

SECTION
2

Forests and Fisheries

DISCOVER

ACTIVITY

What Happened to the Tuna?

1. Use the data in the table to make a line graph. Label the axes of the graph and add a title. (To review graphing, see the Skills Handbook.)
2. Mark the high and low points on the graph.

Think It Over

Inferring How did the tuna population change during this period? Can you suggest a possible reason for this change?

Year	Western Atlantic Bluefin Tuna Population
1970	240,000
1975	190,000
1980	90,000
1985	60,000
1990	45,000
1994	60,000

At first glance, a bluefin tuna and a pine tree may not seem to have much in common. One is an animal and the other is a plant. One lives in the ocean and the other lives on land. However, tuna and pine trees are both living resources. Tuna are a source of food for people. People don't eat pine trees, but they do use them to make lumber, paper, and turpentine. People also use pine needles as mulch in gardens.

Every day you use many different products that are made from living organisms. In this section, you will read about two major types of living resources: forests and fisheries. As you read, think about how they are similar and how they are different.

Forest Resources

Forests are a resource because they contain valuable materials. Many products are made from the flowers, fruits, seeds, and other parts of forest plants. Some of these products, such as maple syrup, rubber, and nuts, come from living trees. Other products, such as lumber and pulp for paper, require cutting trees down. Conifers, including pine and spruce, are used for construction and for making paper. Hardwoods, such as oak, cherry, and maple, are used for furniture because of their strength and beauty.

Trees and other plants produce oxygen that other organisms need to survive. They also absorb carbon dioxide and many pollutants from the air. Trees also help prevent flooding and control soil erosion. Their roots absorb rainwater and hold the soil together.

GUIDE FOR READING

◆ How can forests and fisheries be managed?

Reading Tip As you read, make a list of ways to conserve forests and fisheries.

Figure 5 One important use of forest resources is for building housing.

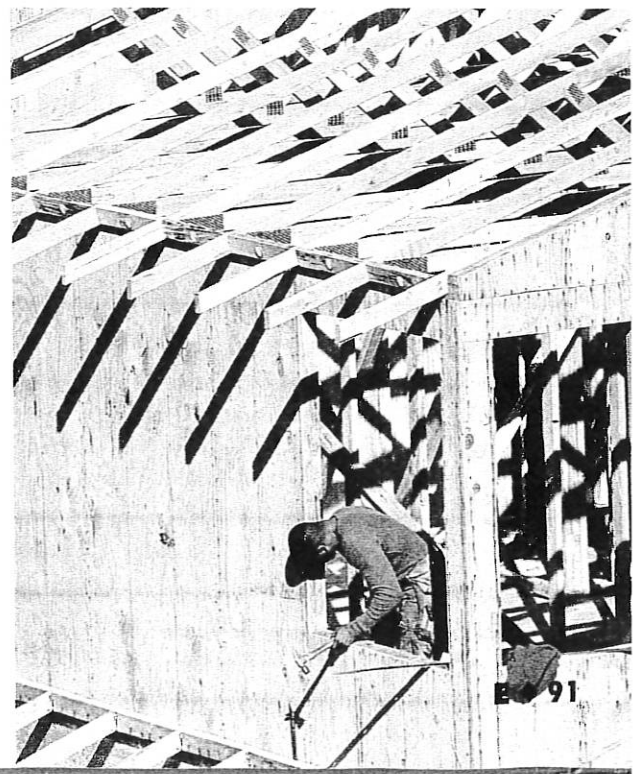
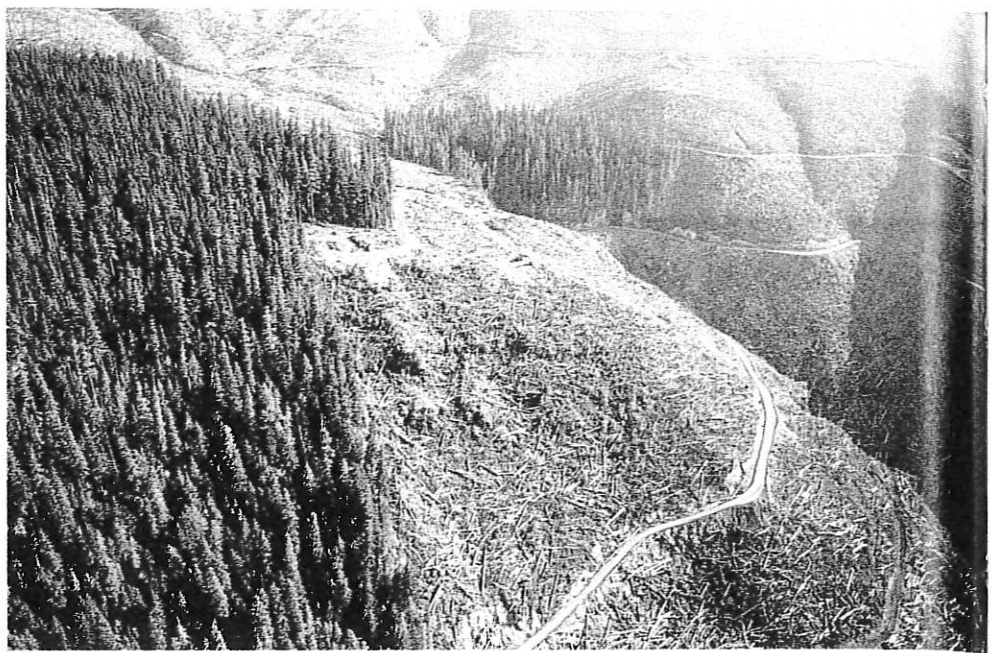


