



UNDERSTANDING CLIMATE CHANGE

The Basics: The Science of Climate Change

Presenter: Melanie Nakagawa, Policy Advisor for Climate Change, Energy, Environment, and Oceans to U.S. Secretary of State John Kerry

Transcript

[TEXT: Young African Leaders Initiative – Online Training Series]

[President Obama:] The climate is changing faster than our efforts to address it. The alarm bells keep ringing. No nation is immune. Worldwide, this summer was the hottest ever recorded, with global carbon emissions still on the rise. We are the first generation to feel the impact of climate change and the last generation that can do something about it.

[TEXT: The Basics: The Science of Climate Change]

[Melanie Nakagawa:]

We've all heard about climate change. It's in the news and on the agenda of leaders and scientists across the globe. But what is it, really? And how are humans changing the Earth's climate?

[TEXT: Melanie Nakagawa, Climate Change Policy Advisor]

I'm Melanie Nakagawa, a policy advisor on climate change to U.S. Secretary of State John Kerry.

[TEXT: Science of Climate Change]

In this lesson we'll examine the science behind climate change, take a look at the distinction between climate and weather, and learn about the greenhouse effect, including how human behavior contributes to the warming of our planet.

Scientists around the world have looked at data from satellites. They've studied weather patterns and measured changes in crop yields and soil composition. And what they've found is that our planet is, on average, getting warmer. Temperatures have been rising since the early 20th century. And most notably, since the late 1970s. This warming reflects long-term changes to the Earth's climate.

But it's important to understand that when we talk about climate, we are not referring to weather. They mean two different things. Weather can change from season to season, day to day, even hour to hour. Sometimes when you least expect it!

Weather reflects short-term conditions in the atmosphere. Climate, on the other hand, refers to the average temperatures and precipitation rates over an extended period of time. When these rates change over time, it can result in profound impacts on our planet. Impacts like rising sea



levels, more extreme weather events, like droughts and floods, melting glaciers, shifts in ecosystems, as well as many others. In other words, real problems.

In the past, changes in our climate resulted from natural causes, such as differences in the sun's activity and volcanic eruptions. However, scientists cannot explain the warming we experienced in the past 100 years without including greenhouse gases emitted by human activity.

So what are these greenhouse gases? When scientists talk about "greenhouse gases," they are referring to several chemical compounds found in the Earth's atmosphere which would trap heat that would normally be released out to space. Some of these compounds occur in nature, such as carbon dioxide and methane. However, others are exclusively human-made and are found in sources like hair spray, paint fumes and aerosol sprays.

These greenhouse gases play a crucial role in warming the Earth's surface and making it habitable. However, too much human-generated greenhouse gas emissions upsets the planet's natural balance, leading to an increase in warming.

Now that we understand the meaning of climate change, let's take a look at how it actually works.

Pollutants and other chemical compounds are released into the atmosphere due to human activity. The sun emits energy that is transmitted to the Earth. About 30 percent of the sun's energy is reflected directly back into space by the atmosphere, clouds, and the surface of the Earth. However, greenhouse gasses in the atmosphere absorb much of the energy emitted from the warm Earth's surface, preventing it from immediately escaping from the Earth's system and back into space. As a result, too large a concentration of greenhouse gasses act like a blanket, making the Earth warmer and throwing off the atmosphere's natural energy balance.

Over the past 100 years, the amount of greenhouse gasses in our atmosphere has been increasing. This is largely due to carbon dioxide emissions from the burning of fossil fuels, such as coal, oil and gas. When these fuels are burned, carbon stored in them for millions of years is released in an instant — directly into the atmosphere — as carbon dioxide. Think about it. Human activity currently releases over 30 billion tons of carbon dioxide into the atmosphere every year!

The bad news is that greenhouse gas concentrations in our atmosphere will continue to increase, continuing to warm the Earth — unless all nations reduce the billions of tons of greenhouse gas we produce each year. The good news is that the world is finally waking up to this global challenge, and there is much we can do to reduce our reliance on fossil fuels.

Now that you've learned about the science behind climate change, please go to yali.state.gov to learn more, test your knowledge, and earn a YALI Network certificate.

[TEXT: Test your knowledge - yali.state.gov - YALI Network]

