**Chapter 5: Habitats and interactions**

****Module 5.1****

SHE: Regrowing a forest

**1**

**a** Remnant vegetation is native vegetation that has survived when areas around have been changed by activities such as grazing or forestry.

**b** Ravensworth State Forest was used for grazing and as a source of timber for more than 100 years. Logging ceased in 1986 and grazing was stopped in 1995. However, a coal mine was established in the area in 1993 and it is still in production. It is an area of original woodland that exists in the Hunter Valley. Other woodland areas in the valley were cleared for agriculture or other purposes.

**2** Answers may include the following:

* Reconstructed habitats are linked to other areas of natural vegetation.
* Existing ponds have been improved with the aim of reintroducing native frogs and other amphibians to the area.
* Corridors provide a way for native animals to move.
* Topsoil that was originally taken from the mine site has been spread in areas to allow natural regrowth of native plant species from seeds in the soil.
* Plant variety provides many different habitats for animals.
* Extra land has been added to the forest reserve, increasing the number of habitats for native animals.
* Areas of forest are being reconstructed to create more sustainable habitats for species living in the area. In the future the reconstructed habitats will be linked to provide corridors along which native animals can move as they search for food and breeding areas.

**3** Topsoil that was originally removed has been spread in areas to allow natural regrowth of native plant species from seeds in the soil. Seeds can survive in the soil for long periods of time and spreading the original topsoil allows a wide variety of native plant species to regenerate naturally. A wide variety of plants, varying from tall trees to small shrubs and grasses, provides many different habitats for animals.

**Module 5.1 review**

**1**

**a** habitat:the place where an organism lives

**b** abiotic factors:non-living factors that include light, wind, water, soil and temperature

**c** adaptation: a special characteristic that helps an organism to survive

**d** ecology:the study of the interactions between living things and their environment

**2**

**a** organism

**b** biotic factors

**c** nocturnal

**d** interdependent

**3** A habitat must provide food, water, shelter and living space, a suitable temperature, mating partners for reproduction, and gases such as oxygen.

**4**

**a** Answers may include: position of the eyes and nostrils, large mouth with sharp teeth, and strong tail for swimming fast.

**b** Answers may include: colouration, sharp claws and teeth, nocturnal habit, and good sense of smell.

**5**

**a** Many eucalypts have buds buried deep in the bark. These buds are protected from fires and sprout quickly after a fire.

**b** Smilax has tendrils that help the plant climb to the canopy to reach light**.**

**6** Any changes to a habitat, such as loss of vegetation, will affect the variety of species living in the area and the number of a particular species. For example, the clearing of bushes will remove the nesting places for small birds. It also has the potential to reduce the number of insects and other possible food sources for these small birds. Loss of nesting places and food will reduce the number of small birds living in the area. Other organisms that are suited to the lack of bushes could potentially move into the area.

**7** Some organisms have very specific needs for food or climate. They are only able to live where these conditions are found. They are not adapted to live elsewhere. Other organisms have requirements that are less restrictive and their needs are found over a much wider area. Therefore, these organisms are able to live in a wider area.

**8** The organisms depend on each other for survival. Some might be a food source for others. Alternatively, others—such as trees—provide a living place as well as a food source for many organisms.

**9**

**a** The biosphere is the place where all life exists. The Earth is a biosphere.

**b** An ecosystem is a small part of the biosphere where organisms interact with their living and non-living surroundings. A coral reef is an example of an ecosystem.

**10** Answers will vary. Possible answers may include:

* clown fish and anemone—mutualism
* coral and algae—mutualism

**11** See the following table.

|  |  |  |
| --- | --- | --- |
| **Symbiotic relationship** | **Similarities** | **Differences** |
| mutualism | neither organism is harmed | an interaction in which both organisms benefit from the relationship |
| commensalism | neither organism is harmed | an interaction between two organisms in which only one of them benefits |

**12**

**a**

**i** The leech benefits by obtaining food (blood), while the humans and other mammals get no benefit, and may be harmed (for example, infection or blood loss).

