

Mathematics Science Strand

**Environmental
Science**

**Module
E2**

Flora and fauna of PNG



Student Support Material

Acknowledgements

These curriculum materials have been written and compiled by:

John Broadfoot *Science Adviser*

Osaku Openg *Balob Teachers' College*

Rosina Paullon *O.L.S.H. Teachers' College – Kabaleo*

Institutional Participants for Science Workshops (1999 – 2002)

Rosina Paullon	Principal Counterpart (O.L.S.H. T.C. - Kabaleo and St. Benedict's T.C.)
Bro. Gerry Buzolic	O.L.S.H. T.C. Kabaleo
Rex Orong	O.L.S.H. T.C. Kabaleo
Bro. Tony Gaul	Holy Trinity T.C.
Mek Poka	Holy Trinity TC
Jerome Goodwill	Gaulim T.C.
Jerry Hendigao	Dauli T.C.
Sam Kambaiye	Dauli T.C
Asaku Openg	St Benedict's T.C. and Balob T.C.
Gamini Ila	St Benedict's TC
Robert Sine	St Benedict's TC
Basa Nayong	Balob T.C.
Otto Wrangian	PNGEI
Synell Ko-ou	PNGEI
John Gonapa	Madang T.C.
Baro Pari	NDOE - Teacher Ed and Staff Development
Paul Hamadi	NDOE - Inspector

Illustrations and photographs courtesy:

John Broadfoot; Encyclopaedia Britannica 2001

Layout and diagrams supported by:

John Broadfoot

Content advisor:

John Broadfoot

Cover Illustration: *Cus Cus, courtesy Chevron Oil*



Primary and Secondary Teacher Education Project

Australian Agency for International Development (AusAID)

GRM International

Papua New Guinea-Australia Development Cooperation Program

Contents

UNIT OVERVIEW	1
RATIONALE	2
OBJECTIVES.....	2
1. INTRODUCTION.....	3
CHARACTERISTICS OF LIVING ORGANISMS.....	3
1. FLORA OF PNG.....	5
CLASSIFYING PLANTS.....	5
FORESTS OF PNG.....	8
FOREST ZONES.....	8
2. FAUNA OF PNG.....	10
CLASSIFICATION OF ANIMALS.....	10
3. ENDANGERED SPECIES OF PNG.....	13
3. PROJECT.....	15
EXAMPLES OF PROJECTS.....	16
CHECKUP	21
APPENDIX 1 CLASSIFICATION OF PLANTS (FLORA)	23
APPENDIX 2 CLASSIFICATION OF ANIMALS (FAUNA).....	25

Unit overview

(Based on the National Curriculum Guidelines)

The shaded Module represents the one studied in these materials.

Unit	Code	Module
Environmental Science	E1	Ecology
	E2	Flora and Fauna of PNG
	E3	Weather and Climate
	E5	Earth Science
	E6	Earth in Space

Symbols used in these materials.

The symbols shown in the table indicate the type of activity to be completed while studying this module.



Read or research



Write or summarise



Activity or discussion



Safety note



First Aid procedure

Rationale

This module aims to prepare students to teach concepts and ideas related to Papua New Guinea plants and animals in the new primary school curriculum and to encourage effective decision-making in relation to plants and animals in their local environment.

Study of fauna and flora provides a clear understanding of the nature of plants and animals, relationship and differences between plants and animals and other smaller groups. Clear understanding of the plants and animals will enable the students appreciate them, look after them and exploit them with care and consideration.

This module will involve students in practical and field exercises to enhance their knowledge of the local context and culture. Relevant content from the Primary science curriculum will be applied in the teaching of this module.

Objectives

At the end of this module the students should be able to:

- list and describe the characteristics of living things;
- describe and name some important plants and animals of PNG;
- classify some the plants and animals of PNG;
- conduct research on one species of plant or one species of animal in PNG;
- collect data in the field;
- compile a report on the species that have been researched and investigated in the field.

IMPORTANT NOTE

<p>This module is intended as a guide only for the completion of a Major Independent Project by students. As such this module should be used as a resource and discussion starter to enable students to select a topic for their research. The module should not be taught as a content module.</p>

1. Introduction

A living thing is any thing that has life. Living things show movement, feeding, respiration, growth and/or reproduction.

Plants are living things that are usually green and they are known as the producers in a community. Plants are needed for animals to survive. Plants can be single celled or a multicelled. Multicelled plants can be flowering or non-flowering and are further classified as monocotyledon or dicotyledon.

The animals of PNG make up the most diverse and richest fauna in the World. Many species are endangered and need protecting from the exploitation by unscrupulous operators.

It is important that everyone recognises and protects the unique flora and fauna of PNG.

Characteristics of living organisms

Respiration

This is the process by which energy is made available as a result of chemical changes within the organism. The most common of these is the chemical decomposition of food as a result of its combination with oxygen. This is not particularly obvious in plants and animals, because we can not look into cells and see it happening, but it is fairly easy to demonstrate that the living creatures take in air, remove some of the oxygen from it and increase the volume of carbon dioxide in it. More simply expressed it can be said that living organisms take in oxygen and give out carbon dioxide. Sometimes this takes place with obvious breathing movements. Respiration also results in a rise in temperature, which is more easily detectable in animals than in plants.

