

Section 3

Using Water Wisely

Key Concept Water resources can be endangered by pollution or overuse.

What You Will Learn

- California's water needs are supplied by using groundwater and surface water, by transporting water from one region of California to another, and by importing water from other areas.
- Conserving water and protecting water sources are important in California because the water supply is limited.

Why It Matters

Polluted water can be harmful to you and to the environment.

Did you know that almost 65% of your body is made of water? You depend on clean, fresh drinking water to maintain that 65% of you. But the amount of fresh water available on Earth is limited. Only 3% of Earth's water is drinkable. And of the 3% of Earth's water that is drinkable, 75% is frozen in the polar icecaps. Therefore, protecting our water resources is important.

Groundwater

Although you can see some of Earth's water in streams and lakes, you cannot see the large amount of water that flows underground. Rainwater and water from streams seeps through the soil and into underground rock and soil. Then, water collects in spaces between rock particles. The water found inside the rocks below Earth's surface is called *groundwater*. The rock layer that stores groundwater and allows the flow of groundwater is called an **aquifer**. As **Figure 1** shows, the upper surface of underground water is called the **water table**. The water table can rise or fall depending on the amount of water in the aquifer. In wet regions, the water table can be at or just beneath the soil's surface.

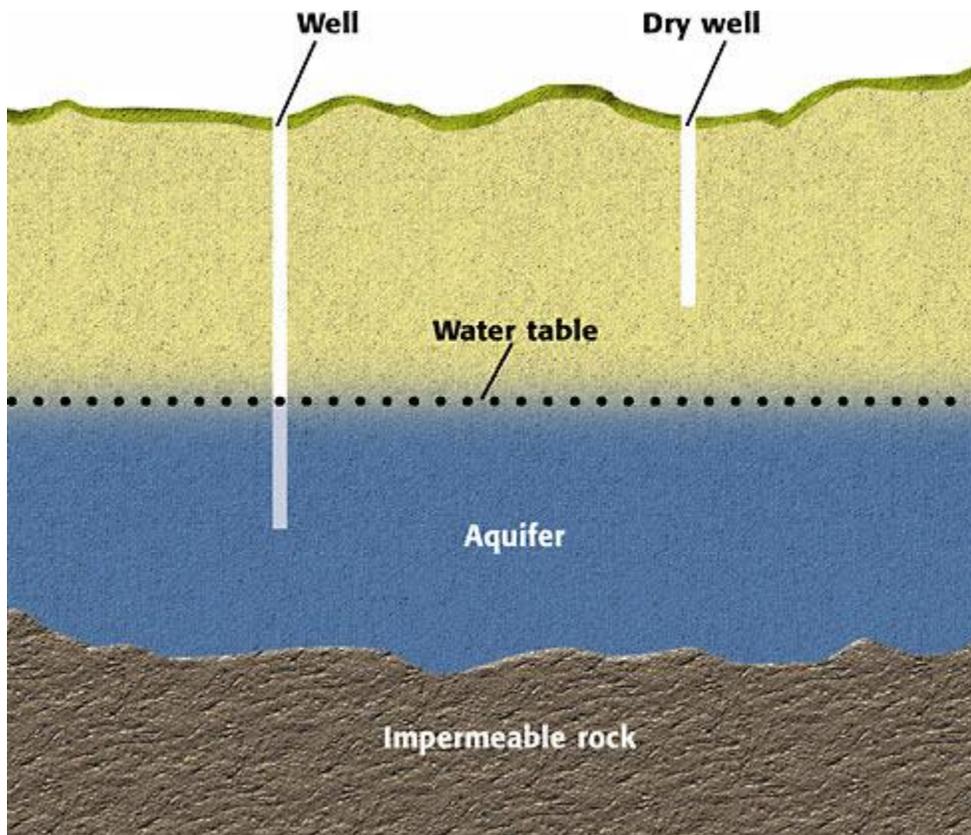


Figure 1 Aquifers contain pores and open spaces to hold water and to allow water to flow. **After heavy rains, would you expect the water table to rise or drop?**

