



## Biodiversity Up Close

An audit of biodiversity in bushland areas

LandLearn  
Department of Primary Industries

Published by: Department of Primary Industries  
LandLearn

© The State of Victoria, 2008

This publication is copyright. The material in this booklet may only be reproduced for educational purposes without prior permission. Due acknowledgement should be given to LandLearn, Department of Primary Industries. Copyright in the photographs remains with the photographers unless otherwise stated. Where copyright of the material does not sit with Department of Primary Industries every effort is made to acknowledge appropriately the sources of the text and images.

ISBN 978-1-74217-082-4

LandLearn is a registered trademark. For more information or additional curriculum support please contact: [landlearn.program@dpi.vic.gov.au](mailto:landlearn.program@dpi.vic.gov.au)

### **Disclaimer**

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purpose and therefore disclaims all liability for any error, loss or other consequences, which may rise from you relying on any information in this publication.

At the time of writing, the Internet addresses appearing in this book were correct. Owing to the dynamic nature of the Internet, however, we cannot guarantee that all of these addresses will remain intact.

***For more information about DPI visit the website at [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au) call the Customer Service Centre on 136 186.***



## A Sustainability Education program of the Department of Primary Industries.

This booklet was compiled by Kathryn Goyen, Professional Development Coordinator, LandLearn, (2008).

Supported by LandLearn staff: Sheree Burke, Hayley Broecker, Lydia Fehring, Sherin Halliday, Jim Mead, Kylie Tuhan and Heather Wildes.

### LandLearn aims to:

- Engage students in active, experiential learning which can include on-going participation in community environmental management projects
- Encourage and support the incorporation of studies about sustainable agriculture and natural resources management into schools' curricula
- Provide support for teachers and school communities through professional development, current learning and teaching resources and student activities that make learning fun
- Promote partnerships between schools and community groups, such as Landcare, and between urban and rural school communities.

### Key messages

Caring for our land and its resources is a shared responsibility. Learning and action now is an investment in a future with:

- A sustainable environment
- Quality food and natural fibres produced by farmers using responsible practices
- Viable rural and regional communities
- Challenging, valued and purposeful careers and employment in agriculture-based industries.

### Support for schools

Visit the LandLearn website: [www.landlearn.net.au](http://www.landlearn.net.au)

As a provider of curriculum resources and support, LandLearn works in the context of a holistic, integrated approach to environment education. Schools can adapt the learning activities and teaching resources to suit their particular curriculum structure, pedagogical approach and learning themes. Sustainability and the environment, including sustainable agriculture as the source of food and natural fibre, can provide an integrating framework for the implementation of the *Victorian Essential Learning Standards*.

Principals, Curriculum and Professional Development Coordinators and teachers are invited to contact LandLearn to discuss the support LandLearn offers to schools, including professional development and fieldwork. Themes we can assist with include sustainable agriculture as the source of food and natural fibre, school gardens (especially edible ones) as learning environments, landcare, natural resource management, biodiversity in a range of landscapes, all underpinned by the principles of sustainability education.

LandLearn teaching and learning resources aim to support transformative learning that will empower students to take responsibility for their actions and for behaviour change to contribute to a sustainable future. The resources include activities to encourage students as individuals, and whole school communities to participate in local community action and projects to support relevant local and regional management plans.

Email: [landlearn.program@dpi.vic.gov.au](mailto:landlearn.program@dpi.vic.gov.au)

## Table of contents

	Page Number
<b>Introduction</b>	<b>4</b>
<i>Victorian Essential Learning Standards Curriculum Connections</i>	4
Teacher Background Information	10
How to use the Biodiversity Up Close Audit Tool	12
<b>Part 1: Identifying the Study Site</b>	<b>13</b>
Obtaining an Aerial Photograph	14
Determining the Size of the Study Area	15
Determining the Vegetation Class/Habitat Type	16
<b>Activity 1: Introducing Biodiversity and the Audit Tool</b>	<b>17</b>
<b>Part 2: Habitat Quality Assessment</b>	<b>19</b>
<b>Teacher Notes: Habitat Quality Assessment</b>	<b>20</b>
<b>Activity 2: Number of Large Trees</b>	<b>21</b>
<b>Activity 3: Canopy Cover</b>	<b>23</b>
<b>Activity 4: Understorey</b>	<b>25</b>
<b>Activity 5: Weediness</b>	<b>27</b>
<b>Activity 6: Recruitment</b>	<b>29</b>
<b>Activity 7: Organic Litter</b>	<b>31</b>
<b>Activity 8: Logs</b>	<b>33</b>
<b>Activity 9: Surrounding Vegetation</b>	<b>35</b>
<b>Part 3: Flora and Fauna Diversity Assessment</b>	<b>37</b>
<b>Activity 10: Monitoring Flora Species</b>	<b>38</b>
<b>Activity 11: Monitoring Fauna Species</b>	<b>40</b>
<b>Part 4: Action Plan for Biodiversity</b>	<b>43</b>
<b>Activity 12: Action Plan for Biodiversity</b>	<b>44</b>
<b>Student Worksheets</b>	<b>46</b>
<b>Glossary and Biodiversity Resources</b>	<b>63</b>

### Acknowledgements

LandLearn would like to thank the following people for their contributions, collaboration and feedback: Anthony Mann and Simon Woodland (Shire of Yarra Ranges), Guy Pritchard and Hilary Tabrett (Zoos Victoria), Kylie Robertson (SEEDS), Cara Horner and Lorna Pettifer (CERES), Jess Bailey (Greening Australia), Steve Clancy, Val Stajsic, Frank Udovicic and Sharon Willoughby (Royal Botanic Gardens Melbourne), Neil McLeod (Department of Primary Industries), Karen Brown (Toolangi Forest Education), Ed Williams and students of Healesville High School, Anna Schluse and students of St Francis Xavier College (East Ballarat).

## Victorian Essential Learning Standards Curriculum Connections for Biodiversity Up Close

Strand	Physical, Personal and Social Learning				Discipline-based Learning								Inter-disciplinary Learning			
	Health and Physical Education	Interpersonal Development	Personal Learning	Civics and Citizenship	The Arts	English	Humanities – Economics	Humanities – Geography	Humanities – History	LOTE	Mathematics	Science	Communication	Design, Creativity and Technology	Information and Communications Technology	Thinking Processes
<b>Domain</b>																
<b>Activity 1:</b> Introducing Biodiversity and the Audit Tool				3								3				3
<b>Activity 2:</b> Number of Large Trees		3 4 5						3 4 5			3 4 5	3 4 5				
<b>Activity 3:</b> Canopy Cover		3 4 5						3 4 5				3 4 5				
<b>Activity 4:</b> Understorey		3 4 5						3 4 5				3 4 5				
<b>Activity 5:</b> Weediness		3 4 5						3 4 5				3 4 5				
<b>Activity 6:</b> Recruitment		3 4 5						3 4 5			4 5	3 4 5				
<b>Activity 7:</b> Organic Litter		3 4 5						3 4 5				3 4 5				
<b>Activity 8:</b> Logs and Rocks		3 4 5						3 4 5			3 4 5	3 4 5				
<b>Activity 9:</b> Surrounding Vegetation		3 4 5						3 4 5 6			3 4 5	3 4				
<b>Activity 10:</b> Monitoring Flora Species						3						3 4 5				
<b>Activity 11:</b> Monitoring Fauna Species		3 4 5										3 4 5 6				
<b>Activity 12:</b> Action Plan for Biodiversity		3 4 5		3 5 6				4 5 6				3 4 5 6				3 4

The most applicable domains for each activity are indicated by the levels.

## *Victorian Essential Learning Standards*

Use of the learning and teaching activities in Biodiversity Up Close may contribute to achievement of the *Victorian Essential Learning Standards*. Indications of relevant Domains and Levels are provided to assist teachers to make decisions about the appropriateness of these activities for their students.

The following tables indicate the elements of each standard that are addressed by activities for levels 3 - 6. Teachers may adapt these activities to address standards at other levels. Relevant activities are represented by activity number.

**Activity 1:** Introducing Biodiversity and the Audit Tool

**Activity 2:** Number of Large Trees

**Activity 3:** Canopy Cover

**Activity 4:** Understorey

**Activity 5:** Weediness

**Activity 6:** Recruitment

**Activity 7:** Organic Litter

**Activity 8:** Logs and Rocks

**Activity 9:** Surrounding Vegetation

**Activity 10:** Monitoring Flora Species

**Activity 11:** Monitoring Fauna Species

**Activity 12:** Action Plan for Biodiversity

*Please note:* Interpersonal Development (Working in Teams) Standards will only be achieved if students work through the activities in small groups, reflect on individual and team outcomes and make recommendations to improve their own and the team's performance.



## Standards addressed at Level 3

Strand	Domain	Dimension	Element of standard Students:	Activity number
Physical, Personal and Social Learning	Interpersonal Development	Working in teams	...cooperate with others in teams for agreed purposes, taking roles and following guidelines established within the task	2,3,4,5,6,7 8, 9,11,12
	Civics and Citizenship	Civic knowledge and understanding	...explain why protection and care for the natural and built environment is important	1, 12
		Community engagement	...identify a local issue and plan possible actions to achieve a desired outcome ... participate in activities to protect and care for the natural and built environment	12 12
Discipline-based Learning	English	Reading	... interpret the main ideas and purpose of texts. They make inferences from imaginative texts about plot and setting and about characters' qualities, motives and actions	10
	Humanities	Humanities knowledge and understanding	... describe, from direct observation, the human and physical characteristics of their local area	2,3,4,5,6 7,8,9
	Mathematics	Space	...locate and identify places on maps and diagrams	9
		Measurement, chance and data	...estimate and measure length and area using appropriate instruments	2,8,9
	Science	Science knowledge and understanding	...distinguish between biotic and abiotic factors in their environment and describe interactions that occur between them ...describe natural physical and biological conditions, and human influences in the environment, which affect the survival of living things	1 2,3,4,5, 6,7,8,9, 10,11,12
		Science at work	... plan, design, conduct and report collaboratively on experiments related to their questions about living and non-living things and events ... select and use simple measuring equipment, use a range of appropriate methods to record observations, and comment on trends	2,3,4,5, 6,7,8,9, 10,11,12 2,3,4,5, 6,7,8,9, 10,11,12
Interdisciplinary Learning	Thinking Processes	Reasoning, processing and inquiry	...collect and organise ideas from a range of sources to answer their own and others' questions ...provide reasons for their conclusions ...	12 12
		Reflection, evaluation and metacognition	... use appropriate language to explain their thinking ...identify and provide reasons for their point of view, and justify changes in their thinking	1 1

## Standards addressed at Level 4

Strand	Domain	Dimension	Element of standard Students:	Activity number
Physical, Personal and Social Learning	Interpersonal Development	Working in teams	...work effectively in different teams and take on a variety of roles to complete tasks of varying length and complexity	2,3,4,5, 6,7,8,9, 11,12
			...accept responsibility for their role and tasks	2,3,4,5, 6,7,8,9, 11,12
Discipline-based Learning	Humanities (Geography)	Geographic knowledge and understanding	...recommend ways of protecting environmentally sensitive areas in a sustainable way. They provide examples and evidence based on their inquiries  ...use geographic language to identify and describe the human and physical characteristics of local environments depicted by different kinds of maps, diagrams, photographs and satellite images ...	2,3,4, 5,6,7,8, 9,12  9
		Geospatial skills	...identify features from maps, satellite images ...research, collect, record and describe data obtained through field surveys and measurements to form conclusions about the use of resources ...	9 2,3,4,5, 6,7,8,9
	Mathematics	Number	... add, subtract, and multiply fractions and apply these operations in practical contexts	2,6,8,9
		Measurement, chance and data	...use metric units to estimate and measure length and area	2,8,9
	Science	Science at work	...explain how sustainable practices have been developed and/or are applied in their local environment ...design their own simple experiments to collect data and draw conclusions	12 11
			...approach data collection systematically, and analyse data quantitatively ...use a range of simple measuring instruments and materials, and demonstrate understanding of their personal responsibility in using them	2,3,4,5,6 7,8,9,11 2,3,4,5, 6,8,9, 10,11
Interdisciplinary Learning	Thinking Processes	Reasoning, processing and inquiry	...use the information they collect to develop concepts, solve problems or inform decision making	12

