

Woodlands - Landuse

This unit provides opportunities for students to develop an appreciation for the Australian box woodlands. They are able to explore the importance of this type of Australian environment to biodiversity and agriculture - past, present and future. The unit focuses on the landuse practices of today, yesterday and the emerging practices of tomorrow.

- Part 1 People and Woodlands - Today
- Part 2 People and Woodlands - Yesterday
- Part 3 People and Woodlands - Tomorrow

The outcomes and indicators from *Human Society and Its Environment K-6 Syllabus* (1998) Board of Studies NSW are included in this unit. The unit concentrates primarily on Stage 2 (S2 - Middle Primary) Outcomes, however the final and future section also has relevance to Stage 3 (S3 - Upper Primary) Outcomes.

The areas of study include:

- Change and Continuity - CC
- Cultures - CU
- Environments - EN
- Social Systems and Structures - SS

Outcomes are set out in the following way

ENS2.6

Area of study/Stage/Outcome

Background Teacher Information

Part 1

White Box Woodland

Plants, like humans, rarely live alone, preferring instead to live with other species in interdependent communities. Each plant community also lives with an animal community, to form complex ecosystem.

The most common remaining tree community on the Western slopes of Northern New South Wales is the white box woodlands, dominated by white box (*Eucalyptus albens*). A woodland is defined as having a canopy cover of less than 30% and usually less than 30m in height. White box usually follows this definition, although in areas previously cleared and regenerated it may have a more dense forest structure. Woodland trees usually have a spreading branch appearance, different to the usual straight trunk and high branching forest trees. White box woodland is most common on the upper and mid slopes, making up to 100% of the upper storey (top layer), although it may be found with other species such as rough-barked apple, grey box, yellow box, Blakely's red gum, white cypress pine, tumbledown gum, or kurrajong.

The understorey (mid and ground layers), is dominated by a variety of shrubs, (hop bush, kangaroo thorn, native olive, cough/curry bush, sticky daisy bush and a variety of wattles), or in the case of grassy white box woodlands, scattered shrubs amongst grass and herbs. The grassy white box woodlands have mostly been cleared or completely modified by grazing to the point where very little remains. White box woodland with a shrubby understorey is much more common.

Based on information from Plants in your pants by David Carr, illustrations by Gail Cannon. A joint project of Greening Australia (Northwest NSW) and Manilla Landcare Group

For further information about Box Woodlands see Bill Semple's article

Wk	Activity	Outcomes and Indicators
	<p>Part 1 – (1/2)</p> <p>People and Woodlands: Today</p> <p>How do we use the land around us?</p> <p>See Background Information describing Woodlands in general and white box woodland in particular.</p> <p>Activity 1 Brainstorm / Think, Pair, Share this question to develop a Data Base or Retrieval Chart. Develop a Concept Map (categorise the students' answers eg recreational, rural, housing, industry, transport, etc.)</p> <p>Activity 2 Use dictionaries / encyclopaedias to develop a word bank of terms which relate to rural enterprises (eg resource, primary industry, farm, cultivate, native vegetation, introduced species, exotic, intensive, biodiversity, sustainable, etc.)</p> <p>Activity 3 Observation, recording and discussion Walk to a local lookout or 'vantage point' and ask the students to discuss what they see. Ask them to comment on:</p> <ul style="list-style-type: none"> ➤ Landforms ➤ Patterns in land use ➤ Identify water courses ➤ Timbered and cleared areas; why is this so? ➤ What this view would have looked like in the 1700's*; in 6 months time (seasonal changes) ➤ What changes have modern Australians brought about? <p>Activity 4 Observation and recording of patterns. Have the students sketch one view from the lookout, noting the patterns of landuse. In class, use this visual information to create an artwork reflecting the landscape they have been viewing. Discuss line and shape eg the natural forms and lines of the landscape are rounded, jagged ..., while the man-made tend to be straight, square,</p>	<p>ENS2.6 Describes people's interactions with environments and identifies responsible ways of interacting with environments. ☐ <i>observes some practices associated with the management of natural and built features and sites</i> ☐ <i>presents alternatives to, and consequences of, using features, sites and places in particular ways</i> ☐ <i>examines the advantages and disadvantages of various land uses</i> ☐ <i>identifies processes used by people to change environments.</i></p> <p>ENS2.5 Describes places in the local area and other parts of Australia and explains their significance. ☐ <i>names and locates natural, built and heritage features in their local area and evaluates their significance</i> ☐ <i>gives reasons why particular activities may be associated with particular natural, built and heritage features and places, eg states why the railway station is where it is</i> ☐ <i>compares natural and built features, sites and places in their local area with other locations in Australia</i> ☐ <i>uses geographical terminology to describe natural and built features in their local area</i> ☐ <i>locates and maps cities, rivers and mountains in New South Wales and uses locational terminology such as north, south, east, west</i></p> <p>SSS2.7 Describes how and why people and technologies interact to meet needs and explains the effects of these interactions on people and the environment. ☐ <i>explains the changes to the local area over time and the advantages and disadvantages of these changes, eg fencing, dams, clearing</i> ☐ <i>makes statements about the responsibilities of producers towards the environment</i> ☐ <i>describes primary industries in the local area</i></p>
Woodlands	- Landuse: Today, Yesterday and Tomorrow.	Nell Chaffey

Wk	Activity	Outcomes and Indicators
	<p>Part 1 – continued (2/2)</p> <p>People and Woodlands: Today</p> <p>Activity 5 Mapping woodland characteristics. Using atlases, have the students locate their town and district. Find maps of Australia which may show:</p> <ul style="list-style-type: none"> ➤ Land use ➤ Vegetation ➤ Landform ➤ Rainfall and climate (temperature extremes)* ➤ National parks and state forests ➤ Soils types ➤ Watercourses <p>Using an Australian atlas have the students draw conclusions about woodlands; where they are found , the landform and climate parameters*, how the land they are native to is being used etc. Have them look at and/or mark these onto a blackline outline of Australia. Then their location (local town/city). See worksheet proforma.</p> <p>Activity 6 Brainstorm different types of local primary industry. Locate articles and advertisements related to primary industries, in local newspapers and on local radio and TV. Choose a particular enterprise and prepare a presentation about that industry. (This might include brochures, maps diagrams, reports of interviews...) The presentation should include the various impacts of this enterprise on the local area: How do we benefit from this enterprise (food, clothing etc)? Who benefits from this enterprise (jobs, business etc)? How was the environment changed to accommodate this enterprise? (Evaluate and give reasons and/or possible solutions.)</p>	<p>Evaluation:</p>

Name: _____

Characteristics of woodlands

- **Name the type of woodland in your chosen locality.**
- **Land use**
- **Vegetation**
- **Landform/s**
- **Rainfall and climate**
- **Soils type/s**

- Name the major **watercourses** found in and through the box woodlands in your area. Underline them if they have built structures on them (eg dams).

Name these and note the reasons why we have created these bodies of water?

- Name any **National parks and state forests** that represent the box woodland ecosystem? Are there any in your area? What are the possible consequences of this?

<p>Please note the activities in this section have been set in Gamilaraay (Kamilaroi) <i>Country</i>. We pay our respects to the Gamilaraay people, traditional owners of much of the North-West of NSW and their culture. The activities in this section hope to reflect some of the knowledge and understandings which the Gamilaraay people employed as caretakers of their <i>Country</i> prior to invasion, in order to encourage an understanding of and appreciation for Aboriginal landuse practices in general and the Gamilaraay people in particular.</p>
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Wk	Activity	Outcomes and Indicators
	<p>Part 2 – (1/2)</p> <p>People and Woodlands: Yesterday</p> <p>How did Aboriginal people use the land around us?</p> <p>During the course of this study, read and share with your students, some or all of these books.</p> <p>Picture books:-</p> <ul style="list-style-type: none"> • <i>The Paddock</i> - Lilith Norman (1992) Random House ISBN 0 09 182651 9 • <i>My place</i> -Nadia Wheatly (1987) Collins Dove ISBN 0 85924 575 6 • <i>You and me Murrawee</i> - Kerry Hashmi (199) <p>Junior Novels:-</p> <ul style="list-style-type: none"> • <i>Walking the boundaries</i> -Jackie French (1993) Angus and Robertson ISBN 0 207 17796 1 • <i>Beyond the boundaries</i> -Jackie French (1996) Angus and Robertson ISBN 0 207 18746 0 <p>Have students observe/notice Aboriginal technology and landuse in these stories. From discussion of these points ask why these practices were not understood/obvious to most non-Aboriginal people who took possession of the lands of the Aboriginal peoples of Australia.</p> <p>Activity 1 Ask if your students know the name/s of the traditional owners of the land they are on. Acknowledge the traditional owners. Brainstorm, Think-Pair-Share, a database of the evidence we have today of their presence on this land. (eg place names, local stories and knowledge of quarry sites, art sites, middens, marked trees etc.) List these.</p> <p>Activity 2 Mapping and language - To increase awareness and extend class knowledge ask students which local places, plants and animals have Aboriginal names and do they know what these names mean. See <u>Background Information</u> and <u>worksheet proforma</u>.</p>	<p>CCS2.2 Explains changes in the community and family life and evaluates the effects of these on different individuals, groups and environments. <i>☐ Compares different versions of local history, beginning with the Aboriginal community that lives/lived in the area.</i> <i>☐ Identifies the effects of change on the environment eg changes in land use.</i></p> <p>ENS2.6 Describes people’s interactions with environments and identifies responsible ways of interacting with environments. <i>☐ Examines some of the practices used by Aboriginal peoples to care for the local woodland and the water environments</i> <i>☐ Recognises that Aboriginal peoples have a special relationship with the land</i> <i>☐ Identifies Aboriginal place names in their local area</i></p> <p>SSS2.7 Describes how and why people and technologies interact to meet needs and explains the effects of these interactions on people and the environment. <i>☐ Identifies ways in which Aboriginal people met their needs in the local woodland environment</i> <i>☐ Identifies some ways that religious and/or belief systems operate to satisfy needs.</i></p>

	<p>Part 2 continued (2/2) People and Woodlands: Yesterday How did Aboriginal people use the land around us?</p> <p><u>Activity 3</u> Look at the <u>Map of tribes of NSW</u>, either on the screen or as an overhead. What do you think the size of the tribal lands may reflect? Students can compare the indigenous national boundaries with the maps they created and used in Part 1, Activity 5.</p> <p><u>Activity 4</u> Guided visualisation activity <i>(i)</i> Walk into the bush, have students sit comfortably with their eyes closed and listen to the scenario/guided visualisation provided or one of your creation. <i>Or</i> <i>(ii)</i> In the classroom as above. To help create an appropriate background, listen to relaxation music based on the Australian bush eg A Symphony of Australian Birds, Simtrack Studios, P.O. Box 293, Mortdale N.S.W. 2223. Follow the guidelines when using this strategy. At the conclusion of the visualisation have students describe/summarise the features of the Aboriginal way of managing and cultivating the landscape. See <u>Background Information</u> and <u>sample visualisation</u>.</p> <p><u>Activity 5</u> Investigate the possum, a woodland animal. Consider all the uses which Aboriginal people made of the various parts of a possum. Collate these uses in a retrieval chart. See <u>Background Information</u> and <u>worksheet proforma</u>.</p> <p><u>Activity 6</u> Investigate the kurrajong, a woodland tree. Consider all the uses which Aboriginal people made of the various parts of a kurrajong tree. Collate these uses in a retrieval chart. See <u>Background Information</u> and <u>worksheet proforma</u>. Activities 5 and 6 can be related back to Part 1, Activity 6.</p>	<p>CUS2.4 Describes different viewpoints, ways of living, languages and belief systems in a variety of communities.</p> <ul style="list-style-type: none"> □ <i>Gives some reasons why their local community is different to others and why it is of value and should be respected</i> □ <i>Gives some similarities and differences between communities in Australia. (past and present)</i> □ <i>Locates and identifies evidence of the languages used in the community, beginning with the original Aboriginal languages, eg signage, place names</i> <p>Evaluation:</p>
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Background Teacher information

Part 2, Activity 2:

Kamilaroi (Gamilaraay) words we use for plants and animals

As the *Wunda* (ghost/white people) moved north from the Sydney area and settled on the lands of the Kamilaroi, they came across animals and plants they had never seen before. Because the *Wunda* did not have names for these animals in English, (they were different to any that they had in England and Europe) or words for these plants and animals from another Aboriginal language, the Kamilaroi names (pronunciation sometimes altered), were used. Today people all over the world use these words.

