

DISCOVERING THE HILLS FOREST

- teacher resource package -



Part of an Environmental Education Program on
the Western Australian Jarrah Forest for Year 6 and 7 students.



Department of Conservation and Land Management

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Managing Editor

Ron Kawalilak

Editor

Richard Grant

Project Coordinator

Fiona Marr

Project Writers

Sheelagh Tillotson - Matthew Gibney Catholic
Primary School

Fiona Marr - Community Education Officer, CALM

Sheryl Hunter - First Steps Project,
Ministry of Education (WA)

Project Consultant

Sheryl Hunter - First Steps Project,
Ministry of Education (WA)

Graphic Design and Illustration

Kellee Merritt

Cartoon Maps

Neil Elliott

Cartoon Posters

Terry Roberts

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Preface

Our Future Starts Now

Conserving our plants, animals and the environment in which they live is becoming increasingly difficult because resources are scarce. Conservation and wildlife agencies throughout the world realise that conservation objectives cannot be achieved through government funding alone; they require the support of an educated and active community.

Western Australia covers more than 2.5 million square kilometres of which CALM manages 195 000 square kilometres, 7.5 percent of the total. CALM conserves wildlife and manages national and marine parks, nature reserves and State forests; its responsibilities increase as the size of the conservation estate and community expectations grow. To maintain its programs and services, CALM seeks funds from alternative sources, including the corporate sector. Sponsorship enables CALM to continue to conserve wildlife and manage the environment while educating and involving the community in its programs.



ICI Connection

ICI Australia supports the Discovering The Hills Forest Program. It is also a major sponsor of many major environmental programs, including Earthwatch, Greening Australia, Greening the Goldfields and the Banksia awards.

ICI Australia is part of the ICI Group that employs more than 130 000 people worldwide and operates in many countries. ICI has an international reputation as a company that takes a responsible approach to making its operations environmentally safe. In Australia the company operates its business with proper regard to the safety and welfare of its employees, customers and the community.

CALM welcomes ICI Australia's commitment to Western Australia's environment by sponsoring the Discovering The Hills Forest Program.

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Getting Started



Introduction

The Challenge

We live in a changing, complex world.

A wide range of opinions are held on issues important to people, particularly issues relating to the quality of our lives and what the future holds for our children.

No issue has caused greater debate and a wider range of opinions in recent years than the environment, its management and its ability to withstand the pressures being applied to it.

Today's students, as our next generation of adults, need to know how to cope with our changing world and the issues they face.

Teachers no longer have all the answers; they need to explore the issues with their students and help their students to develop problem-solving and decision-making skills.

Journey of Discovery

The Discovering The Hills Forest program aims to develop an awareness that people are part of the environment. Instead of separating us from all things "natural" and good, and portraying people as "unnatural", and, therefore, our actions as bad, we need to understand that all things are connected. Once it is accepted that people are a part of life on earth, students and teachers can be empowered to act on behalf of the environment of which they are part.

Part of this journey of discovery takes place in Mundaring, 40 km east of Perth, in Western Australia's unique Jarrah forest.

Getting Started

CALM believes this program will lead to a better understanding by school students and teachers of the complexity of the issues involved in managing Western Australia's forests. And in our joint role in their wise use.

Fiona Marr
CALM
Community Education Officer
May 1993

Goal and Aims

Goal

The program's goal is to -

Develop students' feelings for, and awareness and understanding of how people fit into the Jarrah forest ecosystem and to empower them to take actions that lessen their impacts on that environment.

Aims

Discovering The Hills Forest is a **program of learning** for teachers and students that aims to -

1. Develop an awareness of and feelings for the Jarrah forest ecosystem.
2. Develop knowledge about land uses in the Jarrah forest.
3. Develop an understanding of the relationship between people and the forest environment.
4. Encourage wiser use of forest resources.



Program Components

The program consists of three parts -

1. Teachers' resource package

This package outlines classroom activities that precede and follow a one-day excursion to the forest. Also outlined, are the program's links to existing primary curricula and a list of educational resources that support the program.

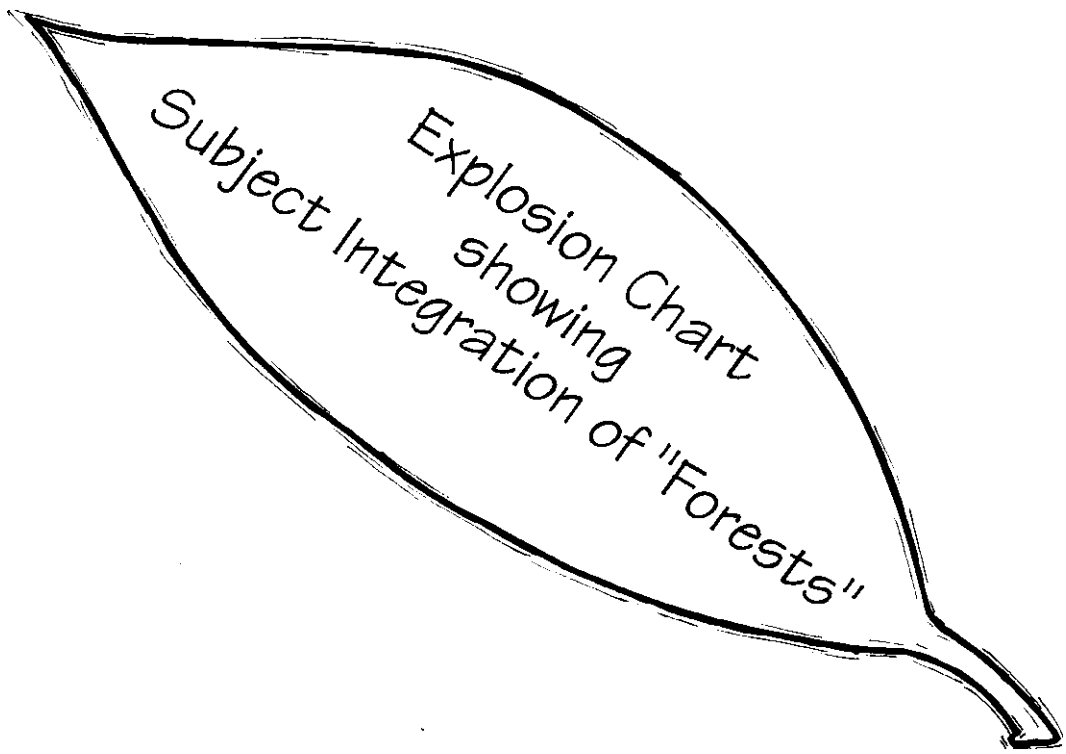
2. Teacher/parent in-service course

For teachers and students to gain maximum benefit from this program, a half-day in-service course is conducted for teachers and parents. The course outlines the program, introduces and explains the resource package and provides an insight into the Jarrah forest and the excursion.

3. One-day forest excursion

CALM staff and professional environmental educators will lead an activity-based excursion at The Hills Forest. The excursion will develop an understanding of how people interact with the Jarrah forest.





Explosion Chart
showing
Subject Integration of "Forests"

All These Curricular Links

Background

Teachers often ask where does Environmental Education (EE) fit into the curriculum?

EE involves three things - educating **about** the environment, educating in the environment and educating for the environment. EE also embraces a number of other subjects, borrowing much from the content, values and concepts of Science and Social Studies while drawing on the processes of the other primary subjects, such as Language, Music, Physical Education, Maths, Health and Art and Graft. While it involves traditional curriculum areas, EE demands a commitment from participants to explore values that underlie their existing actions and to develop feelings, attitudes and actions that minimize their impact on the environment.

