Our Environment

Chapter 1

CONTEXT AREA

- Our Earth is home to all people and all other living things. A healthy environment is needed by every living thing on Earth. To survive we need an environment free of pollution.
- How does the environment work? What is a healthy environment? What is the environment made of? What are its parts? How do they work together?
- Understanding our environment is important for our survival. The greenhouse effect, ozone hole and pollution may threaten our future. What are they? Why have they happened? Can they be reversed?
- Why is it important to 'Act locally, think globally'?

PRESCRIBED FOCUS AREAS

4.3 identifies areas of everyday life that have been affected by scientific developments
4.5 describes areas of current scientific research

DOMAINS

KNOWLEDGE AND UNDERSTANDING

4.10 ecosystems
- **a** describe some adaptations of living things to factors in their environment
- **b** describe, using examples of food chains and food webs from Australian ecosystems, how producers, consumers and decomposers are related
- **c** describe the roles of photosynthesis and respiration in ecosystems
- **d** discuss some effects of bushfires, drought and flood on Australian ecosystems

SKILLS

4.15 uses given criteria to gather first-hand data
4.19 draws conclusions based on information available
4.22 undertakes a variety of individual and team tasks with guidance

VALUES AND ATTITUDES

4.24 respects different viewpoints on science issues and is honest, fair and ethical
4.25 recognises the relevance and importance of lifelong learning and acknowledges the continued impact of science in many aspects of everyday life
4.26 recognises the role of science in providing information about issues being considered and in increasing an understanding of the world around them
4.27 acknowledges their responsibility to conserve, protect and maintain the environment for the future

CONCEPTS

Why is the environment important?	Importance of environment and heritage Location and reasons for national parks
Levels of life	Population, community, ecosystem
A place to live	Habitat and territory
Food chains	Producers, consumers, photosynthesis Food chain, movement of energy
Food pyramids	Number of organisms in food chains
Food webs	Read and interpret food webs
Decomposers	Role of decomposers in environment
Partners in life	Mutualism, commensalism, parasitism
The web of life	Importance of balanced ecosystem
Studying environments	Comparing two environments Exploring leaf litter
Case study—koalas	Overpopulation on Kangaroo Island
Fire, flood, drought	Effects of fire, flood, drought on ecosystems

1.1 Why is the environment important?

If you were asked to name the most important place or thing on Earth, what would you answer? Is it the beach, the bush, skateboard park, your best friend, or your pet?

All of these places and things are part of our environment. Forests, beaches, and deserts are part of our natural environment. Towns, buildings and roads are all part of our human environment.

The word 'environment' means all the things that surround and affect an organism in its life. These include temperature, rain, other plants and animals, wind, soil, and many other things.

The environment is basic to the survival of every living thing. Caretakers in zoos and animal parks go to a lot of trouble to get the animals' environment correct. But it is not a natural environment. They have to maintain it every day. Consider the polar bear and seal displays. Every day the caretakers must bring in fresh fish for food and ice to keep the water cool. The water has to be filtered and treated, and there are machines to make waves for the animals to enjoy. A natural environment maintains itself and provides the needs of the animals and plants living there.

Heritage sites

Heritage refers to the things we inherit from our past. It is the remnants of our history. The human environment includes both our natural heritage and our cultural heritage. Natural heritage places are important and unusual. They include the Great Barrier Reef, Uluru and Kakadu. Our cultural heritage includes things made by people. This includes famous buildings, rock art and implements such as spears and machines. Maintaining our heritage, and preserving the natural environment, are very important.

Many heritage areas are very special. Some of these are World Heritage Areas which are listed by the United Nations. Some Australian World Heritage Areas are Kakadu, Uluru, Willandra Lakes, Lord Howe Island , the Blue Mountains and the forests of South-West Tasmania.

National parks

National parks are parts of our environment which have been set aside for preservation. For an area to become a national park, it should be mostly unspoilt and be a good example of an environment. Some national parks include special scenery, geological formations, or areas of significance to Aboriginal Australians. National parks are open to visitors and are managed to protect their natural state.

Different national parks are chosen because they represent different environments, such as rainforest, heathland, or desert. This is why there are so many national parks in many different parts of Australia.

National parks are special areas, and should be treated with care. Remember the saying, 'Take nothing but photographs, leave nothing but footprints'. In other words, don't take anything home with you except photographs, memories and your rubbish!

Our cultural heritage includes many historic buildings

Uluru

Coral reefs in the Great Barrier Reef are part of our natural heritage

Bungle Bungles, WA

River red gums and the Murray River, Victoria

CHECKPOINT:

COPY AND COMPLETE

The word 'environment' means all the things that _____ and affect an _____ in ___ ____. These include _____, rain, other _____ and _____, wind, ____, and many other things.

The environment is basic to the _____ of _____ living thing.
The human environment includes both our _____ heritage and our _____ _____. Natural _____ places are important and _____. They include the Great Barrier Reef, _____ and _____. Our cultural _____ includes things made by _____. This includes famous _____, rock ___ and _____.
National parks are parts of our _____ which have been set aside for _____. Different _____ parks are chosen because they represent different _____, such as _____, _____, or _____.

QUESTIONS

1 List the needs of a polar bear or seal in an animal park or zoo. Refer to the text for some of these needs.

2 List the needs of a plant growing in a garden. You should be able to list more than four needs.

3 List the needs of an animal which you could keep as a pet, such as a cat, dog, horse or guinea pig. You should be able to list more than five needs.

4 Why have areas been set aside as national parks? Name some national parks near your home.

5 Compare a bowl containing one fish with an aquarium containing different types of fish, plants and snails.
   - **a** Which fishy environment is likely to last longer? Explain your answer.
   - **b** Compare an astronaut in a rocket to a large number of plants and animals in a fully equipped space station. Is this a similar comparison to the fish bowl and aquarium example?
   - **c** Our Earth is our home. Is it more like the fish bowl or aquarium, or the rocket or space station? Explain your answer.

6 Are there any heritage sites near your school, or in your suburb or town? Consider old buildings, special statues or memorials, or unusual natural places like caves or deep waterholes. Why are these places worth preserving?

7 Why do some people think it necessary to preserve various old buildings and places in the natural environment?

1.2 Levels of life

The study of the environment, and how plants and animals live in it, is called ecology. The name comes from the Greek words *ecos* (= house) and *logos* (= study). Every part of the Earth is home for some plants and animals, and is their environment. Humans have the entire Earth as their environment.

A species is a group of the same type of living things. They reproduce together and have fertile offspring. An organism is one individual in a species. Groups of organisms that live in the same environment are called a community. A community contains organisms of different species.

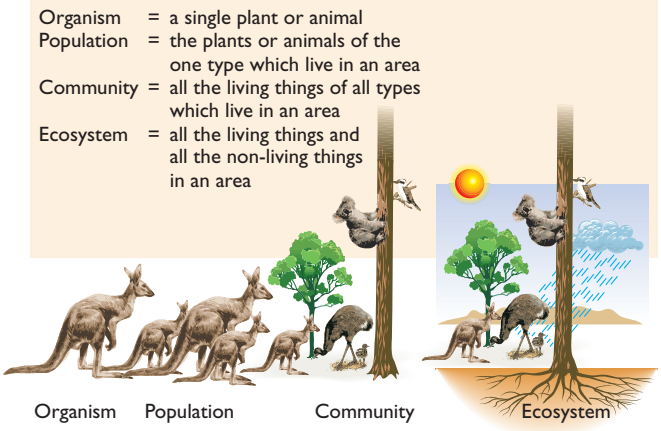
An ecosystem is an ecological system. It is a part of the Earth where plants and animals live, and where they interact with the environment.

An ecosystem can be divided into two parts:

1 Living, or biotic, environment. This includes all the other living things which affect the survival of an organism. The biotic factors affecting a mouse are the number of food plants, the numbers and types of animals which hunt it, and the tiny worms which live inside its body.

2 Non-living, or abiotic, environment. These are all the non-living things which affect an organism and its survival. Abiotic factors include the temperature, wind, available nutrients, amount of rain, amount of sunlight, and the shelter available.

Ecosystems can be large or small. The biggest ecosystem is the Earth. Small ecosystems could be a rotting log, a rock pool, or a section of a creek. Each ecosystem can maintain itself and the living things which are a part of it. We say the ecosystem is self-sustaining, or balanced.



Ecosystems are a complex interaction of many living things and the environment

CHECKPOINT: QUESTIONS

1 Write the meaning of the following words. Refer to the text for their exact meanings.

ecology, organism, population, community, ecosystem, species, biotic, abiotic

2 Which of the following are biotic factors and which are abiotic factors?
- **a** intensity of sunlight
- **b** high levels of humidity
- **c** a dry wind which blows every afternoon
- **d** shelter under a stone
- **e** suitable plants for food
- **f** eagles which hunt for food
- **g** dry sandy soil which falls in each time a rabbit digs a burrow

3 Rank the following in order of size, from simplest to most complex.

population, organism, ecosystem, community

4 Identify the following as forming a population, community or ecosystem. Give a reason for your answer.
- **a** flies, worms, fungus inside a rotting body of a kangaroo
- **b** a group of wild pigs living in a small swamp
- **c** a family of possums hiding in the hollow trunk of a tree
- **d** an eagle hunting for food
- **e** a small lagoon
- **f** a colony of marsupial mice
- **g** a cage of guinea pigs in a pet shop
- **h** a wheat field

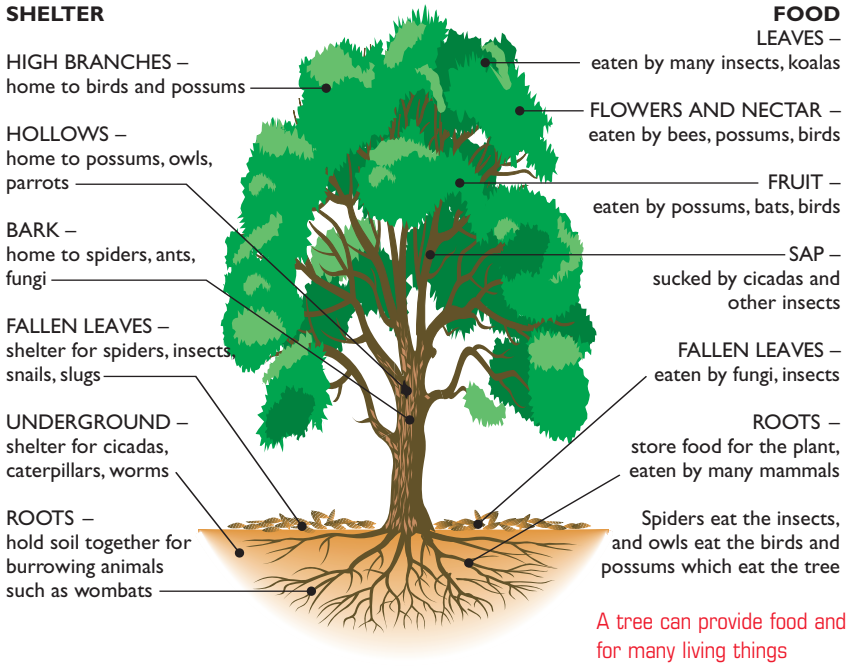
1.3 A place to live

All living things need a place to live. This place provides shelter and protection, and somewhere to raise their young. It should be close to food and water.

