

# Biodiversity



**Science Learning Area: LIFE AND LIVING**

**Primary Module  
Year 4-7**

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### Teacher Use

Teachers can use the topic of biodiversity to engage students in real life scientific challenges that can be found in their own backyard. This detailed study can empower students to protect their local environment and engage in sustainable practices.

The visit to the GDC will involve students in working with staff to compile a reference collection of insects that are common to the GDC site. They will also be involved in examining and identifying species of invertebrates that are attracted to ultra violet light.



### Teacher Use



These sheets are for teachers to use prior to their visit to the GDC. They can be used for students to access or as general background information.

Ecology is the relationship of living things to each other and to their surroundings. This idea that all living things are connected to each other is important. The Earth continues to flourish and function in a healthy way because everything in it works in harmony with each other. This means that the air, earth, energy from the Sun and all living thing on the Earth depend on each other and must function as a team.

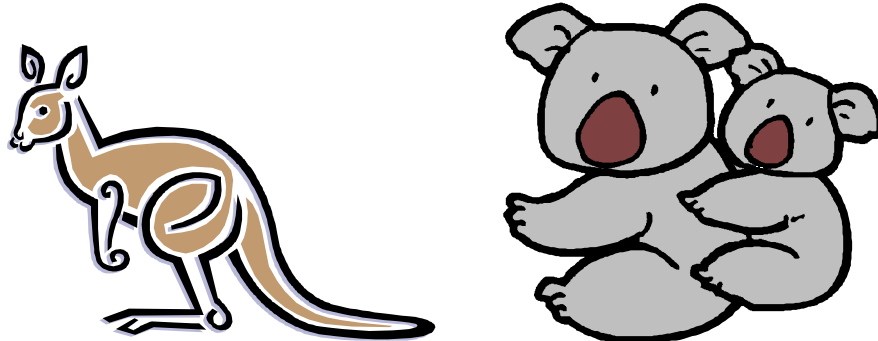
Humans are part of this team. To survive you need fresh air to breathe, fresh water to drink, fertile soil in which to grow plants to eat, and energy from the Sun to warm us. We also need biodiversity – the many millions of plants and animals that live in so many different habitats.

Biodiversity can be explored at three levels – genetic, species and ecosystem diversity. These three levels work together to create the complexity of life on Earth. **Genetic diversity** is the variety of genes within a species. Each species is made up of individuals that have their own particular genetic composition. This means that a species may have different populations each having different genetic compositions. To conserve genetic diversity, different populations of a species must be conserved. **Species diversity** is the variety of species within a habitat or a region. Some habitats, such as rain forests and coral reefs, have many species. Others, such as salt flats or a polluted stream have few. **Ecosystem diversity** is the variety of ecosystems in a given place. An ecosystem is a community of organisms and their physical environment interacting together. An ecosystem can cover a large area, such as a forest or a small area, such as a pond.

As a developed nation, Australia has a special responsibility for biodiversity conservation and management. The best way to conserve biodiversity is to save habitats and ecosystems rather than trying to save a single species.

It is estimated that there are 13.6 million species of plants, animals and micro-organisms on Earth. Australia has about one million of these, which represent more than 7% of the worlds total and is more than twice the species in Europe and North America combined.

Mega diversity describes countries with a very high level of biodiversity. Twelve of the mega diverse countries, including Australia, contain about 75% of the Earth's total biodiversity. Australia's high number of endemic species – ones that only occur in Australia – is largely a result of its period of separation from other countries.



Australia was once part of the great southern continent Gondwana, which also included South America, Africa, India and Antarctica. Gondwana began to break up 140 million years ago and about 50 million years ago Australia eventually split from Antarctica. Australia's unique biodiversity is mostly explained by the isolation of our continent from other landmasses.



*(An artists impression of what the Earth may have looked like 160 million years ago and then as the continents began to break up)*

**So what is happening to our biodiversity?** There are many threats to biodiversity. Some scientists believe that we are now witnessing the sixth mass extinction, the only mass extinction to be caused by a single species – humans. Another great threat to biodiversity is the size and rate of human population. The loss of habitat through land clearing has also resulted in the loss of many ecosystems during the last 200 years. Between 1788 and 1998 we have lost 20 species of mammals, 20 species of birds and 68 species of plants. Weeds can also cause loss of habitat as they are unwanted plants where they do not naturally occur. In some parts of Australia there are almost as many weed species as there are indigenous species. Many weeds escape from farms and gardens. Weeds, often, cannot be eaten by indigenous animals and fungi, and often make poor

homes for animals. Feral animals have endangered many of Australia's mammals when rabbits and foxes entered their habitat.

Many cultures understand that when natural resources are used they must be used in a sustainable way. This means allowing for a natural replacement of the resources as they are used. This leaves a minimal impact on the biodiversity of the area. Pollution, climate change and disease are also having an effect on our biodiversity.

