Forest Research in Québec

Current Advances and Perspectives

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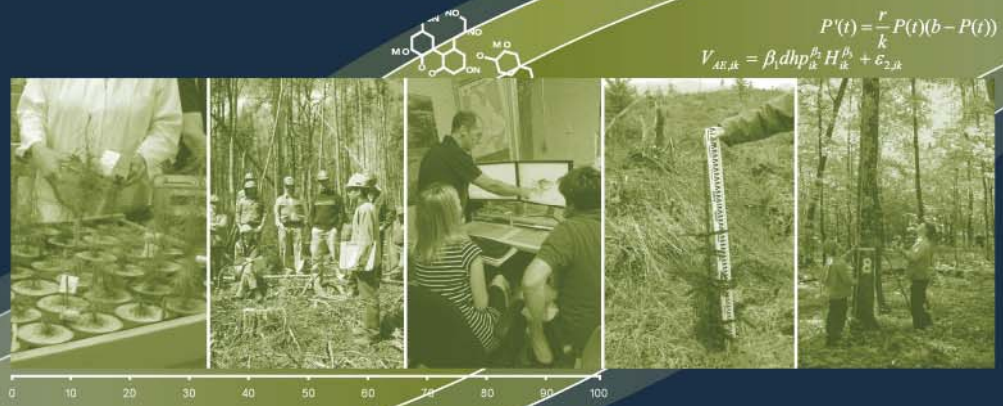
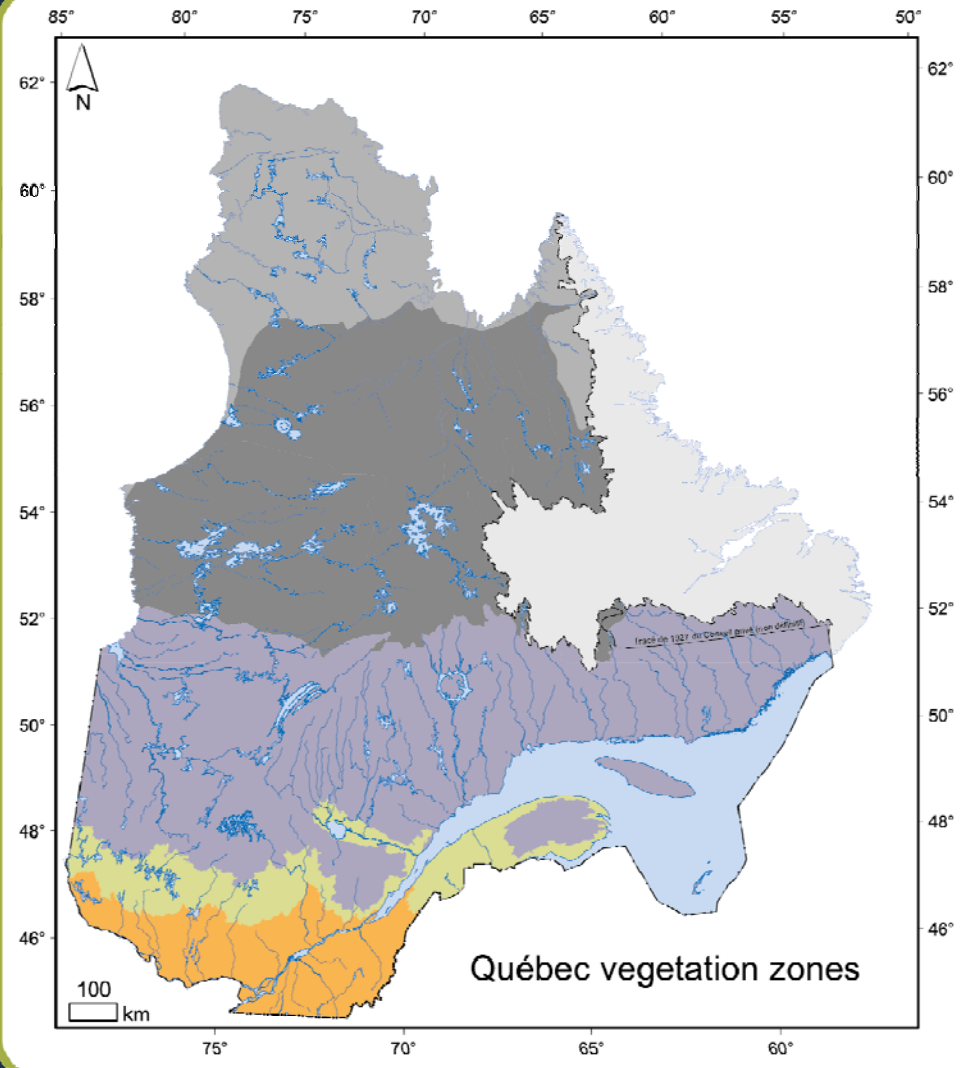


Ressources naturelles et Faune
Québec

Québec Forests – *A brief overview*



Arctic zone

Shrubs and herbs tundra (north of treeline)

Boreal forest

Open boreal forest (taiga and forest tundra transition zone)

Continuous boreal forest (balsam fir and black spruce,...)

Temperate forest

Mixedwood forest (yellow birch, balsam fir,...)

Hardwood forest (sugar maple, yellow birch,...)

