the best science-based information available to make informed decisions, we can ensure that the forests of British Columbia continue to provide their many benefits to future generations.

Jim Snetsinger, RPF
Chief Forester
Ministry of Forests and Range

Acknowledgements

This report was made possible by the ideas, cooperation and hard work of many people.

The names of most individuals who contributed directly, reviewed drafts or gave permission to use their images are provided in the List of Contributors in the back of this report. Some contributors chose not to be listed, and others, regrettably, may have been overlooked in the compilation of the list.

Every effort was made to accurately incorporate the contributors' information and carefully weigh their views. The report's information and assessments may, however, differ from those of individual contributors, and readers should not assume that the report's information and statements about a particular topic are necessarily endorsed by contributors knowledgeable about that topic.

Many others provided guidance, encouragement, contacts, access to files and administrative support. Still more provided ideas and inspiration in the reports they produced for other agencies and jurisdictions.

Elimination of accidental omissions, errors and misrepresentations was a guiding principle for this report. I take full responsibility for any such shortcomings that may have survived the final stages of preparation, and trust that readers will not attribute them to any contributors.

Tom Niemann, RPF
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The Indicators

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Executive Summary

Forests figure prominently in the well-being of British Columbia's environment, economy and communities. Ensuring sustainable forest management is therefore vital to the province's health on many levels.

Assessing progress in achieving sustainable forest management is challenging not only because the subject is complex, but also because of the varying opinions and viewpoints people bring to the topic. An understanding of current conditions and trends, and of the adequacy of information to assess them, provides a basis for informed decisions.

This report is part of the Ministry of Forests and Range's efforts to enable assessment of sustainable forest management. The purpose is two-fold:

- To provide information to enable readers to assess the province's progress in achieving sustainable forest management.
- To provide the ministry's assessment of that progress.

Detailed information and assessments are provided for 12 of 24 indicators grouped into three broad categories: environmental, economic and social, and governance and support. Not all data are current to the year 2006 – the date of data varies from the year 2000 for some indicators to 2006 for several. Overviews are provided for the remaining 12 indicators that will be fully developed in future editions.

Environmental Indicators

Information and the ministry's assessments are provided for 5 of 10 environmental indicators: Ecosystem diversity, Protected forests, Ecosystem dynamics, Species diversity, and Genetic diversity. The assessments are summarized in Figure 1.

British Columbia's rich natural resources include vast and diverse forests. In terms of forest types and ages, most of this diversity still exists 150 years after the start of European settlement.

A reasonably representative 10% of the province's forests are in protected areas. These and other forest areas provide large tracts of natural habitat, undeveloped areas for scientific study and wilderness for recreation. Some forest types are threatened by development.

Since 1950, the dynamics of B.C.'s forest ecosystems have changed with increasing wildfire suppression, timber harvests and climate change. These changes may reduce ecosystem stability and resilience, and disrupt future

economic activity. The unprecedented magnitude of the current mountain pine beetle epidemic demonstrates the potential impact of such changes.

British Columbia has a rich diversity of species, and most forest-associated species have healthy populations. Populations and ranges of some species have expanded, while declining habitat quantity and quality has reduced populations of other species, in some cases putting them at risk. Management responses have increased over the past two decades.

A wide range of environmental conditions has led to great genetic diversity in the more than 40 tree species found in B.C. Genetic gains in timber growth and pest resistance are increasingly included in reforestation. Insects, fires and climate change are expected to damage some genetic reserves and installations.

Ministry's partial assessment based on these five indicators

Despite concerns about changes in ecosystem dynamics and continuing pressure on threatened and endangered species, the prospects for environmental sustainability in British Columbia's forests are positive.

Substantial databases have been assembled for these five indicators. Available information is only partially adequate for assessing sustainable forest management for four of the five indicators.

Environmental Indicators	State	Trend	Information
1. Ecosystem diversity	 good	 mixed	 partial
2. Protected forests	 good	 improving	 partial
3. Ecosystem dynamics	 mixed	 deteriorating	 partial
4. Species diversity	 mixed	 deteriorating	 partial
6. Genetic diversity	 good	 mixed	 adequate

FIGURE 1. Ministry of Forests and Range assessments of environmental indicators.

Economic and Social Indicators

Information and the ministry's assessments are provided for 5 of 10 economic and social indicators: Ownership and management, Timber harvest, Silviculture, Jobs and communities, and First Nations involvement. The assessments are summarized in Figure 2.

Most of British Columbia's forests are owned by the provincial government on behalf of all British Columbians. First Nations claim aboriginal rights and title to many areas of the province. Operational management of timber harvests and other uses is delegated to tenure holders with a variety of rights and obligations.

Much of B.C.'s economic development in the 1800s and 1900s depended on the forest sector. After a century of rapidly increasing timber harvest, the level of cut stabilized in the 1990s and is forecast to be sustainable. However, significant decreases in some local timber supplies are expected.

With B.C.'s high level of public ownership, most silvicultural activities such as reforestation have depended on government policies or funding. Silvicultural practices have evolved over the past 30 years, improving conservation of biological diversity, reforestation, and the volume and value of future timber supplies.

Employment in the forest sector has remained fairly stable while the province's economy grew and diversified. Provincial dependence on the forest sector has therefore decreased, but many rural communities are still highly dependent. They are also vulnerable to downturns in timber product markets and the impacts of the current mountain pine beetle epidemic.

The involvement of First Nations people in the timber-based economy has increased in recent years and is expected to grow further. While First Nations participation in forest management has increased, many issues regarding aboriginal rights and title remain to be settled.

Ministry's partial assessment based on these five indicators
Despite some localized timber supply problems and the need to complete treaty negotiations with First Nations, the prospects for economic and social sustainability in British Columbia's forests are positive.

Many of the information needs for assessing sustainable forest management are being met for these five indicators, but some gaps remain.

