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# **Future Forest Ecosystems of BC**

**EXPLORING THE OPPORTUNITIES**

Symposium & Workshop  
Report

**MINISTRY OF FORESTS AND RANGE  
CHIEF FORESTER'S OFFICE**

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# Introduction

On December 6, 2005 a symposium entitled **The Future Forest Ecosystems of BC – Exploring the Opportunities** was held at the University of Northern British Columbia in Prince George. The objectives were:

1. To identify the current and potential future condition of British Columbia's forests relative to stresses of climate change, wildfire, catastrophic pathogen and insect attacks, and other ecological change agents.
2. To determine how other jurisdictions have, or are planning to respond to similar stresses or changes.
3. To review the current forest management paradigm (legislation, tenure, policy, practices and science) regarding BC's ability to manage ecosystems in light of the forecasted changes.
4. To determine potential improvements in BC's forest management paradigm to effectively respond to the future.
5. To identify key information needs, including how First Nation traditional knowledge might contribute to our knowledge base.

Presentation materials for most of the symposium speakers are available to the public by visiting the Ministry of Forests and Range web site at:

[http://www.for.gov.bc.ca/hts/Future\\_Forests/](http://www.for.gov.bc.ca/hts/Future_Forests/) .

The symposium was followed by a series of six concurrent workshops on December 7, 2005. Approximately 75 participants, with a variety of perspectives and experience from research, provincial and federal government agencies, First Nations, forest and range industry, independent consulting and environmental organizations contributed to the workshop results. Participants met in six multidisciplinary working groups to identify knowledge requirements and discuss potential changes that would enhance the capacity of forest management in BC to respond to expected future conditions.

Each of the working groups provided a verbal report to a closing plenary session, and subsequently produced a report summarizing their discussions and findings. The working group reports will provide the basis for more detailed problem analysis, leading to recommendations and implementation plans. Immediately following the workshops, a

brief *Workshop Overview Summary – Key Opportunities and Messages* was posted on the Ministry internet site.

This report provides highlights of the messages presented in the symposium and a brief summary of the working group reports. Copies of each working group report can be found on the Ministry of Forests and Range web site at:

[http://www.for.gov.bc.ca/hts/Future\\_Forests/](http://www.for.gov.bc.ca/hts/Future_Forests/) .

## **A Broad Provincial Context**

British Columbia is located on the western coast of North America, between 49 and 60 degrees latitude. Its climate is moderated by the Pacific Ocean. Roughly half the province's 94 million hectare land mass is covered by natural (indigenous) forests. The Coast Mountains separate the coastal regions, with a more moderate, moist climate from the generally dryer interior regions. Elevations range from sea level to about 4,000 metres, with much of the interior being plateau or rolling terrain between 400 and 1,000 metres in elevation. The forests are equally variable, from temperate rain-forests to dry semi-open parklands and vast boreal and sub-boreal areas.

A dominant feature of these forests is the preponderance of coniferous (softwood) tree species with relatively high commercial value. Most of these species require 80-120 years to reach their full size and maturity. Deciduous tree species such as birch, aspen and alder are less dominant in most regions, but are widespread and normally mature in 40-60 years. Natural disturbance and succession patterns vary by region; however, fire, insects, pathogens and wind have historically been important change agents. The near-exclusion of fire since midway through the last century has, to some extent interrupted the natural processes of forest renewal and led to a high percentage of mature and over-mature timber.

The population of British Columbia was just over 4 ¼ million people in 2005 and is forecast by BC Stats to be 6 million within 25 years. The population is heavily concentrated on the south coast and southern Vancouver Island, and in a few mid-sized

regional centres in the interior. Except for a few corridors, the rural population is very widely scattered. Aboriginal Peoples (First Nations) make up about 8 per cent of the population, and many are spread throughout the province in nearly 200 small communities. These regional, rural and First Nations communities tend to participate in and depend directly on forest harvesting and manufacturing, and other forest-based activities for jobs and economic prosperity. At one time, 50 cents of every dollar generated in BC was purported to come from forestry. While this number is much smaller now, forests are still the economic mainstay of many communities.

About 47 million hectares or 95 per cent of the BC's forests are provincial (public) land and are managed by provincial government agencies. Strategic land use plans have been completed for about 73 per cent of the province, and the planning process is underway for another 12 per cent. These plans identify areas that are to be protected for conservation purposes and those that are open for development.

The province's timber harvest in 2004 exceeded 80 million cubic metres – an increase of approximately 7.5 per cent from 2003, and 5 per cent above the five-year average harvest. Although fluctuations in the annual harvest level are not unusual, the increase in the 2004 harvest level can be attributed to strong market prices and the salvage of fire and beetle killed wood (for example, in September 2004, the total allowable annual cut, for the three north-central timber supply areas most affected by beetle, was increased by 4.9 million cubic meters. This action by the Chief Forester was designed to facilitate salvage logging of the affected areas to realize value from the dead trees, speed-up regeneration and restore forest productivity).

