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Interactions between living and non-living things

Strand

Life and Living

Key concept

Environments are dynamic and have living and non-living components which interact.

Purpose

Activities in this module are designed to help students understand that interactions occur between living things and non-living components of environments. Students have opportunities to:

- observe and identify a variety of interactions associated with living things and their environments;
- collect information about the adaptations of organisms that help them meet their needs;
- design investigations into how various living things sustain life;
- explain some relationships associated with the meeting of needs of living things, the features and roles of these living things and their environments;
- construct a model of an ecosystem involving organisms and their needs;
- describe the features of different environments.

Overview of activities

The following table shows the activities in this module and the way in which these are organised in **introductory**, **developmental** and **culminating** phases.

Introductory ►

Drawing an environment

Developmental ►

Feeding behaviours
Feeding relationships
Predator/prey
Plants that feed us
Place of people in the food chain
Playground plot
Interactions in the environment

Culminating

Changing conditions
Ecosystem model



Core learning outcomes

This module focuses on the following core learning outcomes from the Years 1 to 10 Science Syllabus:

Life and Living

2.3 Students make links between different features of the environment and the specific needs of living things.

3.3 Students describe some interactions (including feeding relationships) between living things and between living and non-living parts of the environment.

4.3 Students make generalisations about the types of interaction which take place between the living and non-living parts of the environment.

Core content

This module incorporates the following core content from the syllabus:

Life and Living

Features of different environments

Natural relationships

- interactions between living things (predator/prey)
- interactions between living and non-living things to meet needs
- interactions between non-living things (effect on environments)

Ecosystems

- roles of organisms — producer, consumer, decomposer

Human influence

Assessment strategy

Suggestions for gathering information about student learning are provided in each of the activities in this module. Once sufficient information has been collected, judgments can be made about students' demonstrations of outcomes. Typical demonstrations of this module's intended outcomes are provided here to indicate the pattern of behaviour to look for when making judgments.

Life and Living

2.3 Students make links between different features of the environment and the specific needs of living things.

Students may:

- identify features of an environment (for example, water, food and shelter) that suit particular living things;
- explain the interaction between living things and non-living things;
- relate the features of an environment to the ways in which its inhabitants meet their needs for survival;
- illustrate and/or model organisms in their habitat.

Life and Living**3.3 Students describe some interactions (including feeding relationships) between living things and between living and non-living parts of the environment.**

Students may:

- conclude that living things rely for their survival upon other living things — for example, for food and shelter;
- explain interactions between living things;
- relate the needs of living things to the types of interaction between them;
- conclude that living things rely upon non-living things for survival — for example, some animals live under the ground for protection and shelter;
- explain that as a result of events such as bush fires, floods and droughts, non-living things can change environments and the organisms that live in them;
- conclude that environments are made up of both living and non-living elements.

Life and Living**4.3 Students make generalisations about the types of interaction which take place between the living and non-living parts of the environment.**

Students may:

- look for patterns and meanings in adaptations of structure and behaviour of groups of living things;
- explain their ideas about interactions between groups of living things and the environment;
- illustrate or model significant parts of the environment and how they affect the living components generally.

Background information**Current scientific conceptions****Habitats and environments**

All living things, referred to as ‘organisms’, have a particular place, called a habitat, in which they live. Habitats are many and varied — for example, the habitat of a leaf-curling insect is the inside of a rolled leaf; the habitat of a platypus is its burrow and nearby creek; the habitat of barnacles may be rocks in the intertidal zone. Habitats have specific features and can change over time.

The term ‘environment’ is used to refer to the conditions of an area in which an organism lives. Change in the environment can be caused by natural events such as earth movements (for example, land slides), weather (for example, rainfall), and a declining population or increase in population of plants or animals, including human beings. In Australia, fire, flood and purposeful interventions by people are significant factors in environmental change.

Living and non-living elements of environments

The environment of every organism has living and non-living elements that are essential for the survival of the individual organism and of the species. For example, a bird needs food (from living or once-living sources), water, shelter and a breeding place.

Plants

Green plants are producers. They use inorganic materials (carbon dioxide from the air, minerals and water from the soil) and energy from the sun to produce complex, organic materials for their own needs. This process is called photosynthesis. The organic products of photosynthesis contain energy that plants need to survive and reproduce. The organic materials of plants are the source of energy for herbivores — then, in turn, for carnivores, omnivores, parasites and decomposers.

Animals

When describing interactions between animals, it is useful to group the animals in some way — for example, according to their habitats. Some live under the ground; many have habitats on the ground's surface; some spend much of their lives above the ground in trees, while others live in rivers or seas. Alternatively, animals can be grouped according to what they eat. Some animals eat plants; these are called herbivores. Some animals, called carnivores, eat other animals. Carnivores that hunt live animals are called predators; the hunted animal is the prey. Scavengers are animals that eat the remains of dead animals and sometimes plants. Animals that eat both plants and other animals are called omnivores.

Organisms with highly developed cooperative behaviours are described as 'social'. Examples of social organisms include insects such as bees and ants. Within social groups, individual animals have a particular role upon which others depend.

Students' prior understandings

Students' prior understandings may differ from current scientific conceptions in a range of ways. Some students may think that:

- environments are big and naturally unchanging;
- people are not a natural part of the environment;
- non-living things cannot interact because they do not move or grow;
- living things may use non-living things but do not rely on them for survival.