Economic and Social Indicators	State	Trend	Information
11. Ownership and management	 mixed	 mixed	 adequate
13. Timber harvest	 good	 mixed	 partial
14. Silviculture	 good	 mixed	 partial
18. Jobs and communities	 mixed	 mixed	 adequate
19. First Nations involvement	 mixed	 improving	 adequate

FIGURE 2. Ministry of Forests and Range assessments of economic and social indicators.

Indicators of Governance and Support

Information and the ministry's assessments are provided for two of four governance and support indicators: Law and Certification. The assessments are summarized in Figure 3.

British Columbia's forest law is designed to support sustainable forest management. The province's legal framework includes compliance and enforcement activities, public reporting by the independent Forest Practices Board, and systematic monitoring and assessment of the law's effectiveness.

Forest certification led by non-government organizations complements the governance provided by B.C.'s legal framework. British Columbia's forest industry has pursued forest certification to maintain access to markets and demonstrate the province's high quality of forest management.

Ministry's partial assessment based on these two indicators
British Columbia's forest law and progress on forest certification support sustainable forest management.

Many of the information needs for assessing sustainable forest management are being met for these two indicators. Information on the effectiveness of governance and support is still in an early stage of development.

Governance and Support Indicators	State	Trend	Information
21. Law	 good	 improving	 partial
24. Certification	 good	 improving	 adequate

FIGURE 3. Ministry of Forests and Range assessments of governance and support indicators.

Conclusion

The information presented in this report enables a partial assessment of British Columbia's progress towards sustainable forest management.

The Ministry of Forests and Range assessed the state of 7 of 12 indicators as "good." Five indicators were assessed as "mixed," or having some good and some poor conditions.

Trends for 4 of 12 indicators were assessed as "improving." Six indicators were assessed as "mixed," or having some improving and some deteriorating trends. Two indicators were assessed as "deteriorating."

Information for 5 of 12 indicators was considered "adequate" for assessing the indicators' state and trend. Seven indicators were deemed to have only partially adequate information, typically because one or more important pieces of information are not available.

The Ministry of Forests and Range's assessment identifies many positive attributes of the resource base and substantive accomplishments. It also shows that there are some significant challenges ahead to ensure sustainable forest management in British Columbia.

About This Report

Rocky Mountain Trench – Wayne Erickson

Vancouver – Tom Ryan

Sections:

Purpose
Content
Changes and Updates from the 2004 Edition
How to Use This Report
Accountability
Turning Assessment into Action

Purpose

Forests figure prominently in the well-being of British Columbia's environment, economy and communities.

The purpose of this report is two-fold:

- To provide information and links to enable readers to assess the province's progress in achieving sustainable forest management.
- To provide the Ministry of Forests and Range' assessment of that progress.

Content

The four parts following "About This Report" provide an overview of British Columbia's forests and society, an overview of forest management in the province, and discussions of sustainable forest management and indicators.

Indicators of sustainable forest management form the main body of this report. The selected indicators are based on those found in national-level frameworks, and on issues of particular significance to British Columbia. The indicators are grouped into three broad categories: environmental, economic and social, and governance and support.

Information and assessments are provided for 12 of 24 indicators. Overviews are provided for the remaining 12 indicators that will be fully developed in future editions of the report.

For each indicator, the report provides summary information relevant to several questions, along with links to further information, maps, data, and related international and national indicators. Each indicator ends with the Ministry of Forests and Range's assessment of the indicator.

Readers' independent assessments

The text under each indicator question includes some explanation of the information, but no assessment of implications for sustainability. This is intended to enable readers to make their own assessments of sustainability.

The Ministry of Forests and Range's assessment

For each indicator, the ministry assessed the state, trend and adequacy of information, as follows:

- the **state** – whether conditions identified by the indicator suggest good, poor, mixed or fair progress towards sustainable forest management;
- the **trend** – whether those conditions are improving, deteriorating, mixed, uncertain or showing no change; and
- the adequacy of **information** – whether information available for the indicator is adequate, inadequate or partial for assessing the state and trend at the provincial level.

The symbols used to summarize the assessment are shown in Figure 4.

This report does not describe or assess the Ministry of Forests and Range's activities, goals, targets or performance, as these are covered in the ministry's service plans and annual reports. Similarly, it does not examine the activities or performance of individual forest companies. Information about these can be found elsewhere.

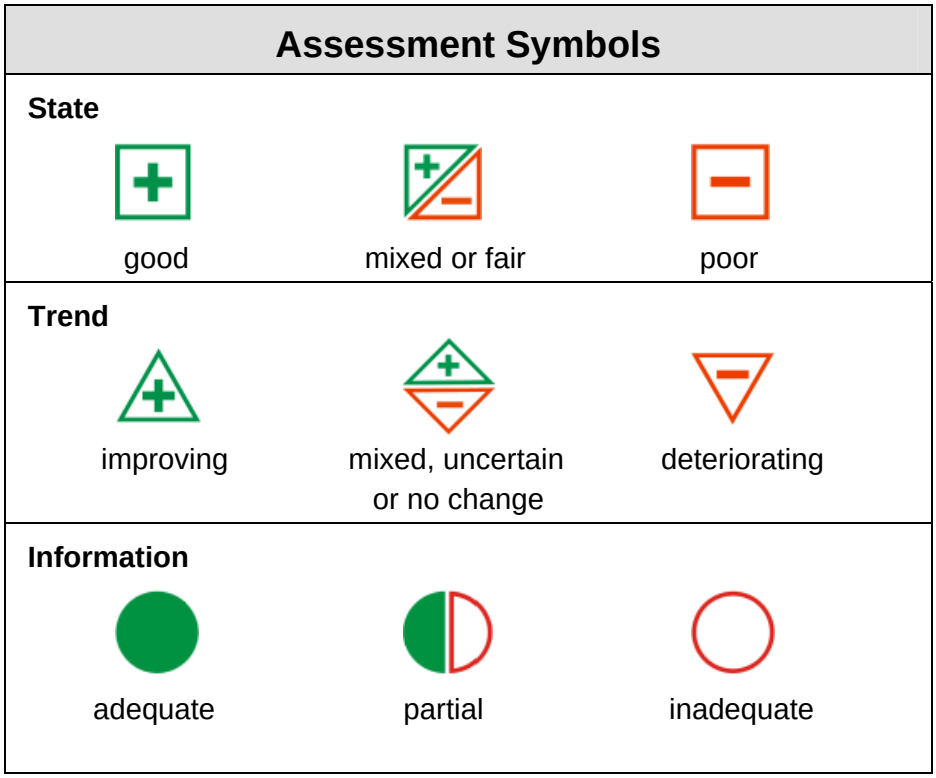

FIGURE 4. Assessment symbols used in this report.

