



## Climate Change: On the Road to Mitigation

Climate affects forests, and vice versa. Since the beginning of time, the Earth's climate has regularly undergone changes. However, changes seem to be occurring more quickly today than ever before. Researchers with the Canadian Forest Service (CFS) and the Université du Québec à Montréal (UQAM) are studying the impact of climate change on forest productivity and fire frequency. Based on these new findings, forest managers will be able to implement mitigation measures.

### Getting hotter in the north?

Because of the global warming predicted in climate change scenarios, many researchers are now expecting increased forest growth at northern latitudes. However, recent CFS research has rather shown that the global warming predicted to occur by the end of the 21st century would result in decreased productivity in Canadian black spruce forests, despite lengthened growing seasons.

Although temperature change opens the possibility for improved growing conditions in northern Canada, it seems that any such positive impact is quashed in southern Canada's black spruce forests, notably by a decrease in available soil moisture, which is essential to growth. Researchers are also predicting an increase in plant respiration in these forests, which would redirect a portion of the energy destined for growth and thus increase the negative impact of higher temperatures on growth.



Photo: A. Terrier, UQAM

Furthermore, an increase in atmospheric carbon dioxide has a fertilizing effect on trees, but this effect is clearly insufficient to counter the negative impact of high temperatures. This research

increases our understanding of the impacts of climate change on the carbon balance and, with the help of these findings, forest managers will be able to implement mitigation and adaptation strategies.



# Branching Out

from the Canadian Forest Service - Laurentian Forestry Centre

## Seeing the forest for the trees

Similarly to forest composition, climate change affects forest fire frequency; in the boreal forest, climate change would increase the occurrence of fires. The introduction and increase of the proportion of deciduous trees in coniferous stands could be an effective strategy to counteract this increase in fire frequency by decreasing fire intensity and spread rate.

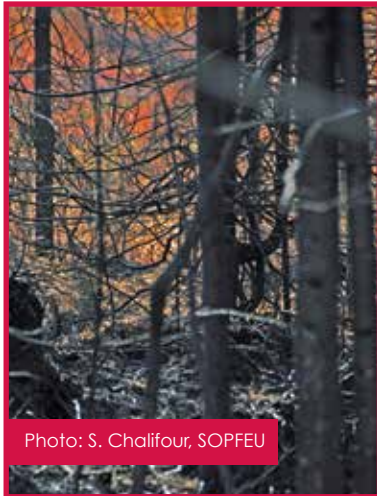


Photo: S. Chalifour, SOPFEU

In order to validate this assumption, CFS and UQAM researchers have developed a model that includes fire frequency, weather conditions and forest composition, and they applied it to the boreal forest under different climate scenarios between 1971 and 2100. The researchers showed that the densification of deciduous trees in stands dominated by softwood could decrease fire intensity and spread rate. The annual increase rate of the proportion of deciduous trees varies by region, i.e. between 0.1% and 0.2% annually for the southern portion of the boreal forest

(which essentially covers the managed forest) and between 0.3% and 0.4% per year for the northern portion. Although these values vary based on the climate scenario, this would be enough to maintain burn rates at current levels.

Implementing mitigation solutions is a complex task, notably due to the sheer size of the boreal forest. In the southern portion of the forest, the objective will be easier to meet as forest activities already tend to increase the proportion of deciduous trees.

However, some management practices could be detrimental to risk mitigation efforts. These practices include reforestation using only softwood in non-forested moors and practices aiming to maintain significant proportions of conifers in order to maximize harvesting. These practices could even result in increased burn rates and should be used with caution.

Forest planning must consider the possible impacts of a reduction in volume due to fire and of decreased growth due to global warming.

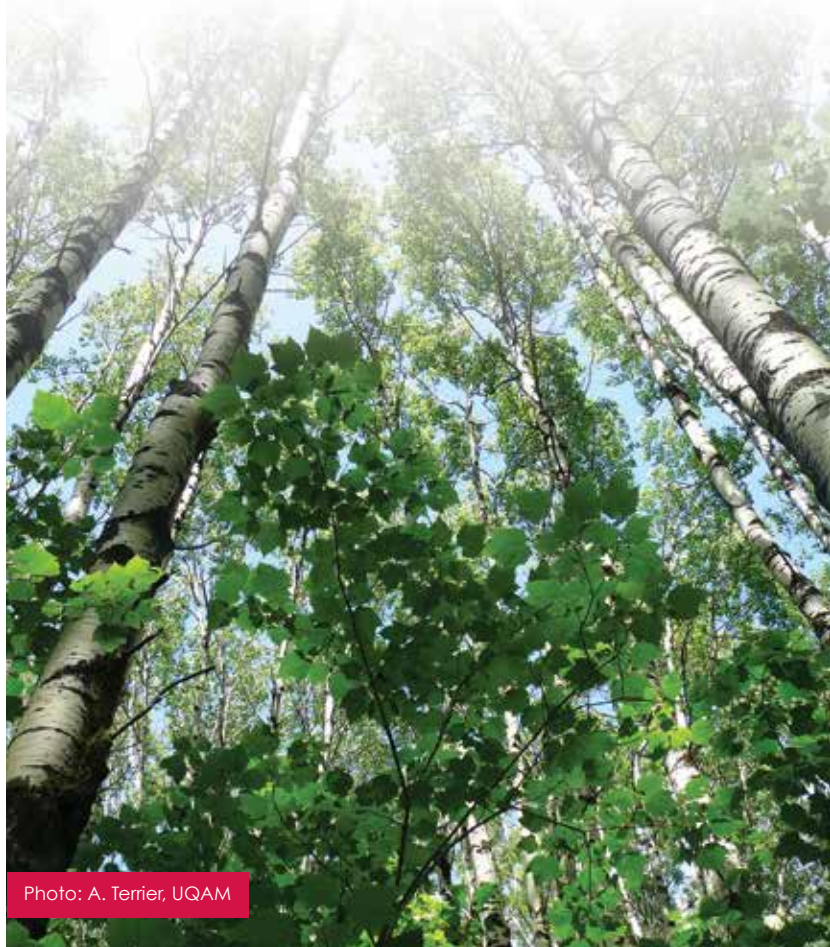


Photo: A. Terrier, UQAM

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