**ii** The bees benefit by obtaining food (nectar), while the flowers benefit by getting their pollen transferred from one flower to another, enabling them to reproduce.

**iii** The vines benefit by obtaining more sunlight, while the trees are unaffected.

**iv** The cleaner fish benefit by obtaining food (parasites), while the carnivorous fish benefit by having parasites removed.

**b**

**i** Parasitism

**ii** Mutualism

**iii** Commensalism

**iv** Mutualism

**13** Organisms have characteristics that suit them to a particular set of conditions. For example, polar bears have white fur that provides camouflage in the snow and ice. They are efficient predators because they are not seen easily by prey. Polar bears would stand out in areas without ice. Many Australian native birds and possums use holes in large trees as nesting places. They do not build nests on branches or in the ground like some other birds and, therefore, they cannot move to an area without large, old trees.

**14**

**a** Answers will vary. Example: spotted-tailed quoll

**b** Answers will vary. Example: seeing in dim light

**c** It is cooler at night. It is easier to hide from predators. It is easier to stalk prey in the dim light.

**15**

**a** Answers may include:

* Temperature: Organisms would need adaptations that allow them to keep cool. Being active at night is one such adaptation.
* Lack of water: Many hot environments are also very dry. Koalas drink very little and get the water they need from the leaves they eat. Trees produce long tap roots to reach water deep in the soil.

**b** Answers may include:

* Temperature: Organisms would need adaptations that help them keep warm. Thick fur or fat as insulation are examples of such adaptations.
* Lack of water: When water is frozen it is not available to plants or animals. Many trees lose their leaves in winter to reduce their need for water.
* Availability of food: Many animals hibernate over winter. This reduces their need for food at a time when it is scarce or hard to obtain.

**c** Answers may include:

* Number of hiding places: Organisms would have more likelihood of survival if they are able to hide from predators. In this environment some animals adapt by living in tunnels or thorny bushes.
* Feeding: Organisms would not be able to spend as much time finding food if they were hiding from predators. Some animals adapt by feeding at night and hiding during daylight hours.

**16**

**a** More light would reach the ground. There would be more wind and there would also be more rain reaching the ground.

**b** Plants that do not survive in heavy shade would be able to grow, so the vegetation in that part of the forest would change. Grasses, small shrubs and tree saplings would be present. Shade-loving plants that were growing in the shade of the tall trees would not survive.

**17** Answers will vary and may include: human impact, climate change, habitat destruction, introduction of a disease, predators or competing species.

**18** Answers will vary.

**19** Answers will vary.

**Module 5.2 review**

**1**

**a** prey:animals that are eaten by other animals

**b** carnivore: ananimal that eats other animals

**c** consumer: an organism that must eat other organisms to get the energy and nutrients it needs

**d** decomposer: an organism that gets the energy it needs by breaking down dead matter and waste products

**2**

**a** predator (Students may also use the term *carnivore*’.

**b** herbivore

**c** producer

**d** photosynthesis

**3** In a food chain the arrow shows the direction in which the energy is moving.

**4** It is from sunlight that energy enters the food chain. Producer organisms trap the energy from the sun and convert it into food.

**5** Only producer organisms are able to trap energy from the Sun and convert it into energy in food.

**6** Grass: producer

Fungi: decomposer

Grasshopper: consumer

Mouse: consumer

Bacteria: decomposer

Eagle: consumer

Acacia tree: producer

**7**

**a** Humans are consumers because they must eat other organisms to get the energy and nutrients they need.

**b** Humans are omnivores because they eat and digest both animal and plant matter.

**c** Humans are an apex consumer because they have no natural predators.

**8**

**a** Plants

**b** Grub, snail, small animal, aphid

**c** Small bird, beetle

**d** Large bird

**9** Food chains include:

* Plant 🡪 small animal 🡪 large bird
* Plant 🡪 aphid 🡪 beetle 🡪 large bird
* Plant 🡪 aphid 🡪 beetle 🡪 small bird 🡪 large bird
* Plant 🡪 aphid 🡪 small bird 🡪 large bird
* Plant 🡪 snail 🡪 small bird 🡪 large bird
* Plant 🡪 grub 🡪 small bird 🡪 large bird