Some students may not have considered the following as interactions between living things:

- animals eating plants;
- large animals such as cattle being host to smaller organisms such as ticks.

Teachers can help students build on these prior understandings by helping them observe an ecosystem and identify the living and non-living things in it. They can also help students to identify various environments and associated micro-environments, the features of these environments that support specialised communities of organisms, and the interactions between these various organisms. Through observation, discussion and investigation of local environments and feeding relationships, students clarify and extend their understandings.

Terminology

Terms associated with elements of environments, with the interactions between living things, and between living and non-living things within these environments, are essential to the activities in this module — for example:

carnivore	environments	interaction	predator
consumer	food chain	matter	prey
decomposer	food webs	organisms	producer
ecosystem	habitat	oxygen	relationships
energy	herbivore	parasite	scavenger

Students may already be familiar with some of these terms and understand their meanings and use in scientific contexts. If so, the activities in this module will provide opportunities for them to evaluate current usage. If not, these activities will provide opportunities for students to develop their understandings.

School authority policies

Teachers need to be aware of and observe school authority policies that may be relevant to this module.

Safety policies are of particular relevance to the activities that follow. It is essential that demonstrations and student activities are conducted according to procedures developed through appropriate risk assessments at the school.

In this module, teachers need to consider safety issues relating to:

- observing and handling biological material, plants and animals;
- conducting excursions to field study sites.

Teachers also need to consider policies relating to the ethical care and use of animals in the learning environment.

Support materials and references

Bosak, S., Bosak, D. A. & Puppa, B. 1991, *Science Is*, Scholastic Canada, Markham, Ontario.

Ingram, Mrill 1993, *Bottle Biology*, University of Wisconsin, Madison.

ACTIVITY**Drawing an environment***Introductory***Focus**

This activity provides opportunities for students to reflect on and consider the links between the specific needs of living things and features of environments.

Materials

- drawing paper

Teaching considerations

Use this activity to assess students' levels of understanding. Help students to identify features of local and other Australian environments.

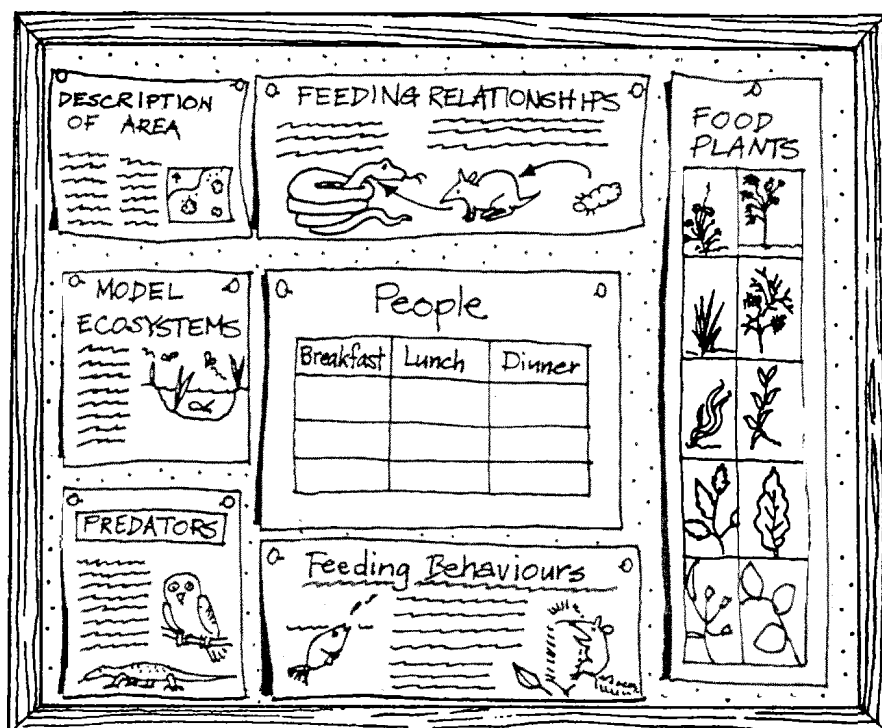
Students are asked to draw any new relationships they see. Learning to do simple drawings is important. If this is not possible, alternatives could include students describing in words, photographing or videoing parts of their local area.

As well as being a starting point from which students can build knowledge, these illustrations are used as a reference for reflection throughout the module. At this stage, students are expected to use language and ideas with which they are familiar.

Class discussion should precede the drawing activity. Some students may require more guidance than others with this activity. Class discussion will help to provide the structure they require.

Ensure students illustrate a range of environments with which they are familiar — for example, one that includes a large, shady tree; a creek; a beach.

Set up a 'fact wall' (see below) to record terminology associated with each activity. Students or the teacher could write definitions or further information about these terms and illustrate the information before adding it to the fact wall.





Working scientifically

Time: 45 minutes

Clarifying and challenging

Applying ideas and concepts

Reflecting and considering

Describing

Discussing thinking

Illustrating

► In a class discussion led by the teacher, students discuss their understanding of an environment, giving ideas and examples. Through discussion, students are encouraged to identify relationships between plants, animals and other living things, and their interactions in different environments.