The Documents

Two documents indicate the links The Discovering The Hills Forest Program has to Western Australia curricula.

1. Curricular Links

Curricular links identifies the specific links that the program has to existing Western Australia curricula. It can be used for accountability and/or as a planning tool.

Among these links, is one to the Ministry of Education's First Steps Language Development Project. Teachers can develop their own whole language program by selecting and integrating other First Steps strategies into their teaching.

2. This Explosion Chart

An explosion chart on the theme "forests" shows how each curriculum area can be integrated into a common forest theme.



Curricular Links - For Year 6

Social Studies

Sharing the Environment Unit

Generalisations

- * People and the environment are interrelated.
- * Change occurs in all environments and societies as a result of natural, technological and ideological factors.

Objectives

- 1.1 (K) Define the term "natural environment" and explain how people use the environment to meet their needs.
- 2.1 (K) Identify different types of environmental conflict.
- 2.2(V) Examine the feelings of people involved in a local and/or Japanese environmental issue.
- 2.3(V) Appreciate the need for all citizens to be aware of and care what happens to their natural environment.
- 3.1(K) Describe the way in which cooperation in the use of the environment is achieved.
- 3.2(V) Evaluate the way in which a local and/or Japanese environmental problem was resolved.
- 3.3(V) Consider the need for a balance between utilization and conservation of the natural environment.
- 3.4(V) Evaluate types of changes in the natural environment.

Water Resources Unit

Generalisations

- * Societies face a conflict between unlimited wants and limited resources and must, therefore, make choices.
- * People and the environment are interrelated.

Objectives

- 1.1 (K) Show that water is essential for human, animal and plant survival (*part*).
- 3.1(K) List the various ways water can be stored.
- 3.2(K) Describe some of the uses of water.
- 3.3(V) Discuss the significance of water conservation in Australia (*part*).

Western Australia's Government

Generalisation

* Societies function in accordance with rules that regulate the behaviour of individuals and groups.

Objectives

2.4(K) Recognize some of the services and facilities provided by the State Government.

Science

Plants

Transpiration - the effects of leaves on plant survival.

Plant responses.

Animals

Responses of animals to their environment.

Characteristics and development of a reptile.

Bones - forming inferences about animals from their bones.

Matter

Rocks - investigating rocks (granite outcrops).

Language

Focus Points

- 2.2.5 Drama e.g. Forest Role Play Game
- 3.2 Informational e.g. What is a Forest?
 - 3.2.1 Procedures e.g. Paper Making
 - 3.2.2 Descriptions e.g. Mystery Tree
 - 3.2.3 Reports e.g. Research Topic
 - 3.2.5 Notes e.g. What's the Difference?
 - 3.2.13 Maps e.g. Design a Day in the Forest
 - 3.2.15 Advertising e.g. Promote the Forest
- 3.4 Poetry e.g. The Forest Jigsaw
- 4.1 Comprehension e.g. The Jarrah Tree
- 4.4 Reading e.g. What is a Forest?
- 5.2 Speaking e.g. Your Decision
- 5.3 Writing e.g. Research Topic
 - 5.3.1 Editing e.g. Research Topic
 - 5.3.2 Proofing e.g. Research Topic

Mathematics

Space

Part 1 Movement and Position in the Environment

Part 2 Exploring 3D Shape

Measurement

Part 1 Length

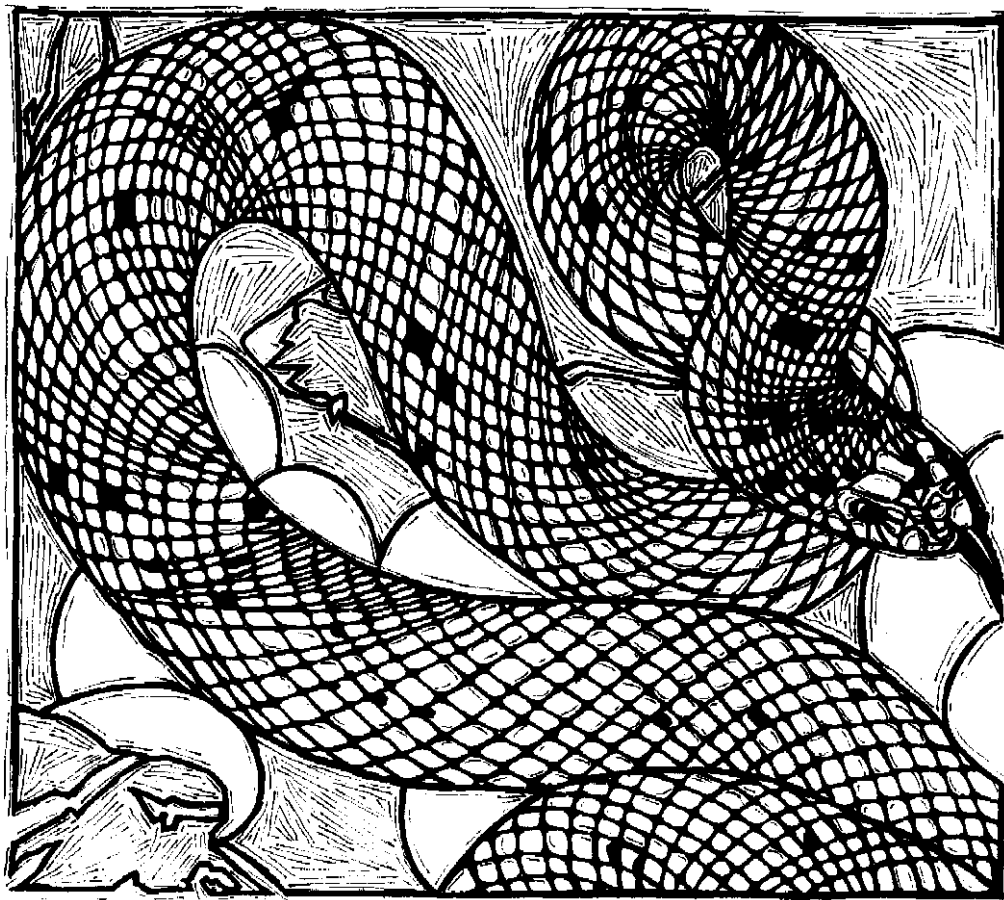
Part 4 Mass

Part 5 Time

Number

Part 4 Statistics

Part 5 Chance processes



Curricular Links - For Year 7

Social Studies

Interacting with the Environment Unit

Generalisations

- * People and the environment are interrelated.
- * Change occurs in all environments and societies as a result of natural, technological and ideological factors.

Understandings

1. In attempting to satisfy wants, people adapt to and modify the natural environment and utilize its resources.

Objectives

- 1.2(K) Describe, in general terms, ways in which people use and modify their natural environment in order to satisfy their basic needs.

Mineral Resources Unit

Generalisations

- * Societies face a conflict between unlimited wants and limited resources and must, therefore, make choices.
- * People and the environment are interrelated.

Understandings

1. Minerals are non-renewable natural resources that can be used in a variety of ways.

Objectives

- 1.1 (K) Distinguish between renewable and non-renewable resources and give examples of each.
- 1.2(K) Explain why we need minerals and show that they can be used in a variety of ways.

Cooperation and Conflict Unit

Generalisations

- * Societies function according to the fulfilment of individual and group responsibilities in a network of interdependence and cooperation.
- * The culture of a group exerts an influence over the values, attitudes and personalities of individuals, but within a group of individuals differ from one another.