**10** See the following table.

|  |  |
| --- | --- |
| **Term**  | **Organism** |
| producer | eucalyptus tree |
| herbivore | snail |
| omnivore | small bird |
| carnivore | hawk |
| decomposer | bacteria |

**11** Eucalyptus tree 🡪 snail 🡪 small bird 🡪 hawk 🡪 bacteria

**12** Decomposers break down the remains of dead plants and animals in addition to breaking down any waste products left by living animals. Decomposers release the nutrients from dead matter into the atmosphere, water and soil, thereby increasing the levels of available nutrients in soil.

Scavengers eat dead animals and scatter their remains. Scavengers are different from decomposers because they are not returning essential nutrients back to the soil.

**13** Decomposers are important to the environment because they release the nutrients from dead matter into the atmosphere, water and soil, thereby increasing the levels of available nutrients in soil. These nutrients are import and for plant growth. In addition, they stop dead matter and waste from building up in the environment.

**14** Producers: seaweed, plants, trees, reeds, shrubs

Herbivores: small fish, insect larvae

Omnivores: frog, small fish, platypus

Carnivores: large fish, kookaburra

**15** Answers will vary. Some humans may be scavengers, however, humans still kill organisms in order to survive rather than eating organisms that have been killed by other animals. Therefore, humans are not scavengers.

**16**

**a** They are both producers and consumers.

**b** Carnivorous plants such as the venus flytrap are producer organisms because they contain chlorophyll and manufacture their own food by photosynthesis. They are also consumers because they obtain nitrogen from the insects they trap.

**17**

**a** If the number of small birds decreased, the numbers of beetles, aphids and snails would increase because they would no longer be preyed on by the small birds. The numbers of plants would decrease there would be more grubs, aphids and snails feeding on them. Without small birds to prey on, the large birds would have to eat more small animals and beetles, so the number of small animals and beetles would decrease, which would allow the number of aphids to increase further.

**b** If the number of large birds increased, the numbers of small birds, small animals and beetles would decrease due to increased predation. The number of aphids, snails and grubs would increase due to decreased predation. More plant material would probably be eaten, although this would depend on the type and amount of plant matter the small animals ate compared to the other herbivores. Some plants might decrease while others would increase.

**c** If the number of plants decreased, the numbers of all other organisms in the food web would decrease, because the plants are the only primary producers.

**18**

• algae (a producer)

• snail (eats algae)

• small fish (eats algae and snails)

• water beetle (eats small fish)

• frog (eats beetles)

• snake (eats beetles and frogs)

• decomposers (breaks down dead animals)

**19**

**a** Answers will vary.

**b** Answers will vary.

**20**

**a** Answers will vary.

**b** Answers will vary.

**c** Answers will vary.

**Module 5.3**

**SHE: Biological control**

**1** Cane toads were first introduced to control cane beetles.

**2** Source of food for the beetle that provided the red dye of soldiers’ uniforms; source of food for cattle

**3** These viruses reduced the number in each case, but because the rabbits developed immunity to them, the viruses ave not completely controlled them.

**4** The cactus moth successfully controlled the prickly pear and did not become a problem species itself. The cane toad did not control the cane beetle and it is now a major environmental pest species.

**5** There is no way of getting rid of cane toads and they eat anything they can, which means they destroy native wildlife and environments.

**6** Many species introduced into Australia have become pest species. Farmers are looking for ways to control pests (especially insects) that eat or otherwise damage their crops. Chemical control methods kill useful species as well as pest species. Biological control methods focus on a particular species and if researched correctly, should not cause harm to other species.

