

Climate Change: Frequently Asked Questions

Sustainable Living

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1. What is climate change or global warming?

The global average surface temperature has increased by about 1 degree F in the past 100 years. Small changes in global temperature can have dramatic effects. Even though weather conditions in certain areas may vary from year to year, such as colder winters, global climate conditions are on a warming track. In addition to warming of the Earth's surface, there has been an increase in heat waves, warming of the lower atmosphere and deep oceans, fewer frosts, retreat of glaciers and sea ice and a rise in sea level. Many species of plants and animals have changed their location or the timing of seasonal activities in ways that provide further evidence of climate change. Although many natural factors influence the Earth's climate, a majority of the world's scientists have determined that greenhouse gas increases were the main factor contributing to climate change since the 1950s.

2. Is climate change already happening?

Yes. The kinds of changes already observed include the following:

- Decrease of snow cover and sea ice and the retreat of mountain glaciers
- Rise in global average sea level and the increase in ocean water temperatures
- Increase in the frequency of extreme precipitation events in some regions of the world
- Thawing of permafrost
- Lengthening of the growing season in middle and high latitudes
- Upward shift of plant and animal ranges
- Decline of some plant and animal species
- Earlier flowering of trees, earlier emergence of insects, earlier egg-laying in birds
- Increase in global average surface temperature of about 1°F in the 20th century

3. What is the greenhouse effect?

Greenhouse gases are a natural part of the atmosphere. They absorb and re-radiate the Sun's



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warmth, and maintain the Earth's surface temperature at a level necessary to support life. The problem we now face is that human actions - particularly burning fossil fuels (coal, oil and natural gas), agriculture and land clearing - are increasing the concentrations of the gases that trap heat. This is the enhanced greenhouse effect, which is contributing to a warming of the Earth's surface. Water vapor is the most abundant greenhouse gas. Its concentration is highly variable and human activities have little direct impact on its amount in the atmosphere. Humans have most impact on carbon dioxide, methane and nitrous oxide.

4. Will a few degrees warming have a significant impact on our climate?

Warming of a few degrees may seem minor compared with day-to-day or seasonal variations in temperature. A few degrees of global warming will lead to more heat waves and fewer frosts,

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compared with day-to-day or seasonal variations in temperature. A few degrees of global warming will lead to more heat waves and fewer frosts, and more fires and droughts in some regions. A small warming of the oceans causes a corresponding sea level rise – water expands as it heats. Melting of glaciers and the ice caps are also contributing to sea level rise. Sea level rise makes coastal areas vulnerable to flooding and storm surges. A few degrees of temperature can impact the spread of insects and diseases.

5. Can the observed changes be explained by natural variability?

Since our entire climate system is fundamentally driven by energy from the sun, if the sun's energy output were to change, then so would the climate. Solar output has been shown to vary. Our understanding of the indirect effects of changes in solar output and feedbacks in the climate system is minimal. In order to reduce uncertainty in our projections of future climate change, more research is necessary on solar impacts. At this time, scientists cannot attribute global warming to energy from the sun alone.

In addition to changes in energy from the sun itself, the Earth's position and orientation relative to the sun (our orbit) also varies slightly, thereby bringing us closer and further away from the sun in predictable cycles (called Milankovitch cycles). Variations in these cycles are believed to be the

cause of Earth's ice-ages. While Milankovitch cycles have tremendous value as a theory to explain ice-ages and long-term changes in the climate, they are unlikely to have very much impact on the decade-century timescale. Over several centuries, it may be possible to observe the effect of these orbital parameters, however for the prediction of climate change in the 21st century, these changes will be far less important than impacts from greenhouse gases.

Resources:

Intergovernmental Panel on Climate Change FAQs - <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-faqs.pdf>

National Oceanic and Atmospheric Administration FAQs - <http://www.ncdc.noaa.gov/oa/climate/globalwarming.html>

Mary Campbell, Urban Sustainability Agent

Pinellas County Extension

12520 Ulmerton Road, Largo, FL 33774

727-582-2100

www.pinellascountyextension.org