

## CH10 - Sustaining Terrestrial Biodiversity: The Ecosystem Approach

### Ecosystem Services

- Ecosystem services are natural services that support life on Earth and are essential to the quality of human life and the functioning of the world's economies. There are four basic types:
  - \_\_\_\_\_: food, water, medicine, raw materials
  - Regulating: pollination, water purification, pest control
  - \_\_\_\_\_: species habitats, genetic diversity
  - Cultural: recreation, intellectual development, tourism

### Public Lands in the U.S.

- 42% of U.S. lands is set aside for public use, enjoyment, and wildlife (73% of which is in \_\_\_\_\_).
- Multiple-Use Lands (National Forest System & National Resource Lands)
  - National Forest System operates on two principles
    - Principle of \_\_\_\_\_ yield: renewable resources should not be harvested faster than they are replenished
    - Principle of multiple use: land should be used simultaneously for a variety of uses

### Types of Forests

- There are three general types of forests, depending on climate: Tropical, Temperate and Polar
- \_\_\_\_\_-Growth Forests are uncut forests and regenerated forests that have not been seriously disturbed for at least several hundred years
- \_\_\_\_\_-Growth Forests are stands of trees resulting from secondary ecological succession after cutting

### Economic Importance of Forests

- Forests provide lumber for housing, biomass for fuelwood, pulp for paper, medicines, and many other products
  - Worldwide, 55% of the timber cut each year is used for \_\_\_\_\_ and cooking
  - The United States is the world's largest per capita importer of wood products. China is the largest overall importer.

### Ecological Importance of Forests

- Forest watersheds filter and regulate flow of water from mountain highlands to croplands and urban areas
- Forests influence \_\_\_\_\_ (50-80% of atmospheric water vapor comes from trees via transpiration and evaporation)
- Forests are a critical component of the \_\_\_\_\_ cycle, taking up 90% of atmospheric carbon dioxide
- Forests provide more habitats for wildlife species than any other biome

### Deforestation of Tropical Forests

- The loss and degradation of remaining tropical forests is 46,000 square miles per year. To compare, North Carolina is 54,000 square miles.
- \_\_\_\_\_ causes include population growth, poverty and government policies
- \_\_\_\_\_ causes include roads, logging, farming, ranching, flooding from dams, mining, and oil drilling

### Forest Management

- The two basic forest management systems
  - \_\_\_\_\_-aged management (or industrial forestry) is when trees are planted and maintained at about the same age and size using monoculture techniques to be harvested simultaneously
  - \_\_\_\_\_-aged management involves the planting of a variety of tree species at many ages for multiple uses. This increases the biodiversity of the area and creates a more stable environment

### Tree Harvesting

- Loggers use various methods to harvest trees
- With selective cutting, intermediate-aged or mature trees are cut singularly or in small groups, creating gaps no bigger than the height of the standing trees
  - \_\_\_\_\_ \_\_\_\_\_ is the selective cutting of the most valuable trees

### **Tree Harvesting (continued)**

- Shelterwood cutting removes all mature trees in two or three cuttings over a period of 10 years
- Seed-tree cutting harvests nearly all of a stand's trees in one cutting, leaving a few uniformly distributed seed-producing trees to regenerate the stand
- \_\_\_\_\_ - \_\_\_\_\_ is the removal of all trees from an area in a single cutting, which is economically advantageous.
- Strip-cutting is clear-cutting a strip of trees along the contour of the land, with a corridor narrow enough to allow natural regeneration.
- Whole-tree harvesting involves cutting trees at the ground level or uprooting entire trees to be placed in a chipping machine for use as pulpwood or fuelwood chips

### **Forests and Fire**

- Intermittent natural fires are an important part of the ecological cycle of some types of forests
  - \_\_\_\_\_ fires usually burn only undergrowth and leaf litter on the forest floor
  - Crown fires may start on the ground but eventually burn whole trees and leap from treetop to treetop
- Protecting forest resources from fire can involve four approaches
  - Prevention
  - \_\_\_\_\_ burning: setting controlled ground fires to prevent buildup of flammable material
  - Presuppression: early detection and control of fires
  - Suppression: fighting fires once they have started

### **Sustainable Forestry**

- Sustainable forest management emphasizes the following
  - Recycling more paper to reduce the harvest of \_\_\_\_\_
  - Practicing selective cutting of individual trees or small groups of most tree species
  - Minimizing \_\_\_\_\_ of larger blocks of forest
  - Minimizing soil erosion and compaction from road building and logging
  - Ban conventional clear-cutting
  - Leaving most standing dead trees and fallen timber to maintain diverse wildlife habitats
  - Include ecological and recreational services in determining \_\_\_\_\_ value

### **Grasslands**

- After forests, the ecosystem most widely used and altered by humans are grasslands. Ecological services provided by grasslands include
  - \_\_\_\_\_ formation
  - erosion control
  - \_\_\_\_\_ cycling
  - storage of atmospheric CO<sub>2</sub>
  - biodiversity maintenance

### **Rangelands**

- Rangelands are unfenced grasslands in temperate and tropical climates that supply forage for grazing (grass-eating) and \_\_\_\_\_ (shrub-eating) animals.
- Overgrazing occurs when too many animals graze for too long and exceed the carrying capacity of a rangeland area. This leads to soil erosion and soil \_\_\_\_\_.

### **Ecosystem Approach**

- The ecosystem approach encourages the protection of habitats and ecosystem services through a four-point plan.
  - Map global ecosystems and create an inventory of the species within and ecosystem services provided
  - Protect the most endangered ecosystems and \_\_\_\_\_
  - Restore degraded ecosystems
  - Encourage biodiversity-friendly \_\_\_\_\_