Canadian Great Northern Boreal Forest: Geographic Distribution, Biophysical Processes And Consequences Of Environmental Change

Describe the geographic distribution of the forest. (map essential)

Worldwide, Boreal forests cover around 12 million km squared and account for about 1/3 of the planet's forests. The forests are found between 50° and 60° north just south of the Arctic Circle., the boreal forest stretches over the northern hemisphere in a band across Canada, Alaska, Russia, and Scandinavia.

In Canada the great northern forest occupies about 35% of Canada's total land area, stretching across the country from the Yukon Territory to Newfoundland and Labrador. The forest goes in a semi-circle like a shape showing the effect of the arctic circle and the curve of the earth. The Rocky Mountains dominates the left side of Canada however the boreal forest continues to run in certain areas of the Rocky Mountains.

Canada's boreal forests encompass thousands of lakes and ponds such as the Great Slave Lake and Lake Athabasca, the lakes surrounded by the boreal forests holds more surface freshwater than any other place on Earth. There are several highways going through the Boreal forest region such as the Mackenzie Highway and the Bicentennial highway. The boreal forest is the largest ecosystem in Canada and accounts for almost 25% of the world's remaining intact forests.

The distribution of the Canadian boreal forest has changed through the years responding to changes in climate and the movement of large ice sheets.

Explain the biophysical processes essential to its functioning (cause and effect)

The Canadian Boreal Forest is just south of the Arctic Circle and therefore experiences extreme summers and winters. These provide significant troubles for animals and plant life living there. Therefore, they have had to adapt throughout time and has resulted with unique characteristics not seen in any other forests in the world. The animals have thick fur coats which enable them to stay warm during the winter. They also have adapted to eat very different types of food especially during winter where food is usually scarce. The animals hibernate during winter creating fat reserves that can be utilized in the winter, this is done through eating as much food as they can. The animals' thin legs are used to enable them to move easily through the snow and their larger size than the same animals found in other forests, helps them conserve heat.

The Canadian great northern forest is a Taiga Biome and therefore has very wintry climate making it less diverse in plant life than many other biomes. Taiga Biomes predominantly contain plants that are conifers, these conifer trees have adapted to the cold and have needle leafed, waxy coated leaves instead of leaves. The trees are evergreen; therefore, they do not need to

grow new needles after winter and when the weather warms, they can take advantage of the brief summer, allowing conifers to avoid wasting energy by growing leaves in the spring. The trees also have a cone like shape to prevents them from collecting heavy snow on them. The needle like leaves always conserve water which is vital for when the ground is frozen. The lack of biodiversity is shown as few species can survive the winter when the soil moisture is frozen.

When needles from the conifers fall on the forest floor, they decay and produce highly acidic soil. This soil makes it difficult for many taiga biomes plants to thrive. A few shrubs, blueberries, and deciduous trees such as oaks, birches and alders which shed their leaves, can be found in warmer and wetter parts of the boreal forest. Some plants are carnivorous and eat insects in order to make up for the nutrient lacking in the soil. However, mosses, fungi and lichens are more common than flowers and undergrowth in heavily forested areas.

Analyse the causes, extent and consequences of environmental change upon the forest. (identify components, draw out and relate implications)

Canada has had a higher rate of global warming than most other regions of the world with average temperatures in Canada already increasing by 1.7 degrees Celsius since 1948. This has led to the melting of permafrost and ice in the artic, sea-level rise and more frequently and severe extreme weather, uncommon heat extremes and major changes in precipitation.

With the quick temperature climate rise, boreal forests are known to be especially sensitive to climate change as the ecosystems are naturally sensitive to warming because of the nature of their soils. Significant ecosystem changes such as events happening earlier, migration and mating in animals, and blooming in plants have all been observed. Evergreen tree species' such as conifer trees may be replaced by deciduous trees such as Oak and Birch trees that can tolerate warmer climates. This is already evident in certain warmer areas of the Great Canadian Forest where there are more deciduous trees than conifer trees.