Discussion questions could include:

- Which native or common animals primarily eat grass?
- What are some pests against which farmers and graziers have to guard their produce and stock?
- Name some predators. What do they eat?
- Which animals clean up scraps and dead animals?
- What do gliders, bats and possums eat?
- Which birds are native to the local area and what do they eat?
- What type of creatures live under the ground and what do they eat?
- What does fungus or mould do to materials on which it grows?
- How does a _____ obtain water?
- How does a _____ take in oxygen?
- How do plants use the environment?
- Which animals do you know that use trees?
- How do these animals use the trees?
- What other parts of the environment do animals use to make their home?
- How do animals use their environment for protection?

► In groups, students consider the responses given to questions and discuss ways of illustrating the relationships between living and non-living elements of a selected environment.

► Students share their illustrations and describe the relationships among and between the various living things, and between the living things and the environment they have depicted. During class discussion of the concepts identified, students reflect on, refine and clarify their ideas.

► Students display their illustrations in an area large enough to accommodate additions to the display as they complete further activities.

Additional learning

► Students explore the features of unfamiliar environments. They compare unfamiliar and familiar environments and make generalisations about environments. For example, students generalise that wherever there are producers (plants), there will probably be herbivores.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' completed illustrations of environments;
- students' oral descriptions of illustrations.

ACTIVITY

Feeding behaviours

Developmental

Focus

This activity provides opportunities for students to develop an understanding of feeding interactions between living things.

Materials

- blindfolds
- breakfast cereal
- cereal bowls

Teaching considerations

Make it clear to students that, while following safety rules, they should role-play animals and respond as they believe the animals would.

Below is some information about dingos, bilbies and kangaroos.

Animals' feeding behaviours

The dingo, a member of the dog family, is a predator that eats mostly other mammals. Its mouth and teeth are adapted to tearing and chewing flesh.

The bilby eats insects and their larvae, seeds, bulbs, fungi and some rodents. It has a snout adapted to sniffing and sorting through the debris on the ground.

Some kangaroos graze near forests and, when alerted to danger, bound in single file into the forest for safety where they are concealed by the trees.

Any animals familiar to the students could be the basis of this activity. Information about selected species can be found in wildlife reference books or through the Internet by entering appropriate words in search engines.

**Safety**

Explain safety rules for playing the games.

Some students may have food intolerances. Diabetics may need to monitor the sugar content of their food.

**Working scientifically**

Time: 30 minutes

Playing
Applying ideas
and concepts
Discussing thinking

► Students discuss how a dingo and a bilby would each behave, and the sounds that each would make, as they look for food and water in their usual environment — for example, the dingo might wait quietly while watching its prey; the bilby might make scuffling sounds as it searches for food.

► Students form a large circle. One student is chosen to be the dingo and another one the bilby. Both are blindfolded and stand in the centre of the circle. The 'dingo' and 'bilby' make sounds and movements typical of these animals. The dingo has to locate the bilby by using only the sense of hearing. The dingo tags the bilby if able to locate it. The bilby uses all its available senses to try to stay away from the dingo.

- ▶ After the game, students consider the ways in which the heads of the bilby and the dingo are adapted. They also consider the diet of each animal. Questions to help students extend their understanding could include:
 - What senses do animals use to catch or stay safe from other animals?
 - Which senses would each use to locate food?
 - In what type of environment might the bilby be caught?
 - In what type of environment might it escape?
- ▶ Students discuss behaviours and other adaptations of kangaroos that favour survival in their environment — for example, an acute sense of hearing and smell, using a sentinel to warn the mob of danger. They discuss environmental features that can provide protection for kangaroos.
- ▶ The teacher then prepares students for a game in which they role-play being kangaroos. An area of the teaching space is designated as the kangaroos' grazing area and another nearby space is designated as a safe area for the kangaroos. Students may list the features of these areas based on real kangaroo habitats.
- ▶ Each student is given a small bowl of dry breakfast cereal or other dry food and pretends to be a grazing kangaroo in the designated grazing area. They kneel in front of the bowls and put their heads down to eat. The teacher chooses one student to act as the lookout kangaroo. The lookout wanders amongst the grazing animals. At the teacher's signal (for example, putting hands on head), the lookout stops and raises his or her hand. When the feeding kangaroos see the lookout's signal, they must run to the safety area. When the lookout puts down his or her hand, the kangaroos return to eat. The game continues until all kangaroos have finished their food.
- ▶ Students discuss with the teacher what happened during the game. Discussion questions could include:
 - How long did it take the kangaroos to finish the food?
 - How easy did you find it to eat and watch for signals at the same time?
 - What benefits are there in animals living in groups?
 - What evidence is there of cooperation between individual animals in the group?
 - What benefits are there in animals working individually or cooperatively?
 - How do animals protect themselves from other animals?



Gathering information about student learning

Sources of information could include:

- students' answers to questions;
- students' contributions to discussions.

ACTIVITY

Feeding relationships

Developmental

Focus

This activity provides opportunities for students to investigate and model environmental interactions.

Students create paper chains to illustrate feeding relationships in an ecosystem.

Materials

- blackboard, whiteboard or butcher's paper
- chalk or marking pen
- strips of paper 5 cm x 20 cm
- glue or staples
- pencils, pens, crayons
- students' illustrations from 'Drawing an environment' activity

Teaching considerations

Use students' illustrations from the first activity, 'Drawing an environment', as a reference for this activity.

Encourage students to use Australian examples of feeding relationships.