Understandings

1. Differing values, interests and goals can lead to conflict among individuals and among groups.
2. Resolution of conflict can be achieved by several forms of cooperation.

Objectives

- 1.2(K) Identify the factors that influence the values, interests and goals held within various groups.
- 2.1 (K) Identify ways in which people cooperate to resolve conflict.
- 2.2(V) Justify decisions that resolve conflict situations by using different forms of cooperation.

Science

Plants

- Interdependence - plants/animals depend upon each other.
- Flowers/fruits/seeds - stages of flowering plant reproduction.
- Pioneer plants - plant adaptations to harsh environments.
- Classification (Transition Science 7-8).

Animals

- Insects - behaviour of social insects.
- Observation (Transition Science 7-8).
- Coloration in nature - use of colour as an adaptation or camouflage.
- Adaptations to environments - physical and behavioural.

Matter

- Rocks and soils - interrelationship and formation.
- Pollution - danger to environment (plants and animals).

Energy

- Weather / climate.

Language

Focus Points

- 2.2.5 Drama e.g. Forest Role Play Game
- 3.2 Informational e.g. What is a Forest?
 - 3.2.1 Procedures e.g. Paper Making
 - 3.2.2 Descriptions e.g. Mystery Tree
 - 3.2.3 Reports e.g. Research Topic
 - 3.2.5 Notes e.g. What's the Difference?

- 3.2.13 Maps e.g. Design a Day in the Forest
- 3.2.15 Advertising e.g. Promote the Forest
- 3.4 Poetry e.g. The Forest Jigsaw
- 4.1 Comprehension e.g. The Jarrah Tree
- 4.4 Reading e.g. What is a Forest?
- 5.2 Speaking e.g. Your Decision
- 5.3 Writing e.g. Research Topic
- 5.3.1 Editing e.g. Research Topic
- 5.3.2 Proofing e.g. Research Topic

Mathematics

Space

Part 1 Movement and Position in the Environment

Part 2 Exploring 3D Shape

Measurement

Part 1 Length

Part 4 Mass

Part 5 Time

Number

Part 4 Statistics






Part 5 Chance processes



Short beaked Echidna

Overview of Activities

1. Introducing the Jarrah Forest

Page	Activity	Commentary
17	Mystery Tree	Students are introduced to the special features of trees through their own sensory investigations.
 20	What is a Forest ?	Brainstorm and categorise "What is a Forest?" An example is given from the information sheet.
 23	The Jarrah Tree	Working with informational text: four strategies to help students comprehend and write non-fiction material.
 33	A Tree for All - Marri	Explore the interrelationships between some animals and plants that live in, on or around the Marri tree.
40	What's the Difference ?	Compare Jarrah and Marri trees by retrieving information from texts.
42	All Part of the Forest Community	Students individually research an animal or plant species of the jarrah forest. Relationships between various forest species can be pieced together by orally sharing these findings.
48	Energy Paths Game: Chuditch, Parrot & Seeds	Learning about food chains is fun with this complex game of tag.
 51	Who Needs It ?	The difference between needs and wants.
 52	The Forest Jigsaw	The Forest Jigsaw kit in your classroom can generate interest and raise awareness about the interrelationships between people and the forest.

2. Visiting the Living Forest

Page	Activity	Commentary
------	----------	------------



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Excursion Outline

Notes outlining the activities of the one-day forest visit.

3. Human Connections: Lessening Your Impact

66	How Do I Feel ?	Survey of students' feelings and opinions about forest landscapes.
----	------------------------	--



68

Promote the Forest

A great opportunity to review the forest excursion. Students design a promotional brochure or radio or television advertisement about The Hills Forest. This links art and language teaching.



71

Looking at Land and Resource Use

This activity introduces forest land use. It focus on the various resource needs of different sections of our community.



72

Using a Land Use Map of The Hills Forest

A map-reading activity identifying some of The Hills Forest landscape and land use features.

73





A Forest Resource: Exploring Land Uses

A research assignment into producing and managing a forest resource. For this activity, "The Forest" includes the entire Northern Jarrah Forest. Year 7 teachers could link bauxite mining, to the "Mineral Resources" unit.

74

Design a Day in the Forest

By designing a day trip to The Hills Forest students develop their skills in map-reading, recall, and in identifying and catering to different people's interests.

Page	Activity	Commentary
75	Forest Management, Uses and Issues	Consider a number of issues that forest managers face daily.
 77	Your Decision	Canvas your students opinions and feelings on some forest management issues. Prepare yourself for a lively discussion.
 80	Forest User Roles and Planning Game	Role-play a community meeting about the use of a hypothetical forest area.
	Everyone Lives in a Catchment	Explore the importance of the Jarrah forest as a water catchment. Year 6 teachers will be able to link this directly with their Social Studies "Water Resources" unit.
 91	Study of One Resource in Detail	Uncover and understand our use of "tree products"- from paper and wood to dyes and medicines. Do a home survey of tree products and take a cartoony look at "A World Without Trees".
 95	What Can I Do to Sustain Our World's Forests ?	Once students appreciate the value of trees to their lives, build on this knowledge. Trees are cut down, and new ones regrown, to provide products people consume. Three activities focus students'attention on their use of paper products and encourages more responsible practices.
100	Summary	A few final ideas!

Introducing the Jarrah Forest




Western Grey Kangaroo, Western Pygmy Possum, Mardo & Common Dunnart

Introducing The Jarrah Forest

Teachers' Notes

The activities in this section introduce the Jarrah Forest. By following the sequence of activities, students will be able to explore parts of the Jarrah Forest ecosystem and develop an understanding of some of its interrelationships.

Several activities are considered essential to develop the program's key concepts. Consult the Overview of Activities; essential activities are denoted by  Extension activities are included for teachers who wish to pursue the topic more deeply.

It is recommended that a "Forest corner" be set up in the classroom. Why not use the corner as a resource, display and learning centre to stimulate interest and discussion?

A Forest is...

A forest is not just trees! A forest is a large **area of land** covered by a living **community** of trees and other plants, and animals. In Western Australia, most of our native forest trees are from a group called Eucalyptus. The south-western corner of our State is home to four major Eucalypt forest types: Jarrah, Karri, Wandoo and Tuart. These forests grow nowhere else.

Jarrah is our main forest tree species. It's tall, grey, has a stringy-barked trunk and its creamy coloured flowers are a common sight throughout the south-west in areas where rainfall exceeds 600 mm a year. The biological name for Jarrah is *Eucalyptus marginata*.

Marri (*Eucalyptus calophylla*) is often found growing among Jarrah trees. Both Jarrah and Marri form the overstorey to other forest trees, shrubs and grasses, which provide shelter and food for an array of forest animals. Jarrah forest animals include birds, mammals, reptiles and many invertebrates.

People are also part of the forest ecosystem. Forests provide us with water, timber, fuel, and many other products such as medicines and paper. They also give us less obvious things like a sense of well being, places to recreate and enjoy their beauty.

Mystery Tree

Every tree is special. The look and feel of a tree's bark, its height, the way its leaves hang, and the number, size, colour and shape of its fruits or flowers are all characteristics special to a particular tree or type (or species) of tree. Some characteristics can be used to distinguish one tree species from another.

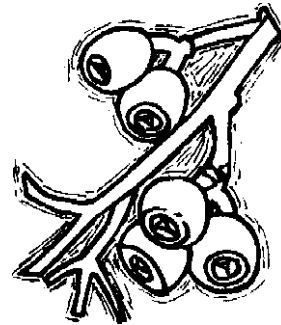
Aims

- * To heighten awareness of trees in the local school environment from an aesthetic, linguistic and sensory viewpoint.
- * To bring about an understanding that trees are intrinsically different from one another in form, colour, size and texture.