Changes and Updates from the 2004 Edition

Reader feedback about the 2004 edition led to improvements in this 2006 edition. Endnotes provide more detailed explanations for technically inclined readers. Sources and notes about the data for each indicator are included in the back matter of the report.

Data were updated for several indicators published in the 2004 edition: Timber harvest (13-1, 13-2, 13-3, 13-4), First Nations involvement (19-1, 19-3), Law (21-2, 21-3, 21-4) and Certification (24-1, 24-2, 24-3, 24-4).

The date of data varies from the year 2000 for some indicators to 2006 for others. Readers are urged to note the years for which data are presented.

How to Use This Report

All parts of the report, individual maps and graphs, and related data tables are available in printer-friendly formats so that they can be used for overheads or illustrations for teaching and other applications. Copyright rules apply: be sure to obtain permission before using any of the material in other

publications or making large numbers of copies for distribution. To obtain copyright permission, please see the contact on the copyright page.

Maps, graphs and data tables are available online at www.for.gov.bc.ca/hfp/sof/.

Terms such as “forest” that have a technical meaning specific to this report are listed in the appendix Glossary. They are underlined the first time they occur within each indicator.

All links to other internet websites worked at the time of publication. The complete URL and a description including the organization are provided to assist readers in finding related websites if the linked websites are changed.

Accountability

The information presented in this report was collected from a variety of sources, each accountable for the quality of the data it provided. Any errors in the presentation or interpretation of those data are, of course, the responsibility of the authors of this report.

Indicators of sustainable forest management cover a scope that is broader than the direct accountabilities of any individual government agency or company. While each organization is accountable for specific aspects of forest management, no one organization is necessarily wholly accountable for the states and trends shown by the indicators.

Turning Assessment into Action

An important goal of this report is to inform the ongoing development of forest policy and management.

Readers are encouraged to take action in two ways:

- provide feedback to help improve the content, presentation and overall usefulness of future editions of the report (please see contact information on the inside front cover), and
- engage in informed, constructive discussion about the future management of British Columbia’s forests.

Actions that support progress in achieving sustainable forest management will benefit all British Columbians.

British Columbia's Forests and Society: An Overview

It seems clear beyond possibility of argument that any given generation of men can have only a lease, not ownership, of the earth; and one essential term of the lease is that the earth be handed on to the next generation with unimpaired potentialities.

– Roderick Haig-Brown
(British Columbia conservationist and winner of a Governor General's Award. *Measure of the Year*, 1950. Toronto: Collins)

Sections:

The Forests
The Society

The Forests

At 95 million hectares, British Columbia is larger than any European country except Russia, about four times the size of the United Kingdom, and larger than the combined areas of the states of Washington, Oregon and California.

About two-thirds of the province is forested, as shown in Figure 5. This makes the province, on a global scale, as important as many forest nations.

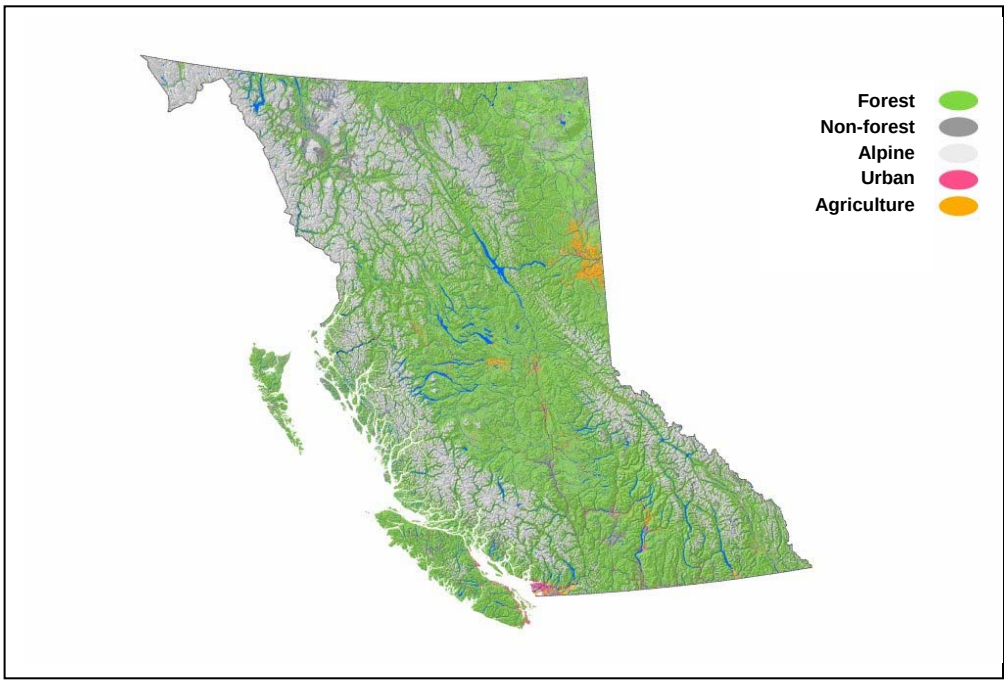

FIGURE 5. Forest land of British Columbia, 2000.

