SUMA | Our cities, towns, villages, resort villages, and northern municipalities are urban hubs bringing people together.

Policy in Brief

Climate Change

What is Climate Change?

Climate change is a long-term gradual shift in the Earth's average weather patterns, including temperature and precipitation.

Isn't That Just the Weather?

Weather is a local event, over a shorter duration. It may be raining; it may be cold out; it may be sunny and hot. These weather conditions can even persist over weeks and months, and will fluctuate by season (as do the longer-term average trends).

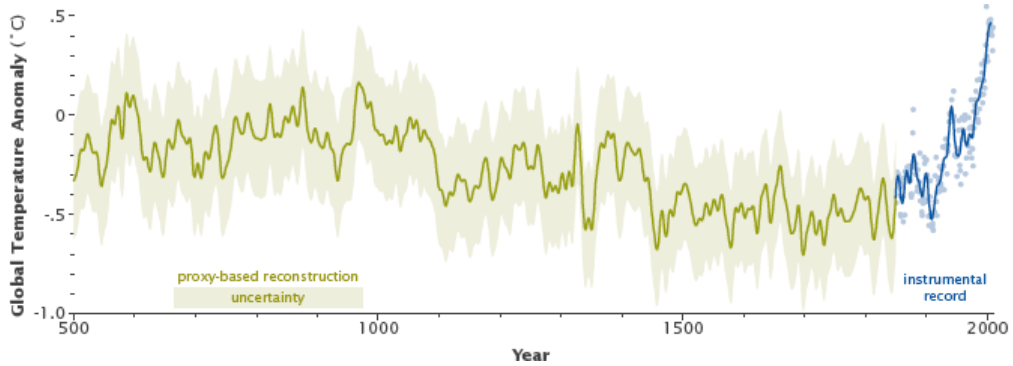
Climate, on the other hand, is long-term in nature, and can be looked at locally, regionally, or globally.

As an example, the Great Sandhills in southwest Saskatchewan can have rainy or snowy *weather*. However, their *climate* is semi-arid, meaning that their longer-term trend is to receive very little precipitation.

Climate also includes temperature, and similar examples can be considered. Have there been very hot summers in the past and will we have very cold winters in the future? Yes. The challenge is that the *average temperature over time* is increasing, which has direct negative effects on our entire global ecosphere.

Doesn't Climate Change Naturally Over Time?

Certainly, or there would be no trend lines at all. Climate regularly wanders back and forth between norms, and the Earth has been naturally warming over the last 16,000 years (since the last ice age). The challenge is how *quickly* climate change is now happening, and how warm the Earth has become since industrialization.[1] When the planet has warmed in the past two million years, it has taken about 5,000 years to warm 5 degrees. We're on track to have that same increase in under 100 years.



[1] https://earthobservatory.nasa.gov/features/GlobalWarming/page3.php

What Does This Increase in Temperatures Have to Do with Humans?

Briefly, life on Earth depends on us having an atmosphere. That atmosphere keeps the gases we depend on for life (oxygen, nitrogen, carbon dioxide) from escaping into space, and those gases insulate the Earth, keeping some of the heat from the sun from escaping back into space and leaving the planet a mostly-frozen wasteland.

The use of fossil fuels, fertilizers, and large-scale animal farming have been essential in the societal and scientific advancements we've made over the last 150 years, and they continue to play an important role in our lives and economies. Unfortunately, they come with downsides through emissions into the atmosphere. Methane (primarily from cattle), carbon dioxide (CO2—primarily from fossil fuels), and Nitrous Oxide (N2O-primarily from fertilizer) are all considered greenhouse gases because they increase the insulation in the atmosphere and lead to an increasing average global temperature.

These gases have different insulating factors, and times that it takes for them to break down and be reabsorbed in our plants and soil. One ton of CO2 can take over 1000 years to be reabsorbed; N2O has 273 times the warming power of CO2, but sticks around only for about 100 years; and methane has around 30 times the warming power of CO2, but breaks down in around 10 years.[2]

Made very simple: we depend on a blanket of gases to keep us from freezing; unfortunately, we keep piling on blankets faster than the Earth can take them off, and that has the potential to end very badly for us, as a species.

