3.7 Consumption and Resource Management

Natural ecosystems are an important source of valuable resources. Chief among these resources are wood and wood fibre. In Canada, the forestry industry obtains the majority of its wood supply from natural forests. Approximately 60 % of the original forest in Canada has been cut at least once (Figure 1).

Figure 1 In 1600 CE, there were approximately 6 billion (6 000 000 000) ha of forest on Earth. An estimated 4 billion ha remain.

Forestry Practices

Forest harvesting methods fall into three categories: clear-cutting, shelterwood cutting, and selective cutting (Figure 2). Clear-cutting is the removal of all or most of the trees in a given area. This method is economical and efficient. It is intended to recreate the pattern produced by a forest fire. Clear-cuts take the shape of large blocks, strips, or smaller patches. Regeneration can occur naturally or artificially by planting seedlings. Both result in forests of even-aged trees. If natural regeneration is used, some scattered, high-quality "seed trees" may be left standing in the clear-cut. Clear-cutting is the most common method of tree harvesting in Ontario and Canada. It accounts for over 90 % of harvested trees.

In shelterwood cutting, mature trees are harvested in a series of two or more cuts. This permits regeneration under the shelter of remaining trees. Regeneration can be natural or artificial. The shelterwood system can be achieved by making long, narrow, parallel strip cuts.

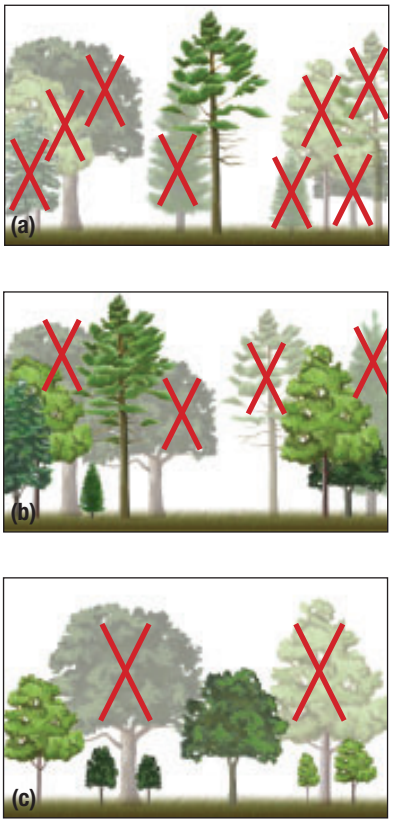

Figure 2 Forests are harvested using (a) clear-cutting, (b) shelterwood cutting, or (c) selective cutting.

In selective cutting, the forest is managed as an uneven aged system. Foresters periodically come in and harvest selected trees. This is the most costly type of cutting, but it has the least impact on the ecological features of the forest. Selective cutting is often performed on private woodlots. It also occurs where there are high values for individual trees and in parks, where the appearance of the forest is highly valued.

Ecological Issues in Forest Management

Natural forests sustain themselves without being managed. When producing wood fibre, however, management is widely practised. It is difficult to manage forests to meet commercial demands while maintaining ecological values.

Clear-cutting is usually the most profitable harvesting method, but there are drawbacks. Following clear-cutting, nutrients are lost from the soil, and erosion increases (Figure 3). Sediment entering streams harms fish spawning areas, and nutrients increase the growth of algae. Also, only one or two species of tree are planted when artificial regeneration methods are used (Figure 4). This dramatically reduces biodiversity. Shelterwood and selective cutting cause fewer environmental problems but are more expensive. The use of pesticides by the forestry industry is also of concern. This is examined in more detail in Chapter 4.

DID YOU KNOW?

A Burning Question about the Mountain Pine Beetle

The mountain pine beetle has devastated lodgepole pine forests of British Columbia. One cause of this is fire suppression. When we prevent or control natural forest fires, we create forests with old trees that are preferred by the beetles. Allowing natural forest fires to occur helps combat this serious pest.

Figure 3 Exposed soil in clear-cut areas is subject to erosion.

Figure 4 This tree planter is likely planting only one or two species in this area.

Forest practices often include fire suppression because forestry companies do not want to lose valuable timber to wildfires. Firefighting teams attempt to stop the spread of fires as soon as they break out. This practice can have negative ecological impacts because many plant and animal species, such as fireweed and wild turkeys, benefit from fire cycles. The species mix of forests that are not subjected to natural fire cycles can change.

Given the very large areas that are available for cutting, it is vital that sound forestry practices are used so that these ecosystems remain sustainable. Forest certification is a recent positive trend in the industry. In 1993, the International Forest Stewardship Council was founded to set criteria and certify forest management practices that are sustainable. By 2006, over 270 million hectares, or 7 %, of the world's forests were certified, indicating that they are being managed sustainably (Figure 5). Sustainable forest practices balance tree harvests with growth rates, protect fish and wildlife habitat, protect waterways, and maintain biodiversity.

Figure 5 This logo means that the forest products comply with the Programme for the Endorsement of Forest Certification Chain-of-Custody Standard.