## Standards addressed at Level 5

Strand	Domain	Dimension	Element of standard Students:	Activity number
Physical, Personal and Social Learning	Interpersonal Development	Working in teams	...accept responsibility as a team member and work cooperatively to achieve a shared purpose within a realistic timeframe	2,3,4,5, 6,7,8,9, 11,12
	Civics and Citizenship	Community engagement	... participate in school and community events and participate in activities to contribute to environmental sustainability	12
Discipline-based Learning	Humanities (Geography)	Geographic knowledge and understanding	...demonstrate understanding of environmental issues based on inquiry and propose ways of ensuring the sustainability of resources	2,3,4,5, 6,7,8,9, 12
		Geospatial skills	...collect geographical information from satellite images and analyse, evaluated and present it using a range of forms	9
			...construct overlay maps using map conventions of scale, legend, title and north point ...identify and gather geographical information from fieldwork and organise, process and communicate it using a range of written, oral, visual and graphic forms	12 2,3,4,5, 6,7,8, 9,12
	Mathematics	Number	... use technology for arithmetic computations involving several operations on rational numbers of any size ...	2,6,8,9
		Measurement, chance and data	... measure length, area using suitable units for these measurements in context	2,8,9
	Science	Science knowledge and understanding	...explain the relationships, past and present, in living and non-living systems, in particular ecosystems, and human impact on these systems	2,3,4,5, 6,7,8,9, 10,11
			...analyse what is needed for living things to survive, thrive or adapt, now and in the future	2,3,4,5, 6,7,8,9, 10,11,
	Science at work	Science at work	...make systematic observations and interpret recorded data appropriately, according to the aims of the study	2,3,4,5, 6,7,8,9, 10,11,12
...in field work, they demonstrate use of basic sampling procedures			2,3,4,5, 6,7,8,9, 10,11,	

## Standards addressed at Level 6

Strand	Domain	Dimension	Element of standard Students:	Activity number
Physical, Personal and Social Learning	Civics and Citizenship	Community engagement	...develop an action plan which demonstrates their knowledge of an environmental issue and suggest strategies to raise community awareness of it.	12
			... participate in a range of citizenship activities at school and in the local community.	12
Discipline-based Learning	Humanities (Geography)	Geospatial skills	...accurately interpret information on different types of maps and photographs at a range of scales, and use map evidence to support explanations, draw inferences and predict associated outcomes	9
			...collect and collate information gathered from fieldwork observations and present their finding observing geographical presentation conventions	12
	Science	Science knowledge and understanding	...use a specific example to explain the sustainable management of a resource	12
Science at work		...formulate their own hypotheses and plan and conduct investigations in order to prove or disprove them	11	

# Teacher Background Information

## What is Biodiversity?

Victoria's Biodiversity Strategy (1997) states that 'biodiversity, or biological diversity is the variety of all living life-forms including plants, animals and micro-organisms, the genes they all contain, and the ecosystems of which they form a part'.

Biodiversity quite simply includes all living things in an ecosystem (including plants, animals and fungi), different types of ecosystems, and recognises the value of genetic differences. Biodiversity also includes people!

Two other terms that are often used when discussing biodiversity are habitat and ecosystem.

- A *habitat* is the place or type of site where an organism or population naturally occurs.
- An *ecosystem* describes a community of plants and animals, the interactions between these and the physical environment in which they live.



## Why is Biodiversity Important?

The conservation of biodiversity is important for four reasons:

### Ecosystem Processes and Services

Biodiversity drives many of the processes that make life possible by providing a number of ecosystem services. These include: climate regulation, disturbance regulation, gas regulation, water regulation, water supply, erosion control and sediment retention, soil formation, food production, shelter, nutrient cycling, raw materials, waste treatment, pollination, genetic resources, and biological control. For example, as much as 50% of pollination is carried out by native insects that fly to crops from nearby bushland.

### Economics

Biodiversity contributes significantly to the economy in a number of ways. It provides resources for research, tourism and development of foods and medicines. It can also increase agricultural production through the ecosystem services provided. For example, in the meat industry, areas of a farm that are protected by vegetation have a 20-30% higher yield than unprotected areas, worth \$38-66 more per hectare per year.

### Aesthetics and Culture

Biodiversity forms a fundamental part of values such as beauty and tranquillity. Many Australians place a high value on native plants and animals, which contribute to a sense of cultural identity, spiritual enrichment and recreation. For example, painting, photography, bushwalking and camping.

### Ethics

No species or generation has the right to sequester (use up and/or take) Earth's resources solely for its own benefit. For example, by causing the extinction of a species we are taking away the right of future generations to be able to live with those species.

(For more detailed information go to [www.dse.vic.gov.au](http://www.dse.vic.gov.au) Conservation & Environment > Biodiversity > Rural Landscapes > Biodiversity and Agriculture > Native Biodiversity Resource Kit > Factsheet 02. Summary of Native Biodiversity Benefits.)

## Why Measure Biodiversity?

Understanding the quality and extent of biodiversity present in a given area is important for both land managers and the community. To effectively conserve and encourage biodiversity into areas you must first know the quality of what is there in the first place. We hope that this resource will enable you to understand the biodiversity present in a park or reserve close to your school.

## Assessing Biodiversity Across Victoria

Native vegetation communities vary significantly across Victoria due to differences in soil types, climate, elevation and rainfall. As a result it is very difficult to directly compare the quality of these different vegetation communities.

For example within a woodland, the presence of more than 7 large trees per hectare is regarded as acceptable for providing habitat for hollow-dependent wildlife. However, within forest habitats the recommended number of large trees per hectare is 12 to provide habitat for hollow-dependent wildlife.

To address this, Ecological Vegetation Classes (EVCs) are used to describe areas that contain groups of plants of similar structure (eg. height, spacing and crown cover). For each of these EVCs, benchmarks and a rating system have been developed describing poor to excellent ratings for different ecosystem variables. This enables comparisons of biodiversity quality to be made between different ecosystems.

In Victoria approximately 250 EVCs have been identified. Of these, the nine vegetation groups (henceforth referred to as habitats) are:

**Rainforest:** containing broad-leaved forest vegetation with a foliage cover > 70%.

**Forests:** containing trees > 10m in height and with a foliage cover between 30 - 70%.

**Woodlands:** containing trees 10 - 30m in height and a foliage cover < 30% (ie. with widely spaced trees with their crowns not touching).

**Mallee:** dominated by Mallee Eucalypt species generally < 10 m in height.

**Scrubs:** containing vegetation 2 -10 m in height, with < 30% foliage cover.

**Heathlands:** containing vegetation < 2m in height with > 30% foliage cover.

**Shrublands:** containing vegetation < 2m in height with < 30% foliage cover.

**Grasslands:** containing vegetation < 1m in height.

**Wetlands:** containing areas of water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salty.

Determining the EVC, or type of habitat, found in your area is an important part of biodiversity assessment. To determine the EVC of your study area see page 16.

# How to use the Biodiversity Up Close Audit Tool

This assessment tool is designed to support the Resource Smart: Biodiversity Module of the Australian Sustainable Schools Initiative – Victoria (AuSSI Vic) by providing a rigorous and easy to use tool to assess an area of remnant bushland found close to the school. This tool has been adapted from the *Environmental Management in Agriculture Worksheets*. Department of Sustainability and Environment (2005).

It is intended that the Biodiversity Up Close tool will be used a number of times to provide snapshots of the state of biodiversity over time. It is hoped that this will support long term and short term improvements to be made within a bushland area. The tool is divided into four parts:

## **Part 1: Identifying the Study Area**

Obtaining an Aerial Photograph, Determining the Size of the Study Area, Determining the Vegetation Class/Habitat Type, Introducing Biodiversity and the Audit Tool

## **Part 2: Habitat Quality Assessment**

*Teacher Notes and Student Worksheets for each of the nine habitat types to assess:*

Number of Large Trees, Canopy Cover, Understorey, Weediness, Recruitment, Organic Litter, Logs, Surrounding Vegetation.

## **Part 3: Flora and Fauna Diversity Assessment**

Monitoring Flora Species, Monitoring Fauna Species.

## **Part 4: Action Plan for Biodiversity**

Short and long term action planning to enhance biodiversity.

The intention of this tool is to raise awareness of the factors that contribute to high quality habitat and biodiversity in an area.

To use the tool work from Part 1 through to Part 4, completing each section as you go. Teacher notes and student worksheets are provided for each section.

Depending on the Level that your class is at, you may wish to work through each assessment sheet as a class, or split the class into small groups to fill in a number of sheets at the one time and report back to the group. Other activities are suggested that may be used to extend student learning.



Students assessing biodiversity in a Plains Woodland Habitat.

# Part 1:

## Identifying the Study Area



## Obtaining an Aerial Photograph

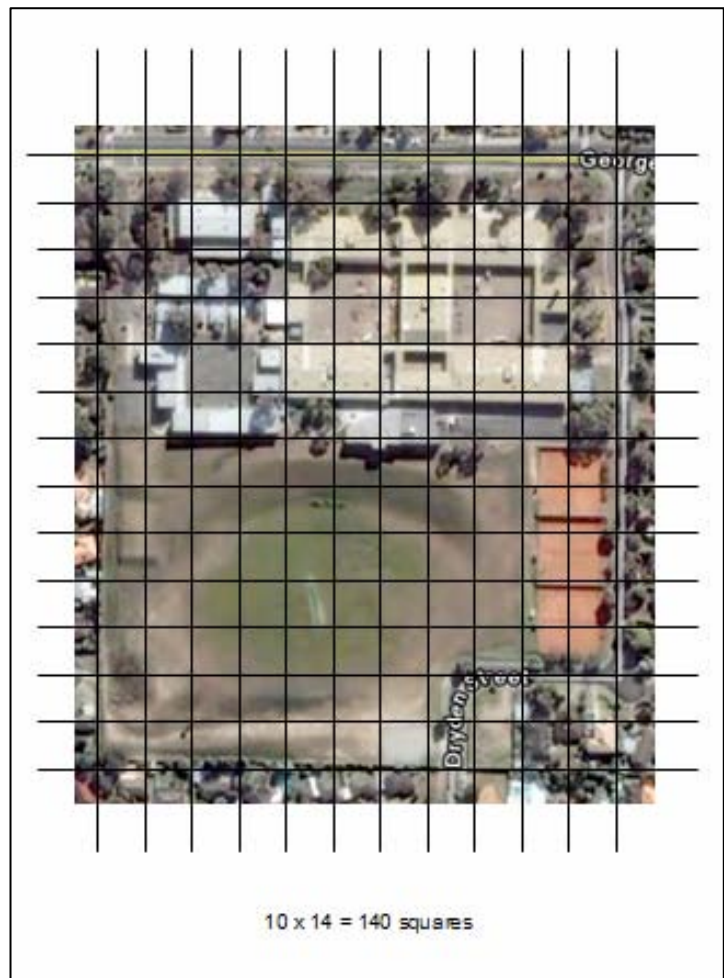
To begin your biodiversity audit, you must first obtain an aerial photograph.

To do this you may be able to use Google Earth.

The Google Earth mapping tool is found at <http://earth.google.com>

1. Enter your suburb in the 'Fly to' search engine.
2. Zoom in on your study area until it fills the frame of the screen, rotate the image so that the boundaries are square with the frame.
3. Click on 'Edit, copy, copy image'. (Copy two images – one close up of the study area and a map showing the land in a 1km radius).
4. Next, paste the images into blank Word Documents – drag the corners of the image to make them fit the size of the page.
5. Finally, determine the area of your study area in  $m^2$  using one of the methods below:

- a. Use Google Earth - Go to 'Tools, Ruler, Line' and change the unit of measurement to 'metres'. Use this 'ruler, line' function to obtain the dimensions of your study area.
- b. Take accurate measurements on the ground with your students using a trundle wheel.
- c. Use a pre-existing map that has a scale to work out the area.