Materials

Per student

- An activity sheet and/or a sheet of plain paper
- Sketching pencil
- Wax crayon
- Sticky tape



What to Do

1. Take your class into the school grounds and ask each student to look for a tree that appeals to her/him. Ask them to sketch their tree from a short distance. Then, ask them to go closer to observe the tree's details and to write three short sentences as clues to its identity.
2. Encourage them to make a bark rubbing and to collect a fallen leaf/fruit/seed pod.
3. Finally, with students working in pairs, ask them to try and pick out each others tree using only the clues that their partner has collected.

Ideas for further things to do

- * The whole group could discuss-
 - a) How their trees varied or were similar?
 - b) Which clues they used first to identify their partners tree
 - the picture, the leaf, or the written facts?
- * The class could display their work in collage form.

Ask students to display the classes results mathematically,
e.g., On a bar graph, show how many trees had-
pointed / rounded leaves
simple / complex leaves
smooth / rough bark
spreading branches
nests or other evidence of animal activity, like birds using trees for feeding,
or perching, or insects and reptiles sheltering under bark.



Marri bark



Jarrah bark

What is a Forest?



Brainstorming and categorising are strategies which could be used throughout this package to monitor students' background, understandings and feelings.

Aims

- * To assess students' understanding about the Jarrah forest and its use.
- * To motivate students to want to find out more about the forest.

Try one of these two options -

Option 1

Materials

Textas and large sheets of paper

What to do

1. Brainstorm the topic:
"What is a Forest?"
to assess student understandings and feelings about the forest before studying the topic.
2. Conduct it in the following way:
Ask your class for all their ideas on "What is a Forest?" Record their responses and then ask each student to group these responses under subheadings and chart them. Finally, compile one chart for the whole class. Work with the students to categorise or classify the information into a logical structure using subheadings. An example chart is given in "What is a Forest?" page 22.
3. Then ask:
What do you want to find out about the topic?
Students discuss and write down things they want to know about the topic. For example, How many types of trees are in the forest? Which tree is tallest? Record these ideas too.
4. Add to this chart throughout the program.

*Adapted from the First Steps Language Development project.
Reading Comprehension Module. Ministry of Education (WA)*

Option 2

Materials

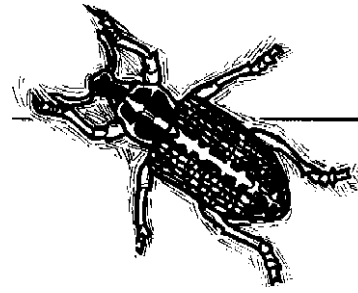
Textas and large sheets of paper
"What is a Forest ?" Information Sheet (1 per student)

What to do

1. Have the students read the text "What is a Forest ?"
2. Ask them to compile a Structured Overview like the example based on "What is a Forest ?" on page 22.
3. You may wish to read the teaching notes on page 24 under "Structured Overview" to assist you.



What is a Forest?



Information Sheet

A Forest is...

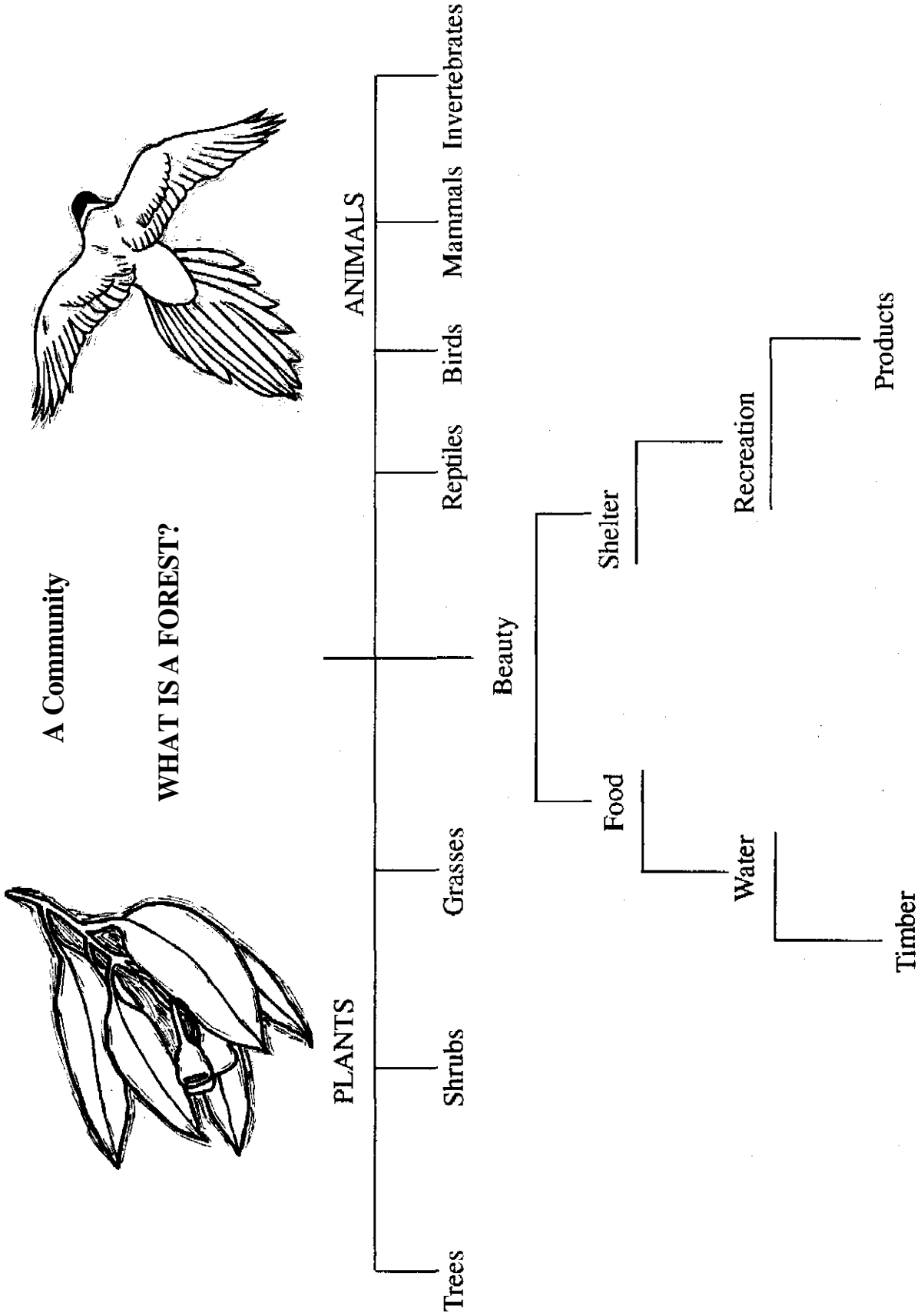
A forest is not just trees! A forest is a large **area of land** covered by a living **community** of trees and other plants, and animals. In Western Australia, most of our native forest trees are from a group called Eucalyptus. The south-west corner of our State is home to four major Eucalypt forest types: Jarrah, Karri, Wandoo and Tuart. These forests grow nowhere else.

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People are also part of the forest ecosystem. Forests provide us with water, timber, fuel, and many other products such as medicines and paper. They also give us less obvious things like a sense of well being, places to recreate and enjoy their beauty.

