SECTION 2

Climate Zones

ENVIRONMENTAL CONNECTION

Key Ideas	Key Terms	Why It Matters
❯ Describe the three types of tropical climates. ❯ Describe the five types of middle-latitude climates. ❯ Describe the three types of polar climates. ❯ Explain why city climates may differ from rural climates.	**tropical climate** **middle-latitude climate** **polar climate** **microclimate**	Identifying and studying the different types of climates on Earth helps you better understand the factors that influence the climate where you live.

Earth has three major types of climate zones—tropical, middle-latitude, and polar—each with distinct temperature characteristics. Each zone also has several types of climates because the amount of precipitation within each zone varies.

Tropical Climates

Climates characterized by high temperatures and located in the equatorial region are referred to as **tropical climates.** These climates have an average monthly temperature of at least 18 °C, even during the coldest months. Within the tropical zone, there are three types of tropical climates, as shown in **Table 1.**

tropical climate a climate characterized by high temperatures and heavy precipitation during at least part of the year

Tropical rain-forest climates are humid and warm. Central Africa, the Amazon River basin of South America, Central America, and Southeast Asia have areas with tropical rain-forest climates.

Tropical desert climates receive very little precipitation. The largest belt of tropical deserts extends across north Africa and southwestern Asia.

Savanna climates are located in South America, Africa, Southeast Asia, and northern Australia. These climates are described in **Table 1.**

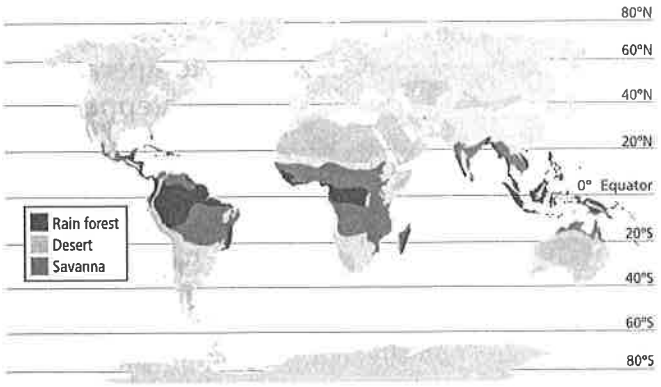
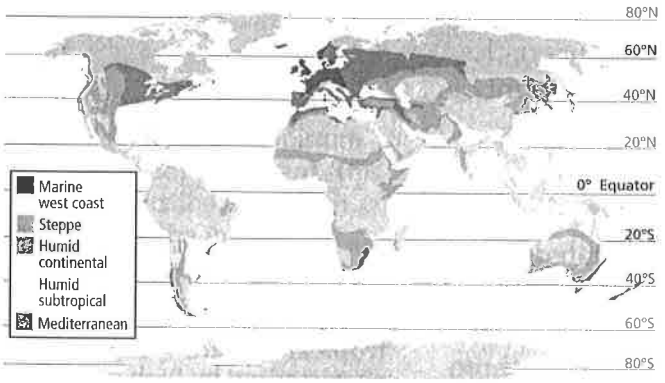


Table 1 Tropical Climates

Climate	Temperature and precipitation	Description
Rain forest	small temperature range; annual rainfall of 200 cm	characterized by dense, lush vegetation; broadleaf plants; and high biodiversity
Desert	large temperature range, with hot days and cold nights; annual rainfall of less than 25 cm	characterized by little to no vegetation and organisms adapted to dry conditions
Savanna	small temperature range; annual rainfall of 50 cm; alternating wet and dry periods	characterized by open grasslands that have clumps of drought-resistant shrubs

Table 2 Middle-Latitude Climates

Climate	Temperature and precipitation	Description
Marine west coast	small annual temperature range; frequent rainfall throughout the year	characterized by deciduous trees and dense forests; mild winters and summers
Steppe	large annual temperature range; annual precipitation of less than 40 cm	characterized by drought-resistant vegetation; cold, dry winters and warm, wet summers
Humid continental	large annual temperature range; annual precipitation of greater than 75 cm	characterized by a wide variety of vegetation and evergreen trees; variable weather
Humid subtropical	large annual temperature range; annual precipitation of 75 to 165 cm	characterized by broadleaf and evergreen trees; high humidity
Mediterranean	small annual temperature range; average annual precipitation of about 40 cm	characterized by broadleaf and evergreen trees; long, dry summers and mild, wet winters



Middle-Latitude Climates

Climates that have an average maximum temperature below 18 °C in the coldest month and an average minimum temperature above 10 °C in the warmest month are referred to as **middle-latitude climates.** There are five middle-latitude climates, which are described in **Table 2.**

Marine west coast climates receive about 60 to 150 cm of precipitation annually. The average temperature is 20 °C in the summer and 7 °C in the winter. The Pacific Northwest of the United States has a marine west coast climate.

Steppe climates are dry climates that receive less than 40 cm of precipitation per year. The average summer temperature is about 23 °C. The winters are very cold and have an average temperature of −1 °C. The Great Plains of the United States has a steppe climate.

The *humid continental climate* and *humid subtropical climate* both have high annual precipitation. However, the humid continental climate has a much greater temperature range between the summers and winters than the humid subtropical climate. In the United States, the humid subtropical climate is in the southeast and the humid continental climate is in the northeast.

The *mediterranean climate* is a mild climate that has a small temperature range between summer and winter. This climate is named after the sea between Africa and Europe, where this climate is located. However, this climate is also found along the coast of central and southern California.

Reading Check **Which subclimates have high annual precipitation?**

middle-latitude climate a climate that has an average maximum temperature below 18 °C in the coldest month and an average minimum temperature above 10 °C in the warmest month

READING TOOLBOX

Cause-and-Effect Map

Draw a cause-and-effect map that shows how different climate conditions affect vegetation.

