The Ministère des Ressources naturelles, de la Faune et des Parcs publishes a quarterly *Newsletter from Québec – Forests* to inform the world community of its achievements in the forestry sector. The publication, dealing primarily with the various aspects of forest management in Québec, enables the Department to remain in contact with its partners abroad.

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Laval University's Experimental Road Site

(By Gaétan Potvin, Direction de l'assistance technique)

In 1999, a life-sized road laboratory was created on land owned by Laval University in the Montmorency Forest, some 60 km north of Québec City. The site, more commonly known by its French acronym SERUL, comprises a 1000-metre stretch of road and a number of related structures.

The site is divided into two trial sectors, each approximately 300 metres in length. The first is used for research into surfacing materials and techniques, as well as road surface maintenance and repair techniques. Its infrastructure comprises a conventional road platform (foundation and subgrade) ready to receive surfaces for testing. The aspects studied include placement techniques, reactions to loads and climatic conditions, and maintenance or repair techniques for different types of surfaces, both finished and unfinished.

The second sector serves as a base for research into road structures and their mechanical or thermodynamic reactions. Its infrastructure includes a 120-metre concrete channel in which a complete road structure, including the subgrade, can be built. The channel enables researchers to control the impact of water and frost on road surfaces.

An additional 100-metre sector has been constructed at one end of the channel, and is used principally to examine the impacts of different heavy vehicle loads and configurations. The infrastructure comprises a complete road structure, equipped to measure the mechanical response of a typical road to the dynamic and static impacts of heavy vehicles.

The laboratory's related structures include a bridge, culverts, a sedimentation tank, a building that houses the data capture and processing systems and a meteorological station, along with a cable network and junction boxes connecting the research instruments to the building.

A bridge has been built over a stream in the middle of the experimental road corridor. It comprises a wooden deck held up by steel joists resting on steel abutments. It was designed principally for structural research, but also serves as a weighbridge for heavy vehicles. Strain gauges under the joists are calibrated according to the load applied to the deck.

In the future, the SERUL laboratory will enable Laval University, its up-and-coming researchers and the project's partners to remain in the forefront of access road restoration techniques. It will also serve as a research tool for civil engineering, forestry engineering (forest operations) and geophysics projects.

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Forest Pathology Applied to Hardwood Forest Selection

(Abstract of a paper by Bruno Boulet, Direction de la conservation des forêts)

Selection cutting, which was introduced in the 1990s to replace diameter-limit cutting, is now practised extensively in tolerant hardwood forests. The area of public land subjected to selection cutting has grown steadily over the last decade; a total of approximately 660,000 hectares of forests were treated in Québec in the period 1990 to 2000.

If selection cutting is to increase the value of the forest, it is important to start by harvesting the trees that will die before the next logging operation, i.e. over the next 20 to 25 years. Salvaging wood going to waste is the principal focus of selection cutting, which is designed to maintain or improve hardwood production in the long term.

Controlling Rot

Forest engineers issue silvicultural prescriptions on the basis of the forest survey data at their disposal, and they must always consider the disastrous consequences of certain diseases, such as white canker rot, or *Inonotus glomeratus*.

Tree markers often cannot see evidence of rot, and as a result the volume of lumber that the forest contains or is able to produce in the long term may be over-estimated, especially if there are a lot of diseased trees. It is therefore extremely important to be able to identify healthy trees, which must be saved at any cost, and then mark the hauling trails accordingly.

Hauling trails must be positioned far enough from the healthy trees to avoid damage during transportation of wood from diseased or defective trees. Wood going to waste should always be harvested first, since it will die before the next logging phase.

Intermediate stage

Advanced stage

Figure 1 – In maple and beech trees, the *Inonotus glomeratus* fungus causes a canker-like rot that compromises their value as lumber, in less than 20 years.

Not all fungi have the same impact on the trees in terms of lumber degradation. They must therefore be assigned different values, reflecting their consequences for tree growth in the long term.

A new tree classification system, based on flaws and evidence of internal abnormalities, has been created to ensure that the trees most likely to die or deteriorate before the next logging phase are harvested first. The system has been tested, and the experimental field data are both reliable and verifiable.

Training for Tree Markers: A "First" in Québec

Tree markers decide which trees should be cut and which should be left standing. They often have very little experience, and their training is usually deficient. At the same time, the current tree classification system leaves a great deal of latitude for interpretation, and is not conducive to good quality work aimed at sustainable forest management. To recognize the trees that will die or deteriorate in the coming years, markers must be able to correctly interpret flaws and other significant indicators that may conceal discoloration or rot.

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The severity of the damage caused by rot fungi depends principally on the origin and type of the defect, the level of vulnerability of the species in question, and the vigour of the individual tree. All this information is required to identify indicators of deterioration and to assess the threat to both the diseased trees, which need to be harvested, and the remaining trees, which need to be released and protected.

A specialized training course for tree markers has therefore been launched, in cooperation with certified educational institutions. The initiative is part of a plan of action designed to restore hardwood forest yields.

Tree marking is a key step in selection cutting. The expertise of the markers will certainly help maximize wood salvage operations, but a number of challenges still remain. Given the steadily rising cost of supplying the mills with high quality timber, it will be important, in the future, to pay more attention to the logging mechanization stage, so that crop trees can be protected, and to the processing of rough wood, so that higher product values can be achieved.

Sound forestry practices help not only to minimize timber losses in the short term, but also to maintain as productive a green capital as possible, so that supplies of timber from the most popular hardwood species can be sustained in the longer term.

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Non-Timber Forest Products (NTFP)

(By Mélanie Turgeon, Direction du développement de l'industrie des produits forestiers)

The FAO (Food and Agriculture Organisation of the United Nations) defines non-timber forest products (NTFP) as goods of biological origin, other than timber, obtained from forests, other woodlands or individual trees.

NTFP can be divided into four categories:

- **Food products**, including wild fruit, mushrooms and maple products;
- **Ornamental products**, including Christmas trees and Christmas wreaths;
- **Pharmaceutical and nutraceutical products**, including Canadian yew, ginseng and fir gum extracts;
- **Manufactured products and materials**, including essential oils, resins, alcohols, etc.

According to Forestry Canada, the current annual commercial value of non-timber forest products in Canada is approximately $440 million, divided as follows:

- $140 million for wild fruit,
- $120 million for maple products,
- $100 million for commercial wild mushrooms,
- $50 million for medicinal plants,
- $30 million for ornamental plants
- and $1 million for essential oils.

Approximately 600 non-timber forest products appear to have commercial potential in Canada. Their development could lead to the creation of between 100,000 and 200,000 jobs throughout the country, mostly in rural areas.

Québec has plenty of undeveloped resources. The essential oil and medicinal plant sectors appear to have the best potential from an economic standpoint. A number of NTFP research and development projects are currently underway in Québec.

The forests still contain many unknown or undeveloped resources. The NTFP industry therefore offers excellent potential for new product development. As an industrial sector, it is still at the emergent stage, and the 21st century will perhaps bring a new form of wood chemistry, a kind of "xylochemistry", on which a whole new industry can be built.

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Canadian yew extract is just one of the pharmaceutical and nutraceutical products manufactured in Québec