**Module 5.3 review**

**1**

**a** fire season: time of the year when fires are most likely to occur

**b** FRB: Fuel reduction burning

**c** MODIS: Moderate Resolution Imaging Spectroradiometer

**2**

**a** germination

**b** biodiversity

**c** sustainable

**3** Low-intensity fires spread more slowly than intense fires and are more easily controlled. Animals have time to escape from low-intensity fires but may be killed by intense fires.

**4** Forests were replaced by open woodlands and grasslands. Grazing animals, such as kangaroos, increased in numbers. Plants used as food also flourished.

**5**

**a** Different areas of land were burned at different times.

**b** This practice provided a variety of habitats for different plants and animals. In turn, this provided a variety of foods for the Indigenous Australians.

**6**

**a** Any fire in the area is more likely to be a low-intensity fire that moves slowly, allowing animals to escape. Animals can move back into the area after the fire.

**b** The fire is easier to control.

**7** Carefully planned burns can be used to create a variety of habitats. Usually some areas are left unburned. Animals can move to these areas to escape the fire. Recently burned areas provide habitats for animals that prefer open areas. Areas left unburned for a few years will have a dense covering of vegetation. Small birds and other animals will find protection from predators in these areas. Planned burns also create fire breaks that stop wildfires from burning particular habitats.

**8** The fence was built to exclude pests from an area.

Benefits:

* It excluded rabbits that were competing with sheep and cattle for food.
* It protected introduced animals such as sheep from the dingo.

Disadvantages:

* It is expensive to maintain.
* The numbers of kangaroos and emus increased because of the increased food supply from farmers crops, which meant that farmers could not graze as many sheep per hectare.

**9** Answers will vary. Examples may include:

* introducing grazing species, such as sheep or cattle, that are not native to an area
* fuel reduction burning to remove the amount of fuel available for fires
* creating man made structures such as fences or buildings
* introducing species such as the cane toad for biological control.

**10** In sustainable ecosystems there will be a wide variety of species. There will be many different habitats for these species. Each species will have a variety of food sources so that if one food source is in short supply, the species will be able to use another. An unsustainable ecosystem does not meet the needs of the species that live there.

**11** Most Europeans thought of fire as a danger to be prevented. Indigenous Australians used fire as a tool and it is still an important part of their culture.

**12** Animals with hard hooves compact the soil more than animals with soft pads on their feet. The hard hooved animals were also much larger than native species, which led to more compacting of the soil. Compact (hard) soil makes it difficult for plants to germinate and crack through the hard surface soil.

**13** Smoke promotes:

* germination of species, which are difficult to germinate by usual (conventional) means
* more uniform germination
* earlier germination
* seedlings that are more robust.

**14** Examples may include:

* Taking the largest trees will change the light patterns on the forest floor. A shaded area with a dense canopy will be replaced by an open sunny area that is more exposed to wind and rain.
* Species such as grasses and herbs that thrive in the more open conditions will come into the area.
* Large trees provide nesting places for animals such as birds and possums and many habitats for insects that live under bark or use rotting branches as a source of food. Younger trees do not provide the same variety or number of living spaces, so some organisms would not be able to remain in the forest in such large numbers.

**15** Firefighters get early warning of where fires are. They can assess the potential danger to homes, industry and farmland and can quickly develop a strategy to protect them.

**16**

**a** The wallaby population increased slowly from 1993 until 1999 and then increased rapidly in 2000 and again in 2001.

**b** Examples may include:

* Drought or fire killed some of the wallabies.
* Drought or fire reduced the food supply of the wallabies.
* The wallabies were eating their food supply at a greater rate than it could regrow, so some wallabies died of starvation.
* Harsh weather conditions killed some of the weaker wallabies.
* Disease killed some wallabies.

**17** Answers will vary.

**Module 5.4**

**SHE: Sustainable palm oil**

**1** To be able to continue using the resources in the future, they need to be managed and used sustainably now. If we use resources without replacing them and looking after the environment, then it will not be sustainable in the long term.

