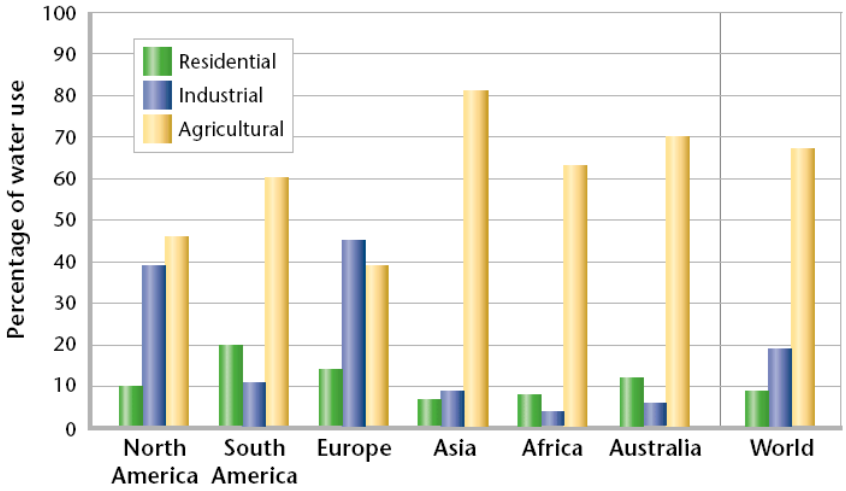
Chapter 11 Section 2

Water Use and Management

- When a water supply is polluted or overused, everyone living downstream can be affected.
- **A shortage of clean, fresh water is one of the world's most pressing environmental problems.**
- According to the World Health Organization, **more than 1 billion people lack access to a clean, reliable source of fresh water.**

Global Water Use

- There are **three major uses for water: residential use, agricultural use, and industrial use.**



Source: World Resources Institute.

Global Water Use

- **Most of the fresh water used worldwide is used to irrigate crops.**
- However, patterns of water use are not the same everywhere. The availability of fresh water, population sizes, and economic conditions affect how people use water.
- **Industry accounts for about 19% of the water used in the world**, with the highest percent occurring in North America and Europe. **About 8% of water is used by households.**

Residential Water Use

- **The average person in the United States uses about 300 L of water a day**. But in India, the average person uses only 41 L of water everyday.
- In the U.S., **only about half of residential water use is for activities inside the home, such as drinking and cooking**. The remainder of the water used residentially is used for activities outside the home such as watering lawns.

Residential Water Use

Daily Water Use in the United States (per Person)	
Use	**Water (L)**
Lawn watering and pools	95
Toilet flushing	90
Bathing	70
Brushing teeth*	10
Cleaning (inside and outside)	20
Cooking and drinking	10
Other	5

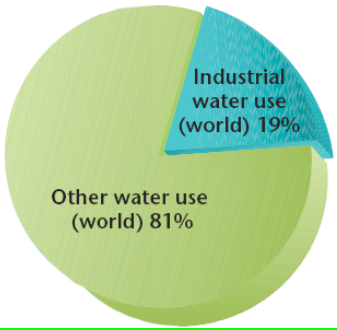
Water Treatment

- Most water must first be made potable.
- **Potable** means suitable for drinking.
- Water treatment removes elements such as mercury, arsenic, and lead, which are poisonous to humans even in low concentrations.
- These elements are found in polluted water, but they can also occur naturally in groundwater.

- A **pathogen** is a virus, microorganism, or other substance that causes disease.
- Pathogens are found in water contaminated by sewage or animal feces, but can be removed with water treatment.
- **There are several methods of treating water to make it potable. A common method includes both physical and chemical treatment.**

Industrial Water Use

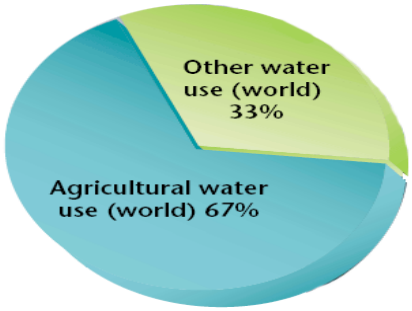
- **Industry accounts for 19% of water used in the world.** Water is used to manufacture goods, to dispose of wastes, and to generate power.