# Symposium Highlights

## Agenda:

Following an introduction and overview of the objectives and context by the Chief Forester, 11 individuals made presentations on the topics listed below. In his remarks, the Chief Forester acknowledged that while the focus of this discussion was on management of ecological systems, there are many interdependent economic and social systems that will need to be examined concurrently.

### **Setting the Context for the Future Forests of BC**

- The Future of BC's Forests – A Global Context, by Rob Kozak, University of BC
- Overview of Predicted Climate Changes in BC, by Dave Spittlehouse, Ministry of Forests and Range

### **Ecosystem Processes**

- Changes in Ecosystem Processes and Management in BC, by Suzanne Simard, University of BC
- Perspectives on Historic Variability, Climate Change, and Forest Management in Western Oregon and Washington, by Fred Swanson, US Forest Service
- Applying Traditional Aboriginal Knowledge to Managing Ecosystem Processes, by Russell Collier, Gitxsan First Nation

### **Fire**

- Future BC Fire Regimes: Emerging Fire and Forest Management Issues and Potential Adaptation Strategies, by Brad Hawkes, Canadian Forestry Service

### **Biotic Disturbance Agents**

- Ignorance is Bliss: Pathogens and Changing Ecosystem Processes, by Kathy Lewis, University of Northern BC
- Insects: The Agents of Succession. Dynamics of Forest Insects in Changing Ecosystems, by Lorraine Maclauchlan, Ministry of Forests and Range

### **Scientific Foundation for Management**

- Ecosystems in the Time of Cholera: BEC to Basics, by Jim Pojar, Canadian Parks and Wilderness Society

### **Reforestation Strategies and Species Selection**

- Making Choices in Uncertain Times: Species Selection and Genetic Considerations, by Sally Aitken, University of BC

### **Alternative Paradigms**

- Alternative Management Paradigms and their Ability to Respond to Changes, by Bruce Larson, University of BC

## **Synopsis:**

Each of the symposium speakers provided information and perspectives that established a foundation for the workshops that followed. Their individual presentations can be found on the Ministry of Forests and Range web site. The next few pages describe the key messages and highlights of the combined presentations.

The forests of British Columbia are being impacted by the dynamics of environmental change and human activity in ways that were unforeseen only a decade ago. Many of the assumptions that forest management professionals have relied upon to plan for the growing and harvesting of trees and for management of other important ecological services, no longer appear valid, or at least require re-examination. Information was presented to show that one of the primary challenges to these assumptions, the trend toward a warmer climate, continues unabated and that even dramatic reductions in global carbon-dioxide emissions would not reverse the trend for several decades.

The symposium opened with an examination of the global context for management of forest ecosystems, and a challenge to set aside old assumptions and develop a vision that reflects current realities and future needs. Participants heard that the human population is expected to reach between 8 and 14 billion within less than a decade and

forests, covering 30 per cent of the global landmass, contribute an array of services needed for survival. At the same time, our consumption is depleting forests' natural capital at an enormous rate, and only a significant change in approach will bring about sustainability. Simply becoming more efficient resource users will not be enough to reverse the draw-down on natural capital – it will be necessary to find mechanisms that promote restoration of capital.

Climate change predictions for BC suggest strongly that for the foreseeable future, management regimes will have to adapt continuously to changes in temperature and moisture well outside the range of normal variability, and that the rate of change is faster than in the past. Traditionally scientists and forest managers have developed models, policies and practices based on what is known about historical trends and ranges of variability. The inherent uncertainty of traditional forecast methods is magnified considerably by climate change, and this suggests that new ways of thinking and predicting, as well as new ways of managing are needed – a new paradigm.

Many presenters agree that continuing to work within the current parameters and assumptions will result in increasing exposure to unintended negative consequences. They suggest that it is important to acknowledge the unexpected changes and the level of uncertainty, and rather than focusing on trying to predict the specific outcome of policies, become better at processes of adaptive management. There is a similar convergence of thought toward the suggestion that rather than attempting to link practices to the notion of “sustainability”, which is often difficult to define, it would be more effective to manage ecosystems for “resiliency”.

Speakers offered the perspective, for example, that while a management practice that encourages well-spaced, even aged, single species stands of trees may be an efficient method of silviculture and timber supply management at one level, when carried out on a large scale it reduces ecosystem diversity. This forest simplification or loss of diversity is inconsistent with natural ecosystem patterns and processes, and leads to less resilience and therefore an increased risk of catastrophic damage when an outbreak of insects or disease occurs. It was noted that often our response has been to dedicate research effort toward dealing with the symptoms of this interruption of natural pattern and process, rather than to understanding and working with it.