The place in the environment in which a plant or animal lives is called its habitat. A habitat can be the sea shore, a fast flowing creek, desert sand or tall grass. Living things are adapted to their environment and to their habitat.

A tree is like a guesthouse or hotel for many living things. Different parts of the tree provide different habitats. A tree also provides shelter, protection, and food. Many animals spend their whole life near just one tree.

Many animals have a territory. This is an area where they hunt for their food. Their territory contains enough food and water and shelter sites to ensure the survival of the family group of animals. For example, the territory of a pair of magpies is about the size of five football fields. Magpies will defend this area against other magpies. A territory is a small part of the habitat of magpies. The habitat of a magpie is an open forest or grassland with trees, or a suburban area with trees that can be used as resting sites.



A tree can provide food and shelter for many living things

CHECKPOINT:

COPY AND COMPLETE

The place in the _____ in which a plant or animal lives is called its _____. A habitat can be the ___ _____, a fast _____ _____, desert ____ or tall _____.

Many animals have a _____. Their territory contains enough ____ and _____ and _____ sites to ensure the survival of the _____ _____ of animals.

QUESTIONS

1 Which is larger—a territory or a habitat? Explain.

2 Why do animals need a territory?

3 You can find many microhabitats around your house or school. Explain what a microhabitat is, giving examples.

4 List some microhabitats which exist in and around a tree.

5 Is a group of plants and animals living in a tree best called a population or community? Is a tree an example of an ecosystem? Explain.

6 List the biotic and abiotic factors of the following:
a a possum living in a hollow of a tree trunk
b a lizard living among leaves on the ground
c a leaf growing near the middle of a tree.

1.4 Food chains

There are many plants and animals living in an ecosystem. They rely on each other in many ways. Most important is their need for food. Food is needed by all living things because it contains energy. All living things need energy to survive.

There are many words used by ecologists which relate only to food and energy. This activity has many new words in it, but each is about food, energy and ecosystems.

Plants make their own food using energy from the Sun. Their green leaves catch solar energy which is used to join water and carbon dioxide to make sugar. Sugar is an energy-rich substance. Plants and animals use sugar as food. It contains a lot of stored chemical energy. The process in which plants use the energy in sunlight to make their own food is called photosynthesis.

Plants use some of the food that they make to stay alive. The extra food is used to make them grow. Plants grow new branches and new leaves, flowers and seeds. All these are made from food and contain energy. Animals eat plants to obtain this energy. This energy came from the Sun. Food contains stored solar energy.

Plants are called producers, meaning that they produce or make food. Plants produce the food which animals need. Animals cannot make food, but must eat ready-made food. They are called consumers. This means that animals consume (= use up) the food made and stored by plants.

Animals can obtain the energy they need to stay alive by eating plants. They need to get energy out of their food. The process of obtaining energy from food is called respiration.

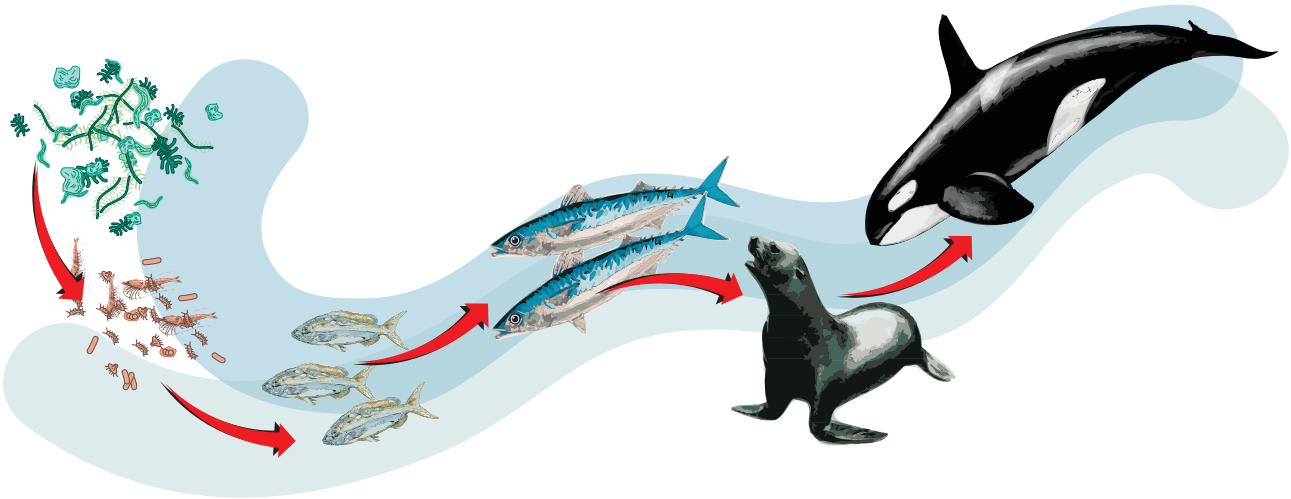
Animals that eat only plants are called herbivores, which means 'plant eaters'. Some examples are koalas, kangaroos, cows, sheep and rabbits. Animals that eat meat are called carnivores, which means 'flesh eaters'. Some examples are eagles, quolls, sharks and cats. Carnivores often eat the whole animal, leaving only crushed bones.

Some animals eat plants and other animals. They are called omnivores, which means 'everything eaters'. Some examples are brushtail possums, seagulls, and foxes. Many possums eat flowers and nectar, but will also eat grasshoppers and beetles if they are easy to catch.

Ocean (or marine) ecosystems are similar to land (or terrestrial) ecosystems. In oceans the main producers are microscopic plants called phytoplankton. The herbivores are small animals called plankton and shrimps called krill. Many large whales filter krill from sea water before eating them. The plankton and krill are also food for many other fish. Food chains exist in ocean ecosystems as they do in land ecosystems.

The flow of food in an ecosystem can be shown in a food chain. Some food chains are:

grass ⇒ rabbit ⇒ fox
seeds ⇒ mouse ⇒ cat
roots ⇒ bandicoot ⇒ eagle
algae ⇒ small fish ⇒ big fish ⇒ shark



A food chain in the ocean

The arrows show which way the food goes. When the rabbit eats the grass, the food in the grass goes into the rabbit. The fox eats the rabbit for its food. The food in the rabbit goes into the fox. Since food contains energy, the movement of food is also the movement of energy. Since all the food was produced by plants, there must be a plant (or a plant product such as seeds or roots) at the beginning of every food chain. Every food chain ends in a carnivore. So food chains will often look like this:

producer ⇒ herbivore ⇒ carnivore

Food is so important that many special names are given to the feeding relationships in the environment. They are herbivore, carnivore, omnivore, and producer and consumer. There are two other important words. A predator is an animal that hunts and feeds on other animals. Predators usually hunt and kill other animals for their food. Some examples of predators are snakes, quolls, eagles, lions and sharks. Prey is the animal which the predator catches and eats. When an owl eats a mouse, the owl is the predator and the mouse is the prey.

CHECKPOINT:

COPY AND COMPLETE

Food is needed by all _____ _____ because it contains _____. All living things need _____ to _____. Plants make their own ____ using _____ from the ___. The extra ____ is used to make them ____. Food contains stored _____ _____. Animals eat _____ to obtain _____.

Plants are called _____, meaning that they _____ or ____ food. Animals cannot ____ food, but must eat _____-____ food. They are called _____.

Animals that eat only plants are called _____. Animals that eat meat are called _____. Some animals eat _____ and other _____. They are called _____.

The flow of ____ in an _____ can be shown in a food _____. The _____ shows which way the ____ goes.

_____ ⇒ herbivore ⇒ _____

A _____ is an animal that feeds on other animals. ____ is the animal which the _____ catches and eats.

QUESTIONS

1 What is the meaning of the following words: producer, consumer, photosynthesis, respiration, marine, terrestrial, herbivore, carnivore, omnivore, predator, prey.

