



Biodiversity Up Close

An audit of biodiversity in the school ground

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LandLearn

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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

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.

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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
Domain																
Activity 1: Introducing Biodiversity and the Audit Tool				3							3				3	
Activity 2: Surfaces within the School Ground		3 4 5						3 4 5 6			3 4 5	3 4 5				
Activity 3: Surrounding Vegetation								3 4 5 6			3	3				
Activity 4: Tree Measurements		3 4 5						3 4 5			4 5	3 4 5				
Activity 5: Understorey and Vegetation Structure		3 4 5						3 4 5 6			3 4 5	3 4 5				
Activity 6: Environmental Weeds		3 4 5						3 4 5			3	3 4 5				
Activity 7: Organic Litter		3 4 5						3 4 5 6			3 4 5	3 4 5				
Activity 8: Logs and Rocks		3 4 5						3 4 5			3 4 5	3 4 5				
Activity 9: Soil Management		3 4 5						3 4 5			3	3 4 5				
Activity 10: Habitat Extras		3 4 5						3 4 5				3 4 5				
Activity 11: Monitoring Flora Species						3						4 5				
Activity 12: Monitoring Fauna Species		3 4 5										3 4 5 6				
Activity 13: 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: Surfaces within the School Ground

Activity 3: Surrounding Vegetation

Activity 4: Tree Measurements

Activity 5: Understorey and Vegetation Structure

Activity 6: Environmental Weeds

Activity 7: Organic Litter

Activity 8: Logs and Rocks

Activity 9: Soil Management

Activity 10: Habitat Extras

Activity 11: Monitoring Flora Species

Activity 12: Monitoring Fauna Species

Activity 13: 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	2,4,5,6,7,8,9,10,12,13
	Civics and Citizenship	Civic knowledge and understanding	...explain why protection and care for the natural and built environment is important	1, 13
		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	13 13
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.	11
	Humanities	Humanities knowledge and understanding	... describe how aspects of places in their local area have changed over time	2
			... describe, from direct observation, the human and physical characteristics of their local area	2,3,4,5,6,7,8,9,10
	Mathematics	Number	... estimate the results of computations and recognise whether these are likely to be over-estimates or under-estimates	2,5,7
		Space	...locate and identify places on maps and diagrams	2,3,5,6,7,8,9
		Measurement, chance and data	...estimate and measure length and area using appropriate instruments	2,5,7
	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 ... explain how features of the landscape are altered by processes of weathering and erosion	1 2,3,4,5,6,7,8,9,10,13 11
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	12 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 ...	13 13
		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	2,4,5,6,7 8,9,10, 12,13
			...accept responsibility for their role and tasks	2,4,5,6,7, 8,9,10, 12,13
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 ...	13 2,3,5, 7,13
		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 ...	2,3,5, 7,9 2,3,4,5, 6,7,8,9 10,13
	Mathematics	Number	... add, subtract, and multiply fractions and apply these operations in practical contexts	2,4,5,7
		Measurement, chance and data	...use metric units to estimate and measure length and area	2,4,5, 6,7,8
	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 ...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	13 12 2,4,5,6 7,8,9, 10,12 4,8,11,12
Interdisciplinary Learning	Thinking Processes	Reasoning, processing and inquiry	...use the information they collect to develop concepts, solve problems or inform decision making	13

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	2,4,5,6,7, 8 9,10, 12 13
	Civics and Citizenship	Community engagement	... participate in school and community events and participate in activities to contribute to environmental sustainability	13
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	2-10,13
		Geospatial skills	...collect geographical information from satellite images and analyse, evaluated and present it using a range of forms ...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	2,3,5,7 13 2-10,13
	Mathematics	Number	... use technology for arithmetic computations involving several operations on rational numbers of any size ...	2,4,5,7
		Measurement, chance and data	... measure length, area using suitable units for these measurements in context	2,4,5, 7,8
	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 ...analyse what is needed for living things to survive, thrive or adapt, now and in the future	2, 4-13 13
		Science at work	...make systematic observations and interpret recorded data appropriately, according to the aims of the study ...in field work, they demonstrate use of basic sampling procedures	2, 4-13 2, 4-13

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.	13
			... participate in a range of citizenship activities at school and in the local community.	
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	2,3, 5,7
			...collect and collate information gathered from fieldwork observations and present their finding observing geographical presentation conventions	13
	Science	Science knowledge and understanding	...use a specific example to explain the sustainable management of a resource	13
		Science at work	...formulate their own hypotheses and plan and conduct investigations in order to prove or disprove them	12

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 Conservation & Environment > Biodiversity > Rural Landscapes > Biodiversity and Agriculture > Native Biodiversity Resource Kit > Factsheet 02. Summary of Native Biodiversity Benefits.)

Why Measure Biodiversity in the School Ground and Beyond?

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. In addition, approximately 66% of Victoria consists of private land. It is therefore important that biodiversity is protected not only within nature conservation reserves but also on these private lands.

While extensive work is undertaken on farms and within parks to conserve biodiversity, there is a lot that can be done within schools and backyards. We hope that this resource will enable you to understand the biodiversity present in your school ground and then work to enhance this.

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 -10m 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 school ground 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 the biodiversity in the school ground. It can also be used to assess the biodiversity within an area of native habitat 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 within a school to provide snapshots of the state of biodiversity in the school ground over time. It is hoped that this will support long term and short term improvements to be made within the school ground. The tool is divided into four parts:

Part 1: Identifying the Study Area

Obtaining an Aerial Photograph, Determining the Size of the School Ground in Hectares, Determining the Vegetation Class/Habitat Type, Introducing Biodiversity and the Audit Tool, Surfaces within the School Ground, Surrounding Vegetation, Snapshot of the Study Site.

Part 2: Habitat Quality Assessment

Teacher Notes and Student Worksheets for each of the nine habitat types to assess:
Tree Measurements, Understorey and Vegetation Structure, Environmental Weeds, Organic Litter, Logs and Rocks, Soil Management, Habitat Extras, Quick Habitat Quality Assessment.

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.

This tool can be used as an audit/teaching and learning tool or as an audit tool only. Whichever way it is used, the intention 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. A quick assessment sheet is included in Part 2: Habitat Quality Assessment and may be used in conjunction with the teacher notes if the assessment is to be undertaken without student involvement.

Using the tool with students:

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



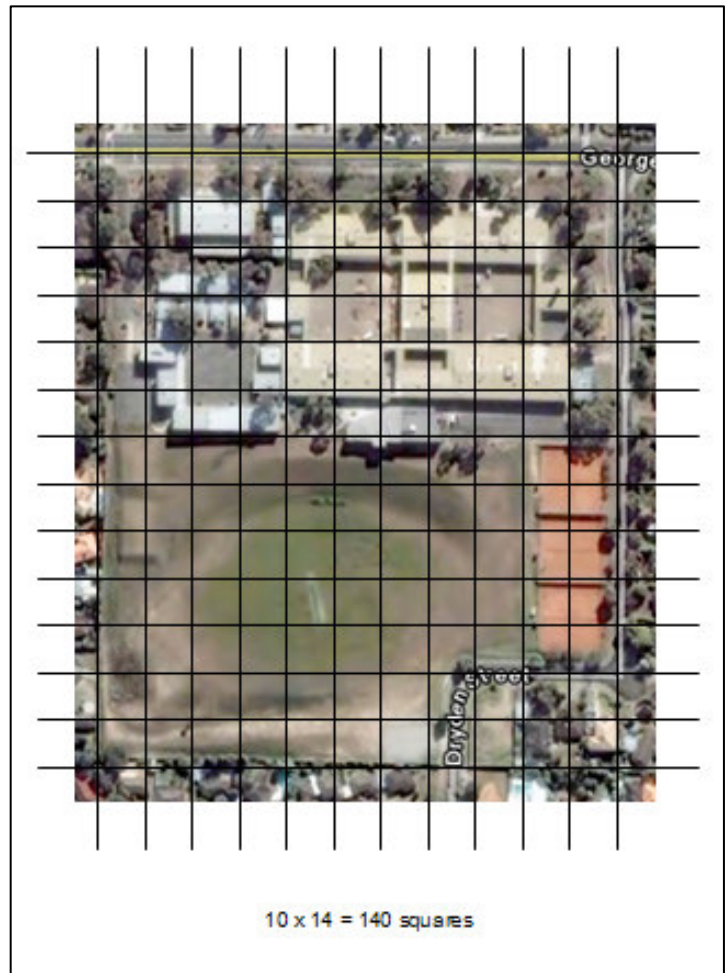
Obtaining an Aerial Photograph

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

Your school may already have one, you may need to contact your local council, or you may be able to use Google Earth.