Listed below are the Kamilaroi and Australian English words for some plants and animals native to the lands of the Kamilaroi before white settlement

English:	Kamilaroi:	What is it?	Is it still here?
Brolga * #	burrulga	bird	no
myall *	maayal	tree	yes
bindi-eye *#	bindayaa	prickly plant	yes
bumble tree	bambul	tree	yes
coolabah *#	gulubaa	tree	yes
galah *#	gilaa	bird	yes
mulga *#	malga	tree	yes
budgerigar *#	gidjirrigaa	bird	yes, rare in the wild

* Macquarie School Dictionary, Jacaranda Press, (1995)

Macquarie Junior dictionary, 2nd ed., Jacaranda Press, (1992)

[The Kamilaroi (Gamilaraay) and Yuwaalaraay languages share many words.]

Some Kamilaroi names come from the sounds the animal makes

English	Kamilaroi
kookaburra willy wagtail magpie	gugurrgaagaa thirri thirri / jirri jirri galalu / burruagalu

As the Kamilaroi language and dialects were not written languages, pronunciation could vary from group to group. When English speakers came to write it down their spellings reflected these variations. They confused some sounds; for instance, 'g' and 'k'/'c'.

Name: _____

Kamilaroi words we use for plants and animals

1. Say each Kamilaroi word to yourself, listen to how it sounds; can you find the Australian English version of the word?

Complete the table.

Kamilaroi			
bambul	malga	gilaa	gulabaa
burrurga	bindayaa	gidjirrigaa	maayal

Australian English	Kamilaroi	What is it?	Is it still here today?
Brolga			
myall			
bindi-eye			
budgerigar			
coolabah			
galah			
mulga			
bumble tree			

2. Some names for our native birds sound like the call the bird makes. Say the Kamilaroi word to yourself and decide which bird it belongs to. Use a different coloured line to join each bird to its Kamilaroi name.

kookaburra

gulu / galalu / burragalu

willy wagtail

gugurrgaagaa

magpie

thirri thirri / jirri jirri

Background Teacher information

Landuse Yesterday, Activity 2:

Kamilaroi place names

Many of today's place names in this area were originally Kamilaroi place names. When non-indigenous people became interested in the meanings of the names they had adopted, the pronunciations and meanings had been corrupted for a number of reasons:

- often place names were anglicised, the emphasis being given to different syllables in the word/s
- over time, Kamilaroi people were discouraged from using their language, and increasingly becoming English speakers
- The Kamilaroi people of a particular area were no longer to be found living in their *country* (spiritual/living place) and indigenous people, not of that *country*, nor familiar with the traditions of that *country* were asked to interpret, and give their understandings of the names.

As a consequence some places have had a number of interpretations over time and we are unable to say with any real certainty which is correct. A selection of place names and their generally held meanings are listed below. This is not an exhaustive list but it does show that place names reflected the geographical and natural features of an area.

Mullaley	where there is one (mountain)
Gurley	river wattle or native willow
Yallaroi	stony place
Tareelaroi	having reeds
Narrabri	many (creek) forks / having black-snakes
Collarenebri	with coolabah blossoms
Boggabri	place of creeks
Quirindi	where there are fish
Graman	long valley/plain
Gragin	high (long) peak
Barwon	big one (river)
Gunnedah	at (the place of) white stones
Garah	lagoon
Wee Waa	fire or firewood, thrown
Pilliga	for spears or where (we go for) spears
Breeza	here there are fleas
Keepit	many bends in the river
Goonoo Goonoo	much faeces
Bundarra	place of kangaroos

A possible awareness raising activity would be to get a local map. (How local depends on your situation and interest in detail. Your local council and the NRMA are good sources of this kind of information.) Have your students mark in or highlight 'local language' place names*, then have them locate and write the generally accepted meaning on the map/worksheet you have prepared. Elders from your Aboriginal community and members of your historical society may prove helpful sources of knowledge for this activity. Ask students if they know, or from the map, can they see the feature/s after which a place is named. Be sure to ask students if there have been any changes, eg if a place means 'place of fish' or other animal or plant, is the animal/plant still found there? If not, speculate why not? Or speculate why a particular animal/plant would have been found in that area? Or what is it about the trees here that would make them good for spear making? Etc.

***Be aware that other language groups overlapped the woodland areas so all place names will not be exclusively Kamilaroi.** Also, in more recent times, many people have used a variety of Aboriginal words from other language groups to name their homes/properties. There are a number of publications available of Aboriginal words/names, their meanings and origins.

References

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Howell, Robyn (1982) The History and Culture of the Aboriginal People of the Ashford District, NSW Department of Education

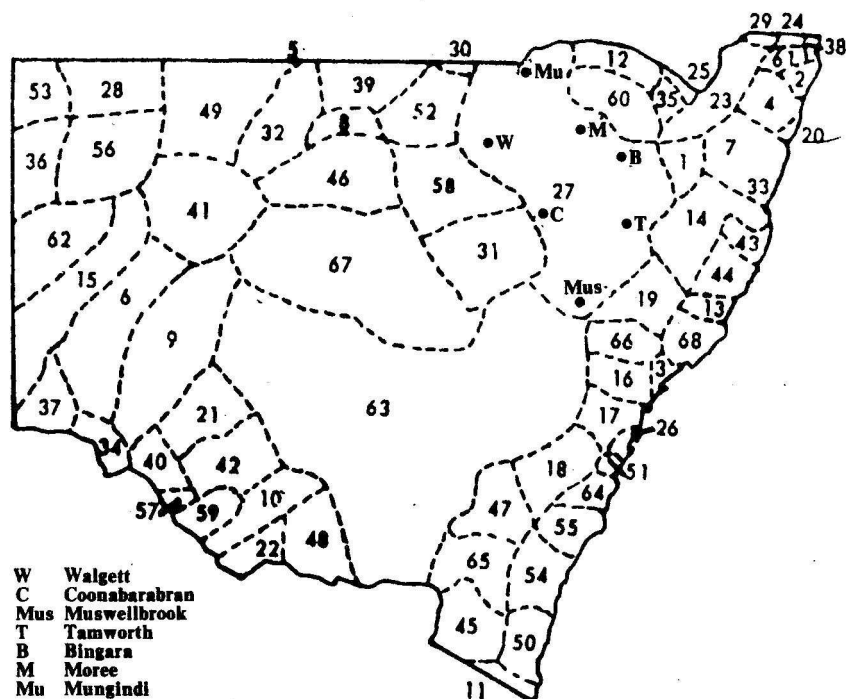
Kneale, K E (1984) A Mee Mee's Memories, Kay Kneale, Inverell

O'Rourke, Michael (1997) The Kamilaroi Lands: North-central New South Wales in the early 19th century. Michael O'Rourke, Griffith

Background Teacher Information

Part 2 Activity 3

ABORIGINAL TRIBES OF NEW SOUTH WALES



- | | | |
|----------------|-------------------------|----------------|
| 1. Anaiwan | 24. Kalibal | 47. Ngunawal |
| 2. Arakwal | 25. Kambuwal | 48. Pangerang |
| 3. Awabakal | 26. Eora (Port Jackson) | 49. Parundji |
| 4. Badjelang | 27. Kamilaroi | 50. Thaua |
| 5. Badjiri | 28. Krenggapa | 51. Turawal |
| 6. Barkendji | 29. Kitabal | 52. Ualarai |
| 7. Banbai | 30. Koamu | 53. Wadikali |
| 8. Baranbinja | 31. Koinberi | 54. Walbanga |
| 9. Barindji | 32. Kula | 55. Wandandian |
| 10. Baraparapa | 33. Kumbainggiri | 56. Wanjiwalku |
| 11. Bidawal | 34. Kureinji | 57. Wati-wati |
| 12. Bigambul | 35. Kwiambal | 58. Weilwan |
| 13. Birpai | 36. Maljangapa | 59. Wembawemba |
| 14. Dainggati | 37. Maraura | 60. Weraerai |
| 15. Danggali | 38. Minjangbal | 61. Widjabal |
| 16. Darkinung | 39. Morowari | 62. Wiljakali |
| 17. Daruk | 40. Muthimuthi | 63. Wiradjuri |
| 18. Gandangara | 41. Naualko | 64. Wodiwodi |
| 19. Geawegal | 42. Narinari | 65. Wolgal |
| 20. Jiegara | 43. Ngaku | 66. Wonarua |
| 21. Jita-jita | 44. Ngamba | 67. Wongaibon |
| 22. Joti-jota | 45. Ngarigo | 68. Worimi |
| 23. Jukambal | 46. Ngemba | |

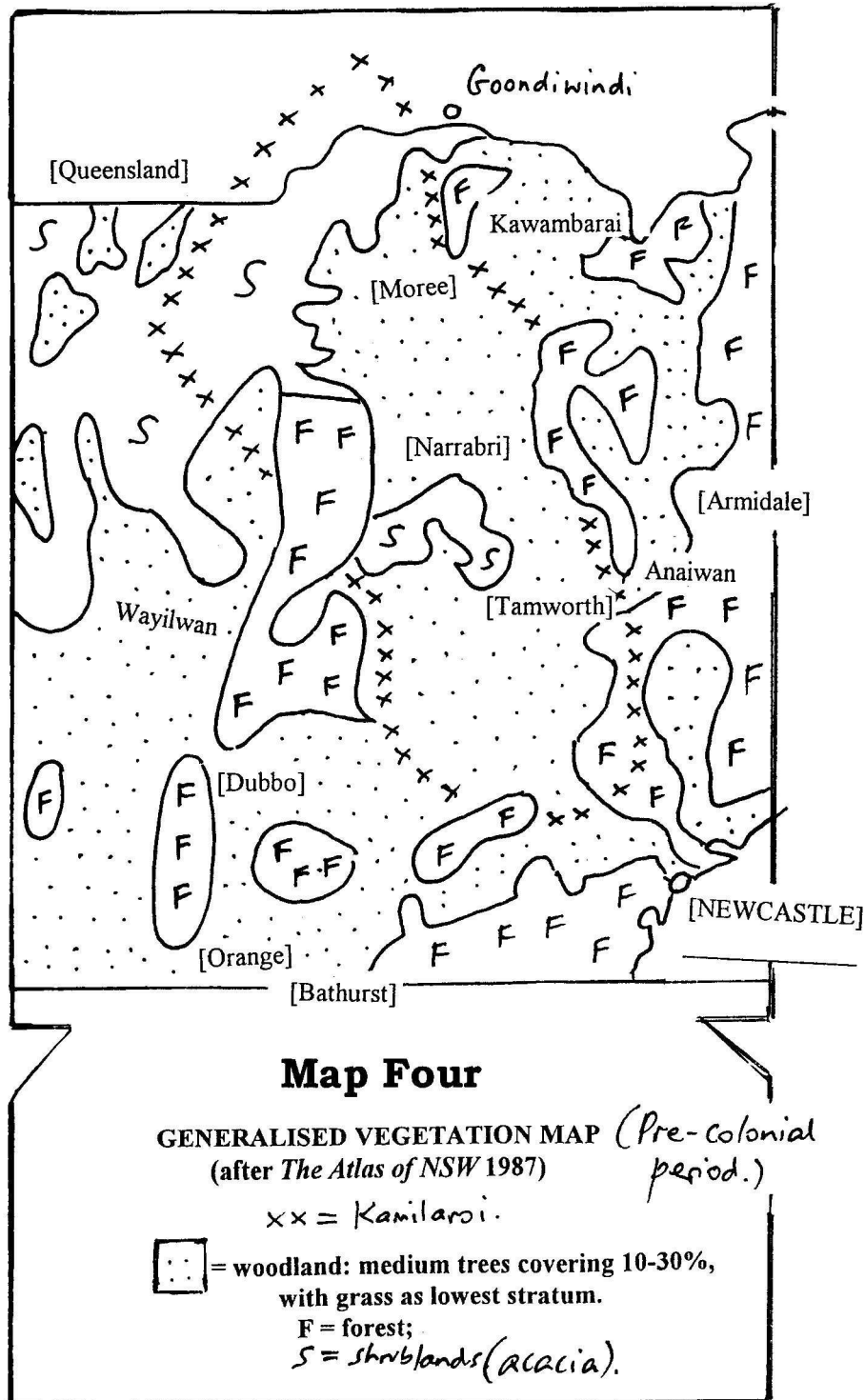
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From O'Rourke (1997)