In our economy, supply and demand influence the prices of goods. When a product is scarce or in high demand, its price tends to rise. As the price rises, there is a strong incentive to produce more of the product. This pattern of supply and demand can be dangerous when applied to natural resources. If the demand for a rare type of tropical wood increases, so will the price (Figure 6). The rise in value will increase the pressure on logging companies to cut more of the rare tree species. Soon the species will be overharvested and may become threatened. Balancing supply and demand is a problem on an international scale because all parties must agree to stop overharvesting the particular species.

To learn about the profession of a forester,
GO TO NELSON SCIENCE

Figure 6 High demands for valuable tropical tree species, such as mahogany, increase logging pressure and threaten the sustainability of forest ecosystems.

Wildlife Management

Ontario's wild animals are hunted for food and sport. In southern Ontario, deer and waterfowl are among the most commonly hunted game species. In northern Ontario, moose is a prized species. The impact of hunting depends on a variety of ecological factors. Is the population large and healthy? Is it increasing or decreasing in size? Is the population being properly monitored? Is the hunt uncontrolled, with little understanding of the implications for the ecosystem?

To learn about being a conservation officer,
GO TO NELSON SCIENCE

Managed hunts are sometimes used to control populations. For example, wolves are now absent from many parts of Ontario. The loss of this top predator has resulted in large deer populations in some regions. As the number of deer increases, they deplete their natural food supply and feed on agricultural crops. The only natural controls on the population are starvation and disease. In such cases, a controlled hunt will bring the population down to a more sustainable size.

Wildlife is a renewable resource when it is consumed sustainably. This means that harvesting must not exceed a population's ability to replace itself. Historically, First Nations and Inuit peoples in Canada harvested wildlife in a sustainable way for many hundreds and thousands of years. Aboriginal peoples had small population sizes and had an intimate knowledge of their natural environment.

DID YOU KNOW?

Changing Fashions Saved the Beaver

Canada's historic fur trade was based on beaver trapping. Beaver pelts were shipped to Europe and made into felt hats. The demand was so great that beavers were driven to near-extinction. A change in European fashion meant that felt hats were replaced by silk hats. This caused the demand for beaver pelts to collapse.

The ethic of **stewardship** and pattern of sustainable harvesting changed dramatically with the arrival of European settlers. Europeans were more interested in resources as a source of revenue. They harvested animals to sell to large European markets rather than to feed and clothe themselves. Without a good knowledge of the land, they sought the expertise of Aboriginal peoples. Aboriginal peoples trapped furs in exchange for European goods such as cotton and rifles. Unfortunately, this resulted in overharvesting of a number of wildlife species.

stewardship taking responsibility for managing and protecting the environment

RESEARCH THIS FISHERIES MISMANAGEMENT

SKILLS: Researching, Communicating

SKILLS HANDBOOK 4.B.

Fisheries management regulations often include size limits requiring fishers to release individuals that are under a minimum size. The assumption is that harvesting small young fish, lobsters, and crabs is wasteful.

This practice, however, may result in an unsustainable fishery. Instead of helping maintain a strong population, the minimum size limits have actually caused species to become smaller. Scientists now believe the exact opposite approach may be needed—keep the small ones and release the big ones!

1. Use the Internet to learn about fisheries science and how size limit regulations affect fish populations.

GO TO NELSON SCIENCE

A. Which individuals are the best reproducing individuals in a population? Describe them in terms of age and size. K/U T/I
B. How might smaller individuals benefit when only large individuals are caught? A
C. What important Canadian fish species are being affected by current fishing practices? How has the average body size of these species changed over the past few decades? K/U T/I

UNIT TASK Bookmark

You can apply what you learned about how forestry practices and wildlife management influence species distributions to the Unit Task described on page 156.

IN SUMMARY

- Three main forest harvesting methods are clear-cutting, shelterwood cutting, and selective cutting.
- Forests must be managed to reduce ecological impacts such as soil erosion.
- Harvesting of wildlife must be done in a sustainable and ethical manner.
- The impact of hunting on wildlife is influenced by the population's size, health, food supply, and natural predators.
- A supply and demand–based economy increases pressure on rare and valuable natural resources.
- Sustainable forestry practices protect ecosystems and maintain biodiversity.

CHECK YOUR LEARNING

1. Identify the major natural resources derived from natural ecosystems. K/U
2. Describe and compare three common forestry cutting methods. K/U
3. In what ways do humans manage forest ecosystems? Explain. K/U
4. List the benefits of forest product certification. A
5. (a) Explain what is meant by "supply and demand."
   (b) How does it influence forestry practices? K/U A
6. How did the introduction of livestock change the relationship between people and large predators? K/U
7. Describe how the arrival of Europeans in North America changed the relationships between humans and wildlife. T/I
8. Most Ontario students have grown up in a place that was once a forested region but is no longer. What method of forestry practice produced this change? T/I A
9. Modern hunters use all-terrain vehicles, high-powered rifles, and global positioning systems (GPS). How might these technologies influence hunting success? A