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

1. Enter your school name and suburb in the 'Fly to' search engine.
2. Zoom in on your school until it fills the frame of the screen, rotate the image so that the school boundaries are square with the frame.
3. Click on 'Edit, copy, copy image'. (Copy three images – one close up of the school ground, and maps showing the land in a 1km and 5km radius around the school).
4. Paste the images into blank Word Documents – drag the corners of the image to make them fit the size of the page. Draw a grid over the map showing the close up of the school ground (as shown below) and count the number of squares covering the school ground.
5. Finally, determine the area of your school ground 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 school ground and calculate the area of your school.
 - 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 covered by the school.





Determining the Size of the School Ground in Hectares

1. Work out the area of your school ground in square metres (m²).

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

If your school 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 school which has a length of 100m and a width of 75m:

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

Calculate the area of your school in m² below:

2. Convert area from m² to hectares (ha).

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

To calculate the number of hectares in the school ground divide the school area by the area of a hectare (1 hectare = 100m x 100m = 10,000 m²).

Eg. To calculate the number of hectares in a school of 7,500 m²:

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

Calculate the area of your school in hectares (ha)

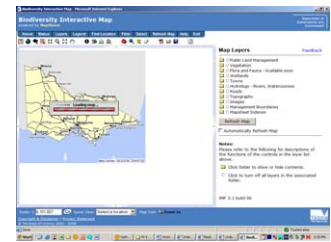
School area (m²) _____ ÷ 10,000 = _____ **ha**

Enter this number into the *Snapshot of the Study Site – a summary* sheet on page 23. You will need to provide students with this number for the calculations in the *Habitat Quality Assessment: Student Report Sheets*.

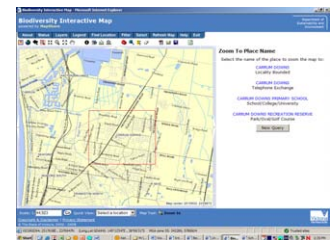
Determining the Ecological Vegetation Class / Habitat Type


Knowing the Ecological Vegetation Class (EVC) in the school ground is important as it enables appropriate plants to be planted when undertaking revegetation works (for more information see page 49). To determine the type of habitat covering your school ground currently and in the past (1970's), follow the instructions given below.

Step 1: Go to www.dse.vic.gov.au > Interactive Maps > Biodiversity Interactive maps. The window pictured will open.



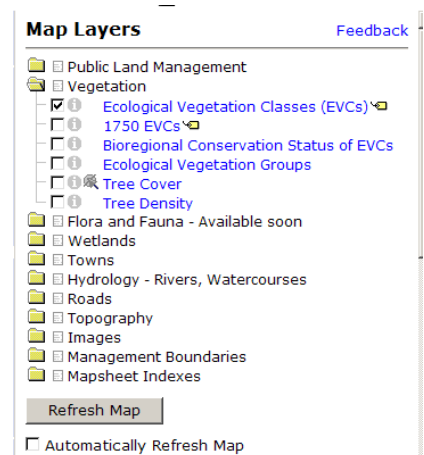
Step 2: Click on Find location > Place Name. Enter the suburb of your study area. Click on the school if it is shown or the locality bounded option for the suburb.




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.

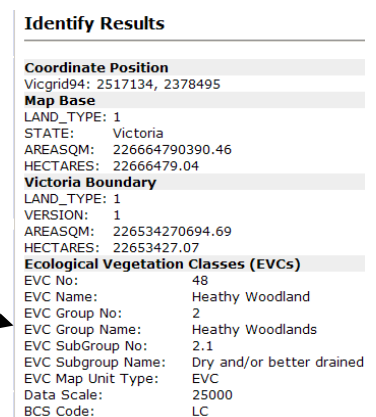
Note: If no colours appear over your study area click on Vegetation and place a tick in the 1750's EVCs box. Click Refresh Map.



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 the 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 55), 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 the school ground 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?

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'.

Activity 2: Surfaces within the School Ground

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 different types of surfaces within the school ground.

Student outcomes

This activity will enable students to:

- Identify features of their school ground from aerial photographs and through fieldwork activities
- Interpret their results and make recommendations about future actions that can be taken in the school ground.

Background notes for teachers

Understanding the different components of an area of land is an important tool for land managers. On farms, property management plans are often developed that enable decisions to be made about the whole farm. When looking at your school ground a similar approach can be taken.

Different surfaces within the school ground have different properties. They may be impermeable (eg. buildings, basketball courts, pathways) or permeable (eg. soft surfaces including gardens, ovals or bushland).

Knowledge of the proportion of different surfaces within your school ground provides information about the extent of habitat that is present for biodiversity. It also provides information about the amount of rainwater you may be able to harvest from the rooves of your school buildings. It is important to have a high percentage cover of soft surfaces and vegetation within the school ground as they provide food and shelter for biodiversity.

When looking at vegetation within the school ground it is also important to distinguish whether they are native, indigenous native or exotic. Plants can be classified as either **native** (from Australia), **indigenous** (native and from the local area) or **exotic** (introduced from another country). Indigenous natives are preferable to have in your school ground, followed by natives and then exotics as they are better suited to the soil type and conditions of the area and will preserve the integrity of the local habitat.

Materials

Student Worksheet: Surfaces within the School Ground (page 56), A3 size Laminated aerial maps of the school covered by a grid and whiteboard markers (enough maps and markers for one of each per group).

Victorian Essential Learning Standards Domains and (Levels):

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5,6)

Mathematics (3,4,5)

Science (3,4,5)

Duration: 1 hour

Setting: In the classroom and the school ground



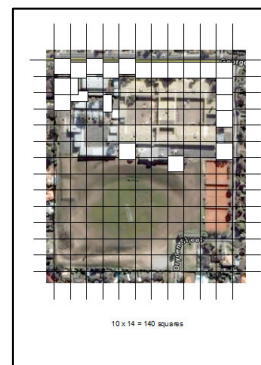
Sulphur-crested Cockatoos are large white parrots measuring 45-50cm in height.

Cockatoos can sometimes be found in school grounds nesting in large **trees** or feeding on the ground amongst the **grass**.

The activity

1. Ask students to estimate the percentage cover of the following three types of surfaces in the school ground and discuss whether these are likely to be over or under-estimates:

- ◆ Built structures / roofs (eg. school buildings, sheds)
- ◆ Hard impermeable surfaces (eg. car parks, basketball courts)
- ◆ Soft surfaces (eg. mulch, vegetation, grassy areas)



2. Break the class into pairs or groups of 3. Assign each group with a variable to measure investigating different surfaces in the school ground. Depending on the size of your class you may have two groups measuring each variable.

Group 1: Built structures / roofs

Group 2: Hard impermeable surfaces (eg. car parks)

Group 3: Soft surfaces (eg. mulch, vegetation, grassy play areas)

(Groups 4 - 6 will investigate types of soft surfaces)

Group 4: Tree and/or shrub cover (indigenous or native) and Tree and/or shrub cover (exotic)

Group 5: Grass cover (indigenous or native) and Grass cover (exotics – lawns / ovals)

Group 6: Ornamentals and vegetable gardens and Mulch cover (eg. Tanbark)

3. Each group should use a whiteboard marker to shade in the areas on the map where the surface they are investigating are found. Students will need to walk around the school ground to do this.

4. Count the number of boxes shaded in.

5. The percentage cover of each type of surface within the school can be calculated using the formula below. This can be calculated using the student worksheet (you may wish to fill this out as a class).