## Determining the Size of the Study Area in Hectares

### 1. Work out the area of your study site in square metres (m<sup>2</sup>).

For a rectangular/square shaped site simply multiply the school boundary length by width.

If your site is an irregular shape, break it up into smaller shapes and calculate the area of each individually and then add them up. (The area of a triangle = base x height ÷ 2).

Eg. To calculate the area of a site which has a length of 100m and a width of 75m:

$$100 \times 75 = 7,500 \text{ m}^2$$

Calculate the area of your study site in m<sup>2</sup> below:

### 2. Convert area from m<sup>2</sup> to hectares (ha).

Knowing the area of your study site in hectares is important as it allows comparisons to be made accurately between sites of differing size.

To calculate the number of hectares, divide the area of the study site by the area of a hectare (1 hectare = 100m x 100m = 10,000 m<sup>2</sup>).

Eg. To calculate the number of hectares in a study site of 7,500 m<sup>2</sup>:

$$7,500 \div 10,000 = 0.75 \text{ hectares (or } \frac{3}{4} \text{ of a hectare).}$$

Calculate the area of your site in hectares (ha)

**Study site area (m<sup>2</sup>)** \_\_\_\_\_ ÷ **10,000** = \_\_\_\_\_ **ha**

## Determining the Ecological Vegetation Class / Habitat Type


Knowing the Ecological Vegetation Class (EVC) in the study area is important. It allows you to accurately understand the types of plants and animals that should be present and the appropriate plants to be planted when undertaking revegetation works. To determine the type of habitat covering your study area currently and in the past (1970's), follow the instructions given below.

**Step 1:** Go to [www.dse.vic.gov.au](http://www.dse.vic.gov.au) > Interactive Maps > Biodiversity Interactive maps. The window pictured will open.



**Step 2:** Click on Find location > Place Name. Enter the suburb of your study area. Click on the school if it is shown or the locality bounded option for the suburb.




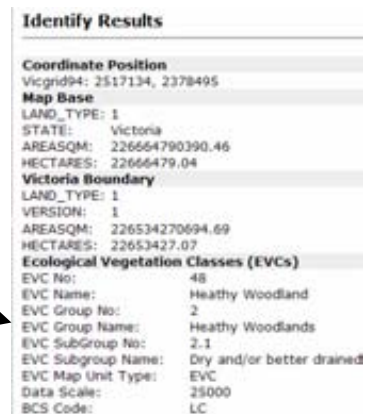
**Step 3:** Use the  icon to zoom in on your study area.

**Step 4:** Click on Layers. Next open the vegetation folder and place a tick in the Ecological Vegetation Classes (EVCs) box. Click Refresh Map.



**Note:** If no colours appear over your study area click on Vegetation and place a tick in the 1750's EVCs box. Click Refresh Map.

**Step 5:** To determine the EVC click on the  icon and then click on the shaded part of the map. An Identify Results page will appear.



**Step 6:** The Vegetation Group or Habitat that you will use for the purposes of this audit is found under the EVC Group Name (eg. Heathy Woodlands = WOODLANDS).

**Step 7:** Use the mail icon  to e-mail a copy of the map to yourself.

## Activity 1: Introducing Biodiversity and the Audit Tool

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

Civics and Citizenship (3)

Science (3)

Thinking Processes (3)

**Duration:** 30 minutes

**Setting:** In the classroom

### Summary

This activity introduces students to the concept of biodiversity and the Biodiversity Up Close audit tool.

### Student outcomes

This activity will enable students to:

- Distinguish between biotic and abiotic things
- Discover diversity of living things in their school ground
- Understand why biodiversity is important.



### Background notes for teachers

Ecosystems consist of both living (biotic) and non-living (abiotic) things. It is the biotic components that make up the biodiversity of an ecosystem.

Biodiversity, or biological diversity can be defined as ‘the variety of all living life-forms including plants, animals and micro-organisms, the genes they all contain, and the ecosystems of which they form a part’. Biodiversity also includes people!

Biodiversity is important because it provides **ecosystem processes and services**, contributes significantly to the **economy**, a sense of **cultural identity**, **spiritual enrichment and recreation**, and for **ethical reasons**. For more information regarding the value of biodiversity refer to the *Teacher Background Information – Why is Biodiversity Important?* on page 10.

### Materials

*Student Worksheet: Why is Biodiversity Important?* (page 47), Coloured pencils

### The activity

This audit tool is designed to allow students to become more observant of their surroundings, understand what species live in the area and what species come and go. In addition it aims to give students an appreciation of the value of biodiversity and why it is important to have understorey, large trees and organic litter in areas to provide food and shelter for animal species.

This simple brainstorming activity introduces students to these concepts by posing two questions:

- ◆ What living and non-living things are found in the school ground?
- ◆ Why are the living things (biodiversity) important?

1. Introduce the activity by discussing that things in the environment can be described as living (biotic) and non living (abiotic). Those that are biotic include plants and animals and can also be called biodiversity.
2. Hand out the *Student Worksheet: Why is Biodiversity Important?* and ask students to draw and write their answers in the spaces provided. As a class share your responses to gain a shared understanding of why the living biodiversity within the environment is important.
3. You may also wish to discuss as a class why it is important to measure biodiversity. (If you know what species are present, you can effectively plan to enhance the biodiversity present, and can record improvements over time.) This activity could be undertaken again after completing the activities to evaluate student learning.

## Discussion questions

- ◆ What is the difference between abiotic and biotic things?
- ◆ What is biodiversity?
- ◆ Why is biodiversity important?
- ◆ Why would scientists and land managers want to understand what types of living things are present in an ecosystem?
- ◆ Did you know that you can study the biodiversity in the school ground and local bushland areas?

## Related LandLearn activities

**Biodiversity in Balance** activity booklet available on *LandLearning CD*. Activities include 'The Brolga story and habitat game', 'Maintaining biodiversity', 'The value of biodiversity in an agricultural landscape' and 'Finding the balance'.

# Part 2:



# Habitat Quality Assessment

## Teacher Notes: Habitat Quality Assessment

The first step when undertaking a habitat quality assessment is to ensure you have the right data collection sheet. This allows you to measure habitat components against suitable benchmarks.

To do this you will need to download the appropriate *Assessment of habitat quality: Self-assessment method* score sheet from: [www.dse.vic.gov.au](http://www.dse.vic.gov.au) > Conservation and Environment > Biodiversity > Rural Landscapes > Biodiversity & Agriculture > Native Biodiversity Resource Kit > EVC Group Score Sheets

Undertaking an assessment of the quality of habitat involves measuring ten different variables:

- ◆ Number of Large Trees
- ◆ Canopy Cover
- ◆ Understorey
- ◆ Weediness
- ◆ Recruitment
- ◆ Organic Litter
- ◆ Logs
- ◆ Size
- ◆ Neighbourhood
- ◆ Core Area

For each variable there are *Student Worksheets* provided on pages 48 - 55 to assist with data collection.

There are a number of ways to undertake the habitat quality assessment component of the audit tool.

**Option 1** - You may wish to measure each component of the tool with your whole class (especially with junior students). In this case completing the habitat quality assessment will take a number of weeks to undertake.

**Option 2** - Break the class into eight groups. Assign each group with a habitat quality type to record.

As some components are quicker to measure than others it is recommended that groups are broken up as follows:

- ◆ Number of Large Trees
- ◆ Canopy Cover
- ◆ Understorey
- ◆ Weediness
- ◆ Organic Litter
- ◆ Logs
- ◆ Surrounding Vegetation (Size, Neighbourhood and Core Area)

As a class explain any new words and discuss the importance of each variable to be measured. You may wish to send students out to collect data at the same time or, have a parent, staff member or an expert from a local Landcare or community group assist groups one at a time to collect data.

Investigations should be written up as scientific studies and calculations made using the *Student Report Sheets* downloadable as a separate file.

## Activity 2: Number of Large Trees

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

### Summary

This activity enables students to identify the habitat value of trees within the study area.

### Student outcomes

This activity will enable students to:

- Count and measure the number of trees in the study area
- Identify trees that provide nesting opportunities for animals
- Understand the importance of habitat trees in ecosystems
- Interpret their results and make recommendations about future actions that can be taken.

### Background notes for teachers

Trees (including those that are dead) are an important component of an ecosystem as they provide food, shelter, and nesting space for many animals. Large trees often provide better habitat as they contain more hollows than small trees, however these hollows can take up to 120 years to form!

Because they are old, large trees are difficult to replace. Nesting boxes provide suitable alternative nesting spaces for birds and animals if there are not any large trees with hollows in your study area.

### Materials

*Student Worksheet: Number of Large Trees* (page 48), Pencil, Calculator, Tape Measure, *Student Report Sheet: Number of Large Trees* (downloadable as a separate file).

### The activity

Walk around the study area and for each tree record if it is:

- native (from Australia) or exotic (introduced from another country)
- dead or alive
- a large tree\*.

To determine if a tree is classified as a 'large tree' measure the circumference of the tree at breast height using the tape measure. Compare this value to the benchmark value given on the *Assessment of habitat quality: Self-assessment method* score sheet for your habitat type.

### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5)

Mathematics (3,4,5)

Science (3,4,5)

**Duration:** 45 minutes

**Setting:** In the classroom and outdoors



**Grey-headed Flying-foxes** are not foxes at all!

They are Australia's largest bat and are important pollinators and seed distributors of many tree species.

Flying Foxes hang upside down or roost in **large trees** during the day and fly off in search of food at night.

If it is greater than the benchmark level it is classified as a large tree. For example in Plains Grassy Woodland trees with CBH > 190cm are 'large trees').

Next, calculate the number of large trees per hectare in the study area.

ie: **Number of large trees per hectare** =  $\frac{\text{number of large trees in the study area}}{\text{number of hectares in the study area}}$

Students should write up their assessment and calculate their results using the *Student Report Sheet: Number of Large Trees*. Results should be entered onto the *Assessment of habitat quality: Self-assessment method* score sheet.

As a class discuss potential actions that your school can do to protect and improve the number of large trees in the study area.

**Suggestions:** *Short term (this year)* and *Long term (next 5 years)*: do not cut down trees unless necessary, plant trees, put up nesting boxes, protect trees from trampling or damage, undertake Landcare activities addressing local land degradation issues such as salinity, erosion, water quality, weeds and insect attack.

### Discussion questions

- ◆ Why do you think that large trees are important?
- ◆ How could more habitat for native wildlife that requires tree hollows be provided?
- ◆ Large trees that contain hollows are difficult to replace because they take so long to grow. What can be done to protect and increase the number of large trees in your local area?

### Related LandLearn activities

**Biodiversity in Bushland, Community and Agricultural Landscapes** activity booklet available on *LandLearn Resource Booklets CD*. Activities include 'Counting trees: size and hollows', 'Forest Storeys' and 'Tree Measurements'.

## Activity 3: Canopy Cover

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the Victorian Essential Learning Standards are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5,6)

Science (3,4,5,6)

**Duration:** 1 hour

**Setting:** Outdoors

### Summary

This activity enables students to measure the quality of the tree canopy cover within a defined area.

### Student outcomes

This activity will enable students to:

- Understand the importance of canopy cover as an indicator of tree health
- Make estimations and take measurements of tree canopy cover
- Interpret their results and make recommendations about future actions that can be taken to improve canopy cover.

### Background notes for teachers

The canopy layer in a forest refers to the highest level of growth (ie. the branches and leaves in the crown of trees). The canopy layer of an ecosystem is important as it provides habitat and protection from predators for birds and small mammals such as sugar gliders and possums. It also provides an organic layer of leaf litter for the forest floor which is broken down into important soil nutrients by microorganisms and helps to retain soil moisture.

Canopy cover describes the proportion of the ground that is shaded when the sun is directly overhead and is a measure of the condition of the trees. If a tree is stressed or sick it will have a lower than average canopy cover.

### Materials

*Student Worksheet: Canopy Cover* (page 49), Digital Camera (optional), Pencil  
*Student Report Sheet: Understorey and Vegetation Structure* (downloadable as a separate file).