Introduce the terms 'producer', 'consumer' and 'decomposer' to accurately describe the roles of various living things and encourage students to use these terms. Record the terms on the fact wall.

If appropriate to students' conceptual development, extend the activity by linking food chains to create food webs.

The term 'food' is relevant to animal intake of nutrients but is not applicable to plants. Establish that food provides animals with nutrients; then use the word 'nutrients' with respect to plant intake.

**Working scientifically**

Time: 45 minutes

Clarifying and challenging
Handling materials
Identifying
Applying ideas and concepts
Constructing and using models

- ▶ Students use their illustrations from the 'Drawing an environment' activity to identify feeding relationships between living things in different environments. The teacher draws diagrams of some of these relationships on the board or butcher's paper and introduces the term 'food chain' to describe the relationships. Students suggest further examples of feeding relationships they have observed or know about and the teacher records these.
- ▶ Students use the diagrams of the feeding relationships to identify examples of one organism eating a variety of foods and an organism that is eaten by many others. Students may be able to illustrate these relationships with different diagrams.
- ▶ Students discuss reasons for food being consumed (that is, for energy and nutrients) and specific adaptations associated with food gathering.

- ▶ Each student chooses one of the food chains discussed. They draw and label, on separate strips of paper, each living thing in the selected food chain. Using the strips of paper, students form a paper chain that models the food chain showing the living things in the correct order of consumption — for example, leaf, caterpillar, bird.
- ▶ Students share their models, explaining which living things are involved and the order of consumption. They display their food chains along with their illustrations of environments.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' illustrations of feeding relationships;
- students' completed food chain models;
- students' explanations of models.

ACTIVITY

Predator/prey

Developmental

Focus

This activity provides opportunities for students to identify and clarify the role of living things in an environment.

Materials

- students' food chains from 'Feeding relationships' activity
- students' illustrations from 'Drawing an environment' activity
- butcher's paper
- marking pens

Teaching considerations

The activity is included to ensure students are making links to their prior knowledge, are formulating questions about the topic, and have been able to construct meaning from what they have learnt so far.

This activity begins with a general discussion on helpful and harmful relationships between living things and then focuses on the predator/prey relationship of animals.

Determine whether students are familiar with the terms 'predator' and 'prey' by asking them to explain the terms using a familiar example.

Write 'predator' and 'prey' at the top of a sheet of butcher's paper on which students' suggestions can be recorded.

Introduce the ideas that, to meet their needs, plants use water and minerals from the soil, gases from the air, and light; and that, in the food chain, plants are the source of energy for animals.

**Working scientifically**

Time: 30 minutes

Identifying
Looking for patterns
and meanings

Clarifying ideas and
concepts

Describing

► Students use their illustrations and food chains to identify ways in which living things rely upon each other. They discuss whether these relationships are helpful or harmful to the living things involved. Some examples are the relationship between:

- birds and trees — helpful for both organisms since birds eat the tree's fruit and disperse the seeds;
- snakes and frogs — harmful to frogs (but helpful to snakes);
- mistletoe and trees — harmful to the trees in which mistletoe grows (but helpful to the mistletoe).

► In small groups or a class group, students examine feeding relationships between animals depicted in their illustrations and food chains. They classify the animals as 'predator' or 'prey' using questions such as the following to guide them:

- Which animals are prey — that is, they are used as food?
- Which animals are predators — that is, they hunt and eat other animals?

- Can all living things be put into either of these two categories? Explain.
- What other categories can you identify related to animals' eating habits — for example, scavengers and parasites?
- What other feeding relationships can you identify for living things?

► Students write on the butcher's paper the names of the living things that they have identified and categorised as 'predator' or 'prey' — for example, snake and frog. The teacher displays the chart in the area where students' illustrations and food chains are displayed.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' identification and categorisations of predators and prey.

ACTIVITY

Plants that feed us

Developmental

Focus

This activity provides opportunities for students to identify and analyse plants that people grow for food.

Materials

- large piece of paper for a wall chart

Teaching considerations

Ensure students understand that people rely on living things — plants and animals — to survive, and that people have developed agricultural practices to help meet their food needs.

Prepare a wall chart of plants and their parts with the headings 'plant', 'leaves', 'roots', 'stems', 'flowers', 'fruits', 'seeds' (see below).

Write a list of plants and their parts that are used for food. Include food plants from various cultures. Highlight produce from the local area or from a nearby farming region during this activity.

**Working scientifically**

Time: 45 minutes

Identifying
Looking for patterns and meaning
Analysing
Creating tables and graphs
Explaining ideas and decisions

- ▶ As a class, students identify and discuss the types of crops grown by primary producers for human consumption — for example, lettuce, tomato, sugarcane, potato and apple.
- ▶ The teacher helps students identify the parts of the crop plants that are used for food. The name of the plant is written on the wall chart and a tick is placed under the heading naming its edible part or parts, as in the table below.

Food from plants

Plant	Leaves	Roots	Stems	Flowers	Fruits	Seeds
Lettuce	✓					
Tomato					✓	
Sugarcane			✓			

- ▶ Students work in groups to develop their own table of foods that people eat, grouping them according to the part of the plant used for food. They should use the prepared list if they are having difficulty writing their own.
- ▶ As a class, students share and discuss their information and then collate it on the class chart. Students illustrate the chart with drawings or pictures before displaying it in the classroom with their other work from the module.