British Columbia is ecologically diverse

The province's mountainous terrain creates a range of distinct climatic zones. Along the Pacific coast, temperatures are mild and rainfall is abundant. The interior plateau, lying in the rain shadow of the Coast Mountains, has a dry continental climate. The northeast, which is part of North America's Great Central Plains, has an extreme continental climate with very cold winters.

This variety of climates, combined with the extensive and varied terrain, has resulted in a complex pattern of many distinct ecosystems. Among them are grasslands, oak parklands, temperate rain forests, dry pine forests, desert-like steppes, boreal black spruce muskegs, tundra and alpine meadows.

The many ecosystems have made British Columbia home to a great diversity of flora and fauna – in fact, a greater diversity than any other province in Canada. British Columbia has an estimated 2,790 species of native vascular plants, 1,000 mosses and liverworts, 1,600 lichens, 522 attached algae and more than 10,000 fungi. As well, 1,138 species of vertebrates have been identified, including 488 birds, 468 fish, 142 mammals, 22 amphibians and 18 reptiles. Invertebrate species are estimated to number between 50,000 and 70,000, including 35,000 insect species.

Three-quarters of Canada's mammal species are found in the province, 24 of which occur only in British Columbia. Some 162 species of birds that breed in British Columbia breed nowhere else in Canada.

The Society

British Columbia has been inhabited for about 10,000 years. When Spanish and British explorers first reached the province's coast in the late 1700s, they found thriving First Nations societies and cultures. Trading posts sprang up throughout the province during the early 1800s, soon giving way to more established towns and cities as settlers arrived in the new British colony from Europe, the United States, Asia and elsewhere.

Before the arrival of Europeans, about 40% of all the native people in Canada lived within the area that became British Columbia. Their population was probably over 80,000, but introduced diseases resulted in severe losses.

The population is concentrated in urban centres in the southwest

The province's total population expanded from 33,000 in 1867 to over 4.3 million in 2006 (see Figure 6). About half of the population now lives in the province's southwest corner (the Lower Mainland), in Vancouver, Surrey and other communities making up the Greater Vancouver Regional District.

Another 30% live on Vancouver Island (mainly in Victoria and Nanaimo) or in the southern Interior's Thompson-Okanagan region (Kelowna and Kamloops). The remaining 20% live primarily in smaller rural communities throughout the province.

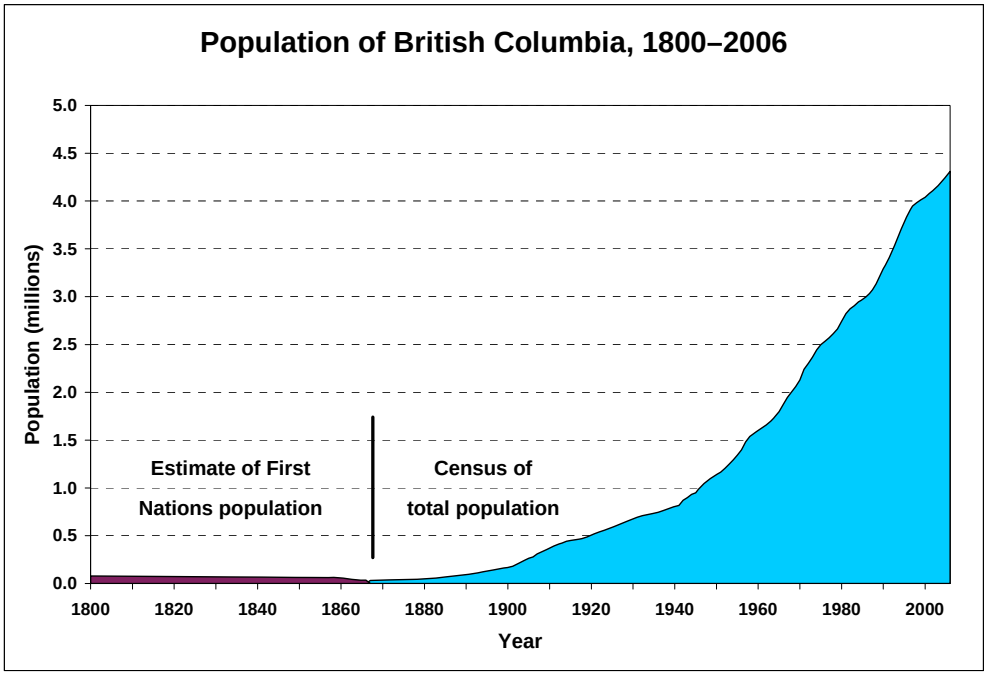

FIGURE 6. Population of British Columbia, 1800–2006.

The growing population has exerted considerable pressure on British Columbia's natural resources, including timber, water, fish, wildlife, range, wilderness and others. This has often resulted in competing demands and conflicting public expectations for the use of forest resources (e.g., ecosystem and watershed protection vs. jobs and other economic benefits). It has also led to increasing risks of wildfires in the wildland/urban interface.

Forestry is the province's most important industry

For thousands of years, aboriginal people depended on the forest for shelter, food, clothing, tools and medicine. The first European settlers also came to rely on the forest – primarily for timber, using the wood to construct buildings, ships and even roads and railway trestles. Industries and communities grew up around timber harvesting and processing, producing logs, lumber, pulp, paper and other products for export and domestic use. Recognition of the value of non-timber forest products and services, such as drinking water and wilderness recreation, is well established and growing.

Today, all communities in British Columbia, urban and rural, continue to have significant cultural, recreational and economic connections with the province's forests.

Timber-based industries, generally referred to as the forest sector, continue to be the foundation of British Columbia's economy, accounting for 7% of employment and 15% of all economic activity when indirect and induced economic activity are included. Although its significance has diminished as the economy has matured and diversified over the past few decades, the forest sector remains the most important employer in many rural communities.

