FACT SHEET: Climate Change

(General)

In order to discuss this, we need to review some basic ideas:

Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates. It refers to both human and naturally produced warming and the effects it has on our planet.

Global warming is a gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect caused by increased levels of carbon dioxide, chlorofluorocarbons and other pollutants as a result of human activity, primarily fossil fuel burning.

The Earth has already warmed 1 degree Celsius since the 19th century. Most of this warming occurred in the past 35 years. We are now looking at another half a degree or more of warming.

Why A Half Degree of Global Warming Is a Big Deal

Half a degree may not sound like much, but, according to the IPCC's report, if countries fail to act, the world will face catastrophic change – erratic weather, life-threatening heat waves and storms, water shortages, rising sea levels, falling food production, the loss of coral reefs and the extinction of more plants and animals.

Evidence

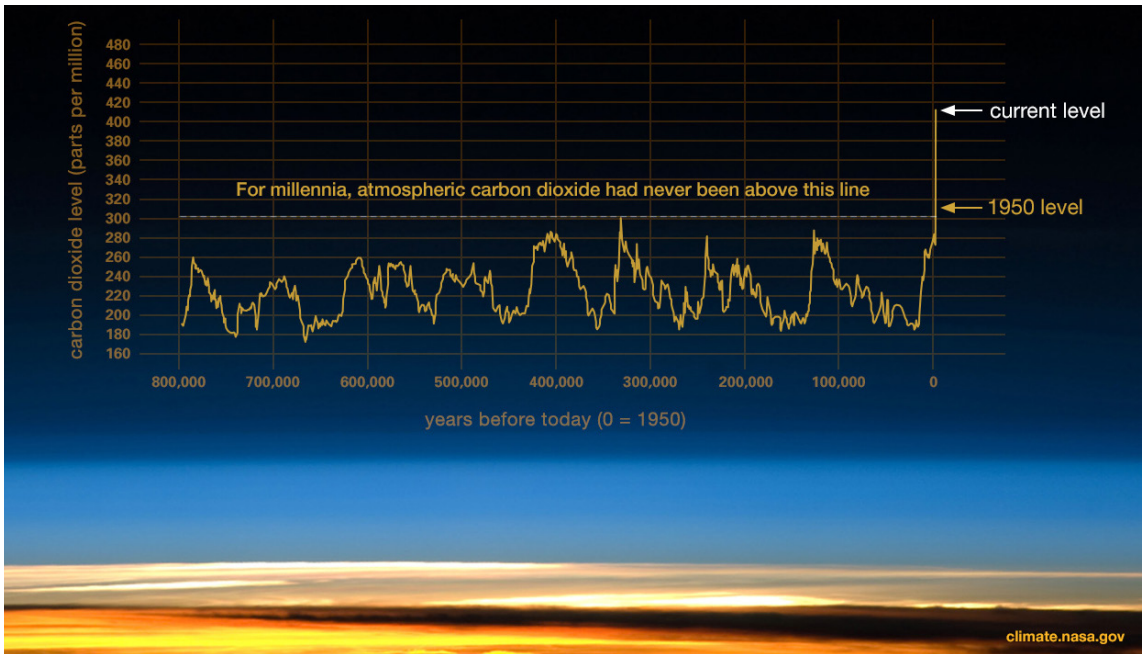
For hundreds of thousands of years, the Earth's climate has changed naturally from multiple ice ages to more comfortable temperatures. But the current warming trend is alarming because it is happening faster than ever before and there is a 95% probability it is due to human activity.

The 2018 report from the Intergovernmental Panel on Climate Change (IPCC, see page 2), compiled by hundreds of scientists from around the world, warns that these dangers are no longer remote or hypothetical.

Scientists have been able to gather a tremendous amount of information from satellites and other new technologies all over the world for many years to determine our climate is being changed.

By drilling for deep ice cores in Greenland, Antarctica, and tropical mountain glaciers, scientists can measure how that the Earth's climate has reacted to changes in greenhouse gas levels in the past. Evidence of ancient trends can also be found in tree rings, ocean sediments, coral reefs, and layers of sedimentary rocks. All of this information has shown that current warming trend is occurring almost ten times faster than any period in the past.

