



# Climate Change

Curriculum Guide



Jane Goodall Institute  
Canada

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## Climate Change Curriculum Guide

Global climate change is one of the largest issues facing humans as a species. This is a pivotal moment in history and educating our youth is key to helping them understand climate change and how to solve it. This curriculum guide provides information and classroom activities about climate change, advice on how to help your students with climate anxiety, and inspiration from youth who are taking action to tackle climate change.

# Climate Change

## What is Climate Change?

Climate change is the process of our planet warming up due to the increase of greenhouse gas emissions that human activity has released into the Earth's atmosphere. These gases (e.g. carbon dioxide, methane) blanket the Earth's atmosphere, preventing the sun's rays (that bounce off the Earth's surface) to escape into space, thus creating a greenhouse effect.

Over the past century, the Earth has warmed by an average of 1°C as reported by the Intergovernmental Panel on Climate Change (IPCC), 2018. The IPCC report also stated that we had 12 years (now 10 years) to take significant action to keep the Earth from warming by more than 1.5°C. Although that might not sound like much, it means big things for people and wildlife around the globe. In some places we are even seeing temperature increases of up to 4°C (<http://bit.ly/arcticmeterology>), especially at the Earth's north and south poles, causing mass melting of the ice that covers the Arctic and Antarctic.

Canada is warming at twice the global rate! (<https://changingclimate.ca>). The changing climate causes extreme and unpredictable weather. Across the country we are experiencing floods in Eastern Canada and forest fires in Western Canada. As temperatures rise, some areas will get wetter, while others will get dryer, meaning that local plants, animals, and people will have difficulty adapting to these rapid changes.



## How are weather and climate different?

Weather is local and temporary — it happens at a particular time and place: rain, snow, wind, hurricanes, tornadoes are weather events. For example, it snowed last week in Toronto, but a week later it could warm up and rain.

Climate describes conditions over longer periods of time and entire regions. Think of climate as the big picture — temperature, amount of rainfall, wind force and other conditions recorded over many years in a region.

Climate change is the overall pattern of weather over time. We are now experiencing extreme weather events more frequently and in more places around the world.

## Do we care if Earth is getting warmer?

Yes, we care! Earth is our only home and the only home for all the animals and plants who share this planet.

## Why is the Earth warming?

Every day human activities release CO<sub>2</sub> and other greenhouse gases into the atmosphere, causing the Earth's temperature to increase. When we drive cars, fly in an airplane, produce food, manufacture clothing or heat our homes, CO<sub>2</sub> is released. This happens through the burning of fossil fuels like oil, coal and natural gas. These are called fossil fuels because they are made from the decomposition of organisms that lived on Earth millions of years ago. By burning fossil fuels, we release all the carbon that has been stored in the Earth for millions

of years over a relatively short period of time, contributing to the greenhouse effect. Carbon dioxide levels in the Earth's atmosphere are at their highest in 650,000 years (<https://climate.nasa.gov>).

Methane is another potent greenhouse gas that contributes to climate change. Methane is 20 to 30 times more powerful than CO<sub>2</sub>, and is

responsible for approximately 28% of the effects of climate change. A contributing factor in the release of methane is society's consumption of beef and dairy products. Animals like cows, sheep and goats, have

a stomach that is segmented into four compartments. They produce methane as part of their digestive process (passed out of their bodies as gas). The animal agriculture industry emits 18% of total global greenhouse gases found in the atmosphere (Food and Agriculture Organization of the United Nations, 2006). This percentage is from methane, plus the energy used to grow food to feed the animals we eat as well as the energy used to transport them. Animal agriculture also contributes significantly to deforestation as land is cleared for grazing and crops for feed. Deforestation results in a loss of carbon sinks, which are natural reservoirs that store carbon and mitigate the effects of climate change.

## What are the effects of climate change?

Climate change will affect animals, people and the environment around the world. As the climate warms, more moisture is absorbed into the atmosphere which can alter weather patterns. In some areas this means more rain and snow, while in other areas this means more droughts. We are already seeing the effects of these weather changes in the north and south poles where melting glaciers are causing sea levels to rise.