What is a Forest? Structured Overview



The Jarrah Tree



The text "The Jarrah Tree" is used as the basis for four learning activities.

Aim

* To introduce strategies that assist children to read and write factual or informational texts.

Materials

Teachers' Notes - Informational Text Strategies
Text - "The Jarrah Tree"

1. Graphic Outline
2. Interesting Words Chart
3. Structured Overview - Teacher's Copy
Structured Overview - Student's Copy
4. How to Write a Report - Teaching Notes
Plan for a Written Report



For Further Information: First read Appendix 1. Then refer to First Steps Modules: Teaching Children How to Write Informational Texts and Reading Comprehension Modules.

Informational Text Strategies

Before Reading: Step 1. Graphic Outline

Scan the text and list the sequence of features as they occur, for example, headings, diagrams, maps, and tables. Make box sizes that show the comparative importance of the information where practical and write in text features, eg, Map -Distribution of Jarrah Forest in WA.

During Their Reading: Step 2. Interesting Words Chart

Read the text "The Jarrah Tree" and select words to place in the words column eg., marginata and species. Indicate the appropriate paragraph in the second column, e.g., species - 1. Encourage the students to use context clues within the text to gain meaning e.g., marginata - 1 , Yes - dark vein or margin in the leaf.

Students write their explanation of the word, e.g., species - a group.
(Dictionaries or other word sources can be used if needed to clarify meaning.)
e.g., species - the classification of things through scientific observations.

After Reading: 3. Structured Overview

Identify vocabulary that is essential for understanding the main ideas and supporting detail of text. Arrange these ideas and words into a pattern that shows their relationship in the text, e.g., "What is a Forest?", "The Jarrah Tree".

4. How to Write a Written Report

The next two pages have teaching notes and "A Plan for a Written Report" that may be used by students.



Jarrah leaves & flowers

Adapted from First Steps Language Development Project: Teaching Children How to Write Informational Text and Reading Comprehension Modules. Ministry of Education (WA) from the original source: Learning to Learn From Text by A Morris and N Stewart-Dore, published by Addison-Wesley, North Ryde, NSW.

How to Write a Report: Teaching Notes

Report Framework

One paragraph, no matter how brief, is written about each of the following five headings.

1. Classify

Tells what the object is, and what group it belongs to e.g., marsupial.

2. Describe

Tells what features the object has i.e., what the object is like (size, shape, colour and features).

3. Locate

Locates the object in terms of place and time i.e., where and/or when it is/was found.

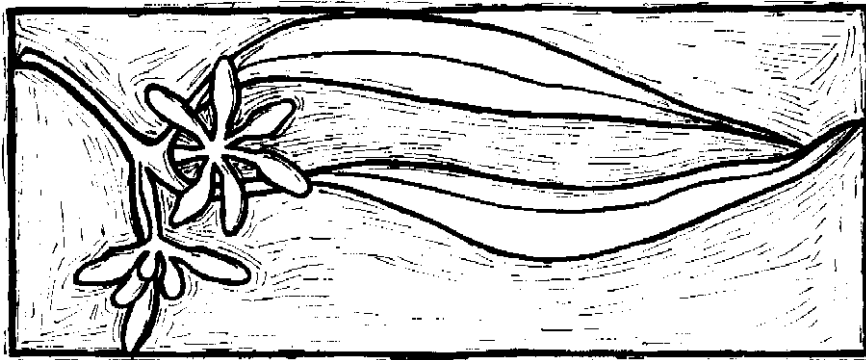
4. Explain

Explains what the object is and how it works or functions.

5. Summarise

An evaluative or interesting comment that effectively closes off the topic.

Examples of written reports: "The Jarrah Tree" and "A Tree for All - Marri". The Report Framework can be used by students to do written or oral reports. This is a useful strategy to use throughout this package.



Jarrah leaves & buds

*Adapted from First Steps Language Development Project,
Teaching Children How to Write Informational Text Module. Ministry of Education (WA),*

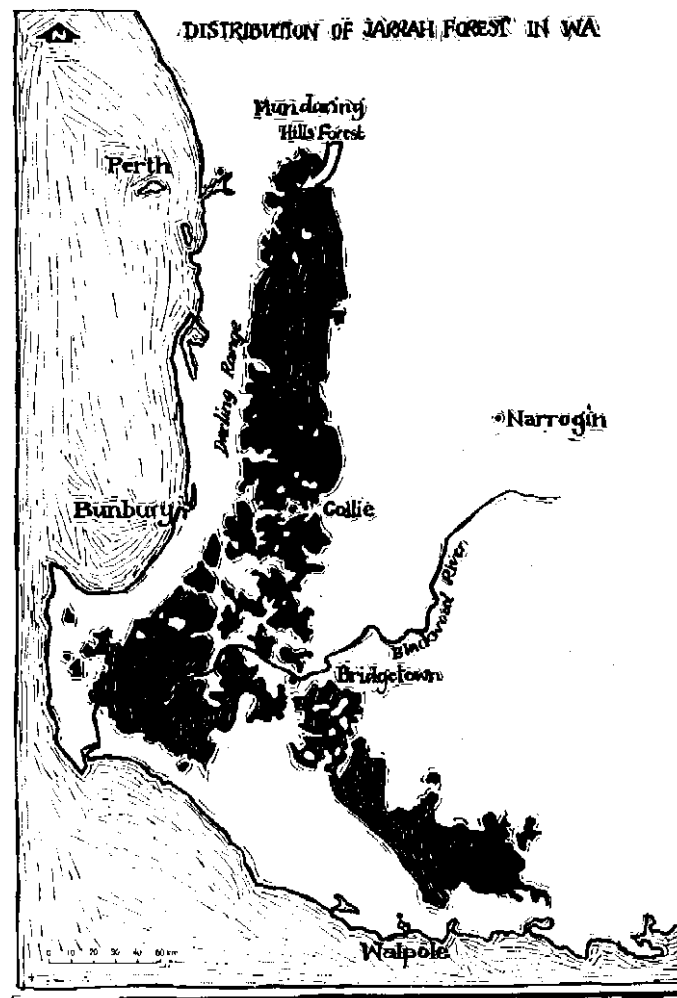
The Jarrah Tree

Jarrah (*Eucalyptus marginata*)

Jarrah is the main forest tree species in Western Australia. Another name for Jarrah is *Eucalyptus marginata*; 'marginata' referring to the distinctive vein or margin on the edge of the leaf. Early settlers to Western Australia called Jarrah "Swan River Mahogany" because of its resemblance to another fine timber, mahogany. From the 1860s the Aboriginal word "Jarrah" again became the popular name for this tree.

Jarrah is unique to Western Australia, and grows throughout the south-west in areas where rainfall is higher than 600 mm a year. The tallest Jarrah forest is found in the Darling Range, between Mundaring and Collie, and around the Blackwood River near Bridgetown. Jarrah has specific characteristics that enables it to grow on harsh, gravelly soils, and in areas prone to frequent fires.

Jarrah is a tall tree with grey, stringy bark and creamy coloured flowers. It is slow-growing, can reach a height of more than 50 m and live for over 450 hundred years.



Distinctive Features of Jarrah

A medium to large tree, found on the Swan Coastal Plain and the Darling Range.

Bark grey, brown in the furrows, stringy; strips can be easily pulled off, revealing a cinnamon or reddish colour.

Leaves green and shiny on one side, pale and dull on the other (green-leaved form); or dull blue-green on both sides (blue-leaved form).

