

Global Climate Change - Part 1

By Deborah Smeltzer
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Climate changes are happening now

We hear the terms “global climate change” and “global warming” used a lot. What do they mean? Scientists define “global climate change” as changes to the Earth’s climate, or long-term weather patterns. The term “global warming,” as it is used currently, refers to changes occurring in the past several decades that are not in line with historical patterns but have been induced by human activity, in particular, the post-industrial use of carbon fuels. These conditions contribute to increases in atmospheric and oceanic temperatures greater than that occurring from natural historical events, such as cycles of glacial advance and retreat caused by very small variations in the Earth’s orbit.

The “greenhouse effect” is the warming that happens when certain gases in Earth’s atmosphere trap heat. These gases let light in but keep heat from escaping, just like the glass walls of a greenhouse. This important process is what helps generate Earth’s atmosphere, more conducive for life than Venus (too hot) or Mars (too cold).

When carbon dioxide is produced in higher than natural levels from burning of fossil fuels and other modern human activities that have occurred during the last century, the greenhouse effect is significantly amplified and the end result is a rapid change in climate. This accelerated change and resultant global warming is occurring faster than many living things can adapt. As the atmosphere warms, climate can change in unexpected ways. As polar ice melts and sea levels rise, weather becomes more extreme. We are already seeing more intense major storms worldwide, and more rain followed by longer and drier droughts. These impacts on climate challenge growing crops and change the ranges in which plants and animals can live. As glaciers and snowpack disappear, the loss of water supplies poses unique challenges to all life.

Here are some facts about global climate change that have been collected by NASA over the past several decades. (<https://climate.nasa.gov/evidence/>)

- **Global temperature rise.** There has been an overall increase worldwide of planet surface temperature of about 2-degrees F (1.1C) since the late 19th century, most of it in the last 35 years. Current warming is occurring roughly ten times faster than the average rate of ice-age-recovery warming.
- **Warming oceans** have absorbed most of the global temperature rise. Average temperatures in the top 2300 feet of seawater have risen 0.302F since 1969.
- **Shrinking ice sheets.** Greenland has lost 30-60 cubic miles of ice per year between 2002-2006; Antarctica has lost 36 cubic miles between 2002-2005. These changes drive significant climate change in other parts of the globe.

- **Glacial retreat** is occurring in mountain ranges around the world: Alps, Himalayas, Andes, Rockies, Alaskan, and African.
- **Decreased snow cover** has been measured in the past five decades in North America and in most places snow is melting earlier each year.
- **Sea level rise** is 8 inches in the last century (1900-1999) and nearly 15 inches in the last two decades (since 2000).
- **Declining Arctic sea ice** in both extent and thickness has changed deep current patterns and altered habitat for many species.
- **Extreme events** – Since 1950, the number of record high events has increased and the number of record low events has decreased in U.S. The U.S. has also seen an increasing number of intense rainfall events.
- **Ocean acidification** has increased 30 percent in surface water due to absorption of two billion tons per year of carbon dioxide. This has a significant impact on marine life forms as well as decreasing harvest potential for human consumption.



A polar bear stands on brash ice in the Napassorssuaq Fjord on the southeastern coast of Greenland. Brash ice is floating ice fragments less than two meters across from disrupted icebergs. *Photo by Deborah Smeltzer / WSU Skagit County Extension Master Gardeners.*

All of these changes have an enormous impact both short-term and long-term on life forms on our planet. In addition to shifting flower/plant blooming times, global warming has allowed some invasive species to thrive. For instance, spruce bark beetles have boomed in Alaska thanks to 20 years of warm summers. The insects have chewed up four million acres of spruce trees. (<http://www.nationalgeographic.com/environment/global-warming/global-warming-effects/>)



A receding glacier with exposed terminal and lateral moraines in a glaciated valley along Skjoldungen Fjord on the southeastern coast of Greenland. *Photo by Deborah Smeltzer / WSU Skagit County Extension Master Gardeners.*

RESOURCES:

- https://climate.nasa.gov/climate_resources/24/
- <https://climate.nasa.gov/evidence/>
- https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-northwest_.html
- <https://cig.uw.edu/resources/special-reports/ps-sok/>
- <https://cliffmass.blogspot.com/>
- <http://www.nationalgeographic.com/environment/global-warming/global-warming-effects/>

Note: Some hyperlinks in this article have been updated since its initial publication.