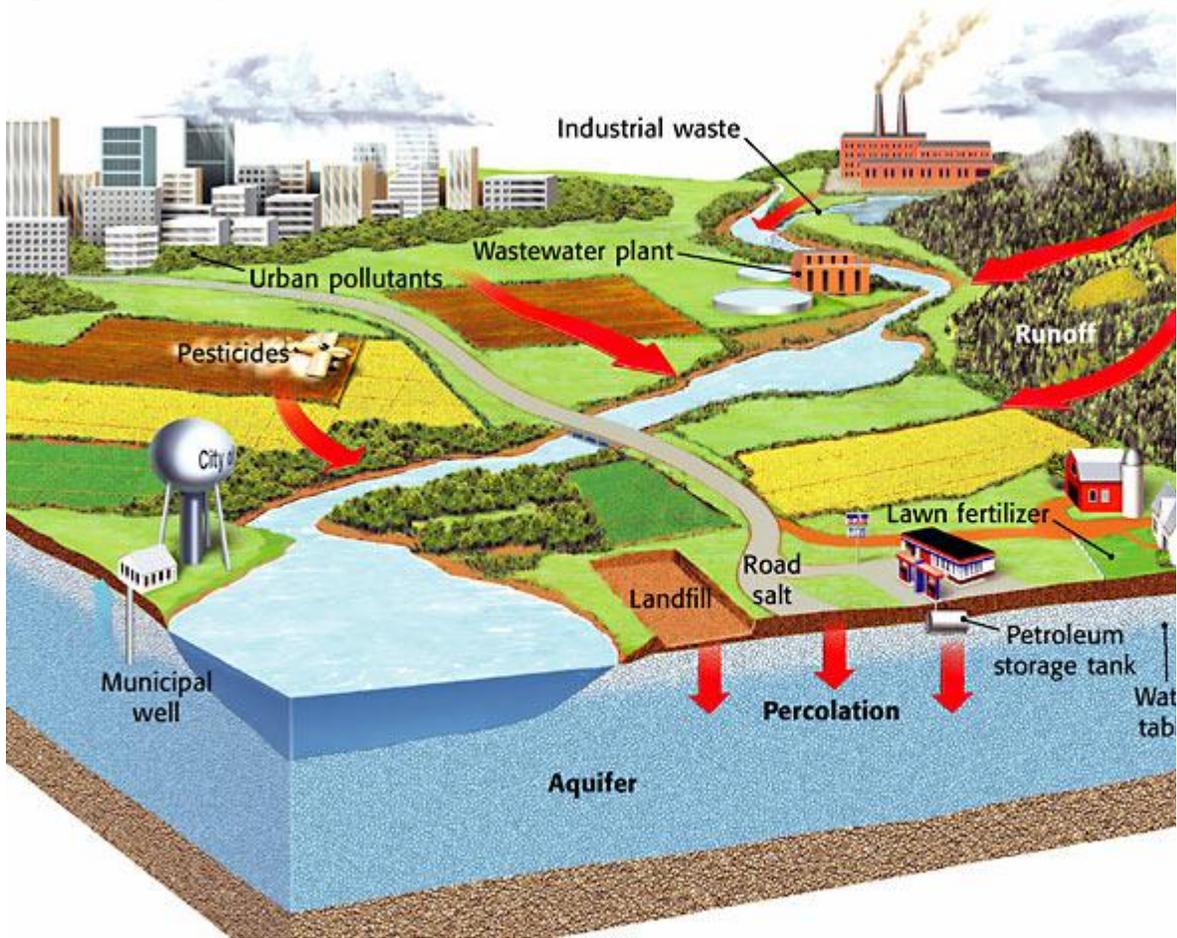
Water Pollution

Water pollution is waste matter or other material that is introduced into water and that is harmful to organisms. Water pollution is harmful to organisms that live in, drink, or are exposed to the water. Surface water, such as the water in rivers and lakes, and groundwater can be polluted by waste from cities, factories, and farms. Water can become so polluted that it cannot be used anymore. In some cases, it can be deadly.

