

**DAY ONE**

**Water Resources**

- Water is \_\_\_\_\_ to life on Earth. Humans can live for more than month without food, but we can live for only a few days without water.
- Two kinds of water found on Earth:
  - \_\_\_\_\_, the water that people can drink, contains little salt.
  - \_\_\_\_\_, the water in oceans, contains a higher concentration of dissolved salts.

**The Water Cycle**

- Water is a \_\_\_\_\_ because it is circulated in the water cycle.
- In the water cycle, water molecules travel between the Earth's \_\_\_\_\_.
  - Water \_\_\_\_\_ at the Earth's surface.
- Water vapor rises into the air.
  - As the vapor rises, it \_\_\_\_\_ to form clouds. Eventually the water in clouds falls back to the Earth.
- The oceans are important because \_\_\_\_\_ all of the Earth's water is in the ocean.

**Global Water Distribution**

- Although \_\_\_\_\_ percent of the Earth's surface is covered with water, nearly \_\_\_\_\_ percent of Earth's water is \_\_\_\_\_ in oceans and seas.
- Of the fresh water on Earth, about \_\_\_\_\_ percent is \_\_\_\_\_ in glaciers and polar icecaps.

**Global Water Distribution**

- The fresh water we use comes mainly from \_\_\_\_\_ and from a relatively narrow zone beneath the Earth's surface.

**Surface Water**

- \_\_\_\_\_ is all the bodies of fresh water, salt water, ice, and snow that are found above the ground.
- The distribution of surface water has played a vital role in the \_\_\_\_\_ of human societies.

**River Systems**

- As streams flow downhill, they combine with other streams and form \_\_\_\_\_.
- A \_\_\_\_\_ is a flowing network of rivers and streams draining a river basin.
- The \_\_\_\_\_ system is the largest river system in the world as it drains an area of land that is nearly the size of Europe.

## Watersheds

- A \_\_\_\_\_ is the area of land that is drained by a water system.
- Rapidly melting snow as well as spring and summer rains can dramatically \_\_\_\_\_ the amount of water in a watershed.

## Groundwater

- Most of the fresh water that is available for human use \_\_\_\_\_ be seen, as it exists underground.
- \_\_\_\_\_ is the water that is beneath the Earth's surface.

## Groundwater

- As water travels beneath the Earth's surface, it eventually reaches a level where the rocks and soil are saturated with water.
  - This level is known as the \_\_\_\_\_.
- The water table has \_\_\_\_\_ that match the shape of the land above. Groundwater tends to flow slowly from the peaks to the valleys.

## Aquifers

- An \_\_\_\_\_ is a body of rock or sediment that stores groundwater and allows the flow of groundwater.
- They are an \_\_\_\_\_ water source for many cities.
- The water table forms the \_\_\_\_\_ of an aquifer, and most aquifers consist of materials such as \_\_\_\_\_ that have a lot of spaces where water can accumulate.
- Groundwater can also \_\_\_\_\_ rock formations, filling vast caves with water, creating underground lakes.

## Porosity

- \_\_\_\_\_ is the percentage of the total volume of a rock or sediment that consists of open spaces.
- The more porous a rock is, the more water it can hold.

## Permeability

- \_\_\_\_\_ is the ability of a rock or sediment to let fluids pass through its open spaces or pores.
- Materials such as \_\_\_\_\_ that allow the flow of water are permeable. Materials such as clay or granite that stop the flow of water are impermeable.
- The most productive aquifers usually form in permeable materials, such as \_\_\_\_\_.

## The Recharge Zone

- The \_\_\_\_\_ is an area in which water travels downward to become part of an aquifer.

- Recharge zones are environmentally sensitive areas because any pollution in the recharge zone can also enter the aquifer.

### **The Recharge Zone**

- The size of an aquifer's recharge zone is affected by the \_\_\_\_\_ of the surface above the aquifer.
- Structures such as \_\_\_\_\_ can act as impermeable layers and reduce the amount of water entering an aquifer.

### **Wells**

- A hole that is \_\_\_\_\_ to reach groundwater is called a well.

### **Wells**

- The height of the water table changes seasonally, so wells are drilled to \_\_\_\_\_ below the water table.

---

## Chapter 11, Section 2: Water Use and Management DAY TWO

### **Water Use and Management**

- A shortage of clean, fresh water is one of the world's \_\_\_\_\_ environmental problems.
- According to the World Health Organization, more than \_\_\_\_\_ people lack access to a clean, reliable source of fresh water.