DIRECTION DE LA RECHERCHE FORESTIÈRE

Ressources naturelles et Faune
Québec

Québec Forests – *A brief overview*

Some indicators

- Commercial forest area: 591 550 km^2
  - Public forested land (82%)
  - Private forested land (18%)
- Standing volume: 70% softwood - 30% hardwood
- Allowable cut: 44M cubic metres
- Annual managed area (0.56% of public forest land)
- Plantation (160M seedlings planted / year)
- + production of maple syrup, blueberries, Christmas trees, essential oils…

Québec Forests

How forest research is structured

Forest research by the provincial research branch is mainly applied research, linked to the forest management responsabilities of the Québec government. It plays an essential role, derived from the new Forest Act (adopted in March 2010) and aimed to answering questions that arise from the application of sustainable forest management.

Québec Forests – *Research fields*

Over the last 40 years, Québec has realized important scientific progress in a number of fields with the aim of supporting its forest management strategies.

Among them:

- Tree improvement
- Tree seedling production
- Forest plantations (reforestation)
- Biodiversity, including genetic diversity
- Silviculture of natural forests and plantations
- Forest ecology
- Environmental stresses
- Forest growth and yield models
- Climate change

Québec Forests
Some current advances

Tree Improvement

- First generation of genetic selection is almost completed for the main commercial species used in reforestation
- Second generation of tree improvement is currently in progress

Québec Forests
Some current advances

Forest Plantations

- Conditions for successful forest plantations are defined at all ecological levels
- Production of biological material for fast growing species plantations is developed (poplar, larch, white spruce)

Québec Forests
Some current advances

Biodiversity

- Evaluation performed at the landscape level to maintain attributes of natural forest composition and structure
- Information obtained at the stand level to maintain floristic and genetic diversity

Québec Forests
Some current advances

Silviculture

- Silvicultural treatments adapted to a variety of forest types and site conditions in order to maintain natural forest conditions and attributes
- Several results obtained from long-term research in silvicultural treatments aimed at improving yield, quality of forest products and economic metrics

Québec Forests
Some current advances

Forest Ecology

- Classification of Québec's forest types in relation to natural dynamics and site productivity

Environmental Stresses

- Effects of acid precipitations on forest health and stand productivity
- Great success obtained for defining policies of acidic emission reductions with our Canadian and US partners over the last 2 decades

Québec Forests
Some current advances

Forest Growth and Yield Models

- Growth models developed at the tree and stand levels to support sustainable forest management objectives
- Yield models developed for both single and multiple rotations are used to determine the annual allowable cut
- Yield tables for plantations, including thinning effects

Québec Forests – *Future direction*

Tree Improvement

- Focused on the development of genetic markers to accelerate the process of tree improvement for commercial species used in reforestation (mainly softwoods)
- Development of the second generation (and third generation in some cases) of tree improvement, with provenances adapted to Québec's most abundant ecosystem types

Québec Forests – *Future direction*

Tree Seedling Production

- New challenge of producing clonal stock from advanced techniques of somatic embryogenesis
- Maintaining water quality in forest nurseries by prevention of fertilizer leaching

Forest Plantations

- Perceived as a means to increase forest productivity and also to decrease harvesting pressure in natural forests
- Special attention is given to planting fast growing species under short rotations (15 to 25 years)

Québec Forests – *Future direction*

Biodiversity

- Québec has adopted a new forest regime by which forest management and practices will help in reducing the gap between man-made and natural forest dynamics (nature-based silviculture)

Silviculture

- Challenge of moving from total to partial-cut harvesting, view as a means to mimic some natural disturbance processes (ecosystem-based management being deployed over the territory)
- Intensify silviculture and implement highly productive plantations on parts of the most productive sites

Québec Forests – *Future direction*

Climate change

- Study potential impacts of future climate on:
  - Forest adaptation and composition
  - Soil fertility and forest productivity
  - Forest disturbance (fire cycle, insect outbreaks and diseases)
  - Forest renewal by natural processes and assisted migration of species
- Promoting silvicultural treatments that will help adaptation of forests to climate change
- Conservation of genetic diversity by the development of new techniques to maintain viable seed banks (long term conservation)

Future of Forest Research
A more complex environment

- Forest management and forest research are both evolving in a more complex environment.
- Development of forest management needs to be based on new knowledge from the scientific community – however any progress in forest management is more complex due to social, economic and environmental issues.

Future of Forest Research
From a Forest Management Perspective

- Local community needs from the forest are more diversified – wood production is no more the only concern
- Adaptative forest management practices need to be implemented
- Better knowledge of the numerous ecosystem functions is required by forest managers to support sustainable forest management objectives
- Society is asking for accountability for sustainable forest management
- Forest managers need results from long-term forest research in order to help reduce uncertainty for public financial investments in forests

Future of Forest Research
From a Forest Research Perspective

- Forest research managers need to increase and diversify their research capacities in order to address new needs and expectations from communities while maintaining a proper balance between environmental functions and production of a diversity of products…

  …in a context of global change !
- Studies aimed at valuing multiple functions and uses are needed; such studies pose both conceptual and empirical research challenges

Future of Forest Research
From a Forest Research Perspective

- At the same time financing research activities becomes more and more difficult. As a potential solution to this paradox, Québec is paying more attention to :
  - better defining research priorities
  - developping more efficient research activities by linking researchers and practioners
  - defining new forest research partnerships.

Conclusion

Forest Managers and Forest Research Managers need to be closely linked – One of the main driver of the new Québec Forest Act

Collectively, we intend to:

- Develop new knowledge that will help decision-makers.
- Develop new knowledge that concur to improve the contribution of the Québec forest sector at an international competitive scale.