Feeding

This is an essential preliminary to respiration, since energy comes ultimately from food. The feeding of a tree by its leaves is less obvious than that of an animal, which moves actively in search of food. Feeding may also result in growth.

Excretion

Living involves a vast number of chemical processes, including respiration, many of which produce substances that are poisonous when moderately concentrated. The elimination of this from the organism is called excretion.

Growth

Strictly, growth is simply an increase in size, but it usually implies also that organism is becoming more complicated and more efficient. An illustration of this is an animal which changes its form from when it is young to when it is an adult, e.g., the frog or butterfly.

Movement

An animal can generally move its whole body, whereas movements of higher plants are usually restricted to certain parts such as opening and closing of petals, or to the movement of parts as a result of growth.

Reproduction

No organism has limitless life, but although individuals must die sooner or later their life is handed onto new individuals by reproduction, resulting in the continued existence of the species.

Irritability (sensitivity)

Irritability is the ability to respond to a stimulus. Obvious signs of sensitivity are the movements made by the animals as a result of noises, or being touched or being seeing an enemy. Full-grown plants do not show such responses under casual observation but, during growth, they respond to the direction of light, gravity and moisture.

Table 1. The similarities or differences between plants and animals

PLANT	ANIMAL
Can be either single or multicelled	Can be either single or multicelled
Usually green because they contain a green substance called chlorophyll	Not usually green because they do not contain chlorophyll
They produce their own food by photosynthesis using water, Carbon Dioxide and mineral salts. Thus, they are known as producers or autotrophic organisms	Animals consumes plants and other animals and are known as consumers or heterotrophic organisms
Stay in one place but responses to stimulus using parts such as root towards the gravity also known as geotropism and shoots towards the light also known as phototropism	Move around to search for food
Have spreading bodies to catch as much sunlight as possible.	Animals have a compacted bodies which are easier to move around

1. Flora of PNG

Classifying plants

Flora (plants) are living things that are usually green and they are known as the producer in a community. It is living matter without which nothing would survive. Plant can be a single celled or a multicelled. Multicelled plants can be flowering or none flowering and further monocotyledon or dicotyledon.

A plant generally consists of a portion above the ground called the shoot and the part below the ground called root. The shoot is usually made up of a stem bearing leaves, buds, flowers and fruits. There are two main types of plant root systems. The plant that has a main root is said to have tap root system (e.g., peanut mango) and the plant that does not have main root (e.g., grasses and cereals) are said to have fibrous root system.

Part	Dicotyledon	Monocotyledon
Leaf	Broad leaves with a network of veins	Narrow leaves with parallel veins
Flower	Parts of the flowers are usually in groups of five.	Parts of the flowers are usually in groups of three.
Embryo	Two cotyledon or seed leaf in their seeds	One cotyledon or seed leaf in their seeds
Root	Tap root system	Fibrous root system
Stem	Herbaceous or woody, one ring of vascular bundles	Herbaceous, scattered vascular bundles
Examples	Hibiscus, mango, rain trees, pea.	Banana, grasses, pineapple, corn, rice, pandanus

The major groups of the non flowering plants are:

1. algae
2. bacteria
3. fungi
4. lichens
5. bryophytes
6. tracheophytes
 - a) pteridophytes
 - b) spermatophytes
 - c) gymnosperms

 **Activity 2 Plant Poster**

Complete the following as a poster for a class.

THE CELLS

All living organisms are made up of cells. Cells are the building blocks of all living things.

A typical plant and an animal cell

The diagrams below are of the plant and an animal cell. The animal cell is of the animal called an amoeba that is single celled .

A _____

B _____

- 1 *From the above information which is the plant and which is the animal cell?*
- 2 *Label parts of the plant and the animal cells.*
- 3 *Draw a table with four columns and the heading "The comparison between a plant and an animal cell". On the first column are the parts of the cells and in the second both, the third plant and the fourth animal. If a part of the cell is only present in the animal cell then put a tick under the animal cell, if it is found in both the plant and the animal cell then the tick goes under the both etc.*
- 4 *Make a list of the seven (7) characteristics living things need in order to survive.*

**Activity 3 Some plants common to PNG**

Here are some common local plants study them and write monocots or dicots beside each one of them.