2 Answer these questions about this food chain.

tree roots ⇒ bandicoot ⇒ quoll

Which organism is the following?
- **a** the carnivore
- **b** the prey of the quoll
- **c** the predator
- **d** the herbivore
- **e** the producer
- **f** the consumers (there are two)

3 Select an organism to complete each food chain. State why you choose the organism.
- **a** grass ⇒ wallaby ⇒ _____ (select from gum tree, rabbit, dingo)
- **b** seeds ⇒ _____ ⇒ cat (select from sparrow, eagle, pelican)
- **c** _____ ⇒ bandicoot ⇒ hawk (select from grass, eagle, rabbit)
- **d** algae ⇒ _____ ⇒ big fish ⇒ shark (select from seaweed, tree, prawn)
- **e** _____ ⇒ prawns ⇒ fish (select from seaweed, shark, salmon)

4 Write the food chain for the organisms shown on the bottom of page 8.

5 Arrange the following organisms into a proper food chain.
- **a** prawn, plankton, fish, shark
- **b** kangaroo, dingo, blady grass
- **c** algae, heron, fish, shrimp

6 In an ecosystem, what moves between organisms? Why is it important?

7 What are the meanings of the arrows in food chains?

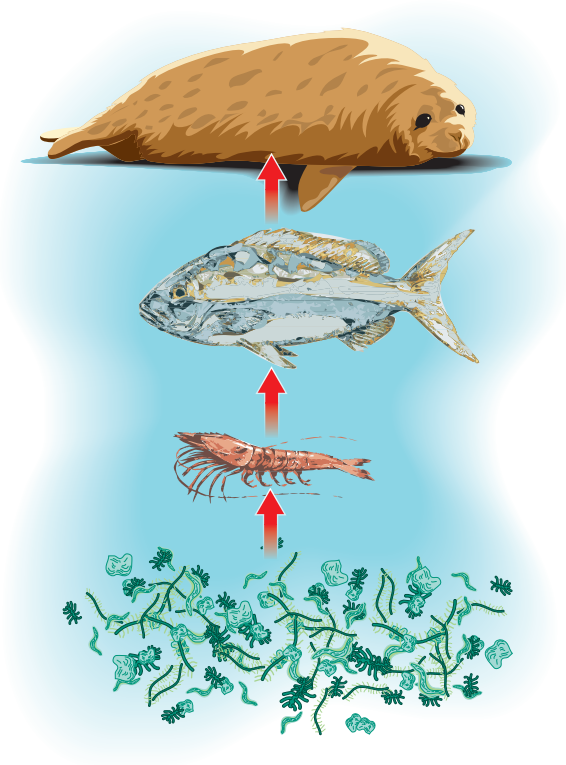
8 Complete the table below with appropriate examples.

	Terrestrial ecosystem	Marine ecosystem
Producer		
Herbivore		
Carnivore		
Source of energy in food		

1.5 Food pyramids

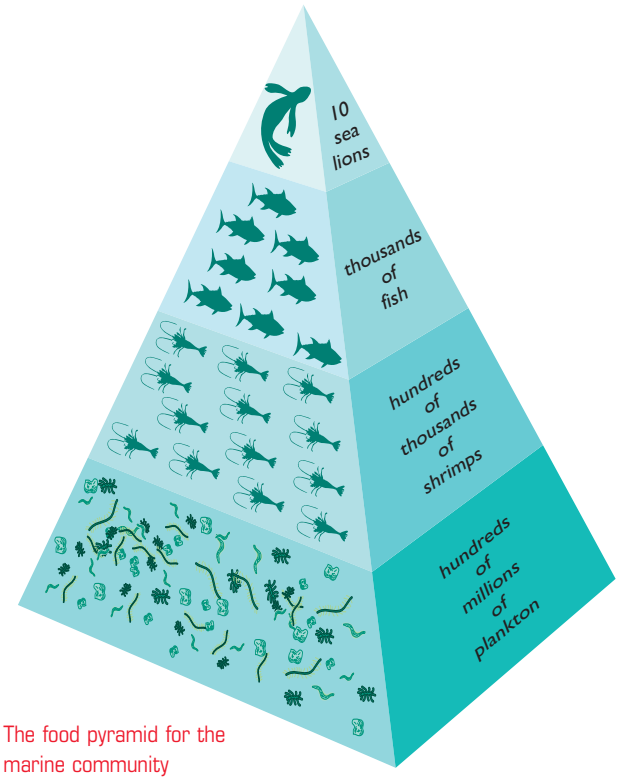
In the ocean there are many more fish than sharks. In the bush there are many more bandicoots and wallabies than eagles and quolls. In every ecosystem there are more herbivores than carnivores. Why is this?

Consider a community off the coast of southern Australia. It contains sea lions, fish, shrimps and plankton. Plankton are the tiny plants and animals which float in the oceans. How much food is needed to keep ten sea lions alive?



A marine food chain

Sea lions eat only fresh fish. Every week each sea lion would eat hundreds of fish. *Ten sea lions would eat thousands of fish.* What do the fish eat? They eat prawns and shrimps. Each fish eats hundreds of shrimps every week. *Thousands of fish would eat hundreds of thousands of shrimps.* What do the shrimps eat? The shrimps eat floating water plants, called plankton. Each shrimp eats thousands of plankton in order to stay alive and grow. *Hundreds of thousands of shrimps would eat hundreds of millions of plankton.* These hundreds of millions of plankton feed only ten sea lions!



The food pyramid for the marine community

These numbers are shown in a food pyramid.

The areas shown in the food pyramid represent the numbers, and the weight, of all the organisms at each level of the food chain. You need hundreds of millions of plankton, which weigh thousands of kilograms, to be the food for hundreds of thousands of shrimps, which weigh hundreds of kilograms. And so on, until at the top of the food chain there are just ten sea lions.

The mass (= weight) of all the living things in the environment is called the biomass. This is a shortened version of the words 'biological mass'. The biomass of the producers is always the largest, and the biomass of the herbivores is smaller. The biomass of the carnivores is smaller still.

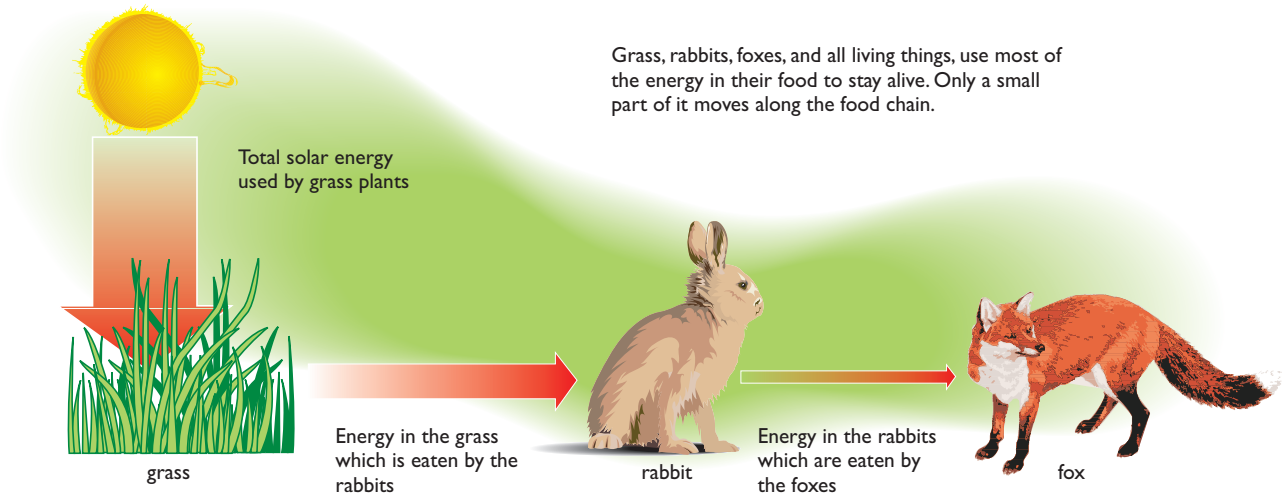
Energy

Every living thing needs energy to stay alive. Animals gain this energy from the food they eat.

If you have a pet dog or cat, you have to feed it every day. Hardly any of this food goes towards making your pet heavier. This is because the food is converted into energy, and more food is needed the next day to make more energy.

The same applies to food chains. Most of the grass eaten by a rabbit is converted to energy to keep the rabbit alive. Only a small fraction of the grass which was eaten by the rabbit can be used as food by the fox. This loss of energy happens at each stage in the food chain.

The movement of energy through living things follows a similar pattern to a food pyramid. Energy is contained in biomass and biomass becomes less as you move up the food chain. There is always a large mass of producer organisms needed to support a smaller mass of herbivores, which support a small mass of carnivores. This shape of a food pyramid never changes.



The movement of energy in the environment

CHECKPOINT:

COPY AND COMPLETE

The areas shown in the food pyramid represent the _____, and the _____, of all the _____ at each _____ of the food _____. The ____ of all the _____ things in the _____ is called the _____. This is a shortened version of the words _____ ____.

Every _____ thing needs _____ to stay alive. Animals gain this _____ from the ____ they eat. The ____ is converted into ____ .

QUESTIONS

1 Draw a food chain for the example in the text describing sea lions. Draw a food pyramid for this food chain, like the blue one drawn on page 10.

2 What is the origin of the word biomass? What does it mean?

3 In each of the following, which has the greater biomass?
- **a** fish or sea lions
- **b** shrimps or sea lions
- **c** carnivores or herbivores
- **d** plants or animals

4 Where does the energy to run the environment come from? In what form do plants store this energy? How does this energy reach the carnivores?

5 What would happen to life on Earth if the Sun suddenly stopped shining?

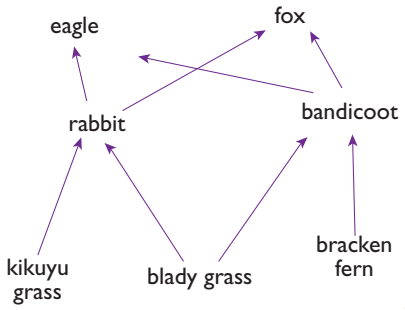
6 Some people have said that there could be more humans on Earth, with plenty of food, if we all ate only plants and not meat. Is this true? Explain.

7 Living things need energy in order to survive.
- **a** How do plants obtain the energy they need to live?
- **b** How do animals obtain the energy they need to live?
- **c** Is the answer for (b) the same for herbivores and carnivores?
- **d** Energy from the Sun makes grass grow, which is eaten by rabbits, which are in turn eaten by foxes. Draw a diagram, or write a paragraph, showing or stating what happens to this energy.

1.6 Food webs

One animal rarely eats just one type of food. Most animals eat a variety of foods every day, and eat different foods in summer compared to winter. Multiple food chains which show these feeding relationships are called food webs.

Like food chains, food webs start with producers. The names of the producers are written at the bottom of the food web. The carnivores are at the top of the food web.