Sustainable forest management is vital to British Columbians

With about 95% of the province in public ownership, the British Columbia government manages the land in the public interest, balancing many environmental, economic and social issues.

The government and people of the province have many years of experience in developing and using tools and processes to enable balanced consideration of environmental, economic and social values. The Protected Areas Strategy, Land and Resource Management Planning, the Forestry Revitalization Plan, and the requirements of the *Forest and Range Practices Act* are just a few of the major initiatives during the past decade that support sustainable forest management.

British Columbians, along with buyers of the province's forest products and tourists who come to see its great outdoors, have an interest in the sustainability of the province's forests, because their continuing use and enjoyment of the forests depend on the province's progress in achieving sustainable forest management.

Forest Management in British Columbia: An Overview

Let us think how long is ninety years. What has happened to stable countries in the last ninety years? ... Human habits have changed equally drastically. Wireless communication, the internal-combustion engine, the aeroplane, atomic fission and fusion, plastics and man-made fibres have been invented. … The per capita use of lumber has dropped by over 50 per cent. Who shall say what further changes will affect the value of the crop by the end of the rotation the Licensee is now starting?

– H. R. MacMillan
(First chief forester of the British Columbia Forest Service and prominent forest industrialist. 1956 Sloan Commission[1])

Sections:

The Concept
Forest Management in British Columbia

The Concept

Forest management can be described as ongoing iterations of five activities:

1. Define and understand the forest
2. Set goals
3. Plan activities
4. Implement activities
5. Assess results

Forest Management in British Columbia

The five activities provide a useful framework for describing the main elements and evolution of forest management in British Columbia.

Define and Understand the Forest

This includes basic rules of ownership and practices, inventory and research.

The British Columbia Forest Service (BCFS) is the main government agency responsible for stewardship of about 50 of the province's 59 million hectares of forest. The province relies on private sector investment to develop B.C.'s forests, creating jobs and revenue, while retaining public ownership to enable conservation measures consistent with public expectations.

The issuance of timber tenures under the *Forest Act* to private forest operators is the key vehicle that establishes rights to forest development and the generation of public revenues through the payment of stumpage. The two main types of long-term tenures issued are area-based tree farm licences (TFLs) and volume-based forest licences (FLs). In addition, short-term timber sale licences (TSLs) facilitate market-based pricing and value-added opportunities. Tenure holders must be compliant with the planning and practices requirements established by the provincial government.

The BCFS manages the forest inventory program for the province's publicly owned forests. The tenure holders are responsible for undertaking the forest inventories. The BCFS, tenure holders and other agencies also undertake inventories of non-timber values to support forest management.

The BCFS's research program contributes to the scientific basis for many aspects of forest management, including silviculture, growth and yield of managed forests, and conservation of soil, water and wildlife. The Canadian Forest Service and several universities also play major roles in research. The forest industry often collaborates on research with partners.

Set Goals

The goals of forest management, and the processes for setting goals, have evolved over the past century in British Columbia. The main goals highlighted below in **bold** include desired future forest conditions for values including timber, biodiversity and cultural heritage resources.

As the forest industry rapidly grew at the beginning of the 20th century, concerns were raised that future timber supplies could be depleted. A royal commission on timber and forestry made recommendations in 1910 that led to the introduction of new timber tenures in the *Forest Act* of 1912 and the establishment of the BCFS **to protect forests** and **regulate their use**.

By 1940, annual rates of harvest had increased substantially, much of the best timber had been allocated, and natural reforestation was not keeping pace with harvesting. A second royal commission recommended in 1945 that the province ensure a **sustained yield of timber**. The *Forest Act* was amended in 1947 to regulate harvests with allowable annual cuts (AACs) and help ensure an orderly transition from harvesting old-growth timber to long-term management of second-growth forests. Area-based tenures, later named TFLs, were granted in exchange for private sector commitments to invest in manufacturing facilities and provide long-term forest management, thereby supporting the province's goal of **economic development**.

Improved access and technological advancements led to increasing AACs as the land base economically suitable for forestry expanded, particularly in

the province's Interior. The increasing scope of industrial forestry in turn led to concerns about other forest values and uses, such as recreation, water, wildlife and fish. In 1976, another royal commission recommended an overhaul of timber tenures and policies, and led to the 1979 *Forest Act* and a new *Ministry of Forests Act.* To ensure **integrated resource management** that provides diverse public benefits, the BCFS now had to explicitly consider non-timber values in its decisions. A new planning process was introduced, new forest management units called timber supply areas (TSAs) were formed, a new process for determining AACs was established, and a strategic management system was initiated that included periodic publication of provincial information in forest and range resource analyses.

Many forest issues arose as public expectations increased in the 1980s. This led to yet another commission that made recommendations in 1991 on many issues including land use conflicts, AACs, and forest planning and practices.

In 1992, government initiated consensus-based land use planning processes, involving diverse public interests, **to reduce land use conflicts**. Today, land use plans have been approved or are nearing approval for 85% of British Columbia, providing long-term management goals and objectives for public lands. The plans also helped deliver the province's goal established in the early 1990s **to double protected areas to 12% by the year 2000**.

Also in the early 1990s, the province re-emphasized the goal of a sustained yield of timber with a new goal of **timely determinations of AACs**. The province's chief forester was legally required to make AAC determinations for TFLs and TSAs every 5 years, taking into account current understanding of the forests, current forest practices and any approved land use plans.

In response to widespread demands **to improve forest practices**, the *Forest Practices Code of British Columbia Act* came into force in 1995. The Code collected hundreds of varied requirements into one consistent legal framework for planning and practices that applied across the province. This resulted in improvements that were widely noted. However, its complex planning requirements and highly prescriptive approach to forest management led to significant increases in costs to both tenure holders and government.