The consequences of this sudden warming will have a direct impact on all of us



Basic Definitions

- Weather refers to short-term (daily) changes in the atmosphere.
- Climate describes what the weather is like over a long period of time (decades) in a specific area.
- Global climate looks at the average weather of the entire Earth over an even longer period of time (centuries).

Climate is what you expect. Weather is what actually happens.

This graph compares the concentration of CO_2 (vertical axis) over time (horizontal axis) based on the atmospheric samples contained in ice cores and more recent direct measurements. It provides evidence that atmospheric CO_2 has increased since the Industrial Revolution. (Credit: NASA - Luthi, D., et al.. 2008; Etheridge, D.M., et al. 2010; Vostok ice core data/J.R. Petit et al.; NOAA Mauna Loa CO2 record.)

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This graph shows the change in average global surface temperature (vertical axis)relative to time (horizontal axis 1951-1980) (Source: NASA's Goddard Institute for Space Studies)

What is the IPCC?

The Intergovernmental Panel on Climate Change is a body of the United Nations established in 1988 dedicated to providing the world with objective, scientific information about human-induced climate change as well as the impacts and possible response options.

The IPCC's Fifth Assessment Report was a critical scientific input into the Paris Agreement in 2015.

Thousands of scientists and other experts contribute on a voluntary basis to writing and reviewing reports, which are then reviewed by governments.

The IPCC provides an internationally accepted authority on climate change, producing reports that have the agreement of leading climate scientists and consensus from participating governments.

Consequences of a Half Degree Increase

Shrinking Ice

- The Antarctic ice sheets have decreased in mass. The rate of loss has tripled in the last decade.7
- This could mean greater habitat losses for polar bears, whales, seals and sea birds.
- Glaciers are retreating almost everywhere around the world — including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa.8 This can lead to reduced sources of water for numerous rivers.
- The melting of ice sheets is leading to the rise in sea levels.

Sea Level Rise

- Global sea level rose about 8 inches in the last century. The rate in the last two decades, however, is nearly double that of the last century and is accelerating slightly every year.
- This will lead to coastal flooding that would affect millions of people.

Wild Weather

Canada's Changing Climate Report, 2019, confirms that climate change is having a direct impact on weather. Heavy rainstorms are triggering catastrophic flooding, summer heatwaves are becoming longer and hotter and extreme weather events are occurring more frequently.

Heat

- According to the World Meteorological Organization (WMO), the 20 warmest years on record have been in the past 22 years, with 2015-2018 making up the top four. Almost 400 all-time high temperatures were set in the northern hemisphere during the summer of 2019.
- According to the World Health Organization "from 1998-2017, more than 166 000 people died due to heatwaves, including more than 70 000 who died during the 2003 heatwave in Europe."
- This means events like the 2018 North American heat wave—which was linked to at least 70 deaths in Quebec and saw heat advisories issued to more than 60 million people across the continent—will likely occur more often.

Wildfires

- Climate change will lead to hotter, drier conditions in many regions, which can increase the risk and severity of wildfires This had been evident recently in places like Alberta, BC, California and Australia.

Drought and Extreme Precipitation

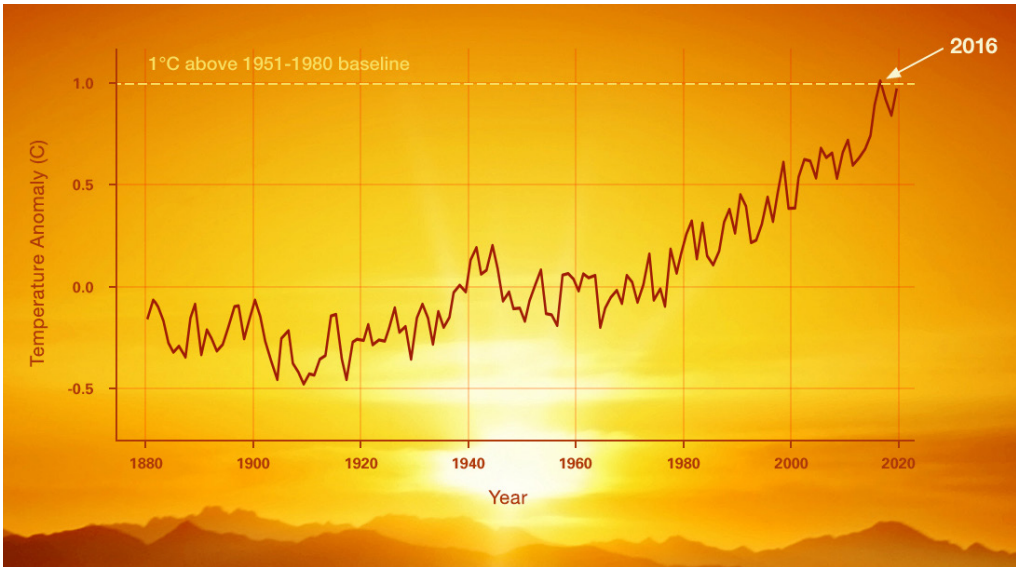
- Warmer temperatures can lead to more water evaporation into the air—and higher retention of that water once there—thus increasing the risk of heavy rainfall.
- Warmer temperatures can also exacerbate the impacts of drought, according to the Center for Climate and Energy Solutions (CCES.) This is because they lead to an increase in evaporation from soils, drying them out.