Background Teachers Information

Landuse Yesterday, Activity 3

From Kneale (1984)



Background teacher information

Landuse Yesterday, Activity 4

Contrary to the impressions of the first Europeans and many of their descendants, the Aboriginal peoples of Australia farmed their land. Without fences they consciously managed and harvested the food resources of their *country* (spiritual and living place) according to the weather conditions and the season, to ensure food resources in particular were available in the future. Groups we call tribes moved more often during lean times or in country which was by nature arid, compared to the movements of groups during good seasons or in country which was by nature more abundant in resources. (Farm sizes of modern day Australia also reflect this variation, for in the far west of the state, a living could not be made on one thousand hectares as it can be on more fertile lands with regular rainfall adjacent to the Great Dividing Range.) It is widely acknowledged that Aboriginal peoples contributed to the extinction of the megafauna and made permanent changes to vegetation in many areas through their use of fire to promote pasture growth. However, Aboriginal land management attitudes and practices allowed them to only harvest what they could use each day, to always leave enough for the animal or plant to replenish its kind and to move according to 'the season' and resources of their *country*. This enabled the Aboriginal peoples to sustain their way of life, for themselves, their descendants and their environment for many millennia.

References

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Ferry, John (1978) Kamilaroi, Hodder & Stoughton, Lane Cove

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Rolls, Eric (1997) The Pilliga, The Murray-Darling Basin Commission, Canberra

Background Teacher Information for Guided Visualisation

Landuse Yesterday, Activity 4

As a strategy, guided visualisations/mind journeys are useful for a number of reasons. They -

- concurrently develop visual images with language
- create a vicarious experience - in order to arouse interest, encourage empathy and enable students to establish a personal relevance for a situation or task
- harness inner thoughts, images and feelings as preparation for problem solving, writing, performance and creativity.

As a teacher when creating or using a guided visualisation, there are four important steps to consider and take.

1. Preparation

To be prepared for the guided visualisation the students must be relaxed and focused.

2. Timing

Don't rush, it's easy to go too quickly and not give your students enough time to create their images and keep up with you. It helps to create the images for yourself as you go, and to observe your students' body language.

3. De-briefing

You need to direct the students out of the guided visualisation at the end. Gentle suggestions allow them to readily make the transition back to the class environment. Some examples of this are; "When I count to five, open your eyes and return to the room. 1 2 3 4..... 5.", "Now see yourself returning to the classroom, open your eyes when you are ready".

4. Be cautious

Try out the guided visualisation you have designed on a peer/friend for feedback, especially if you think the 'created situation' may have strong emotive power.

The guided visualisation provided may be used as it is (The Kamilaroi and Australian English words are optional), modified to suit your situation or merely used as a guide for your own creation.

Reference:

Atkins, Julia (1993) personal communication

Background Teacher Information

Part 2, Activity 4

Grassy white box woodland: Yesterday - Sample guided visualisation

Close your eyes, sit comfortably and relax

Breathe deeply in out in out in out

The buildings, fences, roads and sounds of machines begin to fade.

Listen to the sounds of the natural world around you bird noises insect noises

leaves rustling as a breeze catches them There are many trees, ancient twisted gums, shrubs, the tall grasses a mixture of green and straw colours in scattered tufts, thicker in the clearings where there is little or no woodland canopy

It is spring about two hundred years ago (c.1800) ... it is the time between The Dreaming and the coming of the *Wunda* (ghost/white people) to this place.

The land is vast..... in each direction bluish hills meet the sky, some close, others a distant irregular line on the horizonto the west, the line of hills ends, you glimpse the stretch of the plains, a far off sea of grasses dotted with islands of shrubby trees trees blanket the countryside from the hilltops to the river, then hugging the rivers curving course, they stay with it across the plain.

The woodlands are all about you. You stand on a track used at times by all who pass this way, maybe a *bandaarr* (*bundar*/kangaroo) in a rush, or *Murri* (people) harvesting their land

Following the contours of the slope, the track makes its way down through trees *yarraan* and *bibil* (gum and white box trees), along side scattered tall, straight *gurraray* (cypress pine), shiny leafed, kurrajongs, weeping myall or wilga a shrubby undergrowth of cassia, hopbush, wattle and others till it reaches the grassier open areas further down with their patchwork of grasses and leafy groundcoversthe woodland of the lower slopes, river and creek flats is more open

It is day..... the bush is alive with the activities of birds and insects in the air, on the ground, in, on and among the plants creatures feeding, building, resting. Some creatures aren't so obvious,*bandaarr* ('*bundar*'/kangaroo) resting in the cool hollows and dappled shades of the woodland, *mudhay* ('*moodai*'/possum) sleeping in tree hollows, termites and grubs mining the trees and soil

The *bibil* (white box tree) beside you, you cannot fit your arms around it, how old can it be? many limbs have fallen over time,the hollow remnants of these lost branches stick out at odd angles from the trunk and branches of the tree. You observe and tend 'your country' well for this tree, like others of its kind, has been well managed and will continue to provide for the *Murri* (people), there is a hollow with the fresh, telltale marks of a possum den. Around another *guni* (native bees) come and go; mmm, sticky golden honey to be enjoyed. From others you hear the monotonous rasping call of young *gilaa* (galah), reminding their tired pink and grey parents, perched and grooming in the branches, they are awake and hungry *yurran thaali* (tree goanna) will want to visit this tree, looking for unhatched, unguarded eggs. Listen, the sharp, raucous call of a *muraay* (white cockatoo) flying above the tree tops toward the river..... At ground level, ripening wattle seed pods and grass seeds, when collected, will be ground into flour and baked into cakes... look, the native iris have multiplied from the roots left last year, the harvest of roots will be good again you think about how good they are to eat when roasted.

Still following the track down towards the river, the leaf litter is thick on the ground, you step over logs, fallen branches, some housing termites, good places t for *bigibilla* (echidna), *galibilalaa* (red-bellied black snake), ...and lizard to live. Good tucker.

Closer to the river, trees become larger, twisted, lumpy, river gums and whispering she-oaks stand among the bank and billabong clusters of bottlebrush, tea tree and reed beds which fringe the river's course.

..... the smell of smoke drifts through the air,..... you hear *murri* (people) laughing, talking, small groups are returning from the work of the day in the bush and along the river,..... they have fared well the young men, using spears they traded axe heads for with tribes to the west, have proved their worth, there is a *bandarr* (*bundarr*/'kangaroo), and the women and young children have a *bigibilla* (echidna), roots, fruit, leaves, and a harvesting of *ginbaay* (small mussels) from the bend in the river and fresh *garrang-ay* (black duck) eggs, gathered from the reedbeds; the children only taking what can be eaten tonight and leaving at least one or two in each nest for the bird to hatch.

The afternoon is the time to prepare the fire and food for the evening meal, the main meal of the day. The *murri* (people) are busy. As *yaraay* (the sun) sets, the *gugurrgaagaa* (kookaburra) chuckle in the trees..... the woodland birds and ants cease their labours and begin to settle for the night

Tonight each shall eat according to his/her position and totem. After the meal, when darkness creeps to the edge of the camp, and surrounds it, the young children go, ... to sleep among *mudhay* (*moodai*/'possum) skin rugs in the refurbished *gundi* (bark shelters) at this camp by the bend in the river.

Clapping sticks clink, a singer recounts a Dreaming while the elders sit about the fire planning tomorrow, the older boys will be taken to select and remove bark from a tree to begin a canoe, there is *goodoo* (guduu/Murray cod) and *thagaay* (yellow belly) to be found in this place and stone for axe heads to trade with tribes down the river for ochre for ceremony, and good spear lengths for hunting.....

Families sit around small fires close to their *gundi* (bark shelters/huts). Men are shaping and carving *barran* (boomerang) or mending *bilaar* (spears), their women, making nets from the fibre of kurrajong and other plants to catch birds and fish or to make *gulay* (bags) to carry tools and food, or stitching together *mudhay* (*moodai*/'possum) skins; a new cloak for next winter. The night is quiet now except for the call of the *bulul* (mopoke), the rustle of busy *mudhay* (*moodai*/'possums) moving about the tree canopy, the territorial call of a far off koala.

As night begins to fade, you begin to wake up, you are leaving the camp in the woodland and returning to the present, you start to hear the sounds of machines again, you are aware of the classroom and fellow class members around you. the buildings, fences and roads are returning, when you open your eyes, it will be (today's day/date) again.

References

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- Dugan, Michael (1992) How They Lived Before the Whites, Macmillan Education, South Melbourne
- Ferry, John (1978) Kamilaroi, Hodder & Stoughton, Lane Cove
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- O'Rourke, Michael (1997) The Kamilaroi Lands: North-central New South Wales in the early 19th century. Michael O'Rourke, Griffith
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- Trindall, Joe and Pearl (1998) personal communication

Background Teacher Information

Landuse Yesterday, Activity 5

The useful possum

Body part	Use	Use	Use
fat (animal fats in general were used in these ways)	moisturiser and insulator Fat rubbed on the skin keeps it from drying out and helps to keep the body warmer, when it was cold.	medium To mix dry ingredients for paints and ointments.	To make the body greasy for wrestling contests.
muscle/meat	food Gutted, then quickly roasted on hot coals.		
bone	engraver (lower jaw was attached to a wooden handle with twine bark and gum.)	needles	Toothpick (? - This is just a possibility)
skins	blankets (dried, sewn together, fur on inside, engraved on outside)	cloaks (dried, sewn together, fur on inside, engraved on outside)	water containers (after fur was singed off)
fur (removed from skin)	string (spun with plant fibres to make bags and aprons)	body decoration (often combined with teeth, grass, feathers etc.)	
sinews	strapping (to fix objects together)	'thread' (to sew skins together for blankets and cloaks)	

The possum was not only a staple food of the peoples of the woodland but also valuable for the many 'comforts and conveniences' it could be utilised for. Not only was it to be found in plentiful numbers in the undisturbed woodland environment, it was relatively easy to find and harvest from the hollows of older gums in which it slept during the day. Even young children were skilled at recognising the telltale marks and signs of a possum hollow.

You may find it useful to follow up this activity using an animal that is currently farmed on land in the white box woodland areas. Eg sheep, cattle - dairy and beef, poultry etc.

Name _____

The useful possum

Think-pair-share the body parts/resources a possum could be divided into. Write your responses in the box.

When your class has talked about the uses of these various body parts/resources, complete the following table.

Body part	Use	Use	Use

Part 2 Activity 5 Student worksheet

- Do you think it is a good idea to use animals used for food for other purposes as well? Say why?

