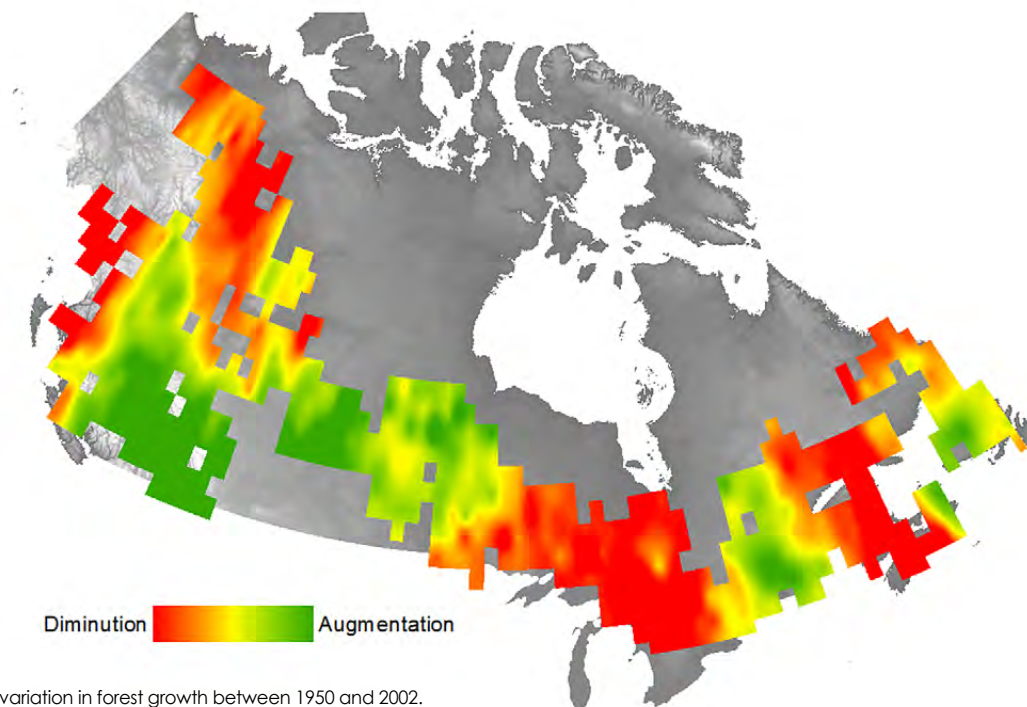


## Canadian Boreal Forest Growth: Half a Century of Stability

Global warming forecasted by climate change scenarios and the increase in carbon dioxide (CO<sub>2</sub>) atmospheric concentration have led many researchers to predict an increase in forest growth at northern latitudes. Are these changes already visible? This is the question that researchers at the Canadian Forest Service (CFS) set out to answer based on meteorological data and Canada's National Forest Inventory data covering the period from 1950 to 2002.



Spatial variation in forest growth between 1950 and 2002.  
Credit: NRCan

Tree growth is accompanied by an increase in the aerial biomass of the tree. Stem growth has varied since 1950. Researchers at the CFS, in collaboration with European researchers, studied this variability by analyzing the growth rings of 19 tree species (13 conifers and 6 deciduous) from the Canadian boreal forest. Remarkably, they have produced the very first a Canada-wide map of climate change impact on forest growth.

### Pluses and minuses

Researchers found that while there has been no overall homogeneous trend in growth across the Canadian boreal forest, both positive and negative growth trends are clearly visible by region and by species. Thus, we see slower a decrease in white spruce and black spruce growth in the Canadian northwest. In the maritime forests of the Atlantic, a decline in growth has been observed

in black spruce, while in the eastern portion of the Boreal Shield, these declines occur in black spruce, white cedar, and jack pine. By contrast, in the forests of western Canada, growth rates were observed to increase in the Rocky Mountain fir, lodgepole pine, Douglas fir, and western hemlock.



# Branching Out

from the Canadian Forest Service - Laurentian Forestry Centre

Tree growth varies according to climate factors and atmospheric CO<sub>2</sub> concentration levels. Despite the fact that CO<sub>2</sub> promotes tree growth, the increase in summer temperatures offsets this effect by reducing the quantity of water available in the soil. These observations demonstrate how ecologically sensitive the Canadian boreal forest is to changes in the hydrological cycle regime.

## Water: a source of stability

The relationship between climate and growth shows that the effects of variation in water availability on growth in the Canadian boreal forest have intensified at the end of the 20th century. The rapid increase in summer temperatures has had a negative impact on this availability.

Our limited understanding of the mechanisms that influence forest growth and the response to environmental changes leaves much unexplained as to the role of the circumpolar boreal forests in the global carbon cycle. These analyses help us gain a new understanding of the ecosystem's growth reactions under the effect of climate change.

Trembling aspen and white spruce in the understorey. Photo: NRCan



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