A simple food web

With a partner or friend, examine the food web drawn above. Write what you believe are the answers to the following questions on a sheet of paper. When you have finished, join with another group of two to make a group of four. Check your answers with each other. Check with your teacher if there are any questions with which you do not agree.

1. Name three producer organisms, two herbivores, and two carnivores.
2. What do the arrows show?
3. What do bandicoots eat?
4. What are the prey species of the eagle?
5. What are the predators of rabbits?
6. Which organism would best take the place of the rabbit? Select from wallaby, cat, and sparrow. Give a reason for your answer.
7. If the disease myxomatosis killed all the rabbits, what effect would this have on the population of the following organisms: eagles, kikuyu grass, blady grass, bandicoots? Give a reason in each case.
8. Write a single food chain from the food web.
9. Draw a food pyramid of this food chain.

Notice that food webs are interconnecting. Every living thing in the environment needs every other living thing in order to survive. When people talk about the 'web of life' they are referring to the interactions between all living things.

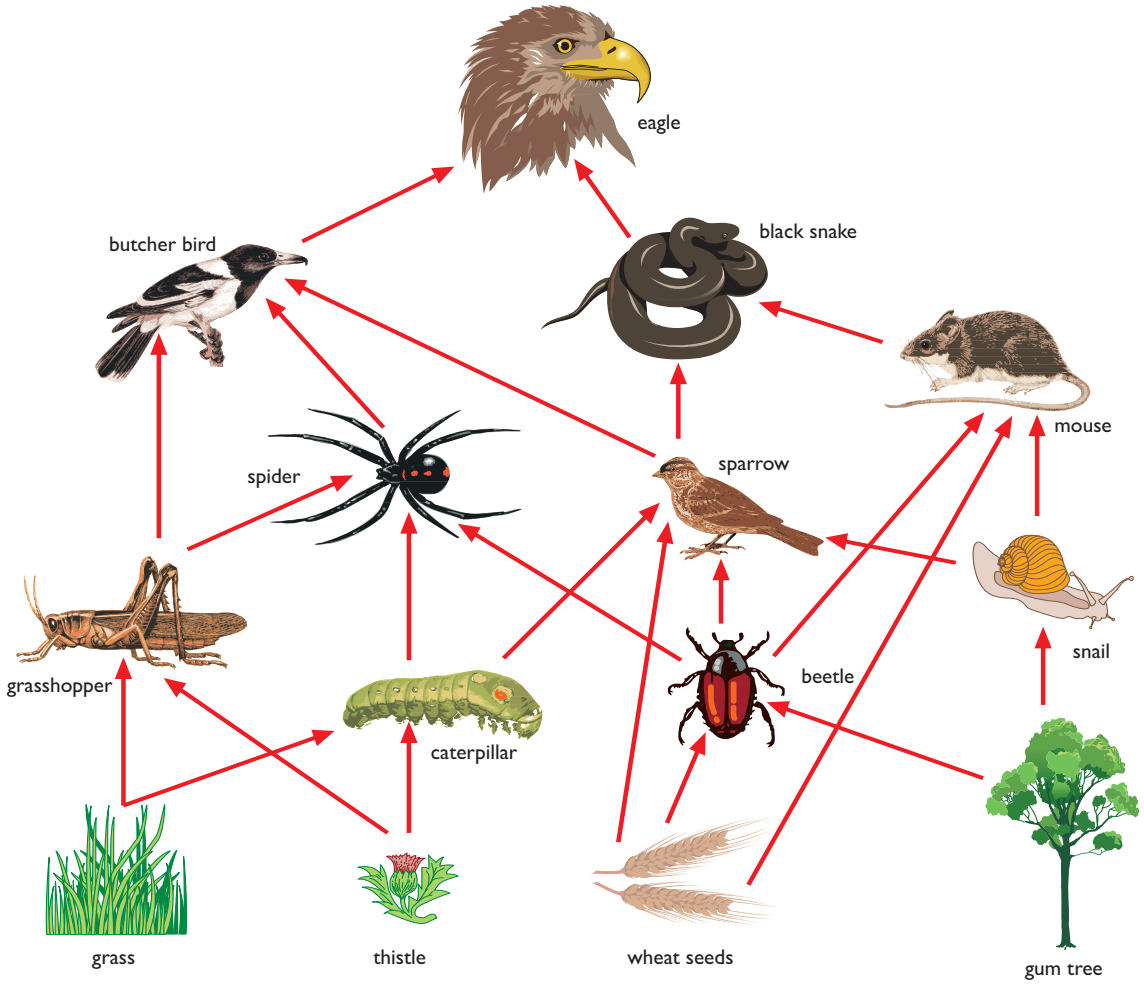
CHECKPOINT:

COPY AND COMPLETE

Multiple food chains which show _____ _____ are called ____ ____. Like food chains, ____ ____ start with _____. The names of the _____ are written at the _____ of the food ___. The _____ are at the top of the food ___. Notice that food ____ are _____. Every _____ _____ in the _____ needs every other _____ _____ in order to _____.

QUESTIONS

1. Flying foxes are a type of bat, which eat fruit, often from trees in orchards and back yards. What effect would killing the flying foxes near your school have on the environment?
2. Many people take their unwanted pets into bush areas and release them.
   - **a** If you released a cat into the bush, how might this affect the food webs in the bush?
   - **b** If you released a seed-eating bird like a budgerigar or a parrot, how might this affect the local environment?
3. Possums are native animals that are common in urban areas. They live in and near houses, and often eat pet food and food that is specially left out for them.
   - **a** How does feeding wild animals affect their population?
   - **b** How does this affect the rest of the animals and plants in the food web?
   - **c** What would be the effect if people suddenly stopped feeding these animals?
4. Some new housing estates are now pet-free. Residents are not allowed to have a cat or dog.
   - **a** Why are pets banned in some new housing estates?
   - **b** Will the ban be most effective in urban or rural areas? Explain.



An extended food web

CHECKPOINT:

QUESTIONS

5 Answer the questions about the food web shown above.

a What are the producers?
b What is the top predator?
c What are two omnivores?
d Which animals are prey to spiders?
e What are the predators of grasshoppers?
f Which of the following animals could best take the place of the grasshopper: lion, blady grass, rabbit?
g If all the grasshoppers died, what effect would this have on the following animals? Consider them one at a time in the order given.
  i population of spiders
  ii population of butcherbirds
  iii population of eagles
  iv population of snakes
h Select one food chain from this food web. Draw a food pyramid of the food chain.
i Remembering the ideas about food pyramids, answer these questions. Which of the following animals would have the larger population? Explain why.
  i caterpillars or spiders
  ii sparrows or snails
  iii eagles or snakes

6 **a** Arrange the following animals to make a food web.

wattle tree	beetle	cat
gum tree flowers	bee	worm
blady grass	possum	mouse

Check with your teacher or a friend that you are correct.

b Name the animals that best fit these descriptions.
  i top predator
  ii an omnivore
  iii consumers
  iv prey of the cat
  v predators of beetles

c Select one food chain from the food web you have drawn, and draw a food pyramid of it.

1.7 Decomposers

When an old building has reached the end of its useful life, it is pulled down. A demolition crew would move in and demolish the building. They remove the bricks and concrete, sell the wood to timber merchants, recycle the steel and glass, and prepare the site for a new building.

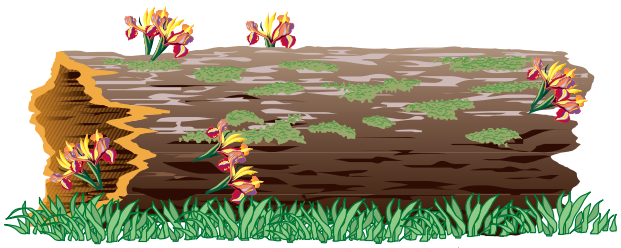
In the environment, the demolishers are called decomposers. They demolish, or decompose, decay or rot, any dead things in the environment. Not only do they decompose, they also make available for recycling all the parts of the dead tree or animal. Decomposers are the environment's recyclers.

A dead animal is found and partly eaten by a scavenger. A scavenger is an animal which hunts and eats dead animals. It would tear apart the body and eat the meat, and perhaps scatter the bones. Some important scavengers are foxes, wild dogs, and ravens. In rivers and lakes, the scavengers are crabs and crayfish. Flies lay their eggs in left-over meat, and the eggs hatch into larvae. The fly larvae are called maggots, and they eat meat and flesh. Cockroaches and beetles would eat the gristle until only the bones remained. Bones, too, will eventually decay if they are buried.

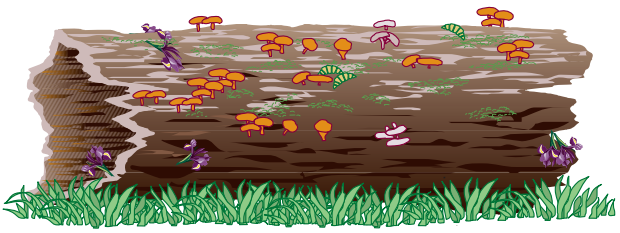
A dead tree is decomposed by termites, with lots of help from fungi, worms, cockroaches, ants and bacteria. These animals attract carnivores such as spiders and centipedes. Larger animals such as echidnas and goannas are attracted by the food. A rotting tree attracts its own community of decomposers and their predators. The diagram below shows the decay of a tree on the floor of a forest.

Fungi decompose logs and dead trees

The most important decomposers are bacteria and fungi. They secrete chemicals which break down the materials in dead bodies and wood. They then absorb these materials as food. Earthworms, crayfish and cockroaches eat rotting food, and



1 When a tree in a forest falls to the ground, the animals which live in it lose their home. The possums and birds have to look for a new home. The other plants which live high in the tree, such as tree orchids and ferns, die.
The tree becomes part of a new environment which is cooler, damper and darker. The tree is home to new plants and animals, including some that start to decompose it.