In 2004, the results-based *Forest and Range Practices Act* (FRPA) replaced the Code. Among its several goals are **to encourage innovation** by reducing the prescriptive aspects of the Code, and **to reduce regulatory costs** by streamlining the planning process and other requirements while **maintaining high environmental standards**. Along with FRPA, legislation governing various resource professionals was amended or introduced **to increase reliance on the judgment of professionals** by clarifying standards of accountability.

Plan Activities

Forest planning typically includes identification of key issues, information and objectives; development and evaluation of scenarios; and selection of a preferred scenario that is fleshed out to make "the plan." The evolution of forest planning in British Columbia reflected its goal-setting history.

Timber was the predominant forest value up to the mid-1970s, so most forest plans focused on timber harvesting. The 1947 *Forest Act* set the stage for long-term area-based tenures, now called TFLs, and a requirement for TFL tenure holders to prepare five-year management plans that address long-term timber supply, a 20-year spatial harvesting plan and investments in forestry activities. These apply to less than 10% of the province's forests.

Following the 1979 *Forest Act*, TFL management plans and a variety of other plans for local areas and specific sites evolved to provide integrated resource management of timber and other forest values, and opportunities for public review and comment.

Beginning in the 1990s, some plans have included more explicit efforts to balance environmental, economic and social goals to achieve sustainable forest management. Most TFL holders now prepare sustainable forest management plans (SFMPs) to support their application for forest certification, using indicators for resource values and targets to describe desired future forest conditions. These SFMPs are generally also submitted to the BCFS for approval to meet most of their management plan requirements.

Most of the province's forests are in TSAs, for which a timber supply analysis every 5 years has been legally required since the early 1990s. The analysis provides a forecast for 200 years or more, taking into account existing land use goals and objectives. There is no legal requirement for long-term plans that address forestry activities and investments needed to achieve desired future forest conditions. That said, many forest tenure holders in TSAs now also voluntarily develop long-term SFMPs in support of forest certification, similar to TFL holders.

On private forest land, which accounts for about 5% of the province's forests, planning is the owner's responsibility. A management commitment is required for some of these lands to maintain a favourable tax classification.

The *Forest Practices Code of British Columbia Act* of 1995 required six levels of forestry plans. Among these, the 5-year forest development plan (FDP) was required to be consistent with legal objectives stemming from land use plans. Prescriptive content requirements, including the need to show the location of intended cutblocks and roads, hampered innovation and responsiveness to changing markets. The subjective approval test "that forest resources be adequately managed and conserved" led to disputes that

delayed approval and implementation of plans. FDPs were updated every one or two years, leading to significant transaction costs between industry and government as well as a short planning horizon. Although streamlining changes were made with respect to the number of required types of plans, the Code's overall approach to forest planning was viewed as too cumbersome and costly.

For major forest tenure holders, the *Forest and Range Practices Act* of 2004 requires two levels of plans, of which one – the forest stewardship plan (FSP) – is submitted for approval by the BCFS. The FSP identifies forest development units within which development can occur, and must provide measurable results or verifiable strategies consistent with government objectives for various forest values. Government objectives stem from a variety of sources. Some come from land use plans, others are provided or enabled in regulations, and others are grandparented from the Code. The FSP has a 5-year term that may be extended to 10 years. Other requirements include consultation with First Nations and providing an opportunity for review and comment by the public and other resource users. Tenure holders must also prepare site plans that identify intended roads, cutblocks and FSP strategies for the site. The site plans are not approved by government but must be available to the public on request.

Implement Activities

Forestry activities today, such as road building, timber harvesting, reforestation, silvicultural treatments and forest protection, have long-term implications for future forest conditions, often well beyond the next 50 or 100 years. Forestry activities need to be carried out by tenure holders and government in a manner that is consistent with completed plans, including land use plans, SFMPs, FSPs and site plans.

Under the *Forest Act,* the BCFS is responsible for issuing tenures, including long-term licence documents such as TFLs and shorter-term road permits and cutting permits, and for determining the stumpage price and other charges that tenure holders must pay. Most forest activities are implemented by tenure holders and contractors working for them. Fire suppression and management of insects and diseases have been the responsibility of the BCFS in partnership with tenure holders.

Before 1987, reforestation of harvested areas on public land was mostly funded by government and carried out by the BCFS and some tenure holders. Reforestation efforts lagged under this arrangement, so in 1987 reforestation was made a legal obligation to be funded and carried out by major tenure holders. The BCFS (now through BC Timber Sales) is legally required to reforest areas harvested under TSLs. Areas of public land where timber was burned by wildfire or killed by insects may be reforested by the BCFS, based on each situation's merits as an investment of public funds.

Similarly, other silvicultural treatments such as juvenile spacing, fertilizing, pruning and commercial thinning are based on their merits as an investment of public funds, and may be carried out by the BCFS or tenure holders.

Assess Results

Monitoring and assessing forest conditions relative to the desired future forest, and evaluating the effectiveness of management activities in achieving goals, supports a cycle of continuous improvement.

Each of the above activities can be assessed and adjusted based on the assessments. For example:

- Is available information adequate? Are tenure obligations clear?
- Are the goals clear and comprehensive?
- Are plans realistic and adequate for realizing the goals?
- Did implementation follow the plan and legal requirements?

Continuous improvement is a fundamental component of modern forest management. Government processes that contribute to continuous improvement include this report, the Ministry of Forests and Range's service plans, the Forest and Range Practices Advisory Council, the Forest and Range Evaluation Program, various adaptive management projects, the investigations and audits by the Forest Practices Board, and the BCFS compliance and enforcement program.

As discussed, many forest tenure holders in British Columbia either have or are actively pursuing independent third-party forest certification. This involves use of indicators, targets, monitoring and reporting on attainment of those targets. The tenure holder's performance is also periodically assessed through independent third-party audits.

Professional associations and academia, often in partnership with government and industry, provide numerous continuing education opportunities to help ensure that resource professionals are aware of their professional obligations, are appropriately qualified to perform key tasks, learn from actions taken and adapt to change.