### The activity

Discuss with students the importance of tree canopy cover as habitat for animals and as an indicator of tree health.

Use the canopy cover student worksheet to estimate the canopy cover for their area of study.

**REMEMBER:** you should factor in the areas covered by trees and the areas between trees.

Students should enter their estimate into the student worksheet.



Christmas Beetles are beautiful to look at, however when in large numbers can eat all of the leaves off a tree!

Dieback is a term used to describe the death of vegetation and can initially be detected through loss of **canopy cover**. Dieback is caused by things such as insect attack (including from **Christmas Beetles**), salinity, drought, disease, and mistletoe infestations.

Students should write up their assessment and calculate their results using the *Student Report Sheet: Canopy Cover*. Results should be entered onto the *Assessment of habitat quality: Self-assessment method* score sheet.

As a class discuss potential actions that your school can do to improve the canopy cover in your study area.

**Suggestions:** *Short term (this year):* Remove severe infestations of mistletoe, do not cut down trees unless necessary, fence off trees to prevent stock damage (if you have stock at school). If required place guards around trees to protect them from possums.

*Long term (next 5 years):* Plant trees or undertake Landcare activities addressing local land degradation issues such as salinity, erosion, water quality, weeds and insect attack,

### Discussion questions

- ◆ What types of factors could reduce tree canopy cover and how could these impacts be reduced?
- ◆ Why is tree canopy cover important?
- ◆ Was there much variation in the average tree canopy cover for different trees in the study area?
- ◆ Is the canopy cover of the areas being studied healthy?
- ◆ What could be done in the study area to improve the tree canopy cover?

### Related LandLearn activities

**Biodiversity in Bushland, Community and Agricultural Landscapes** activity booklet available on *LandLearn Resource Booklets CD*. Activities include 'Forest Storeys'.

## Activity 4: Understorey and Vegetation Structure

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5)

Science (3,4,5)

**Duration:** 1 hour

**Setting:** In the classroom and outdoors

### Summary

This activity enables students to identify the habitat value of understorey within the study area.

### Student outcomes

This activity will enable students to:

- Understand the importance of understorey in ecosystems
- Collect information from fieldwork
- Interpret their results and make recommendations about future actions that can be taken.

### Background notes for teachers

Vegetation can be classified into 3 separate layers: Overstorey (plants greater than 5m tall); Understorey (plants between 5m – 0.5 m); and the Herb layer (non-woody plants less than 0.5m in height).

The greatest richness of plant species at a site will almost always be found in the understorey and herb layer level of an ecosystem. These plants are important because they provide a food source, shelter and create suitable conditions for larger plants to grow in (eg. shelter, shade and maintenance of soil moisture and nutrients).

Unfortunately, these layers (especially the herb layer) are often the most easily impacted upon by disturbance and are the hardest to re-establish.

### Materials

*Student Worksheet: Understorey* (page 50), Pen, *Student Report Sheet: Understorey and Vegetation Structure* (downloadable as a separate file).

### The activity

Estimate the percentage cover of native understorey in the study area and record this in the *Student Worksheet: Understorey*.

Also record the types of vegetation present in the study area.



The **Chocolate Lily** is a fragile **understorey** plant that smells like chocolate! The beautiful lilac coloured flowers produce a chocolate smell to attract insects to aid in pollination.

Unfortunately this flower does not taste like chocolate!!

Students should write up their assessment and calculate their results using the *Student Report Sheet: Understorey*. Results should be entered onto the *Assessment of habitat quality: Self-assessment method* score sheet.

As a class discuss potential actions that your school can do to protect and improve understorey in your study area.

**Suggestions:** *Short term (this year):* Plant native understorey plants, protect areas planted with understorey plants from trampling and damage.

*Long term (next 5 years):* Set up native plant propagation and a green house within the school to grow your own plants.

### Discussion questions

- ◆ Where you surprised with the results? Why/why not?
- ◆ Why do you think that it is important to have understorey plants in the study area?
- ◆ What types of animals do you think that planting understorey plants would encourage into the area?
- ◆ How do you think you could improve the quality of understorey in the study area?

### Related LandLearn activities

**Biodiversity in Bushland, Community and Agricultural Landscapes** and **Bush Foods & Biodiversity** activity booklets available on *LandLearn Resource Booklets CD*. Activities include 'Forest Storeys' and 'Bushfoods in the school yard'.

## Activity 5: Weediness

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5)

Science (3,4,5)

**Duration:** 1 hour

**Setting:** In the classroom and outdoors

### Summary

This activity enables students to identify environmental weeds in the study area.

### Student outcomes

This activity will enable students to:

- Identify environmental weeds found in the study area
- Understand the impact of environmental weeds in ecosystems
- Interpret their results and make recommendations about future actions that can be taken.

### Background notes for teachers

Weeds are plants that grow in an area where they are not wanted. They are usually exotic species (however can also include native Australian species) and can compete with and limit the growth of indigenous plants. Weeds impact on native insects, birds and animals as they reduce the food source that indigenous plants provide. Weeds also impact on agriculture and the economy, threatening the sustainability of natural ecosystems and agricultural production.

Environmental weeds are plants that threaten natural ecosystems. They can invade native areas and out-compete the plants, resulting in a reduction of plant diversity and loss of habitat for native animals.

Weeds can be carried into an area on animals, wind, water, people, vehicles, machinery or they can escape from gardens. It is important to appropriately dispose of weeds - dumping of garden waste in the bush is also a way in which weeds spread.

### Materials

*Student Worksheet: Weediness* (page 51), Weed identification books or a list of Environmental Weeds found in your local area, Pen, *Student Report Sheet: Weediness* (downloadable as a separate file).

### The activity

Using the weed identification books/lists identify 5-10 environmental weeds for your students to look for in the study area. List these in the student worksheet. Provide students working in the environmental weeds group with photos of weeds to look for.



Spider mites love to eat gorse! In Victoria, gorse is a weed common in the Central Highlands, the Southwest and parts of Gippsland. Approval has been given by the Australian Quarantine and Inspection Service (AQIS) and Environment Australia to release the gorse spider mite for the biological control of gorse.

Your local council may have publications to assist with identifying weed species in your local area, or you could use the excellent web based tool found at: [www.weeds.org.au/weedident.htm](http://www.weeds.org.au/weedident.htm)

Using the student worksheets ask students to record the presence of Environmental Weeds and estimate the percentage cover of these weeds in the study area.

**Note:** Identifying weeds can be difficult. Consider contacting your local council or Landcare group to assist you with this.

Students should write up their assessment and calculate their results using the *Student Report Sheet: Weediness*. Results should be entered onto the *Assessment of habitat quality: Self-assessment method* score sheet.

As a class discuss potential actions that your school can do to reduce the number and impact of environmental weeds in your study area.

**Suggestions:** *Short term (this year):* Identify the environmental weeds in the study area, remove them or take action to ensure they do not spread. Weed control techniques include: hand weeding, slashing/mowing/seed head removal, ringbarking of weedy tree species, laying old carpet or black plastic over weed infested areas for a few weeks or months, burning, or use of herbicides (herbicides are dangerous chemicals and appropriate safety precautions must be taken when using these).

*Long term (next 5 years):* Regularly monitor the study area to ensure that weeds do not start growing accidentally or are planted.

### Discussion questions

- ◆ Were you surprised that some of the plants in the study area were environmental weeds?
- ◆ Why do you think that it is important to control environmental weeds?
- ◆ What can the community do to control or eliminate weeds?

### Related LandLearn activities

**Learning in the Garden** activity booklet available on *LandLearning CD*. Activities include 'The Peter Pan Theory of Seed Dispersal'.

'Natives vs Weeds'. **Downloadable** from [www.landlearn.net.au](http://www.landlearn.net.au) > Curriculum activities > Weeds

## Activity 6: Recruitment

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5)

Mathematics (4,5)

Science (3,4,5)

**Duration:** 1 hour

**Setting:** In the classroom and outdoors

### Summary

This activity enables students to be able to identify, and to understand the importance of, recruitment in bushland areas.

### Student outcomes

This activity will enable students to:

- Understand the importance of recruitment of native species in ecosystems
- Identify when recruitment is occurring through fieldwork activities
- Interpret their results and make recommendations about future actions that can be taken.

### Background notes for teachers

Recruitment describes the introduction of new animals or plants into a population due to reproduction or immigration. Recruitment is an important process as it allows population numbers to remain stable, replacing individuals that die.

### Materials

*Student Worksheet: Recruitment* (page 52), Pen, calculator, *Student Report Sheet: Recruitment* (downloadable as a separate file).

### The activity

Count the number of woody species present in the study area. When measuring recruitment in bushland areas it is important to count only woody species that are taller than low growing shrubs, and to treat all eucalypt species as a single species.

Count the number of woody species that are recruiting in the study area. A woody species is considered to be recruiting when the number of immature plants (ie not flowering or fruiting) of an individual woody species is at least 10% of the total population of that species.

Determine the **percentage recruitment occurring in the study area:**

$$= \frac{\text{number of woody species recruiting}}{\text{number of woody species present}} \times 100$$



The Australian Blackwood is a fast growing Australian native tree that grows up to 45m in height and lives for 15-50 years. The seeds of this tree can survive in the soil for many years before starting to grow, often after exposure to heat (eg. bushfires).

Students should write up their assessment and calculate their results using the *Student Report Sheet: Recruitment*. Results should be entered onto the *Assessment of habitat quality: Self-assessment method* score sheet.

As a class discuss potential actions that your school can do to encourage recruitment in your study area.

**Suggestions:** *Short term (this year) and Long term (next 5 years):* Remove weeds, fence off areas from trampling by stock or humans.

### Discussion questions

- ◆ Why do you think recruitment is important?
- ◆ What are the different ways in which recruitment of plant species can occur?
- ◆ Were you surprised by the extent of recruitment occurring?
- ◆ What do you think your school can do to encourage recruitment in the study area?

## Activity 7: Organic Litter

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5)

Science (3,4,5)

**Duration:** 1 hour

**Setting:** In the classroom and outdoors

### Summary

This activity enables students to understand the habitat value of organic litter within the study area.

### Student outcomes

This activity will enable students to:

- Understand the importance of organic litter in ecosystems
- Collect information from fieldwork
- Interpret their results and make recommendations about future actions that can be taken in the study area.

### Background notes for teachers

Organic litter is defined as materials that are no longer attached to a plant and have fallen to the ground. This includes things such as fallen leaves, twigs, tanbark, mulch and small branches less than 30cm circumference.

Organic litter is important because it provides habitat and a food source for many creatures such as insects, spiders and small reptiles. It also breaks down to provide soil nutrients, influences the soil microclimate (ie. the temperature, moisture level, structure and composition) and influences which plants can grow where (recruitment).

### Materials

*Student Worksheet: Organic Litter* (page 53), *Student Report Sheet: Organic Litter* (downloadable as a separate file).

### The activity

Walk around the study site and estimate the percentage cover of organic litter found in the study area and record this on the *Student Worksheet: Organic Litter*.

Students should write up their assessment and calculate their results using the *Student Report Sheet: Organic Litter*. Results should be entered onto the *Assessment of habitat quality: Self-assessment method* score sheet.

As a class discuss potential actions that your school can do to increase the organic litter in your study area.



Slaters look like mini armadillos!

They like to live in dark and moist environments such as leaf litter, compost heaps, under rocks and logs.

They eat decaying vegetable matter and fungi, turning it into rich soil nutrients.

**Suggestions:** *Short term (this year) and Long term (next 5 years): Avoid excess tidying of remnant vegetation areas and retain all organic litter for habitat, maintain the health of trees by undertaking Landcare activities addressing local land degradation issues such as salinity, erosion, water quality, weeds and insect attack.*

## Discussion questions

- ◆ Why do you think organic litter is important?
- ◆ Organic litter is made up of a range of different materials – what types of things were found in the organic litter in the study area (eg. leaves, twigs, tanbark, mulch)
- ◆ Was there any variation in the quality of organic litter found in the study area?
- ◆ How could the organic litter cover be improved in the study area?

