

Section 3.3

Conserving and Protecting Ecosystems

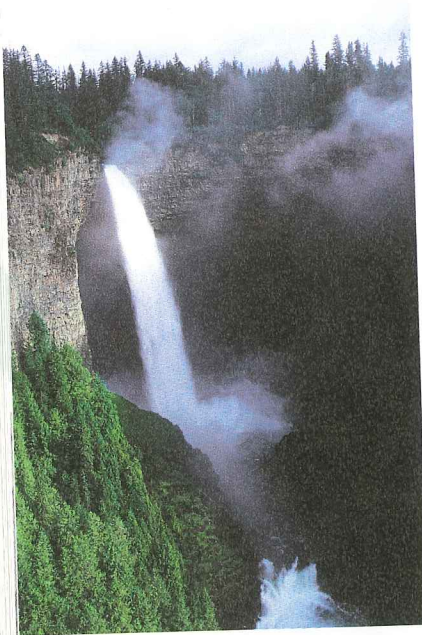


Figure 3.15 Wells Gray Provincial Park is one of the largest protected areas in British Columbia.

Pollution, introduced species, habitat loss, and endangered species are problems that can seem overwhelming. Nevertheless, some people are making positive changes to help protect ecosystems and the organisms that live in them. Recognizing problems and monitoring changes are the first steps. In this section you will learn how some people are putting this information into action.

Preserving Habitats

Creating parks and other protected areas is one way to preserve ecosystems. The government of British Columbia creates provincial parks. The Canadian government creates national parks. In British Columbia there are seven national parks and over 600 provincial parks. Wells Gray Provincial Park, in the eastern part of the province, is shown in Figure 3.15. One goal of the Canadian government is to have national parks in all of the major ecosystems across Canada. Park managers try to balance the protection of habitat while still allowing people to visit and enjoy parts of these wild places.

British Columbia also has 134 **ecological reserves**. These areas are set aside to protect examples of the different habitats in the province as well as rare and endangered plants and animals. Access to most ecological reserves is restricted and people go to them for research or educational purposes only. Most ecological reserves have volunteer wardens that monitor activity in the reserves. High school students from Lester Pearson College near Victoria are the wardens for Race Rocks Ecological Reserve (Figure 3.16). The students work closely with the local Coast Salish people to manage the site and also contribute to research and education projects.



Figure 3.16 Race Rocks Ecological Reserve is near Victoria.

READING Check

What is the main difference between a park and an ecological reserve?

Habitat Restoration and Enhancement

Habitat restoration projects try to restore or improve habitats that have been damaged. For example, groups sometimes “adopt” a stream. They might remove garbage or plant trees along the banks.

Habitat enhancement projects improve existing habitat. One project might be to provide artificial structures such as nest boxes. Nest boxes are platforms that birds use for their nests. The people in Figure 3.17 are putting up bird boxes for purple martins, a bird that nests in British Columbia.

Another project to enhance habitat is to provide safe routes for animals to cross busy highways. In some places in British Columbia, for example, special culverts or fencing has been used to direct frogs, snakes, and other amphibians and reptiles safely across the road. The structures are placed along the routes that animals regularly use to travel between feeding, resting, and breeding sites.

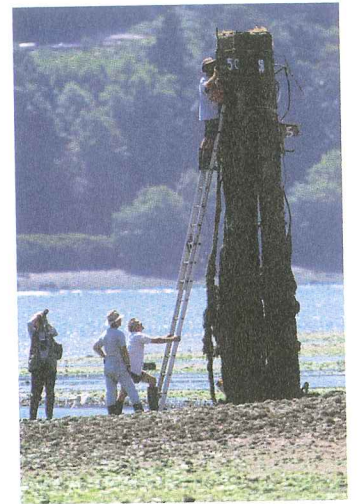
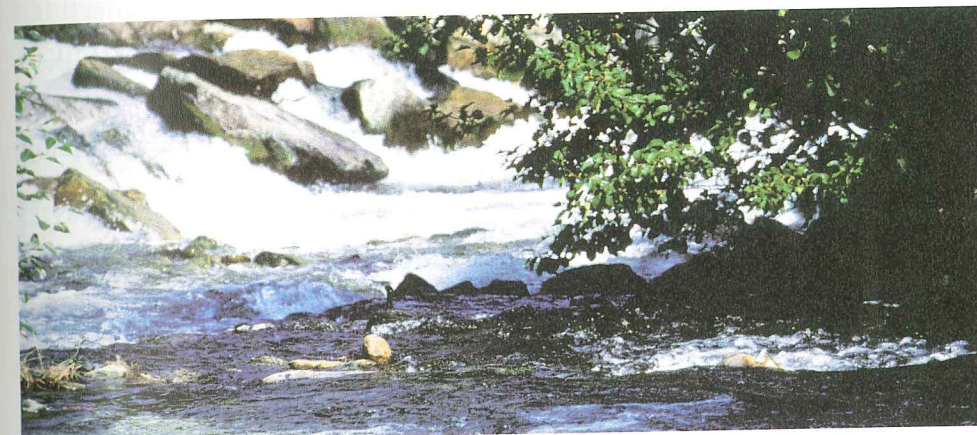