Common name	Scientific names	Monocot or dicot?
Bread fruit	<i>Artocarpus altilis</i>	
Guava	<i>Psidium guajava</i>	
Paw paw	<i>Carica papaya</i>	
Pineapple	<i>Ananas comosus</i>	
Mango	<i>Mangifera indica</i>	
Grapefruit	<i>Citrus paradise</i>	
Pommelo	<i>Citrus medica</i>	
Kamquat	<i>Fortunella japonica</i>	
Tomato	<i>Lycopersicon esculentum</i>	
Egg plant	<i>Solanum melongena</i>	
Watermelon	<i>Citrullus lanatus</i>	
Corn	<i>Zea mays</i>	
Sour sop	<i>Annona muricata</i>	
Avocado	<i>Persea americans</i>	
Cashew nuts	<i>Anacardium occidentale</i>	
Chilli pepper	<i>Capsicum annum</i>	
Cotton	<i>Cossypium</i>	
Rosella	<i>Hibicus sabdariffa</i>	
Castor	<i>Ricinus communis</i>	
Lemon grass	<i>Cymbopogon spp</i>	
Yellow Flame Tree	<i>Peltophorum pterocarpum</i>	
Flamboyant, Flame Tree	<i>Delonix regia</i>	
Grille Plant	<i>Cassia alata</i>	
Golden Showers	<i>Cassia fistula</i>	
Pink Coral Showers	<i>Cassia grandis</i>	
Flames of the Forest	<i>Mucuna novo-guineesis</i>	
Orchid Tree/mountain Ebony	<i>Bauhinia variegata</i>	
Crepe Myrtles	<i>Lagerstroemia</i>	
Plant with seeds coated with red pigment	<i>Bixa orellana</i>	
Raintree	<i>Enterolbium saman</i>	
Frangipani	<i>Plumeria</i>	

Forests of PNG

Much of PNG is still covered with the natural growth of tropical rain forest, of which only a fraction is primeval forest. The vegetation is similar to that of the Philippines, Malaysia, and Indonesia (Irian Jaya).

There are some 40,000 species of flowering plants, including 5,000 species of orchids. There are more than 3,000 tree species, including durian, sandalwood, illupi nut, valuable timber varieties such as teak and ironwood, and rattans. More than 6,000 species are exploited for economic purposes, either directly or indirectly. Major timber operations are located throughout PNG, where the trees are not differentiated but are referred to as "broad-leaved species"; they include, for example, meranti, which has a soft, lightweight, pinkish to darkish red wood. Teak, which is also broad-leaved, comes mainly from plantations in PNG.

The most important vegetation type is the mixed lowland and hill tropical rain forest, which occurs below 5,000 feet. It is characterised by a large number of species, including high-canopied and buttressed trees and woody, thick-stemmed lianas (climbing plants). Epiphytes (plants that derive nourishment from the air and usually live on another plant) such as orchids and ferns, saprophytes (plants that live on dead or decaying matter), and parasites are well developed. Above 5,000 feet this forest gives way to temperate upland forest dominated by oak, laurel, tea, and magnolia species. Another typical feature of PNG vegetation is the mangrove forest, characterised by the formation of stilt or prop-rooted trees, which grow only in salty or brackish water along muddy shores. Mangrove swamps are extensively developed along the coastline of PNG mainland and the islands.

Forest zones

Forest is a large area of land covered by trees. It may be described in a number of zones. Figure 1 shows the distribution of the major rainforests of the World.

Upper mountain forest

Upper mountain forest is sometimes called "cloud forest". The tops of the trees form one layer.

This type of forest is found in higher mountain areas about 3000 m to 3500 m. Here clouds and mists mostly cover the mountains, and mosses and lichens grow on trees and rocks.

Mid mountain forest

Mid mountain forest is often called "moss forest". The tops of the trees form two layers. This forest is found in high mountain areas from about

2000 m to 3000 m. It is often covered in cloud and is wetter than the lower mountain forest. It has many mosses, ferns and plants growing on the trees.

Lower mountain forest

The tops of the trees form three layers. This forest is found in the cool mountain areas about 1000 m to 2000 m. Oak trees and pine trees and also tree ferns and some vines are found here. The forest is drier than the mid-mountain forest is drier than mid mountain forest or lowland rainforest.

Lowland rain forest

Almost half of Papua New Guinea is covered by lowland rainforests. This type of forest grows to altitudes of 1 000 metres. The tops of the trees form three layers. A fourth layer may be present close to the ground. This type of forest contains many different kinds of trees, vines, shrubs, palms, flowering plants and animals.

