Chapter 13
Water Resources

Chapter Outline

CORE CASE STUDY The Colorado River Story

13-1 Will We Have Enough Usable Water?

--What services does the Colorado River provide. For how many states, and how many people?
--What percent of the river's flow is diverted for use in the U.S.? How much is thought to be required for regenerating the estuaries in Baja California?
--How much lower has the annual rainfall been in the South West during the last prolonged drought?
--How much food is produced from water from the Colorado?
--What are four major problems associated with the use of water from the Colorado?

13-1 Will we have enough usable water?

--What important services does water provide? Review water properties pg. 64.
--What percent of the earth's water supply is available to us as accessible, liquid freshwater?
--Why is access to water a global health issue? An economic issue? A security issue? An environmental issue?
--What percentage of people do not have water piped to their homes? What kinds of hardships does this present?
--How do humans alter the hydrologic cycle?
--How is freshwater seen as a tragedy of the commons?
--How has our use of water violated the full-cost principle of sustainability?
--Distinguish between the zone of saturation, the water table, and aquifers.
--Roughly how much more water is in aquifers than in surface lakes and rivers?
--What are lateral and natural recharge? What affects the rate of recharge?
--What are nonrenewable aquifers?
--How can depleting groundwater resources affect surface water?
--What percent of annual runoff is available for human use? How much do we use currently, and how much is projected by 2025?
--What are the three biggest uses of water?
--What is a water footprint? How much water does the typical American use?
--What is virtual water? Who are the largest exporters?
--Why would a country opt to import food rather than use its own water to grow its own?
--If the U.S. has more than enough water to meet its needs, why are there water problems?
--What are the major uses of water in the U.S. (%)?
--Explain water hotspots.
--Why are conflicts among nations over shared water resources likely to increase?

13-2 Is groundwater a sustainable resource?

--What are the advantages of using groundwater? What are the disadvantages?
--On average, how much faster is groundwater being pumped than renewed in the U.S.?
--How have government subsidies accelerated the depletion of the Ogallala aquifer in the U.S.?
--How does the Ogallala aquifer support biodiversity?

--How does over pumping contribute to subsidence? What are the problems associated with it?
--What are ways to reduce or prevent groundwater depletion?
--What are deep aquifers, and what are the potential problems associated with tapping them?

13-3 Can surface water resources be expanded?

--What services due dams and reservoirs provide?
--What are the drawbacks of large dams?
--What percent of the worlds freshwater fish and plants are thought to be endangered of extinct due to dams?
--How many of the Earth's longest rivers consistently run all the way to the sea?
--Why is the lifespan of most dams about 50 years?
--How can dams kill estuaries?
--What are the best suggestions for solving the problems with the Colorado River?

13-4 Can water transfers be used to expand water supplies?

--What are the benefits of transferring water to arid regions?
--What percent of the U.S. produce is produced in the Central Valley of CA?
--What are the disadvantages of transferring water?
-- Why does inefficient use of water continue in U.S. agriculture? What could be done to address it?
--How will climate change affect water supplies?
--What are some of the consequences of diverting water from the Aral Sea, and allowing it to go dry?

13-5 **Is desalination a useful way to expand water supplies?**

--Describe the two methods of desalinization.
--What are the problems with widespread use of desalinization?

13-6 **How can we use freshwater more sustainably?**

--Roughly how much freshwater is wasted due to evaporation, leaks, and inefficient use?
--Why are such losses tolerated?
--What are the least efficient methods of irrigation? What are the most efficient?
--What is a tensiometer, and how can it be used by rural farmers?
--What are solutions to reducing irrigation water losses?
--What steps can individuals take to reduce personal water consumption?
--How does the use of gray water follow the principle of sustainability?
--What are solutions for reducing water losses?
--What is a compostable toilet?

13-7 **How can we reduce the threat of flooding?**

--What benefits do floods provide?
--What human activities have caused an increase in flooding?
--What factors have influenced/increased flooding in Bangladesh? What effects has this flooding had on Bangladesh?
--What precautions is Bangladesh taking to accommodate a rise in sea level?
--What strategies do scientists recommend for reducing flood risk?

What are the three big ideas of this chapter?