Think about something you have eaten today. What animal did it come from? _____ Now complete the table below the way you did for the useful possum.

Body part	Use	Use	Use

Is the animal you selected a native or introduced animal?

Background Teacher Information

Landuse Yesterday, Activity 6

The useful kurrajong

Plant part	Use
Seed	food
Roots	food
Exudate (brownish substance which weeps from the trunk and branches)	food
Bark	Fibre to weave for nets bags and body decorations
Trunk and branches	<ul style="list-style-type: none">• a source of water• a vantage point
leaves	<ul style="list-style-type: none">• shade• a hiding place

The kurrajong was often one of the few woodland trees left standing in cultivation paddocks when land was cleared for farming purposes. This was because the leaves are useful, high quality fodder for stock during times of drought. Also, as the tree relies on a single deep root, it does not compete as much as many other woodland tree species, with the shallow rooted cereal crops, that replaced the deep rooted native grasses and understorey plants. It was the seeds from these plants, which Aboriginal people harvested, ground, and made into cakes/bread. And of course, by just being there it does all the useful things plants do for our environment, plus being endemic (native to the white box woodlands), it adds habitat value for many other creatures. Ants for one just love them!

Name: _____

The useful kurrajong

Think-pair-share the parts of the plant/resources a kurrajong could be divided into. Write your responses in the box.

When your class has talked about the uses of these various plant parts/resources, complete the following table.

Plant part	Use

- Think about something you have eaten today. What plant did it come from? _____

Part 2 Activity 6 Student worksheet

- Now complete the box and table below the way you did for the useful kurrajong. You may need to discuss this or do some research.

Think-pair-share the parts of the plant/resources a _____ could be divided into. Write your responses in the box.

--

Plant part	Use

Is the plant you selected native or introduced? _____

Does it have habitat value too? _____

List:

References

Dugan, Michael (1992) How They Lived Before the Whites, Macmillan Education, South Melbourne

Ferry, John (1978) Kamilaroi, Hodder & Stoughton, Lane Cove

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Porter, Steve (2000) personal communication

Trindall, Joe and Pearl (1998) personal communication

Background Teacher Information

Part 3 People and Woodlands: Tomorrow

How can we, as Australians, best use and sustain the environment/resources around us?

The spirit of Part 3 is summed up by the following quote. If we substitute Non-Aboriginal peoples for *Paheka*, *Country* for the *whakapapa*, Aboriginal peoples for Maori and Australia for *Aotearoa* this quote says it all:

"We need the knowledge the *Paheka* [white people] brings from all over the world as well as the sense of belonging and the *whakapapa* [genealogy/history/culture] of the Maori. The separate paths our people have trod can unite in a highway to the future that is built on the best of both. Maori and *Paheka*, alone and divided, cannot build a secure and happy future for *Aotearoa* [New Zealand]."

Dame Whina Cooper

Maori Kuia (Elder) and Stateswoman

From:

Shaef, Anne Wilson. (1995) *Native wisdom for white minds: Daily reflections inspired by the native peoples of the world*. Random House, Milson's Point

Please note:

Woodlands, Landuse - Tomorrow, is based on knowledge gained, and understandings developed in *Woodlands, Landuse - Today* and *Woodlands, Landuse - Yesterday*. Understandings and knowledge from other woodland units (*Woodland Field Studies* and *Comparing the ecology of the Australian woodland and rainforest environments*) will also play an important role in assisting students in making best use of this section. The following activities are a selection, from which teachers and/or students can choose all or some of the activities, in an order which best suits their situation and purpose.

Background Teacher Information

Landuse Tomorrow, Article summary

Biodiversity in Australia: What, where, and for how long?

Debra Panizzon (Curriculum Studies, University of New England, Armidale, NSW)

Andrew Boulton (Ecosystem Management, University of New England, Armidale, NSW)

Published in full in *Australian Science Teachers Journal*, Volume 46 / Number 4 / December 2000

Abstract

"Australia's most serious environmental problem is the loss of biological diversity or biodiversity. Although most people think of biodiversity as simply the number of species in an area, it can be described at three levels: genetic, species and ecosystem. On a global scale, Australia harbours much of the world's species diversity, and has remarkably high numbers of endemic (found only in Australia) species. Unfortunately, many of our unique species have become extinct, especially in the last 200 years. There are now efforts to protect our biodiversity, and to slow the rate of extinctions. This article reviews current threats to biodiversity and efforts to protect or enhance it in Australia."

Introduction

- The 1996 report on Australia's State of the Environment highlighted loss of biodiversity (plants, animals, and micro organisms, the genes they contain and the ecosystems they form) as Australia's most serious environmental problem.
- ***An important part of any conservation management plan is education and public awareness.***

Biodiversity is

- **Genetic biodiversity** = the variety of genetic information in all of the individuals of each species.
The largest range of populations as possible, including those in marginal habitats near the edge of their natural range, is needed. Selection, natural and commercial, changes the frequency of genes in a pool. The concern is, periodically plants and animals which have become useful to humans are genetically similar which, while it contributes to high production, means that *they* are all susceptible to the same pests and diseases. (The potato Famine in Ireland, and its consequences, was an example of this.) To avoid this situation growers cross-breed commercial stock with wild stock. Danger arises when wild stocks of plants and animals become extinct.
- **Species diversity** = the variety of living species.
Any area will have a *number of different species* and a *relative number of individuals* within each of the species present. This combination represents the wealth of diversity.
Concern arises when a healthy variation is not present. For example, a polluted area may have very few species but individuals are present in large numbers.
- **Ecosystem diversity** = the variety of habitats, biotic communities and ecological processes, and the diversity within these.
Habitat type + climate type = a bioregion [eg (white box) woodlands]. Classification of bioregions is essential for the regional management plans for biodiversity.

The present situation

- There are 1.7 million species known and described worldwide - the number of species could be as high as 5 - 100 million.
- Species richness is greatest in the tropics and decreases towards the poles.
- In Australia there are thought to be over a million species, including micro- organisms. Most are not described.
- Australia's geographical history and range of ecosystems means Australia has much of the world's biodiversity.
- % of the world's species pool endemic to Australia include:-
 - 85% of flowering plant species, (14 families),
 - 84% mammal species, (6 mammal families),

- ❑ 45% bird species, (4 bird families),
 - ❑ 89% reptile species,
 - ❑ 93% frog species.
 - Climate changes 1.5 million years ago, followed by the coming of the Aboriginal peoples at least 50,000 years ago, led to a loss of biodiversity as forest and woodlands, and smaller, more agile species predominated in the drier conditions.
 - The most dramatic changes to Australia's biodiversity have occurred in the 200 years since European settlement. Since 1788 Australia has lost:-
 - ❑ 10 of 144 marsupial species,
 - ❑ 8 of 53 native rodent species.
 - Since 1788 many ecosystems have:-
 - ❑ been simplified and fragmented,
 - ❑ had many exotic species introduced.
- As a consequence many native species are now rare, endangered, threatened or extinct.
- Ecosystem loss between 1788 - 1995:-
 - ❑ 43% of forests cleared,
 - ❑ 60% coastal wetlands in S and E Australia lost,
 - ❑ nearly 90% temperate woodlands (eg white box woodlands) and mallee cleared,
 - ❑ nearly 75% rainforests cleared,
 - ❑ more than 99% temperate, lowland grasslands in S-E Australia lost.
 - In Australia:
 - ❑ no vegetation types remain undisturbed by human activities,
 - ❑ between 1990-95 more than 70 football fields were cleared an hour,
 - ❑ the estimate for 2000 was 8 million trees and 500 000 ha native vegetation.
 - At present, **worldwide** decline and loss of biodiversity is at its highest for 60 million years. Species extinction rates globally each year are:-
 - ❑ Terrestrial vertebrates (mammals, birds and most reptiles is 1 - 10),
 - ❑ Aquatic vertebrates c. 10 -100,
 - ❑ Plants 10 -100,
 - ❑ Terrestrial invertebrates 1000 - 10 000.
 - Worldwide, species on the verge of extinction:-
 - ❑ 25% of mammals,
 - ❑ 10% of trees,
 - ❑ 12% birds.

The threats to biodiversity globally and in Australia are

- A direct and indirect result of:
 - **Increasing human population/Urbanisation**

Australia is the most urbanised society in the world. 85% live in towns over 10 000 people. Ecosystems and biodiversity are affected by the location of urban centres and the supply of water, food and materials from rural ecosystems supplying, and accommodating the waste products of urban populations.

 - **Our lifestyles and expectations**

Numbers of tourists and people pursuing recreation are reaching more inaccessible areas. Heavy tourist/recreation activity, which can be associated with skiing, off road vehicles, and fishing are disturbing ecosystems. Exotic seeds can even be introduced to national parks through horse droppings of trail-riders.

 - **Land clearing**
 - is the single biggest threat to Terrestrial biodiversity
 - impacts on biodiversity in marine and aquatic ecosystems
 - leaves relatively infertile and inaccessible fragments
 - **Exotic species**

Are considered to be the most threatening process in terrestrial biogeographical regions. Exotic fish (European carp, plague minnow) are part of the decline of amphibian and fish biodiversity.

 - **Exotic genes**

Results from mating related, yet genetically distinct organisms, lead to loss of identity in the original gene pool. Examples - domestic dogs and dingoes, honey bees interfering with pollination mechanisms and sexual reproduction of native plant species

 - **Extraction industries**

For example mining and forestry (both of which produce fuel to generate electricity).

 - **Agriculture and pastoralism**
 - **Pollution**

No one activity is responsible for the loss of biodiversity. The causes are interrelated, one leading to the other and cumulative. Successful management and solutions will not result from treating a single cause or just the symptoms.

Rapid land clearing

- ➔ loss of food for herbivores & insectivores → loss of food for carnivores,
- ➔ reduced soil stability → topsoil erosion & loss of nutrients → disruption of microbial pathways in the soils → transported sediments
- ➔ transported sediments → impact on adjacent ecosystems → establishment of exotic species who favour the disturbed environment + compete with native species.
- ➔ Urban & agricultural development → suppression of regeneration by native species → permanent/irreversible changes to the ecosystem.

The benefits of biodiversity

Provision of ecosystem services such as natural water purification, nutrient recycling, organic matter breakdown, and continuing the health of the soil

For example trees and vegetation assist soil formation, and as a critical part of the food web, promote biodiversity improving the chance of plant and animal population recovery after major disturbances - natural (fire, flood, cyclone) and resulting from human activity, as opposed to further extinctions.

Maintenance of biological resources for use as foods and medicines.

- ☐ Worldwide 5000 plant species have been used for food, today most people rely on fewer than 20 species. We need biodiversity to; augment the wild plant gene pool, contribute to global food capacity (eg acacia seeds used by Aboriginal people are superior to rice and wheat in energy, protein and fats).
- ☐ Aboriginal people used native plants for medicines, e.g. eucalyptus oil for relief from respiratory tract infections. Other native species are being used and investigated for medicinal use.
- ☐ Other biological uses are - timber, ornamental plants, oils such as tea tree oil.

The social benefits of biodiversity includes cultural, recreational and aesthetic values.

- ☐ Biodiversity conservation contributes to sustaining Aboriginal cultural identity.
- ☐ Australian biodiversity is a major factor to attracting tourists (scenery and wildlife).
- ☐ Grow from research, education and monitoring natural areas which are valuable living laboratories and reference points.
- ☐ Provided opportunities to adapt to change.

Protecting or restoring biodiversity and the future

- **"Ensuring future biodiversity is the responsibility of all Australians"**
- **"Education and environmental awareness play a critical part in the management and commitment."**

Biodiversity is on the political agenda

The National Strategy for Conservation of Australia's Biological Diversity (1996), signed by Commonwealth, state and territory governments, provides a cohesive framework nationally and internationally to protect biological diversity and ecological systems, and remnant natural areas. It employs six key management strategies.