Hurricanes and Tropical Cyclones

- As the world warms, ocean temperatures will also increase—a process which leads to an increase in the intensity of hurricanes. The warmer the temperature of the sea surface that a hurricane is moving over, the stronger the storm will become because heat energy in the water acts almost like a fuel.
- To add to this problem, global sea levels are rising—driven by climate change—resulting in the increased risk of storm surges and flooding along coastal areas.

Tornadoes

- Tornadoes are formed—usually in thunderstorms—when warm, moist air, which rises, meets cooler air, creating atmospheric instability.
- The rise in average temperature has caused an increase in the strength and frequency of these storms as we have seen in Alberta.



climate.nasa.gov

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Snow/Cold

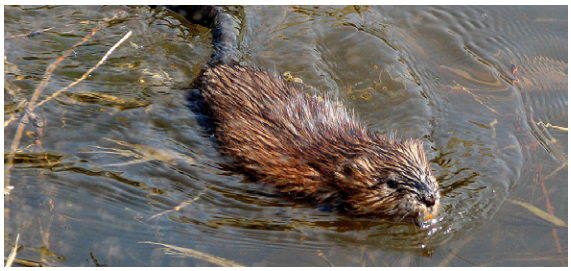
- It may seem counterintuitive, but the increase in snowfall during winter storms may be linked to climate change.
- Remember — there is more moisture in the warmer atmosphere. So when the temperatures are below freezing, snowfall can break records.
- Scientists are studying a connection between a warming Arctic and cold spells in central and eastern North America - rapidly warming Arctic air can weaken the jet stream, allowing frigid polar air to travel farther south.

Ocean Acidification

Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. This is the result of humans emitting more carbon dioxide into the atmosphere so more being absorbed into the oceans. This increase in acid level is endangering sea life.

Animals & Plants

- Increase in temperature with its associated change in weather can cause sever loss of habitat for plants and animals.
- Example - large areas of coral reefs, which provide food and coastal protection for half a billion people worldwide, are suffering from bleaching and dying off due to warming and acidification of the water. As global average temperatures rise, these bleaching events become more regular. With a 2 degree increase of total warming, coral reefs are in danger of vanishing entirely.
- Global crop yields are expected to be lower under increased global warming, especially in sub-Saharan Africa, Southeast Asia and Central and South America.



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Why Are We Having Problems?

- Nations have delayed curbing their greenhouse gas emissions for so long that warming of 1.5 degrees Celsius is now all but inevitable. At current rates of warming, the world will likely cross the1.5 degree threshold between 2030 and 2052.
- Each time the Earth heats up an extra half-degree, the effects aren't uniform across the planet. Some regions, such as the Arctic, will heat up two to three times faster.
- At the United Nations climate negotiations in Paris in 2015, countries promised to hold total global warming to well below 2 degrees and agreed to "pursue efforts" to limit warming to 1.5 degrees. To stay below a 2 degree increase;
    - emissions would have to decline to zero by around 2075.
    - virtually all of the coal plants and gasoline-burning vehicles on the planet would need to be quickly replaced with zero-carbon alternatives.
    - the world would have to swiftly develop technology to remove billions of tons of carbon dioxide from the atmosphere each year.
- Scientists around the world are warning countries of the effects of climate change, yet there are some people who are skeptics or outright global warming deniers. This is in part due to;
    - groups that depend on producing carbon pollution for their profits lobby hard for their interests. In turn, this can affect a politician's stance on environmental issues so they downplay or deny environmental issues.
    - people underestimating how many scientists believe in climate change. Ninety-seven per cent or more of scientists are certain that climate change is real and human-caused, but news media have created a "balanced" perspective - give equal coverage to climate scientist as well as industry officials. This has made the issue look like it was up for debate when it isn't.