2 New plants and animals move in. The cracks are home to spiders, and a snake lives in the hole once used by a possum. Fungi grow on the wood, and extend deep into it. The mushrooms and toadstools we see are their reproductive structures. They are eaten by rats and beetles. The beetles are eaten by antechinuses (marsupial mice), centipedes, and other animals.

break it down into food inside their body. Termites eat rotting wood and convert it into food inside their body. Orchids and staghorns that live high in trees absorb the nutrients from rotting leaves, but they do not decay the leaves themselves. Fungi are the decomposers that staghorns and orchids rely upon for their nutrients.

Animal dung must also be decomposed. Native ants and beetles eat the dung of native Australian animals. The large cow pats (= dollop of dung or manure) of introduced farm animals are too big and too sloppy for native decomposers. People have introduced dung beetles to decompose cow pats. These beetles roll the manure into balls, which they bury. Their eggs are laid inside the tiny balls of manure. Earthworms also eat the nutrients in the manure and decompose it. Fungi, such as mushrooms, grow on manure and use it as their source of food. Fungi are best known as decomposers of logs and dead trees.

The dung pats of cattle are ideal for bush flies to breed in. The pats provide warmth and protection for the flies' eggs. When the introduced beetles arrived in an area, the number of bush flies dropped dramatically.

CHECKPOINT:

COPY AND COMPLETE

In the environment, the demolishers are called _____. They also make available for _____ all the parts of the dead ____ or _____. _____ are the environment's _____.

A dead _____ is found and partly eaten by a _____. A scavenger is an _____ which _____ and ____ dead _____. A dead ____ is _____ by termites, with lots of help from _____, _____, _____, ____ and _____. The most important _____ are _____ and _____. They secrete _____ which break down the materials in _____ _____ and _____.

Animal dung must also be _____. People have introduced dung _____ to decompose ___ ____.

QUESTIONS

1 What is the meaning of the following words? decomposer, decompose, scavenger, dung, cow pat

2 List as many decomposer organisms as you can from the text.

3 List three scavengers mentioned in the text.

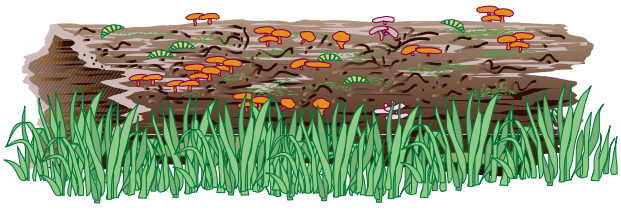
4 To what group of living things do mushrooms belong? What do mushrooms live on? Are they decomposers?

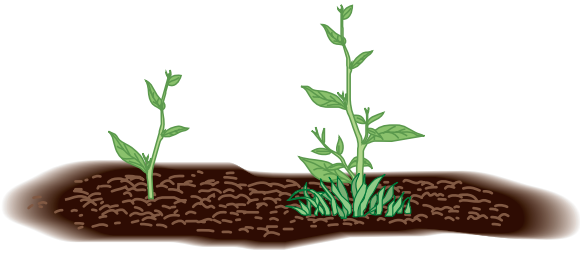
5 Draw three different food chains for the rotting tree which include these animals: termites, worms, cockroaches, ants, spiders, centipedes, echidnas, goannas. Remember that the only producer organism in these food chains is the rotting log.

6 Why are decomposers important to the environment? How would the environment be different if there were no decomposers?

7 Decomposers act in different ways. Some break down dead organisms outside their bodies, and some break down substances inside their bodies. Give examples of each from the text.

8 Gardeners make compost from leaves, grass clippings and food scraps. Almost anything of biological origin can be used to make compost.
   a How is compost made from these materials?
   b Why do gardeners use compost?
   c A compost heap generates heat. Where does this heat come from?





3 Termites eat the wood by tunnelling in from underneath. They stay away from light. Termites produce sawdust, which is shifted by cockroaches and earthworms. The old tree becomes home to beetles, termites, worms, crickets, lizards and spiders.
Many animals lay their eggs and their larvae (= caterpillars) eat the wood. A big goanna will rip open the old tree with its strong claws looking for something to eat. Echidnas search for termites.

4 Decomposers have decayed the tree. Fungi, termites, bacteria and larger animals have all helped. Lizards and burrowing animals scatter the remaining pieces of wood, and brush turkeys scratch the ground searching for seeds and insects.
When there is no wood left the soil becomes soft and is ideal for hiding eggs of worms, leeches and lizards. New trees grow from the many seeds which fall into the soft fertile ground. One of these trees may take the place of the fallen giant.

1.8 Partners in life

No living thing can live on its own. All living things need other organisms as partners, which help to provide their needs, such as food and shelter.

If you were a possum in a forest, your partners would be an old gum tree with a hollow branch in which you would live. Your food would be the flowers on a bottlebrush tree and a colony of insects and moths.

Living things need each other for survival. All living things need food. Eagles are hunters which eat small mammals such as bush rats. The eagle is the predator and the rats are the prey. This is the simplest relationship between living things.

Wedge-tailed eagles eat small mammals such as bush rats

Symbiosis

Some living things are so dependent on other living things that they find it difficult to live on their own. When two living things depend on each other, it is called symbiosis. Their survival depends on living closely with another different living thing.

Different interactions between living things are given different names:

Mutualism is where living things rely on each other to help in their survival. Some organisms live together and even depend on each other for their survival.

An example is a tick bird. This bird walks over the back of large animals and eats the ticks in their fur. The tick bird gets a supply of food without having to fly too far to find it. The large animal has its ticks removed. The ticks eat the animals' blood and reduce their chances of survival. Additionally, some tick birds make loud noises when predators approach and this warns the animals of danger.

Termites have the unusual ability to eat wood and use it as food. This is due to protozoa (one-celled animals) that live in the intestines of termites. The protozoa gain a warm place to live with a constant supply of food, while the termite can eat food that other animals cannot eat.

Mycorrhiza is the association between fungi and the roots of plants. The fungi extract minerals from the soil, especially phosphate, which plants need. Plant roots exchange phosphate for sugar with the fungus.

Cattle egrets and cows are an example of commensalism

Commensalism is where one organism benefits from another organism, which suffers no harm but does not benefit either. An example is a bird's nest high in a tree. The bird gains protection for its nest from most predators. The tree suffers no harm or benefit because of the nest.

A clownfish lives in close company with a sea anemone. The brightly coloured clownfish swims among the poisonous tentacles of the anemone, where it gains protection from predators and a few scraps of food. There does not seem to be any benefit to the anemone.

Cattle egrets are birds that walk beside cattle that are grazing on grass. As the cattle walk along they disturb insects in the grass, which fly out and are eaten by the egrets. The egrets have a clear benefit, and the cattle graze the same whether the egrets are present or not. The cattle do not have any harm or benefit.

Barnacles live on a whale or turtle. The whale or turtle suffers no harm or benefit, but the barnacles gain a place to live and a constant supply of food washes past them as the whale or turtle swims along.

Parasitism is where one organism benefits and the other is harmed. Parasites live inside or on the outside of other living things and eat them while they are still alive. The living thing on which the parasite lives is called the host.

An example is a tapeworm. This long, thin worm lives in the intestines of people and animals, and eats the animal's food before it can be absorbed. Infected animals become thin and may die. The tapeworm grows and becomes large and healthy.

Another example is a mistletoe plant. It is a plant that can make its own food, but it also feeds on the sap from a living tree it grows on. If the mistletoe plant thrives it can kill the tree.

CHECKPOINT:

COPY AND COMPLETE

When two living things depend on each other, it is called _____. Their _____ depends on living _____ with another _____ living thing.

Mutualism is where living things ____ on each other to help in their _____. Some organisms live _____ and _____ on each other for _____.

Commensalism is where one organism _____ from another organism, which suffers no ____ but does not _____ either.

Parasitism is where ___ _____ benefits and the other is _____. Parasites live _____ or on the _____ of other living things and ___ them while they are still _____. The living thing on which the _____ lives is called the ____.

QUESTIONS

1 What is the meaning of these words?
symbiosis, mutualism, commensalism, parasitism, host

2 In the following examples, is the first named animal the predator or the prey?
- **a** fox which hunts and kills rabbits to survive
- **b** seal being attacked by a white pointer shark
- **c** rabbits which are hunted by an eagle
- **d** echidna searching an ant nest for food
- **e** grasshoppers being hunted and eaten by a blue-tongue lizard
- **f** willy wagtail bird sitting on a fence post waiting for a grasshopper
- **g** centipede eating a spider

3 What name is given to the relationship between the following living things. Select from: mutualism, commensalism, parasitism.
- **a** liver fluke which eats the liver of a live sheep
- **b** cattle egret which catches the insects in the grass as a cow walks through the grass
- **c** fungi provide the shelter and nutrients for lichen, and alga provides food
- **d** tick sucking the blood from a bandicoot
- **e** heartworm living inside the heart of a pet dog
- **f** berry-like plant which has its seeds spread by a bird which eats the berries
- **g** possum eating food scraps from a compost heap
- **h** hermit crab living in the left-over shell of a dead snail
- **i** bee which enters a flower to eat the nectar and is covered in pollen
- **j** spider hiding under the bark of a tree
- **k** alga makes food for itself and coral, and in return the coral gives the alga a safe and comfortable place to live

1.9 The web of life

In every community you will find producers, herbivores, carnivores and decomposers. There is a complex interaction between them. Predators hunt their food, and herbivores are on the look-out for carnivores. Scavenging animals are searching for food. Decomposers are decaying the remains of plants and animals. In a community, there are many types of plants and animals. They all live very close to one another and depend on each other for survival.

Every community needs its environment. The environment provides the rain, the nutrients, the solar energy, the shelter and the other factors needed to sustain life. The plants and animals in the community are adapted to live in the environment. The total of all the living things, and the environment, is called an ecosystem.

Every ecosystem has producers, herbivores, carnivores and decomposers. In an Australian grassland ecosystem, the herbivores are kangaroos. In an African grassland ecosystem the herbivores are zebra and antelope. Different herbivores are found in different continents. The same is true of carnivores and producers. Every ecosystem has its own environment, its own herbivores, its own carnivores and its own decomposers.