Sources of Water Pollution

To prevent water pollution, people must understand where pollutants come from. **Figure 4** shows major sources of groundwater pollution. Pollution can come from a single source, such as a factory or a leaking gas station tank. Often, pollution from a single source can be identified and traced to the source. But when pollution comes from various sources, identifying those sources may be hard. For example, a river can be polluted by runoff from any of the land in the river's watershed. If a farm, a road, or any other land surface in a watershed is polluted, runoff from a rainstorm can carry the pollution into a nearby river or lake.

Figure 4 Examples of Groundwater Pollution



The Clean Water Act of 1972

In 1969, the Cuyahoga River in Cleveland, Ohio, was so polluted that the river caught on fire and burned for several days, as shown in **Figure 5**. This shocking event helped pass the Clean Water Act of 1972. The stated purpose of the act was to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." The goal of the act was to make all surface water clean enough for fishing and swimming by 1983. This goal was not achieved. However, much progress has been made since the act was passed. The number of lakes and rivers that are fit for swimming and fishing has increased. Many states, including California, have passed stricter water-quality standards of their own.

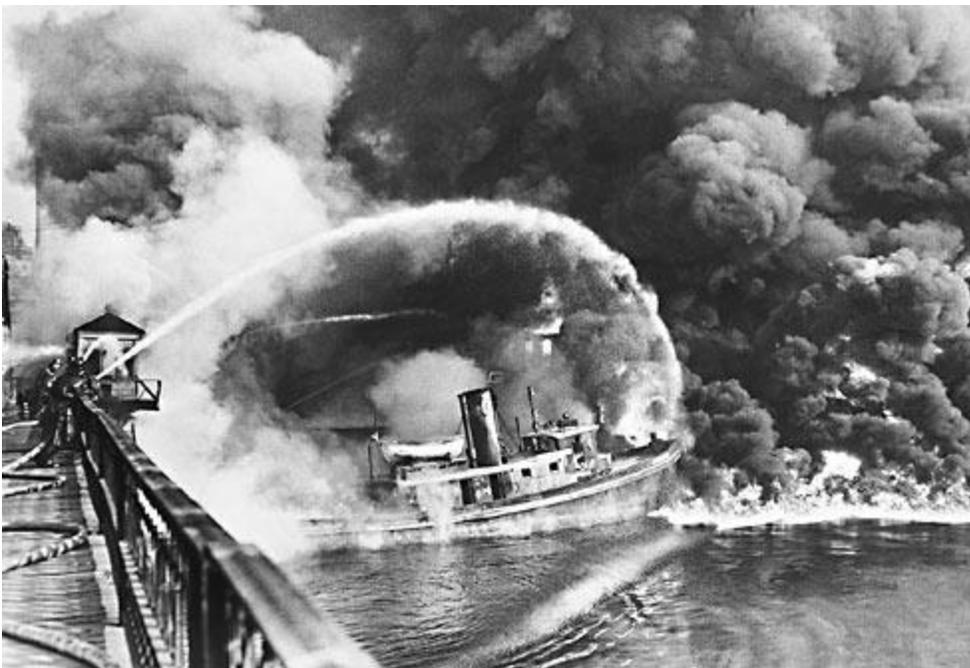


Figure 5 The Cuyahoga River in Ohio was so polluted with petroleum and petroleum byproducts that it caught on fire and burned in 1969.

Other Water-Quality Laws

The Clean Water Act of 1972 opened the door for other water-quality laws. For example, the Marine Protection, Research, and Sanctuaries Act of 1972 has strengthened the laws against ocean dumping. The Oil Pollution Act of 1990 requires all oil tankers traveling in U.S. waters to have double hulls by 2015 as an added protection against oil spills. The Safe Drinking Water Act of 1975 introduced programs to protect groundwater and surface water from pollution.