Animals are affected as they are not able to adapt to the rapidly changing climate. For example, polar bears need sea ice to hunt, but the ice is forming later in the fall and melting earlier in the spring. This means polar bears are

struggling to find food and expend significant energy swimming in search of sea ice. As sea levels rise around the world, animals like sea turtles will lose the beaches where they lay their eggs.

Plants are affected by climate change as well. The Canadian maple syrup industry relies on warm days and cold nights in the late winter and early spring in order for maple trees to produce the sap needed to make the syrup. When the weather is unseasonably warm earlier in the

year during January or February, the tree's sap production is disrupted resulting in a lower yield of maple syrup.

# Climate Change Myths

## Myth 1: There is no scientific consensus on climate change

- 97% of climate scientists agree that human activities are causing climate change (The climate change consensus extends beyond climate scientists, Carleton et al., 2015).
- As more data becomes available, consensus is growing.

## Myth 2: The climate has changed before

- Yes, the climate has changed over the billion years the Earth has existed.
- Changes in carbon levels are always associated with changes in climate, as CO<sub>2</sub> levels go down so does the temperature, and as CO<sub>2</sub> levels rise the temperature does too.
- We are experiencing a rapid rise in CO<sub>2</sub> levels, which correlates with the rapid changes to the climate. This makes it difficult for plants and animals as adaptation and evolution take place over longer periods of time.
- Historically, when the climate has changed rapidly
- it has been disastrous for all forms of life on the planet (High-precision dating of the Kalkarindji large igneous province, Australia, and synchrony with
- the Early-Middle Cambrian (Stage 4-5) extinction, Jourdan et al., 2014).
- We are rapidly increasing the production of CO<sub>2</sub>, at a rate never seen before — half of all man-made greenhouse gas emissions have occurred in the last 30 years (<https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>).

## Myth 3: Too much CO<sub>2</sub> can't be that bad; plants need CO<sub>2</sub>

- Yes, plants take in CO<sub>2</sub> and release oxygen in order to function, but they can only take in a limited amount.
- We are experiencing the effects of climate change because CO<sub>2</sub> in the atmosphere exceeds the amount that can be taken in by plants.
- We are cutting down or burning large forests around the world which reduces the Earth's ability to remove CO<sub>2</sub> from the atmosphere.

## Myth 4: The climate isn't warming, it's still cold in the winter — especially here in Canada!

- It will likely always be somewhat cold in the winter in Canada due to our northern location on the Earth, climate change won't affect that.
- When we talk about climate change we are referring to the effect globally. The Earth is warming but not every place on Earth will get warmer all year round.
- In Canada, we are experiencing more winter storms, with higher amounts of precipitation due to a warmer atmosphere where more water is absorbed from bodies of water.

# Fighting Climate Anxiety

It can often feel overwhelming to hear all the negative news around climate change and global warming. It can be especially frustrating for youth knowing that this is the state of the planet they are inheriting.



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*“I choose to believe that if we get together and develop a new way of thinking we can start putting things right.”*

– Dr. Jane Goodall

It is important that we don't "throw in the towel" and give up because things look so bleak. We must have hope. Dr. Jane Goodall believes strongly in the power of youth and how they can channel that power into action, and reminds everyone "we have a window of time when we can heal some of the harm... But I choose to believe that if we get together and develop a new way of thinking we can start putting things right."

By taking action, youth can make a difference and realize that they are not helpless bystanders to the climate crisis. Connecting your students with other young people who have taken steps to tackle climate change can inspire them to do the same. This inspirational video shows how youth can make a difference: [http://bit.ly/youth\\_climate](http://bit.ly/youth_climate).

Another way to tackle climate anxiety is to explore with your students the amazing gains that have been made in the environmental sector. The news tends to focus on crisis and negative events, but there are many positive stories out there if you search for them. Check out the work done by Professor Elin Kelsey at the University of Victoria on hope and the environment: <https://www.elinkelsey.org>.

# Youth in Action: Tackling Climate Change

## What are youth doing to help tackle climate change?

You and your students may feel like the problem of climate change is large and intimidating, but if we all take steps together to lower our carbon footprint we can make a difference. Jane Goodall's Roots & Shoots program provides a platform for youth to identify their own unique ways to take action and fight climate change in their communities. There are also many youth leaders around the world who are standing up for the Earth.