## Related LandLearn activities

**Biodiversity in Balance** activity booklet available on *LandLearning CD*. Activities include 'Birds and insects as indicators of biodiversity'. (Compare the diversity of insect species found in leaf litter/tanbark areas with concrete or grassy areas.)

## Activity 8: Logs

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

### Summary

This activity enables students to discover the importance of logs and rocks as habitat within the study area.

### Student outcomes

This activity will enable students to:

- Understand the importance of logs in ecosystems
- Record the number and length of logs in the study area
- Interpret their results and make recommendations about future actions that can be taken.

### Background notes for teachers

Logs, whether small, large or rotting provide perfect shelter and nesting places for a range of different animals including echidnas, reptiles, spiders and insects. Logs also provide a food source for insect eating birds that forage around fallen logs and are an important habitat for frogs as they retain moisture.

Unfortunately, people often remove fallen logs from their property or from bush for firewood – reducing the amount of habitat available for these species.

### Materials

*Student Worksheet: Logs* (page 54), Pen, Tape Measure, *Student Report Sheet: Logs* (downloadable as a separate file).

### The activity

Walk around the study area and record on the student worksheet the number of logs present and their length. Logs include stumps, fallen trees or branches that have a circumference of at least 30cm (approximately the size of an adult's ankle) or a diameter of at least 10cm.

Students should disturb the logs as little as possible and take care of spiders and snakes.

Calculate the length of logs in 1 ha:

The **length of logs per hectare** =  $\frac{\text{total length of logs in the study area}}{\text{number of hectares in the study area}}$

### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5)

Mathematics (3,4,5)

Science (3,4,5)

**Duration:** 20 minutes

**Setting:** In the classroom and outdoors



Echidnas look scary but are actually scared – e – cats! They prefer to hide in hollow logs or curl up in a ball than to fight a predator. Echidnas, also known as 'spiny ant eaters' love to eat termites that are also found in logs.

Termites are like little soil engineers. They munch on rotting logs, assisting them to break down into rich soil nutrients and sculpt hollows in logs as they feed.

Students should write up their assessment and calculate their results using the *Student Report Sheet: Logs*. Results should be entered onto the *Assessment of habitat quality: Self-assessment method* score sheet.

As a class discuss potential actions that your school can do to increase the number of logs in your study area.

**Suggestions:** *Short term (this year) and Long term (next 5 years):* Do not collect firewood from the area and place signs up explaining why, avoid excess tidying and introduce logs to the area (do not collect logs from other bushland areas, use logs that have fallen in gardens at school or at home).

## Discussion questions

- ◆ Were you surprised with the results?
- ◆ Why do you think that logs are removed from areas? Are there alternatives?
- ◆ Which species do you think would benefit from logs being present in your study area?
- ◆ What could your school and local community do to improve the number of logs found in bushland areas and to provide habitat for native wildlife?

## Related LandLearn activities

**Biodiversity in Bushland, Community and Agricultural Landscapes** activity booklet available on *LandLearn Resource Booklets CD*. Activities include 'Role play – firewood collection'.

## Activity 9: Surrounding Vegetation

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5,6)

Mathematics (3,4,5)

Science (3,4)

**Duration:** 20 minutes

**Setting:** In the classroom and outdoors

### Summary

This activity enables students to understand how the biodiversity in the landscape surrounding their study area influences, and is influenced, by the biodiversity in the study area.

### Student outcomes

This activity will enable students to:

- Discover the importance of their study area for biodiversity within the surrounding landscape
- Interpret their results and make recommendations about future actions that can be taken.

### Background notes for teachers

Fragmentation is the process of continuous habitat being broken into smaller pieces. The clearing of land for housing and farmland has resulted in isolated pockets of native vegetation occurring across much of the Victorian landscape. When these patches become cut-off from other areas many plant and animal species become isolated, resulting in biodiversity decline and local extinction of sensitive species.

However, if these pockets are *large* and *connected* or close to one another, the impact of this isolation is reduced. *Larger patches* of vegetation are valuable because they can support a greater diversity of habitats and therefore species, and larger populations of wildlife species.

*Corridors and stepping stones* (connections) between patches are important as this allows species to move from one patch to another with reduced risk of predation in search of food, shelter or breeding partners. For example, Squirrel Gliders need patches of vegetation to be less than 50m apart to enable their movement from tree to tree through the landscape.

Another issue to consider is the core area of vegetation patches (ie. their size, shape and the impact of edges). Where one habitat type (eg. bushland) meets another type (eg. paddocks) there is a habitat edge. Species living in these habitat edges are often affected by increased light penetration, salt-laden winds, increased rates of predation, competition, weed invasion, noise, and adjacent land use including chemical spray drift and soil disturbance. To reduce the effect of these edges on biodiversity it is therefore important to have patches that have a large internal area.



Look! Is it a bird? Is it a plane? No, it's a **Squirrel Glider!** They can glide for more than 50m in one movement, however their populations are threatened by clearing of vegetation which impacts on their movement through the landscape. **Wildlife corridors** are very important for this species.

## Materials

*Student Worksheet: Surrounding Vegetation* (page 55), Aerial maps of the study area showing surrounding 1km, Coloured Pencils, *Student Report Sheet: Surrounding Vegetation* (downloadable as a separate file). **Extension activity** (Scissors, Paper towel, Eye dropper, Water)

## The activity

Discuss as a class the importance of remnant bushland areas being large and close to other patches of native vegetation. Undertake the following assessments:

**Size** - Determine the size in hectares of the area being assessed and any adjoining native vegetation.

**Neighbourhood** - Defined by the percentage area covered by native vegetation within 1km of the centre point of the site being assessed (including wetlands, lakes, estuaries and rivers in the 'percentage of native vegetation').

Draw a grid over the aerial map (showing a 1km area surrounding the study area). Shade in the native vegetation areas on the map.

Percentage area covered by native vegetation =  $\frac{\text{number of boxes shaded in}}{\text{total number of boxes in the grid}} \times 100$

**Core Area** - Defined by the distance of the site being assessed from a block of native vegetation greater than 50ha (if the site is part of a remnant patch greater than 50 ha, the distance to core area is scored as 1).

Students should write up their assessment and calculate their results using the *Student Report Sheet: Surrounding Vegetation*. Results should be entered onto the *Assessment of habitat quality: Self-assessment method* score sheet.

## Discussion questions

How could revegetation activities act as a stepping stone between patches or increase the size of other patches of vegetation?

## Extension activity

Demonstrate to the class the importance of having large patches to reduce edge effects.

- Cut a piece of paper towel into three different shapes with the same area.
- Drop water around the edges of the paper towel. Observe and record the area of each shape that becomes wet. (These wet areas represent habitat impacted by edge effects such as increased light penetration, increased rates of predation or competition, weed invasion, noise, and adjacent land use including chemical spray drift and soil disturbance.)
- Discuss as a class why it is important to have large patches to reduce edge effects such as predation and weed invasions.

$$1\text{ cm} \times 9\text{ cm} = 9\text{ cm}^2$$

$$3\text{ cm} \times 3\text{ cm} = 9\text{ cm}^2$$

$$2\text{ cm} \times 4.5\text{ cm} = 9\text{ cm}^2$$

## Related LandLearn activities

**Biodiversity in Bushland, Community and Agricultural Landscapes** activity booklet available on *LandLearn Resource Booklets CD*. Activities include 'Fragmentation – islands of bush in a sea of farmland'.

# Part 3:



# Flora and Fauna Diversity Assessment

## Activity 11: Monitoring Flora Species

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

English (3)

Science (3,4,5)

**Duration:** 1-2 hours

**Setting:** In the classroom and outdoors

### Summary

This activity enables students to discover the diversity of plant species present in the study area and why plants are important.

### Student outcomes

This activity will enable students to:

- Identify plants in their study area
- Create a herbarium of plant species
- Make recommendations about future actions that can be taken.

### Background notes for teachers

Plants are essential for all life on earth. There are approximately 16,000 indigenous plant species found in Australia and they provide biodiversity (including us) with oxygen, food and shelter!

Creating a class or school herbarium is one way for students to gain a greater understanding of the diversity of species present in the school ground. A herbarium is a collection of dried plants that are mounted on pieces of card and systematically arranged. Herbariums are important in the identification and classification of plant species and herbarium collections are found world wide. The National Herbarium of Victoria is located in the Royal Botanic Gardens Melbourne. This herbarium was established in 1853 and holds over 1.2 million plant specimens.

By pressing and drying plants they do not shrivel and retain most of their identification characteristics. A correctly pressed and dried plant will last for hundreds of years, and can be used for study even when extinct in the wild.

### Materials

**The Lorax.** Dr Seuss, Collins (1971), Plant identification books, Old phone books or flower presses or two pieces of wooden lattice (A3 size) and 2 pieces of rope.

*One per student* - Plant specimen collected from the study area, Two sheets of newspaper or paper towel, Two thick cardboard sheets, Tape, Pencil, One A3 piece of thick card, *Student Worksheet: Herbarium sheet* (page 63).



The pink form of **Common Heath** was proclaimed the floral emblem of Victoria on 11 November 1958.

Victoria was the first Australian State to give official recognition to such an emblem.

## The activity

To begin this activity read **The Lorax** with your students. This story introduces the concept of deforestation and the importance of plants for wildlife species, air quality and as beautiful parts of the landscape. After reading the book - discuss as a class why plants are important and the importance of having a range of plant species present in an ecosystem.

### To create a herbarium:

**Step 1:** Ask each student to collect one plant specimen from the study area. Encourage students to select specimens that have flowers or fruit on them and to take samples from a range of species. Samples should be 30-50cm in length and may include the whole plant (if it is small) or a portion of a larger plant. To reduce the impact of this activity on plants in the study area, encourage sampling from abundant/weedy small species or larger plants.

**Step 2:** Ask students to place the specimens between the sheets of newspaper/paper towel and then between the two pieces of cardboard.

**Step 3:** Stack each of these 'cardboard sandwiches' in a pile and use the old phone books / flower presses / two pieces of wooden lattice tied with rope to press the specimens. For best results replace the paper towel every couple of days until dry and place in a warm well aired place eg. low temperature oven (40°C), near a heater or clothes drier, or in full sun on a breezy day. A plant is dry when it becomes stiff ie. you can hold the stalk and the leaves do not droop.

**Step 4:** While the specimens are being pressed ask students to use the identification book to try to identify the species they are pressing and fill out the details on *Plant Collection Notes* found on the *Student Worksheet: Herbarium Sheet*. Discuss with students the importance of accurately recording the location that the sample is taken from (this will provide important information on distribution of the species).

**Step 5:** Once pressed, students should tape their specimen onto the A3 piece of card. They should also cut out and stick the filled in *Plant Collection Notes Label* to the card.

**Step 6:** Exhibit the class herbarium and make labels identifying the plants that can be placed in the school ground. Over time you will build up a school herbarium of all of the species found in the study area. You may wish to laminate the sheets.



*Herbarium specimen from the National Herbarium of Victoria.*

## Discussion questions

- ◆ Why are plants important?
- ◆ Why do you think it is important to have a range of plant species present in an ecosystem?
- ◆ What do you think herbariums are used for?

## Related LandLearn activities

**Plant Power** activity booklet available on *LandLearn Resource Booklets CD*.

## Activity 12: Monitoring Fauna Species

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

#### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Science (3,4,5,6)

**Duration:** 1-2 hours

**Setting:** In the outdoors

### Summary

This activity enables students to discover the diversity of animal species present in the study area.

### Student outcomes

This activity will enable students to:

- Identify fauna species in the study area
- Use different strategies to detect animals in the study area
- Interpret their results and make recommendations about future actions that can be taken.

### Background notes for teachers

Animal species are important in ecosystems and school grounds as they provide services such as insect control and pollination as well as providing a rich learning environment for students. This activity encourages students to be aware of animals living in different areas within the study area and the importance of having high quality habitat ie. logs, rocks, shrubs.