Percentage Cover = (number of boxes shaded in ÷ total number of boxes covering the school) x 100

Eg. Percentage Cover of Exotic tree or shrub cover = $(20.5 \div 140) \times 100 = 15\%$

****Note:** the total number of boxes covering the school was calculated in the *Obtaining an Aerial Photograph* sheet on page 14.

6. Enter these results into the *Snapshot of the Study Site – a summary* sheet on page 23. Compare the calculated results with the estimations made.

Discussion questions

- ◆ Were the estimations close to the actual results? Why do you think they were different?
- ◆ Which types of surfaces do you think would be most important for biodiversity?
- ◆ Do you think that any changes should be made to the percentage cover of any of the types of surfaces? What changes? Why?
- ◆ How do you think the school ground has changed over the last 300 years?

Related LandLearn activities

Planning for Sustainable Land Use activity booklet available on *LandLearn Resource Booklets CD*.

Activity 3: 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):

Humanities – Geography (3,4,5,6)

Mathematics (3)

Science (3)

Duration: 20 minutes

Setting: In the classroom and the school ground

Summary

This activity enables students to understand how the biodiversity in the landscape surrounding the school ground influences, and is influenced, by the biodiversity in the school ground.

Student outcomes

This activity will enable students to:

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

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* 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* 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 size and shape of vegetation patches 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.

Materials

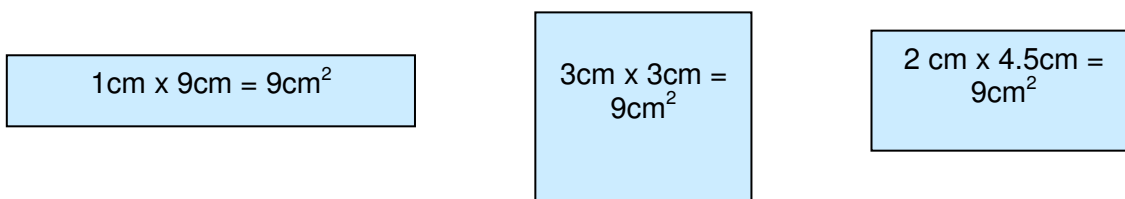
Scissors, paper towel, eye dropper, water, aerial maps of the school showing surrounding 1km and 5km radius (one per student), coloured pencils.



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.

The activity

1. Discuss as a class the importance of large patches and wildlife corridors/stepping stones.
2. Demonstrate to the class the importance of having large patches to reduce edge effects.
 - a. Cut a piece of paper towel into three different shapes with the same area.
 - b. 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.)
 - c. Discuss as a class why it is important to have large patches to reduce edge effects such as predation and weed invasions.



3. In small groups, ask students to shade in on the aerial maps the areas covered by vegetation and to identify the three largest patches of vegetation.
4. Are any of these patches close to the school ground? Are there any corridors/stepping stones between the patches? Enter these results to these two questions into the *Snapshot of the Study Site – a summary sheet* on page 23.
5. Ask students to make recommendations about how the school ground or other areas of land in the local community could act as a stepping stone between patches or increase the size of other patches of vegetation.

Discussion questions

1. Could planting in parts of the school ground or surrounding areas increase the size of any of the patches?
2. Could planting in parts of the school ground or surrounding areas provide linkages between patches?
3. Why do you think it is important to look at the landscape within 1km and 5km of the school ground?

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'.

Snapshot of the Study Site - a summary

Number of hectares in the school ground = _____

Habitat type = _____

Number of boxes (in the grid) covering the school ground = _____

Surface	Percentage cover of the school ground
<i>Eg. Buildings</i>	69 %
Built structures / roofs	
Hard impermeable surfaces (eg. car parks)	
Soft surfaces (eg. mulch, vegetation and grassy play areas)	
<i>Tree and/or shrub cover (indigenous or native)</i>	
<i>Tree and/or shrub cover (exotic)</i>	
<i>Grass cover (indigenous or native)</i>	
<i>Grass cover (exotics – lawns / ovals)</i>	
<i>Ornamentals and vegetable gardens</i>	
<i>Mulch cover</i>	

Is the vegetation in the school ground adjacent to a larger patch of vegetation?

Please circle (Yes / No)

Is the vegetation in the school ground linked to other patches of vegetation by corridors or stepping stones?

Please circle (Yes / No)

Part 2:



Habitat Quality Assessment

Teacher Notes: Habitat Quality Assessment

Undertaking an assessment of the quality of habitat present in the school ground involves measuring eight different variables:

- ◆ Number of Trees
- ◆ Habitat Trees
- ◆ Understorey and Vegetation Structure
- ◆ Environmental Weeds
- ◆ Organic Litter
- ◆ Logs and Rocks
- ◆ Soil Management
- ◆ Habitat Extras

For each variable there are *Student Worksheets* provided on pages 51 - 59 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 pairs or groups of three. Assign each group with a habitat quality type to record. (Each habitat quality type may therefore be assessed by more than one group).

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

- ◆ Tree Measurements (Number of Trees and Habitat Trees)
- ◆ Understorey and Vegetation Structure
- ◆ Environmental Weeds
- ◆ Organic Litter
- ◆ Logs and Rocks / Soil Management / Habitat Extras

With senior classes you may wish to have one group collect the data from the *Surfaces within the School Ground* (Activity 2) at the same time as undertaking the habitat quality investigations.

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.

A quick *School Ground Habitat Quality Assessment* is provided on page 41 to collate class results and calculate a Habitat Quality score.

Activity 4: Tree Measurements

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 school ground.

Student outcomes

This activity will enable students to:

- Count the number of trees in the school ground
- 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 in the school ground.

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 school ground.

Materials

Student Worksheet: Tree Measurements (page 57), Pencil, Calculator, *Student Report Sheet: Tree Measurements* (downloadable as a separate file).

The activity

Walk around the school ground and record the number of trees in the school ground.

For each tree indicate if it is:

- native (from Australia) or exotic (introduced from another country)
- dead or alive
- a habitat tree (trees that provide nesting space for animals ie. they contain hollows, nests or nesting boxes).

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: 45 minutes

Setting: In the classroom and the school ground



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.

Next, calculate the number of trees per hectare in the school ground and the number of habitat trees per hectare in the school ground.

Number of Trees: Divide the number of trees by the number of hectares in the school ground.

ie: **Number of trees/hectare** = $\frac{\text{number of trees in the school ground}}{\text{number of hectares in the school ground}}$

Number of Habitat Trees: Divide the number of habitat trees by the number of hectares in the school ground.

ie: **Number of habitat trees/hectare** = $\frac{\text{number of habitat trees in the school ground}}{\text{number of hectares in the school ground}}$

Students should write up their assessment and calculate their results using the *Student Report Sheet: Tree Measurements*. Results should be entered onto the *Quick School Ground Habitat Quality Assessment* sheet on page 41.

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

Habitat score

Using the information collected, determine the 'Number of Trees' and 'Number of Habitat Trees' ranking (colour) and score (number).

< 10 trees/ha	10 - 20 trees/ha	> 20 trees/ha
0	5	10

No large trees	< 5 habitat trees/ha	5 - 10 habitat trees/ha	> 10 habitat trees/ha	> 10 native habitat trees/ha
0	2	5	7	10

***Note:** in remnant bushland areas the optimal number of large habitat trees is 7-12 (depending on the habitat type). However, due to the greatly altered nature of the school ground, and the risks associated with large trees, the optimal number of habitat trees present has been set at 10.

Discussion questions

- ◆ Why do you think it is important to have trees in the school ground?
- ◆ How could the school provide more habitat for native wildlife that requires tree hollows?
- ◆ 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 school and 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 5: 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.

Summary

This activity enables students to identify the habitat value of understorey within the school ground.

Student outcomes

This activity will enable students to:

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

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 and Vegetation Structure (page 58), Laminated aerial map of the school covered by a grid, Whiteboard markers, Calculator, *Student Report Sheet: Understorey and Vegetation Structure* (downloadable as a separate file).

