CHAPTER 11
Forestry and Resource Management

YOUR WORLD
YOUR TURN
Since 1993, environmentalists, loggers, and British Columbia’s government have struggled to find a balance between the ecological and economic roles of the forests in Clayoquot Sound.

Today, environmental advocates are working together with timber companies to develop and maintain sustainable logging practices.

Talk About It What does sustainable resource use look like, and how can we achieve it?
Lesson 11.1 Resource Management

Overfishing has reduced populations of North Atlantic cod, an economically important fish, by 60% over the last 40 years.
Renewable Resource Management

- Resources are either renewable, such as soil, or nonrenewable, such as fossil fuels.
- Goal is sustainability—resource use that occurs only as fast as can be naturally replaced.
- Must balance human and ecological needs

Did You Know? More than 8 million hectares of forest were lost between 1990 and 2005.
Maximum Sustainable Yield (MSY)

- **Goal**: To harvest maximum resources without compromising future harvests.
- Population sizes are kept far below carrying capacity, enabling fast growth.
- MSY can affect interactions between species and alter entire ecosystems.
- Determining target population size is largely a matter of trial and error.
Ecosystem-Based Forest Management

- **Goal:** To harvest resources while minimizing effects on the rest of the ecosystem.
- Ecologically sensitive areas are carefully monitored and protected; resources are harvested selectively.
- Ecosystems are complex, so choosing which areas to protect and which to harvest is a challenge.
Adaptive Forest Management

• **Goal:** To gather data from areas managed in different ways, and develop a customized management plan based on the results.

• Management practices are continually monitored and adjusted.

• Can be time-consuming and may require changing established practices.
Forests, mostly boreal forests and tropical rain forests, cover about 30% of Earth’s land.
Value of Forests

- **Ecological value:**
  - Provide habitat for organisms
  - Source of biodiversity
  - Prevent erosion
  - Purify water
  - Store carbon, release oxygen

- **Economic value:**
  - Timber for lumber and fuel
  - Source of food
  - Raw material for many medicines
Timber Harvesting Methods

• **Three methods**: Clear-cutting, seed-tree or shelterwood approach, and selection system

• May result in even-aged or uneven-aged regrowth

• Even-aged regrowth tends to be less biodiverse than uneven-aged regrowth.

**Did You Know?** Today most commercial logging in the U.S. occurs in western coniferous forests and southern pine plantations.
Clear-Cutting

- Involves cutting down all trees in a region, resulting in even-aged stands of regrowth
- Changes abiotic conditions in the area, including light penetration, precipitation, wind, and temperature
- **Benefit:** Cost efficient
- **Costs:** Entire communities usually displaced or destroyed; causes soil erosion.
Seed-Tree and Shelterwood Approaches

- **Seed-tree**: Small numbers of mature, healthy trees are left standing, to reseed the area.

- **Shelterwood**: Involves leaving a few mature trees standing to provide shelter for seedlings.

- **Benefit**: Less damaging than clear-cutting.

- **Cost**: As with clear-cutting, leads to mostly even-aged regrowth.
Selection Systems

- Relatively few trees are cut at once under a selection system.
- Selection can involve widely spaced single trees or groups.

**Benefits:**
- More biodiverse, uneven-aged growth
- Less overall environmental damage

**Costs:**
- Machinery disturb forest interior.
- Expensive process
- More dangerous for loggers
Deforestation

• Unlike timber harvesting, deforestation replaces forested areas with some other land use, such as commercial or residential property.

• Deforestation in tropical and arid regions has the most negative effects due to loss of biodiversity and desertification risk respectively.

• Globally, deforestation adds CO$_2$ to Earth’s atmosphere.
Deforestation in the United States

• Deforestation for timber and farmland facilitated U.S. expansion.

• Wood felled for buildings and fuel during the pre- and early Industrial Revolution periods.

• By the early 1900s, very little old-growth forest (forest that has never been logged) remained in the United States.

Did You Know? Once old-growth forest is logged, it may need hundreds of years to regrow.
Deforestation in Developing Nations

- Timber from old-growth tropical rain forests is a source of income in developing nations.
- Advanced technology enables deforestation to occur far faster than it has in the United States.
- Deforestation of tropical rain forests has an enormously negative effect on global species diversity.

The border between Haiti (left) and the Dominican Republic (right) shows Haiti’s deforestation.
Most logging in the U.S. takes place on private land, but timber companies are also allowed to harvest trees in National Forests under supervision by the U.S. Forest Service.
U.S. National Forests

• The national forest system was established in 1905.
• Originally set aside to grow trees for timber and to protect watersheds
• Today, managed by the U.S. Forest Service, for timber, recreation, wildlife habitat, and mining
National Forest Management Act (1976)

- Requires that renewable resource management plans be made for each national forest
- Plans are required to be consistent with the principles of multiple use and maximum sustainable yield.
- Logging has declined in national forests since passage of the Act, but policies are vulnerable to political influence.
Logging on Private Land

• Most logging in the U.S. takes place on privately owned tree plantations.

• A tree plantation is typically an even-aged monoculture with little habitat variety or biodiversity.

• Use of plantations for timber protects National Forests from being logged.
Fire Policies

• Fire Suppression:
  • Negative effects on ecosystems that depend on fire
  • Fuel for future fires accumulates (limbs, sticks, and leaf litter).
  • Suppressing small fires increases likelihood of larger, dangerous fires.

• Prescribed Burns:
  • Carefully controlled burning helps to reduce fuel buildup and to restore ecosystems.
  • Rarely burn out of control, but occasional accidents frighten the public.

- Encourages prescribed burns
- Promotes salvage logging—removal of small trees, underbrush, and snags by timber companies
- Seen as harmful by many scientists and environmental advocates
- Salvage logging can slow forest regrowth, promotes wildfires, and destroys snags—habitat for wildlife.
Sustainable Forestry Products

• Independent organizations certify that wood products are produced sustainably.

• Forest Stewardship Council (FSC) has the strictest standards and most widely accepted certification process.

• Certified wood costs more to produce, but will be supplied by timber companies if there is demand.

Did You Know? In British Columbia, Canada, 70% of the annual timber harvest is certified.