Greta Thunberg is a Swedish teenager who has sparked the Fridays for Future climate strikes around the world and inspired many young people to take action. In April 2019 she spoke at the European Union Parliament, famously saying, "I am 16 years old, I come from Sweden and I want you to panic. I want you to act as if the house was on fire." By speaking to world leaders and politicians, Greta shows that you do not need to be an adult to have a great influence on the world stage.

Dr. Jane Goodall and Greta met at the World Economic Forum in Davos, Switzerland in 2019. Jane says of Greta, "she's brave and she truly, truly believes in what she's talking about."

## Young Canadians speaking up!

Across Canada there are many young people working together and taking action, like Youth in a Green War in Winnipeg, Manitoba, who have marched and protested to bring attention to the climate crisis. Stonewall Youth Going Green in Stonewall, Manitoba, are attempting to establish a ban on plastic bags in their town. In Edmonton, Alberta, youth have organized the Edmonton Youth for Climate group, led by 15-year-old Abram Ilcsion. Fridays for Future Canada shares information about where climate strikes are happening in Canada.

Another Canadian leader working to protect our environment is Autumn Peltier, a young Indigenous woman from Wiikwemkoong First Nation on Manitoulin Island who is the Chief Water Commissioner for her community. She has been an advocate for safe, clean drinking water in Indigenous communities since she was 12. Recently, at age 15, she attended the United Nations Global Landscapes Forum to speak about the need to protect our water and provide clean water to all Canadians. "I'm here to tell people about the importance of water, and to educate people on a cultural and spiritual level," Autumn has said, "They need to know that we need to act now."

# Actions students can take

- **Watch what you eat!**

What we eat has a big impact on climate change because animal agriculture contributes to 18% of global greenhouse emissions. Eating fewer animal products and moving to a plant-based diet is one of the top ways to reduce your carbon footprint. You could also ask your school cafeteria to offer more plant-based options.

- **Plant trees!**

Trees absorb carbon dioxide and release oxygen. When we plant native tree species in our communities we help remove carbon dioxide from the atmosphere and increase the output of oxygen. This also creates safe habitats and food sources for animals.

- **Conserve energy!**

Ask your parents if you can lower your household thermostat in the winter and raise it in the summer so your home does not use as much energy to heat or cool itself. Use sweaters and blankets to stay warm and a fan to stay cool.

- **Ditch the car!**

Try to walk, bike or take public transport rather than drive. Transportation accounted for 24% of Canada's greenhouse gases in 2017, the second-largest source of emissions.

- **Buy Less!**

Manufacturing clothing has a huge carbon footprint. We have become used to cheap, disposable clothing. Try investing in more durable pieces of clothing that you can use for years. Instead of buying new clothes, host a clothing swap with friends, or buy second-hand clothes from thrift stores and consignment shops.

- **Walk the talk!**

Organizing or joining one of the global climate strikes can increase awareness of the climate crisis locally. It's important to follow up with actions that can reduce your carbon footprint:

<https://globalclimatactive.net>

<https://www.fridaysforfuture.org>

- **Write letters!**

Reach out to your municipal, provincial or federal government about the climate action you want to see happen in Canada and the importance of acting now. See the sample letter at the end of the booklet to help you get started.





# Classroom activities

## **Energy Audit of your Classroom (Math/ Science/ English):**

Conduct a classroom energy audit. You can do it simply by seeing how many lights are on, checking if the heat or air conditioner is on, monitor whether the computers are left on all day and night. Students can brainstorm ways to reduce the energy use in their classroom. They can share what they discover with the whole school and then write a letter to their principal on ways the school can be more energy efficient.

## **Calculate your Carbon Footprint (Math/ Science/ Art):**

Show your students how to calculate their carbon footprint. Students can trace their foot on construction paper and create a design or write about how they will reduce their carbon footprint. Showcase the art work at your school. Students can also use the calculator to simulate living in a less developed country. This creates a good discussion about how people from different parts of the world contribute to climate change. <https://www.footprintcalculator.org>.

## **Trash Monsters (Art/ Science):**

Organize a school/ neighbourhood clean-up. Students can categorize the types of trash (plastic, paper, metal) they find and research their effects on the environment. They can then repurpose the trash into an art project, like trash monsters, to show their school the issue of trash and also how to reuse things we would otherwise throw away.