The traditional ecological knowledge and practices of aboriginal people, and the concepts behind modern 'ecosystem-based management' support the idea that natural processes and patterns need to be maintained. They suggest that what current forest management regimes may strive to remove from a stand, (e.g., deciduous shrubs) or may inadvertently disrupt production of, are actually important ecosystem products and services with economic value in addition to any intrinsic value. Changing current management practices to forego the apparent economic advantages of rapidly growing, single (or coniferous only) species stands of trees would not necessarily mean a loss of commercial opportunity when the potential for non-traditional and non-timber forest products is considered. These may include water, carbon sequestration capacity, wildlife habitat, food and medicinal plants and recreational uses.

One of the natural processes our current management regime has succeeded in removing (at least temporarily) from many ecosystems is fire. To achieve a number of public policy objectives, managers have largely eliminated the natural impact of wildfire in forests, and more recently have seriously constrained the use of prescribed fire. Not only does this policy often result in a build-up of fuels, leading eventually to a greater risk of large, catastrophic wildfires, but it also disrupts the dynamics of ecosystems and the components in them that depend on fire in their lifecycle. This can, over time, reduce forest diversity and resilience. Many have concluded that while it will be unacceptable to ignore the immediate risks of fire to public safety, health or economic capital, it is equally ill advised to continue with a policy of exclusion.

Another example is in the role of deciduous species (e.g., birch and aspen) in commercial plantations. Practices such as brushing, aimed at increasing the productivity of targeted coniferous species like pine, may in fact reduce the stand's resistance to pathogens and predispose it to high levels of mortality – an unintended consequence. The risk of introduced (non-native) pathogens through human activity adds even greater uncertainty. Insect resistance too, can be impacted by management practices, reinforcing the need to discard some old assumptions and work to understand plausible scenarios within the emerging climatic conditions. Insects adapt more quickly to change than trees – they can have 100 or more lifecycles in the lifetime of a tree. The normal balance that allows trees to repel insect attack is interrupted when the trees are stressed

by extremes of temperature or moisture – a condition most likely to occur on the edges of their biogeoclimatic ranges. Presenters pointed out that we will need to better understand these dynamics and incorporate them into our management practices.

When dealing with complex, interwoven systems, policy makers and managers are challenged with the dilemma of unintended consequences. Policies and practices that focus on one, or a small group of results, and fail to properly account for natural ecosystem patterns and processes can often leave the forest in worse (i.e., less resilient) condition, and less able to provide the desired products and services. On the other hand, it is impossible, at least with our current level of knowledge and technology, to understand all the variables and cause-and-effect relationships in a forest over space and time. We therefore make assumptions. Our assumptions of a decade ago, although they were informed by our best understanding at the time, can now be informed by new information, experience and perspectives.

All of these change trends and uncertainties are cause for us to rethink not only our policies and practices, but our fundamental approaches to management. However, we are fortunate to have a body of good science and information to begin with, including our biogeoclimatic ecosystem classification system (BEC). The vegetation of an ecosystem may change as the climate warms and moisture levels rise or fall, but underlying features will not – geophysical conditions, and ecosystem processes remain. We can learn to adapt by increasing our emphasis on long term monitoring and continuity of information, by thinking about the dynamic interactions occurring, looking for ways to maintain the inherent resilience of forest ecosystems, and being truly open to adaptive management. Presenters suggest that the flexibility model is the only way to address the risks and uncertainty facing forest ecosystems in BC and the future generations who depend upon them.

The working group sessions that followed the introductory symposium were designed to take these concepts, perspectives and challenges, flesh them out and begin developing specific advice to policy makers and forest managers.

# Summary of Working Group Reports

At the December 7, 2005 workshop, six working groups were formed to work concurrently on six topics – ecosystem processes, fire, biotic agents, BEC as a scientific foundation, species and genetics, and alternative paradigms. The groups comprised a mix of representatives from government agencies, universities, First Nations, forest and range industry, environmental organizations, and consulting resource professionals.

Each working group discussed (a) strengths and limitations of the current forest management paradigm in addressing expected ecosystem changes and variability, and (b) general and specific strategies for paradigm change.

In summary, the working groups determined that the current forest management paradigm does not give sufficient consideration to ecological processes and principles, nor does it anticipate future change to ecosystems created by climate change, catastrophic disturbances, and other change agents. Accordingly, the working groups generally favored adapting the current forest management paradigm to achieve ecosystem resilience. Such a shift would include more direct involvement by First Nations, increased protected areas, ecosystem-based operational planning, flexible science-based forest practices, more funding and capacity to conduct long-term research and adaptive management, and increased public education.

To learn more about the comprehensive discussions of each working group, please refer to the working group reports posted on the Ministry of Forests and Range web site at:

[http://www.for.gov.bc.ca/hts/Future\\_Forests/](http://www.for.gov.bc.ca/hts/Future_Forests/) .