There is much that we can all do to begin to restore biodiversity in our local area. Students can become involved in measuring and increasing biodiversity in their local area. Students can increase or create local habitats in school grounds to encourage indigenous local species to set up homes.





TEACHER USE



These sheets are for teachers to use for assessment purposes.

## **Overarching Learning Outcomes** **Curriculum Framework**

There are opportunities in this package for students to demonstrate the following outcomes:

- OLO 3** Students recognise when and what information is needed, locate and obtain it from a range of sources and evaluate, use and share it with others.
- OLO 5** Students describe and reason about patterns, structures and relationships in order to understand, interpret, justify and make predictions.
- OLO 7** Students understand and appreciate the physical, biological and technological world and have the knowledge and skills to make decisions in relation to it
- OLO 6** Students visualise consequences, think laterally, recognise potential and are prepared to test options

The following Progress Maps will enable teachers to have a clear picture about the achievements required of students to demonstrate an outcome.

### **Investigating Scientifically:**

#### **Aspect 1:**

**Planning:** Plans for investigations, to test ideas about the natural and technological world

#### **Aspect 2:**

**Conducting:** Collects and record a variety of information relevant to their investigations

#### **Aspect 3:**

**Processing Data:** Translate and analyse information to find patterns and draw conclusions to extend their understandings

#### **Aspect 4:**

**Evaluating:** Reflect on an investigation to find patterns and draw conclusions to extend their understandings

### **Life and Living**

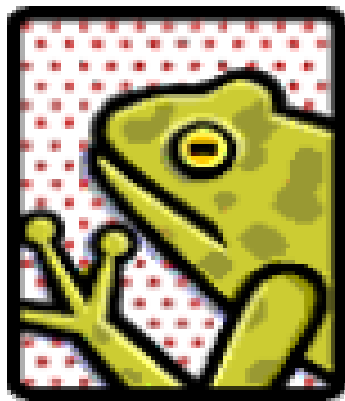
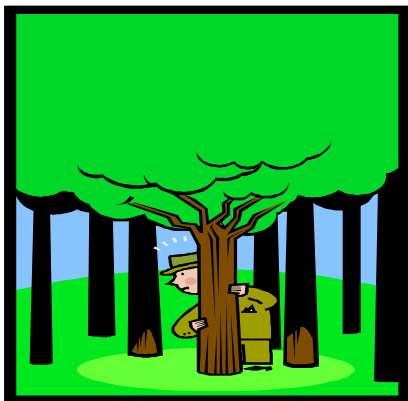
Students understand their own biology and that of other living things, and recognise the interdependence of life.

## Investigating Scientifically

	<b>Level 2</b> When given a focus question & a familiar situation contributes elementary ideas about variables & procedures, collects and makes limited records of data and can say if what happened was expected	<b>Level 3</b> Shows some awareness of the need for fair testing, makes simple predictions, collects & organises numerical data & descriptive information using simple tables, diagrams & graphs & identifies main features, patterns and difficulties in an investigation	<b>Level 4</b> Plans and conducts different types of investigations, takes into account the main variables, collects data using repeat trials; explains patterns in data; makes suggestions for improvement
<b>Planning:</b> Plan investigations to test ideas.	Identifies when given a focus question some of the variables to be considered	Plans for investigations on sound, shows awareness of fair testing, makes simple predictions based on personal experience.	Identifies variables to be changed, the variables to be measured and at least one variable to be controlled
<b>Conducting:</b> collect and record a variety of information relevant to their investigation.	Observes, classifies, describes and makes simple non-standard measurements and limited records of data	Uses simple equipment in a consistent manner, records data in simple tables, diagrams or observations	Uses equipment appropriately; recognises the need for safety equipment and precautions; takes care with data collection to ensure accuracy
<b>Processing data:</b> translate and analyse information to find patterns and draw conclusions to extend their findings	Makes comparisons between objects and events observed	Displays numerical data as tables, bar graphs and identifies patterns in data, summarises data	Calculates averages from repeated trials; plots data as line graphs where appropriate; makes conclusions which summarise and explain patterns in data.
<b>Evaluating data:</b> reflect on an investigation, evaluate the process, generate ideas	Comments on what happened; determines if what happened was expected	Identifies difficulties experienced in conducting the experiment	Makes suggestions for improving the investigation

