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The Physical Environment

Many characteristics of the boreal forest are affected by the physical environment in which they are found. Three major components of the physical environment that shape the boreal forest include landscape and soil type, climate, and water systems.

Geology, Soils, and Landscape

Boreal forests are found on land shaped by the movement of glaciers. In the Alberta boreal forest lowlands, dominant landscape features include accumulations of sediment deposited by glacial rivers and lakes. These sediments lie overtop of deeply buried bedrock, although bedrock outcrops can be found along major stream valleys (Heritage Community Foundation 2008).

Soils in the boreal forest are typically **podzols** (from the Russian word for “ash”), gray soils that are thin, acidic, and poor in nutrients. These soils lie beneath a mat of coniferous tree needles and other organic material that accumulates due to the slow decomposition rates and limited soil microorganism activity that occurs in the cold climate. Tannins and other acidic compounds from this layer cause the upper layers of soil to become acidic (Lakehead University 2007). Podzols are formed when precipitation exceeds evaporation, and nutrients, minerals, and organic matter are leached by downward-moving acidic water from the upper soil layers. These soils are unsuitable for agriculture, but can support numerous species of trees, shrubs, and other plants that have adapted to these soil conditions.

In Alberta, the boreal forest region ranges in elevation from about 150 m, near the Alberta-Northwest Territories border, to over 1,100 m near the Alberta-British Columbia border. The most common landforms include level to undulating plains with extensive wetlands, while hummocky landscapes, high-elevation plateaus, and dune fields are also found (NRC 2006).

Climate

The boreal forest is characterized by long, cold, and dry [winters](#), and short, warm, and moist [summers](#), with approximately 50 to 100 frost-free days per year (Lakehead University 2007). During the growing season, so much carbon dioxide is absorbed by the forest from the atmosphere that global carbon dioxide levels drop during this time (UCMP 2006). During the inactive periods when the forests are not growing, this carbon remains stored in wood, soils, and forest peatlands (muskeg), making these important carbon sinks. As a result, the boreal forests are an important factor in global carbon dioxide levels and climate change (NRCAN 2004). For more information on climate in the boreal forest region, click [here](#).

Water Systems

More freshwater is found in the lakes, rivers and wetlands of the Canadian boreal forest than any other place on earth (DUC 2008a). The extensive network of [wetlands](#) is characteristic of the boreal forest, and plays an important role in water filtration, flood and drought control, and carbon storage. Wetlands support a unique community of vegetation adapted for life in water-logged conditions, and also provide habitat or other resources for numerous species of birds, fish, and other animals.



Boreal forest in the Athabasca River basin.
Source: Hatfield Consultants 2008
(click to enlarge)

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