### Materials

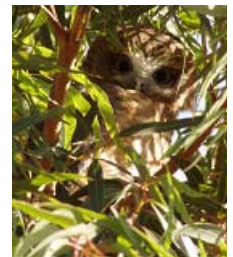
*Monitoring Fauna Student Worksheet and Checklists* (pages 57-60), White sheet, Butterfly nets, Tracks and Scats identification book, Animal identification books.

### The activity

To start this activity brainstorm with your students the different methods that can be used to detect animals within the study area. As a class decide on which methods are possible to be undertaken by students.

Discuss as a class the **dangers and risks** to both students and wildlife that must be considered. Ensure that students are careful of spiders and snakes, and that if rolling logs/rocks that they gently roll them away from themselves, keeping one edge in contact with the ground, and then gently place the log/rock back. This will ensure that the cavities in which the insects/lizards are living under the log/rock are not disturbed. Discuss with students the importance of disturbing the animals found as little as possible.

Split the class into six Animal Detective Teams. Suggested teams and detection methods are listed over the page. Another detection method not described here is spotlighting at night. You may wish to search for nocturnal birds, mammals or amphibians at night to have an accurate record of the fauna species found in the study area.



The Boobook Owl requires large trees to provide them with nesting hollows.

Do you have owls living in your study area?

<b>Animal Detective Team</b>	<b>Detection Method</b>	<b>Types of animals found</b>	<b>Materials required and issues to consider</b>
<i>The Big Eyes</i>	Visual Observation	Birds, mammals, reptiles/amphibians, invertebrates	Animal identification books.
<i>The Big Ears</i>	Listening	Birds, mammals, amphibians or invertebrates	
<i>The Trackers</i>	Tracks, scats, feathers and fur	Birds, mammals, reptiles or amphibians	A useful book to assist this group is: <b>Mammal Tracks and Signs. A Field Guide for South-Eastern Australia.</b> B. Triggs, Oxford University Press, Melbourne (1984)
<i>The Sweepers</i>	Sweep/butterfly net	Invertebrates	This group could pass the net over grass, bushes or concrete areas within the study site.
<i>Shakers</i>	Shaking bushes over white sheets	Invertebrates	It is important that bushes lower than chest height are sampled for safety reasons.
<i>Rollers</i>	Log and rock rolling/ Looking under bark	Reptiles, amphibians, or invertebrates	Care should be taken of spiders and snakes for this method.

- ◆ Before the Animal Detective Teams begin searching for fauna species ask each group to write down a plan of what they are going to do using the *Student Worksheet: Monitoring Fauna*.
- ◆ Provide each animal detective team with the Monitoring Fauna Species Checklists for birds, mammals, reptiles, amphibians and invertebrates to collect their results. These sheets are very generic - students may also wish to identify the animals to the species level (eg. identify the type of honeyeaters present in the study area or the type of bats present).
- ◆ Once students have collected the results, they are to give group presentations on what they found.

This activity is designed to enable students to monitor fauna in the study area over a period of time to see whether there is a change (increase or decrease) in fauna in relation to activities undertaken within the site (tree planting, creation of new gardens etc.).

However, changes in wildlife abundance will also occur due to weather, time of year (winter versus spring) and the availability of food (eg. presence of flowering trees). It is therefore important that fauna surveys are undertaken at different times of the year, during different weather conditions and at different times of the day.

## Discussion questions

This activity provides the perfect opportunity for students to graph their results (bar or line graphs) over time to answer questions such as:

- Does the diversity of animal species change with the seasons or time of day?
- Has the diversity of animal species changed after activities such as tree planting?

The table below provides suggestions on actions that can be taken to boost the population of species that are missing from your study area grounds or found only in low numbers.

**Table 1: Habitat attributes affecting fauna species distribution**

Important attributes are shaded in blue.

Source: Adapted from Stewards for Sustainability (Zoos Victoria)

Attribute	Birds	Arboreal mammals	Ground Mammals	Bats	Reptiles	Amphibians	Invertebrates
<b>Trees</b>							
Number of over-storey stems							
Number of large trees							
Area covered by over-storey stems							
Diversity of tree species							
Eucalypt species richness							
Abundance of flowers							
Shedding of bark							
Leaf nutrients							
Tree canopy cover							
Height of canopy							
Number of hollow bearing trees							
Number of large dead trees							
Distribution of hollow trees							
<b>Mid-story and shrubs</b>							
Hight of mid-story							
% cover of mid-story							
Diversity of shrubs							
Cover of shrubs							
Density of foliage							
Area covered by acacia species							
<b>Ground cover and physical features</b>							
Cover of herbs and grasses							
Cover of lichens							
% cover of leaf litter							
% cover of logs							
% cover of bare ground							
% cover of rocks							
Pond or bog							

## Related LandLearn activities

**Biodiversity in Bushland, Community and Agricultural Landscapes** activity booklet available on *LandLearn Resource Booklets CD*. Activities include 'Making a Poota'.

# Part 4:



# Action Plan for Biodiversity

## Activity 13: Action Plan for Biodiversity

### Curriculum connections

Use of this learning and teaching activity may contribute to achievement of elements of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

### Summary

This action plan activity allows you to summarise the results found in Parts 1, 2 and 3 of the Biodiversity Up Close Audit Tool and provides a framework for determining long and short term actions and priorities to improve the biodiversity of the study area.

### Student outcomes

This activity will enable students to:

- Prioritise improvements that can be made to enhance biodiversity in the study area
- Make recommendations about future actions that can be taken in the study area.

### Background notes for teachers

Action planning is a process that will allow students and teachers to develop priorities and a plan, for how biodiversity improvements will be made in the study area.

Other factors to consider that may assist with your action planning are listed below.

### Determining indigenous species for your region

If you choose to undertake plantings in your study area it is important to plant locally native (indigenous) species. To find list of these species, contact your local council OR go to [www.dse.vic.gov.au](http://www.dse.vic.gov.au) > Conservation and Environment > Biodiversity > Ecological Vegetation Class (EVC) Benchmarks by Bioregion.

Click on the appropriate Victorian Bioregion eg. Gippsland Plain.

Click on the Mapping Unit EVC that is in your study area eg. Valley Heathy Forest.



### Photo point monitoring

You may wish to record improvements made to the biodiversity on your study area over time by taking photos of key areas of the study area before and after action is taken! For more information refer to the resource below:

**Land Managers Guide : Photo Point Monitoring** Queensland Department of Natural Resources and Water (2006) [www.nrw.qld.gov.au/monitoring\\_guide/indicators/photopoints/index.html](http://www.nrw.qld.gov.au/monitoring_guide/indicators/photopoints/index.html)

### **Victorian Essential Learning Standards Domains and (Levels):**

Interpersonal Development (3,4,5)

Civics and Citizenship (3,5,6)

Humanities – Geography (4,5,6)

Science (3,4,5,6)

Thinking Processes (3,4)

**Duration:** 1 hour

**Setting:** In the classroom

## Materials

*Student Worksheet: Action Plan for Biodiversity – Habitat Quality* (page 61), *Student Worksheet: Action Plan for Biodiversity – Flora and Fauna Diversity* (page 62).

## The activity

**Step 1:** Copy the results/score/rating from Parts 1, 2 and 3 into the Action Plan for Biodiversity Worksheets.

**Step 2:** As a class discuss which of the issues are a high, medium or low priority for improvement. Consider which actions will have the greatest benefits for biodiversity in the study area, and which actions are suitable for your school to undertake.

**Step 3:** Determine a goal result or score or rating.

**Step 4:** Determine if any action is required to meet this goal.

**Step 5:** Describe the short and long term actions that can be undertaken. Ensure that you specify what will be done, by whom, when, where and how.

**Step 6:** Sign and date your plan to demonstrate your commitment to the planned actions and activities.

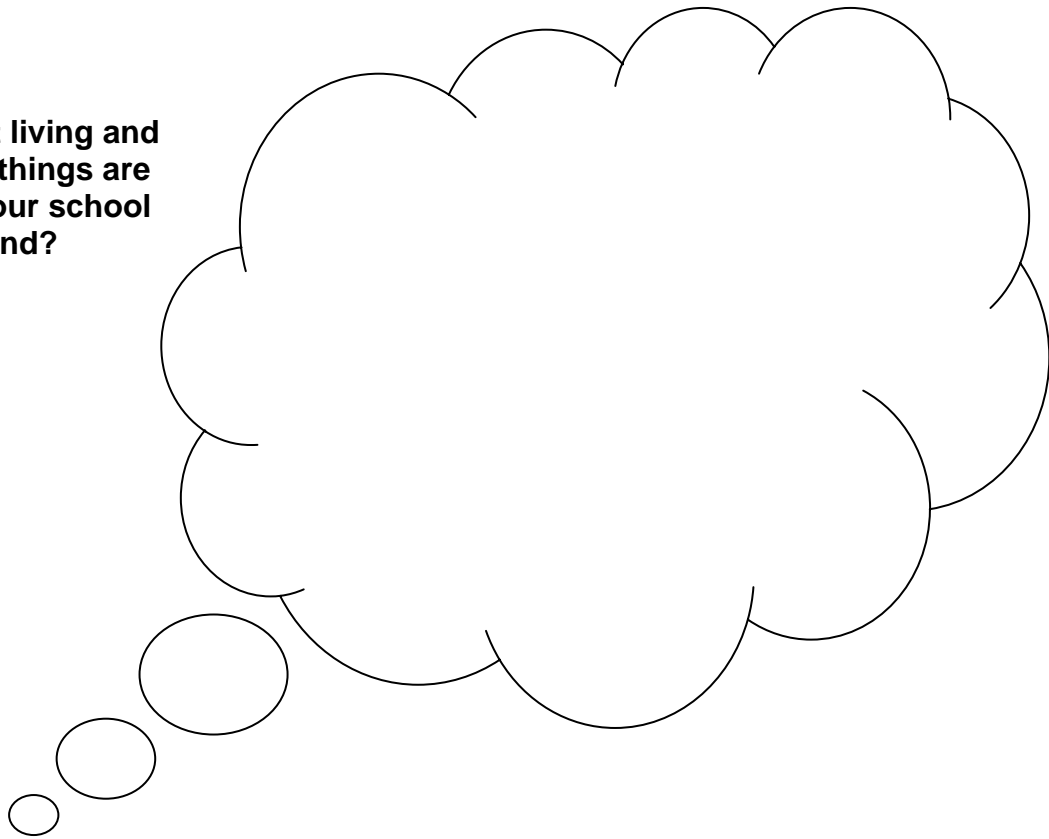
**Step 7:** Once the plan has been developed, students should produce themed overlay maps of actions to be undertaken.



# Student worksheets

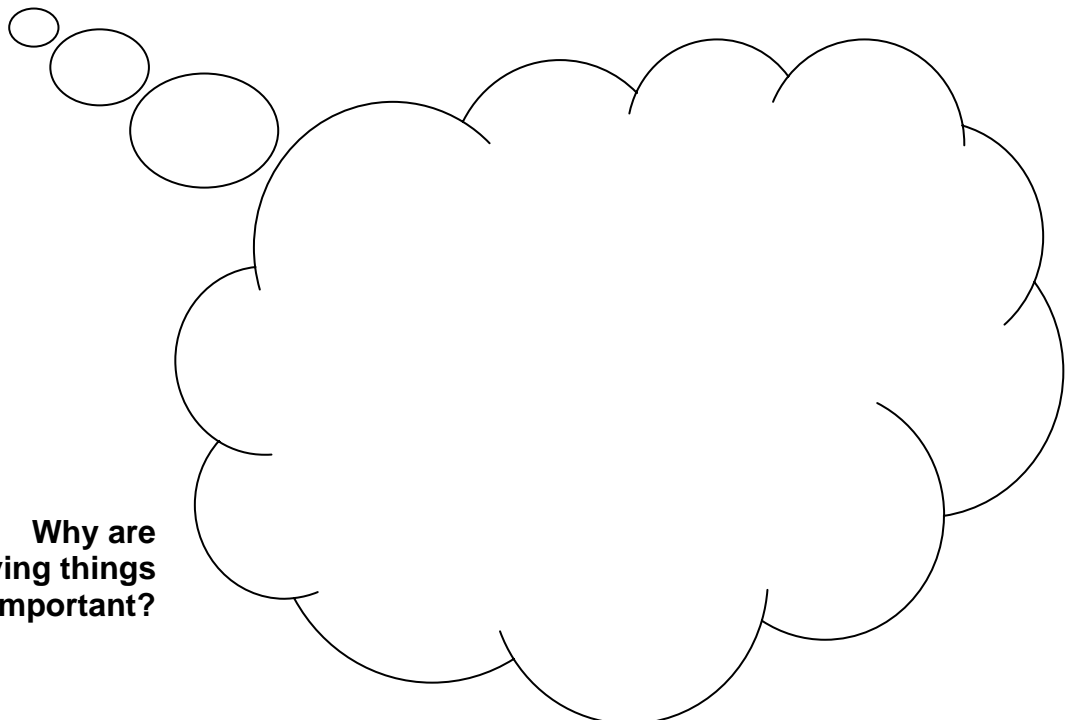
# Student Worksheet: Why is Biodiversity Important?

