

The Canadian Forest Service: New directions for Science and Technology

by Yvan Hardy¹

As with most organizations today, the Canadian Forest Service (CFS) has a mission statement. For the CFS, the mission is “to promote the sustainable development of Canada’s forests and competitiveness of the Canadian forest sector for the well-being of present and future generations of Canadians.” That is a relatively simple statement but, as we know, it depicts an enormously complex scientific and professional challenge. Forest management is no longer a local, regional or national issue. It is all of those things, and it is also a global issue. For example, not only must we understand and anticipate the impact of climate change on Canada’s forests, we must understand, and make management decisions that take into account the impact of Canada’s forests on climate change.

We have learned that we must constantly pursue techniques and methods that will ensure the sustainability of the resource over the long term, and that we must also consider factors like wildlife management, adaptive management, the integration of First Nations traditional knowledge, inclusion of non-timber values, and other socioeconomic realities.

All of these are social and legislative priorities. They cannot be ignored, and they will not be achieved by guesses and rules of thumb. Our solutions to these challenges must be based on sound science, and developed by the skilful application of the technologies we create with our research. In addition, we must continue to provide forest managers with the information they need to solve problems today, as well as a commitment to ongoing scientific monitoring and research so that practices and plans can be adjusted as our knowledge grows.

Finding the delicate balance we seek among the economic, environmental and social demands placed on our forests and finding ways to measure our progress toward that goal will require a scientific effort that is both broad-based and focussed on results.

As Canada’s national forest science organization, the Canadian Forest Service has been pursuing these goals for more than 100 years, and is committed to continuing to play a pre-eminent role in this ongoing endeavour. As it works to fulfill that commitment, the CFS must also be mindful of its role in the Government of Canada’s overall science and technology (S&T) strategy, aimed at building a strong national system of innovation, and maintaining the Government of Canada’s place as a credible contributor to that system.

The Government of Canada’s S&T strategy points to the need for a focussed, coordinated, national effort from all sectors to pursue the innovations that will assure Canada of success in the new, knowledge-based, global economy.

In the forestry sector, this means continuing to develop and implement the innovative technologies that contribute to sustainable management practices at home, and marketing the results of those technologies to the world. By doing so, we contribute

to the pursuit of sustainable development on a global scale, and in the process, we bring economic benefits to Canada. That said, it must be understood that the implementation of the Government of Canada’s S&T strategy is still a work-in-progress. Science-based departments and agencies, including the CFS, are in a state of transition as they position themselves to fulfill the four key roles for Government of Canada S&T identified by the federal government’s Council of Science and Technology Advisors (CSTA):

- 1) support for decision-making, policy development and regulations;
- 2) development and management of standards;
- 3) support for public health, safety, environmental and defence needs; and
- 4) enabling economic and social development.

In assuming these roles, the CSTA has further recommended that all S&T activities performed or funded by the Government of Canada adhere to three principles:

Alignment—federal S&T activities must be in line with departmental mandates and the overall priorities of the government.

Linkages—to ensure access to the best available inputs, federal government S&T activities must be tied in with other activities within the federal government, other levels of government, universities and the private sector.

Excellence—S&T performed, funded and used by the Government of Canada must be of the highest quality, and meet or exceed international standards for scientific and technological excellence.

As a result of these recommendations, science-based government departments are re-examining the way they conduct and deliver their science in order to identify and bring more focus to core activities, ensure those activities are guided by overall Government of Canada policy priorities, and at the same time, provide the kind of research that will ensure policy is guided by sound science. This includes ongoing reviews of research priorities to ensure decision-makers are informed about emerging issues.

Science-based departments are also looking for ways to increase collaboration with researchers in other government departments, other levels of government, academic institutions, industry and non-government organizations. Certainly, partnerships are nothing new to the CFS. Given the size and diversity of Canada’s forests and the different jurisdictions responsible for managing the resource, advancing the science of forest management has always demanded a cooperative approach.

To further enhance opportunities for partnership and to provide national coordination of its research agenda, the CFS has



Yvan Hardy

¹Assistant Deputy Minister, Canadian Forest Service, Natural Resources Canada. E-mail: yhardy@NRCan.gc.ca

established national, target-based research networks. Each of the networks, linked through the five CFS regional forestry centres and CFS headquarters in Ottawa, focuses on strategic areas critical to achieving sustainable forest management: climate change and fire research; knowledge and information synthesis; forest health and biodiversity; forest ecosystem processes; and enhanced timber production and protection.