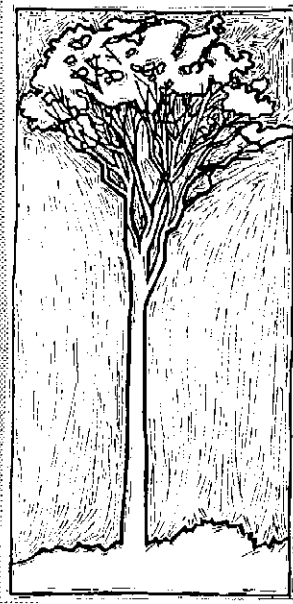
Bud-cap narrowly conical, longer than the floral tube.

Flowers in spring or early summer.

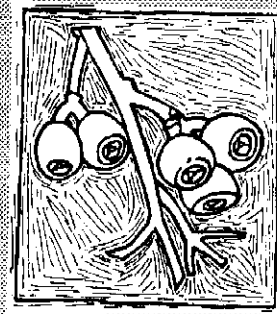
Fruits globular to cup-shaped, 12-15 x 12-15mm.

Seeds black, 5-6mm long.

Source: *Leaf & Branch*
c. CAIM (1990) p121



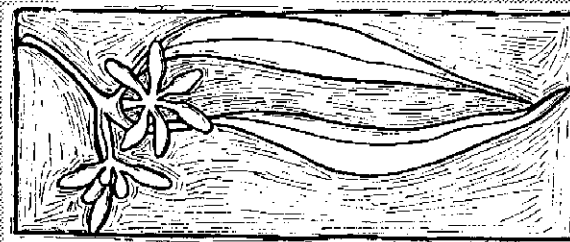
Jarrah tree



Jarrah fruit



Jarrah leaves & flowers



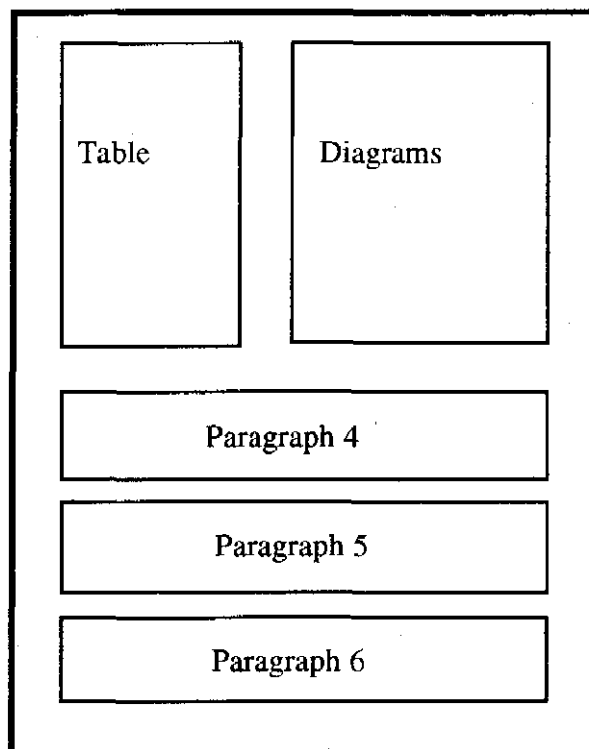
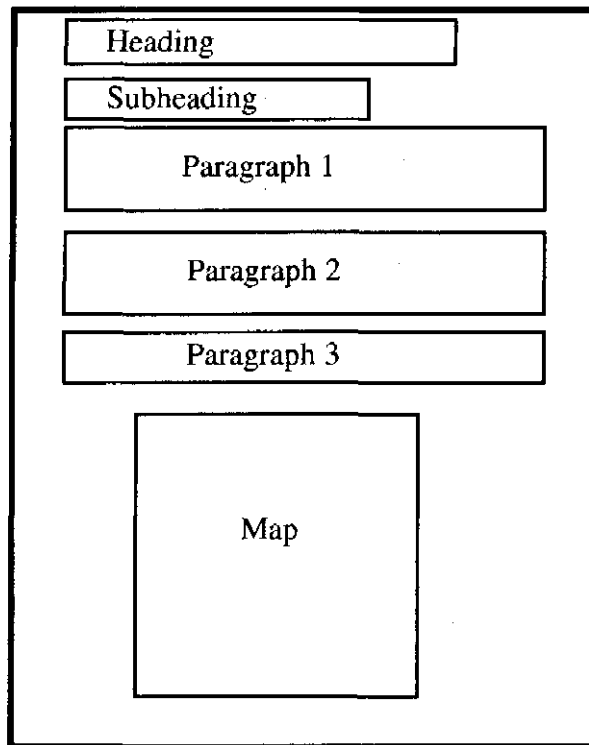
Jarrah leaves & buds

The long straight trunk makes the Jarrah tree highly suitable for the production of timber. Timber from this tree is renowned for its hardness, durability and colour. Jarrah poles support our power lines, Jarrah sleepers support our rail lines and Jarrah is used to make much of our furniture.

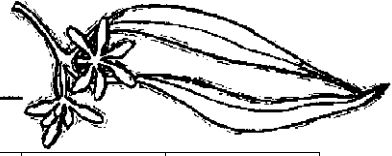
Hollow Jarrah logs, lying on the forest floor, provide important shelter for many animals. The tough timber stands up well against fire and decay, forming homes and shelter for mammals like bandicoots and chuditch.

The under growth of the Jarrah forest is made up of banksia, blackboys, wattles, sheoaks, zamia palms and numerous other shrubs and plants. Many of these plants are host to the soil fungi *Phytophthora* which causes **dieback** disease. This disease attacks and rots the roots of many susceptible plants including Jarrah, and starves the plants of the water needed to survive.

