**Chapter 17**

**Land Resources**

**Lecture Outline:**

1. Land Use
   1. One of the best ways to maintain biological diversity and to protect endangered and threatened species is by preserving or restoring the natural areas to which these organisms are adapted
   2. World land use
      1. Currently, humans use an estimated 3% of the world’s total land area for cities and 38% for agriculture
      2. 29% remain as natural ecosystems with the potential for human development
   3. Land use in the United States
      1. 55% of U.S. land is privately owned, 3% by Native American tribes
      2. 35% of U.S. land is owned by the federal government, 7% by local and state governments
      3. Managing public and private land
         1. Economic factors largely control land use
         2. The *wise-use movement* believes that the primary purpose of federal lands is to enhance economic growth
         3. The *environmental movement* views federal lands as a legacy of U.S. citizens
2. Wilderness, Parks, and Wildlife Refuges
   1. *Wilderness* encompasses regions where the land and its community of organisms are not greatly disturbed by human activities and where humans visit but do not permanently inhabit
      1. The Wilderness Act of 1964 sets aside federally owned land as part of the *National Wilderness Preservation System*
         1. These areas are to remain natural and unchanged for future generations to enjoy
         2. They are given the highest protection of any public lands
      2. *Invasive species* that have become established in wilderness have the potential to upset the balance among native species
   2. National parks
      1. The National Park System (NPS) was created in 1916; it currently administers 388 sites, 58 of which are national parks
      2. One of the primary roles of the NPS is to teach people about the natural environment, management of natural resources, and history of a site by providing nature walks and guided tours of its parks
      3. Threats to U.S. parks
         1. Human activity (i.e., crime, vandalism, litter, pollution, etc.)
         2. Declining populations of many species of mammals (i.e., bears)
         3. Environmental stressors (i.e., pollution)
      4. Natural regulation
         1. *Natural regulation* is a management policy that involves letting nature take its course
         2. In Yellowstone, elk herds and fire are controlled by natural regulation
   3. Wildlife refuges
      1. The National Wildlife Refuge System was established in 1903
      2. It contains more than 535 refuges that aim to preserve lands and waters for the conservation of fishes, wildlife, and plants
3. Forests
   1. Forests play an essential role in local and regional precipitation, and in regulating global biogeochemical cycles
   2. Forest management
      1. Traditional forest management often results in low-diversity forests where such *monocultures* cannot support the variety of organisms typically found in natural forests
      2. *Ecologically sustainable forest management* (*sustainable forestry*) maintains a mix of forest trees by age and species, thus seeking to conserve forests for the long-term commercial harvest of timber and nontimber forest products
         1. *Wildlife corridors* are protected zones that connect isolated unlogged or undeveloped areas
         2. The purpose of wildlife corridors is to provide escape routes, migration routes, and larger territories for various animals
      3. Harvesting trees
         1. The U.S., Canada, Russia, Brazil, and China currently produce more than half of the world’s timber
         2. 50% of harvested wood is burned directly as fuelwood or to make charcoal
         3. Loggers harvest trees in several ways
            1. *Selective cutting*
            2. *Shelterwood cutting*
            3. *Seed tree cutting*
            4. *Clearcutting*
   3. Deforestation
      1. The most serious problem facing the world’s forests is *deforestation*
      2. Causes include fires caused by drought and land-clearing practices, expansion of agriculture, construction of roads, tree harvests, insects and diseases
      3. Deforestation often results in decreased soil fertility, increased soil erosion, increased sedimentation of waterways, formation of deserts, and species extinction
   4. Forest trends in the United States
      1. The U. S. has 155 national forests
      2. In recent years temperate forests have expanded as the result of secondary succession
      3. More than one half of U.S. forests are privately owned
         1. The Forest Legacy Program is a provision of the 1990 Farm Bill that helps private land owners protect environmentally important forestlands from development
         2. *Conservation easements* are legal agreements that protect privately owned forest from development for a specified number of years
   5. Trends in tropical forests
      1. *Tropical rain forests* are found in Central and South America, Africa, and Southeast Asia
         1. They occur in warm, moist climates
         2. Most receive more than 200 cm of precipitation annually
      2. *Tropical dry forests* receive less annual precipitation and are subject to a prolonged dry season
         1. Trees typically shed their leaves and remain dormant in the dry season
         2. They occur in India, Kenya, Zimbabwe, Egypt, and Brazil
      3. Most of the remaining undisturbed tropical forests are being cleared and burned at a rate unprecedented in human history
         1. Why are tropical rain forests disappearing?
            1. Population growth, economic, social and government factors, subsistence agriculture, commercial logging, cattle ranching, and mining
            2. *Slash-and-burn agriculture* is practiced by nearly 200 million subsistence farmers in tropical rain forests

