How it Works: Global Climate Change

In the past few weeks, we have experienced some unseasonably warm weather. What's to blame for this unexpected warmth?

PRACTICAL SCIENCE WITH PHIL FREDA

While strolling on campus at Saint Joseph's University last week, I noticed that one of the trees near the Science Center was starting to bud.

After seeing this, I thought it might be a good time to discuss how global warming works and what it may mean for us as a species.

I am in no way stating that this current warm weather we are experiencing is a direct result of global warming, but this discovery did pique my interest.

The mechanism of global warming

I'm sure that most of us have heard of the greenhouse effect, but how does it actually work?
The greenhouse effect is actually a very good thing.

If we didn't have our atmosphere and ozone layer, the Earth would be too cold to support life.

After sunlight (heat) enters our atmosphere, it is partially absorbed by the land and sea.

According to How Stuff Works, about 70% is absorbed by the land, oceans, plants and other things.
The remaining 30-percent is reflected out into space, essentially lost.

The 70-percent is eventually radiated back out. Some is lost in space but some is absorbed by molecules in the atmosphere.

These molecules emit the heat back toward the Earth.

Essentially, what we have on Earth is a giant climate control system.

So what's the problem?

The problem is that we humans emit the same molecules, like carbon dioxide and methane, which make the greenhouse effect possible, through pollution.

Cars, factories, and other fossil fuel powered machines all add greenhouse gases to the atmosphere.

If we put more greenhouse gases in the atmosphere, what do you think will happen?

If you guessed, increase the effectiveness of the greenhouse effect, you are correct!

It is a very simple concept but some still think that it is not possible.

If you keep adding salt to your favorite dish, it will unsurprisingly get saltier.

The greenhouse mechanism is well understood, but are global temperatures really increasing?

The effects of Global Climate Change

According to the Intergovernmental Panel on Climate Change (IPCC), which is a group of over 2,500 scientists from across the world, the global temperature increased 0.74°C from 1906 to 2006.

This may not seem like a lot, but according to How Stuff Works, the last ice age was caused by only a 5°C decrease in global temperature.

Specifically, an increase in only 1°C over a period of one to two hundred years is considered global warming.

If we continue on the trend we are on, global warming will indeed be a reality.

Unfortunately, increased temperatures are not the only consequence.

Even though the global temperature is increased, that doesn't mean that it will necessarily get hotter everywhere and at all times.

"Global Wierding"

Some scientists and conservationists have chosen a more appropriate moniker for this effect: "global wierding".

This phrase was coined by Hunter Lovins, the co-founder of Rocky Mountain Institute.

In addition to a warming effect, global climate change can also bring on increased precipitation and anomalous weather.

According to the Environmental Defense Fund (EDF) and the World Meteorological Organization (WMO), increased ocean temperatures are speeding up the cycling of water between the ocean and the atmosphere, leading to intense rainfall in some areas and horrible droughts in others.

Along with these consequences, wildfires, flooding, droughts and hurricanes may also increase.
Global climate change will also affect wildlife and humans.

Trees and other photosynthetic organisms are very important in controlling greenhouse gases.

Carbon dioxide (CO_2) is absorbed by green algae and trees but deforestation and habitat destruction from humans will lessen the ability for these organisms to curtail greenhouse gases.

By removing trees and habitat, we are actually hastening the effects of global climate change.

The two organisms that receive the most attention in the press are polar bears and the corals.

Polar bears are beginning to lose their habitat because of the melting of sea ice due to increased temperatures.

To add insult to injury, melting sea ice will increase the global sea level, which will lead to worldwide flooding.

Corals, on the other hand, are in a symbiotic relationship to photosynthetic algae, which help nourish them. In response to small changes in water temperature, corals shed these algae, bleaching them.

This loss of nutrients usually leads to death of the corals, which are integral parts of the biosphere.

Overall, increased global temperatures will disrupt almost the entire biosphere.

Most creatures have evolved over the course of millions of years to become adapted to their respective environment.

The force of evolution is usually extremely gradual, whereas global climate change, by definition, is not.

If living things cannot "keep up" with these environmental changes, we may see the loss of a great deal of organisms, many of which we rely on for food or medical purposes.

Lastly, increased temperatures may also decrease air quality, increase the spread of disease and cause more intense heat waves.

Many diseases, like malaria, may become increasingly common in areas that were once too cold to support their spreading, according to the EDF.

So what can we do?

Now that I probably scared everyone extensively, I would like to say that none of these cataclysmic prophecies are written in stone.

We still have time to work at this problem, but we need to start now.

We have to remember, however, that the minutest effects, on the most "insignificant" organism, or in some "unrelated" country, can have enormous effects on us as a species and the planet as a whole.

Some may say that the bleaching of corals has nothing to do with their daily activities or life as a whole. That statement couldn't be more wrong.

The food chain relies on every member, even ourselves to an extent.

It is up to us to be responsible and act like the big brother here.

We have to stick up for this planet and all of its denizens before it's too late.

We humans cannot survive without all of the vastly important organisms that also share this planet with us.

Think about it!

For more on global climate change, check out this video with Dr. Clint Springer, Assistant Professor of Biology at Saint Joseph's University.