- **Most of the water that is used in industry is used to cool power plants.**

Agricultural Water Use

- **Agriculture accounts for 67% of the water used in the world**. Plants require a lot of water to grow, and **as much as 80% of the water used in agriculture evaporates.**



Irrigation

- **Irrigation** is a method of providing plants with water from sources other than direct precipitation.
- Many different irrigation techniques are used today. For example, some crops are irrigated by shallow, water filled ditches.
- **In the U.S., high-pressured overhead sprinklers are the most common form of irrigation**. However, this method is inefficient because nearly half the water evaporates and never reaches the plant roots.

Water Management Projects

- Water management projects can have various goals, such as bringing in water to make a dry area habitable, creating a reservoir for drinking water, or generating electric power, which then allows people to live and grow crops in desert areas.

Water Diversion Projects

- To supply dry regions with water, all or part of a river can be diverted into canals that carry water across great distances.
- **The Colorado River is divided to meet the needs of 7 states**.
- So much of the river's water is diverted for irrigation and drinking water that the river runs dry before it reaches the Gulf of California.

Dams and Reservoirs

- A **dam** is a structure that is built across a river to control a river's flow.
- A **reservoir** is an artificial body of water that usually forms behind a dam. Water from a reservoir can be used for flood control, drinking water, irrigation, recreation, and industry.
- Hydroelectric dams use the power of flowing water to turn a turbine that generates electrical energy. **About 20% of the world's electrical energy is generated using this method.**
- But, interrupting a river's flow can have consequences. For example, when the land behind a dam is flooded, people are displaced, and entire ecosystems can be destroyed.
- Fertile sediment also builds up behind a dam instead of enriching the land farther down the river, and farmland below may be less productive.

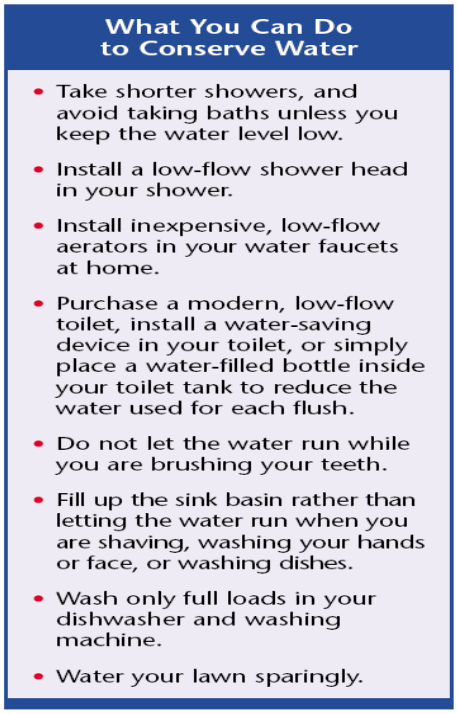
- Dam failure can be another problem. If a dam bursts, the people living along the river below may be killed.

Water Conservation

- **As water sources become depleted, water becomes more expensive.**
- This is because wells must be dug deeper, water must be piped greater distances, and polluted water must be cleaned up before it can be used.
- **Water Conservation is one way that we can help ensure that everyone will have enough water at a reasonable price.**

Most of the water loss in agriculture comes from evaporation, seepage, and runoff.

- **In industry today, the most widely used water conservation practices involve the recycling of cooling water and wastewater**.



Solutions for the Future

- In some places, conservation alone is not enough to prevent water shortages, and as populations grow, other sources of fresh water need to be developed.
- Two possible solutions are:
  - Desalination
  - Transporting Fresh Water

- **Desalination** is the process of removing salt from ocean water.
- Because desalination consumes a lot of energy, the process is too expensive for many nations to consider.