The activity

Estimate the percentage cover of understorey in the gardens in the school ground and record this in the *Student Worksheet: Understorey and Vegetation Structure*.

Walk around the school ground and shade in the areas on the map where understorey plants are present (excluding grass <1m).

Victorian Essential Learning Standards Domains and (Levels):

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5,6)

Mathematics (3,4,5)

Science (3,4,5)

Duration: 1 hour

Setting: In the classroom and the school ground



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!!

Record in the student worksheet the types of vegetation in the school ground:

Overstorey: Tree > 5m,

Understorey: Shrub 1-5m, Small Shrub < 1m, Tall grass (or grass like) > 1m, Scrambler/climber,

Herb-layer: Fern, Moss/Lichen, Orchids, Small grass (or grass like) < 0.5m, Other

Count the total number of boxes that are shaded on the map and use the calculation below to determine the percentage cover of understorey present in the school ground.

Compare the calculation results with the estimations made.

$$\text{Percentage Cover of Understorey} = \frac{\text{Number of understorey boxes shaded in}}{\text{Number of boxes (in the grid) covering the school ground}} \times 100$$

* the Number of boxes (in the grid) covering the school ground is found on page 23

Students should write up their assessment and calculate their results using the *Student Report Sheet: Understorey and Vegetation Structure*. Results should be entered onto the *Quick School Ground Habitat Quality Assessment* sheet on page 41.

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

Suggestions: *Short term (this year):* Plant native understorey plants, protect areas planted with understorey plants from trampling and damage, plan, create and design signs to place around the school ground explaining the importance of understorey. *Long term (next 5 years):* Set up native plant propagation and a green house within the school to grow your own plants.

Habitat score

Using the information collected, determine the 'Understorey and Vegetation Structure' ranking (colour) and score (number).

< 5% understorey cover in the school ground	5 - 15% understorey cover in the school ground	15 - 25% understorey cover in the school ground	> 25% understorey cover in the school ground	> 25% native understorey cover in the school ground
0	7	13	19	25

***Note:** in bushland habitats the optimal percentage cover of native understorey is >75%. However due to the greatly altered nature of the school ground and the mixture of land uses the optimal percentage cover of understorey has been adjusted to reflect this.

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 school ground?
- ◆ What types of animals do you think that planting understorey plants would encourage into the school ground?
- ◆ How do you think you could improve the quality of understorey in the school ground?

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 6: Environmental Weeds

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 environmental weeds in the school ground.

Student outcomes

This activity will enable students to:

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

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: Environmental Weeds (page 59), Weed identification books or a list of Environmental Weeds found in your local area, Laminated aerial map of the school covered by a grid, Whiteboard markers, *Student Report Sheet: Environmental Weeds* (downloadable as a separate file).

Victorian Essential Learning Standards Domains and (Levels):

Interpersonal Development (3,4,5)

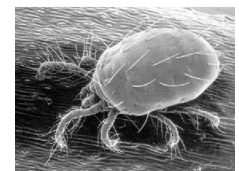
Humanities – Geography (3,4,5)

Mathematics (3)

Science (3,4,5)

Duration: 1 hour

Setting: In the classroom and the school ground



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.

The activity

Using the weed identification books/lists identify 5-10 environmental weeds for your students to look for in the school ground. List these in the student worksheet. Provide students working in the environmental weeds group with photos of weeds to look for. 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. More information about weeds can be found at www.dpi.vic.gov.au > Online Services > Information Notes Series > Weeds.

Using the student worksheets ask students to record the Environmental Weeds found in the school ground and to shade in on the map the location of these weeds.

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: Environmental Weeds*. Results should be entered onto the *Quick School Ground Habitat Quality Assessment* sheet on page 41.

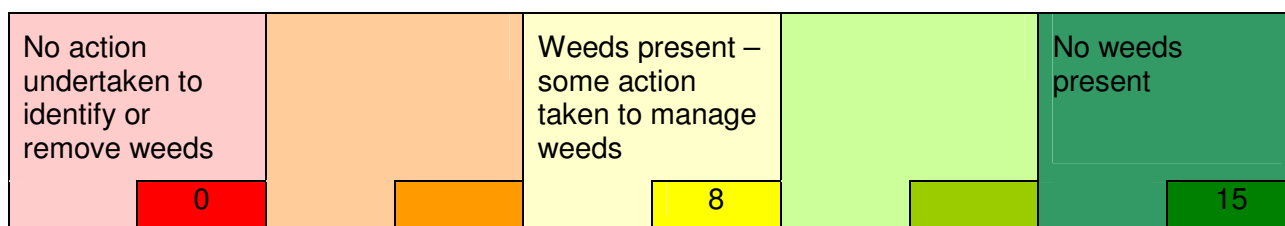
As a class discuss potential actions that your school can do to reduce the number and impact of environmental weeds in your school and local area.

Suggestions: *Short term (this year):* Identify the environmental weeds in your school ground, 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 school ground to ensure that weeds do not start growing accidentally or are planted.

Habitat score

Using the information collected, determine the 'Environmental Weeds' ranking (colour) and score (number).



Discussion questions

- ◆ Were you surprised that some of the plants in the school ground were environmental weeds?
- ◆ Why do you think that it is important to control environmental weeds in the school ground?
- ◆ 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 > Curriculum activities > Weeds

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.

Summary

This activity enables students to understand the habitat value of organic litter within the school ground.

Student outcomes

This activity will enable students to:

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

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 60), Laminated aerial map of the school covered by a grid, Whiteboard markers, Calculator, *Student Report Sheet: Organic Litter* (downloadable as a separate file).

The activity

Estimate the percentage of garden beds in the school ground covered by organic litter or mulch and record this on the *Student Worksheet: Organic Litter*.

Walk around the school ground and outline on the map the garden beds in the school. Shade in on the map the garden beds where organic litter is present.

Count the total number of boxes that are shaded on the map and use the calculation over the page to determine the percentage cover of organic litter present in the school ground.

Victorian Essential Learning Standards Domains and (Levels):

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5,6)

Mathematics (3,4,5)

Science (3,4,5)

Duration: 1 hour

Setting: In the classroom and the school ground



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.

$$\text{Percentage Cover of Organic Litter} = \frac{\text{Number of boxes shaded in}}{\text{Number of boxes outlined (containing garden beds)}} \times 100$$

Compare the calculated results with the estimations made.

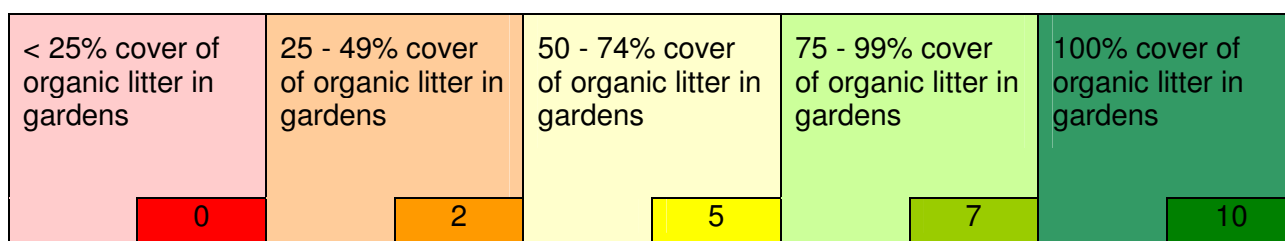
Students should write up their assessment and calculate their results using the *Student Report Sheet: Organic Litter*. Results should be entered onto the *Quick School Ground Habitat Quality Assessment* sheet on page 41.

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

Suggestions: *Short term (this year) and Long term (next 5 years):* Mulch garden beds (this will also reduce water loss!), put leaf litter in garden beds rather than in the bin.

Habitat score

Using the information collected, determine the 'Organic Litter' ranking (colour) and score (number).



***Note:** in bushland habitats the optimal percentage cover of organic litter is 50% in Rainforest habitats, 10% in Mallee habitats and 20% in Forest habitats. For the purposes of this school ground audit the optimal percentage cover of organic litter in the school ground (excluding buildings, hard surfaces and grassy play areas) is 100% to encourage mulching of garden areas.

