

# 2010 Learning Objectives

## **HYDROLOGY AND CLIMATOLOGY**

1. Explain the hydrologic relationship and the environmental benefits of groundwater and surface water.
2. How does global warming affect water supplies? Explain how this effect on water supplies impacts both groundwater and energy supplies.

## **WATER QUALITY AND QUANTITY**

1. Know the two greatest users of fresh water in North America and explain why conjunctive use of groundwater and surface water is important to ground water management and optimizing supply.
2. Appraise the value of groundwater as a component to an integrated regional water management plan, and propose strategies to increase and replenish groundwater supplies.
3. Describe the sources of pollution to groundwater and evaluate strategies for cleanup or improving groundwater quality.

## **The WATER/ENERGY NEXUS**

1. Assess the negative energy impact that is associated with desalination and explain why this is a major concern for the construction of desalination facilities for San Diego, CA.
2. Evaluate the impact of energy production on fresh water supplies. Compare and contrast the effect on groundwater resulting from increased production of energy from nuclear and fossil fueled power plants and from biofuels necessitated by a large increase in the use of electric cars including the direct effect on groundwater resulting from the production of biofuels from both algae and cultivated plants such as soy beans and switch grass.
3. Outline a management policy that will protect and manage groundwater resources for the needs of humans, the environment, the economy and energy production. Differentiate the different roles that government agencies will have in protecting and managing groundwater resources as well as how water use is regulated at the state/province and federal level.

## **LAND USE PLANNING AND ITS EFFECTS ON GROUNDWATER**

1. Describe where groundwater depletion is occurring, the areas at risk in the future and explain how is groundwater depletion is directly related to energy use and water demand. Evaluate the impact of ground water depletion in the San Joaquin Valley watershed.
2. Analyze the impact of over pumping of groundwater and justify reasons why land use planning is necessary for groundwater management. Students should design, propose and justify management practices to achieve water conservation and water use efficiency as part of a groundwater management plan in both an urban and rural/agricultural watershed.
3. Identify the concept of conjunctive use management for groundwater basins and the integration of basin recharge programs to accommodate urban and agricultural overdraft challenges. Identify the advantages and disadvantages of instituting basin management programs.