Figure 3.17 Nest boxes provide nesting habitat for many birds in British Columbia.

Figure 3.18

Several groups are working together to restore the health of the Salmon River.

Often, several groups work together to improve damaged habitats. This is the case on the Salmon River (shown in Figure 3.18), which runs into Shuswap Lake near Salmon Arm. Over the years, the river’s habitat has been damaged. Several groups have joined together to help restore the health of the Salmon River. People from the Neskonlith band raised 2000 seedlings of the shrub red osier dogwood to plant along the riverbanks. Volunteers from the Salmon Arm Fish and Game Club put up fences and rebuilt stream banks. The Environmental Youth Corp surveyed landowners to get their suggestions for solutions to pollution and erosion problems. It may take a long time to restore the Salmon River, but the people of the Salmon Valley are determined to try.

How would you care for a habitat for which you have the responsibility? Try your ideas in the next investigation.

- ☀ Predicting
- ☀ Modelling
- ☀ Observing
- ☀ Controlling Variables

Model Ecosystem in a Bottle

If you could design an ecosystem, what would you include? How would you care for the ecosystem to ensure that it stayed healthy? Try your ideas by making a terrarium, a small garden in a bottle.



Question

What abiotic factors do you need to grow healthy plants?

Safety Precautions



Materials

potting soil
seeds or small plants (**Note:** Do not remove plants from parks or other protected areas.)
masking tape

Apparatus

scissors
a clean 2-L plastic pop bottle

Procedure

- 1 Predict the abiotic factors that you will need in order to grow healthy plants in a plastic bottle. Write your prediction in your notebook.
- 2 Use the scissors to carefully cut off the neck of the plastic pop bottle.

- 3 Add potting soil to the bottom half of the bottle until it measures about 10 cm deep.
- 4 Plant your seeds or small plants. Place the top of the bottle back onto the bottom half and secure the two-halves together with masking tape.
- 5 Write a plan that you will follow to care for your terrarium.
- 6 Choose a good location for your terrarium and monitor it over the next two to three weeks. **Record** your observations of your terrarium during this time.
- 7 Adjust the plan you developed in step 5 if you find that the requirements for your terrarium change.

Analyze

1. How successful were the plants in your terrarium?
2. What did not work well in your terrarium?

Conclude and Apply

3. How would you adjust the growing conditions for your next terrarium?
4. What changes to the abiotic factors would cause your plants to become “extinct”?
5. If there were other organisms in your terrarium, what biotic factors would cause your plants to become “extinct” in your model ecosystem?
6. How is your model like an actual ecosystem? How is it different?

Endangered Species Protection

In British Columbia, over 350 species of plants and animals are threatened or endangered. Therefore, special consideration is needed to protect their habitat. When a species is endangered, biologists might start a **captive breeding program**. In these programs, the animals are mated in captive situations, such as zoos. Biologists then release the offspring back into the wild. By raising the babies in captivity, more young will survive than would in the wild.

The Vancouver Island marmot, shown in Figure 3.19, is endangered. Scientists estimate that there are less than 50 marmots left in the wild. Habitat loss has been the major factor that has led to the marmot's decline. The Vancouver Island Marmot Recovery Team is working to protect marmot habitat. They have also started a captive breeding program to try and increase the population size of this rare animal.



Figure 3.19 The Vancouver Island marmot is one of the most endangered species in North America.

Environmental Stewardship

Stewardship is the careful and responsible management of something for which you are responsible. Aboriginal peoples in British Columbia practised stewardship by developing methods of harvesting resources that allowed them to take only specific numbers or amounts of resources. For example, they used fish traps, fish weirs (see Figure 3.20) or fences, and nets to harvest fish from the rivers and shorelines of British Columbia. The extra fish that they caught when they used these methods could be released alive when enough fish had been caught. As well, if any fish were too small or of the wrong species, the people would release them.



