Learning Objectives: At the end of this chapter, students will understand:

- Why water is one of the major resource issues of the 21st century
- What a water budget is, and why it is useful in analyzing water supply problems and potential solutions
- What groundwater is, and what environmental problems are associated with its use
- How water can be conserved at home and in industrial and agricultural practice
- Why sustainable water management will become more difficult as the demand for water increases
- Why sustainable water management will become more difficult as the demand for water increases
- The concepts of virtual water and a water footprint and their link to water management and conservation
- What the environmental impacts are of water projects such as dams, reservoirs, canals and channelization
- What a wetland is, how wetlands function, and why they are important
- Why we are facing a growing global water shortage linked to our food supply

Case Study: Palm Beach County, Florida: Water Use, Conservation and Reuse
What are some of the benefits of using reclaimed water?

1: What are some of the factors that make water so special?

2: What is the largest reservoir of water on Earth?
What is the largest reservoir of freshwater on Earth?

3: What is the residence time of water in the atmosphere?
Groundwater and Streams
4: What is the water table?

5: What is a discharge zone?

6: What is an aquifer?

What is a cone of depression? How is it created?

7: What is an effluent stream?
What is a stream that flows all year called?

8: What is an influent stream?
What is a stream that doesn’t flow all year called?

Water Supply: A U.S. Example
9: What is a water budget? How is it calculated?

Precipitation and Runoff Patterns
10: What is the average water use for people in the U.S.?
What is the average water use for people in Europe?
What is the average water use for people in Sub-Saharan Africa?

Groundwater Use and Problems
11: How many people in the U.S. use groundwater as a source of drinking water?

12: What problems can groundwater overdraft cause?

13: What is happening to the Ogallala Aquifer (High Plains Aquifer)?
Desalination as a Water Source
14: What is the percentage of salt in saltwater? ______% 

15: To be used as a freshwater source, the salt content must be reduced to about ____%

16: What are some of the environmental impacts of desalination?

Water Use
17: Describe the difference between off-stream use and in-stream use.

18: What is one of the issues with off-stream use in the Pacific Northwest?

19: Describe what happened to the Aral Sea.

Some Trends in Water use
20: What are the two biggest users of freshwater withdrawals?

Water Conservation
21: What are some of the suggestions for improved irrigation to conserve water?

Public Supply and Domestic Use
22: Domestic use of water (homes) accounts for ____% of total national water withdrawals.

23: What is Southern California (San Diego) doing to help with water shortages in the future?
24: List 5 things that you can do at home to help conserve water usage

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**Virtual Water**
25: What is *virtual water*?

26: How much water does it take to *make a cup of coffee*?

27: How much water does it take to *raise beef*?

**Wetlands**
28: How do we define *wetlands*?

29: Wetlands are very important, what are the *natural service functions* of wetlands?

30: How much of the original wetlands of the U.S. have disappeared? ____%

**Restoration of Wetlands**
31: What did the *National Environmental Policy Act* of 1969 require?

**Dams and the Environment**
32: Explain the *environmental impacts of dams*
33: What are the **PROS and CONS** of the Three Gorges Dam?

34: What are some of the *issues associated with removing of dams*?

**Global Water Shortage Linked to Food Supply**

35: What are the environmental issues associated with global water shortage and food supply?

36: Water is one of our most abundant resources, *why are we concerned about its availability in the future***?

**Study Questions**

1: Which is more important from a national point of view, conservation of water use in agriculture or in urban areas? *Why?*