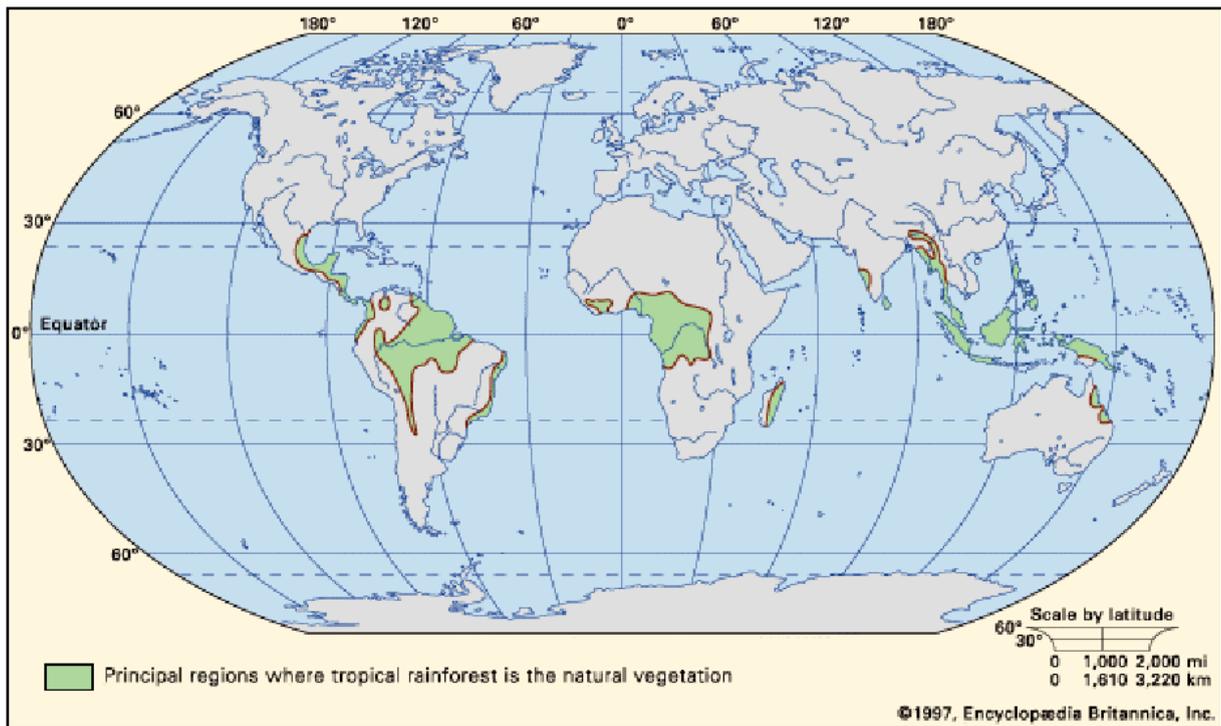


Figure 1. Worldwide distribution of tropical rainforests.

2. Fauna of PNG

Main ideas developed

Animals are living things that are not plants. The animals are first divided to invertebrates and vertebrates. Invertebrates are animals without backbones and vertebrates are animals with backbones. Both invertebrates and vertebrates are further divided in to others smaller groups depending on other features and characteristics.

Classification of animals

In order to conduct fieldwork it is necessary to have a basic understanding of the classification system and characteristics of fauna.

Table 2 lists the major phyla of animals. Appendix 2 gives the general characteristics of major animal (fauna) phyla. Two examples of the classification into subphyla are also given in the appendix.

Table 2. Biological groups of animals.

INVERTEBRATES	VERTEBRATES
1. Protozoa	1. Fish
2. Porifera	2. Amphibians
3. Coelenterates	3. Reptiles
4. Platyhelminthes	4. Birds
5. Annelids	5. Mammal
6. Nematodes	5.1 Monotremes
7. Molluscs	5.2 Marsupial
8. Echinoderms	5.3 Placentals
9. Arthropods	
9.1 Crustaceans	
9.2 Myriapods	
9.3 Arachnids	
9.4 Insects	

 **Activity 4 Animals (fauna)**

Review the different groups of animals and complete the information in a table as shown below. This should be completed in your own time or during study. Briefly describe the animals in each of the given biological groups.

Organism	Examples	Body structure	Habitat	Food and oxygen intake
----------	----------	----------------	---------	------------------------

<p><i>Protozoa</i></p> <p><i>Coelenterates</i></p> <p><i>Annelids</i></p> <p><i>Echinoderms</i></p> <p><i>Molluscs</i></p> <p><i>Arthropods</i></p> <ul style="list-style-type: none"> • crustacea • insects • arachnids

<p><i>Vertebrates</i></p> <ul style="list-style-type: none"> • fish • amphibians • reptiles • birds • mammals
--

 **Activity 5. Review of classification**

- 1 *Collect specimens from a local area of bush/garden/forest/reef nearby.*
- 2 *Devise your own classification system for the materials you have collected.*
- 3 *Compare your classification system with the scientific system.*
- 4 *Prepare a labelled display of your collection for the group.*
- 5 *Report to your group the advantages and disadvantages of your system and the scientific system.*



Activity 6 *Plants and animals of PNG*

Plant and animal card game

(This can be a class activity or assignment)

1. Choose 10 plants and animals of forest, grassland or seashore.
2. Draw them on the cardboard and cut them out.
3. Write the name of the plant or animal on the back of each card. Five or more sets will be required for the game.
4. Prepare a big dice with questions for every set of cards on every face. Each side with the following questions.
 - i. Say whether it is a plant or an animal and say one thing about it.
 - ii. Name the animal/plant in your language and then in English.
 - iii. Briefly describe the plant/animal?
 - iv. Where does it live/grow?
 - v. Name and describe the biological group it belongs to?
 - vi. Name the biological group of the organism and name two other organisms from the same group.

Work out how you will use both the dice and the to play the game and write out its rules or procedures for.

3. Endangered species of PNG

There are many endangered species Worldwide. PNG has many unique species of plants and animals (flora and fauna) which have been identified as endangered.

The term endangered refers to any species of plant or animal that is threatened with extinction.

A number of agencies, both international and national, work to maintain lists of **endangered** species, to protect and preserve natural habitats, and to promote programs for recovery and reestablishment of these species. One such international agency is the Survival Service Commission of the International Union for Conservation of Nature and Natural Resources (IUCN), which publishes information on **endangered** species Worldwide in a series of loose-leaf binders called the *Red Data Book*. Another agency is the Secretariat for the Convention on International Trade in **Endangered** Species of Wild Fauna and Flora.