**Gathering information about student learning**

Sources of information could include:

- students' contributions to discussions;
- groups' completed tables.

ACTIVITY

Place of people in the food chain

Developmental

Focus

This activity provides opportunities for students to analyse the food that people eat and to expand their understanding of feeding relationships.

Materials

No particular materials are required.

Teaching considerations

Food is essential to all animals. It provides nutrients for growth, repair and reproduction as well as supplying the energy needed to perform all the body processes essential to life.

So far, the place of human beings in food chains has not been considered. This is addressed in this activity.

For ideas on creating food chains, refer to the activity 'Feeding relationships' on pp. 10–11.

Use the activity 'Feeding relationships' as a starting point for this activity.

**Working scientifically**

Time: 30 minutes

Analysing
Making links
Reflecting and considering
Creating diagrams
Creating tables and graphs

- ▶ As a class, students reflect on the concept of feeding relationships. They consider how humans depend on other organisms for food.
- ▶ Students give examples of the kinds of organisms that people depend on for their survival. The teacher lists these on the board.
- ▶ Students write down all the food and drink that they have consumed in the past 24 hours. They then use this information to create a table or draw diagrams to show the plants or animals from which that food and drink came.
- ▶ Students then discuss what is eaten by the animals that humans use for food. They create food chains that include humans.
- ▶ Students present their tables or diagrams and food chains to the class.

Additional learning

- ▶ Students research and discuss the diets of people from a range of cultures, making links between the local environment and the natural or traditional diet of the population.

**Gathering information about student learning**

Sources of information could include:

- students' contributions to discussions;
- students' completed tables or diagrams;
- students' presentations.

ACTIVITY

Playground plot

Developmental

Focus

This activity provides opportunities for students to observe and collect information about a variety of living and non-living things in a natural environment.

Materials

For each group:

- plot of land approximately 2 m x 2 m

Teaching considerations

In this activity, students work in groups to observe different small areas of the natural environment.

Mark the plots off in a way that does not disturb the area — for example, use pegs and string.

A nearby creek, picnic area or bushland near the school could be used for this activity. Alternatively, the activity could be undertaken in conjunction with a school camp or excursion.

**Safety**

Inform students of safe practices for handling organisms — for example:

- Identify plants and animals that could be dangerous or cause an allergic reaction.
- Minimise disturbance to animals and plants in the habitat.
- Handle animals and plants in a safe, gentle and non-threatening way.

If this activity is to be completed outside the school grounds, follow relevant school policy and procedures for excursions.

**Working scientifically**

Time: 60 minutes

Collecting
information
Identifying
Making and judging
observations

► Students listen as the teacher explains that they will be studying a plot of land to observe and collect information about the interactions that occur between living and non-living things in a natural environment. They discuss the rules of working outdoors with organisms in their environments and the teacher's expectations of them, including that they:

- talk quietly;
- do not disturb the plot in any way;
- observe carefully;
- listen for animal sounds and movements;
- do not touch plants or animals unnecessarily;
- stay at their assigned plot.

- ▶ Students and the teacher negotiate the data to be collected — for example, they might collect information on:
 - the type of ground;
 - nests;
 - burrows;
 - tree or log hollows;
 - air currents or wind;
 - water;
 - shade;
 - type of plants and animals;
 - number of plants and animals.
- ▶ Students work in small groups to observe a plot and collect and record data.
- ▶ Students decide whether the elements of the plot were living or non-living. They also discuss and consider how they could organise and present the information so that it can be shared easily.
- ▶ Students share the information they have collected with the rest of the class. They discuss similarities and differences between plots. They discuss how data from all the groups can be collated and displayed and their suggestions are recorded for use in the next activity.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' collection and recording of information;
- students' sharing information about the plot.

ACTIVITY

Interactions in the environment

Developmental

Focus

This activity provides opportunities for students to organise the information that they have collected to reflect, make links and consider the interactions between living and non-living parts of the environment.

Materials

- data collected in previous activity
- butcher's paper
- Resource Sheet 1, 'Interactions in a woodland'

Teaching considerations

Ensure each group develops a plan before starting the task. Students should be able to clearly explain their plan before presenting their findings.

Prepare students for this activity by reviewing the previous activity. Collate a list of all elements, living and non-living, observed in their plot. At the end of the previous activity, the students were to decide whether the elements of the plot were living or non-living and to consider how they could present such information.

Assist students in their collation and presentation by:

- allocating time for discussion with each group;
- facilitating the sharing of ideas with the entire class group.

Resource Sheet 1 provides examples of a student's responses to this activity.

**Working scientifically**

Time: 60 minutes

Making plans**Applying ideas and concepts****Making links****Reflecting and considering****Creating presentations****Explaining ideas and decisions**

► Students reflect on and discuss the information collected during the previous activity when they observed a plot of ground. With the help of the teacher, they make a list of all elements that they observed in their plot. Students then group these elements as living or non-living.

► Students use their observations from the previous activity to identify any interactions that occur in the environment. They group these as interactions between:

- non-living and non-living elements;
- non-living and living elements;
- living and living elements.

► Students describe the interactions, relating them to living things meeting their needs. They could consider:

- the different types of feeding relationships;
- ways in which shelter is achieved;
- how different living things get oxygen and water.