**2** By protecting areas of high conservation value from deforestation and by working with companies to reduce their greenhouse gas emissions, water use, pesticide use and fertiliser use.

**3** By buying palm oil that is certified as sustainable. The palm oil industry is important for the livelihoods of many small-scale farmers and the economy of Indonesia and Malaysia. Rather than boycotting the industry, we need to encourage them to grow palm oil using environmentally and socially responsible practices.

When you buy a product, you are sending an important message to its producer: that you like the product and support what they do. Often consumers do not know what practices are involved in making their food, clothes or household products. It is your responsibility as a consumer to learn about any unethical practices that may be going on during the process of manufacturing the products you buy. You can then make informed choices about whether you want to support those companies or support the companies that are using environmentally and socially responsible practices.

**Module 5.4 review**

**1**

**a** extinct: when an organism has not been seen in the wild for over 50 years and the last known individual has died

**b** rare species: have low numbers and are often spread out over a large area

**c** cross-breeding: mating different breeds of animals together to produce offspring

**2**

**a** native

**b** endangered

**c** vulnerable

**3** Any three of the following: agriculture, logging, mining, urbanisation

**4**

**a** Any two of the following: Leadbeater’s possum, helmeted honeyeater, blue whale, beaked gecko

**b** Any two of the following: mountain pygmy possum, giant Gippsland earthworm, mallee fowl, bilby, diamond python

**5** Salt tolerance

**6** Answers will vary. Examples may include wood, latex rubber (forestry), metal, plastic, brick, concrete, plaster, glass (mining).

**7**

**a** Open-cut mining is mining where all vegetation is removed from the land surface. Resources are removed from the surface downwards, creating a pit.

**b** The habitats are destroyed. There is potential for poisonous chemicals from the mine to seep into waterways, causing further damage to habitats and the animals living there. Loose soil may cause waterways to become turbid.

**8** Answers will vary. Examples may include:

* fundraising for research and conservation programs
* breeding programs
* maintaining genetic diversity within a species through DNA profiling and selecting mates through global zoo network
* re-establishing populations in the wild after breeding
* zoo conservation programs and research
* catch and release programs
* animal survey to determine numbers in the wild.

**9**

a More sweat glands and oily skin

b Good meat production and the red colouring

**10** Endangered species are close to extinction and only very small numbers remain. Vulnerable species are experiencing a rapid population decline and are in danger of becoming extinct if the drop in numbers continues. Rare species have low numbers and are often spread out over a large area. Although the populations may be small, they are not decreasing.

**11** No. Many introduced species provide humans with their major food sources.

**12** Pasture is poor/sparce in Australia compared to Europe. Cattle will have to travel farther to gain the same amount of nutrition.

**13** Answers will vary.

**Chapter review**

**1** It is through the producer that energy enters the food chain.

**2** Sunlight

**3** Biosphere, ecosystem, habitat

**4** Endangered, vulnerable, rare

**5** Provides timber both now and into the future, protects forest environments to maintain biodiversity and provides community amenities

**6** An address is where a person lives. A habitat is where an organisms lives in the natural environment (its address).

**7**

**a** The fox and the eagle would be in direct competition for food and the amount of prey available to the eagle would decrease; therefore, eagle numbers would decrease.

**b** See an example of a possible diagrammatic answer below.



**8** Environmental conditions are different in Australia when compared to Europe and Asia, where many of the domesticated animals have come from. The animals are not well adapted to Australian conditions. Breeding new varieties produces animals that are better adapted to the conditions in Australia.

**9** The prey is the source of food for the predator. The prey is being eaten; the predator is doing the eating.

**10**

cat: consumer

magpie: consumer

rose: producer

eucalypt: producer

sparrow: consumer

worm: consumer

ant: consumer

grass: producer

daisy: producer

**11**

water birds: biotic

water temperature: abiotic

crocodile: biotic

rate of water flow: abiotic

amount of salt in the water: abiotic

water plants: biotic

frogs: biotic

fish: biotic

**12**

**a** The lizard, bandicoot and bilby compete for grass seeds and insects.The wallaby and insects compete for grass.

**b** The lizard, bandicoot and bilby would be equally affected because they all eat insects. They all have another source of food.