These networks ensure that CFS research in each of these key areas is coordinated across the country, while allowing scientists in different regions of the country to continue to respond to the needs of local and regional clients. The networks provide a mechanism to keep scientists in one part of the country informed of their colleagues' activities elsewhere in Canada. This facilitates the formation of national partnerships among CFS scientists and ensures that information being generated on current and emerging issues is gathered and reported on a national scale and in a timely fashion.

The research networks are a recognition that moving toward sustainable forest management on a national scale requires research that is focussed not only at that level, but also that sustainable management on a national scale is very much the sum of the forest management decisions taken at the regional and stand level across the country.

The overall goals for CFS S&T activities are defined in the CFS 2000–2003 Science and Technology Business Plan. The business plan identifies three broad strategic directions aimed at meeting the needs, interests and priorities of CFS partners and clients and at fulfilling the key roles for Government of Canada S&T, as recommended by the Council of Science and Technology Advisors.

The first strategic direction is to *enhance Canada's capacity to practice sustainable forest management*. This means demonstrating, in ways that are acceptable to both the scientific community and the lay public, that enhanced timber production and the conservation and protection of forest ecosystems are not mutually exclusive.

In the first instance, we are rapidly approaching the limits of growth in the fibre supply. Most of the country's commercially accessible—and environmentally acceptable—forest resources have been allocated, and we must find ways to produce more fibre from an increasingly limited source. To this end, a major focus of CFS research is determining to what extent we can increase timber production.

To enhance the long-term competitive position of Canada's forest products industry, CFS researchers are working in partnership with their colleagues at three major forestry research institutes—Forintek Canada Corporation, the Forest Engineering Research Institute of Canada (FERIC), and the Pulp and Paper Research Institute of Canada (Paprican).

Intensive forestry may provide part of the answer to increasing productivity and at the same time, decrease pressure on natural ecosystems. Early results from field trials already underway with genetically improved white pine and white spruce varieties suggest that productivity gains of 15% and 25% respectively, are well within the realm of the possible. Despite this promise, there are economic and social barriers that must be identified, considered and resolved before these technologies can be put into practice. The CFS is conducting research in this area as well.

Sustainable forest management also means protecting the resource from hazards like fire, and domestic and imported for-

est pests. The CFS pioneered fire management research and continues to pursue improved fire management techniques. Among other protection activities with its research partners, the CFS continues to develop diagnostic kits for detecting alien pests. Most recently, Warnex Incorporated of Montreal announced the commercial release of the Sclerotest™, a DNA-based system to detect scleroderris canker. The testing process, initially developed by CFS scientists at the Laurentian Forestry Centre in Ste. Foy, Quebec, allows for much faster detection of the fungus that causes the canker, and also allows users to differentiate the North American race of the fungus from the far more damaging European race, responsible for a devastating outbreak in Scandinavia last summer.

CFS scientists will continue their partnership with the Canadian Food Inspection Agency on invasive alien species, and to ensure international compliance with Canadian regulations for the use of dunnage and other wood packaging materials to ship products—a prime source of alien pest invasions such as the Brown spruce longhorn beetle attacking red spruce in Halifax.

Enhancing timber production is of no value if we cannot continue to market our wood and wood products. Concerns over the effects of forestry practices on the forest environment in Canada continue to grow here and around the world, and science must recognize and address these concerns. On a global scale, these concerns could limit market access for Canadian wood products, while domestic concerns over environmental degradation could mean a smaller land base available for forest management.

The CFS is pursuing a number of initiatives to add to our knowledge of both natural and anthropogenic disturbances on forest ecosystem productivity and dynamics, and continues to develop ways to synthesize and integrate knowledge gathered at the local, regional and provincial level into broad, accessible national data.

The second strategic direction for CFS S&T activities is to *position Canada to address global forest issues by supporting efforts to meet international commitments*. As a signatory to the Kyoto Protocol, Canada has made a commitment to join much of the world in taking action against climate change. The CFS is playing a major role in providing scientific support to the issue of climate change, from determining the role of forests in the carbon cycle to developing models to anticipate the impact of climate change on Canada's forests. In these and other climate change-related initiatives, CFS scientists are collaborating with the international science community through a variety of agencies, academic institutions and working arrangements between individual scientists.

CFS researchers are also involved in international studies aimed at developing new methods of monitoring forest health, detecting and controlling forest pests and advancing initiatives in support of Canada's status as a signatory to the Convention on Biodiversity. CFS researchers are advancing the science of seed storage and conservation as a means of preserving biodiversity, and perfecting DNA-based techniques for monitoring species and genetic diversity.