Growing awareness

Many current land and water use practices are not sustainable and there is a growing awareness of the precarious nature of Australia's environments.

Websites on Australian biodiversity

- Australian Environment Online Articles

<http://www.erin.gov.au/portfolio/esd/biodiv/articles/soybean.html>

<http://www.erin.gov.au/portfolio/esd/biodiv/articles/drugs.html>

<http://www.erin.gov.au/portfolio/esd/biodiv/articles/cemetery.html>

- Community Biodiversity Network Education Centre

<http://nccnsw.org.au/member/cbn/context/>

- Environment Australia
<http://chm.environment.gov.au/aust.html#PortraitofAustralia'sbiodiversity>
- Facts and Figures
http://nccnsw.org.au/member/cbn/projects/FactsofLife/FOL_A.html
- Myths
<http://nccnsw.org.au/member/cbn/projects/EducationCentre/myths.html#BiodiversityMyths>
- Hot issues
http://nccnsw.org.au/member/cbn/projects/bionet/hi_index.html

These also may still be useful

September is *Earth Alive!* Biodiversity Month.

For ideas and resources

www.tnd.com.au/cbn/

- For student projects
www.cbn.org.au/projects/earthalive/2000.html

Other relevant web sites, contact organisations and resources:

- Bio diversity Group, **Environment Australia**
www.environment.gov.au
Environment Australia - Department of the Environment and Heritage
Produces a brochure, *Biodiversity at a glance: nature's variety, our heritage, our future*
Which has lots of suggestions for what we can all do in our everyday lives to protect biodiversity presented in a colourful pictorial format. They also produce a 24p. booklet with more detailed information and a full colour poster. Both are available free by phoning 1800 803 772
- **Community Biodiversity Network**
www.cbn.org.au
- **Woodland Bird Watch:**
<http://home.mira.net/~raou/constat10.html>
- **Birds Australia** - *Conservation through knowledge*
415 Riverdale Rd Hawthorn East, Vic 3123
 - Ph 03 9882 2622
 - Fax 03 9882 2677
 - Email raou@raou.com.au
 - woodland birds coordinator, based in Dubbo, Judie Peet Miworld@bigpond.com
 -
- **Greening Australia North West**
Produced the publication of *Kit and Kaboodle* which contains a wealth of field study activities suitable for primary school students to enhance environmental appreciation, understanding and awareness.
 - Kentucky St., Armidale NSW 2350 Ph: 02 6772 3248

- **Department of Land and Water Conservation**

Produce a variety of publications pertaining to landuse and sustainability including VegNotes Series 1 - 4

Barwon Regional Office 155-157 Marius St. Tamworth NSW 2340

General Enquiries Ph: 02 6764 5900

Landcare 02 6764 5984

Gunnedah Education Centre PO Box 462, Kamilaroi Highway, Gunnedah NSW 2380

Tel. 02 6742 4893 Fax. 02 6742 5109 E-mail. Ceaston@dlwc.nsw.gov.au

- **National Parks and Wildlife Service**

Produce numerous publications pertaining to various issues involving flora, fauna and the future.

www.npws.nsw.gov.au

Armidale Office 85 Faulkner St. Armidale

Ph. 02 6776 4260

Fax 02 6771 1894

Email armidale@npws.nsw.gov.au

Farming for the Future 02 6773 7210

Living with Fire (1998) Crown Copyright ISBN 0 731360184, A joint bushfire management agency publication. Part 1 *Fire ecology*, examines the broader ecological issues of bushfire in Australian habitats.

- **Natural Heritage Trust**

Have lots of brochures with accompanying web pages,

eg Logs have life inside - <http://www.ea.gov.au/firewood>

- **NSW Agriculture/Salt Action**

Have published an environmental education unit designed to meet Human Society and It's Environment Stage 3 outcomes focusing on the Murray Darling Basin entitled *A taste of salt - rivers, catchments and salinity*. (1999) ISBN 0 7347 11352 161 Kite St., Orange, NSW 2800

- **WIRES**

Tamworth 0500 855 333

PO Box 734 Tamworth NSW 2340

Armidale 33 John St. Uralla NSW 2358

Ph. 02 6778 4994

Fax 02 6778 3372

- **Reptile awareness displays of Australia**

Phil Grono

www.radoa.com.

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Email phil@radoa.com

PO Box 1604 Tamworth NSW 2340

Background teacher information

Part 3 Activity 8

HOW TO ASSESS HABITAT & CONSERVATION VALUE

(Phil Spark 1999)

The beginning of good management requires a thorough assessment and description of the woodlands present state. The initial assessment becomes the benchmark to measure positive and negative changes in response to different management strategies.

The initial inspection of your woodland should identify the habitats present and the abundance of each of them. From that assessment the areas of highest conservation value are identified and strategies can be developed to address degrading processes such as habitat removal, erosion, and over grazing.

Habitats found to be deficient can be prioritised for rehabilitation or reconstruction, and locations can be identified where immature trees suitable for fencing and firewood timber can be taken with minimal impact.

Suggested Approach To Habitat Assessment

Select three sites of approximately 50 x 50 metres within your woodland at locations where the tree density is most dense, least dense, and a middle density between both.

In those areas count the number of:

- ⇒ large tree hollows greater than 10 cm diameter, that a Brushtail Possum, Cockatoo, Large Goanna, or Owl could live in
- ⇒ the number of small tree hollows up to 10 cm diameter that a Squirrel Glider, Parrot, Bat or Reptile could live in
- ⇒ count the large logs greater than 30 cm diameter
- ⇒ count small logs up to 30 cm diameter

Determine the percentage of ground area covered by:

Rock - e.g. Boulders with crevices, scree slopes, scattered rock on soil.

Litter – depth and type e.g. bark, leaves, coarse debris of limbs,

Bare soil – exposed soil between vegetation, litter and rock.

Vegetation – Grasses, herbs, low bushes.

Vegetation Diversity and Structure Assessment

- ⇒ Record the number of tree species present: their heights, how many distinct canopy layers are formed.
- ⇒ The percentage of each tree age class i.e. Dead trees, senescent or old growth trees, mature trees, immature trees, and juvenile trees.
- ⇒ The number of shrub species present: their heights, how many distinct layers do they form.
- ⇒ The approximate number of tall grass species present: their average height.

MANAGING WOODLAND HABITATS FOR CONSERVATION AND AGRICULTURAL PRODUCTION.

The management of any woodland will determine the habitat present and its conservation value.

It is no exaggeration to say that human influence on natural systems is increasingly supplanting the process of natural selection, so that, as Sir Otto Frankel has said, "we have acquired evolutionary responsibility", and it behoves us to exercise it wisely.

IMPORTANT MANAGEMENT ISSUES

Grazing Management, Fire Regime, Timber removal, Feral Animal Control, Riparian Zone Management, Weeds, Corridors/Linkages.

(A). *GRAZING*

The majority of the white box woodlands remaining are grazed by sheep and cattle, if managed poorly grazing can be degrading to the conservation value of the area. However if managed properly grazing can be carried out whilst enhancing the conservation value of degraded woodland.

Good grazing management maximises the grazing intensity for short duration's which encourages regeneration and plant species diversity. Good grazing management improves ground cover, maximises moisture retention, maximises productive capability and provides fauna habitat.

Consequence of *bad management* on fauna and their habitats.

- Loss of shelter
- Higher predation by both native and feral predators.
- Loss of and competition for food sources
- Loss of nesting sites
- Loss of foraging site
- Loss of nutrients
- Loss of moisture through increased runoff and evaporation

THE POTENTIAL IMPACTS OF POOR GRAZING MANAGEMENT .

• Physical impacts such as soil compaction

Australian soils and vegetation are not adapted to the heavy cloven hoofs of livestock. This is exacerbated during wetter conditions leaving the soil with a hard compressed surface. During dry times the disturbance caused by the heavy hoofs results in increased erosion by wind and water.

The hard compacted surface deflects the rainfall and slows infiltration which results in increased runoff and erosion. That increases the aridity of the area as that moisture normally retained in the ecosystem has been lost. The entire food chain suffers as a result of less water in the system, droughts are more prolonged and severe.

- **Competition for food resource**

Many native fauna sustain themselves by eating the same grasses, seeds, herbs, and foliage of shrubs and trees as those eaten by livestock. They are unable to cope with such competition and are excluded or reduced in population as a result.

- **Exclusion of palatable species**

Livestock have preferred tastes just as we do, some native grasses, shrubs, herbs and trees are sought out for their eating quality. Continued grazing pressure will eliminate such species as they are prevented from growing and setting seed. This can happen even at low stocking rates if set stocking is practised.

- **Decreased ground cover**

Soil erosion and weeds are known to increase as vegetation cover decreases. The germination of some tree and shrubs species is favoured by such conditions resulting in a change to species composition over time. Water is lost out of the system.

- **Increased evaporation rates.**

It stands to reason, that if sunlight is directed onto the soil surface the soil will dry out more quickly. While Australian plants have adaptations to extreme climate variability, if the mean moisture content of the soil changes over time those plants affected will be displaced by more arid tolerant species.

- **Modification to forest or woodland structure**

Grazing has a similar impact as that of low intensity fire, both favour some grass and shrub species and both limit the regeneration of many shrubs and trees, resulting in a modified structure which has reduced biodiversity.

- **Exposure to predation**

Small terrestrial animals (frogs, reptiles, mammals, ground birds) all require cover to forage within their territories. Logs, fallen debris, and rock are ideal refuges and foraging sites but to get from refuge to refuge they depend on grass or shrub cover. The removal of such cover severely limits their movements as nocturnal predators such as Barn Owl, Masked Owl, Boobook Owl, Barking Owl, Tawny Frogmouth, Fox and Cat can easily detect and catch them. The same can be said for diurnal fauna whose movements are easily detected by Raptors and birds such as Kookaburras, Butcherbirds, Magpies and Currawongs.

(B). FIRE MANAGEMENT

The continued study of past fire regimes is vital to our own successful management of the land. If we are to ensure the continued viability of all our biodiversity we must manage its habitat in a way that mimics the environment from which it evolved.

Fire has the potential to severely degrade a woodland, frequent use modifies the flora species composition and destroys existing habitats such as hollow logs and hollow trees. Fire use requires careful management to maximise benefits and minimise impacts.

Fire should not be used in White Box remnants without just cause. It can be useful for stimulation and germination of the soil seed bank to encourage species diversity of plants. However its use should be carefully controlled to ensure sections containing important habitat are retained unburnt and an overall mosaic effect is created.

Fire also has the potential to encourage the spread of weeds such as Coolati grass, to the point that it will exclude most other native species.

It is considered that spring burns minimise the impact of fire on fauna as winter dormant species are active and the shelter required for over wintering, predator avoidance, and nesting sites can regenerate quickly over summer.

Careful management is essential because there is no longer connection of similar habitats to enable migration, geneflow and recolonisation, or escape from catastrophes such as fire and the pending climate change.

(C) TIMBER MANAGEMENT

- **Tree hollows**

Tree hollows are usually the most limited habitat resource and the main factor determining the presence of breeding populations of hollow dependent : Parrots, Cockatoos, Owls, Kingfishers, Pardalotes, Squirrel Gliders, Sugar Gliders, Brushtail Possums, Bats, Reptiles and Frogs.

For that reason all existing hollow and mature trees need complete protection. Protection is achieved by avoiding such trees when getting firewood and fence timber, and ensuring they are protected from fire.

Artificial hollow habitats such as nest boxes are very successful for providing nesting and shelter sites for fauna in areas where there are none.

Thinning stands of unnaturally dense regrowth and allowing the timber to dry out can provide a sustainable firewood and fencing timber resource.

- **Regrowth**

Thinning regrowth gradually over a period of years can recreate a natural tree spacing, and enhance the regeneration of arboreal habitats. It is important to retain trees that enhance the proportion of each tree species present and those that will provide the earliest hollow habitats.