**What living and non-living things are found in your school ground?**



Draw or write your answers in the bubbles !

**Why are living things important?**





70% canopy cover



*Acacia dealbata* 20m

60% canopy cover



*Eucalyptus obliqua* 15m

40% canopy cover



*Eucalyptus ovata* 15m

30% canopy cover



*Eucalyptus baxteri* 20m

25% canopy cover



*Eucalyptus obliqua* 20m

20% canopy cover



*Eucalyptus viminalis* 20m

Cut out this square – use the images around this square to help estimate canopy cover.

Student Worksheet:  
Canopy Cover  
Total % Canopy Cover = \_\_\_\_\_

**REMEMBER:** You will need to estimate the total canopy cover of your study area including under and between trees.

## Student Worksheet: Understorey

### Creature Feature



The **Chocolate Lily** is an **understorey** plant that smells like chocolate! The beautiful purple coloured flowers produce a chocolate smell to attract insects to aid in pollination.

Unfortunately this flower does not taste like chocolate!!

**New words:** Pollination, Estimate, Percentage, Shrub

### What to do:

**Step 1:** Walk around the study area and estimate the percentage cover of native understorey vegetation. \_\_\_\_\_

**Step 2:** Tick below the types of native vegetation you find in the study area:

- Tree > 5m
- Shrub (1-5m)
- Small Shrub < 1m
- Large Herb > 0.5m
- Small Herb < 0.5m
- Fern
- Moss/Lichen
- Scrambler/climber
- Tall grass (or grass like) > 1m
- Small Grass (or grass like) < 0.5m
- Other \_\_\_\_\_



# Student Worksheet: Recruitment



## Creature Feature

The **Australian Blackwood** is a fast growing Australian native tree that grows up to 45m in height and lives for 15-50 years. The seeds of this tree can survive in the soil for many years before starting to grow, often after exposure to heat (eg. bushfires).

New words: Recruitment, Woody plants

## What to do:

**Step 1:** Count the number of woody species present in the study area. \_\_\_\_\_

*Count only woody species that are taller than low growing shrubs and treat all eucalypt species as a single species.*

**Step 2:** Count the number of woody species that are recruiting in the study area. \_\_\_\_\_

*A woody species is counted as recruiting when the number of immature plants (ie not flowering or fruiting) of an individual woody species is at least 10% of the total population of that species.*

**Step 3: Determine the percentage recruitment occurring in the study area:**

$$= \frac{\text{number of woody species recruiting}}{\text{number of woody species present}} \times 100$$

$$= \frac{\quad}{\quad} \div \frac{\quad}{\quad} \times 100$$

=

# Student Worksheet: Organic Litter



## Creature Feature

Slaters look like mini armadillos! They like to live in dark and moist environments such as leaf litter, compost heaps, under rocks and logs.

They eat decaying vegetable matter and fungi, turning it into rich soil nutrients.

**New words:** Organic Litter, Estimate, Circumference

## What to do:



**Step 1:** Estimate the percentage of the study area covered by organic litter. \_\_\_\_\_

*(Organic litter includes things such as fallen leaves, twigs, tanbark, mulch and small branches less than 30cm circumference)*

**Step 2:** Does the quality of the organic litter vary across the site? \_\_\_\_\_

How? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Student Worksheet: Logs

	<h3>Creature Feature</h3>
	<p><b>Echidnas</b> look scary but are actually scared – e – cats! They prefer to hide in hollow <b>logs</b> or curl up in a ball than to fight a predator.</p>
	<p><b>Termites</b> are like little soil engineers. They munch on rotting logs, assisting them to break down into rich <b>soil nutrients</b> and sculpt hollows in <b>logs</b> as they feed.</p>
	<p><b>New words:</b> Estimate, Circumference</p>

Log Number	Length (m)
Eg Log 1	1.6m
<b>Total Log Length</b>	=            m

## What to do: Logs

**Step 1:** Walk around the study area and record in the table the length of each log that you find (*logs include stumps, fallen trees or branches that have a circumference of at least 30cm - approximately the size of an adult ankle*).

**Step 2:** Add up all of the log lengths and enter this value into the Total box (this is the Total Log Length).

**Step 3:** Calculate the Total Log Length per hectare.

= Total Log Length (m) ÷ Number of hectares studied

= \_\_\_\_\_ ÷ \_\_\_\_\_

=

## Student Worksheet: Surrounding Vegetation



### Creature Feature

Look! Is it a bird? Is it a plane? No, it's a **Squirrel Glider!** They can glide for more than 50m in one movement, however their populations are threatened by clearing of vegetation which impacts on their movement through the landscape. **Wildlife corridors** are very important for this species.

**New words:** Wildlife corridor, Estimate, Circumference

### What to do:

**Step 1: (Size)** Determine the size in hectares of the area being assessed and any adjoining native vegetation.

**Step 2: (Neighbourhood)** Determine the percentage area covered by native vegetation within 1km of the centre point of the site being assessed (including wetlands, lakes, estuaries and rivers in the 'percentage of native vegetation').

Draw a grid over the aerial map (showing a 1km area surrounding the study area). Shade in the native vegetation areas on the map.

Count the total number of boxes covering the aerial map: \_\_\_\_\_

Count the total number of boxes shaded in: \_\_\_\_\_

**Step 3:** Calculate the percentage area covered by native vegetation

$$= \frac{\text{number of boxes shaded in}}{\text{total number of boxes in the grid}} \times 100$$

**Sep 4: (Core Area)** Determine the distance of the site being assessed from a block of native vegetation greater than 50ha (if the site is part of a remnant patch greater than 50 ha, the distance to core area is scored as less than 1km).



# Student Worksheet: Monitoring Fauna

## Animal Detective Team Name (tick the box):

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> The Big Eyes | <input type="checkbox"/> The Big Ears |
| <input type="checkbox"/> The Shakers  | <input type="checkbox"/> The Rollers  |
| <input type="checkbox"/> The Trackers | <input type="checkbox"/> The Sweepers |
| <input type="checkbox"/> _____        |                                       |



## Team members:

---

---

## What are you going to do?

---

---

---

## How are you going to do it?

---

---

---

## Who is going to do what?

---

---

---

## Where will you do it?

---

---

---

## When will you do it / for how long?

---

---

---

## Why are you doing it?

---

---

---

## Materials required:















---

---

---













## Monitoring Fauna Checklist – Birds

Place a tick in the box for each type of bird that you see.  
If you know the name of the bird, record it in the 'Other' section.

 <p><b>Owl</b></p>	 <p><b>Emu</b></p>	 <p><b>Duck, swan, geese and waterbird</b></p>	 <p><b>Seabirds</b></p>
 <p><b>Birds of prey</b></p>	 <p><b>Pigeon</b></p>	 <p><b>Parrot Cockatoo</b></p>	 <p><b>Chicken</b> (Introduced species)</p>
 <p><b>Kookaburra Kingfisher</b></p>	 <p><b>Swallow</b></p>	 <p><b>Wren Robin</b></p>	 <p><b>Blackbird Myna Sparrow</b> (Introduced species)</p>
 <p><b>Honey eater</b></p>	 <p><b>Magpie Crow</b></p>	<p><b>Other</b></p>	





## Monitoring Fauna Checklist – Mammals

Place a tick in the box for each type of mammal that you see.  
If you know the name of the mammal, record it in the 'Other' section.

 <p><b>Possum Glider</b></p>	 <p><b>Bat</b></p>	 <p><b>Kangaroo Wallaby</b></p>	 <p><b>Small mammal</b></p>	 <p><b>Koala</b></p>
 <p><b>Platypus</b></p>	 <p><b>Echidna</b></p>	 <p><b>Dog</b> (Introduced species)</p>	 <p><b>Cat</b> (Introduced species)</p>	 <p><b>Rabbit</b> (Introduced species)</p>
 <p><b>Mouse or Rat</b> (Introduced species)</p>	 <p><b>Fox</b> (Introduced species)</p>	<p><b>Other</b></p>		








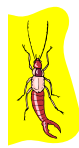












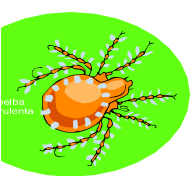





## Monitoring Fauna Checklist – Reptiles and Amphibians

Place a tick in the box for each type of reptile/amphibian that you see.  
If you know the name of the reptile/amphibian, record it below the boxes.

 <p><b>Lizard</b></p>	 <p><b>Snake</b></p>	 <p><b>Turtle</b></p>	 <p><b>Frog</b></p>
--	---	---	--

## Monitoring Fauna Checklist – Invertebrates

Place a tick in the box for each type of invertebrates that you see.  
If you know the name of the invertebrates, record it in the 'Other' section.

 <b>Mayfly</b> <b>Dragonfly</b> <b>Stonefly</b>	 <b>Butterfly</b> <b>Moth</b> <b>Caterpillar</b>	 <b>Beetle Larvae</b> <b>Beetle</b>	 <b>Thrip</b>
 <b>Millipede</b>	 <b>Centipede</b>	 <b>Termite</b>	 <b>Earwig</b>
 <b>Fly</b>	 <b>Ant</b>	 <b>Bee</b> <b>Wasp</b>	 <b>Mosquito</b> <b>Cranefly</b>
 <b>Earthworm</b>	 <b>Slug</b> <b>Snail</b>	 <b>Flatworm</b> <b>Leech</b>	 <b>Springtail</b>
 <b>Cockroach</b> <b>Preying Mantis</b>	 <b>Stick and Leaf Insect</b>	 <b>Grasshopper</b> <b>Cricket</b>	 <b>Cicada</b>
 <b>Mite</b>	 <b>Scorpion</b>	 <b>Spider</b>	 <b>Aphid</b>
 <b>Slater</b>	 <b>Amphipod</b>	<b>Other</b>	

## Student Worksheet: Action Plan for Biodiversity - Habitat Quality

Issue	Current score	Priority for improvement (High, Medium, Low)	Goal Score	Action Required (Yes/No)	Actions - long and short term (Who, what, when, where, how)
Number of Large Trees					
Canopy Cover					
Understorey					
Weediness					
Recruitment					
Organic Litter					
Logs					
Surrounding Vegetation					
<b>TOTAL</b>					

## Student Worksheet: Action Plan for Biodiversity - Flora and Fauna Diversity

Fauna/Flora species	Current number of species found in the study area	Priority for improvement (High, Medium, Low)	Goal number of species	Action Required (Yes/No)	Actions - long and short term (Who, what, when, where, how)
Plants					
Birds					
Mammals					
Reptiles					
Amphibians					
Insects (include families not species eg. ant, fly, worm)					

Signed by: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

# Glossary

**Biological Control** - the control of pests and parasites using other organisms, often natural predators.

**Circumference** - distance around the outside of a circle, tree trunk or log.

**Ecosystem** – a community of plants and animals, the interactions between these and the physical environment in which they live.

**Environmental Weed** – plants that grown in an area where they are not wanted and that threaten natural ecosystems. Environmental weeds are often exotic plant species.