## **Letter Writing Campaign (Language/ English/ Social Studies/ Science):**

Students can learn how to write a persuasive letter to a government official to voice their concern over the issue of climate change. Ask students to research the science of climate change, what the current government policies are and consider how these policies could be improved. Students can use the template provided on page 10, or compose their own letter. Students can personalize the letter to share why this issue is important for them and make sure they ask for a response. Divide up the class to target all levels of government and compare the responses received.

### **Additional Resources:**

Greta's TED talk: [http://bit.ly/Greta\\_TED](http://bit.ly/Greta_TED)

Greta's speech in front of the EU Parliament: [http://bit.ly/Greta\\_Parliament](http://bit.ly/Greta_Parliament)

Vice documentary about Greta and her impact across the world: [http://bit.ly/Greta\\_ViceDoc](http://bit.ly/Greta_ViceDoc)

Jane's solutions to climate change: [http://bit.ly/Jane\\_ClimateChange](http://bit.ly/Jane_ClimateChange)

Impact of climate change on chimpanzees: [http://bit.ly/Chimps\\_ClimateChange](http://bit.ly/Chimps_ClimateChange)

UN Sustainable Development Goals, The Largest Lesson, on Climate Action: [http://bit.ly/GlobalGoals\\_Climate](http://bit.ly/GlobalGoals_Climate)

## Sample Letter to send your local, provincial or federal politician.

You should be able to find the address of your local politician by doing a Google search for the name of your local representative. For greater impact, you could send another copy to a federal politician as well.

Remember to include your address, and date at the top of the letter. Making the letter personal by including local issues is also a good idea. This is one example sourced from:  
<http://www.global-greenhouse-warming.com/climate-change-letter.html>

[your address]

[date]

Dear [name],

I am writing to express my concern about the imminent threat climate change poses to our country, to our people and future generations of Canadians. An overwhelming number of scientists agree, and signs abound that climate change is occurring much faster than was initially predicted. We have only a few critical years before the changes become irreversible.

More than 2,000 scientists contributing to the Intergovernmental Panel on Climate Change (IPCC) have made it clear that cuts of at least 50% to 70% in global greenhouse gas emissions are necessary to allow our climate to re-stabilize. Therefore, the Government should be making every effort to reduce greenhouse gas emissions – now. Specifically, I believe you should act to address the issues below, and I ask you to provide me with information on what the government is doing to reduce greenhouse gas emissions in the following areas:

1. Reducing carbon dioxide emissions from coal-fired power plants.
2. Reducing emissions from the transport sector.
3. Funding initiatives for alternative and renewable energy technology.
4. Incentives for the uptake of renewable energy.
5. Removal of subsidies for fossil-based fuel sources.
6. Removal of subsidies to the animal agriculture sector and repositioning them to the development of new sources of protein.

To secure a future for our nation and our children now is the time to set a new and positive direction for our national energy policy. We need policies that will lead our nation away from fossil-based fuels.

Our addiction to fossil fuel harms human health, causes global warming, degrades land and marine ecosystems, and pollutes the Earth. We need energy systems that provide clean, renewable, and reliable energy that does not threaten human health or the environment. We do create our futures, and not to reach for it would be a gross abdication of our moral responsibility.

Climate change is related to many issues, it connects to poverty, migration, food and water security and health. We cannot wait until tomorrow, we must take strong action now to address the daunting issues that climate change poses.

Sincerely,  
[your name]



# Glossary

**Atmosphere** – layer of gases that surround our planet

**Carbon dioxide (CO<sub>2</sub>)** – a greenhouse gas that is released when fossil fuels are burned

**Carbon sink** – a natural reservoir that stores carbon

**Climate** – conditions over longer periods of time and entire regions

**Fossil fuels** – Oil, coal and natural gas that are made from the decomposition of organisms that lived on Earth millions of years ago

**Methane** – a potent greenhouse gas that is 20 to 30 times more powerful than CO<sub>2</sub>

**Weather** – local and temporary, it happens at a particular time and place: rain, snow, wind, hurricanes, tornadoes



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