The third strategic direction is to *strengthen Canada's ability to measure progress toward sustainable forest management*. We need to know whether our efforts to develop and implement sustainable forest management techniques are effective, and we must be able to demonstrate this progress to

others. International agreements signed by Canada require this kind of reporting and, as mentioned earlier, the ability to show that forest practices are environmentally responsible is becoming a factor in market access. The CFS is playing a leading role in establishing the National Forest Information System, coordinating the development of the Forest Ecosystem Research Network of Sites (FERNS), and contributing to the design and maintenance of the National Forest Inventory.

Working with partners as diverse as the Canadian Space Agency and Weyerhaeuser Canada Ltd., CFS researchers continue to gather data and develop the statistical tools and models that will enhance our capacity to determine when significant changes are occurring in a forest ecosystem. Moving forward in this area strengthens Canada's position and influence in the Montreal Process to define and implement criteria and indicators that will likely form one of the main international standards against which sustainable forestry practices will be measured.

The CFS Science and Technology Business Plan recognizes that different people value the forests in different but no less legitimate ways. Sustainable development of the resource goes beyond ensuring the long-term viability of the forestry sector; it includes the other social and economic values Canadians assign to our forests. These are the so-called non-consumptive forest values like tourism, recreation and traditional subsistence.

To address these questions and meet the needs of these users of the forest, CFS research is developing better methods of assessing the economic and social impacts of forest management, as well as mechanisms for public participation to ensure these other voices are heard.

Our research partnerships are extending beyond what might be considered the traditional areas of forest science, to include social scientists and socio-economic specialists in other areas of government, the private sector and non-governmental organizations. This allows the CFS to integrate work in the social and natural sciences and apply that research to further our progress toward sustainable management.

Our work in this area has brought about an evolution in the way the CFS delivers its science information and knowledge. In addition to publishing for a specific scientific audience, the CFS is also developing ways to provide the results of its science in other forms.

Forest managers need to know how to apply the results of our research. The CFS is accelerating the process of synthesizing scientific data into technical guidelines and manuals that can be used by forest practitioners and communities with an interest in the forest resource. Through the CFS research networks, we continue to build effective partnerships between those who acquire the knowledge and those who put the knowledge into practice.

Our S&T efforts must also recognize the unique relationship that exists between the forests and Canada's Aboriginal peoples. Close to 80 per cent of Aboriginal communities are situated within commercially productive forest regions, and as the process of land claim settlements and treaty negotiations moves ahead, Canada's First Nations may become stewards of a significant forest land base.

The CFS continues to pursue the information-sharing partnerships that will allow Aboriginal peoples and communities the opportunity to develop greater technical and operational capacities to practice long-term, sustainable forest management in order to access to all the benefits the forest resource can offer. At the same time, First Nation peoples possess a considerable body of traditional ecological knowledge—knowledge that could make a direct contribution to reaching Canada's goal of sustainable forest development.

This kind of knowledge transfer cannot happen without respect for cultural differences regarding the way knowledge is gathered, recorded and communicated, and certainly not without respect for the custodial rights of First Nations to this knowledge. In collaboration with the National Aboriginal Forestry Association and other Aboriginal stakeholders, the CFS is assisting in the development of an Aboriginal research agenda that will reflect the values and specific community needs of Canada's First Nations.

Clearly, the scientific challenges attached to sustainable forest management are many, varied and complex. The CFS S&T business plan sets out an agenda for attacking these challenges in a directed and measurable way, with an emphasis on both immediate results and long-term impacts. In so doing, the S&T business plan reflects the commitment of the CFS to sharpen the focus of its research activities by making them more target-oriented and as relevant as possible to its clients, partners and stakeholders—including the people of Canada, who are demanding more of government S&T programs. The CFS must be able to demonstrate that its S&T results in solutions to problems, contributes to sound policy and regulations and meets public expectations of ethical conduct.

While the S&T business plan and the CFS research networks show a commitment to fulfilling this role, implementing the plan and ensuring the networks are as effective as they can be over the long term represents significant challenges for the CFS. In many ways, moving toward a more results- and product-oriented brand of science requires a change of culture at the CFS. To achieve this cultural change, not only the organization, but the people within it, must be willing to re-think and as necessary, re-define their approach as individual researchers.

There are other hurdles to overcome. The question of attracting and retaining the appropriate human resources must be addressed, and we must do a better job communicating the relevance of our science to audiences that may not be scientifically literate.

The CFS is going through a period of transition and renewal in order to position itself to better meet those challenges, to anticipate and prepare for the challenges of tomorrow, and to ensure its science is aligned closely with the priorities of the people and the Government of Canada. The process is not complete, but the first steps have been taken—steps that confirm the CFS has the intention and the capacity to fulfill its mission to promote sustainable development of Canada's forest resources, and in doing so, become a significant contributor to the building of Canada's national system of innovation.