Graphic Outline



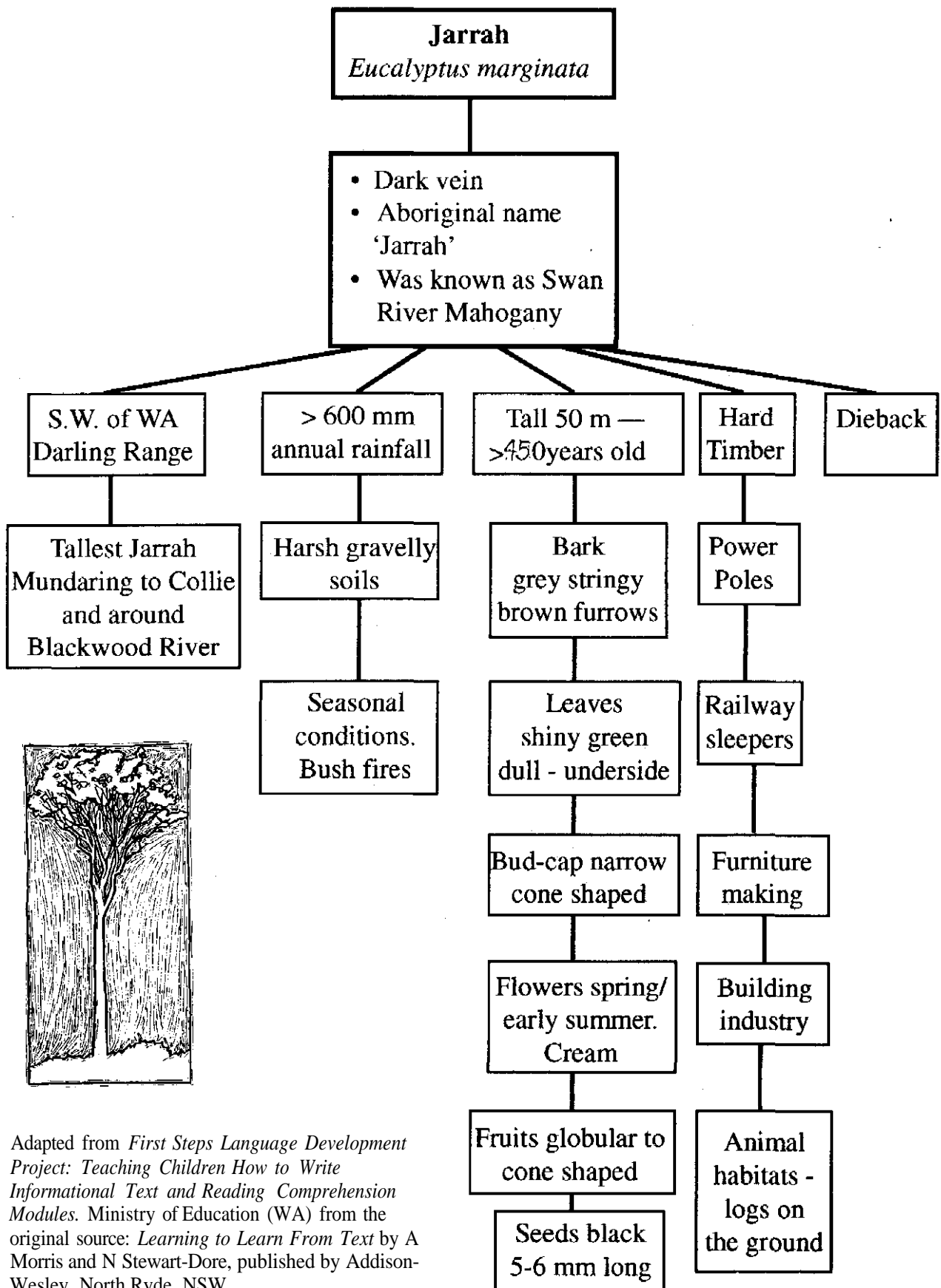
Interesting Words Chart



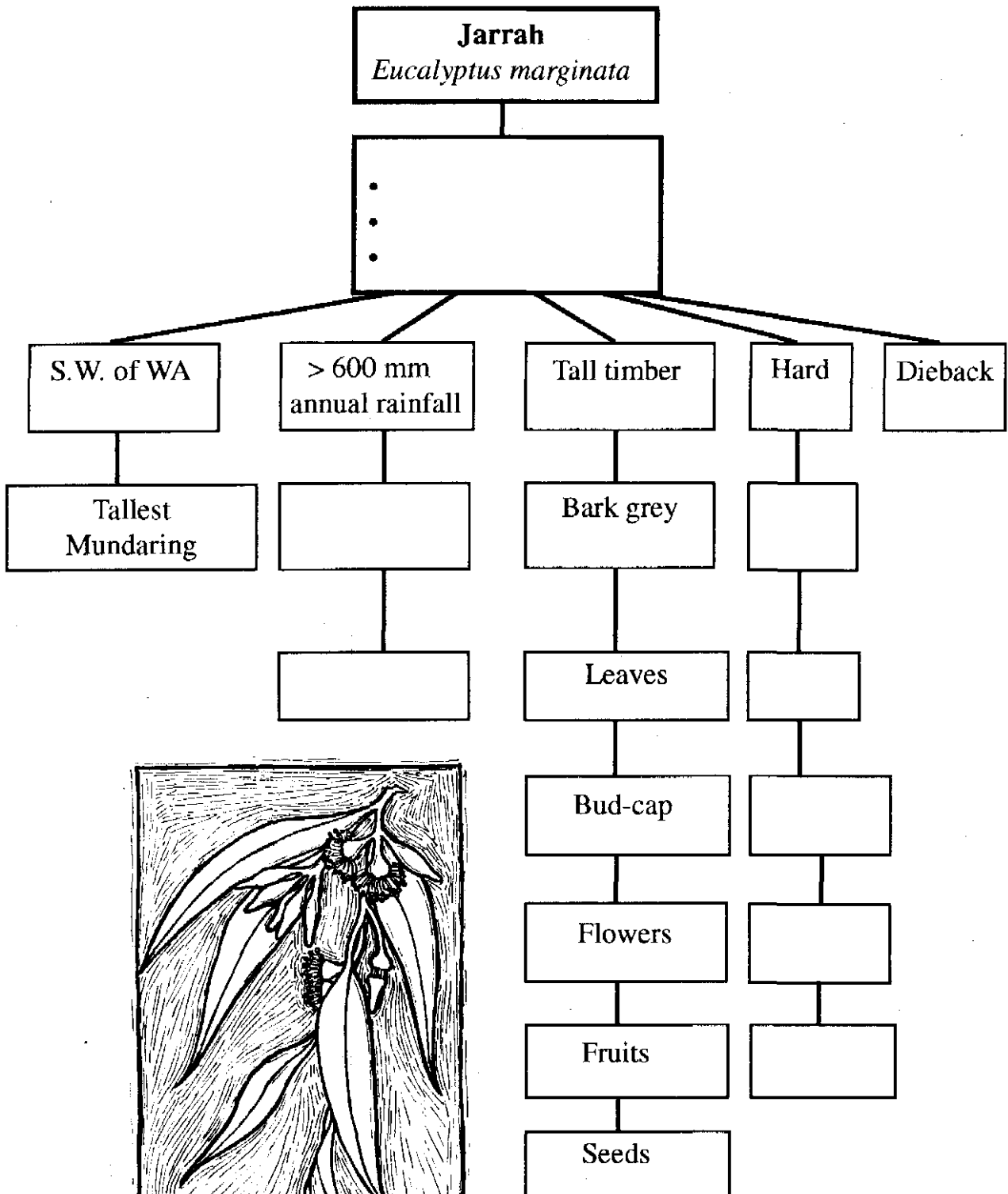
Word	Paragraph	Any help given in text ?	Dictionary Meaning	Own Explanation
species	1	No		
marginata	1	Yes - distinctive vein or margin		
unique	2			
durability	4			

Adapted from First Steps Language Development Project: Teaching Children How to Write Informational Text and Reading Comprehension Modules. Ministry of Education (WA) from the original source: Learning to Learn From Text by A Morris and N Stewart-Dore, published by Addison-Wesley, North Ryde, NSW.

Structured Overview: Teacher's Copy



Structured Overview: Students Copy



Adapted from *First Steps Language Development Project: Teaching Children How to Write Informational Text and Reading Comprehension Modules*. Ministry of Education (WA) from the original source: *Learning to Learn From Text* by A Morris and N Stewart-Dore, published by Addison-Wesley, North Ryde, NSW.

A Tree for All - Marri



Plants and animals depend on and affect one another in many ways. They provide each other with food, moisture, shelter, and so on. These links are called **interrelationships**.

Marri is one of the more common trees found in the Jarrah forest. Discover some of the interrelationships between the different parts of a Marri tree and some other forest wildlife. (Please note the Marri in "A Tree for All" poster is stylised. It depicts many relationships involving many Marri trees. All these relationships would not happen in one tree at any one time).

Aims

- * To develop an understanding of interrelationships between animals and plants.
- * To increase knowledge of the names and characteristics of some forest animals and plants.

Materials

"A Tree for All - Marri" Information Sheet (1 per student).
"A Tree for All- Marri" Student Poster (1 per student)
A collection of Marri leaves, bark, flowers*, buds *
and/or fruit (* available seasonally).