What Is This Increase in Temperatures Doing?

The short answer is: melting a lot of ice, and changing our ocean and air currents.

The Artic and Antarctic have enormous glaciers of ice. There is an annual cycle where in the winter cold temperatures cause more ice to form from seawater. Because salt doesn't freeze, as the water molecules turn to ice, the salt separates out and goes into the unfrozen water beneath the glacier, making it saltier (and making glaciers into fresh water). The extra salt in the water makes it denser, causing a deep ocean current when it sinks and brings in fresher water above it. This process naturally reverses and shifts currents in the summer, when the outer parts of the glaciers melt and salination (saltiness) of the water around the glaciers decreases.

[2] https://www.epa.gov/ghgemissions/understanding-global-warming-potentials

At the same time, surface currents on the ocean, caused by Earth's rotation, the tidal motion from our moon, and prevailing winds moving from east to west, bring warmer surface waters north from the equator.[3]

Warmer global temperatures are causing more glacial ice to melt in the summer months, and less ice to reform in the winter months. Because the ice sheets also play an important part in reflecting light and heat back into space, while seawater tends to absorb the heat of the sun, this glacial melt creates its own feedback loop, making the problem progressively worse.

The influx of fresher, less dense water at the poles changes ocean currents to bring less warm, southern-hemisphere water to our coastlines; it also means that the colder polar waters aren't making it to the southern hemisphere. For the southern hemisphere, this means more, and stronger, hurricanes and tropical storms, as these arise and strengthen in areas where warm surface waters only have warmer deep waters to mix with.[4] For the northern hemisphere, the colder waters result in less evaporation, and thus less precipitation. This is very problematic for Saskatchewan, as we primarily depend on moisture tracking in from the west coast.

Prevailing wind currents are also affected by increases in global temperatures, as their cycles depend on many of the same variables as ocean currents (though with salination not being an issue, the temperature of the air has a much greater effect on it rising and falling). Warmer waters cause warmer air masses, which move upward in the atmosphere, drawing in cooler winds beneath them. When the sea currents are not circulating in the same fashion, the air currents will certainly be affected.

When the changes to ocean and air currents are taken together, we are likely to see much more severe weather patterns, particularly those referred to as El Ninos and La Ninas, which are likely to be more severe, more frequently.[5] That would lead to a much greater likelihood of our Saskatchewan climate yo-yoing between 3-5 years of very severe, dry weather, with winds coming northward through the United States, followed by 3-5 year stretches of too much water, with winds and precipitation travelling in from the west. Years where we experience a happy medium will be much less frequent.

So What? The Earth Will Be Fine.

While the Earth can, and will, handle the temperature shifts without an issue, and will certainly get back to equilibrium over a long-enough timeline (gradually, as excess

[3] https://education.nationalgeographic.org/resource/ocean-currents/
[4] https://www.whoi.edu/know-your-ocean/did-you-know/how-does-the-ocean-affect-storms/
[5] https://research.noaa.gov/2020/11/09/new-research-volume-explores-future-of-enso-under-influence-of-climate-change/

gases in the atmosphere are reabsorbed over 1000+ years), the same cannot be said of humans, who are extremely dependent on our environment to provide for us. More frequent droughts and floods threaten the agriculture that feeds us and the overland water sources that many of us depend on, while an increase in severe weather systems has the potential to be particularly disastrous for those living near coastlines, and extremely disruptive for the trade and export markets that our economy depends on.

From an individual perspective, this will likely mean food, in particular, will become much more expensive, as the costs and risks of growing crops and raising cattle will only increase. We may also see disastrous consequences to our economy as our export capabilities suffer, and everything becomes more expensive.

Isn't This All Just a Hoax? Don't Many Scientists Disagree that Humans are Accelerating Climate Change?

Granted, finding 100% of any group that agrees on something is virtually impossible…but scientific agreement on the human influence on climate change is exceptionally strong.

There have been a variety of attempts to quantify this agreement through surveys and meta-analyses (broad reviews of published academic papers), most notably in 2012, 2016, and 2021. All have shown a 97%+ consensus in the scientific community, with the 2021 meta-analysis showing 99% consensus.[6]

If That's True, Then Why Does the Story Keep Changing? First It Was Pollution, then Acid Rain, then Holes in the Ozone Layer, then Global Warming, and Now Climate Change!