Boreal forests also store 338 Pentagrams or 338 billion metric tonnes of carbon below the forests. In some regions, boreal forests grow on permafrost providing stability to the root systems of these trees trapping the carbon in the soil. As the boreal regions warm, the permafrost melts, affecting tree stability, acting as a release of carbon and other greenhouse gases into the atmosphere.

Permafrost is ground that remains frozen for two or more years consecutively. Permafrost can be from 1 metre to 1500 metres thick and is found under a layer of soil. Permafrost stores carbon-based remains of plants and animals that froze before they could decompose. It is estimated that the world's permafrost stores 1,500 billion tons of carbon with almost 25% being in Canadian soil. Through the rise of the climate in the northern hemisphere, scientists are afraid that permafrost will thaw, if it continues melting the temperatures will rise and will gradually keep rising through more melting of permafrost.

Deforestation in Canada is a lot less of an issue than climate change. Deforestation in Canada is one of the lowest areas deforested in the world. In 2010, the annual deforestation rate in Canada was less than 0.02% of the world's forests. The rate has been declining for over 25 years, in 1990, 63,100 hectares were lost due to deforestation, this was almost halved in 2014

with only 34,200 hectares being lost. In 2019 Canada’s 348 million hectares of forest land represents 9% of earth’s forest cover and accounts for only 0.3% of global deforestation. This has been done through Canada’s management of boreal forests and is a world leader in sustainable forest management. To do this Canada works with agricultural and resource development in order to balance conservation objectives, to ensure that the 2.5 million Aboriginal people and Canadians can still rely on the forests for economic stability.

Although there is very little deforestation this does not mean there is no timber harvesting and logging. Timber harvesting and logging is a very significant part of the Canadian economy and the timber harvesters must ensure that forests can continue to provide timber by remaining under sustainable limits. Between 1990 and 2017, Canada's wood supply has remained relatively stable, decreasing slightly to maintain sustainability through forests.

An evaluation of the management of the forest. (make a judgement based on criteria)

Inserting image...The Canadian Great Northern forest has been managed significantly well in an environmental and economical aspect. The Great northern forest of Canada has many animals in their regions which are facing the risk of extinction mainly through, climate change, the loss of forest and grassland to cities and agriculture, Hunting, and the pollution of lakes. A selection of Endangered species of plants and animals in Boreal forests in Canada include, the Wolverine, Grizzly bear, Whooping Crane, Methuselahs Beard Lichen, Woodland Caribou, and the Lady’s Slipper Flower. The Canadian government has been encouraged to protect these species’ through the support of inhabitants of Canada

The forest receives management funding through the Canadian government. With a CAD $175 million commitment to supply funding to 67 conservation initiatives, Canada shows its sustainability and healthier future for the boreal forest creating the protection of some of Canada’s treasured landscapes. The boreal forest is important as its habitats unique wildlife such as the boreal caribou and pine marten. The forest also has cultural meaning as it has been the home for Indigenous Peoples for thousands of years. The forest stores more than 12 percent of all carbon in its soils and plants being a significant impact against climate change. This announcement is a necessary step towards the protection of forests for the benefit of the government, the inhabitants of Canada, and the rest of the world.

The Non-Government Organisation, Greenpeace, has been aiming to stop the rate at which the Canadian boreal forest is deforested. After 7 years of campaigning, Greenpeace have announced their success with the creation of an agreement between Greenpeace and other campaign groups and logging companies that announces the protection of areas of the country’s boreal forest.

With the stopping of deforestation and logging in areas of the Canadian boreal forests this will allow Potential alternate Benefits for the government. More Tourism will be able to be done through less logging with tourists wanting to do Outdoor sports such as Hiking, swimming, canoeing, and sightseeing of beautiful lakes, rivers and lanscapes. This will allow financial benefits for the Canadian government. The government will also receive carbon credits overtime if they show their levels of carbon being released beginning to decrease.

Canada uses three systems to ensure sustainability. Within months of the introduction of the internationally recognized forest certification programs, Canada had 170 million hectares certified to at least one of the three programs. All three certification programs promote principles that are the basis of sustainable forest management around the planet. The use of the verification is to ensure consumers that the products that they are buying are coming from well managed forests, this system is essential and supplemental to government regulations.