**Estimate** – to form an approximate value for a quantity.

**Exotic Plants** - plants that are not naturally found in Australia and have been introduced into an area.

**Habitat** – the place or type of site where an organism or population naturally occurs.

**Habitat Tree** – a tree that provides nesting space or shelter to animals species.

**Herb layer** – layer of vegetation dominated by non-woody plants less than 0.5m in height.

**Hectare** – a unit of land measurement equalling 10,000 m<sup>2</sup> (100m x 100m in size).

**Herbarium** – a collection of dried plants that are mounted on pieces of card and systematically classified.

**Indigenous Plants** – plants that are locally native ie. naturally found in Australia and growing in the local area.

**Native Plants** – plants that are naturally found in Australia (as opposed to exotic plants that people introduce into an area).

**Organic Litter** – materials that are no longer attached to a plant and have fallen to the ground (includes leaves, twigs, mulch and small branches less than 30 cm in diameter).

**Overstorey** – the top layer of vegetation (the tree canopy cover) usually greater than 5m in height.

**Percentage** - a part or portion expressed in hundredths.

**Pollination** – the transfer of pollen grains from one flower to another.

**Regeneration** – regrowth of plants.

**Recruitment** - the influx of new organism members into a population due to reproduction or immigration

**Shrub** - a low growing woody plant, usually with several major branches.

**Understorey** – the layer of vegetation under the tree canopy usually between 5 – 0.5 m.

**Wetland** – an area containing water, whether natural or artificial, permanent or temporary, with water that is static, flowing, fresh, brackish or salty.

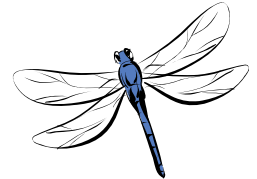
# Biodiversity Resources List

## Teaching and Learning Resources

### LandLearn Resources

**LandLearn Resource Booklets CD.** LandLearn, Department of Primary Industries (updated 2008)

- AgriMaths
- Biodiversity & Agriculture
- Biodiversity in Bushland, Agriculture & Community Landscapes
- Bushfoods and Biodiversity
- Fact & Fiction
- Grow and Gobble
- Planning for Sustainable Land Use
- Plant Power
- Wonderful Wiggly Worms



**Super Seeds!** LandLearn, Department of Primary Industries (2005)

**LandLearning.** LandLearn, Department of Primary Industries (2007)

- Biodiversity in Balance
- Fact & Fiction 2
- Fruit Fly Frenzy
- Learning in the Garden

**Food and Water: futures thinking** (*including Water Use and Management in the Shepparton Irrigation Region*). LandLearn, Department of Primary Industries (2008)

### LandLearn Fieldwork

- **Water Use and Management in the Shepparton Irrigation Region** (*on Food and Water: futures thinking*). LandLearn, Department of Primary Industries (2008)
- **Keep It Clean – a journey through the Yea catchment.** LandLearn, Department of Primary Industries (2007)
- **Salinity in an Urban Landscape – Fieldwork in Braeside Park.** LandLearn, Department of Primary Industries (2007)

**LandLearn activities** on the website: [www.landlearn.net.au](http://www.landlearn.net.au) > Curriculum Activities

**LandLearn resources are available from:** [landlearn.program@dpi.vic.gov.au](mailto:landlearn.program@dpi.vic.gov.au)

### Other Resources

**Catchment Education Resource.** Department of Natural Resources and Environment (1998)

**Food webs, Classification and Biodiversity.** Jim Grant, Bob Winters, Helen Widdop Quinton, Andrea Lomdahl, Steward Jackel, and Ian Smissen, Gould League of Vic Inc. (1999)

## Online Resources

**Biodiversity kits and activities** - Australian Government Department of the Environment and Water Resources found at [www.environment.gov.au](http://www.environment.gov.au) > resources / education > publications > kits and activities



**BUZZ biodiversity game – learning about farming for wildlife.** FACE (2004)  
An interactive game found at: [www.face-online.org.uk](http://www.face-online.org.uk) Biodiversity > BUZZ biodiversity game

**Earth Alive - Home Guide: How to conserve you local biodiversity.** Andreas Glanznig & Paul Bateson, Environs Australia and the Community Biodiversity Network (1999).  
Found at [www.environs.org.au](http://www.environs.org.au) > Publications > Other Environs Publications > Earth Alive - home guide How to conserve your local biodiversity

**Environmental Management in Agriculture – Native Biodiversity Resource Kit.** Department of Natural Resources & Environment (2005). Found at [www.dse.vic.gov.au](http://www.dse.vic.gov.au) Conservation and Environment > Environmental Management in Agriculture

**Farm Forestry: trees at work.** Department of Primary Industries (2005) found at [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au) > Agriculture and Food > Private Forestry > Education

**Ghastly Guests: Upper primary unit of work investigating weeds.** Susanna Greig, Cooperative Research Centre for Australian Weed management (2005). Download from: [www.weeds.crc.org.au](http://www.weeds.crc.org.au) > education and training > for schools

**Green kids guide to threatened species – 9 ways you can help** Found at: [www.wf.org.au/ourwork/species/tsn](http://www.wf.org.au/ourwork/species/tsn) > publications > Green kids guide to threatened species

**Lore of the Land – reconciling spirit and place in Australia’s story** - to assist Implementing Aboriginal Studies into the School Curriculum found at [www.loreoftheland.com.au](http://www.loreoftheland.com.au)

**Misbehaving Plants** Susanna Greig, Cooperative Research Centre for Australian Weed management (2007). Download from: [www.weeds.crc.org.au](http://www.weeds.crc.org.au) > education and training > for schools

**Remnants game.** Birds Australia (2001)  
An interactive game found at: [www.birdsaustralia.com.au/remnants/remnants.html](http://www.birdsaustralia.com.au/remnants/remnants.html)

**Tiwest Night Stalk Interactive Game** found at [www.perthzoo.wa.gov.au](http://www.perthzoo.wa.gov.au) > schools > classroom resources

**The Forgotten Flora.** Dr Josephine Milne & Dr Teresa Lebel, Royal Botanic Gardens, Melbourne (2007). Order through [www.rbq.vic.gov.au](http://www.rbq.vic.gov.au) > Research and Conservation > Scientific Publications > The Forgotten Flora.

**Victorian Resources Online** found at [www.dpi.vic.gov.au/vro](http://www.dpi.vic.gov.au/vro)

**Weed Wipeout.** Cooperative Research Centre for Australian Weed management (2005). Found at [www.weeds.crc.org.au](http://www.weeds.crc.org.au) > education and training > for schools

**Wetlands – Resource materials for teachers.** Department of Natural Resources and Environment (2001). Found at [www.dse.vic.gov.au](http://www.dse.vic.gov.au) > Conservation and Environment > Biodiversity > Wetlands > Educational resources

## Out of Print Resources you may have in your library



**Agriculture & Land Management Fieldwork Kit.** Dianne Hanna & Ann Fagan, Department of Natural Resources & Environment (2001)

**Biodiversity Education Resource Book 1 - Primary CSF levels 3 & 4.** Department of Natural Resources and Environment. (1999)

**Biodiversity Education Resource Book 2 - Secondary CSF levels 5 & 6.** Department of Natural Resources and Environment. (1999)

**Exploring Biodiversity – A Resource Book of Ideas for National Science Week.** Australian Science Teachers Association (2001)

**Pride in Victorian Farming.** Julianne Sharp & Elizabeth Gardiner, Food & Agriculture in the Classroom, Department of Natural Resources & Environment (1996)

## Reference Books

**A Field Guide to Mammals of Victoria.** Peter Menkhorst and Frank Knight, Oxford University Press, Melbourne (2005)

**Australian Backyard Wildlife.** Jim Grant & Bob Winters, Gould League, Moorabbin (1997)

**First Field Guide to Australian Insects and Spiders.** Steve Parish Publishing (1997)

**How to plan wildlife landscapes: a guide for community organisations.** Department of Natural Resources and Environment (2002)

**Mammal Tracks and Signs. A Field Guide for South-Eastern Australia.** B. Triggs, Oxford University Press, Melbourne (1984)

**The Birds of Australia.** K. Simpson & N. Day, Lloyd O'Neil, Victoria (1986)

**Biodiversity: Australia's Living Wealth.** Andrew Beattie, Reed Books (1995)

**Reptiles and amphibians of Australia.** H.G. Cogger, Reed, Sydney (1999)

## Other useful resources for teachers

### **Care and Use of Animals in Victorian Schools – Policy**

Department of Education and Early Childhood Development.

Found at [www.education.vic.gov.au/management/schooloperations/animalcare/policy.htm](http://www.education.vic.gov.au/management/schooloperations/animalcare/policy.htm)

**Grants and support available to schools** for sustainability projects (available through LandLearn) e-mail us [landlearn.program@dpi.vic.gov.au](mailto:landlearn.program@dpi.vic.gov.au)

## Where to purchase books

DPI / DSE and former Department of Natural Resources & Environment publications may be available at Information Victoria Bookshop, 356 Collins Street Melbourne 3000. [www.bookshop.vic.gov.au/](http://www.bookshop.vic.gov.au/). Other listed books should be available through general bookshops or school book suppliers.

## Other websites to visit

### **Australia's Biodiversity - Impacts of Climate Change.**

Australian Government Department of the Environment and Water Resources. Found at [www.greenhouse.gov.au/impacts/biodiversity.html](http://www.greenhouse.gov.au/impacts/biodiversity.html)

**Australian Government Department of the Environment and Water Resources - Biodiversity** found at [www.environment.gov.au](http://www.environment.gov.au) > biodiversity

**Australian Government Department of the Environment and Water Resources - Sustainability Education** found at [www.environment.gov.au](http://www.environment.gov.au) > resources > education

**Catchment Management Authorities** found at [www.dse.vic.gov.au](http://www.dse.vic.gov.au) > Water > Water Governance Arrangements > Catchment Management Authorities

**CERES (Centre for Education and Research in Environmental Strategies)** found at [www.ceres.org.au](http://www.ceres.org.au)

**CSIRO Do it yourself science** found at [www.csiro.au](http://www.csiro.au) > Explore and educate > Do-it yourself science > Backyard Biodiversity / Biology experiments / Environment experiments

**Department of Sustainability and Environment – Biodiversity Education information** [www.dse.vic.gov.au](http://www.dse.vic.gov.au) > plants and animals > education

**Earthwatch** found at [www.earthwatch.org/index.html](http://www.earthwatch.org/index.html)

**Flora for Fauna** found at [www.floraforfauna.com.au](http://www.floraforfauna.com.au)

**Gould League** found at [www.gould.edu.au](http://www.gould.edu.au)

**Greening Australia** found at [www.greeningaustralia.org.au](http://www.greeningaustralia.org.au)

**Junior Landcare** found at [www.juniorlandcare.com.au](http://www.juniorlandcare.com.au)

**Landcare Education** found at [www.landcareeducation.com](http://www.landcareeducation.com)

**Museum of Victoria** found at [www.mov.vic.gov.au/education](http://www.mov.vic.gov.au/education)  
Bugs, Forest secrets, Marine life, Future harvest, Bioinformatics, Flying colours, Spiders parlour

**Museum Australia** website on biodiversity found at [www.amonline.net.au/biodiversity](http://www.amonline.net.au/biodiversity)

**Parks Victoria Education Site** found at [www.parkseducation.org/](http://www.parkseducation.org/)

**Royal Botanic Gardens Melbourne and Cranbourne** found at [www.rbq.vic.gov.au/education](http://www.rbq.vic.gov.au/education)

**Threatened Species Network** found at [www.wwf.org.au/ourwork/species/tsn/](http://www.wwf.org.au/ourwork/species/tsn/)

**Toolangi Forest Education Service** found at [www.dse.vic.gov.au](http://www.dse.vic.gov.au) > Forests > For Students

**Waterwatch** found at [www.vic.waterwatch.org.au](http://www.vic.waterwatch.org.au)

**Zoos Victoria** found at [www.zoo.org.au](http://www.zoo.org.au) > Learning programs > On-line learning resources

## Additions to this list:

If you know of or use some great resources we have not listed here please provide the relevant details to LandLearn so we can add them to this list for others to share.

