Chapter 6: Interaction between organisms

6.1 All organisms are interdependent

Student book answers (pages 102–103)

Check your learning 6.1

Remember and understand

1 If food chains start with plants, where do plants get their energy from?

Plants use light energy from the sun to make their own food.

2 What is the difference between food chains and food webs?

A food chain shows a simple feeding relationship between a limited number of species, whereas a food web shows the multiple feeding interactions between all the species in a habitat.

Analyse and apply

3 Imagine you were asked to find out how many different types of animals lived in your backyard or local park. How would you go about finding out? Would it be possible to count them all?

Student answers will vary; typically, it would not be possible to count them all, but you could section off a few different areas of the yard or park and try to find the animals that live in those sections.

4 Examine the food web in Figure 6.4.

a Can you identify an animal that is both a secondary and a tertiary consumer?

Butcher bird

b How would you classify the snake?

The snake is a third-order consumer.

Evaluate and create

5 Construct our own food web of organisms you would find in the local park. Correctly identify the producer and all the consumers.

Student answers will vary.

6.2 All organisms have a role in an ecosystem

Student book answers (pages 104–105)

Check your learning 6.2

Remember and understand

1 What are animals that eat both meat and plants called?

Omnivores

2 What could be one of the consequences if decomposers didn’t exist?

If decomposers didn’t exist, dead material would pile up.

3 List three organisms that act as decomposers.

Any three of: bacteria, fungi, slugs, worms etc.

Analyse and apply

4 How would you be affected if all bees died as a result of infection?

Bees play an important role in the pollination of wild plants and our crops. Without this pollination, the yield from crops would decrease dramatically.

5 We get the energy we need by eating other living organisms. Where do the following organisms get their energy?

a producers

The Sun

b first-order consumers

Producers

c decomposers

Dead material

Evaluate and create

6 Design an organism for a food web. What role does your organism play in the food web? What factors would affect the survival of your organism?

Student answers will vary.

6.3 Food webs can be disrupted

Student book answers (pages 106–107)

Check your learning 6.3

Remember and understand

1 Give an example of an introduced animal.

Any one of: European wasp, cane toad, rabbit, snail, cattle, sheep, fox etc.

2 What is an indicator species?

Amphibians, such as frogs, are considered to be an indicator species because their population numbers give us warning of unsafe environmental conditions that could eventually seriously affect our health.

Analyse and apply

3 Why do you think some animals and plants can become pests when introduced into Australia?

Introduced plants and animals often do not have natural predators or diseases to keep their populations in check, so they increase in number until they become a pest.

Evaluate and create

4 One way to control an introduced organism is to introduce another organism that eats it. This is called biological control. When it works, it can be very good. However, sometimes things can go wrong and the organism introduced to help the problem becomes a much bigger problem. Research the introduction of the prickly pear plant and the cane toad. How successful were these forms of biological control?

The moth *Cactoblastis cactorum* was introduced as a natural consumer of the prickly pear, which was a pest species in Australia. Its caterpillars only ate the prickly pear cactus and did not affect any native plant species. Many native Australian predators successfully ate both the caterpillars and the moths, ensuring that the *C. cactorum* population did not get out of control. When the cactus was all gone, the moths had nowhere to breed and nothing to feed on, so their population declined. There was very little impact on native food webs, except to remove the cactus.

The cane toad was introduced to keep the population of cane beetles under control. The cane toad was able to switch its diet to many native species and has since migrated away from the cane fields of Queensland. Without any natural predator, the size of the cane toad population has increased. The cane toad is reducing the size of many native species’ populations. It has been very unsuccessful as a biological control agent.

5 In winter and spring after it has rained, the most common animal to find outside is the humble garden snail. Don’t be fooled by this animal – it is probably the most successful of all introduced animals and causes millions of dollars of damage to food production each year. What might surprise you is how it got to Australia in the first place. Research the introduction of the garden snail. (Hint: The Royal Botanic Gardens in Melbourne had something to do with it.)

Student answers will vary.

6 Organism numbers can decrease for a number of reasons including loss of habitat, climate change and direct removal by humans. Describe an example of each.

Student answers will vary.

6.4 Human activity can affect local habitats

Student book answers (pages 108–109)

Check your learning 6.4

Remember and understand

1 What does the term ‘urban sprawl’ mean?

Urban sprawl means the spread of urban areas into rural areas, such as farmland, forests and coastal lands that lie on the outer edges of cities.