Long-term forest management requires inter-generational learning and adaptation to broad changes such as changes in society's values regarding forest resources, changes in global demand for forest products and, increasingly, climate change.

About Sustainable Forest Management

Forestry isn't rocket science. It is much more complicated.

– Fred Bunnell
(Professor, University of British Columbia)

Sections:

The Concept
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Criteria, Indicators and Forest Certification
Reporting on Sustainable Forest Management
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The Concept

Sustainable forest management is a widely supported goal. Forest practices have addressed aspects of sustainability for centuries, but “sustainable forest management” is a relatively recent concept that explicitly encompasses environmental, economic and social dimensions. It is more comprehensive than earlier concepts such as “sustained yield of timber.”

Sustainable forest management can be viewed as a sector-specific subset of the broader concept of sustainable development, which was first given prominence by the World Commission on Environment and Development, commonly known as the Brundtland Commission. In its 1987 report, “Our Common Future,” the commission emphasized the interdependence of environmental integrity, economic development and social security. Specifically, the commission stated:

> *Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

The concepts of sustainable development and sustainable forest management have gained wide acceptance, even though their exact meaning and the methods for their implementation are often disputed. A variety of graphic models, such as three overlapping circles representing the environment, the economy and society, are used to illustrate the concepts.

Numerous efforts that support sustainable development and sustainable forest management are being implemented in a variety of ways by governments, communities and industries.

Definition

This report uses the vision statement in Canada's National Forest Strategy as its definition of sustainable forest management:

> *The long-term health of Canada's forest will be maintained and enhanced, for the benefit of all living things, and for the social, cultural, environmental and economic well-being of all Canadians now and in the future.*
>
> – National Forest Strategy Coalition, National Forest Strategy, 2003–2008

Criteria, Indicators and Forest Certification

Sustainable forest management gained prominence at the 1992 Earth Summit, or United Nations Conference on Environment and Development (UNCED), in both the Forest Principles and in Chapter 11: Combating Deforestation of the conference's programmes for the 21st century, called Agenda 21.

Two streams of global action followed from UNCED:

1. governments committed themselves to developing and using indicators to define, assess and promote progress towards sustainable forest management at the national level; and

2. non-government organizations (NGOs) – some of them dissatisfied with government-led efforts to address forestry – developed forest certification systems to promote sustainable forest management at the operational forestry level.

Both streams use indicators to measure or describe aspects of sustainability and their trends (for more details, see the section About Indicators). Governments have typically grouped indicators into categories, referred to as criteria of sustainable forest management.

Criteria and indicators have been developed by nine regional groups of nations that contain most of the world's forests. One of these groups, known as the Montréal Process, involves 12 nations including Canada. Its goal is to define and promote the conservation and sustainable management of temperate and boreal forests. In 1995, the Montréal Process published its framework of 67 indicators, grouped under seven criteria that address the environment, economy, society, and institutional and other frameworks that support sustainable forest management. The framework was re-issued in

1999 with a new numbering of the indicators (MP 1999 indicators). Some of the member countries have published national reports based on these criteria and indicators.

The Canadian Council of Forest Ministers (CCFM) also developed a framework of criteria and indicators to reflect the unique aspects of Canadian forests and values of particular concern to Canadians. This framework of six criteria and 83 indicators was also published in 1995. The first full report based on these indicators was published in 2000. A revised framework of 46 indicators was published in 2003 (CCFM 2003 indicators), reflecting experience from use of the framework and advances in scientific knowledge.

This report, *The State of British Columbia's Forests – 2006*, cross-references relevant indicators of the Montréal Process (1999) and CCFM (2003) for the convenience of readers.

While many governments were developing criteria and indicators, several NGOs and a few nations developed forest certification systems to encourage companies to practice sustainable forestry at the operational level. These systems share many aspects of the governmental criteria and indicators frameworks. Both are based on the concepts of sustainable development: both use indicators to report on progress and trigger appropriate actions; and both share the goal of sustainable forest management.

The two streams of action have interacted in several ways. The use of criteria and indicators has spread from the national level to the operational level, NGOs and governments have advised each other on indicators, and some governments have obtained certification for their forest management. For example, the CCFM's 1995 criteria and indicators were the basis for the Canadian Standards Association's forest certification system published in 1996 and revised in 2002. This and other forest certification systems are now used widely in British Columbia, as discussed in the indicator on Certification.

Reporting on Sustainable Forest Management

Reporting on sustainable forest management is challenging.

Sustainable forest management is not just about trees. It involves other plants, as well as wildlife, soil and water, air quality and greenhouse gases; all economic activities that depend on the forests; the communities that depend on those economic activities; and other social and cultural activities and values related to forests.

For these reasons, the scope of reports on sustainable forest management is typically broader than that of the direct accountabilities of a single government agency or the actions of individual forest industry operators.

Ensuring relevance and credibility

The Montréal Process and CCFM criteria and indicators offer a good starting point for selecting relevant indicators for any jurisdiction in Canada, since they were developed through consultation with experts on all aspects of sustainable forest management. To be locally relevant, however, reporting must also reflect the unique aspects of the nature, history and culture of a jurisdiction and its forests.

The credibility of reporting depends on the use of the best science-based information available and the inclusion of both positive and negative findings. Credibility is further supported by identifying knowledge gaps and, where possible, using information from public sources.

Challenges in reporting

Several factors pose practical challenges to finding and presenting relevant, useful information and data on the indicators. This report attempts to address and balance all of these challenges:

- *Cost* – The cost of detailed inventories of all forest resources is high and data may be unavailable.
- *Time* – Assembling and analyzing extensive datasets to provide meaningful information is time-consuming, making presentation of recent information difficult.
- *Technical/scientific* – Exactly what to measure and how to measure it are the subjects of technical debate, and all of the potential approaches have different technical merits and problems.
- *Administrative* – Access to information, as well as permission to report on it, is sometimes limited by proprietary concerns (e.g., information related to commercial interests and private land) or the sensitivity of information (e.g., rare ecosystems that might be threatened by vandals or nature lovers if their locations were made public).

