SECTION 1

Water Resources

The next time you drink a glass of water, think about where the water came from. Did you know that some of the water in your glass may have been part of a rainstorm that pounded the Earth long before life existed? Or that water may have been part of a dinosaur that lived millions of years ago. Some of the water we drink today has been around since water formed on Earth billions of years ago. Water is essential to life on Earth. Humans can survive for more than a month without food, but we can live for only a few days without water.

Two kinds of water are found on Earth. Fresh water—the water that people can drink—contains little salt. Salt water—the water in oceans—contains a higher concentration of dissolved salts. Most human uses for water, such as drinking and agriculture, require fresh water.

Objectives

- Describe the distribution of Earth's water resources.
- Explain why fresh water is one of Earth's limited resources.
- Describe the distribution of Earth's surface water.
- Describe the relationship between groundwater and surface water in a watershed.

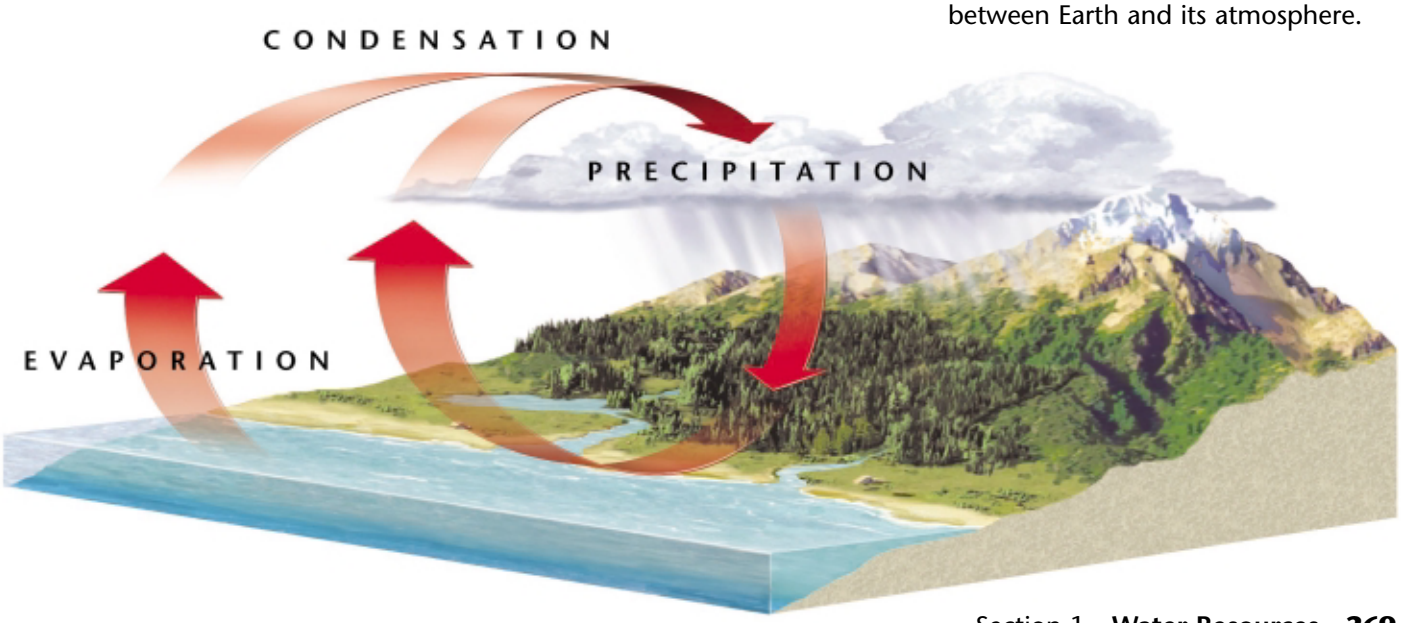
Key Terms

surface water
river system
watershed
groundwater
aquifer
porosity
permeability
recharge zone

The Water Cycle

The Earth is often called "the Water Planet" because it has an abundance of water in all forms: solid, liquid, and gas. Water is a renewable resource because it is circulated in the water cycle, as shown in **Figure 1.** In the water cycle, water molecules travel between the Earth's surface and the atmosphere. Water evaporates at the Earth's surface and leaves behind salts and other impurities. Water vapor, which is a gas, rises into the air. As water vapor rises through the atmosphere, the gas cools and condenses into drops of liquid water that form clouds. Eventually the water in clouds falls back to Earth and replenishes the Earth's fresh water. The oceans are an important part of the water cycle because almost all of Earth's water is in the oceans.

Figure 1 ▶ The water cycle is the continuous movement of water between Earth and its atmosphere.



Global Water Distribution

To understand why fresh water is such a limited resource you have to understand how little fresh water is found on Earth. Although 71 percent of the Earth's surface is covered with water, nearly 97 percent of Earth's water is salt water in oceans and seas. **Figure 2** illustrates this relationship. Of the fresh water on Earth, about 77 percent is frozen in glaciers and polar icecaps. Only a small percentage of the water on Earth is liquid fresh water that humans can use. The fresh water we use comes mainly from lakes and rivers and from a relatively narrow zone beneath the Earth's surface.