A balance

In every community there is a balance between living things. If there are too many rabbits for the available grass, then some rabbits will starve or move to a new area, while the grass grows again. If there are too many foxes for the number of rabbits, many foxes may die of starvation or move to a new area. The balance between the number of producers, herbivores and carnivores is important and applies to all ecosystems.

An Australian ecosystem

An example of an ecosystem is an Australian fresh-water billabong or lake. The birds in them hunt in different ways. Herons and egrets are wading birds, which walk in shallow water to find their meal of fish. Birds with longer legs can wade into deeper water, and catch bigger fish. A kingfisher sits on a branch overlooking the water. It will dive into the water to catch fish. A pelican swims over the water, and uses its bill to scoop up fish.

Hunting habits are different. Some birds hunt on their own. Other birds, like pelicans, hunt in groups. They herd fish into shallow water where it is easier for the birds to catch them.

Even breeding habits are different. A king-fisher nests in the hollow of a dead tree. Some egrets build a stick nest high in a dead tree. Herons and pelicans nest on crushed reeds surrounded by water. Usually the breeding seasons are different.

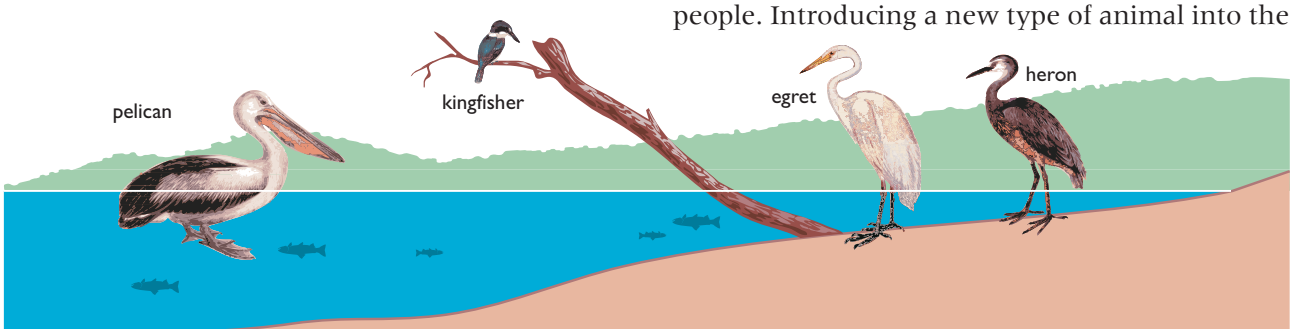
The environment is important. It needs to be just right to support the birds in our billabong example. Temperature, rainfall, wind, even the mud in the lagoon, must be right for this ecosystem to function properly.

The same is true of all ecosystems. Every living thing has its special role to play in the functioning of the whole ecosystem.

In a spider's web, all the strands are joined to each other. If you break one part of the web, the whole web is weakened. The same applies to an ecosystem. Everything in the ecosystem relies on everything else for its survival. This is what people mean when they talk about the web of life.

People and ecosystems

The web of life can be disturbed by the actions of people. Introducing a new type of animal into the



Birds in a swamp community

local creek will upset the balance. A cat will eat some of the birds and mice which would have been food for quolls and possums. A goldfish will dig up the mud in the creek which will cause the water to go murky. This stops sunlight reaching water plants so they cannot make food. These plants will die. Some native fish cannot live in muddy water because the grains of mud clog up their gills. They will die or move somewhere else in the creek. Simple actions like these can upset the balance in an ecosystem.

The actions of people can also help protect the environment. Recycle as much as you can, don't use poisons on your garden, don't waste water, use phosphate-free detergent, put a bell on your cat or dog so it cannot kill wildlife, use public transport or walk instead of riding in a near-empty car, and so on. Remember the motto 'Think global, act local'.

CHECKPOINT:

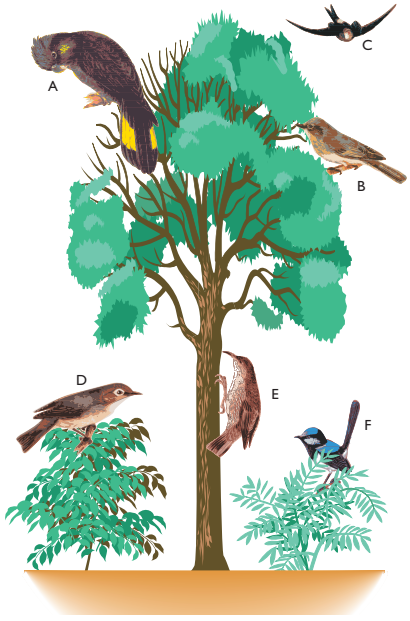
COPY AND COMPLETE

In a community, there are many types of _____ and _____. They all live very _____ to one another and _____ on each other for _____. Every ecosystem has _____, _____, _____ and _____.

Every _____ _____ has a special ____ to play in the _____ of the whole ecosystem.
Everything in the _____ relies on _____ _____ for its _____. This is what people mean when they talk about the ___ __ ____.

QUESTIONS

1 The diagram following shows the feeding habitats of five types of insect eating birds. Each bird is identified by a letter.
Which is the bird, A, B, C, D, E or F, in the drawing?
- **a** silvereye, eats insects in thick bushes and scrub
- **b** black cockatoo, eats beetle larvae and cicadas in branches high in the trees
- **c** grey fantail, eats insects flying around the leaves on high trees
- **d** blue wren, eats insects near the ground
- **e** tree-creeper, searches for and eats the insects under the bark of trees
- **f** swift, feeds high in the air, above the trees, not stopping for a rest.



2 Many people have not seen black cockatoos, but blue wrens are well known. Explain why.

3 Other birds live in or near trees, but eat flowers and seeds. Copy a tree drawing (like Question 1) into your note book, and label with arrows where you would expect to find each type of bird.
- **a** parrot, eats seeds and flowers high in trees
- **b** lorikeet, eats the nectar in flowers in low trees and branches
- **c** rosella, eats the seeds from low trees and shrubs
- **d** finch, eats small grass seeds inside the seed heads
- **e** galah, eats large seeds on the ground.

4 An older tree, with its thick bark, roots and hollows, can support many carnivorous animals such as spiders, lizards and snakes. These animals eat the same food as the birds in Question 1. The carnivorous animals are eaten by birds such as butcher birds and kookaburras. Kookaburras hunt from a perch much higher than that of a butcher bird, and will take larger prey than a butcher bird. A butcher bird, being smaller, will take prey close to the trunk of a tree where the branches and leaves are thickest.
- **a** Butcher birds and kookaburras eat similar food, but rarely do they compete for food. Explain.
- **b** List all the birds that live in or around a tree. List only those mentioned in Questions 1, 3 or 4.
- **c** Why is a tree sometimes called 'nature's guesthouse'?

1.10 Studying environments

Look around your school and local area. Is there somewhere close and safe that you could use to study a part of an ecosystem?

EXPERIMENT

AIM: To compare local environments

Select two environments in or near your school. You could choose the oval, flower garden, cow paddock, or the local park. Measure as many aspects of the environment as you can.

Set out your results in a table in your note book. Allow lots of space to neatly record your observations and results.

Answer the following questions:

1 Which environment has the greatest variety of life?

2 Does the area with the greatest variety of plant life have the greatest variety of animal life? Why do you think this is so?

3 Which environment would be the most pleasant place to live?

4 Many people plant trees around their homes. Why do they do this?

5 List the human activities that take place in each of the environments.

6 How do these activities affect each particular environment?

Feature	Environment No. 1	Environment No. 2
Temperature in the sun		
Amount of shade		
Temperature in the shade		
Wind strength		
Is the wind constant or gusty?		
Light intensity		
Humidity		
Amount of bare earth		
Is there any water for animals to drink?		
Plant types present e.g. trees, shrubs, herbs, grasses, ferns, mosses, algae		
Invertebrate animals seen or heard		
Vertebrate animals seen or heard		
Other features you might notice		

EXPERIMENT

AIM: To compare and contrast unknown environments

The photographs show three different environments. Use the headings in the table above as a comparison of these areas. Do not include numbers in your comparison, but use descriptive words and phrases that compare and contrast the areas. Use your knowledge of the environment to help you with your answers.

Grass on a river floodplain

Stunted eucalypts in an alpine region

Rainforest

EXPERIMENT

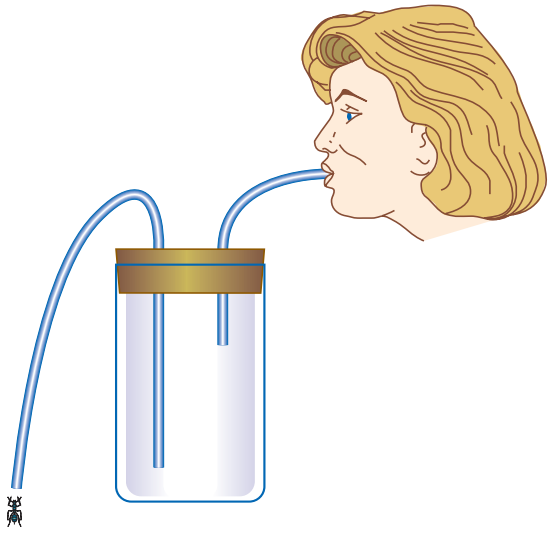
AIM: To explore leaf litter

Leaf litter is the name given to the dead and rotting leaves which lie on the ground under trees and in gardens. This habitat is home to many tiny invertebrates. Most are decomposers, but some are carnivores.

Leaf litter animals are small and fragile. Collect them with a wet paintbrush or a pooter. A pooter is collecting equipment which works by suction. Your teacher can give you a pooter, or the materials to make your own. Clean the mouth piece after someone else has used it.

You will need:

- some old newspaper to sit or kneel on
- plastic test-tubes or specimen tubes; lids are a good idea
- a wet paintbrush, to pick up tiny animals without crushing them
- a pooter, a collector which works by suction
- hand lenses or small microscopes
- pen and paper for recording your results
- a copy of the chart to identify these animals.