► In their groups, students plan how to present their information as a wall chart. Their chart should describe the feeding and other interactions occurring in their plot and should use diagrams and tables rather than large amounts of text to present information.

► When the wall charts are completed, students present them to the rest of the class.

Additional learning

► Students plan an event to present their work to parents and other students. This provides students with a context and audience for their report.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions and decision making;
- students' wall charts and presentations.

ACTIVITY

Changing conditions

Culminating

Focus

This activity provides opportunities for students to formulate questions and to collect information about the effects of changing conditions, caused naturally or by human influence, within environments.

Materials

- research materials (books, videos, posters, CD-ROMs, websites)

Teaching considerations

Negotiate with students a list of topics related to environmental change. Include in the list only topics for which adequate, accessible resources are available for students to use for research. Setting students a timeline for researching, discussing and preparing their reports will help them structure their work.

Organise a special display or school assembly to showcase the students' work and to share it with other students.

**Working scientifically**

Time: 60 minutes (Follow-up sessions may be required.)

Accessing resources
Collecting information
Reflecting and considering
Summarising and reporting

► As a class group, students compose a list of environmental changes that they would be interested in researching. They group these as natural changes — for example, weathering, erosion, droughts, floods, bushfires, earthquakes, volcanic eruptions and plagues of pests; or caused by human activity — for example, loss of forests or of native plants and animals, overpopulation, and air and water pollution.

► Students discuss their ideas, sharing any knowledge that they have on the suggested topics. In small groups, students choose a topic and identify aspects of the topic that they will research. These could include:

- a description of the changes and what happens to the environments where the changes occur;
- why some people see it as a problem;
- what, if anything, can be done to stop, reduce or reverse the effects of the change;
- other sides to the issue that need to be considered.

► Students share the work among group members to complete the research and prepare a report that is structured around these aspects. They present the final report as a television documentary with all group members taking a turn at presenting.

**Gathering information about student learning**

Sources of information could include:

- students' contributions to discussions;
- students' gathering, selection and synthesis of information;
- students' presentations.

ACTIVITY

Ecosystem model

Culminating

Focus

This activity provides opportunities for students to clarify ideas and concepts explored in preceding activities by constructing and observing a model of an ecosystem.

Materials

- Resource Sheet 2, 'Constructing an eco-column'
- materials for the eco-column listed on Resource Sheet 2

Teaching considerations

An eco-column is an artificial environment. In this activity it is constructed from plastic bottles.

Prepare for this activity by making an eco-column. Use this as a model to explain to students how to make their own eco-columns.

Do not store completed eco-columns containing living organisms in direct sunlight.

Negotiate the format and content of the students' reports at the beginning of the activity.

On completion of the activity, animals from the eco-column should be returned to the place where they were collected.

**Safety**

The teacher or another adult should cut the plastic bottles used to make the eco-columns.

Inform students about safe practices for investigating and handling plants and animals — for example:

- Identify plants and animals that may be dangerous or cause allergic reactions.
- Wear gloves at all times.
- Handle animals in a safe, gentle and non-threatening way.
- Minimise disturbance to animals and plants in the habitat.
- Do not lick or taste plant matter.
- Do not stand too close to the edges of rivers or ponds.

**Working scientifically**

Time: 60 minutes (Follow-up sessions will be required for students to record information about their eco-columns.)

Handling materials
Dealing in an orderly manner with the parts of a complex whole
Constructing and using models

- Students identify a research question upon which to focus their observations — for example:
- Can the needs of the living things be met in this artificial habitat?
 - Are the needs of this caterpillar apparently being met? Does it come from a cocoon?
 - What happens to the grasshopper nymphs over the observation period?

R Resource
Sheet 2

► Students use information from Resource Sheet 2 to construct an eco-column. They keep a record of the construction (a diagram is sufficient) and of the elements added to their column. They explain why each of the elements was added. They record their observations of the changing conditions inside the eco-column.

► When students complete their observations, they compile a report with their conclusions from, and an evaluation of, the project.

**Gathering information about student learning**

Sources of information could include:

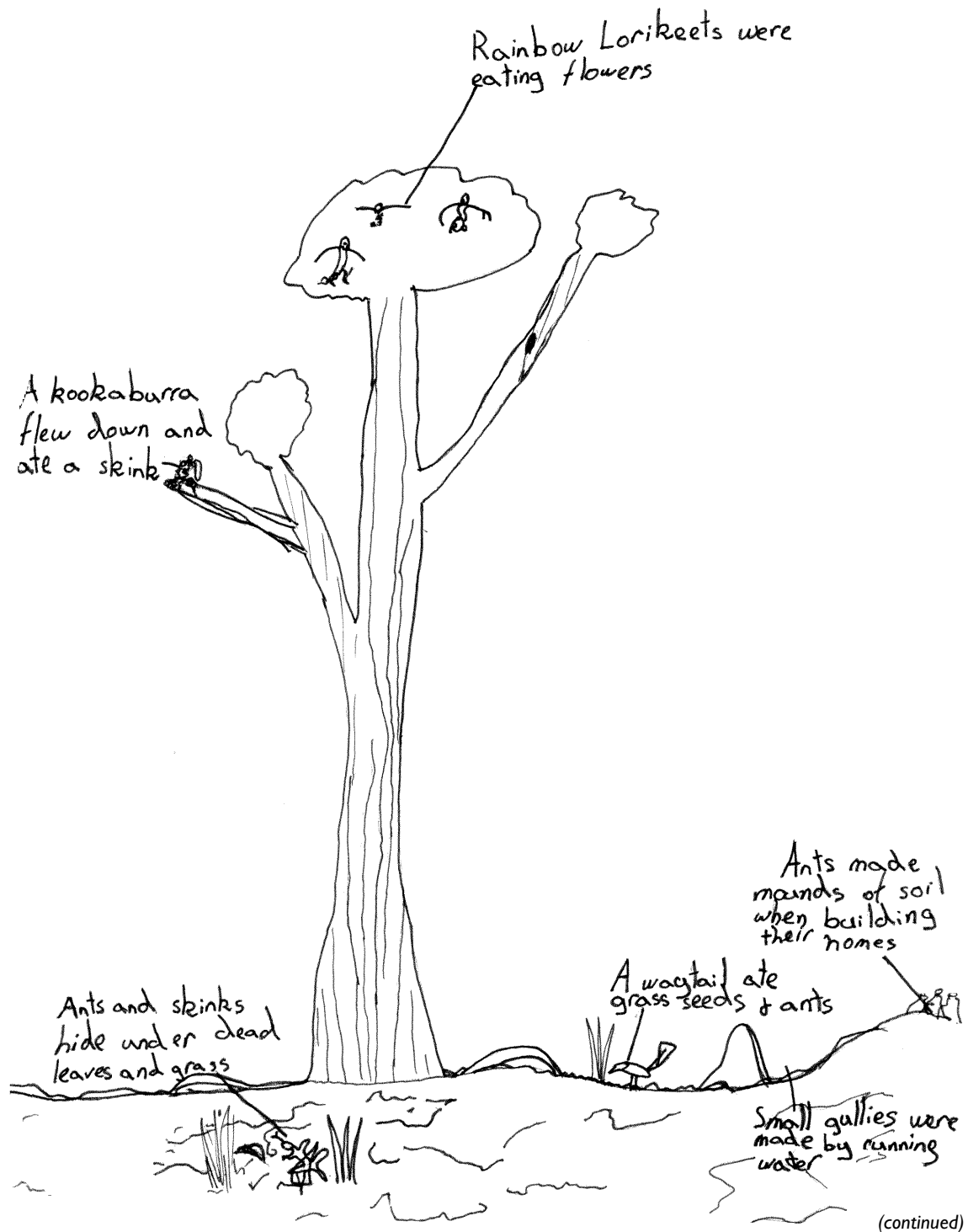
- students' planning and construction of the eco-columns;
- students' records of construction and observations of the eco-columns;
- students' final reports and evaluations of the project.

Interactions in a woodland

R1 Resource Sheet 1

INTERACTIONS BETWEEN LIVING AND NON-LIVING THINGS • MIDDLE PRIMARY

Interactions In A Woodland



Source: Example of a student's response

Interactions in a woodland (continued)

R1
 Resource Sheet 1

Interactions in a woodland

What we observed in our plot	Living or non-living	Interactions taking place	Relationship
Trees with flowers	L	Lorikeets were eating flowers.	L+L
Long grass	L	Bees were flying around flowers collecting pollen.	L+L
Dry leaves and grass on the grass.	N		
Dirt	N	Ants were digging in the dirt to make homes	L+N
Ants	L	Heavy rain made small gullies.	N+N
Rainbow lorikeets	L		
Small gullies	N	The wagtails were eating ants.	L+L
Wagtails	L		
kookaburras	L	The kookaburra ate a skink.	L+L
Skinks	L	Ants & skinks were hiding under leaves	L+L
Insects	L		