## Life and Living

	<b>Level 2</b> Understands that needs, features and functions of living things are related and change over time	<b>Level 3</b> Understand that living things have features that form systems which determine their interaction with the environment	<b>Level 4</b> Understand that systems can interact and that such interactions can lead to change
All living things in the environment are interdependent and changing one aspect of the environment will change other aspects	Describe the needs of some living things	Makes connections between living things and the environment	Describe processes that connect living things in an ecosystem
The relationship between structure and function in living things is a basis for understanding life maintaining processes	Identify some functions related to features of a living thing such as: the use of fins on a fish	Identify patterns of features that form systems with particular functions such as: explain why fish have gill and gill slits and humans have lungs and a rib cage	Describe the interaction between different systems with particular functions such as: explain how different organs of a fish support its survival
Organisms grow, reproduce and change over generations	Describe how living things may change over time such as tadpoles changing into frogs	Describe patterns of similarities and differences between groups of familiar living thing such as: classify some animals as amphibians, mammals, fish or birds	Identify a process of change to show that groups of living things have changed over time such as explain why pink and grey galah population has increased in Australia



## TEACHER USE

The following activity and information will give students the opportunity to develop some understanding of the topic prior to their visit to the GDC

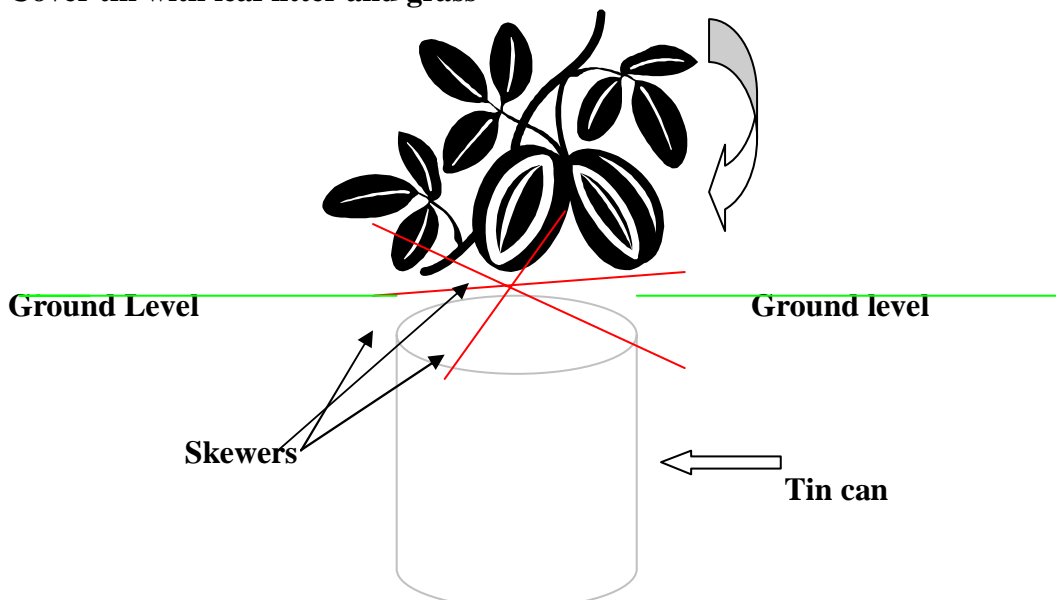
### 1. Schoolyard Biodiversity Study

The students will be studying invertebrates, which make up 99% of all living animal species and are a major component of biodiversity. **The students will complete a 24-hour survey that will compare invertebrates that live in leaf litter with those that live on a lawn or oval.**

This study will help students find out more about the diversity of invertebrates in their area. The students will need to make pitfall traps in the ground in areas where leaf litter is found and in the lawn in the school grounds.

- To set up the pitfall traps students will need 2 small tin cans, skewers and a small trowel.
- Select an area where there is a lot of leaf litter. Student dig a hole that they can fit the tin into, make sure there are no sharp edges on the tin. Join the skewers together using sticky tape and lay across the tin. Cover the skewers with leaves and grass and leave overnight. Repeat the process in an area of lawn and leave overnight.

#### Cover tin with leaf litter and grass



Compare the number and type of invertebrates that you have collected in the two sites and use the following worksheets to collate your information.



## WORKSHEET

Name: \_\_\_\_\_ Others in my Group: \_\_\_\_\_

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1. What is the task you have been set?

2. What previous knowledge do you have that may be useful? (What do you already know about invertebrates?)

3. What predictions can you make which are relevant? (Perhaps predict which area will have the most invertebrates.)

4. From what you already know about invertebrates, why do you think your prediction will happen?

5. What method will you use to test your prediction?

6. Draw a sketch and list your materials?

7. What things are likely to have an effect in your investigations?

8. What will you measure?

9. Record your information below – draw the invertebrate, name it if you can and record the number of each species found.