2 Suggest four things you can do to reduce the damage you may do to the environment (your ecological footprint).

Student answers will vary, but typically an ecological footprint can be reduced by eating less meat, eating more locally grown produce, buying fewer unnecessary items and recycling more.

Analyse and apply

3 The ‘Australian dream’ is a term that has been used to describe the wish of many Australians to own a home on a block of land in the suburbs. What problems have arisen as a consequence of many Australians living this dream?

Student answers will vary. Responses may include that Australians commonly want to live in houses rather than high-rise flats and apartments. Houses and private backyards take up more space than apartment blocks, which increases urban sprawl. Natural ecosystems need to be cleared to make space for houses and farms to grow food for cities. Less native habitat means less biodiversity.

Evaluate and create

4 Create a table with the headings ‘Problems’ and ‘Solutions’. In the Problems column, list the types of thing that people do that affect wildlife (e.g. building homes and roads, cutting down trees). In the Solutions column, provide some solutions to each problem.

Student responses will vary, but may include:

|  |  |
| --- | --- |
| Problems | Solutions |
| Cutting down trees | • Replant trees where possible |
| • Live in smaller houses or apartment buildings to reduce urban sprawl |
| Adding fertilisers to crops that can end up in waterways, causing eutrophication | • Use organic fertiliser or soil organic carbon (SOC) to improve soil quality |
| • Build wetlands to reduce the run off of water |
| Introducing new plant and animal species | • Research possible food webs before introducing new species |
| • Encourage natural predators and disease to eradicate or keep pest species in check |

6.5 Science as a human endeavour: Isolated populations can be used as case studies

Student book answers (pages 110–111)

Extend your understanding 6.5

Student answers to the questions will vary. Suggested answers are given below.

1 Figure 6.19 shows a desolate, treeless landscape. Yet, when the Rapa Nui first encountered the island, it was covered in a lush forest of giant palms. What types of materials would have been available on Easter Island to support such a complex society?

The giant palms would have provided plenty of timber for building materials and also would have provided plenty of food in the form of insects, birds and possibly small mammals, as well as lush plants that may have been edible. There would have been adequate rainfall and rich volcanic soil to support the lush forest.

2 What types of materials would Rapa Nui have brought with them to establish their society?

They probably brought with them tools, seeds, animals and, of course, their lifestyle skills for survival.

3 How would the Rapa Nui have used the island’s resources to survive and increase in population?

The rich soil would have grown crops easily with high yields, producing lots of food for the people, increasing their health and ability to raise healthy children. Good food resources, including animal food products like eggs and fish, would have enabled the population to increase.

4 Do you think the people of Easter Island realised they were destroying their natural resources? Explain.

Student answers will vary.

5 In what way did the loss of trees affect the ability of the Rapa Nui to survive?

The loss of trees significantly reduced the number of producers in the ecosystem, but more directly meant the Rapa Nui couldn’t build canoes to go out to sea. The loss of transport meant the people could no longer fish, increasing their reliance on the island for their food resources.

6 On an island as small as Easter Island, a person could stand on the highest point and see every part of the island. The person who cut down the last tree would have seen that this was the last tree, but they still cut it down. How do you think this person would have felt? Do you think they would have understood what they were doing?

Student answers will vary.

7 We like to think that, in our culture, we would never put ourselves in the same position as the person on Easter Island who cut down the last tree. What similarities do you see between what our culture is doing and what happened on Easter Island?

Student answers will vary, but they should make clear comparisons between Easter Island culture and modern culture.

6.6 Science as a human endeavour: Environments can be responsibly managed

Student book answers (pages 112–113)

Extend your understanding 6.6

1 How would building a frog pond in your local school, park or backyard help local wildlife?

A frog pond in your backyard or school ground could help protect the diversity of frogs and other species in your local area.

2 Research two community organisations that help protect the natural environment. Where are they located? Who are their members? How do people join? What do members do to help the environment?

Student answers will vary.

3 Why is it no longer just governments that are responsible for the environment? Do you think they would have achieved much without the support of local communities?

Student answers will vary.

4 Imagine a friend asked, ‘Why is biodiversity so important?’ Draft a reply that takes into account the key concepts covered here.

Student answers will vary but should emphasise that biodiversity is the measure of the number of different species in an ecosystem.

5 Do you have remnant bushland near where you live or near your school? Draw a map of your house or school and the locations of remnant bush reserves. Do these reserves connect to each other?

Student answers will vary.

6 Find out what native animals may still live in the reserves in your local area. Many places have conservation or field naturalist clubs that might be able to help you.