Figure 6 Clear-cutting has left large portions of these hillsides bare. *Interpreting Photographs* What problems might clear-cutting cause?



Social Studies CONNECTION

Many of the world's living resources are owned by no one—they are shared by everyone. A word that is sometimes used to describe such a shared resource is a "commons." This word comes from a time when villages were built around common areas of open land. All the town's residents grazed their cattle on the commons. This worked well as long as there weren't too many people. But as more and more people brought their cattle to the commons, the area would become overgrazed. There would not be enough pasture to feed even one cow—the "tragedy of the commons."

In Your Journal

Suppose you live in a farming community with a central commons. Propose a solution that will allow residents to use the commons while protecting it from overuse.

Managing Forests

There are about 300 million hectares of forests in the United States. That's nearly a third of the nation's area! Many forests are located on publicly owned land. Others are owned by private timber and paper companies or by individuals. Forest industries provide jobs for 1.5 million people.

Because new trees can be planted to replace trees that are cut down, forests can be renewable resources. The United States Forest Service and environmental organizations work with forestry companies to conserve forest resources. They try to develop logging methods that maintain forests as renewable resources.

Logging Methods There are two major methods of logging: clear-cutting and selective cutting. **Clear-cutting** is the process of cutting down all the trees in an area at once. Cutting down only some trees in a forest and leaving a mix of tree sizes and species behind is called **selective cutting**.

Each logging method has advantages and disadvantages. Clear-cutting is usually quicker and cheaper than selective cutting. It may also be safer for the loggers. In selective cutting, the loggers must move the heavy equipment and logs around the remaining trees in the forest. But selective cutting is usually less damaging to the forest environment than clear-cutting. When an area of forest is clear-cut, the habitat changes. Clear-cutting exposes the soil to wind and rain. Without the protection of the tree roots, the soil is more easily blown or washed away. Soil washed into streams may harm the fish and other organisms that live there.