<b>Number of invertebrates found in leaf litter pitfall</b>	<b>Invertebrates found in leaf litter pitfall</b>	<b>Number of invertebrates found in lawn pitfall</b>	<b>Invertebrates found lawn pitfall</b>





### **Pre –Visit Activities**

#### **Schoolyard Biodiversity Study**

**It would be expected that the pitfall in the lawn would trap less invertebrates than the pitfall where the leaf litter is found. The leaf litter creates an environment that offers shelter and food to small animals.**

**Try to elicit this response from the students when they begin to compare their results.**



### TEACHER INFORMATION

The GDC is situated in pristine bushland and provides students with unique opportunities to visit and study within one of the world's top 10 biodiversity 'hot spots'. This package on biodiversity encourages students to explore the Life and Living and Working Scientifically aspects of the Science Learning Area by studying invertebrates, which are common to the GDC site.

## **WARNING!!!!**

**STUDENTS NEED TO TAKE CARE WHEN HANDLING INSECTS AT THE GDC. STUDENTS ARE TO AVOID HANDLING INSECTS WITH BARE HANDS.**

1. Students will be working with staff at the GDC to compile a reference collection of insects that are common to the site. There is not a lot of information available about our insects so students could well find themselves discovering a new species. Traps will have been set prior to students visit.

**Materials:** digital cameras, worksheet, pen, white sheet of paper

- Students will accompany GDC staff to sites of pitfall traps and collect specimens recording site where each is found. Use Activity 1 Student Worksheet.
- Students will use the digital camera to record each specimen. Students will then return to the centre and using the Food Web poster locate where the different species are found on the food chain.
- They will identify the species using the Insect Identification poster – if an insect cannot be identified this will be noted with the student's name and contact. If the invertebrate is a new found species the student will be notified.
- Students will print off digital images and compare to species already in the GDC collection. If species is not already represented student can add image to the collection.

2. Students will be involved in examining and identifying species of invertebrates attracted to ultra violet light.

This activity can be conducted prior to a session at the Observatory – or collection can take place during daytime with insects collected during the night.

An ultra violet light will be placed in a secure outdoor place shining on a white sheet. The bottom of the sheet is folded to make an open pocket for insects to fall into and hide. Many nocturnal insects will be attracted to the light and rest on the sheet.

- Students will collect insects and record on worksheet.
- They will identify the insects and find their place on the Food Web poster
- Digital images will be taken and added to the GDC collection.

**STUDENT WORKSHEET****Activity One – Looking at the diversity of species**

1. Choose an area where you will collect samples of invertebrates. Alternatively for Activity Two you can use the insects collected in the sheet using the ultra violet light. Use the 'bug catchers' and place one invertebrate into a separate petri dish and cover with a lid. Examine the animals caught and try to sort them into different species. What features will you use to decide if they belong to the same species? List the features below that you will use to sort your animals.
  
2. Place all the species of each type carefully on top of each other. Arrange the stacks from smallest to largest. Label each stack with the species you have collected. Draw a graph below– which sort of graph is your choice – to represent the insects collected in each stack. Remember to label the axes.



3. Compare your results with another group. Where there any differences. Can you explain the differences. Write the differences below.

4. What do your results tell you?

5. Use the digital camera to record each specimen. Return to the centre and using the **Food Web** poster locate where the different species are found on the food chain. Draw below where they fit into the food chain.

6. Identify the species using the **Insect Identification** poster – if an insect cannot be identified this will be noted with the student's name and contact. If the invertebrate is a new found species the student will be notified. Retain the new found species and return to your area where you caught the invertebrates and release the rest gently onto the ground.

### **Activity 2.**

1. Collect the specimens that you have found in the sheet. Sort them into types or species. Complete the tally chart below to find out which species are the most common.

Species	Tally

2. Take digital photos of the specimens and add them to the GDC collection.

**TEACHER AND STUDENT INFORMATION**Fact Finding Mission

You are going to spend some time studying on of the invertebrates that you collected and took photos of on site at the GDC. To help you compile background knowledge of your creature see if you can find the answers to as many of the following questions as possible. Use the library and Internet to help you locate information

1. What does your creature look like? Describe it.
2. Do the male and female look different? Explain the differences and draw a picture of them showing the differences.



Male



Female

3. Why do you think they are different?

4. Does your creature have an alternate popular name?
  
5. What is the scientific name for your creature?
  
6. What Phylum, Class, Order and Family does your creature belong to?
  
7. What other creatures belong to this Class?
  
8. Why does your creature belong to this Class?
  
9. Why do you think your creature belongs to the family that it does?
  
10. In what parts of Australia is your creature found?

11. Is your creature a parasite, a host or neither of these?
12. Does your creature have special features that help nit to feed?
13. Describe, with the aid of a diagram, the life cycle of your creature?  
Include:
- Where mating usually takes place;
  - How the young are produced;
  - Description of other stages of growth.
14. If you wanted to find your creature in the bush, where would you look?

15. What other interesting facts did you discover?

16. The presentation of your information is your choice. Remember to include a list of references that you used to find your information.