Student answers will vary.

6.7 Science as a human endeavour: Modern land managers use traditional Indigenous techniques

Student book answers (pages 114–115)

Extend your understanding 6.7

1 What does ‘custodian of the land’ mean to Indigenous Australians?

Being a custodian of the land implies the role of caretaker, responsible for looking after the land.

2 Describe two ways Indigenous Australians made sure they did not disrupt the ecosystem too much.

**•** Ensuring no one species is overeaten

**•** Working with fire to ensure the continuing health of the plant and animal life

3 What is meant by firestick farming?

Firestick farming is the regular practice of burning off the bush to prevent build up and promote new shoots.

4 Draw up a table of pros and cons of controlled burning of bushland. Evaluate the points you raise in your table. Do you agree or disagree with the use of fire to control the environment?

Student answers will vary.

Review 6

Student book answers (pages 116–117)

Remember and understand

1 True of false?

a School ovals and nature strips are known as green wedges.

False. School ovals are areas of vegetation known as green wedges, but nature strips are not.

b A frog pond in your backyard or school could help protect the diversity of frogs in your area.

True

c The world’s population is decreasing.

False. The world’s population is increasing.

2 What is the difference between a producer and a consumer?

Producers make their own food, consumers eat other organisms.

3 What is an ecological footprint?

An ecological footprint is a measure of the amount of resources required to support your lifestyle.

Apply and analyse

4 Compile a list of introduced organisms that can be found around your school.

a Try to find out how the organism came to your area.

b How does this organism interfere with the local ecosystem?

Student answers will vary.

5 With a growing population, humans are requiring more from the land around them. Describe three ways in which humans are changing the environment.

Student answers will vary.

Evaluate and create

6 Consider the food web in Figure 6.4. If the mouse were to become locally extinct, list the possible changes that may occur to the other organisms in the food web.

With no mice, there would be less for the snakes to eat, so their numbers may decline. Snail and beetle numbers may increase with no mice.

7 In the same ecosystem, what would have happened if another animal was introduced? Would it matter if the animal was a herbivore or a carnivore?

Student answers will vary.

8 Imagine a world without spiders. Describe what the world would be like. In your answer, consider what spiders eat and what organisms eat spiders.

Student answers will vary, but should include that spiders prey on other insects we may find annoying (e.g. flies and mosquitos) and are vital prey for many birds, bats, frogs and small mammals.

9 In some cases, introduced animals, like the monkeys introduced to Hobart, fail and never become established. In other cases, they are spectacular ‘successes’, such as the rabbits and foxes across much of southern Australia. In terms of the environment in which these animals live and their interactions with other animals, explain why some animals succeed and others do not.

Success or failure depends on how much food is available for the introduced species and whether or not they have predators in their new environment. Breeding conditions and the right landscape and climate are also factors.

10 Create a poster that illustrates why it is important to protect ecosystems.

Student answers will vary.

11 A simple change to your daily habits, such as reusing and recycling paper at school, can make a difference to ecosystems. Use this example, or another, to explain how your actions impact on biodiversity.

Student responses will vary but should make the point that every little effort counts, particularly when many small efforts of individuals add up to a very large effort of the whole population.

12 The balance of nature is very delicate, and changes to the environment or any member of a food web bring about changes throughout the whole system. Food webs are graphical ways of showing eating relationships inside ecosystems. If the food web is changing, then so is the ecosystem. Which do you think would be more resistant to change: big complicated ecosystems with numerous species interacting or simple ecosystems with relatively few species interacting? Explain.

Student answers will vary.

13 In this unit you have learned about the Earth’s growing population. Create a visual representation (sketch, drawing, poster or similar) to represent the Earth’s changing population 50 years ago, now and 50 years into the future.

Student answers will vary.

14 The diversity of livestock, such as cattle, is declining in Africa. Why should Australians care about cows in Africa? Should livestock diversity be conserved? Who should be responsible for maintaining livestock diversity?

Student answers will vary.

Ethical behaviour

15 Do you consider it okay to step on an ant? What about squashing a spider? How is this similar to killing a larger animal? How is it different?

Student answers will vary.

16 Humans have tried a number of methods to reduce rabbit numbers in Australia, including the introduction of a virus that caused serious deformities and led to a slow and painful death. Do you agree with this method? Do you think the people involved knew what the consequences would be before they released this ‘biological control’? Find out more about controlling rabbit populations and suggest your preferred method.

Student answers will vary.