In PNG the Department of Environment and Conservation is responsible for conservation and management of wildlife resources and their habitats, including **endangered** species. It also provides for the drawing up of lists of such species and promotes the protection of critical habitats (areas designated as critical to the survival of a species).

Research by various organisations and the Department of Environment has confirmed that a number of important species may be on the brink of extinction in PNG. The table below lists some mammals that are endangered.

Some endangered mammals of PNG

Common name	Scientific name	Local name/s	Occurrence
Long beaked echidna	<i>Zaglossus bruijini</i>	Domu, Siaburu, Saangi, Egil	Central Province
Goodfellow's Tree-kangaroo	<i>Dendrolagus goodfellowi</i>	Yemma, Timboyok, Waiman, Wolo	Central, Milne, Wau, Chimbu
Huon Tree-kangaroo	<i>Dendrolagus matschiei</i>	Sivam	Madang, Komba
Tenkile	<i>Dendrolagus scottae</i>	Tenkile	Sandaun
Calaby's Pademelon	<i>Thylogale calabyi</i>	Kobuli	Central
Telefomin Cuscus	<i>Phalanger matanim</i>	Matanim	Sandaun, Telefol
Black-spotted Cuscus	<i>Spilogale rufoniger</i>	Tekeib, Oru	Sandaun, Olo
Greater Small-toothed Rat	<i>Macruromys major</i>	Koloba Pelia	Chimbu
Bulmer's Fruit-bat	<i>Aproteles bulmerae</i>	Sikkam	Wopkaimin, Western



Activity 7. Endangered species of PNG

- 1 *Study the list of mammals given on the previous page.*
- 2 *Which of these mammals have you seen?*
- 3 *Why do you think they are heading for extinction?*
- 4 *Read the statements below.*
- 5 *Form groups and discuss each of the statements.*
- 6 *Report each group's findings to the class.*
- 7 *Use your findings to conduct your individual research Project.*

- There is a strong link between habitat preservation and species survival.
- A number of PNG species of flora and fauna are under threat because of habitat destruction or removal.
- People of PNG should be aware of the threats to endangered species.
- Conservation of habitats and species is important for the survival of humans.

Refer to the Modules, *Ecology and Marine Resources*, for explanation of terminology and examples of other endangered species in PNG.

3. Project

The major assessment item for this module is an individual or paired project. This topic should be conducted as an equivalent to a total of 9 hours of class time, having a focus on the local environment and designed and conducted by you (individually) or as pairs.

To assist you with the research, field investigation and report format the following example is given.

The curriculum guidelines list the following examples:

- 1** Investigate the capture, use and sale of fauna or flora from the local area. Produce a display including such things as specimens and charts to highlight the effects of these activities on the fauna or flora. Report to your group on your findings.
- 2** Study one local species of native plant or animal that is endangered and produce a chart of its life cycle, habitat, food and use. Prepare a display of pictures, drawings and specimens to explain as much detail as you can about the species. Produce a report of your findings for the group.
- 3** Collect specimens of different plants from the local area, which are used for specific purposes such as clothing, building, medicines, ornament, eating, ceremonies and magic. Make a display of them including labels with names (local and scientific, if possible), uses and special details. Prepare a report for the group on your findings.
- 4** Make a detailed study of an area that has recently been logged. Interview local landowners and communities to determine how decisions were made, what aspects of the process the community is satisfied and dissatisfied with, what advice was sought and obtained, and what advantages and disadvantages have come to the community. Take photographs for a display and prepare a report on your findings.

Examples of projects

Project Example 1. Endangered fauna of PNG

Some species of wallabies, actually pademelons, in PNG have been hunted and driven from their natural habitat to the point of being classed as endangered. Read the following extract and use the information to continue your research about one of the species listed as endangered.

Your report must clearly describe the species in detail, include a map showing the distribution, describe the habitat, present reasons for the species being in decline, propose ways to revive the species both in the natural habitat and/or in captivity. You might mention breeding programs for the species.



Wallaby

Wallaby refers to any of several middle-sized marsupial mammals belonging to the kangaroo family, Macropodidae (kangaroos). They are found chiefly in Australia and PNG. The 11 species of brush wallabies (genus *Macropus*, subgenus *Protemnodon*) are built like the big kangaroos but differ somewhat in dentition. Their head and body length is 45 to 105 cm (18 to 41 inches), and the tail is 33 to 75 cm long. A common species is the red-necked wallaby (*M. rufogriseus*), with reddish nape and shoulders, which inhabits brushlands of southeastern Australia and Tasmania; this species is often seen in zoos. The pretty-faced wallaby, or whiptail (*M. elegans*, or *M. parryi*), with distinctive cheek marks, is found in open woods of coastal eastern Australia.

The six named species of rock wallabies (*Petrogale*) live among rocks, usually near water. They are prettily coloured in shades of brown and gray and are distinguished by stripes, patches, or other markings. They are extremely agile on rocky terrain. The three species of nail-tailed wallabies (*Onychogalea*; see photograph).