Sustainable Forestry Forests can be managed to provide a sustained yield. A **sustainable yield** is a regular amount of a renewable resource such as trees that can be harvested without

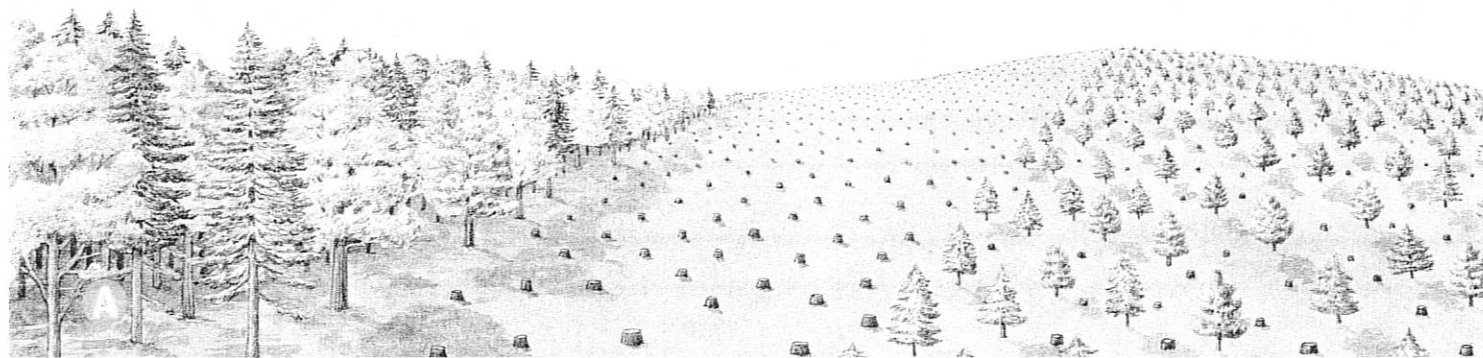
reducing the future supply. This works sort of like a book swap: as long as you donate a book each time you borrow one, the total supply of books will not be affected. Planting a tree to replace one being cut down is like donating a book to replace a borrowed one.

Part of forest management is planning how frequently the trees must be replanted to keep a constant supply. Different species grow at different rates. Trees with softer woods, such as pines, usually mature faster than trees with harder woods, such as hickory, oak, and cherry. Forests containing faster-growing trees can be harvested and replanted more often. For example, pine forests may be harvested every 20 to 30 years. On the other hand, some hardwood forests may be harvested only every 40 to 100 years. One sustainable approach is to log small patches of forest. This way, different sections of forest can be harvested every year.

Certified Wood Forests that are managed in a sustainable way can be certified by the Forest Stewardship Council. Once a forest is certified, all wood logged from that forest may carry a “well-managed” label. This label allows businesses and individuals to select wood from forests that are managed for sustainable yields.

✓ Checkpoint What is a sustainable yield?

Figure 7 Two logging methods are clear-cutting and selective cutting. **A.** After clear-cutting, the new trees are usually all the same age and species. **B.** Selective cutting results in a more diverse forest.



Original forest

Clear-cutting

Replanted growth



Original forest

Selective cutting

Diverse regrowth

Sharpen your Skills

Calculating

In a recent year, the total catch of fish in the world was 112.9 million metric tons. Based on the data below, calculate the percent of this total each country caught.

ACTIVITY

Country	Catch (millions of metric tons)
China	24.4
Japan	6.8
United States	5.6
Peru	8.9

Figure 8 A fishing boat returns to harbor at the end of a long day. Overfishing has forced the crews of many boats to find other work until the fisheries recover.

Fisheries

Until recently, the oceans seemed like an unlimited resource. The waters held such huge schools of fish, it seemed impossible that they could ever disappear. And fish reproduce in incredible numbers. A single codfish can lay as many as nine million eggs in a single year! But people have discovered that this resource has limits. After many years of big catches, the number of sardines off the California coast suddenly declined. The same thing happened to the huge schools of cod off the New England coast. What caused these changes?

An area with a large population of valuable ocean organisms is called a **fishery**. Some major fisheries include the Grand Banks off Newfoundland, Georges Bank off New England, and Monterey Canyon off California. Fisheries like these are valuable renewable resources. But if fish are caught at a faster rate than they can breed, the population decreases. This situation is known as overfishing.

Scientists estimate that 70 percent of the world's major fisheries have been overfished. But if those fish populations are allowed to recover, a sustainable yield of fish can once again be harvested. **Managing fisheries for a sustainable yield includes setting fishing limits, changing fishing methods, developing aquaculture techniques, and finding new resources.**

Fishing Limits Laws can help protect individual fish species. Laws may also limit the amount that can be caught or require that fish be at least a certain size. This ensures that young fish



survive long enough to reproduce. Also, setting an upper limit on the size of fish caught ensures that breeding fish remain in the population. But if a fishery has been severely overfished, the government may need to completely ban fishing until the populations can recover.