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Canada is warming up twice as fast as the rest of the world and that warming is "effectively irreversible," a recent scientific report from Environment and Climate Change Canada noted.

This means that it's incredibly important for people to understand the realities of climate change and work to take action — regardless of political lines.

It's something that's going to harm everyone equally.

We All Can Do More

While governments need to make big changes - individuals can play a role too. Scientists say we all have to make major changes to our lifestyles, in order to avoid severely damaging climate change. The IPCC says we need to:

- drive electric cars and walk or cycle short distances
- take trains and buses instead of planes
- use videoconferencing instead of business travel
- use a washing line instead of a tumble dryer
- insulate homes better
- demand low carbon in every consumer product.
- eat more locally sourced seasonal food - and throw less of it away

We can also;

- Use low flow faucets / Avoid wasting water
- Upgrade your furnace / Lower your thermostat
- Use solar panels and efficient wood burning stoves
- Upgrade your hot water heater
- Turn lights off or half off / Use led bulbs
- Use reusable water bottles
- Bring our own bags for shopping
- Compost & Recycle.

Greenplanet Energy Analytics

Get involved with local policy making to;

- reduce fossil fuel production, consumption and pollution
- increase use of clean, renewable energy
- support energy-efficient technologies.
- work to preserve forests and wetlands.
- encourage change in farming practices to benefit the environment. For example, beef cattle raised on deforested land produces 12 times more greenhouse gas emissions than those reared on natural pastures.

Resources - General

Climate change: 12 years to save the planet? Make that 18 months
https://www.bbc.com/news/science-environment-48964736

The UN Intergovernmental Panel on Climate Change - Special Report - Global Warming of 1.5 ºC
https://www.ipcc.ch/sr15/

A Degree of Concern: Why Global Temperatures Matter - NASA
https://climate.nasa.gov/news/2865/a-degree-of-concern-why-global-temperatures-matter/

Why Is 1.5 Degrees The Danger Line For Global Warming? – Climate Reality Project
https://www.climaterealityproject.org/blog/why-15-degrees-danger-line-global-warming

Canada's Changing Climate Report 2019
https://changingclimate.ca/CCCR2019

Overview: Weather, Global Warming and Climate Change
https://climate.nasa.gov/resources/global-warming-vs-climate-change/

The Last Time CO2 Was This High, Humans Didn't Exist - Climate Central
https://www.climatecentral.org/news/the-last-time-co2-was-this-high-humans-didnt-exist-15938

Alberta Climate Records Website - University of Lethbridge
http://albertaclimaterecords.com/#

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Resources - Specific Topics

2X Faster: Severe weather events are a new Canadian normal
https://www.theweathernetwork.com/ca/news/article/2x-faster-severe-weather-events-are-a-new-canadian-normal-climate-change

Canada's top 10 weather stories of 2019
https://www.canada.ca/en/environment-climate-change/services/top-ten-weather-stories/2019.html

Wild Weather – National Geographic (chart)
https://www.nationalgeographic.com/climate-change/how-to-live-with-it/weather.html

Report: Climate change is making specific weather events more extreme - National Oceanic and Atmospheric Administration
https://www.noaa.gov/news/report-climate-change-is-making-specific-weather-events-more-extreme

Climate Change Is Going To Make Extreme Weather Events Worse: Here's Why - Newsweek
https://www.newsweek.com/climate-change-extreme-weather-events-worse-1460125

Extremes of Flood and Drought – NASA
https://climate.nasa.gov/news/2881/earths-freshwater-future-extremes-of-flood-and-drought/

Video - On Thin Ice: Polar Bears and Global Warming (2007)
https://www.youtube.com/watch?v=E1cyUmx5htA

About Ice Cores - National Science Foundation Ice Core Facility
https://icecores.org/about-ice-cores

Majority of Canadians believe in climate change — here's why some still don't – Global News (video & article)
https://globalnews.ca/news/5782855/why-people-deny-climate-change/