Bridled nail-tailed wallaby (*Onychogalea fraenata*) are named for a horny growth on the tail tip. They are handsomely striped at the shoulder. Because they rotate their forelimbs while hopping, they are often called organ-grinders. Two species are **endangered**.

The two species of hare wallabies (*Lagorchestes*) are small animals that have the movements and some of the habits of hares. Often called pademelons, the three species of scrub wallabies (*Thylogale*) of New Guinea, the Bismarck Archipelago, and Tasmania are small and stocky, with short hind limbs and pointy noses. They are hunted for meat and fur. A similar species is the short-

tailed scrub wallaby, or quokka (*Setonix brachyurus*); this species is now restricted to two offshore islands of Western Australia.

Project Example 2. Plants (flora)

If you choose to study a group of plants, you might use the following questions/activities as guidelines.

1. ALGAE

- (a) Pull some green stuff from under the water and study it.
- (b) Where do they grow?
- (c) Put it under the microscope and draw what you saw in the space below.
- (d) Label parts as observed.
- (e) Make a general comment on your observation.

2. BACTERIA

- (a) Draw a typical structure of a bacteria.
- (b) Label parts of a typical bacteria.
- (c) Why can't we study bacteria here at this college.?
- (d) Read and take notes on what bacteria are.

3. FUNGI

- (a) What are fungi?
- (b) Draw a mushroom .
- (c) What does it consist of?
- (d) What colour are they?
- (e) Do they make their own food?
- (f) So, how do you think they survive?
- (g) Fungi can be both saprophytic and parasitic. define the words saprophyte and parasite.
- (h) Give some examples of fungi that are parasitic.

4. BRYOPHYTES

- (a) Where do mosses grow?
- (b) Pull some out and study them.
- (c) Comment on your observation.
- (d) How do bryophytes reproduce?

5. LICHENS

- (a) What are lichens?
- (b) Where do they grow

- (c) One of them is a producer and the other is a consumer. Which is which?
- (d) Why do you think they are always found together?

6. TRACHEOPHYTES

What are tracheophytes?

6a PTERIDOPHYTES

- (a) What are pteridophytes?
- (b) Give some examples.
- (c) Where do they grow most?
- (d) Draw a nest fern sometimes known as the staghorn (*Platycerium bifurcatum*).
- (e) Generally speaking reproduction is by spores. Where did you observe the spores on this group of plants?
- (f) Collect some spores. Feel them and make your comment.
- (g) Study them under the microscope draw what you saw and comments on their features.
- (h) From reading the library books how do these group of plants reproduce?

6b SPERMATOPHYTES

What are spermatophytes?

6c GYMNOSPERMS

- (a) What are gymnosperms?
- (b) Give some examples.
- (c) How do they reproduce?
- (d) What kind of pollination takes place?
- (e) Explain how gymnosperms differ from the rest of the non-flowering plants.

Project Example 3. The life cycles of the common insects

Create a 'Big Book' to report and present your research about the life cycles of common insects. The big book is to become a teaching aid for Primary classes.

Guidelines

1. In groups of four, buy a C4 drawing book and make it into your "Big Book" to use for the report on the life cycle of insects.
2. On the very front page of the big book you will have the title in fancy writing, however when your book is open to the next two pages the one on the left will be used only for drawings while the right side will be used for describing what is on the left page (i.e., the drawing)
3. Use colours in the drawings.
4. Drawings must be in pencil and be large.
5. Writing must be large and should not show on the other page.
6. All draft work must be shown to the lecturer before it is transferred into your big book.
7. Marks will also be given according to how your work is set up using the required format.

Guidelines for page setup:

1. Draw different types of insects. Name them and describe the insects under the following points:
 - body parts
 - habitats
 - food assimilation
2. Draw the three (3) different types of insect's life cycles. These are:
 - incomplete metamorphosis
 - complete metamorphosis
 - no change (e.g. silver fish)
3. Describe a life cycle in general terms and define metamorphosis in terms of complete and incomplete.
4. Draw an insect that undergoes incomplete metamorphosis. Name the stages.
5. Draw an insect that undergoes complete metamorphosis. Name the stages.
6. Draw a silverfish life cycle. How is a silverfish life cycle is different from the incomplete and complete metamorphosis?

7. Draw these: larvae, a maggot, a grub, a caterpillar, a wriggler and a nymph. Write on the description pages "THE LARVAE STAGE". State what a larva is. Write "There are different types of larvae. They can be called maggots, grubs, caterpillars, wrigglers, or nymphs depending on what characteristics they have."
8. Draw a maggot. Describe the characteristics of a maggot. Write, "Maggots grow to become insects like"
9. Draw a grub. Describe the characteristics of a grub. Write, "Grubs grow to become insects like"
10. Draw a caterpillar. Describe the characteristics of a caterpillar. Write, "Caterpillars grow to become insects like"
11. Draw a wriggler. Describe the characteristics of a wriggler. Write, "Wrigglers grow to become"
12. Draw a nymph. Describe the characteristics of a nymph. Write "Nymphs grow to become insects like"
13. Draw a chrysalis (pupa) of a butterfly and a pupa of a mosquito, a grasshopper moulting its skin, caterpillar, a butterfly coming out of its chrysalis and exposing its wings to the sun and a grasshopper regenerating one of its legs over the two (2) pages.
14. Write the heading: INTERESTING CHARACTERISTICS OF INSECTS and under each drawing write these respectively:
 - Inactive phase, moulting, rapid period of growth, sun strengthening wings and regeneration.
15. Draw insects that are pests. Describe what pests are.
16. Draw things that can be used to control the spread of pests on the two (2) pages. Write the heading: "SOME CONTROL MEASURES"
17. Draw things that can be used to control the spread of mosquitoes. Write MOSQUITOES then below it write:

The spread of mosquitoes can be controlled using the following methods:

18. Draw things that can be used to control the spread of weevils in bags of flour and rice. Write WEEVILS then below write:

The spread of weevils can be controlled using the following methods:

19. Draw things that can be used to control the spread of flies. Write FLIES then below write:

The spread of flies can be controlled using the following methods:

20. Draw things that can be used to control the spread of termites. Write

The spread of termites can be controlled using the following methods:

TERMITES then below write:

21. Draw chemicals, which are used to control insect pests and put a red cross across the page. Write the heading as HAZARDOUS/DANGEROUS CHEMICALS then below write:

When you have finished writing your reasons, write below: Biological control is the best way to approach your pest insects because it uses **no**

Chemicals should not be used to control pest insects because of the following reasons:

chemicals and is safe in us and the environment.

Checkup

- Spot the seven characteristics of living things and describe each one of them.

R	E	S	P	I	R	A	T	I	O	N	A	C	G
E	X	B	D	F	J	L	O	R	U	S	P	M	K
P	C	E	H	I	N	Q	T	F	V	X	O	Y	W
R	R	Z	A	E	G	F	C	E	H	I	J	D	B
O	E	G	R	O	W	T	H	E	A	I	C	D	K
D	T	N	O	Q	R	A	C	D	D	A	C	Q	A
U	I	R	R	I	T	A	B	I	L	I	T	Y	A
C	O	N	A	C	Q	T	U	N	F	D	B	E	C
T	N	P	V	X	Z	E	C	G	H	J	N	N	G
I	A	R	W	Y	A	F	D	I	H	K	M	O	I
O	M	O	V	E	M	E	N	T	A	N	P	R	O
N	B	D	F	C	G	E	I	H	K	M	J	Q	L

2. Here are some words related to plants and animals, use them to fill in the missing information.

Invertebrate, plants, monocotyledons, shoot, root dicotyledon, vertebrate, fish, reptile, amphibian, birds, mammals, flowering, echinoderm, forest, unicellular, photosynthesis, insect, monocotyledons, annelids, dicotyledons, arachnids, producers

Plants

_____ are living things that are usually green and can make food by the process of _____. The plants are known as the _____ because they produce food for themselves and for other organisms in the food chain or food web. Plants are made up of two main parts, the portion above the ground called the _____ and the portion below the ground called _____. Plants can be _____ or non-flowering plants.

Fern, moss, and liverworts are examples of _____ plant. Flowering plants with one cotyledon in the seeds, have leaves with parallel vein, flower parts in threes are called _____ while the plants that have two seed eaves in their seeds, with a net work of vein and flower parts in four or five are called _____. Large areas of land where there are trees are called _____.

Animals

Animals can be unicellular or multicellular. Bacteria, amoeba and paramecium are _____ animals.

Animals without backbone are called _____ whilst the animals with backbone are _____. Here are some examples of invertebrates:

- _____ is the group of invertebrate with hard shell and several pair of legs on each body.
- Sea urchin, star fish and sea cucumber are examples of _____
- Bees, ants, flies, beetles, cockroaches and grasshoppers are examples _____
- _____ are invertebrates such as earth worm and leeches that their bodies divided in to segments.
- _____ are invertebrates that have eight jointed legs,

The vertebrates are further divided in to five classes:

- a. _____ cold blooded vertebrates with scales and fins and breathe through lungs
- b. _____ cold-blooded vertebrate with scales but no fin, lay soft-shelled eggs, breathe through lungs.
- c. _____ cold blooded vertebrate with smooth skin, lay soft eggs in water, young live in the water and breathe through gills and the adults breathe through lungs.
- d. _____ warm-blooded vertebrates with feathers that lay eggs with hard shells, and breathe through lungs and most can fly.
- e. _____ are warm-blooded mammals that have fur or hair, look after young and feed them with milk.

Appendix 1 Classification of plants (flora)

Plants can be divided into different biological groups depending on their similarities and differences.