Assessing Sustainable Forest Management

Assessing sustainable forest management is difficult because of the complex and intertwined nature of its many aspects. Nonetheless, questions about sustainability need to be asked, and answered, to help inform future actions.

The conditions of forests and societies continually change, as do interactions between the two. Perceptions of what is sustainable or unsustainable change over time.

An indicator may be assessed relative to historical conditions, technical or scientific thresholds, and desired targets. Where these reference values are unknown, unclear or disputed, meaningful assessment of the indicator is difficult.

Assessment of several indicators collectively is conceptually even more problematic. First, indicators that use different units of measure cannot simply be added together unless they are converted to a common unit. Conversion may be technically problematic or wholly inappropriate. Second, the relationships between indicators are often complex, making interpretation of their interactions unreliable. Third, because the importance of any one indicator relative to another depends on the values and perspective of the assessor, even experts have trouble developing a consensus on overall assessments.

While various approaches have been developed to assess multiple indicators collectively, no one approach is entirely satisfactory.

About Indicators

Not everything that can be counted counts, and not everything that counts can be counted.

– Albert Einstein

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The Concept
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Selection of Indicators

The Concept

The indicators in this report provide information that enables people to assess aspects of forest management. A meaningful assessment usually requires more than one indicator.

Definition

An indicator is defined in this report as follows, based on the definition used in the Montréal Process:

> *A quantitative or qualitative variable used to describe a state or condition. When observed periodically, it shows a trend. It provides information that is factual, usually for a specific time and place.*

Indicators of Sustainable Forest Management

Indicators are central to any report on the state of forests. They are used at all strategic and operational levels of forest management – global, national, provincial or state, forest management unit, and specific plot of land – to describe the state of forests and human interactions with forests.

They are used to:

- help explain the context or background situation;
- clarify management goals (by the choice of performance indicators);
- check for compliance with regulations and policies;
- check the implementation of plans;

- assess overall outcomes and effectiveness of management efforts; and
- improve understanding of how forests and societies function.

Tracking an indicator over time is called monitoring. The above uses of indicators are referred to, respectively, as background monitoring, performance monitoring, compliance monitoring, implementation monitoring, effectiveness monitoring and improvement monitoring. The last includes validation monitoring – checking the validity of assumptions and models used in management.

These different types of monitoring are most helpful when used in combination. For example, monitoring that confirms full compliance with laws is reassuring to a certain extent, but more meaningful when combined with effectiveness monitoring that confirms compliance is achieving desired outcomes.

Sustainable forest management requires continual improvement and adjustment based on the monitoring of indicators. Reports on the state of forests may draw from several types of monitoring, but typically emphasize the assessment of overall outcomes to assist decision-making about future directions.

Types of Indicators

The indicators in this and other similar reports can be grouped into several complementary types:

- *Quantitative, qualitative* – Of the two, quantitative indicators are generally preferred. However, qualitative (descriptive) indicators are sometimes all that is available. This report mostly uses quantitative indicators.
- *Input, process, output, outcome* – Inputs and processes are used in management systems to achieve desired outputs and outcomes. For example, inputs of money, workers and time are applied to activities (processes) such as planting and tending trees. This results in outputs of areas planted with different species and, over time, outcomes such as habitat for animals and economic activities related to timber harvesting and milling. Indicators are used to track all of these stages. This report emphasizes outcome indicators, with output indicators used as surrogates where necessary. Input and process indicators may also be used to monitor activities that support sustainability.
- *Pressure, state, response* – Problem management can be informed by knowledge about a problem's cause or driving force (pressure), its

effect (state) and the actions undertaken to address both cause and effect (response). For example, growing human populations (pressure) tend to cause loss of wildlife habitat and reduced wildlife populations (state), leading to the need for corrective measures such as protection of critical habitat (response). Trends of all three types of indicators help to show if a problem is being resolved. In this report, the relationships between indicators are described in terms of pressure, state and response.

- *Environmental, economic, social, institutional* – Environmental, economic, social and institutional indicators must be considered together, in a balanced way. Overemphasis or omission of one or more of these types of indicators is likely to lead to a lack of sustainability. In this report, the more descriptive phrase "governance and support" is used in place of "institutional."

Selection of Indicators

Given the complexity of sustainable forest management, selecting a list of indicators that is sufficiently comprehensive for the topic, yet also limited to a useable number that readers can comprehend, is challenging.

The selection of indicators for this report was guided by the attributes of good indicators used for the development of the CCFM's 2003 criteria and indicators. A good indicator is one that:

- is relevant,
- is measurable,
- is understandable,
- can be forecast, and
- has reference values.

An indicator must be relevant to an important aspect of sustainable forest management, sensitive to changes in the environment and human activities, and appropriate for the spatial scale being assessed. It should be a variable that is necessary (and, if possible, sufficient) to illustrate that aspect of forest management and to inform decisions.

A measurable indicator is one for which it is technically and financially feasible to obtain timely, reliable data and, ideally, for which there is sufficient historical information to provide meaningful trends. Qualitative indicators must be sufficiently precise in their descriptions to permit meaningful comparisons over time.

Intended audiences must readily understand the information conveyed by an indicator, and be able to use it to form their own assessments.

Indicators that can be forecast using science-based predictions of the effects of management choices and other factors are particularly useful for assessing future sustainability.

Reference values – for instance, historical baselines, technical or scientific thresholds and desired targets – provide a context for assessment of states and trends.

The indicators selected for this report satisfied the above five attributes more completely than did other candidate indicators. While keeping the same indicators over a long period enables assessment of trends, experience in the use of the indicators and changes in scientific knowledge over time make rethinking the list of indicators periodically necessary.