**c** Eagles would eat more bilbies and wallabies. Insect numbers could increase, providing more food for bilbies and lizards. They would also have more grass seed. Therefore, their numbers should increase. This results in more predation of the insects.

**13** Humans are able to build homes, grow food and make clothes. They are also able to use technology to make environments suitable for their survival.

**14**

a–b

 Positive: introduced species, agriculture

Negative: agriculture, mining, urbanisation, logging, introduced species

c Answers may include:

* Agriculture destroys natural habitats. New habitats that are created cannot survive without human management.
* Mining causes vegetation to be removed and so habitats are destroyed.
* In urbanisation, natural habitats are replaced by cities. Some organisms such as possums have adapted to live in cities and are thriving in this modified habitat. Possums have become dependent on buildings for shelter, and on vegetable gardens and scraps for food.
* Logging removes old trees from forests, and clears plantation forests in which modified habitats have been created.
* Introduced species compete with the native species for food, or prey on the native species. This causes native species numbers to decline.

d Answers may include:

* Introduced species are sources of food for humans, so they are not using native species for food. Some introduced species are successfully being used as biological control agents for other pests.
* Agriculture has extended grassland for grazing and has increased the food supply for herbivores such as kangaroos, allowing their numbers to increase.
* Fruit trees are also a source of food for native animals such as the fruit bat (flying fox).

**15**

**a**

**i** It could occupy the space where native plants would normally grow. The dense cover would shade out plants that need full sun. The large numbers of seeds from the berries may make it able to out-compete native species.

**ii** A large area of Lantana would create a uniform/similar habitat that would favour species that thrive in that environment. Other species would have fewer habitats available or would not be able to live in that habitat and could die out or be forced to move.

**b** Answers may include:

* Slash it before it flowers so that it cannot produce seeds—but this would have to be done regularly because the plants will grow back.
* Pull it out—but bare soil would then be ideal for the germination of any Lantana seeds in the soil.
* Poison it—but the poison could affect neighbouring vegetation or get into waterways, and bare soil would be created.
* Use biological control. Find an organism that feeds on the Lantana but does not affect other plants or animals.

**16**

**a** Answers will vary.

**b** Answers will vary.

**17**

**a–b**

i grass (producer) 🡪 grasshopper (primary consumer) 🡪 frog (secondary consumer ) 🡪 snake (tertiary consumer)

**ii** eucalypt (producer) 🡪 caterpillar (primary consumer) 🡪 kookaburra (secondary consumer)

**iii** water plants (producer ) 🡪 snail (primary consumer) 🡪 small fish (secondary consumer) 🡪 large fish (tertiary consumer) 🡪 shark (4th-order consumer)

**18** Answers will vary.

**19** Answers will vary.

**20** Illustration showing the main features of diagram on page 438, Teacher Companion Pearson Science 7

**Inquiry skills**

**Research**

Answers are students’ own.

**Thinking scientifically**

**1** D

**2** A

**3** C

**4** D

**5** C

**6**

**a** The eastern grey kangaroo has seen a decline in numbers from 1885 to 1920. The red-necked wallaby population has been increasing and decreasing in numbers from 1885 to 1920; however, the overall trend is declining.

**b** The rabbit has seen an increase in numbers from 1885 to 1920. The sheep population has been increasing and decreasing in numbers from 1885 to 1920; however, the overall trend is increasing.

**c** As the rabbit population has increased, the eastern grey kangaroo population has been decreasing.

**d** This drop in number could have been caused by lack of food, drought, disease, and culling.

**e** The rabbit and sheep are competing with the eastern grey kangaroo for food.