

Climate Change

Climate change is a significant and lasting change in weather patterns over long periods of time. Although this phenomenon is a natural process, the earth's climate has become warmer than it normally would have since the start of the industrial revolution. This unnatural warming, which began in the late 1800's, is often referred to as 'Global Warming', which is the direct result of greenhouse gases.

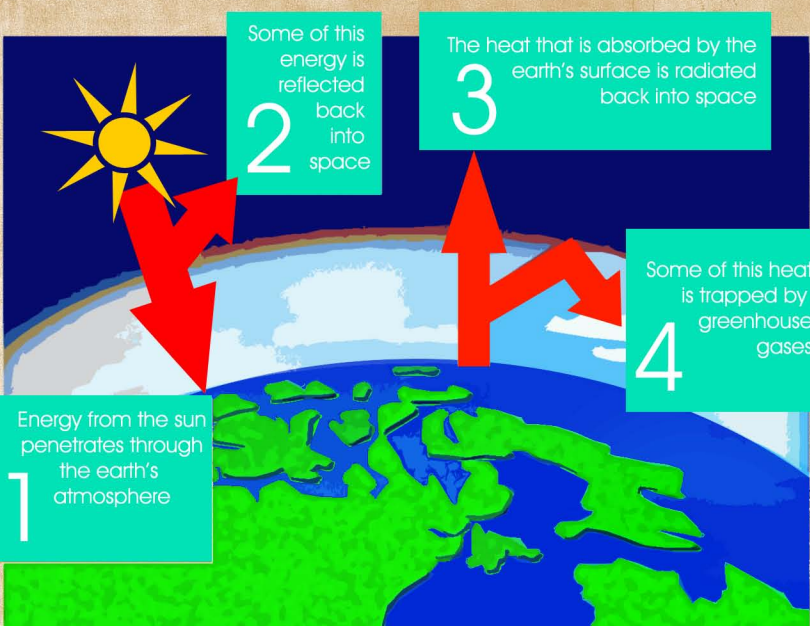
Greenhouse gases keep our planet warm by absorbing and emitting solar radiation that makes its way into the earth's atmosphere. This process is the cause of the 'greenhouse effect'. The greenhouse effect is natural, and keeps the earth's temperature at 30°C warmer than without it. However the earth is a lot warmer than it should be naturally, and this is a result of increased greenhouse gases in the atmosphere because of humans. Greenhouse gases are released during many common day activities. One gas in particular that has received a lot of attention is carbon dioxide, a major bi-product of burning fossil fuels, such as natural gas, oil and coal. Other common greenhouse gases include methane and nitrous oxide.

5 Major Greenhouse Gases

Water vapour
Nitrous oxide
Ozone
Methane
Carbon dioxide

Global Carbon Cycle

The global carbon cycle is a unique balance between forests, soils and oceans. Forests soak up carbon during photosynthesis and also release carbon during decomposition. Oceans and soils work in the same way, by absorbing carbon but also releasing carbon. All of these factors have been balanced for thousands of years.



Main Contributors to Increased Greenhouse Gases

Humans release an enormous amount of greenhouse gases every year. Human activities alone can have an impact on the levels of carbon in the atmosphere, as do land use decisions.

Burning of fossil fuels

We burn fossil fuels to run machines on a daily basis to produce goods. We transport goods around the country and globally. All of these actions release an enormous amount of carbon into the atmosphere.



Deforestation and Land Conversion

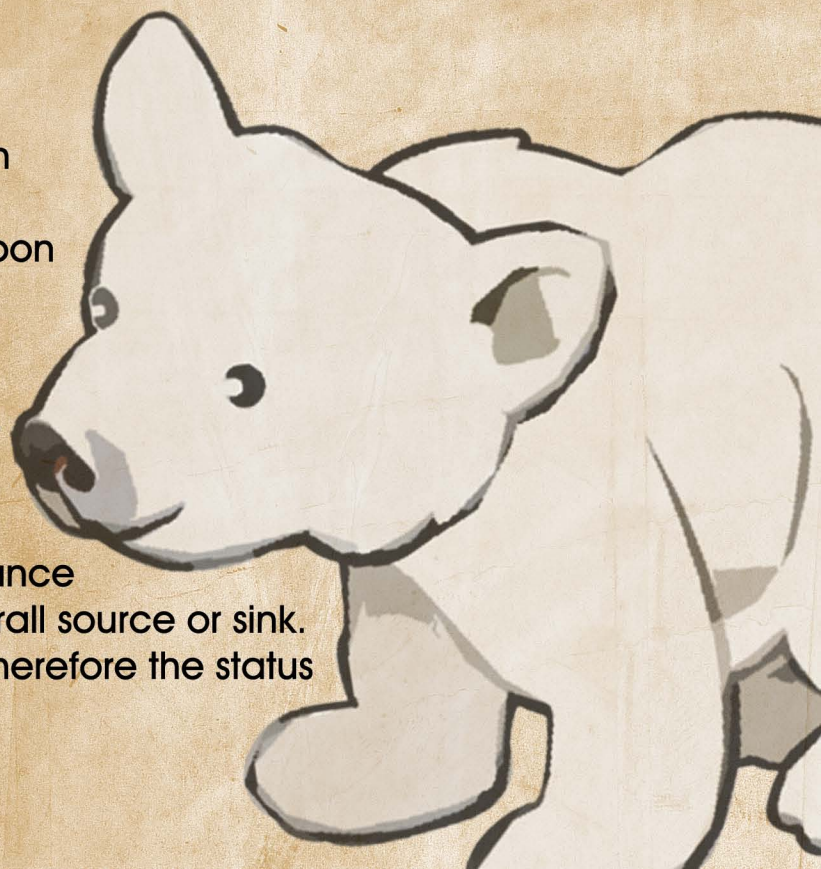
Forests help to remove carbon from the atmosphere through photosynthesis. When a forest is removed without replacing a new one, this is deforestation. When this occurs, it removes the potential for that forest to absorb carbon therefore increasing the carbon in the atmosphere. Converting land to a different use from a forest also removes the potential of that forest to absorb carbon.