Source: Example of a student's response

Constructing an eco-column



Resource Sheet 2

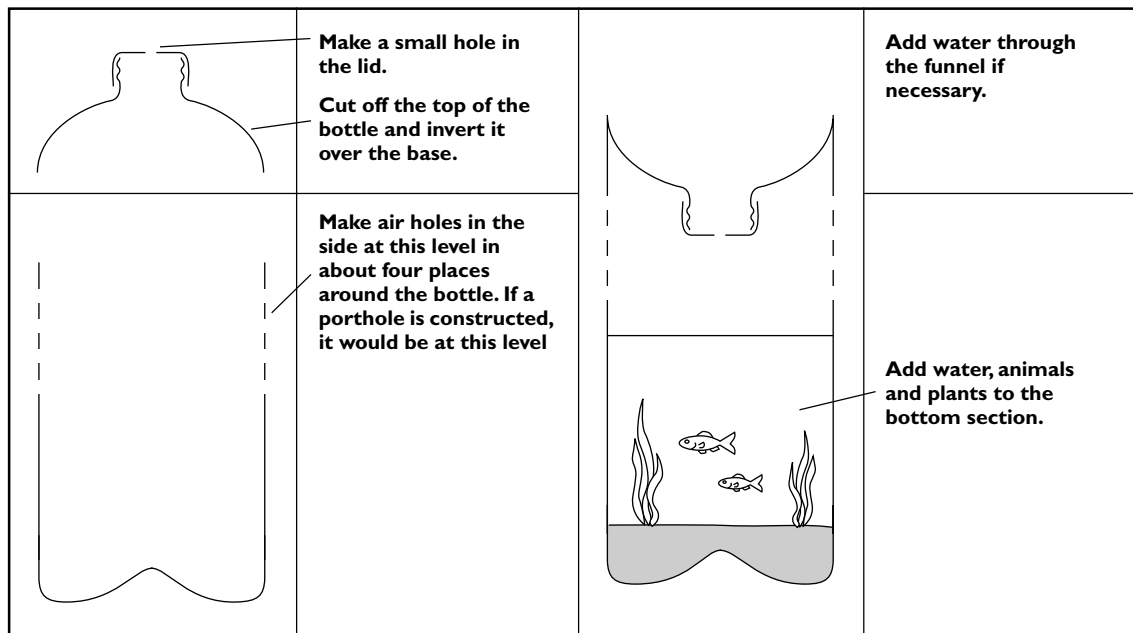
INTERACTIONS BETWEEN LIVING AND NON-LIVING THINGS • MIDDLE PRIMARY

Materials

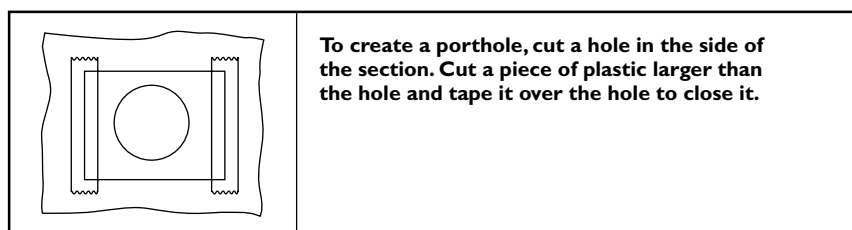
- one or two 2-litre or 3-litre soft drink bottles (per group)
- scissors or razor in safety holder
- skewer
- clear adhesive tape
- soil
- water
- plants, compost, fruit, flies, spiders, snails and other small organisms

To make an aquatic environment

One bottle required — remove labels and screw the lid on tightly.



A porthole could be added to the section containing the plants and animals. This would make it easy to add food or new plants or animals.



(continued)

Constructing an eco-column (continued)

32

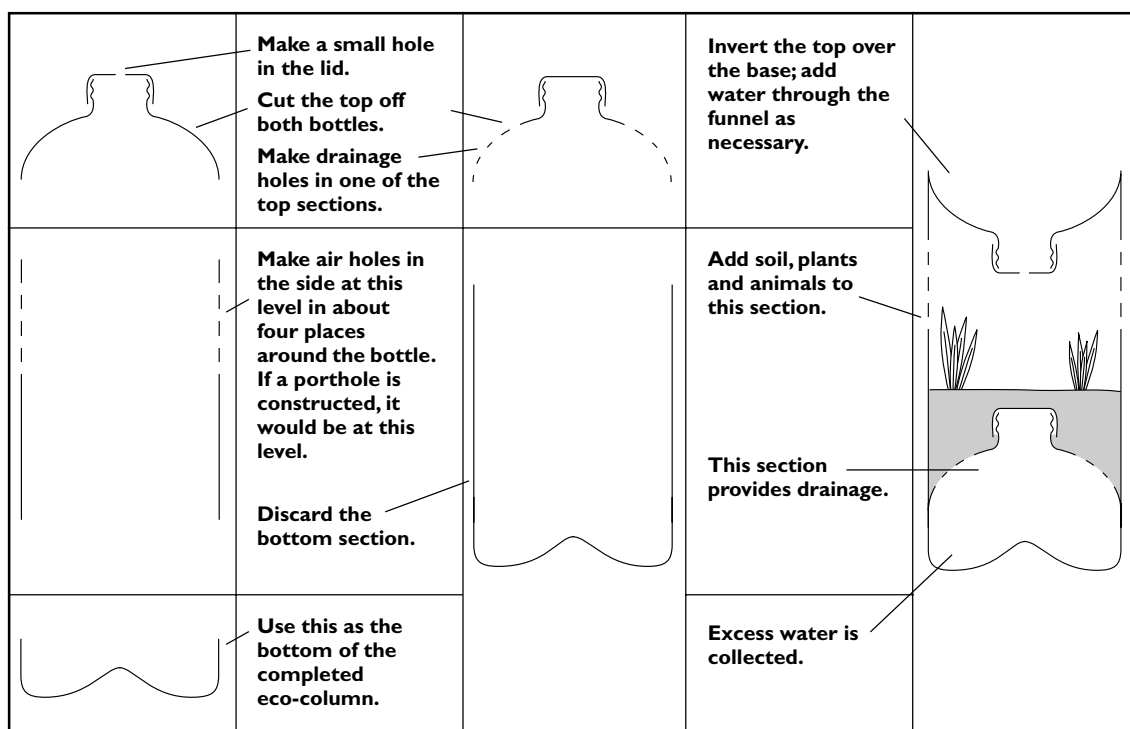
Resource Sheet 2

To create a terrestrial environment

Two bottles are required — remove labels and screw lids on tightly.

Bottle 1 — cut off the top and bottom.

Bottle 2 — cut off and keep the top; discard the rest.



Acknowledgments

This module is based on material developed by Claire McDermott in association with the Queensland School Curriculum Council.

This sourcebook module should be read in conjunction with the following Queensland School Curriculum Council materials:

Years 1 to 10 Science Syllabus

Years 1 to 10 Science Sourcebook: Guidelines

Science Initial In-service Materials

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