Answer Key for "Forests Are More than Trees"

TEACHER PAGE

Answers to "Questions for "Forests Are More than Trees"" student page (page 29)

1. Forest ecosystem services may include the following:
   - *Clean Water*. Forests absorb rain, cool and cleanse water, recharge underground aquifers, reduce flooding, and sustain watersheds.
   - *Oxygen*. Forests absorb carbon dioxide (CO_2) from the atmosphere and release oxygen.
   - *Nutrient Cycling*. Forest trees absorb nutrients from the soil and store them in their cells; nutrients are returned to the soil and atmosphere when trees die.
   - *Carbon Storage*. Forests store CO_2 from the atmosphere.
   - Temperature Regulation and Rainfall. With transpiration, forests can influence regional temperatures and annual rainfall.
   - *Wildlife Habitat*. Forests provide food, shelter, and water for thousands of plant and animal species.
   - *Resources*. Forests provide charcoal, firewood, fruits, nuts, lumber, medicines, paper, turpentine, and other resources.

2. Forces that changed North American forests both before and after European settlement include:
   (a) Before European settlement: Native people regularly burned forestland for hunting, for ease of travel, to reduce insect pests, and to promote berries and other foods. In some regions, native people also cleared forests to grow crops.
   (b) After European settlement: Both the human population and their reliance on forests increased. Forests were extensively cleared for agriculture, fuelwood, timber, and urban expansion. Starting in the 20th century, conservation practices have helped to stabilize forests.

3. Pressing issues facing North American forests include climate change, fire, invasive species, and changes in ownership.

4. Invasive species are plants, animals, or diseases that are capable of spreading rapidly and causing economic or environmental harm. Invasive species are a problem for forests because they displace native species and trigger other disturbances.

5. Benefits of fire include helping some species reproduce, helping with decomposition, and aiding nutrient cycling.

   Costs of fire include loss of property, health risks, and the monetary cost of suppression.

6. Increased levels of CO_2 in the atmosphere are causing changes in the Earth's climate. Climate change is expected to affect the extent, location, and structure of forests. Because forests absorb and sequester CO_2, they are an important way to reduce CO_2 in the atmosphere and, thus, reduce the effects of climate change.

7. In recent years, forest products companies have sold large tracts of land to individual and group investors. Also, a large percentage of private forest is currently held by elderly owners and so is expected to change hands in the near future. Both of those trends are likely to result in a significant loss of forestland.

8. Interactions between trees and other forest ecosystem components may include:
   - *Food Webs.* These webs involve the transfer of food energy among forest organisms, including consumers, decomposers, and producers.
   - *Nutrient Cycles.* Cycling includes vital nutrients such as carbon, nitrogen, phosphorus, potassium, and sulfur, which are absorbed into the tree, stored in its cells, and then returned to the soil after the tree dies.
   - *Photosynthesis*. Trees and other plants use the sun's energy to convert CO_2 and water into carbohydrates and oxygen.
   - *Associations*. These relationships are among forest organisms, including symbiotic relationships such as commensalism, mutualism, and parasitism.
   - *Connections*. Forest trees play different roles, such as providing food, homes, shade, and shelter, as well as fixing nitrogen.
   - *Seasonal Changes*. Evolving changes in sunlight, temperature, and precipitation affect forest plants and animals in a number of ways.

9. An urban forest is the collection of trees in a city, town, or suburb. Benefits of urban forests include beauty, clean water and air, energy savings, open space, reduced noise, places for recreation, and wildlife habitat.

10. Forest sustainability is managing forests to meet the needs of the present while enabling future generations to meet their needs. Balancing current and future needs is critical to the survival of forests and the people who depend on them.