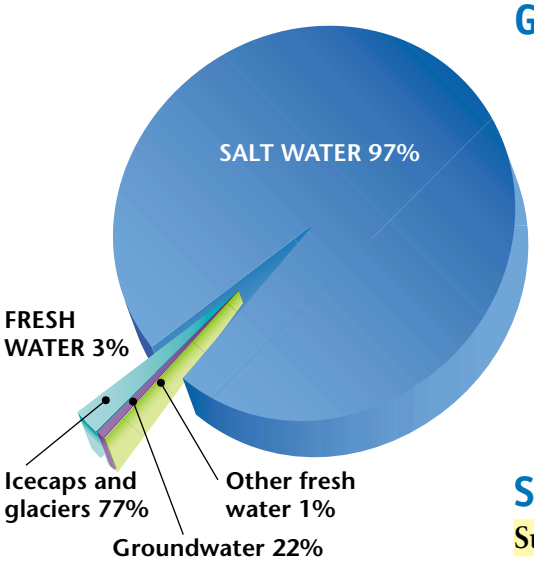
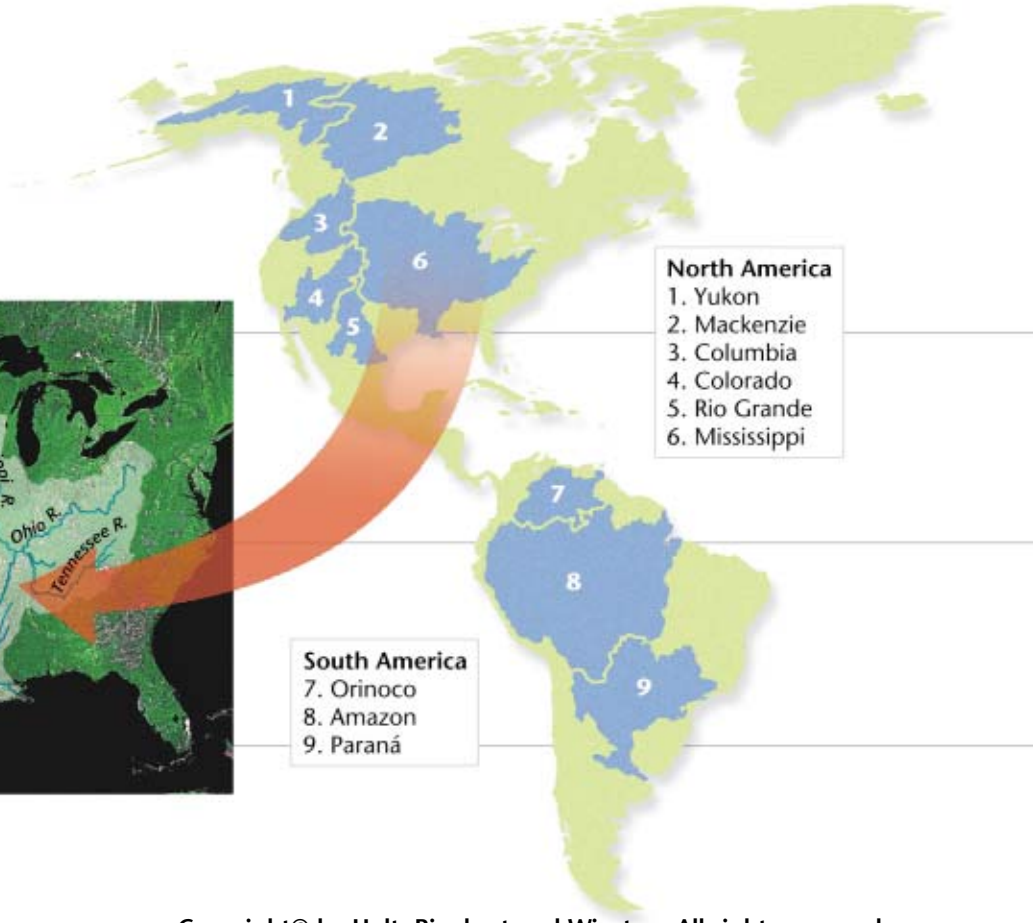


Figure 2 ▶ This pie graph shows the distribution of water on Earth. What percentage of the Earth's fresh water is in lakes and rivers?

Surface Water

Surface water is fresh water on Earth's land surface. Surface water is found in lakes, rivers, streams, and wetlands. Although surface water makes up a small fraction of the fresh water on Earth, the distribution of surface water has played a vital role in the development of human societies. Throughout history, people have built cities, towns, and farms near reliable sources of surface water. Some of the oldest cities in the world were built near rivers. Today, most large cities depend on surface water for their water supplies. Rivers, lakes, and streams provide drinking water, water to grow crops, food such as fish and shellfish, power for industry, and a means of transportation by boat.

Figure 3 ▶ **Watersheds of the World** This map shows the Earth's major watersheds. The highlighted area of the satellite image below shows that the Mississippi River watershed covers almost half of the United States.



River Systems Have you ever wondered where all the water in a river comes from? Streams form as water from falling rain and melting snow drains from mountains, hills, plateaus, and plains. As streams flow downhill, they combine with other streams and form rivers. The more streams that run into a river, the larger the river becomes. As streams and rivers move across the land, they form a flowing network of water called a **river system.** If a river system is viewed from above, it can look like the roots of a tree that are feeding into a trunk. The Mississippi, the Amazon, and the Nile are enormous river systems because they collect the water that flows from vast areas of land. The Amazon River system is the largest river system in the world—it drains an area of land that is nearly the size of Europe.

Watersheds The area of land that is drained by a river is known as a **watershed.** The watershed of the Mississippi River is shown in the satellite image in **Figure 3.** Pollution anywhere in a watershed may end up polluting a river. The amount of water that enters a watershed varies throughout the year. Rapidly melting snow as well as spring and summer rains can dramatically increase the amount of water in a watershed. Other times of the year, the river system that drains a watershed may be reduced to a trickle. Communities that depend on rivers for water can be severely affected by these changes to the river system.

Connection to Biology

Amazon River Dolphins The Amazon River dolphin is one of the world's few freshwater dolphin species. The dolphins are almost completely blind, but they can easily navigate through the silty waters of the Amazon by using sonar.

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