

Welcome to the Climate Change *Investi-gator!*

Is the climate changing over time? In the past few years, most scientists have agreed on at least one thing about climate change. They have agreed that changes in Earth's climate over the past 100 or more years point to a warming of Earth's surface. This warming is greater than they would have expected from normal cycles.

The average temperature of Earth depends on two things. First, the temperature depends on how much of the sun's energy comes through the atmosphere to Earth's surface. Second, the temperature depends on how much energy escapes back into space. About 90 percent of the sun's energy is trapped by gases in the atmosphere! This energy is sent back to Earth in all directions. This energy warms the planet. This is called the greenhouse effect. The gases are called greenhouse gases. Without these gases, humans and other forms of life could not survive on Earth.

Over the last 150 years, however, the amount of greenhouse gases in the atmosphere has risen sharply. The sharp rise in greenhouse gases is believed to be caused by an increase

in the burning of fossil fuels. Examples of fossil fuels are oil, coal, and natural gas. These higher levels of greenhouse gases in the atmosphere

trap more of the sun's heat. This leads to increasing temperatures on Earth.

Evidence from scientific measurements gives scientists more confidence in their conclusions about global climate change. Yearly global temperatures have been rising, the amount of Arctic sea ice has been shrinking, and glaciers are getting smaller. Scientists are now able to use computer programs for help. These computer programs track and predict changes in the atmosphere and oceans across the globe.

Global climate change is sometimes called global warming. Scientists use the term "global climate change" because many aspects of Earth's climate are changing. Along with rising yearly temperatures, scientists predict increases in both droughts and flooding. The effects of climate change will be different in different places on Earth. Some places will experience periods of heavy rain, for example, and others will experience periods of low rainfall.

Because of climate change, scientists and forest managers have had to think in new ways about our natural resources. While we work to reduce the amount of fossil fuels



we burn, we also must work with the coming changes. Here are some of the new ways scientists and forest managers are thinking:

- 1. Instead of fighting change, work with it. Do what we can to reduce the impact of climate change, but be prepared for change and adapt as needed.**
- 2. Understand that we do not know exactly what will happen in the future, but we do the best job we can with prediction. Sometimes, we will make a decision about what to do, and later we may have to make a different decision.**
- 3. Accept that the way we did things in the past may not be the right choice for the future.**
- 4. Focus on the way forests and other natural systems work, instead of what they look like.**

Climate change will bring challenges for everyone. However, climate change is also helping us to think in new ways and to do some things differently. In this *Investigator*, you will find research that focuses on the Pacific Northwest region of the United States. The scientists in this region have been studying how climate change may be affecting different animals, plants, and ecosystems.

In this journal, you will read about four topics. In “Amphibious Assault” you will learn how frog and toad breeding patterns might respond to climate change. The article “Seed Ya Later!” examines how plants may move in a changing climate. In “There’s Snow Place Like Home” you will learn



The Pacific Northwest region of the United States.

how climate change may affect wolverines. Finally, in the article “Frozen Food,” you will learn how water from melting glaciers may provide food for animals living in nearby bays and rivers. Forest Service scientists have been a part of the research in these articles. You can learn more about the Forest Service by reading the inside back cover of this journal or by visiting <http://www.scienceinvestigator.org>.