Discussion questions

- ◆ Organic litter is made up of a range of different materials – what types of things were found in the organic litter in the school ground (eg. leaves, twigs, tanbark, mulch)
- ◆ Was there any variation in the quality of organic litter found in the school ground?
- ◆ Did you see any insects hiding in the organic litter? Do you think there would be more there than on concrete or grassy areas?
- ◆ Why do you think it is important to have organic litter in the school ground?

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 and Rocks

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 school ground.

Student outcomes

This activity will enable students to:

- Understand the importance of logs and rocks in ecosystems
- Record and map the number of logs and rocks in the school ground
- Interpret their results and make recommendations about future actions that can be taken in the school ground.

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. To encourage more biodiversity into your school yard, ensure that there are some rocks or logs present in garden beds or under trees.

Materials

Student Worksheet: Logs and Rocks & Soil Management (page 61), Pen,
Student Report Sheet: Logs and Rocks (downloadable as a separate file).

The activity

Walk around the school ground and record on the student worksheet the number of logs and rocks present.

Logs include fallen trees or branches that have a circumference of at least 30cm (approximately the size of an adults ankle). Rocks that have a circumference greater than 50cm should also be counted.

The **number of logs and rocks/hectare** = $\frac{\text{number of logs and rocks in the school ground}}{\text{number of hectares in the school ground}}$

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 the school ground



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 and Rocks*. Results should be entered onto the *Quick School Ground Habitat Quality Assessment* sheet on page 41.

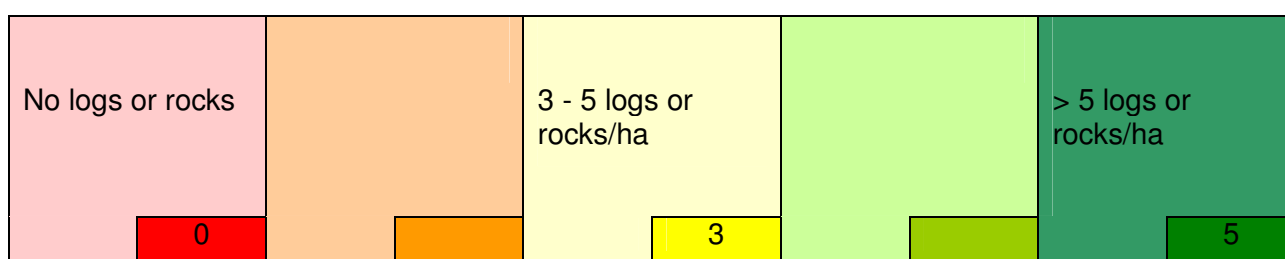
As a class discuss potential actions that your school can do to increase the number of logs and rocks in your school and local area.

Suggestions: *Short term (this year):* Place large logs and rocks in garden beds in areas that will be safe for students (do not collect logs from bushland areas, use logs that have fallen in gardens).

Long term (next 5 years): when branches fall to the ground leave some of them in garden beds to provide habitat for biodiversity.

Habitat score

Using the information collected, determine the 'Logs and Rocks' ranking (colour) and score (number).



Discussion questions

- ◆ Were you surprised with the results? Were there more rocks or logs?
- ◆ Do you think that all of the logs and rocks that you counted provided habitat for biodiversity?
- ◆ 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 school ground?
- ◆ What could your school and local community do to protect and 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: Soil Management

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 learn about and identify soil management strategies in the school ground.

Student outcomes

This activity will enable students to:

- Identify erosion and compaction in the school ground
- Assess the effectiveness of soil management strategies within the school ground
- Interpret their results and make recommendations about future actions that can be taken in the school ground.

Background notes for teachers

Soil is one of our most precious natural resources. Without healthy soils, we are unable to grow food for us to live!

Soil erosion is a natural process and has occurred throughout geological history – it is the wearing away of land or soil by water, wind or ice. However, sometimes it occurs at a much faster rate due to human disturbance such as clearing of native vegetation. Since 1950, erosion has resulted in the loss of 1/5 of the topsoil from the world's agricultural land and 1/5 of the topsoil from tropical forests.

Soil compaction is the process of reducing the pore space within soil by packing the particles closer together. In a school ground it is most commonly caused by students walking over areas or by vehicles. Compacted soil has lower rates of water absorption, lower numbers of soil macro-invertebrates and trees/plants can not grow well in compacted soil.

Soil within the school ground can be managed by reducing soil erosion and compaction, limiting the use of pesticides and chemicals and mulching garden beds to return nutrients to the soil and retain water moisture.

Materials

Student Worksheet: Logs and Rocks & Soil Management (found on pg 61), Pen, *Student Report Sheet: Soil Management* (downloadable as a separate file).

Victorian Essential Learning Standards Domains and (Levels):

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5)

Mathematics (3)

Science (3,4,5)

Duration: 20 minutes

Setting: In the classroom and the school ground



Grasses are an important part of the ecosystem as they are the initial colonisers (ie. they are the first plants to grow in an area). They help to **bind and stabilise the soil**, are a source of humus, and provide habitat for animals, birds, reptiles and insects.

Australian native grasses are deep rooted and help to **conserve moisture in the soil**.

The activity

Walk around the school ground and assess the erosion, compaction and soil management practices using the student worksheet.

Students should write up their assessment and calculate their results using the *Student Report Sheet: Soil Management*. Results should be entered onto the *Quick School Ground Habitat Quality Assessment* sheet on pg 41.

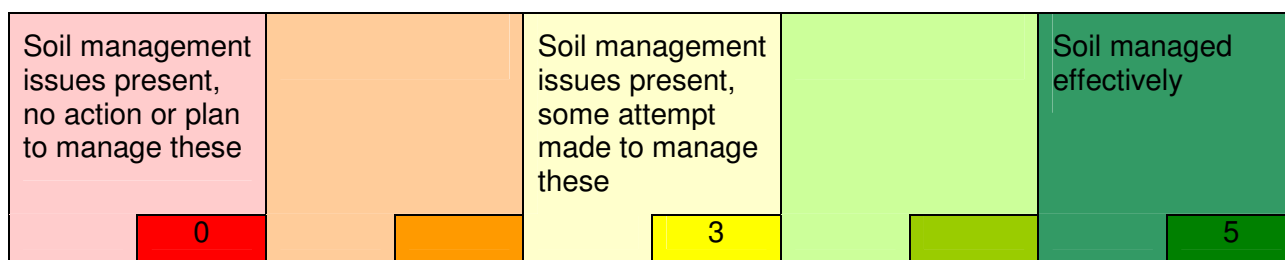
As a class discuss potential actions that your school can do to effectively manage the soil in your school and local area.

Suggestions: *Short term (this year):* Restrict access and manage areas that are being eroded or compacted through fencing, planting or mulching (especially around trees). Use organic fertilisers such as blood and bone and limit the use of pesticides and chemicals on the soil.

Long term (next 5 years): Build retaining walls, plant garden beds and mulch areas to encourage water absorption.

Habitat Score

Using the information collected, determine the 'Soil Management' ranking (colour) and score (number).



Discussion questions

- ◆ Were you surprised by the amount of erosion and compaction present in the school ground?
- ◆ What is currently being done to manage the soil in the school ground?
- ◆ What long and short term actions do you think should be undertaken to effectively manage the soil in the school ground?

Related LandLearn activities

Soils Aint Dirt activity booklet available on *LandLearn Resource Booklets CD*.

'Comparing Apples and Earth'. **Downloadable** from www.landlearn.net.au > Curriculum activities > Sustainability

Activity 10: Habitat Extras

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 actions that have been taken within the school ground to provide habitat for wildlife species, save water and reduce energy and waste.

Student outcomes

This activity will enable students to:

- Record actions taken to enhance biodiversity in the school ground
- Interpret their results and make recommendations about future actions that can be taken in the school ground.

