# Chapter 7 Earth's Climate System

## What You Will Learn

In this chapter, you will learn how to...

- **identify** the principal components of Earth's climate system
- **describe** various tools and systems for classifying climates
- **analyze** effects of climate change on human activities and natural systems

## Why It Matters

Climate affects living conditions for all organisms on the planet. A change in climate will lead to changes in the survival and distribution of many species, and to changes in human activities such as farming, fishing, and forestry.

## Skills You Will Use

In this chapter, you will learn how to...

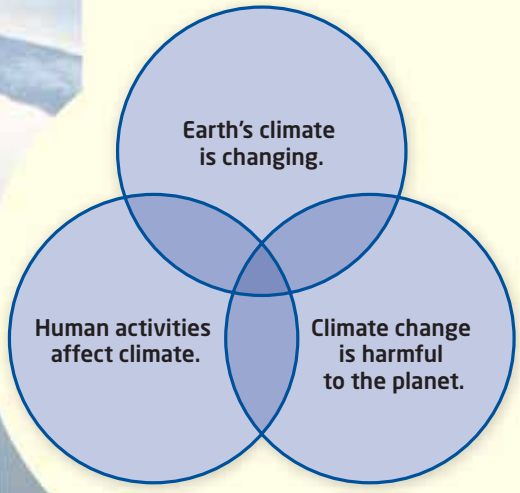
- **investigate** natural and human factors that affect climate change
- **assess** and **evaluate** tools and systems for studying climates
- **analyze** some of the effects of climate change around the world

You may have heard about recent changes to global climate and how humans are affecting it. But you may not realize how much climate change may affect human life in the future. For example, warmer global temperatures are reducing the area of the Arctic that is covered by ice. Aboriginal hunters in northern Canada rely on sea ice as important hunting grounds and travel routes. Their traditional way of life is threatened by changes in sea ice that result from global climate change.

# Activity 7-1

## Views on Climate Change

Many people say that human survival on Earth is in danger because of climate change. Other people say that only our lifestyles will change as we adapt to our changing planet. What do you think?




Venn diagrams can be used to identify similarities and differences between subjects.

### Materials

- chart paper
- markers or pens
- sticky notes
- stopwatch

### Procedure

1. Working in pairs or in a small group, create a Venn diagram–like the one shown above–on the chart paper. Leave enough room in the overlapping sections for writing later.
2. Have a group member set the stopwatch for 10 min. Write down anything that you believe or have heard someone say about climate change on a sticky note.
3. With your group, decide where on the Venn diagram to put each of your thoughts. Set aside any comments that do not fit into these three categories.
4. Colour in the section of the Venn diagram that most closely matches your personal beliefs about climate change.

### Questions

1. What are your overall views about climate change? What are the overall views of your group or class?
2. What information would you like to have in order to assess the validity of some of the statements or beliefs you have or have heard about climate change? Could any information make you change your beliefs about climate change? Explain why or why not.

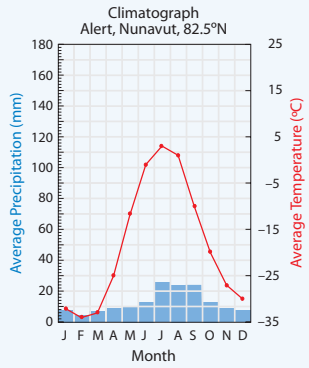
# Study Toolkit

These strategies will help you use this textbook to develop your understanding of science concepts and skills.
To find out more about these and other strategies, refer to the Study Toolkit Overview, which begins on page 560.

Reading Graphic Text

## Interpreting Climatographs

In a climatograph, a bar graph is combined with a line graph. Before interpreting a climatograph, read the title, the axis labels, and any accompanying text. Note the units of measurement and how the numbers are scaled. Then look for patterns in the shape of the line or in the clusters of bars. For example, the climatograph below shows that temperature and precipitation in Alert are highest during the summer.




The tundra has a layer of permanently frozen soil, called permafrost. Plants grow close to the ground. Trees cannot survive because of the thin soil and lack of moisture.

### Use the Strategy

Examine the climatograph for the desert biome on page 285. Identify and describe any relationships between the two sets of data. Write a sentence about average temperatures in the desert biome.

Reading Effectively

## Making Inferences

Often, textual material does not contain *all* of the details about a topic. Some details or connections between ideas may be implied rather than stated explicitly. You need to make inferences by combining information in the text with your prior knowledge. For example, the table below shows one inference you could make about the text in the first column.

| Information in Text | + Prior Knowledge | = Inference |
|---|---|---|
| Air currents travel in fairly constant directions around the world. These air currents are known as prevailing winds. | When I watch the weather forecast for my area, I notice that weather systems often move into Canada from the southwestern United States. | The prevailing winds in North America generally blow from the southwest toward the northeast. |

### Use the Strategy

Read the first paragraph in the section titled "Winds Affect Precipitation" on page 274. Create a table like the one above, and make an inference about the movement of air masses.

Word Study

## Word Origins

When you learn a new word, finding its *origin*, or the language it came from, can be helpful. For example, to better understand the meaning of *albedo*, find the word in a dictionary. You will probably see an entry that is similar to the one below.

**albedo** *noun* reflective power; *specifically*: the fraction of incident radiation (as light) that is reflected by a surface or body (such as the moon or a cloud) [from Late Latin, *whiteness*, from Latin *albus*]

The dictionary entry tells you that *albedo* comes from the Latin *albus*, meaning whiteness. This information might help you remember the meaning of *albedo*: the ratio of light that is reflected by a surface. It might also prompt you to think about related words, such as *albino* (an animal or a plant that has a very pale appearance) and *albatross* (a large white sea bird).

### Use the Strategy

Find the Greek origin of the word *tectonic*. Explain how the Greek origin helps you understand the current meaning of the word.