- **Logs, Litter and Debris**

Ground cover of logs, litter, and debris provides essential habitat for both vertebrates and invertebrates. Retaining logs and litter increases the overall mosaic of habitats and food resources present, which promotes flora and fauna species diversity, moisture retention and nutrient recycling .

Artificial litter and debris, which could be anything from hay or wood chips, to old car parts or carpet are very effective to provide shelter and nesting sites for both invertebrates and vertebrates.

(D). RIPARIAN ZONE MANAGEMENT

Wetlands – Dams – Drainage lines – Creeks – Rivers

- ⇒ The riparian vegetation found along waterways in woodlands provides essential habitat for both invertebrates and vertebrates.
- ⇒ Permanent water bodies provide essential habitat for species such as the platypus, water rat, water dragon, water skink, turtles and waterbirds.
- ⇒ Temporary water bodies provide essential habitat for invertebrates, frogs, turtles, and breeding and foraging habitat for water birds.
- ⇒ Artificial banks and levees are very effective to enhance aquatic and semi-aquatic habitats, they can create a mosaic of aquatic habitats ranging in depths and water permanency.
- ⇒ Fencing to exclude stock from core areas will promote aquatic and semi-aquatic plants which provide shelter and nesting sites.
- ⇒ Riparian vegetation should be protected by a buffer of 30 mtrs either side of the waterway.

(E) FERAL AND PEST MANAGEMENT

Feral animals such as Cats Foxes and Wild Pigs predate on ground nesting birds, small mammals, reptiles, and frogs. In disturbed environments the predation pressure is sufficient to exclude many species, and severely limit others.

Introduce herbivores such as Rabbits and Goats can have a significant impact on some plants by selectively browsing on palatable shrubs etc to a point that they will eliminate them.

Native fauna can also reach pest proportions requiring control. For instance Noisy Miners effectively exclude many birds from their territory to protect their invertebrate food source creating an ecological imbalance which can result in an invertebrate abundance and lead to dieback of trees.

Populations of Feral and Pest species can be controlled by:

- ⇒ Shooting – Poisoning – Trapping – Habitat destruction.
- ⇒ Environmentally friendly baiting programs for foxes and pigs can be organised in conjunction with the Rural Lands Protection Boards.
- ⇒ Cats can be trapped or shot.
- ⇒ Rabbits can be controlled by ripping their burrows (no need to destroy logs)

F). WEEDS

Many introduced plants have become weeds capable of invading remnant vegetation. Such plants require constant control to prevent their dominance of the native plants which provide the preferred food sources and habitats for native fauna.

Often where weed invasion occurs feral animals are favored by the habitat created by the weeds, foxes, rabbits and blackberries are a classic example how a weed can advantage feral fauna.

(G) CORRIDORS – LINKAGES BETWEEN REMNANTS

Without linkages to permit migration and dispersal of fauna across the landscape many fauna would become locally extinct in small remnants, as they are too small to support viable breeding populations of many native species.

Those remnants large enough to support small breeding populations will also eventually die out through inbreeding, catastrophe, predation or a combination of all threats.

Consequently existing linkages require protection to maintain and enhance their conservation values. In those areas where linkages have been broken by clearing etc revegetation is required to rebuild the corridor to enable migration and dispersal of fauna to occur again.

(H) REFUGES

To guarantee conservation of biodiversity in a locality requires some areas to be managed solely for conservation. Such areas are to be protected from all the threats so far identified and managed accordingly to enable conservation to occur during the extremes of droughts, floods, and fire.

This role is usually played by National Parks and Nature Reserves. Unfortunately no such reserves exist in the North West that conserve the vegetation types found in productive agricultural land, such as White Box Woodland. Therefore it is important that such conservation reserves be obtained either by voluntary conservation agreements or by purchase.

	Part 3 - (1/4) People and Woodlands: Tomorrow How can we, as Australians, best use and sustain the environment/resources around us? See Background Information - Introduction	This part of the unit can be modified/used to work towards and develop both Stage 2 and Stage 3 outcomes. CCS2.2 Explains changes in the community and family life and evaluates the effects of these on different individuals, groups and
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	<p>Activity 1 This activity can be used as a pre- and post unit assessment. Using the Wild life in your Backyard and Wildlife on the Farm from the Greening Australia <i>Kit and Kaboodle</i> Activities. Have students respond to the drawings and answer the questions. <u>Backyard worksheet proforma</u> <u>Farm worksheet proforma</u></p> <p>Activity 2 Have students complete the table showing past and present uses and management of the woodland environment. Then draw conclusions, make observations and perhaps make suggestions. See <u>Background Information</u> and <u>worksheet proforma</u>.</p> <p>Activity 3 Information selection and evaluation. Have students monitor newspapers, radio and television news and current affairs programs for a specified period of time and make a note of the environmental issues mentioned, (including ads). They can categorise these items, tally them and form conclusions. For instance which issues feature locally, nationally, or globally. An issue can then be selected to research. Included in their product should be a description of the problem, the causes, the implications (for woodlands), the solution and how they, as an individual, can participate in that solution.</p> <p>Activity 4 Using the information from Activity 3, students can respond to a selected issue or issues using Edward De Bono's Six Thinking Hats strategy.</p> <p>Activity 5 Take the solutions for an issue researched in Activity 3. Have students examine the solution/s using De Bono's PMI (Plus, Minus and Interesting aspects of an idea/situation) thinking strategy to determine which solution best chance of being sustainable and benefiting the environment and the well-being of the animal, plant and human communities involved.</p> <p>Part 3 continued (2/4) People and Woodlands: Tomorrow How can we, as Australians, best use and sustain the environment/resources around us?</p> <p>Activity 6 Problem solving using a future scenario: (i) Self written using the Teacher background</p>	<p>environments.</p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Demonstrates an understanding that different groups may have different points of view about changes in the community</i> <input type="checkbox"/> <i>Identifies some of the effects of change on different individuals and groups in the local community</i> <input type="checkbox"/> <i>Identifies the effects of change on the environment eg landuse</i> <input type="checkbox"/> <i>Identifies continuing and changing practices in landuse</i> <p>ENS2.5 Describes places in the local area and other parts of Australia and explains their significance.</p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Gives reasons why particular activities may be associated with particular natural and built heritage features, eg can state why remnant vegetation is mostly found on hills, along roads and in areas of poorer fertility? Or why the woodland understorey is missing in most areas.</i> <input type="checkbox"/> <i>Compares ways in which members of the community, past and present, have used/use features of the local area to meet their needs.</i> <input type="checkbox"/> <i>Recognises the importance of some Aboriginal land and water management practices</i> <input type="checkbox"/> <i>Describes ways in which Aboriginal peoples have used the environment to meet their needs</i> <input type="checkbox"/> <i>Explores environmental practices of other cultures, (as practiced in Australia)</i> <input type="checkbox"/> <i>Describes how people can construct and modify environments in a manner that reflects ideas, culture, needs and wants.</i> <input type="checkbox"/> <i>Uses geographical terminology to describe natural and built features in their local area</i> <p>ENS2.6 Describes people's interactions with environments and identifies responsible ways of interacting with environments.</p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Identifies issues about the care of places in their locality, or places of importance to them</i> <input type="checkbox"/> <i>Presents alternatives to, and consequences of, using their locality in particular ways</i> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Examines the advantages and disadvantages of various land uses</i> <input type="checkbox"/> <i>Compares uses of their locality today with past land uses</i> <input type="checkbox"/> <i>Plans and recommends strategies for caring for their locality</i> <p>SSS2.7 Describes how and why people and technologies interact to meet</p>
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	<p>information for guided visualisation as used in Part 2, Activity 4 and/or (ii) From an Australian author, eg - <i>The Paddock</i> - Lillith Norman (1992) Random House - <i>Window</i> - Jeannie Baker (1991) Julia MacRae Books - <i>Beyond the boundaries</i> - Jackie French (1996) Angus and Robertson and/or (iii) Prepared, eg - The Greening Australia <i>Kit and Kaboodle</i> pictures from Part 3, Activity 1 - Unit 10, Linking Landcare, Upper Primary, Decisions, decisions. From: <i>Do something. Environmental education in action for primary schools</i>. (1998) Planet Ark and the Australian Association for Environmental Education (AAEE, PO Box 152, Manly NSW 2095 Ph: 02 9976 5087) Students should work in groups of 2 or 4 Step 1 Share the scenario Step 2 Brainstorm the problem/s you recognise in the scenario Step 3 Decide on the underlying cause/s to the problem/s (Research may be necessary*) Step 4 Brainstorm possible solutions to the underlying problem/s* Step 5 Decide what the criteria/benchmark/standard will be to determine if a solution is to be judged as being successful or not, eg is it sustainable, does it maintain woodland biodiversity?* Step 6 Score each solution using each of the agreed benchmarks to determine the best solution Step 7 Develop a plan of implementation for the 'best' solution* Step 8 Present your solution to the class/grade (Here, Steps 5 & 6 could be repeated if desired.) Part 3 continued (3/4) People and Woodlands: Tomorrow How can we, as Australians, best use and sustain the environment/resources around us? Activity 7 Desire a future/Design a future. Ask students to respond to the challenge;</p>	<p>needs and explains the effects of these interactions on people and the environment. <input type="checkbox"/> <i>Explains the changes to a system over time and the advantages and disadvantages of these changes, eg in relation to landuse, for the provision of food, water and shelter for an increasingly urban population.</i> <input type="checkbox"/> <i>Makes statements about the responsibilities of producers and consumers within systems towards people and the environment</i> <input type="checkbox"/> <i>Describes how changes in technology have affected lifestyles and the environment, eg farming and transport technologies.</i> ENS3.5 Demonstrates an understanding of the interconnectedness between Australia and global environments and how individuals and groups can act in an ecologically responsible manner. <input type="checkbox"/> <i>Locates and describes patterns of human involvement in environmental areas of Australia, eg human use of woodland areas</i> <input type="checkbox"/> <i>Explains the effects of human changes on an environment, evaluating the positive and negative aspects of these changes</i> <input type="checkbox"/> <i>Explains some ways in which Aboriginal management of environments contributes to ecological sustainability</i> <input type="checkbox"/> <i>Evaluates a variety of ways of addressing environmental problems in Australia</i> <input type="checkbox"/> <i>Uses geographical terminology and tools to locate and investigate environments</i> <input type="checkbox"/> <i>Identifies how some aspects of religious and other belief systems can affect the way in which groups interact with the environment, eg Aboriginal landuse</i> <input type="checkbox"/> <i>Investigates an environmental issue of local, regional, state, or national significance in relation to landuse and woodlands.</i> <input type="checkbox"/> <i>Participates in the maintenance or improvement of an environment, eg a piece of remnant woodland, re/establishing a woodland corridor or understorey between/in remnant woodland, including endemic native plants in urban garden plantings.</i> ENS3.6 Explains how various beliefs and practices influence the ways in which people interact with, change and value their environment. <input type="checkbox"/> <i>Identifies the different viewpoints that may be held by groups and individuals, including Aboriginal peoples, farmers and miners, about landuse.</i></p>
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	<p>(i) What do you want the woodlands future to be considering all the elements, (natural, human, animal and plant) or</p> <p>(2) After listening to/reading, John Marsden's <i>Prayer for the twenty-first Century</i>, (1997) Lothian. ISBN 0 85091 814 6, write a response, eg Prayer for the environment/twenty-second century. Using the book as a model a selection of student art work could be included in the finished product.</p> <p>Activity 8 Assessing a patch of bushland and formulating a management plan This could be an ongoing class/grade/school project which involves remnant bushland in/adjacent to the school or in the community (urban or rural setting). Permission to undertake such work would mean that you would need to contact and establish a suitable understanding with the relevant landholder/authority (local council, government department). Procedures to follow can be found in:</p> <ul style="list-style-type: none"> • <i>Your bushland. Tips for Managing Native bush plants in the New England Region</i> by Peter J Clarke • <i>Conserving box-ironbark forests in Victoria education kit</i>, Dept. Natural Resources and the Environment, Vic. Section 4: <i>Conducting a local box-ironbark forest conservation project</i> has a good model/guide to follow - Australian Nature Conservation Agency, • <i>VegNotes</i> Series 1 (2 & 3) NSW Dept Land and Water Conservation <p>Summary/Overview of bushland health check: <u>How healthy is your patch of woodland?</u></p> <ul style="list-style-type: none"> □ Is there a variety of different types and species of woodland plants? □ Are all stages of the plant lifecycle (seeds/fruits, seedlings immature, mature, dying/dead) present over time (seasons/years)? □ What is the presence of introduced/weed species to the endemic woodland? <p>Part 3 continued (4/4) People and Woodlands: Tomorrow How can we, as Australians, best use and sustain the environment/resources around us?</p> <p>Other Activities:</p> <ul style="list-style-type: none"> • <u>Unit 15 Lets make a better future</u> From <i>Do something! Environmental education in</i> 	<ul style="list-style-type: none"> □ Examines how natural, cultural, religious, historical, economic and political factors can influence people's interactions with the environment. □ Examines issues associated with differing values about natural and built environments, using a variety of sources, including the media □ Expresses a personal point of view on an environmental issue and provides supporting evidence □ Recognises Aboriginal Dreaming stories explain the origins of features of the landscape, natural phenomena and ways of caring for the environment □ Compares the relative costs and benefits of different technologies used to modify and create environments, eg landuse practices and sustainability/biodiversity <p>SSS3.7 Describes how Australian people, systems and communities are globally interconnected and recognises global responsibilities.</p> <ul style="list-style-type: none"> □ Describes how, and gives reasons why, Australia is interdependent with other nations, eg environmental treaties, biodiversity, goods produced from woodland areas for export etc □ Makes some statements about global responsibilities, eg responsibilities of users and producers of goods and services, care of the planet <p>Evaluation:</p>
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	<p><i>action for primary schools</i> (1998) Planet Ark and the Australian Association for Environmental Education Inc.</p> <p>Has activities which encourage children to become aware of their individual contribution to a sustainable future whether they be a producer and/or a consumer in the way they live their day to day lives.</p> <ul style="list-style-type: none"> • <u>Extinction is forever. Who's next?</u> <ul style="list-style-type: none"> □ To represent the extinction rates, of woodland/Australian fauna, use percentages for the real/projected rates of extinction taken from a reputable source, eg (Pannizon and Boulton (2000) Biodiversity in Australia or a Murray-Darling Basin publication), and have students using grid paper (100 squares to a page), mark in the corresponding number of squares to represent the nominated percentage. A separate page could be used for each group, eg mammal, fish, reptile, bird etc. □ To extend this concept further the percentage of individuals who would be missing from the class group could then be calculated and symbolically represented in a manner which students would not find confronting. • <u>A selection of Picture Books with environmental thoughts regarding the future.</u> <ul style="list-style-type: none"> □ <i>Where the forest meets the sea</i> - Jeannie Baker (1987) Julia MacRae Books □ <i>The story of Rosy Dock</i> - Jeannie Baker (1995) Random House □ <i>The hidden forest</i> - Jeannie Baker (2000) Walker Books □ <i>The Lorax</i> - Dr Suess (1971) William Collins and Sons □ <i>Kenju's Forest</i> - Junko Morimoto (1992) Angus and Robertson □ <i>Goanna</i> - Jenny Wagner/Noela Hills (1988) Viking Kestrel(Penguin Books) □ <i>Cry me a river</i> - Rodney McRae (1991) Angus and Robertson (HarperCollins) □ <i>The man who planted trees</i> - Jean Giono/Jean Roberts/Frederic Back (1983) Collins Dove <p>This is not an exhaustive list, however it is worth seeing if these titles are available in your library, and keep your eyes open for other picture book titles. Picture books, like poems often simply and eloquently get to the heart of quite complex issues. Comparatively quick to read and share, they make excellent discussion/activity starters for students of all ages.</p>	