Background notes for teachers

Although natural areas such as parks and reserves provide the best quality habitat for biodiversity, built environments, such as school grounds, also play an important role. They provide a source of food, shelter, nesting space and provide corridors for movement from one area to another.

By taking action to enhance the biodiversity within your school ground you are also enhancing the biodiversity within your local area.

Materials

Student Worksheet: Habitat Extras (page 62), Pen, *Student Report Sheet: Habitat Extras* (downloadable as a separate file).

The activity

Walk around the school ground and from the list described in the student worksheet, place a tick beside the Habitat Extras that are present.

Make a list of any other activities undertaken in the school ground to enhance biodiversity that are present and not described.

Students should write up their assessment and calculate their results using the *Student Report Sheet: Habitat Extras*. Results should be entered onto the *Quick School Ground Habitat Quality Assessment* sheet on page 41.

Victorian Essential Learning Standards Domains and (Levels):

Interpersonal Development (3,4,5)

Humanities – Geography (3,4,5)

Science (3,4,5)

Duration: 20 minutes

Setting: In the classroom and the school ground



Ponds and wetlands provide important habitat for numerous species including insects, **frogs**, reptiles and birds.

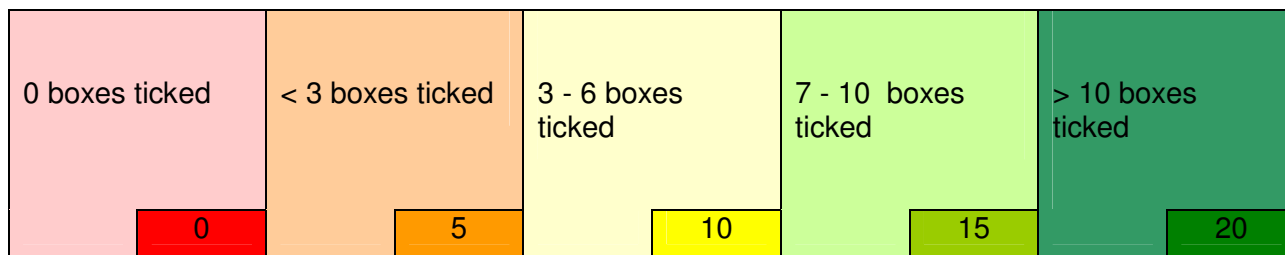
Did you know that there are 208 species of frogs in Australia?

As a class discuss potential actions that your school can do to enhance the biodiversity in your school and local area.

Suggestions: *Short term (this year) and Long term (next 5 years):* Undertake some of the habitat enhancement activities in your school ground. Remember, just because an activity has been undertaken in the school grounds once does not mean that more can not be done eg. building more nest boxes, another vegetable garden or propagating more indigenous plants.

Habitat score

Using the information collected, determine the 'Habitat Extras' ranking (colour) and score (number).



Discussion questions

- ◆ Why do you think having things like wetlands and nesting boxes increase biodiversity?
- ◆ Why is having less rubbish in the school ground and using less chemicals important for conserving biodiversity?
- ◆ What do you think is the most important action to take to increase biodiversity in the school ground?

Related LandLearn activities

'Meet the locals – a food web'. **Downloadable** from www.landlearn.net.au > Curriculum activities > Biodiversity



Quick School Ground Habitat Quality Assessment

Attribute	Description	Ranking	Score
Number of Trees/ha = = $\frac{\text{number of trees}}{\text{number of hectares in the school}}$	< 10 trees / ha	Red	0
	10 – 20 trees / ha	Yellow	5
	> 20 trees / ha	Deep Green	10
Number of Habitat Trees/ha = = $\frac{\text{number of habitat trees}}{\text{number of hectares in the school}}$	No large trees	Red	0
	< 5 habitat trees/ha	Orange	2
	5 – 10 habitat trees/ha	Yellow	5
	> 10 habitat trees/ha	Light Green	7
	> 10 native habitat trees/ha	Deep Green	10
Understorey and Vegetation Structure Underline when present: Understorey: Shrub (1-5m), Small Shrub < 1m, Tall grass > 1m, Scrambler/climber Herb-layer: Fern, Moss/Lichen, Orchids, Native Grasses < 0.5m, Other _____	< 5% understorey cover in the school ground	Red	0
	5 – 15% understorey cover in the school ground	Orange	7
	15 – 25% understorey cover in the school ground	Yellow	13
	> 25% understorey cover in the school ground	Light Green	19
	> 25% native understorey cover in the school ground	Deep Green	25
Environmental Weeds	No action taken to identify or remove weeds	Red	0
	Weeds present - some action taken to manage weeds	Yellow	8
	No weeds present	Deep Green	15
Organic Litter = Organic litter includes leaves, twigs, small branches, tanbark and mulch < 30 cm circumference	< 25% cover of organic litter in gardens	Red	0
	25 – 49% cover of organic litter in gardens	Orange	2
	50 – 74% cover of organic litter in gardens	Yellow	5
	75 – 99% cover of organic litter in gardens	Light Green	7
	100% cover of organic litter in gardens	Deep Green	10
Logs and Rocks/ha = = $\frac{\text{number of logs and rocks}}{\text{number of hectares in the school}}$	No Logs or rocks	Red	0
	3 – 5 logs or rocks/ha	Yellow	3
	> 5 logs or rocks/ha	Deep Green	5
Soil Management	Soil management issues present, no action or plan to manage these made	Red	0
	Soil management issues present, some attempt made to manage these	Yellow	3
	Soil managed effectively	Deep Green	5
Habitat Extras Underline when present: Composting area, Vegetable garden/ orchard, Lids on bins or bins located inside the buildings, Indigenous plant propagation, Lizard lounge, Plants and/or animals in the classroom, Frog pond/wetland, Plan to decrease rubbish in the school ground, Bird bath, Indigenous food garden, Plants (flora) in the school ground identified and labelled, Nest boxes, List of animals (fauna) in the school ground maintained, Limited spraying of chemicals in the school ground, Fallen branches and leaf litter remaining in garden beds, Water from taps used to water gardens, Native plants naturally regenerating, Other	0 enhancements underlined	Red	0
	< 3 enhancements underlined	Orange	5
	3 – 6 enhancements underlined	Yellow	10
	7 – 10 enhancements underlined	Light Green	15
	> 10 enhancements underlined	Deep Green	20
TOTAL (out of 100)	Aim for score > 75		

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 (4,5)

Duration: 1-2 hours

Setting: In the classroom and the school ground

Summary

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

Student outcomes

This activity will enable students to:

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

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 school ground, 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 school ground. 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 school ground, 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 in the school ground 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 school ground. You may wish to laminate the sheets.

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*.



Herbarium specimen from the National Herbarium of Victoria.

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 school ground

Summary

This activity enables students to discover the diversity of animal species present in the school ground.

Student outcomes

This activity will enable students to:

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

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 school ground and the importance of having high quality habitat ie. logs, rocks, shrubs.

Materials

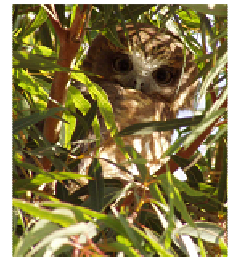
Monitoring Fauna Student Worksheet and Checklists (pages 64-67), White sheet, Butterfly nets, Tracks and Scats identification book, Animal identification books.

The activity

To start this activity brainstorm with your students the different methods that can be used to detect animals within the school ground. 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 school ground.



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

Do you have owls living in your school ground?

Animal Detective Team	Detection Method	Types of animals found	Materials required and issues to consider
<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: Mammal Tracks and Signs. A Field Guide for South-Eastern Australia. 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 school ground.
<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 school ground 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 school ground over a period of time to see whether there is a change (increase or decrease) in fauna in relation to activities undertaken within the school (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 putting in bird baths?

The table below provides suggestions on actions that can be taken to boost the population of species that are missing from your school ground 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
Trees							
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							
Mid-story and shrubs							
Hight of mid-story							
% cover of mid-story							
Diversity of shrubs							
Cover of shrubs							
Density of foliage							
Area covered by acacia species							
Ground cover and physical features							
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 school ground.