### **Global Water Use**

- There are three major uses for water:  
\_\_\_\_\_.

### **Global Water Use**

- Most of the fresh water used worldwide is used to \_\_\_\_\_.
- Industry accounts for about \_\_\_\_\_ of the water used in the world, with the highest percent occurring in \_\_\_\_\_.
- About \_\_\_\_\_ of water is used by households.

### **Residential Water Use**

- There are striking differences in residential water use throughout the world.
  - For example, the average person in the United States uses about \_\_\_\_\_ of water a day.
  - But in India, the average person uses only \_\_\_\_\_ of water every day.
- 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.

### **Water Treatment**

- Most water must first be made potable.

- \_\_\_\_\_ means suitable for drinking.
- Water treatment removes elements such as \_\_\_\_\_, which are poisonous to humans even in low concentrations.

### Water Treatment

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

### Industrial Water Use

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

### Industrial Water Use

- Most of the water that is used in industry is used to \_\_\_\_\_ power plants.
- Power-plant cooling systems usually \_\_\_\_\_ from a surface water source such as a river or a lake, carry the water through pipes in a \_\_\_\_\_, and then \_\_\_\_\_ the water back into the source.

### Agricultural Water Use

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

### Irrigation

- \_\_\_\_\_ is a method of providing plants with water from sources other than direct precipitation.
- In the U.S., \_\_\_\_\_ sprinklers are the most common form of irrigation.
- However, this method is \_\_\_\_\_ because nearly half the water evaporates and never reaches the plant roots.

### Water Management Projects

- Water management projects, such as \_\_\_\_\_, are designed to meet these needs.
- Water management projects can have various goals, such as
  - bringing in water to make a dry area \_\_\_\_\_
  - creating a \_\_\_\_\_ for drinking water,
  - \_\_\_\_\_, which then allows people to live and grow crops in desert areas.

### Dams and Reservoirs

- A \_\_\_\_\_ is a structure that is built across a river to control a river's flow.
- A \_\_\_\_\_ is an artificial body of water that usually forms behind a dam.

- Water from a reservoir can be used for \_\_\_\_\_.

- Hydroelectric dams use the power of flowing water to turn a \_\_\_\_\_ that generates electrical energy.
- About \_\_\_\_\_ of the world electrical energy is generated using this method.

### **Water Conservation**

- \_\_\_\_\_ is one way that we can help ensure that everyone will have enough water at a reasonable price.

### **Water Conservation in Agriculture**

- Most of the water loss in agriculture comes from \_\_\_\_\_, so technologies that reduce these problems go a long way toward conserving water.
- \_\_\_\_\_ offer a promising step toward conservation.
  - They deliver small amounts of water directly to plant roots by using \_\_\_\_\_.

### **Water Conservation in Industry**

- In industry today, the most widely used water conservation practices involve the \_\_\_\_\_.

### **Water Conservation at Home**

- Water-saving technology, such as \_\_\_\_\_, can also help reduce household water use.
- Another way some people conserve water outside the home is by \_\_\_\_\_, or designing a landscape that requires minimal water use.

### **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**

- \_\_\_\_\_ is the process of removing salt from ocean water.

### **Transporting Water**

- Because \_\_\_\_\_ of the Earth's fresh water is frozen in icecaps, icebergs are another potential freshwater source.

Chapter 11, Section 3: Water Pollution  
**DAY THREE**

**Water Pollution**

- \_\_\_\_\_ is the introduction  
\_\_\_\_\_ into water that is harmful to organisms living in the water or to those that drink or are exposed to the water.
- However, the two underlying causes of water pollution are \_\_\_\_\_.

**Water Pollution**

- In developing parts of the world, water pollution is a big problem because often the only water available for drinking in these countries is polluted with \_\_\_\_\_, which can spread waterborne diseases.
- Water pollution comes from two types of sources:  
\_\_\_\_\_.

**Point-Source Pollution**

- \_\_\_\_\_ is pollution that comes from a specific site.

**Nonpoint-Source Pollution**

- \_\_\_\_\_ is pollution that comes from many sources rather than from a single specific site.
- An example is pollution that reaches a body of water from \_\_\_\_\_.
- Controlling nonpoint-source pollution depends to a great extent on \_\_\_\_\_ of the effects of activities such as spraying lawn chemicals.