Figure 3.20 Wooden weirs like this one used by Aboriginal peoples trap fish in a sustainable way.

INTERNET CONNECT

www.mcgrawhill.ca/links/BCscience7

To learn more about Vancouver Island marmots and the attempts being made to prevent them from becoming extinct, go to the web site above. Click on **Web Links** to find out where to go next. At the site you can meet some of the researchers, learn about marmot biology and habitat needs, and learn how you can help this endangered species.

DidYouKnow?

The Nisga'a people used fish wheels on the Nass River. The river current spins the wheel's curved panels, which scoop up fish and drop them, unharmed, into pens. Today, the Nisga'a operate fish wheels on both the lower and upper Nass River, allowing biologists to tag fish at the lower wheel and monitor how many of them are caught upstream. This is a form of environmental monitoring.



Figure 3.21 This woman is removing a strip of bark from a cedar tree to be used for weaving. This practice does not kill the tree.

When harvesting the bark, people made careful cuts so that the inner bark, which protected the birch's living tissues, was left on the tree. This method ensured that the tree would continue to grow.

READING check

What is an example of good environmental stewardship?



Figure 3.22 Aboriginal peoples learned how to harvest birch bark without killing the tree.

Aboriginal peoples also practised stewardship when harvesting trees. Coastal Aboriginal peoples, for example, used cedar for a wide variety of purposes such as houses and clothing. Planks of wood were wedged from living trees. Bark was stripped in a way that did not harm the trees (see Figure 3.21). Many trees with strips of bark or planks removed can be seen today, alive and healthy, growing in the forest.

Aboriginal peoples of the British Columbia interior harvested white birch bark for baskets, roofs, canoes, and many other items (see Figure 3.22). When har-

Today, responsible stewardship of natural resources is more important than ever. The total human population is so large that just meeting basic needs requires more resources than were needed in the past. One method that some people are using is **selective harvesting** (taking only some of the resources). For example, loggers harvest only certain trees or smaller stands of trees at any one time. There are specific hunting and fishing seasons. By acting as good stewards of the environment, we can ensure that resources will be available for future generations.

Educating People About Wildlife

Fortunately for everyone, a large part of British Columbia is still in its natural state. Sometimes, though, the needs of wildlife conflict with the needs of people. For example, when settlers first came to North America, badgers (Figure 3.23) were seen as a nuisance. People shot, trapped, and poisoned them. People did not understand how badgers benefit the environment. The burrows they dig help air and water penetrate into the soil. As well, badgers prey on rodents, which eat grain crops. Badgers are now endangered in British Columbia. One of the important parts of the plan to help their populations recover is to educate people about them.



Figure 3.23 Badgers are an endangered species in British Columbia. Some people are working to educate others about the importance of this species.

Natural history clubs, nature centres, zoos, and aquariums all educate people about the species and wild places in British Columbia. A "Living with Wildlife" program in Revelstoke is educating people about how to live safely around bears. They encourage people to keep all food, garbage, compost, and extra fruit on fruit trees, away from the bears. If the bears have no reason to come into town, they will probably stay in the wild. Once a bear becomes accustomed to human food, it will often lose its fear of people. Sadly, the bear usually ends up being shot.

Pause & Reflect

Sometimes people value things only if they are useful to them. For example, some people wonder, "What good is an animal such as a slug, or a badger, or a wolf?" Should you value only those organisms that have an obvious value to you? Write your thoughts in your science notebook.

Now that you have completed this chapter, try to do the following. If you cannot, go back to the sections indicated in brackets after each part.

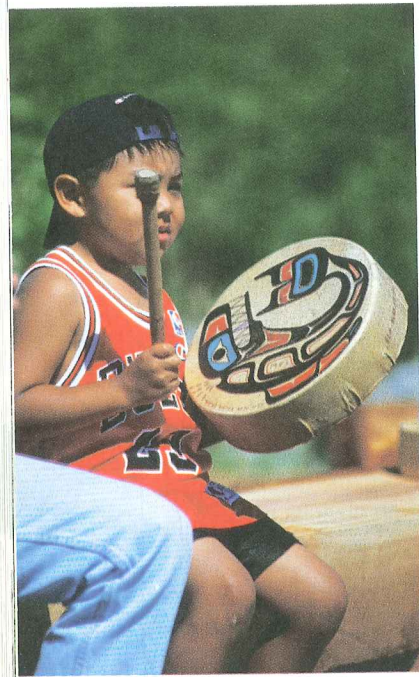


Figure 3.24 This Heiltsuk youth is at an outdoor camp in the Koeye River Valley on B.C.'s central coast.