These are all genuine issues that we've faced, and—in some cases—overcome, which illustrates our ability to change, if we want to.

Pollution is a broad term for air and water-based emissions from human sources, which are still a major concern for our air and water quality, particularly in high industrial, and dense urban areas. Two of the major pollutants in the 70s and 80s causing concern were sulfur dioxide and nitrogen oxide, which turned into nitric and sulfuric acids when they mixed with rainwater—causing acid rain. Governments in North America and Europe, in particular, aggressively restricted emission of these gases, reducing the incidence of acid rain.[7]

The ozone layer is one layer of the atmosphere, which helps absorb radiation from the sun. In the 1970s, scientists identified portions growing alarmingly thin, and were able to

[6] https://iopscience.iop.org/article/10.1088/1748-9326/ac2966

[7] https://www.epa.gov/acidrain/what-acid-rain

trace the cause back to chlorine and bromine being released into the atmosphere, primarily from chlorofluorocarbons (and similar compounds) used in aerosol propellants in everything from hair spray to fire extinguishers, and refrigerants. Again, governments aggressively restricted these substances, and we have seen the ozone layer slowly regenerating ever since.[8]

Global warming is still very much a concern, as noted above. The gradual shift to using "climate change" was because people living in colder climates regularly equated weather with global climate, and had difficulty seeing how the planet could be heating up while they were still experiencing cold winter temperatures.

But Canada only Contributes a Fraction of Green House Gases. Why Change?

In terms of total emissions, it's absolutely true that Canada contributes only a fraction of the total GHG released each year, making any large-scale change less meaningful. However, the fact that our emissions per capita are virtually tied for second with the United States and Russia (Saudi Arabia is in the lead)[9] shows that there are still a large number of easy wins that we could consider that could potentially reduce our GHG emissions, while at the same time setting us up for greater financial success in the long-term.

Is SUMA Suggesting We Just Stop Using Fossil Fuels?

Fossil fuels will almost certainly be an important part of the Saskatchewan and world economy for a long time to come. We're not advocating for people to stop using them—merely to help prepare for a gradual transition to green technologies that will be less expensive to operate over the long term, particularly when the potential costs of climate change are tallied.

Why Are Municipalities Concerned About Climate Change?

Municipalities are the order of government closest to the people, supplying services that residents depend on every day: water, wastewater, solid waste management, roadways, and recreation. These services, and communities themselves, are vulnerable to climate change, and would greatly benefit from having infrastructure for those core services built to higher resiliency standards. Water and sewage lift stations and plants, for example, are often negatively affected by flooding, leading to contaminated water sources and expensive environmental cleanups. Greater resiliency would lead to fewer disruptions in critical services during emergencies.

[8] https://www.epa.gov/ozone-layer-protection/basic-ozone-layer-science

[9] https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/global-greenhouse-gas-emissions.html

Municipalities are also substantial consumers of utilities, as they frequently operate large facilities. This presents a unique opportunity for municipalities to reduce their carbon footprint, engage in green energy development projects, and save money for their residents through lower utility usage.

What Does SUMA Want?

We're advocating for the province to begin picking the low-hanging fruit by supporting municipalities in reducing their consumption and carbon footprint, while simultaneously reducing costs or providing tertiary benefits for residents over the long-term. This would also help seed a stronger green economy in our province, creating jobs and strengthening communities. All of this could be accomplished through:

- Increased provincial support for energy efficiency grants to help municipalities improve on their green infrastructure initiatives, and better rates from SaskPower for communities contributing to the power grid.
- Establishment of a dedicated municipal climate fund to support a Municipal Eco-Action Centre (MEAC). This centre would support municipalities with funds for GHG reduction and increased resiliency, as well as the necessary education and technical support to adapt to climate change.
- Establishment of a centralized platform for climate risk data accessibility. This platform will provide municipalities with access to updated climate risk assessments and reliable data to plan and make projections for future conditions.
- Government-led efforts to promote education and raise public awareness on climate adaptation and eco-friendly infrastructures.