Table 3. Major plant division key

	General Characteristics	Group
1a	Reproduce by spores; no seeds, cones or flowers	FERN & FERN - ALLIES (ferns)
1b	Reproduce by seeds which arise in cones or flowers	Go to 2
2a	Seeds produced in cones, leaves usually needle-like	Class GYMNOSPERMAE (Gymnosperm)
2b	Seeds developed from flowers, leaves usually broad,	Class ANGIOSPERMAE (Angiosperm) Go to 3
3a	Seeds with one cotyledon, leaves usually parallel-veined, flower parts in threes, vascular bundles in stem scattered.	Subclass MONOCOTYLEDONSAE (Monocots)
3b	Seeds with two cotyledons, leaves usually net-veined, flower parts in fours or fives, vascular bundles in stem in circle or form a solid ring.	Subclass DICOTYLEDONSAE (Dicots)

Table 4. Major plant phyla key

	General Characteristics	Division
1a	With true roots, stems and leaves.	TRACEOPHYTA (vascular plants)
1b	No true roots, stems or leaves	Go to 2
2a	With small leaf-like structures and root-like structures which are very fine and hair-like (rhizoids). Visible to naked eye.	BRYOPHYTA (Mosses and leafy liverworts)
2b	No small root-like structures. Leaf-like structures may be present.	Go to 3
3a	Not green or greenish in colour	Go to 4
3b	Green or greenish in colour	Go to 6
4a	Single cell, microscopic, yellowish-brown or gold in colour, some with glassy wall, aquatic.	CHRYSOPHYTHA (Golden- brown algae: diatoms)
4b	Multicellular, usually macroscopic, sometimes very large.	Go to 5
5a	Red seaweed, sometimes greenish-red in colour.	RHODOPHYTA (Red algae)
5b	Brown seaweeds, sometimes greenish or golden brown in colour. May have leaf like structures and hold fasts. Close examinations reveal no veins.	PHAEOPHYTA (Brown algae)
6a	Terrestrial	Go to 7
6b	Aquatic	Go to 8
7a	Green in colour, usually in sheltered wet situation.	BRYOPHYTA (thallus-like liverworts)
7b	Grey-green or bluish green, usually on exposed rock or old wood	LICHEN (Not a plant but consists of a fungus and either an algae or blue-green algae)
8a	Green pigment only present, unicellular or microscopic.	CHLOROPHYTA
8b	Pigment other than green also present.	Go to 9
9a	Microscopic with minute cells, grey-green or blue-green.	BLUE GREEN ALGAE (not a plant same kingdom as bacteria)
9b	Macroscopic	Go to 10
10a	Greenish-red pigmentation.	RHODOPHYTA
10b	Greenish-brown pigmentation.	PHAEOPHYTA

Appendix 2 Classification of animals (fauna)

Table 5. Classification of animals into major phyla

	General Characteristics	Phylum
1a	Single cells, colonies, microscopic	Protozoa
1b	Multicellular, usually microscopic	Go to 2
2a	Symmetry, radial or irregular	Go to 3
2b	Symmetry, bilateral	Go to 6
3a	Body generally irregular and perforated by pores	Go to 4
3b	Body without pores	Go to 5
4a	Body soft	Porifera (sponges)
4b	Body hard	Coelenterata (corals)
5a	Body soft and sack-like	Coelenterata (jellyfish)
5b	Body spiny, 5 - parted	Echinodermata (starfish)
6a	Body segmented	Go to 9
6b	Body non-segmented	Go to 7
7a	Body leaf-like, thin and flat	Platyhelminthes (Flatworms)
7b	Body not flat	Go to 8
8a	Body spindle shape	Nematoda (round worm)
8b	Body soft usually with a shell	Mollusca (snail)
9a	Body worm-like in the adult	Go to 10
9b	Body not worm-like	Go to 11
10a	Body flat, parasites	Platyhelminthes (Tape worms)
10b	Body round, paired appendages; if present not jointed.	Annelids (Segmented worms)
11a	Skeleton external, 1 or 2 pairs of jointed appendages per segment	Arthropoda (insects, crabs) Go to the class key
11b	Skeleton internal, 2 pairs of jointed appendages only	Chordata Go to the class key

Table 6. Classification of the Phylum Chordata

General Characteristics		
1a	Locomotory appendages are present as some form of fins; respiration is accomplished by means of pharyngeal gills; skin is covered with scales subclass	Pisces
1b	Not as 1a	Go to 2
2a	Body is naked not covered with plates, scales, feathers or hair; digits are not provided with claws or nails, skin is usually soft and slimy - cold blooded	Amphibia
2b	Skin is covered with scales, feathers, or hair	Go to 3
3a	Body is naked with plates or scales or both; digits end with variously developed claws, locomotory appendages present or absent, paired when present, cold blooded	Reptilia
3b	Body covered with feathers or hair; warm blooded	Go to 4
4a	Body covered with feathers and scales; warm blooded	Birds
4b	Body is wholly, partly, provided with hairs; mammary glands present	Mammal

Table 7. Classification of the Phylum Arthropoda

General Characteristics		
1a	Antennae present	Go to 2
1b	Antennae absent, body generally consists of cephalothorax and abdomen, cephalothorax usually bears 6 pairs of appendages	Arachnida
2a	Two pairs of antennae are present, gills are present, gills are present as organs of respiration, usually at least 5 pairs of legs, and body is usually segmented.	Crustacea
2b	One pair of antennae present.	Go to 3
3a	Three pairs of well-developed segmented legs are, usually have wings, but maybe absent, body is divided into head, thorax and abdomen	Insecta
3b	More than three pairs of walking legs.	Go to 4
4a	Majority of the body segments having two pairs of legs per segment.	Diplopoda
4b	Only one pair of leg to a body segment, last segment of the leg has a single claw	Chilopoda