

PRIMARY BOREAL FORESTS

PRIMARY BOREAL FORESTS PROVIDE CRITICAL STORES OF CARBON, BIODIVERSITY AND FRESHWATER



Carbon

Boreal forests store about 65% of the world's forest carbon, which is mostly held within the soils.

- > The cold, wet, environment slows decomposition on the forest floor, leading to thick layers of moss and litter, and soils that can be meters deep **storing ~85% of the ecosystem's carbon**. Due to climate change, these regions are becoming warmer and drier, meaning that the amount of carbon these ecosystems can store will likely be lower in the future.
- > Permafrost is soil that remains frozen throughout the year, preventing decomposition and **storing large quantities of carbon**. In a warming climate, permafrost will thaw, emitting methane and carbon dioxide.
- > Peat is partially decayed vegetation often found in the fens and bogs of the boreal forest, where the water-saturated soils prevent full decomposition, and **stores 270 billion tonnes of carbon** across the boreal forest.
- > Carbon storage within the soils of the boreal forest has a **turnover rate of approximately 50 years**, which is more than twice as long as that in temperate or tropical forests.
- > Fire is a natural part of this ecosystem and is necessary for the regeneration of several important tree species. However, **climate change is leading to higher frequency and severity of these fires**.
- > **Clear-cut logging does not mimic wildfire**. Fires do not combust tree boles, and the resulting dead standing trees and woody debris are longer-lived than most sawn timber products by at least a factor of two.

Boreal forests are home to 481 Million hectares of remaining primary forest, or 41% of the global total

Big, Old Trees

Large trees are critical to maintaining biodiversity, and are being lost due to harvesting and other anthropogenic impacts.

- > Southern boreal forests typically have trees **15-30 m high**, while northern boreal forests have stunted trees usually **3-15 m high**.
- > Old trees are **critical for the growth and abundance of epiphytic lichens** on their branches, which can decrease by a factor of 6 in managed forests.
- > Old, dead trees, both standing and on the ground, **provide diverse habitats** that are important for many species of birds, fungi and insects.
- > **Logging and other anthropogenic disturbances homogenize the landscape**, leading to an abundance of young forests and a scarcity of older forests, while removing much of the dead wood, and render the forest vulnerable to human-ignited fires.

Biodiversity

The diverse ecosystems, flora and fauna within the boreal forest, contribute to the ecosystem services this biome provides.



- > **US\$703 billion of services** per year in Canada alone.
- > **60% of the world's remaining surface freshwater** is stored within the boreal forest, and the wetlands purify this water, filtering out contaminants.
- > **Provides important breeding ground** for birds from further south, and important for almost half of all North America's bird species.
- > **Maintaining biodiversity leads to higher levels of ecosystem services** such as carbon storage, berry production and game populations.
- > **Many indigenous communities are dependent** on the ecological integrity of old growth boreal forests for medicinal plants, cultural practices and traditional livelihoods.
- > These ecosystem services are likely **at risk under the warming climate**.