What role do forests have in climate change?

Forests are a main part of the global carbon cycle; however they alone are unable to mitigate the increased levels of human carbon dioxide emissions in the atmosphere.

Forests can act as both sources and sinks in the global carbon cycle, and this can differ within a forest with some areas releasing carbon (source) at a quicker rate than they are absorbing (sink). It is the overall net balance that determines whether the forest is an overall source or sink. Also, forests can shift from sinks to sources; therefore the status of a forest is always changing.



Impact to Forests

Continued global warming in the future is expected to have significant effects on the health and distribution of forests, especially in Canada, where average annual temperatures in northern Canada are estimated to increase by up to 5°C.



Stress

Future warming and increased drought will introduce new and increase current stresses to native trees in Canada. These stresses will increase the susceptibility of the forest to attack from pests and disease, threatening the future health of forest stands. These stresses may make forests less resilient, and benefit tree species that are more aggressive. In many cases, aggressive species are not native to these forest regions. This means that species composition may change in forests, with non-native species dominating.

Natural Disturbances

The incidences and severity of natural disturbances is expected to increase with increased warming of the climate (i.e. extreme storms, pest outbreaks). While forest ecosystems are well adapted to natural disturbances, this combined with the increase in environmental stress will challenge the future of Canada's forests. The Mountain Pine Beetle outbreaks in the west coast are closely linked with increasing temperatures that have expanded the range of the beetle. Mild winters have decreased mortality rates for the beetles, thereby contributing to their exploding populations. Additionally, forest fires have increased in frequency and severity across Canada.



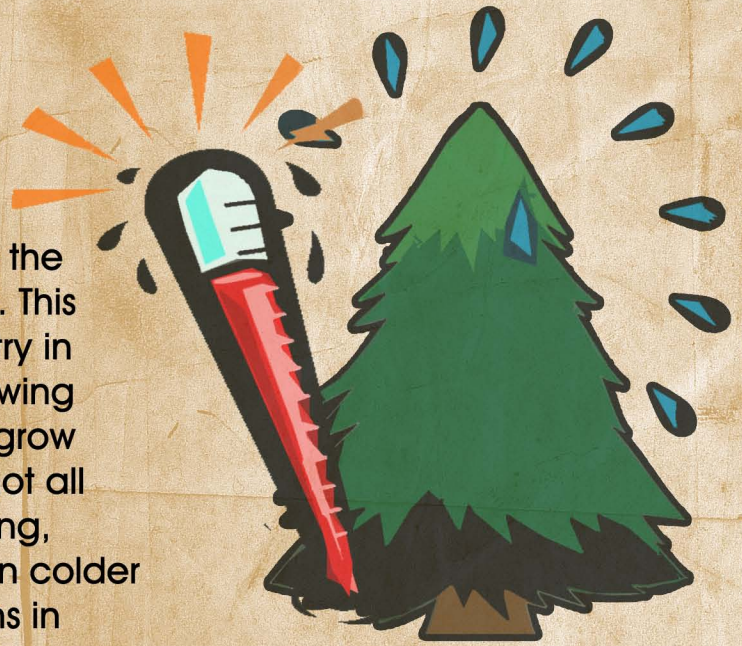
Shifting Ecosystems

A warmer and drier ecosystem will have an impact on the distribution of forests. These changes in the environment may cause a shift in ecosystems. Some trees are able to adapt to the changes in their environment, while some species may not.



Increased Productivity

Although there are many negative effects of climate change, warmer climates have the potential to increase the length of the growing season for forests. This could have benefits for the forest industry in Canada, especially since the short growing seasons mean longer waits for trees to grow to an economically potential size. But not all species will benefit from general warming, because of their strong dependence on colder temperatures to keep insect populations in check.



Canada & Climate Change

Canada is one of the highest per capita emitters of carbon, this means that each of us release a lot of carbon every day. Although our forest resources are plentiful this does not mean that it balances out our carbon emissions. There should be an effort made to both reduce the carbon emitted as well as finding new ways to store carbon.

Mitigation vs. Adaptation

There are two paths that we can take when it comes to dealing with climate change. The first is to mitigate the change, and the second is to adapt to it.

Mitigation refers to measures taken to and continue to decrease our carbon emissions to reverse the negative consequences.

Adaptation is about adapting to the changes that are occurring.