Student outcomes

This activity will enable students to:

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

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 school ground.

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 school grounds 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 > 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.

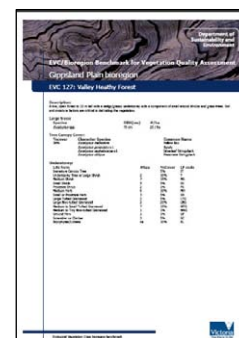


Photo point monitoring

You may wish to record improvements made to the biodiversity on your school ground over time by taking photos of key areas of the school ground 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

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 – the Study Area (page 65), Student Worksheet: Action Plan for Biodiversity – Habitat Quality (page 66), Student Worksheet: Action Plan for Biodiversity – Flora and Fauna Diversity (page 67).

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 school ground, and which actions are suitable for your school.

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. Remember to discuss your plans with the school principal to ensure that any long term school plans are factored in eg. building extensions.

Step 6: Sign and date your plan to demonstrate your commitment to the planned actions and activities. Remember to include maintenance activities in the plan for the long and short term eg. maintaining nest boxes, cleaning out bird baths.

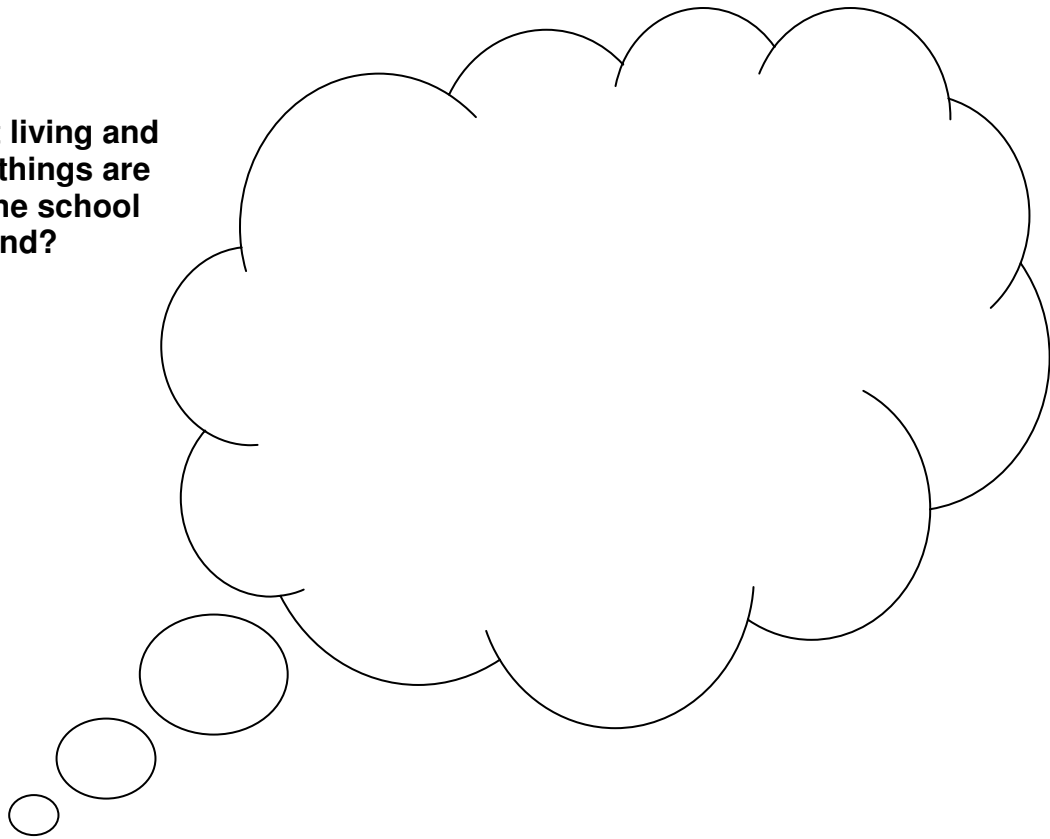
Step 7: Once the plan has been developed, students should produce themed overlay maps of actions to be undertaken.



Student worksheets

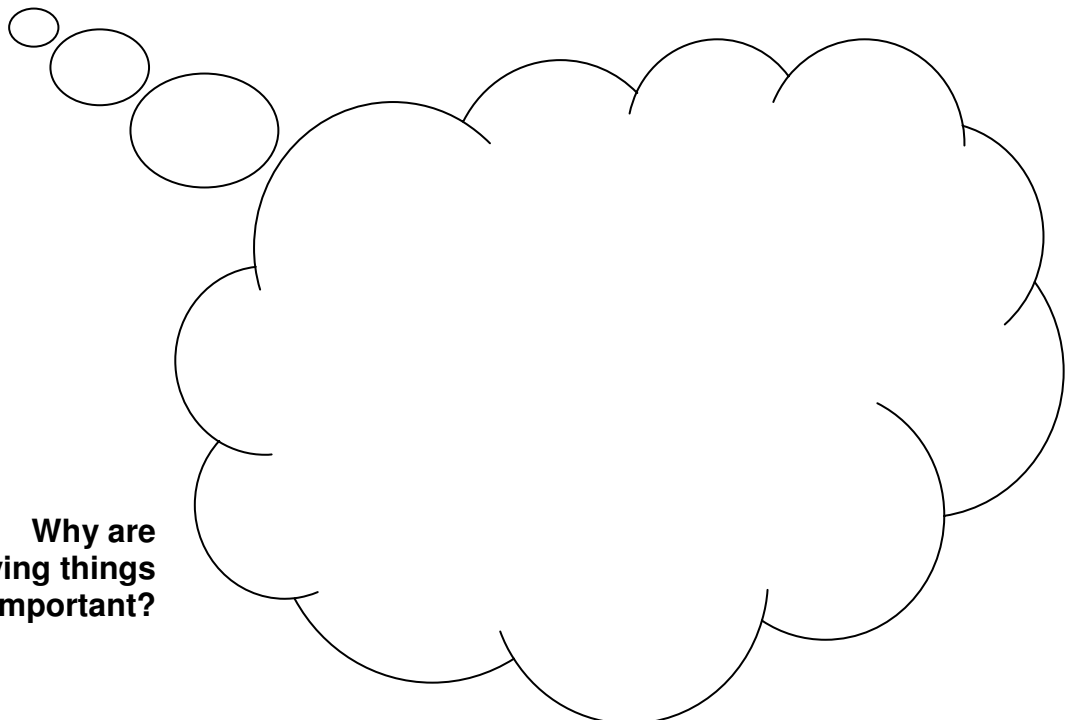
Student Worksheet: Why is Biodiversity Important?

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



Draw or write your answers in the bubbles !

Why are living things important?



Student Worksheet: Surfaces within the School Ground



Creature Feature

Sulphur-crested Cockatoos are large white parrots up to 50cm in height.

Cockatoos can be found nesting in large **trees** or feeding on the ground amongst the **grass** in school grounds.

New words: Native, Exotic, Percentage, Estimate

What to do:

Step 1: Walk around the school ground and shade on the map (using different coloured pens), where each type of surface is found.

Step 2: Count the number of squares coloured in for each type of surface and enter this in the table below.

Step 3: Calculate the percentage cover of each surface.

Surface	Estimate	Number of boxes covered by surface type		Total number of boxes covering the school ground = ____		Percentage cover
<i>Eg: Buildings</i>		69	÷	100	X 100	= 69%
Built structures / roofs			÷		X 100	=
Hard impermeable surfaces			÷		X 100	=
Soft surfaces						
<i>Tree and/or shrub cover (indigenous or native)</i>			÷		X 100	=
<i>Tree and/or shrub cover (exotic)</i>			÷		X 100	=
<i>Grass cover (indigenous or native)</i>			÷		X 100	=
<i>Grass cover (exotics – lawns / ovals)</i>			÷		X 100	=
<i>Ornamentals and vegetable gardens</i>			÷		X 100	=
<i>Mulch cover</i>			÷		X 100	=

Student Worksheet: Understorey and Vegetation Structure



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: Overstorey, Understorey, Herb-layer, Pollination, Estimate, Percentage, Shrub

What to do:

Step 1: Estimate the percentage of your school ground where understorey is present (*Understorey includes all plants that grow below trees excluding lawn*). _____

Step 2: Walk around the school ground and shade in on the map where understorey is found.