Legislation has improved water quality in the United States. However, the cooperation of individuals, businesses, and the government will be essential to maintain a clean water supply in the future.

Standards Check Summarize how the Clean Water Act of 1972 has helped reduce water pollution.

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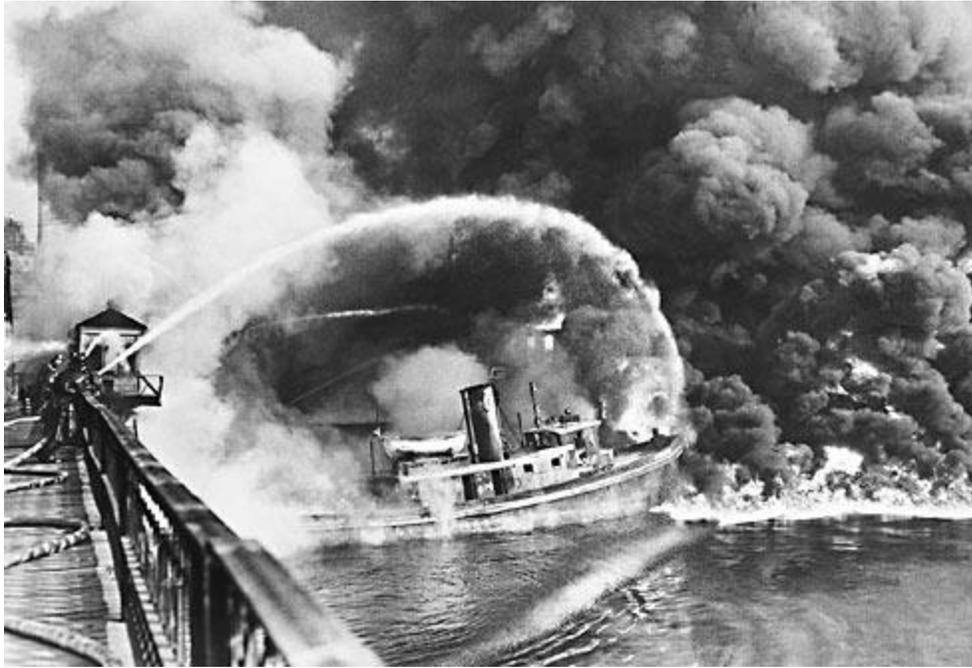


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What You Can Do

Can one person make a difference? When you multiply one by the millions of people who are trying to save water, you can make a big difference. Your behavior alone can help conserve water. For example, you can avoid running the water while brushing your teeth or washing dishes. You can take shorter showers. You can wash the car by using only a bucket and a hose that has a shutoff nozzle. You can run the dishwasher and washing machine only when they are full. As you can see, there are many ways to reduce how much water you use.

Standards Check List four things that you can do to conserve water.



Section Summary

- An aquifer is a rock and soil layer that stores groundwater and allows the flow of groundwater.
- California receives its water from surface water, from aquifers, and from other areas.
- Water sources can be polluted by cities, factories, and farms.
- Water can be conserved by using only the water that is needed, by recycling water, and by using drip irrigation systems.



Chapter Summary

The Big Idea

Topography is reshaped as water flows downhill in streams and rivers.

Section 1

The Active River

Key Concept Water running downhill is the dominant process in shaping the landscape.

- Moving water shapes the surface of Earth by the process of erosion.
- The sun is the major source of energy that drives the water cycle.
- Three factors that affect the rate of stream erosion are gradient, discharge, and load.



Rivers that have a high gradient have a lot of erosive energy.

Section 2

Stream and River Deposits

Key Concept Rivers and streams are dynamic systems that erode, transport sediment, change course, and flood their banks in natural and recurring patterns.

- Three types of stream deposits are deltas, alluvial fans, and floodplains.
- Rivers and streams flood their banks in natural and recurring patterns, and these floods affect humans and wildlife habitats.



The Nile River delta in Egypt formed as a result of stream deposition.

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Native plants get the water that they need from the natural environment.