**Wastewater**

- \_\_\_\_\_ is water that contains wastes from homes or industry.
- At a wastewater treatment plant, water is \_\_\_\_\_ to make the water clean enough to return to a river or lake.

**Treating Wastewater**

- Most of the wastewater from homes contains \_\_\_\_\_ that can be broken down by living organisms.

**Sewage Sludge**

- One of the products of wastewater treatment is \_\_\_\_\_, the solid material that remains after treatment.
- Sludge can be an \_\_\_\_\_ to cities as the volume of sludge that has to be disposed of every year is enormous.

**Sewage Sludge**

- If the toxicity of sludge can be reduced to safe levels, it can be used as a \_\_\_\_\_.

### Artificial Eutrophication

- Most nutrients in water come from \_\_\_\_\_, such as leaves and animal waste that is broken down into mineral nutrients by decomposers such as bacteria and fungi.
- Nutrients are an essential part of any aquatic ecosystem, but when lakes and slow-moving streams contain an abundance of nutrients, they are \_\_\_\_\_.

### Artificial Eutrophication

- Eutrophication is a \_\_\_\_\_
- When organic matter builds up in a body of water, it will begin to \_\_\_\_\_.

### Artificial Eutrophication

- The natural process of eutrophication is accelerated when inorganic plant nutrients, such as \_\_\_\_\_, enter the water from sewage and fertilizer runoff.
- \_\_\_\_\_ is a process that increases the amount of nutrients in a body of water through human activities, such as waste disposal and land drainage.
- The major causes of eutrophication are \_\_\_\_\_ in some laundry detergents.

### Artificial Eutrophication

- \_\_\_\_\_ is a plant nutrient that can cause the excessive growth of algae.
- In bodies of water polluted by phosphorus, algae can form large floating mats, called \_\_\_\_\_.

### Thermal Pollution

- \_\_\_\_\_ is a temperature \_\_\_\_\_ in a body of water that is caused by \_\_\_\_\_ and that has harmful effect on water quality and on the ability of that body of water to support life.
- Thermal pollution can occur when \_\_\_\_\_ and other industries use water in their cooling systems and then discharge the warm water into a lake or river.

### Thermal Pollution

- Thermal pollution can cause \_\_\_\_\_ if the discharged water is too warm for the fish to survive.
- As oxygen levels \_\_\_\_\_, aquatic organisms may \_\_\_\_\_.

### Groundwater Pollution

- Pollutants usually enter groundwater when polluted surface water \_\_\_\_\_ down from the Earth's surface.

- \_\_\_\_\_ products are common groundwater pollutants.

### Groundwater Pollution

- \_\_\_\_\_ are another major source of groundwater pollution because as they age, they may develop leaks that allow pollutants to seep in to the groundwater.

### Cleaning Up Groundwater Pollution

- Groundwater pollution is one of the \_\_\_\_\_ problems in the world.

### Ocean Pollution

- But at least \_\_\_\_\_ percent of ocean pollution, including pollutants such as \_\_\_\_\_ comes from activities on land, near the coasts.

### Oil Spills

- Ocean water is also polluted by accidental oil spills. Each year, about \_\_\_\_\_ from tanker accidents are spilled into the ocean.
- Such oil spills have dramatic effects, but they are responsible for only about \_\_\_\_\_ in the oceans.
- Water Pollution and Ecosystems

### Water Pollution and Ecosystems

- Water pollution can cause immediate damage to an ecosystem, but the effects can be far reaching as some pollutants build up in the environment because they do not decompose quickly.
- \_\_\_\_\_ is the accumulation of pollutants at successive levels of the food chain.
- Biomagnification has alarming consequences for organisms at the top of the food chain, and is one reason why U.S. states \_\_\_\_\_ of fish people can eat from certain bodies of water.

### Cleaning Up Water Pollution

- \_\_\_\_\_ was to designed to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.”
- The percentage of lakes that are fit for swimming has increased by \_\_\_\_\_, and many states have passed stricter water-quality standards.

### Cleaning Up Water Pollution

- For example, the \_\_\_\_\_ strengthened the laws against ocean dumping.
- Also, the \_\_\_\_\_ requires all oil tankers traveling in U.S. waters to have double hulls by 2015 as an added protection against oil spills