One of the best ways for people to learn about ecosystems and how to care for them is to spend time outdoors. Hiking, camping, canoeing, and biking are ways to enjoy and learn about the natural world. The student in Figure 3.24 is taking part in a culture and science camp on the Koeye River near Bella Bella. Near an ancient village, children learn more about their traditional lands, waters, culture, and values.

Even if you cannot go out to wilderness areas, you can still learn about ecosystems by observing your neighbourhood. Watch the birds, take a walk in a park, or look at the organisms wriggling in a ditch! The more you understand about the natural world, the better you can take care of all living things.

Section 3.3 Summary

There are many ways in which people are working to conserve and protect ecosystems. Some of these ways include:

- protecting habitats in national and provincial parks as well as in ecological reserves
- becoming involved in habitat restoration or enhancement projects
- working to help threatened and endangered species with habitat protection and captive breeding projects
- practising environmental stewardship
- educating the public about the needs of species and ecosystems

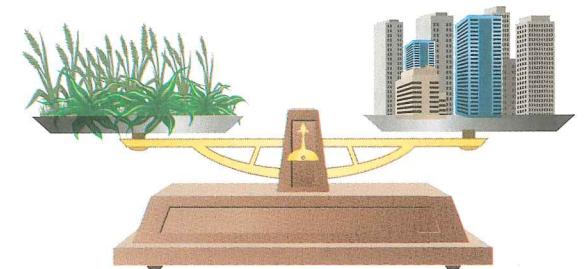
Key Terms

ecological reserves
 habitat restoration projects
 habitat enhancement projects
 captive breeding program
 stewardship
 selective harvesting

Check Your Understanding

1. What are three ways that people can restore or enhance habitat?
2. (a) Give an example of selective harvesting.
 (b) Give an example of stewardship.
3. What is one way that you could be involved in a project that helps a species or habitat?
4. **Apply** Design a brochure to educate people about a plant or animal of your choice.
5. **Thinking Critically** Should humans simply leave all natural ecosystems exactly as they are, or is it acceptable to make changes? What kinds of changes are acceptable? Use these questions as the basis for an article or letter to a local or regional newspaper.

- (a) Describe the meaning of traditional ecological knowledge. (3.1)
- (b) Give two examples of ways in which scientists can monitor ecosystems. (3.1)
- (c) Describe three ways in which ecologists can survey species. (3.1)
- (d) Explain ways in which human activities can impact ecosystems. (3.2)
- (e) Give an example of how an introduced species can impact an ecosystem. (3.2)
- (f) Give an example of a renewable resource and of a non-renewable resource. (3.2)
- (g) Use a greenhouse as a model to explain the process of global warming. (3.2)
- (h) Describe human actions that can help conserve and protect ecosystems. (3.3)
- (i) Explain what is meant by responsible stewardship. (3.3)
- (j) Give an example of a habitat enhancement or restoration project. (3.3)
- (k) Explain the role of education in conserving and protecting ecosystems. (3.3)



Prepare Your Own Summary

Summarize this chapter by doing one of the following. Use a graphic organizer (such as a concept map), create a poster, or write a summary to include the key chapter ideas. Here are a few ideas to use as a guide:

- Make a three-part presentation showing how humans learn about ecosystems, how humans can harm ecosystems, and how humans can help ecosystems.
- Write a plan with your ideas for helping an endangered species. Include background information explaining why the species is endangered, how you would monitor this species, and how you could help it.

- Create a talk, skit, game, or other way of teaching a group of young people about how the choices we make can affect the environment.