Fishing Methods Today fishing practices are regulated by laws. Some fishing crews now use nets with a larger mesh size to allow small, young fish to escape. Some methods have been outlawed. These methods include poisoning fish with cyanide and stunning them by exploding dynamite underwater. These techniques kill all the fish in an area rather than selecting certain fish.

Aquaculture The practice of raising fish and other water-dwelling organisms for food is called **aquaculture**. The fish may be raised in artificial ponds or bays. Salmon, catfish, and shrimp are farmed in this way in the United States.

However, aquaculture is not a perfect solution. The artificial ponds and bays often replace natural habitats such as salt marshes. Maintaining the farms can cause pollution and spread diseases into wild fish populations.

New Resources Today about 9,000 different fish species are harvested for food. More than half the animal protein eaten by people throughout the world comes from fish. One way to help feed a growing human population is to fish for new species. Scientists and chefs are working together to introduce people to deep-water species such as monkfish and tile fish, as well as easy-to-farm freshwater fish such as tilapia.

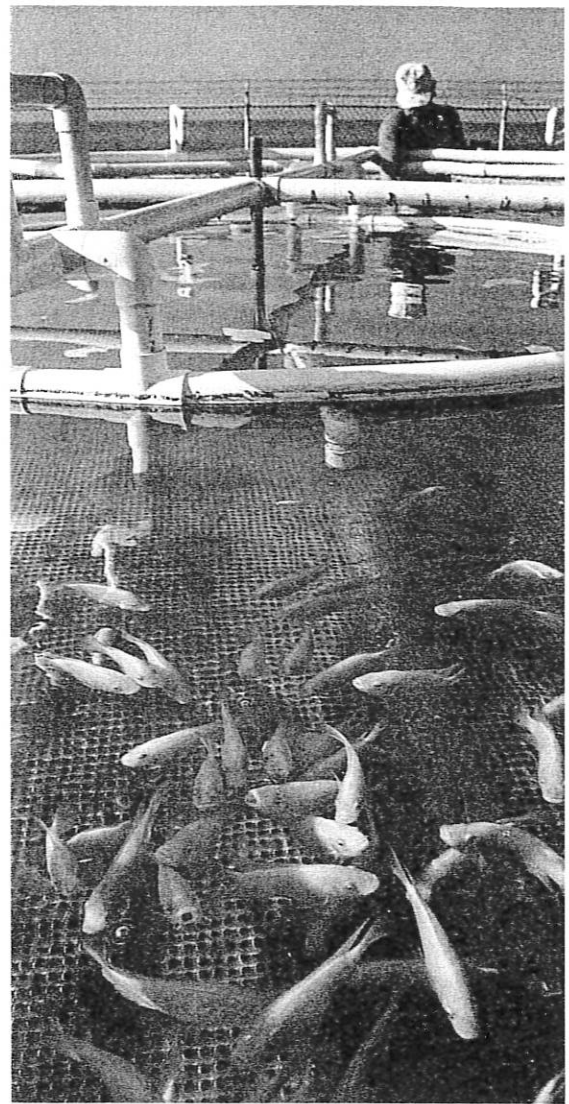


Figure 9 As fishing limits become stricter, aquaculture is playing a larger role in meeting the worldwide demand for fish. This fish farm in Hawaii raises tilapia.



Section 2 Review

1. Describe one example of a sustainable forestry practice.
2. What are three ways fisheries can be managed so that they will continue to provide fish for the future?
3. Why are forests considered renewable resources?
4. **Thinking Critically Comparing and Contrasting** Describe the advantages and disadvantages of clear-cutting and selective cutting.

Science at Home

With a family member, conduct a "Forest and Fishery" survey of your home. Make a list of all the things that are made from either forest or fishery products. Then ask other family members to predict how many items are on the list. Are they surprised by the answer?