Using a pooter: don't suck too hard!

Before you start, ask your teacher about any bull ants, poisonous spiders or centipedes which are found in your area. There may be some animals which could bite you. Do not touch any animal with your fingers. Don't touch the ground with your legs, but sit on the newspaper. If in doubt, leave the animals alone and ask your teacher.

Find an undisturbed area, about 50 cm long and 50 cm wide. Work only in this area. Lift up the leaves slowly. Use your brush to pick up the tiny white animals. Some of them, like springtails, will jump away quickly.

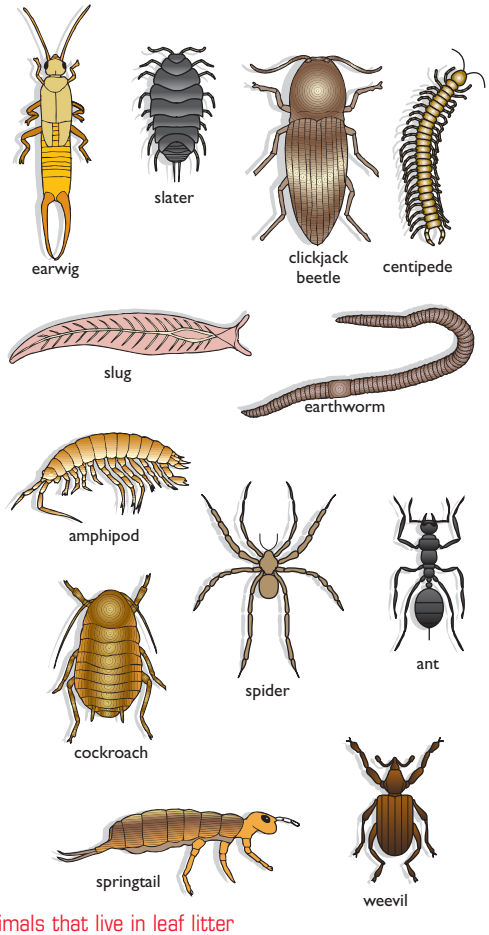
In your Science note book, make a list of the animals you find. Include as a separate list things like eggs, cocoons, larvae, and types of fungi.

When you have finished, return the animals and leaves to the place where you found them.

1 Why should you wear gloves when collecting specimens?
2 Why should you sit on newspaper when conducting fieldwork like this?
3 What is the reason for using a wet paintbrush and a pooter for collecting specimens?
4 Why is it important to return animals to where you found them?
5 A leaf litter community is unusual in that it does not contain any producer organisms, such as healthy green plants. What is the energy source for this community?

Extension

Find out what these animals eat, and draw a food web for the leaf litter.

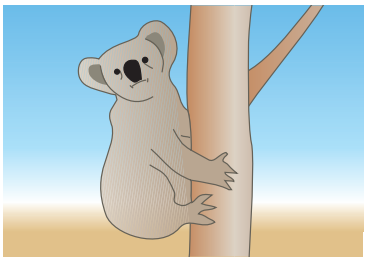


Some animals that live in leaf litter

1.11 Case study—koalas

Natural environments are in balance. The producers balance the herbivores and carnivores. The abiotic environment works with the biotic environment. Ecosystems are self regulating. However, the activities of people can disturb the environment.

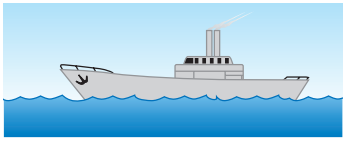
An example is described below. It shows that management of the environment is complex and that there are no easy solutions.



Before European settlement the Aboriginal Australians hunted the koala. They used its meat and fur. The Aborigines took only enough koalas to keep a balance in the population.

The first Europeans drove the Aborigines from their land. They brought their own food animals with them, and did not hunt koalas. The population of koalas increased very quickly.

In the early 20th century, koalas were hunted for their fur. In 1924, for example, two million pelts (= skin with fur) were exported overseas. The pelts were used in Europe to make fur coats, slippers, hats and handbags.



When the population in some areas became low, laws were passed to protect koalas. Special reserves and parks were established.

In towns and suburbs koalas die because of lack of habitat, attacks by dogs and being hit by cars. In some towns there are koala hospitals.

In their natural environment, some koala populations have been reduced by the disease called chlamydia. It is sexually transmitted and causes blindness and infertility. Diseased koalas cannot see their food and starve to death.

Chlamydia has caused a balance in the population. When koalas are too crowded the disease spreads quickly and many die. When there are fewer koalas, the disease does not spread much, if at all.

In 1923, eighteen healthy koalas were released onto Kangaroo Island. No koalas lived on the island before this. There was no disease and no predators. By 1995 there were 5000 koalas. They had eaten all their food trees and were beginning to starve.

Unless something was done, the koalas would starve to death when they ran out of food trees.

Five possible answers to the problem, and some comments about them, are written below:

1 Plant more food trees. It takes 30 years for the food tree to grow.

2 Relocate the koalas. This means moving some of them to a new location. Most suitable koala habitats in Australia are occupied by other koalas. Koalas are territorial, and will fight with newcomers.

3 Cull them, which means killing some of them quickly and painlessly.

4 Sterilise (= desex) some of them, like we do with pet cats and dogs. These koalas will not reproduce. Fewer koalas means fewer trees get eaten.

5 Catch them and send them to overseas zoos. Most overseas countries do not have gum trees, and so the koalas would have no food.

Answer these questions neatly in your note book. Write the question and answer in full sentences.

1 What is the meaning of these words: habitat, predator, relocate, cull, sterilise, pelt.

2 How did European settlement upset the balance in the population of the koalas?

3 What fashion items were koala pelts used for in the 1920s?

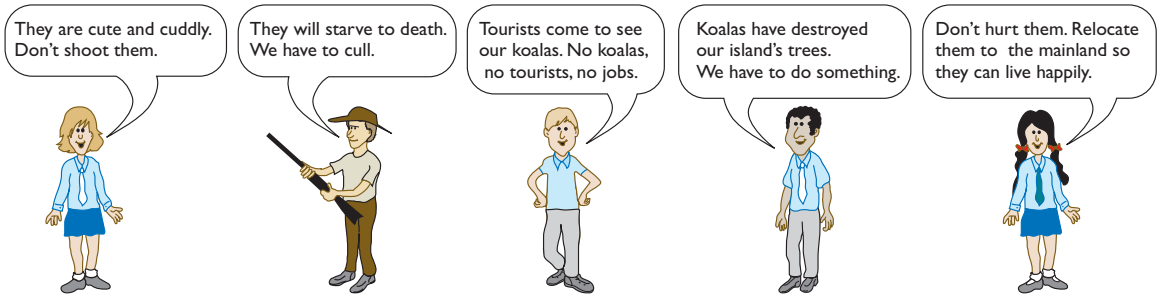
4 Name three causes of death of koalas living near towns and suburbs.

5 What is the main reason why people put koalas onto Kangaroo Island?

6 Why did the population of koalas on Kangaroo Island increase so quickly?

Now continue reading.

Everyone seemed to have a different opinion:



Biologists and other scientists looked for the facts:

- in 1995 there were 5000 koalas, in 2004 there were almost 30 000 koalas
- the habitat on the island is 1400 hectares
- there is irreversible damage to the koalas' food tree, the manna gum, and to the bird and insect life that relies on the trees
- some koalas were in poor health due to a lack of food and disease, brought on by overcrowding.

After hearing all the arguments, the Government decided to:

1 sterilise some koalas

2 plant more food trees

3 move some koalas to Mount Gambier, where they originally came from.

From 1997 to 2004, 3850 koalas were captured and sterilised. Of these, 2350 were released back onto the island and 1500 were relocated to Mount Gambier. No koalas were killed. The long term solution may involve new ideas and strategies. These could include giving some of the koalas a contraceptive device so they do not give birth, or fencing off some areas to allow food trees time to regenerate.

Answer these questions neatly in your note book. Write the question and answer in full sentences as before.

7 How did scientists help in making these decisions?

8 If you were the person who had to make the final decision, what would you decide? Explain your reasons clearly.

9 If you were the person in charge of an ecology research centre, how would you direct the research projects to reduce this problem in the future? List your ideas clearly, giving reasons.

10 Design a poster that can inform overseas tourists of the measures taken to control the population of koalas on Kangaroo Island.

1.12 Fire, flood, drought

The Australian environment is unique. Australia is home to many plants and animals found nowhere else in the world. But the Australian environment is also severe. Plants and animals have to cope with fires, floods and drought.

Fire

Fire was important in the life of Aboriginal Australians. They regularly set fire to the countryside to encourage new plant growth. The fresh, soft growth attracted kangaroos and other animals that were good to hunt. In contrast, European settlers feared fire and the effects it had on their animals and plants. Wildfires caused by lightning strikes were also a natural feature of the environment, but Europeans tried to put them out whenever they could.

Aboriginal people have lived in Australia for at least 40 000 years longer than Europeans. Their use of fire changed the environment. Plants and animals have adapted to it. Fire is now essential to the survival of many natural ecosystems in Australia.

Much of the vegetation of Australia has adapted to live with fire. Many plants live for one year, flower, and produce seeds. A fire might kill the plants, but there are enough seeds in the ground to allow the species to survive. Some plants produce seed pods which lie dormant until the heat of a fire opens them. In a hot fire the branches of a tree may be burnt off. The tree then grows tiny shoots from the trunk called epicormic shoots. These shoots grow leaves which make food for the tree to survive until it can grow new branches. Some plants have lignotubers. These are woody bulbs which are under the ground. When the plant above the ground has been destroyed by fire, the lignotubers supply the food which enables the plant to grow again.

The ash from a fire acts as fertiliser. The growth of short-lived plants and grasses gives an abundant supply of food and shelter to small animals, which will quickly populate the area. There is a greater variety of life in a regularly burnt grassland region than in a similar but unburnt area.