3 Review

Key Terms

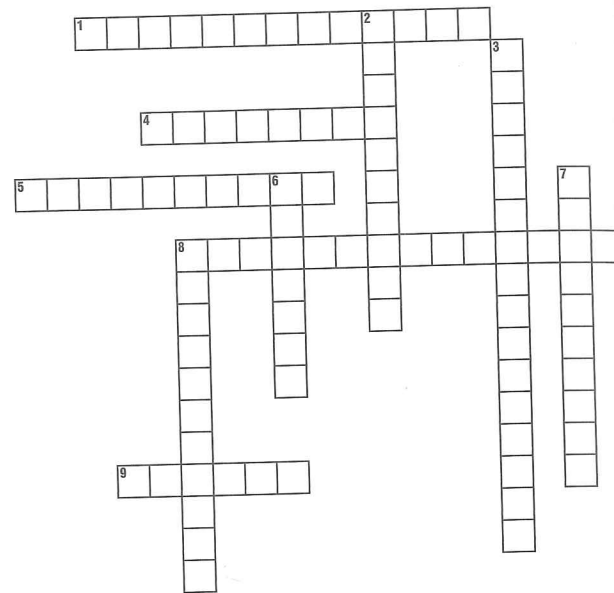
- | | |
|---|--|
| traditional ecological knowledge ecosystem monitoring long-term monitoring baseline data permanent plots annual surveys environmental impact assessment natural resources renewable resources non-renewable resources sustainability habitat fragmentation introduced species | native species fossil fuels greenhouse effect global warming aquatic acid rain solid waste endangered species extinct threatened species ecological reserves habitat restoration projects habitat enhancement projects captive breeding program stewardship selective harvesting |
|---|--|

Reviewing Key Terms

If you need to review, the section numbers show you where these terms were introduced. Use the clues below to complete this crossword puzzle. Do not write in your textbook.

Across

- When two parts of an animal's habitat are separated, it is called habitat _____. (3.2)
- The information gathered at the beginning of a monitoring project is _____ data. (3.1)
- When a species is almost extinct, it is _____. (3.2)
- Responsible use of resources and care for ecosystems is called _____. (3.2)



9. Coal, oil, and natural gas are called _____ fuels. (3.2)

Down

- A species that is _____ can become endangered if the causes for it being at risk are not reversed. (3.2)
- We use _____ to supply our basic needs. (3.2)
- A species that no longer exists is _____. (3.2)
- A species that is not native to an ecosystem is called a(n) _____ species. (3.2)
- When people use resources in a way that they are not used up, they are practising _____. (3.3)

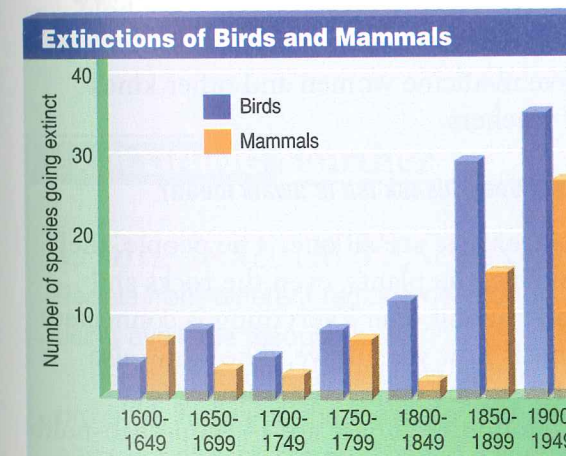
Understanding Key Ideas

Section numbers are provided if you need to review.

- What are two reasons that might cause a species to become threatened or endangered? (3.2)

- How can introduced species affect populations of native species? (3.2)
- How would a road through a wilderness area affect the organisms? (3.2)
- How can traditional ecological knowledge be used to help make decisions over land and resource use? (3.1)
- What are the differences between extinct, endangered, and threatened species? (3.2)
- List one way you could help to conserve each of the following: (a) animals, (b) energy, (c) trees, (d) water. (3.3)
- Why is it important to monitor changes in ecosystems over a long period of time? (3.1)

Developing Skills



The graph above shows extinction rates for species of birds and mammals since 1600. Use the graph to answer questions 18-21.

- In what interval did the most extinctions of mammalian species occur? (a) 1600-1649 (b) 1650-1699 (c) 1850-1899 (d) 1900-1949

- Approximately how many species of birds became extinct in the interval 1650-1699? (a) 7 (b) 10 (c) 15 (d) 20
- Approximately how many species of birds became extinct during the interval from 1900-1949? (a) 37 (b) 30 (c) 115 (d) 300
- How many species of birds and how many species of mammals do you predict became extinct in the years 1959-1999?

Problem Solving

- Create a monitoring plan for a bird that lives in your area.
- Create a plan for reducing your impact on the environment.

Critical Thinking

- Why should British Columbians who lives in cities be concerned about the loss of habitats in a forest in a remote part of the province that is uninhabited by people? Explain your answer.
- Some people think that parks are a waste of land and money because few people visit them. How would you respond to this statement?

Pause & Reflect

Go back to the beginning of this chapter on page 62, and check your original answers to the Getting Ready questions. How has your thinking changed? How would you answer those questions now that you have investigated the topics in this chapter?