The first crop yield is often quite high

Soil productivity declines rapidly, and the process is repeated on a new tract of land

* + - 1. Why are tropical dry forests disappearing?
         1. Primarily for fuelwood
         2. Wood is used as heating and cooking fuel by much of the developing world
  1. Boreal forests and deforestation
     1. Boreal forests comprise the world’s largest biome; they occur in Alaska, Canada, Scandinavia, and northern Russia
     2. They are currently the primary source of the world’s industrial wood and wood fiber and are harvested primarily by clearcut logging

1. Rangelands and Agricultural Lands
   1. *Rangelands* are grasslands that serve as important areas of food production for humans by providing fodder for livestock
   2. Rangeland degradation and desertification
      1. The *carrying capacity (K)* of a rangeland is the maximum number of animals the rangeland plants can sustain over an indefinite period without deterioration
         1. When the *K* of the rangeland is exceeded, grasses and other plants are *overgrazed*
         2. During dry periods (droughts) the *K* of the rangeland is considerably lower
      2. *Land degradation* often results when overgrazing and extended drought occur at the same time
         1. This results in the *desertification* of once fertile rangeland
         2. Worldwide, desertification seems to be on the increase
         3. 135 million people are in danger of displacement as a result of desertification
   3. Rangeland trends in the United States
      1. Rangelands make up approximately 30% of the total land area in the U.S. and occur mostly in the western states
         1. One-third is publicly owned; two-thirds is privately owned
         2. The Bureau of Land Management guided by the Taylor Grazing Act (1934), the Federal Land Policy and Management Act (1976), and the Public Rangelands Improvement Act (1978) manages approximately 69 million of the 89 million hectares of public rangelands
      2. Grazing fees on public rangelands
         1. In 2004, the monthly grazing fee was $1.43 per cow on lands managed by BLM and $1.52 per month on lands managed by the USFS
         2. On private land the fee is more than $13 per cow
   4. Agricultural lands
      1. The U.S. has more than 121 million hectares of *prime farmland*
      2. Much of the prime farmland is falling victim to urbanization and suburban sprawl
2. Wetlands and Coastal Areas
   1. *Wetlands* are lands transitional between aquatic and terrestrial ecosystems
      1. Wetlands recharge groundwater, reduce damage from flooding, improve water quality, provide a habitat for many species (including many threatened and endangered species), and are recreational sites for human activity
      2. The loss of wetlands is legislatively controlled by a section of the 1972 Clean Water Act
         1. The federal government owns less than 25% of wetlands in the lower 48 states, the remaining 75% is privately owned
         2. Although some private owners recognize the value of wetlands and voluntarily protect them, others are constrained by economic realities that dictate what they must do with their land
         3. Congress authorized the Wetlands Reserve Program under the Food Security Act of 1985 to help restore and protect privately owned freshwater wetlands that were previously drained
   2. Coastlines
      1. Intact coastal wetlands moderate the effects of tides more inexpensively than engineering structures such as retaining walls
      2. Few laws protect shoreline along bays and sounds
      3. Coastal demographics
         1. Many coastal areas are overdeveloped, highly polluted, and overfished
         2. About two-thirds of the world’s population live within 150km of a coastline
3. Conservation of Land Resources
   1. Our ancestors considered natural areas as an unlimited resource to exploit
   2. Conservation strategies that set aside ecosystems are the best way to preserve an area’s biodiversity