Many animals are not so lucky in a fire. Large mammals such as possums and koalas may be killed. Bandicoots and mice can survive in their

A blackbutt forest one week, one year and two years after a fire

burrows until the fire passes. Kangaroos, snakes and lizards might outrun the fire, but many might be killed by it. Even in a severe fire there are small areas such as creeks and gullies which are not burnt. Many animals seek shelter in these areas until the fire has passed.

After a severe fire there is no food or shelter. All the leaves and seeds have been burnt. The dead trees with nesting spaces, and hollow logs, have been destroyed. The animals which survive the fire are easy prey to predators such as eagles and dingos. When it next rains, plant growth is rapid. The abundance of food, new places to hide, and not much competition for food, ensure that animals breed quickly.

Flood

If there is too much rain, water can build up on the ground and not flow away quickly enough. This build-up of water is called a flood. Floods do not cause the rapid loss of life and habitat destruction of fires, but their effects on the environment can be just as severe.

Just as some ecosystems need fires to sustain them, some ecosystems need regular floods for their existence. Billabongs, swamps, and fresh-water marshes are examples. Floodwaters wash in nutrients which sustain the entire community. The height of the water is critical for the long-term survival of the ecosystem. In central Australia, excess water can cover large areas. These become breeding grounds for many animals, especially waterbirds and insects.

Drought

A drought is a long period without rain. It is a feature of the Australian climate, and native plants and animals have adapted to it.

Kakadu National Park—Mamukala Wetlands

Plants will either evade drought or resist the effects of drought. Plants which evade drought are short lived. Their seeds are germinated by rain and the plants grow quickly and flower within weeks. Seeds are left in the ground that will germinate after it next rains. Some seeds are coated with a special chemical which is washed off by rain. The seeds germinate when their chances of survival are greatest.

Many plants resist the effects of drought. Some have broad shallow roots to soak up water quickly after rain, others have deep roots to reach underground water. Leaves that are small or rolled reduce water loss. Some leaves hang down with their edges facing the Sun, so the leaves do not get very hot. Most leaves of desert plants are hairy, and the hairs trap a layer of air close to the leaf. This keeps the surface of the leaf cooler than the surrounding air.

Many water birds follow flood waters. Pelicans and ibis will live around Sydney when there is a drought in western New South Wales, and will return to their breeding grounds when conditions are suitable for breeding and rearing their young.

CHECKPOINT:

COPY AND COMPLETE

Fire was important in the ____ of Aboriginal _____. Their use of ____ changed the _____. Plants and animals have _____ to it. ____ is now essential to the _____ of many natural _____ in _____.

Some _____ need regular _____ for their existence. Billabongs, _____, and _____ _____ are examples. Floodwaters wash in _____ which sustain the _____ _____.

Drought is a feature of the Australian _____, and _____ plants and animals have _____ to it. Plants will either _____ drought or _____ the _____ of _____.

QUESTIONS

1 What are the three major events that threaten the Australian environment?

2 List four adaptations of Australian plants to fire.

3 How do animals survive a bushfire?

4 Which ecosystems depend on floods for their existence?

5 How do plants survive drought?

6 List some adaptations of Australian plants to surviving drought.

Review and Research

Review questions

1 Write a clear T or F (for true or false) against each of the following statements:
   a Producers produce all the food in an environment.
   b A predator eats plants and grass.
   c Water is used and reused in the environment.
   d In a food chain the consumers always come first.
   e Prey is eaten by the predator.
   f Carnivores are always producer organisms.
   g Decomposers decay dead things in the environment.
   h A tapeworm living inside a sheep is a decomposer.
   i Different living things depending on each other is called symbiosis.
   j A population is all the living things in an ecosystem.

2 Here is a simple food chain:

   GRASS ⇒ RABBIT ⇒ FOX

   a What do the arrows show?
   b Where does the energy in the food come from?
   c Draw a food pyramid for this food chain.

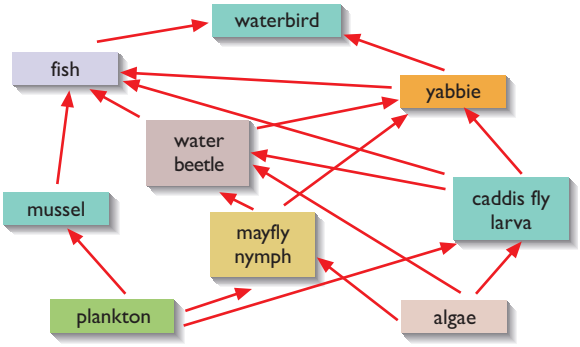
3 The following ten words have their meanings written below. Write the meaning and correct word in your note book.

   herbivore, predator, prey, population, community, habitat, ecology, ecosystem, parasite, producer

   a an animal that eats grass and plant matter
   b an animal that is hunted and eaten by another animal
   c an area where a plant or animal lives
   d the study of the environment and how things live in it
   e all the living things that live and interact together
   f an organism that makes food for the whole community
   g an organism which eats another living thing while it is still alive
   h an animal that hunts and kills for food
   i all the plants or animals of the one type that live in a place
   j the whole environment and living and non-living things in it.

4 a Explain why a tick bird and a cow are an example of mutualism.
   b Why is a bird's nest in a tree often given as an example of commensalism?
   c When a leech is sucking your blood, what is the parasite and what is the host?

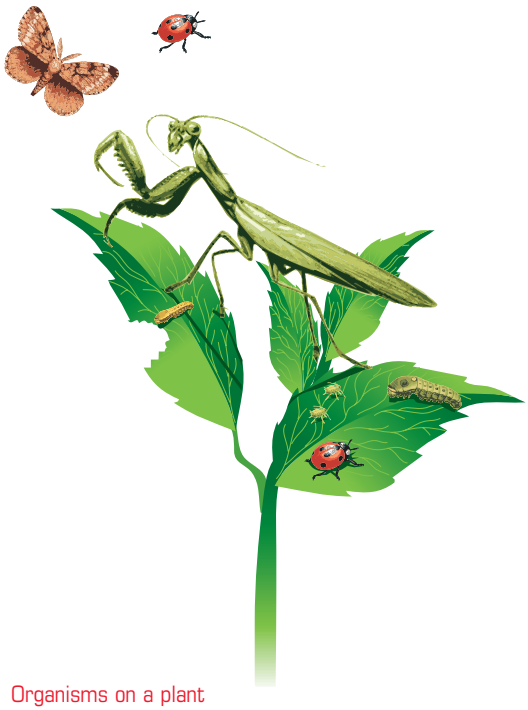
5 These questions refer to the food web drawn below. It shows the interaction between living things found in a section of a fast flowing, fresh water, stony creek.



A food web

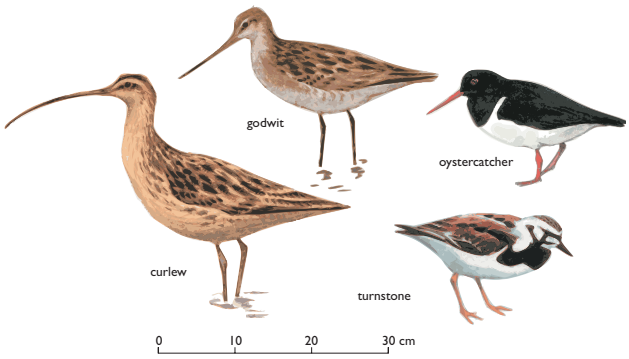
   a Which animal is an omnivore?
   b What are the prey species of the yabbie? Is it a herbivore or carnivore?
   c What are the predators of yabbies?
   d In a survey, students found three water beetles. Would the number of mayfly nymphs in this section of creek be higher or lower than in sections with no water beetles?
   e Explain what would happen to the population of waterbirds if all the fish were removed from the creek.
   f During the winter there is not as much sunlight as in the summer. The colder water also slows the growth of algae and plankton. How would this affect the population of waterbirds?

6 The diagram on page 27 shows some organisms that live on the tips of growing plants. Tiny aphids suck the sap from the plant, and are eaten by the larvae of ladybird beetles. Larvae of moths eat the leaves, and then pupate and grow into adult moths. Praying mantises eat the adult moths and adult ladybird beetles. Draw a food web that shows these feeding relationships.



Organisms on a plant

7 Mudflats are found in the estuary of rivers. They are covered by water at high tide and uncovered at low tide. A group of birds called waders live on mudflats, where they eat worms and shellfish that burrow in the mud.



Birds found in mudflats

a Which bird would you find hunting in deep water?

b These birds never compete for food. Why is this? Consider the length of their legs and length of their bills.

Thinking questions

1 Explain the benefits to both animals or plants in these examples of mutualism.

a In central and south America, the bull's horn acacia (a small tree) has large hollow thorns that are home to stinging ants. The ants eat sugar that is made by the plants. The ants sting other insects that land on the tree, remove fungus and other debris from the tree, and even bite off leaves from other plants that grow too close to their tree.

b A staghorn fern growing high in a tree gains protection from ground dwelling herbivores. The folded fronds (large leaves) of the ferns collect dead leaves that are blown in, which are broken down by a fungus that grows on and around the staghorn.

2 Explain the relationship between a cuckoo and other birds. Cuckoos will find a nest, and then push out any baby birds which are in the nest. Then they lay their eggs in it. The birds which own the nest will raise the baby cuckoos as if they are their own babies.

Research questions

1 Large fish and sharks are accompanied by small fish which swim with them. Two types are remora and lampreys. What is the symbiotic relationship between them and the shark or fish?

2 There have been many people who have become famous for their work in studying the environment or raising people's awareness of it. Research one of the following people: Ernst Haeckel, Rachel Carson, David Suzuki, Karen Silkwood, Petra Kelly, Bill Mollison.

3 What is meant by animals being nomadic or migratory? Find an example of each and describe how this behaviour helps each animal's survival.

Word check

environment	heritage	Kakadu
Uluru	aquarium	terrarium
biotic	organism	species
population	community	ecosystem
habitat	territory	photosynthesis
respiration	producer	consumer
prey	predator	herbivore
carnivore	omnivore	pyramid
biomass	decomposer	symbiosis
mutualism	commensalism	parasitism
pelt	desex	

Concept map

Draw a concept map of the main ideas in this chapter.