Background Teacher Information

Landuse Tomorrow, Activity 2

Woodland landuse comparison table

Think about the observations you have made and the conclusions you have reached studying past and recent/present land use practises. Complete the table.

Natural Resource type	Traditional non-Aboriginal landuse	Traditional Aboriginal landuse
Land	<ul style="list-style-type: none"> Land clearing Intensive landuse requiring soil disturbance to produce food surplus to sell Areas fenced, mostly according to a grid for management purposes and to denote ownership Restricted movement (within a property). Ability to survive extreme weather conditions is influenced by access to redirected water, ability to pay for alternative food supply for stock (brought in or to move stock elsewhere). 	<ul style="list-style-type: none"> No land clearing Minimal soil disturbance No fences /communal guardianship of <i>Country</i> Movement according to seasonal breeding cycles of endemic plant and animal food sources. Ability to survive extreme weather conditions influenced by the group's fitness/ability to move to and with the food sources they harvested.
Water	<ul style="list-style-type: none"> Rainwater collected and stored for later domestic use Surface water dammed, stored and redirected to water animals and to irrigate plant crops away from watercourses. Also stored, redirected and treated for use by large town (urban) populations Rivers used to take away treated and untreated water waste from towns (urban population centres) along the way Artesian/subterranean water sources tapped stored and redirected to water animals and to irrigate plant crops away from watercourses and in arid areas 	<ul style="list-style-type: none"> Surface water used when and where it was found by people (guardians of the <i>Country</i>) and the animals and plants which were endemic to and moved around a given habitats. Rivers used for transport by canoe, a source of shelter, (living things, including a rich variety of plants gather along watercourses) food (e.g. fish, mussels, water birds and their eggs) and water
Plants Plants continued	<ul style="list-style-type: none"> Introduced domesticated species bred for a variety of market requirements Some endemic plants retained for fodder, wood and shelter value for people, introduced animal and plant crops. Crop rotation and fertilizers used to maintain high levels of production to supply clothing, shelter and food needs of growing population. Monoculture - one crop to a given area for a season Harvesting generally means 	<ul style="list-style-type: none"> Use of endemic species only No domestication of medicinal, otherwise useful or food plants Harvested according to the season and the daily requirements of the group. Plants grew in their ecological niches, scattered throughout the woodland. Harvesting always meant leaving enough breeding stock for the next season. Use of fire to stimulate fresh native grass growth Use of endemic species for

	collecting everything planted and starting from the beginning for each season's crop. <ul style="list-style-type: none"> Not so much now but use of fire to clear stubble from paddocks after harvest. Today chemicals are used to clear areas of plant competition and/or to hasten the harvest. 	medicinal purposes
Animals	<ul style="list-style-type: none"> Use of a small number of introduced/domesticated, mainly hard hoofed species, bred for a variety of market requirements Stock rotated around defined areas (paddocks). To maintain high levels of production, at various levels; chemicals used to maintain health and control parasites and intensive feeding practices can be implemented (from fodder crops to feedlots) to supply the clothing and food needs of an increasingly town based (urban) population. (These products are supplemented by a range of primary and secondary imported products.) Most endemic animals are removed with time as their habitat is removed/modified. Larger animals and some birds can become pests as they take advantage of the provision of water and introduced crops and their numbers increase. 	<ul style="list-style-type: none"> Use of a range of undomesticated, endemic native species only Harvested according to the season and the daily requirements of the group. Animals lived in their ecological niches, scattered throughout the woodland. Harvesting always meant leaving enough breeding stock for the next season. Use of fire to stimulate fresh native grass growth to encourage animals out into the open for easier of hunting. barter for imported/traded products (weapons, ochres)

Look at the information in your table. What conclusion/s can you draw from the information in this table?

Student responses should reflect an understanding that the Australian environment has over time been influenced by two different landuse regimes. 1. That of the Aboriginal peoples which prevailed for tens of thousands of years, successfully sustaining a relatively small population and a rich biodiversity of flora and fauna in what was an increasingly arid landscape, using the resources about them. 2. The landuse regime, which has prevailed for the past 200+ years, which began when the British settled on the East coast of Australia and began the systematic 'take over' of the country was based on the European knowledge and understandings, practices and species. All that was native, if not useful to or if it did not fit into the European model, was swept aside and/or replaced. This removal has intensified with an increasing population, the consequences of which are becoming more obvious (erosion, salinity, feral animals, increasing extinctions, lack of sustainability, water contamination etc). We need to discover ways to combine an appreciation and understanding of the native resources (plant and animal) with improved farming methods to sustainably support a larger population while maintaining a healthy environment. Students could perhaps have a 'what if' brainstorming session where they could come up with combinations of ideas from the *indigenous landuse practices* and *non-indigenous landuse practices* to enhance and improve future landuse and environmental quality. Following are some 'real life' ideas/examples scientists are currently studying/developing to stimulate you and get you started!

- "It means agriculture, biodiversity, river systems, forests, all being managed from now on as a single complex, biological system. And this, they say, will require a complete change to the way Australians work their land.
It will involve new crops, new cropping cycles and even the re-breeding of established crops like wheat so they imitate the biological and hydrological characteristics of deep-rooted native grasses. If Australia is to keep earning a living from agriculture then it must radically redesign its farming. We need to create new systems tailored to the unique biophysical characteristics of Australia's soils and climate ... to make agriculture a natural feature of the landscape."

Dr John Williams, CSIRO

Reinventing Australian plant production systems

From: Citizens Wildlife Corridors Armidale Inc., Autumn 2001, Newsletter Number 20

- An excellent collection of information regarding strategies to address current and 'future' landuse issues and the moves toward sustainability and biodiversity are to be found in *Rural production and native vegetation conservation: adding value to the natural assets of New South Wales. Information for landholders* (1998) NSW Dept Land and Water Conservation. It contains a series of informative leaflets called *VegNotes*, which NSWDLWC produced with TMC Murray Catchment Management Committee Inc - Series 1 *Getting to know your vegetation*, Series 2 *Managing native vegetation*, Series 3 *Re-establishing native vegetation* and Series 4 *Economics of native vegetation*
- *Your bushland. Tips for Managing Native bush plants in the New England Region* (1998) UNE by Peter J Clarke is very student friendly and covers lots of areas such as problems and solutions, regeneration, assessment, monitoring etc
- *Re-leafing New England: A farmer's guide to trees on farms* produced by New England Trees on Farm (1994) UNE has lots of useful diagrams and information.
- *A farmer's guide to trees and bushland on the North-West Slopes and Plains* produced by North-West Catchment Management Committee (1997) UNE ISBN 07313 11700 also has useful diagrams and information
- *Murray-Darling Basin Resources* (1997) Peter Crabb, Murray-Darling Basin Commission (GPO Box 409, Canberra ACT 2601- ISBN 1 875209 58 1) gives a very comprehensive overview of resources, landuse and management
- Australian Nature Conservation Agency, (1996) *Conserving box-ironbark forests in Victoria education kit*, Department of Natural Resources and the Environment, Victoria, has a comprehensive collection of background information on fauna and flora. Also a selection of classroom and fieldwork activities. A section (4) entitled, *Conducting a local box-ironbark forest conservation project* is a good model/guide to a similar woodland study in your local area.
- Research into and understanding our soils and the impact our society's landuse production systems are having on them are pointing the way to

changing methods of production of the foods and fibres we all require:
 "Healthy soil is literally the foundation of a profitable grazing business..... soil loss
 out strips the rate of replacementsoil is made up of stuff (minerals and living and
 previously living organic matter) and spaces (air and water)" 70-90% organisms in
 an ecosystem can live underground in healthy soil "The key to creating and
 maintaining a healthy soil is providing habitat and nourishment for the organisms in
 the soil "According to Australian soil scientist, Dr Christine Jones, "pulsed"
 grazing (short graze periods with adequate recovery periods) adds organic matter to
 the soil and is the most effective grazing method for maintaining healthy soils.
 Leaving adequate residue (plant cover) on the soil surface is also critical. Christine
 Jones says when a plant is heavily grazed then rested, as occurs under a cell grazing
 system, the roots get an intermittent 'pruning' which releases organic material into
 the soil and then allows the root system to regrow However, a conventionally
 grazed pasture system doesn't allow this type of root growth because when a plant is
 constantly being eaten off it cannot accumulate the energy needed to grow more
 extensive roots. Returning adequate organic matter to the soil and encouraging
 its decomposition into humus are essential for healthy productive soils. But most
 farming practises deplete organic matter and destroy humus. According to Dr Jones,
 "Conventional farming and grazing techniques create biological deserts". The use of
 nitrogen fertiliser, which doubled crop yields, was considered a major break through
 in agriculture. However, its cost has been enormous. Farmers became miners,
 depleting their farms of their most valuable resource, humus. You can afford,
 economically or biologically, to lose the humus. Replenishing soil organic matter and
 maintaining a thriving soil microbe population are essential"