Step 3: Tick below the types of vegetation you find in the school ground:

Overstorey:

Tree > 5m

Understorey:

Shrub (1-5m)

Small Shrub < 1m

Scrambler/climber

Tall grass (or grass like) > 1m

Herb-layer:

Fern

Orchids

Small grass (or grass like) < 0.5m

Moss/Lichen

Other _____

Step 4: Are most of these plants native or exotic? _____

Step 5: Count the total number of boxes that are shaded on the map _____

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.

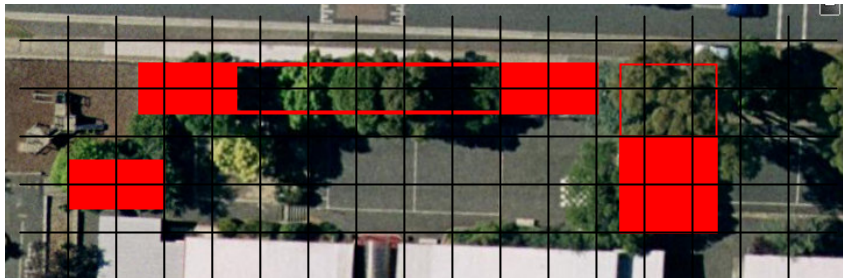
They eat decaying vegetable matter and fungi, turning it into rich soil nutrients.

New words: Organic Litter, Estimate, Circumference

What to do:

Step 1: Estimate the percentage of garden beds in your school ground that are covered by organic litter or mulch (*Organic litter includes things such as fallen leaves, twigs, tanbark, mulch and small branches less than 30cm circumference*) _____

Step 2: Walk around the school ground and outline on the map the garden beds in the school ground. Shade in the areas of the garden beds that are covered by organic litter or mulch (See example below).



Step 3: Count the total number of boxes that are outlined on the map _____

Step 4: Count the total number of boxes that are shaded on the map _____

Student Worksheet: Logs and Rocks & Soil Management



Creature Feature

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.



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.

New words: Estimate, Circumference, Tally

What to do: Logs and Rocks

Step 1: Walk around the school ground and make a tally below of the number of rocks and logs found in the school ground. (Logs must have a circumference greater than 30cm – approximately the size of your ankle).

Number of Logs in the School Ground	Number of Rocks in the School Ground

What to do: Soil Management

Step 1: Walk around the school ground and answer the following questions:

- a) Is there any erosion present in the school ground? Yes/No _____
- b) Is there any compaction present in the school ground? Yes/No _____
- c) Are pesticides or chemicals used in the school ground? Yes/No _____
- d) Are the garden beds in the school ground mulched? Yes/No _____
- e) Are there any management strategies in place to manage the soil in the school ground eg. fencing off areas, planting to reduce erosion. Yes/No _____
- f) If yes what are these? _____

Student Worksheet: Habitat Extras



Creature Feature

Ponds and **wetlands** provide important habitat for numerous species including insects, **frogs**, reptiles and birds. Did you know that there are 208 species of frogs in Australia?

New words: Wetland, Indigenous, Regenerating

What to do:

Step 1: Walk around the school ground and from the list below, place a tick beside the Habitat Extras that are present.

- Composting area
- Vegetable garden / orchard
- Lizard lounge
- Plants and/or animals in the classroom
- Frog pond/wetland
- Plan to decrease rubbish in the school ground
- Bird bath
- Plants (flora) in the school ground identified and labelled
- Nest boxes
- List of animals (fauna) in the school ground maintained
- Indigenous food garden
- Lids on bins or bins located inside the buildings
- Indigenous plant propagation
- Limited spraying of chemicals in the school ground
- Fallen branches and leaf litter remaining in garden beds
- Water from taps used to water gardens
- Native plants naturally regenerating

Step 2: List any other activities or actions that have been taken to enhance biodiversity in the school ground.

Step 3: How many Habitat Extras are present in your school ground? _____

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?










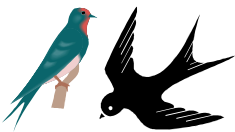





When will you do it / for how long?

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.

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





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







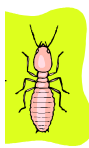
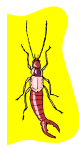









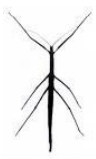


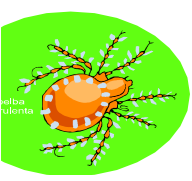





Monitoring Fauna Checklist – Reptiles and Amphibians

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>Lizard</p>	 <p>Snake</p>	 <p>Turtle</p>	 <p>Frog</p>
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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.

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

Student Worksheet: Action Plan for Biodiversity - the Study Area

Issue	Current results	Priority for improvement <small>(High, Medium, Low)</small>	Goal Result	Action Required <small>(Yes/No)</small>	Action - long and short term <small>(Who, what, when, where, how)</small>
% Cover of : Buildings					
Hard impermeable surfaces					
Soft surfaces					
Tree and/or shrub cover (indigenous or native)					
Tree and/or shrub cover (exotic)					
Grass cover (indigenous or native)					
Grass cover (exotics – lawns / ovals)					
Ornamentals and vegetable gardens					
Mulch cover					
Surrounding Vegetation: Large patches present (yes/no)					
Corridors or Stepping stones present (yes/no)					

Student Worksheet: Action Plan for Biodiversity - Habitat Quality

Issue	Current rating <small>(Red – Green)</small>	Current score	Priority for improvement <small>(High, Medium, Low)</small>	Goal Score	Action Required <small>(Yes/No)</small>	Actions - long and short term <small>(Who, what, when, where, how)</small>
Number of Trees/ha						
Number of Habitat Trees/ha						
Understorey and Vegetation Structure						
Environmental Weeds						
Organic Litter						
Logs and Rocks						
Soil Management						
Habitat Extras						
TOTAL						

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

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

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 m² (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.

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

Tally – a method of recording data by making a mark for each positive answer and then counting the number of marks.

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 > Curriculum Activities

LandLearn resources are available from 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 > 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 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 > 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 Conservation and Environment > Environmental Management in Agriculture

Farm Forestry: trees at work. Department of Primary Industries (2005) found at 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 > 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 > 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.lorefortheland.com.au

Misbehaving Plants Susanna Greig, Cooperative Research Centre for Australian Weed management (2007). Download from: 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

Tiwest Night Stalk Interactive Game found at 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 > Research and Conservation > Scientific Publications > The Forgotten Flora.

Victorian Resources Online found at www.dpi.vic.gov.au/vro

Weed Wipeout. Cooperative Research Centre for Australian Weed management (2005). Found at 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 > 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

Grants and support available to schools for sustainability projects (available through LandLearn) e-mail us 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/. 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

Australian Government Department of the Environment and Water Resources - Biodiversity found at www.environment.gov.au > biodiversity

Australian Government Department of the Environment and Water Resources - Sustainability Education found at www.environment.gov.au > resources > education

Catchment Management Authorities found at 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

CSIRO Do it yourself science found at 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 > plants and animals > education

Earthwatch found at www.earthwatch.org/index.html

Flora for Fauna found at www.floraforfauna.com.au

Gould League found at www.gould.edu.au

Greening Australia found at www.greeningaustralia.org.au

Junior Landcare found at www.juniorlandcare.com.au

Landcare Education found at www.landcareeducation.com

Museum of Victoria found at 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

Parks Victoria Education Site found at www.parkseducation.org/

Royal Botanic Gardens Melbourne and Cranbourne found at www.rbq.vic.gov.au/education

Threatened Species Network found at www.wwf.org.au/ourwork/species/tsn/

Toolangi Forest Education Service found at www.dse.vic.gov.au > Forests > For Students

Waterwatch found at www.vic.waterwatch.org.au

Zoos Victoria found at 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.