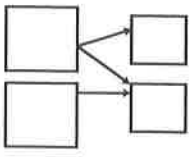


Figure 1 Subarctic climates, as shown here at Tombstone Valley in Yukon, Canada, support sparse tree growth.

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Polar Climates

The climates of the polar regions are referred to as the **polar climates.** There are three types of polar climates: the subarctic climate, shown in **Figure 1,** the tundra climate, and the polar icecap climate. The *subarctic climate* has the largest annual temperature range of all climates. The difference between summer and winter temperatures in the subarctic climate has been as much as 63 °C. The *tundra climate* has a smaller annual temperature range than the subarctic climate does. However, the average temperature of the tundra climate is colder than that of the subarctic climate. In the *polar icecap climate,* most of the land surface and much of the ocean are covered in thick sheets of ice year-round. The average temperature never rises above freezing. The polar climates are described in **Table 3.**

polar climate a climate that is characterized by average temperatures that are near or below freezing

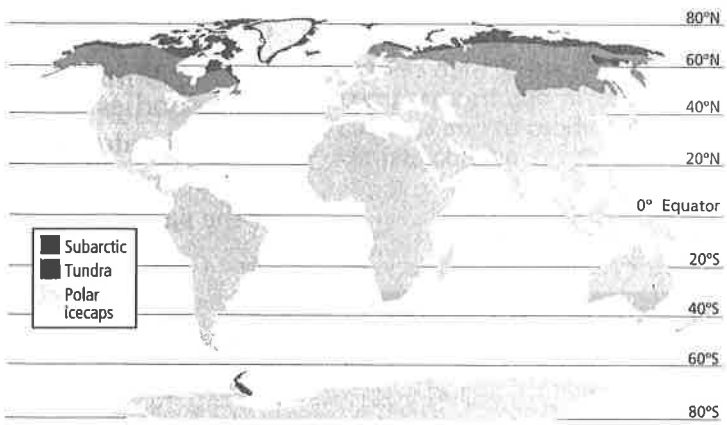

Table 3 Polar Climates

Climate	Temperature and precipitation	Description
Subarctic	largest annual temperature range (63 °C); annual precipitation of 25 to 50 cm	characterized by evergreen trees; brief, cool summers and long, cold winters
Tundra	average temperature below 4 °C; annual precipitation of 25 cm	characterized by treeless plains; nine months of temperatures below freezing
Polar icecap	average temperature below 0 °C; low annual precipitation	characterized by little or no life; temperatures below freezing year-round and high winds

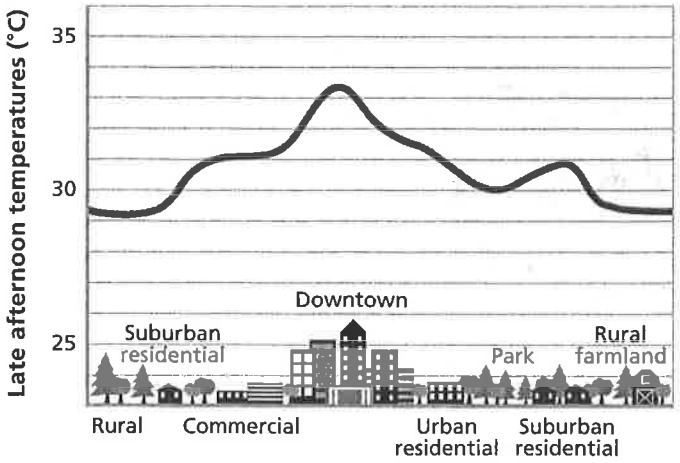

Figure 2 The less vegetation and more pavement and buildings an area has, the higher the temperatures in the area tend to be.

Local Climates

The climate of a small area is called a **microclimate.** Microclimates are influenced by density of vegetation, by elevation, and by proximity to large bodies of water and structures built by humans. For example, in a city, pavement and buildings absorb solar energy and then reradiate that energy as heat, which raises the temperature of the air above and creates a "heat island," as shown in **Figure 2.** As a result, the average temperature may be a few degrees higher in the city than it is in surrounding rural areas. In contrast, vegetation in rural areas does not reradiate as much energy, so temperatures in those areas are lower.

microclimate the climate of a small area

Academic Vocabulary

variation (VER ee AY shuhn) a difference in the usual form or function

Effects of Elevation

Elevation also may affect local climates. As elevation increases, temperature decreases and the climate changes. For example, the *highland climate* is characterized by large variations in temperature and precipitation over short distances because of changes in elevation. Highland climates are commonly located in mountainous regions—even in tropical areas.

Effects of Large Bodies of Water

Large bodies of water, such as lakes, influence local climates. The water absorbs and releases heat slower than the land does. Thus, the water moderates the temperature of the nearby land. Large bodies of water can also increase precipitation. Therefore, microclimates near large bodies of water have a smaller range of temperatures and higher annual precipitation than other locations at the same latitude do.

Section 2 Review

Key Ideas

1. **Identify** the three types of climate zones.
2. **Describe** the three types of tropical climates.
3. **Describe** the five types of middle-latitude climates.
4. **Describe** the three types of polar climates.
5. **Identify** three factors that influence microclimates.
6. **Explain** why city climates may differ from rural climates.

Critical Thinking

7. **Making Inferences** What would happen to the temperature of a rural location if the vegetation were replaced with a parking lot?
8. **Compare and Contrast** Compare latitude lines with the boundaries of major climate zones. Why do they align in some regions but not in others?

Concept Mapping

9. Use the following terms to create a concept map: *tropical climate, subarctic, tundra, steppe, polar icecap, mediterranean, middle-latitude climate, rain forest, savanna, desert,* and *polar climate.*