Dave Pratt: *From: Citizens Wildlife Corridors Armidale Inc., Autumn 2001, Newsletter
 Number 20*

Top 10 reasons to care about biodiversity

Biodiversity:

1. Feeds and clothes us
2. Keeps our world clean
3. Keeps us healthy
4. Keeps us in touch with our origins
5. Renews our spirit
6. Inspires our artists
7. Will look after our children
8. Boosts our economy
9. Teaches us to wonder
10. Protects our planet

From: Citizens Wildlife Corridors Armidale Inc., Autumn 2001, Newsletter Number 20

Also no matter where we live;

- Our food and medicines come from biodiversity
- Native birds, bats and insects pollinate our gardens
- We breathe oxygen produced by trees

- Trees take up carbon dioxide produced by our factories
- Plants keep the air fresh in our offices
- Tiny bugs break down our garbage into fertile soils
- Our crops are protected by pests from foraging birds and insects
- Marine organisms clean up the sewerage we put into the oceans

From: Citizens Wildlife Corridors Armidale Inc., Autumn 2001, Newsletter Number 20

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Landuse Tomorrow, Activity 2 Student worksheet

Name: _____

Woodland landuse comparison table

Think about the observations you have made and the conclusions you have reached studying past and present land use practises. Complete the table.

Natural Resource type	Traditional non-Aboriginal landuse	Traditional Aboriginal landuse
Land		
Water		

Plants		
Animals		

Look at the information in your table. What conclusion/s can you draw from the information in this table?

Wildlife in YOUR Backyard

It is not only the farmers who need to think about caring for our country. There is much that we can all do to preserve wildlife in parks, reserves and in our own backyards.

Examine the cartoon ..

1. What has the family in backyard 1 done to their suburban landscape?

.....
.....

2. What has happened to all of the wildlife as a result of their actions?

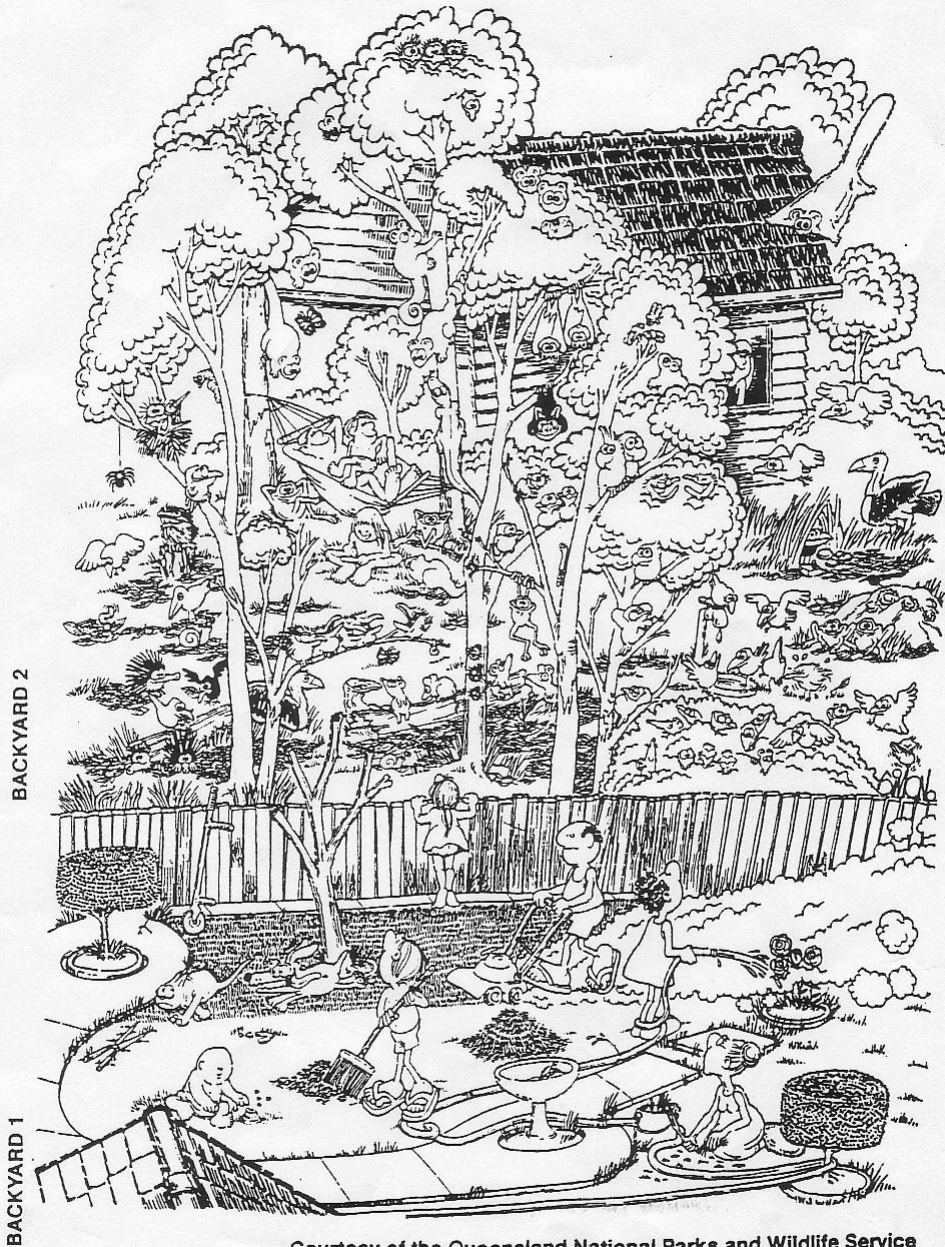
.....
.....
.....

3. What do you think that both of these cartoon are trying to tell us?

.....
.....
.....

Source: Issues in Land Management; Landcare in Your Hands

Wildlife in your Backyard



Courtesy of the Queensland National Parks and Wildlife Service

Source: Issues in Land Management; Landcare in Your Hands

Wildlife on the Farm

Some native animals such as kangaroos and pests such as rabbits compete with farmers' livestock for grass and water. Others can help make farming more productive. Hawks, snakes and lizards feed on rabbits, hares, rats and field mice. Birds and possums eat insect pests which are a threat to crops and grasses. These native animals need a natural landscape in which to live. Therefore it is important that there be plenty of trees and shrubs on farm land.

Look carefully at the cartoon.

1. What do you think has happened to paddock 1.?

.....
.....

2. Why do you think soil erosion has occurred?

.....
.....

3. Is that paddock, in its present state, of much use to the farmer? Why?

.....
.....

4. How is paddock 2 different to paddock 1?

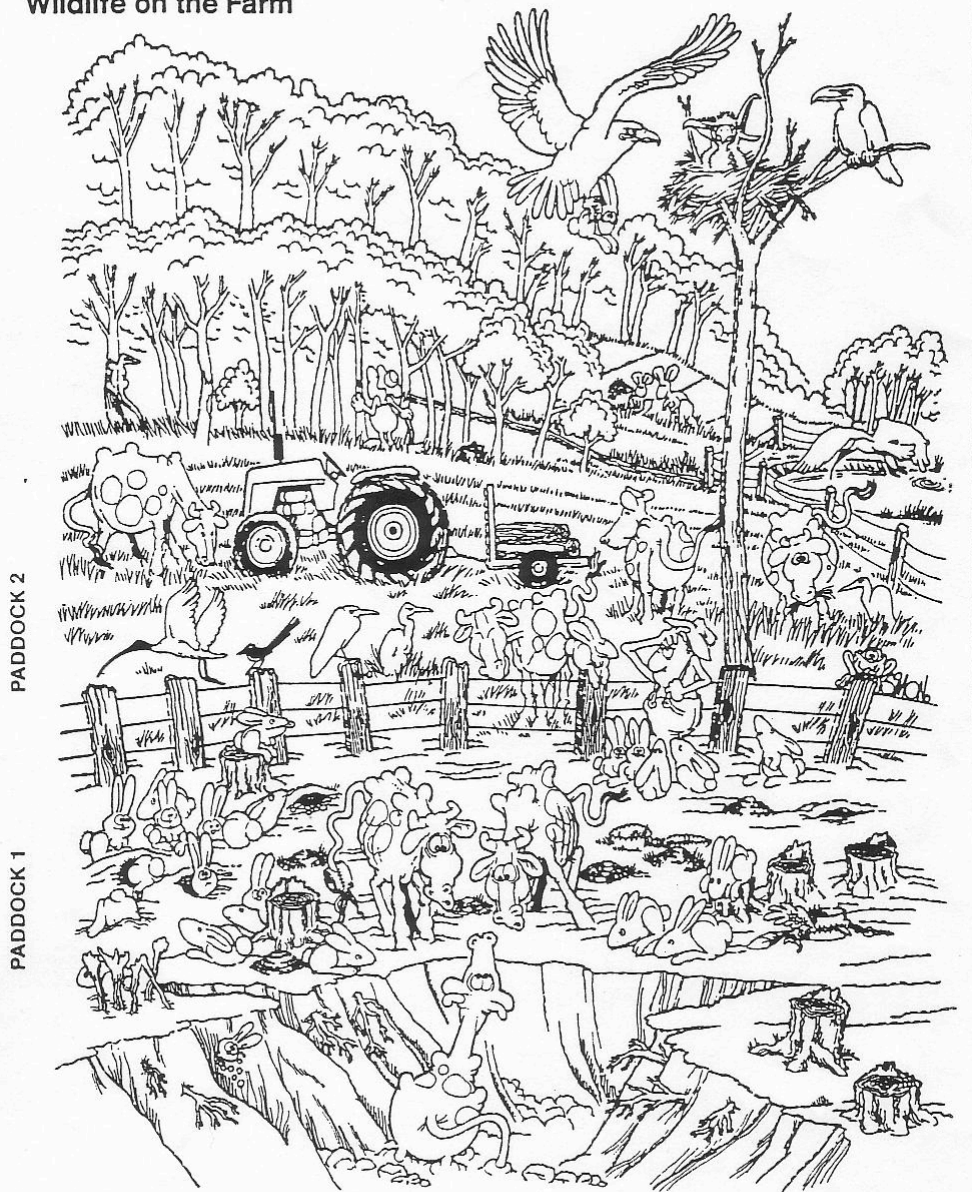
.....
.....

5. Do you think that a balance has been sought between the farmer's needs and those of the native wildlife.? Why?

.....
.....
.....

Source: Issues in Land Management; Landcare in Your Hands

Wildlife on the Farm



Courtesy of the Queensland National Parks and Wildlife Service

**TRAVELLING STOCK ROUTE &
GRAZED Paddock**



LOOKOUT VIEW



FARMED LANDSCAPE



PADDOCK