What to Do

1. Introduce the lesson by showing the students the parts of the Marri you have collected. Let them touch, examine and discuss them.
2. In groups of two or three, ask the students to read the information sheet. Then ask them to examine their poster for relationships between the plants and animals and the various parts of the Marri. Ask them to record their observations in the relevant spaces on the poster.
e.g., a) Chuditch using the tree to hunt food.
b) A bird using a tree for a nest site.
c) Bee collecting pollen from flower.
3. Links can be drawn between the written information and the visual information (picture) of the tree.

4. Alternatively, use the text for a Reading Comprehension lesson, or as the basis of a Vocabulary/Spelling list of forest words.
5. Some students may wish to colour in their poster. Challenge your students to research the correct colours of birds, mammals, reptiles and the tree. Or provide them with large photos, charts and posters. Check "Our Wild Plants" Package produced by Greening Western Australia for a reference.



Laughing Kookaburra

A Tree for All - Marri

..... Nature's Boarding House

Marri (*Eucalyptus calophylla*) is a distinctive tree found throughout Western Australia's South West. Known also as 'Red Gum', marri usually grows among other forest trees.

Large, urn-shaped fruit or 'honkey nuts' and clusters of flowers borne on the end of branches are two of the features that make marri 'A Tree for All'.....Nature's Boarding House.

Flowers, Fruits and Nuts

- 1 Bees and ants sip nectar and collect pollen from flowers. Rainbow Bee-eater birds 2 eat bees and ants.
- 3 Red-capped and Twenty-eight parrots 4 pick the seeds from honkey nuts.

Leaves and Branches

- 5 Many birds nest among the leaves and branches and forage for insects and reptiles in the trees and on the ground.
- 6 Singing Honeyeaters peck lerps from leaves. Lerps are insects that suck sap.
- 7 The parasitic Mistletoe plant gets water and nutrients from the marri.

Tree Hollows, Trunk and Bark

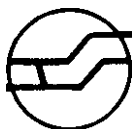
- 8 Brushtail possums and parrots use hollows in marri trees for roosts and nests.
- 9 Velvet geckoes shelter under bark and at night hunt for insects in the branches, trunk and leaves.

Fallen Branches and Tree Trunks

- 10 Chuditch come out from hollows at night to hunt on the ground and in the trees for birds and small mammals such as possums, bandicoots, rats and mice.
- 11 Numbats rest in fallen hollow branches at night and feed during the day on termites.
- 12 Termites chew at the tree trunks protected in their woody tunnels.

Leaf Litter

- 13 Fungi, along with numerous worms, bugs and insects, feed on fallen leaves and branches and their droppings turn forest debris into humus.
- 14 Reptiles (snakes and lizards) and some small mammals (rats and mice) forage among the leaf litter for these "little rotters".



A 7 for All Marri

Nature's Boarding House

Trees are an essential part of our environment. Look over this marri tree to discover how it provides resting and living places and food for other forest wildlife.

Some of the ways that wildlife uses the marri tree are listed. Test your own observation skills by finding others. Write your answers in the spaces.

Flowers, Fruits and Nuts

- Rainbow Bee-eater birds pick bees and ants from the flowers.

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

Leaves and Branches

- The parasitic mistletoe plants gets water and nutrients from the marri.

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

Tree Hollows, Trunk and Bark

- Velvet geckoes shelter under bark by day, and hunt insects by night.

.....
.....

Fallen Branches and Tree Trunks

- Chuditch hunt and feed on nesting birds by night.

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

Leaf Litter

- Fungi, worms, bugs and insects feed on fallen leaves and branches.

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



A Tree for All - Marri - Information Sheet

The Marri is one of the common eucalypts in The Hills Forest area, and one with which you may be familiar.

Background

- * Named by Robert Brown at Albany in 1801 for its beautiful (*calos*) and leaf (*phyllori*). Marri has the scientific name *Eucalyptus calophylla*.
- * Marri is found through the south-west of Western Australia.
- * It is also known as the Red Gum because of the dark red sap that "bleeds" from the bark when it is damaged.
- * Marri usually grows among other forest trees such as Jarrah and Tuart.

Appearance

- * Medium sized tree, growing up to 40 m tall.
- * Trunk is covered with a thick layer of short-flaked, grey-brown bark.
The Marri has large leaves and large bell-shaped fruit ("Monkey Nuts").

Growth Habit

- * The large leaves are a glossy green on the upper surface, and a dull green on the lower surface.
- * New growth has red branches, and bronze-green leaves.
- * Masses of green buds form in the large heads at the ends of the branches. These become clusters of large cream or pink flowers.
- * Flowers in February/ March. Flowers are cream or pink.
- * Marri fruits are commonly known as "Monkey Nuts". They vary in size from 1-5 cm in diameter.
- * Seeds drop from ripened fruit when the seal splits open.

Marri: Active Member of the Community

Marri trees provide for the needs of many other forest life. It is indeed A Tree for All - nature's boarding house.

Flowers, Fruits and Nuts

Bees and ants sip nectar and collect pollen from the flowers. They must watch for the Rainbow Bee-eater birds that will eat them.

Red-capped and Twenty-eight parrots take the seeds from the honkey nuts.

Leaves and Branches

Many birds rest among the leaves and branches, and forage for insects and reptiles on the tree and the ground beneath.

Honey-eaters pick lerps from the leaves. Lerps are insects that suck sap. Parasitic mistletoe attaches itself to the branches and also lives on the sap of the host tree.

Tree Hollows, Trunk and Bark

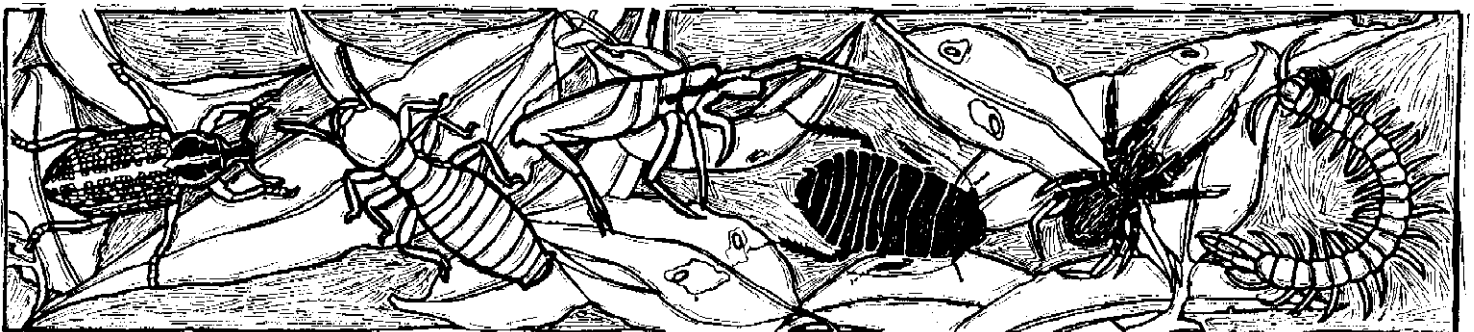
Brushtail possums, bats and parrots use hollows in Marri trees for roosts and nests. Velvet Geckoes shelter under the bark and at night hunt for insects in the branches, trunk and leaves.

Fallen Branches and Tree Trunks

Chuditch come out from hollows at night to hunt on the ground and in the trees for beetles, cockroaches and centipedes, small mammals such as mardos, rats, mice, and birds and reptiles. Numbats rest in the hollow logs at night and feed during the day on termites. Termites chew at the trunk within the protection of woody tunnels.

Leaf Litter - Decomposers

Fungi, along with numerous earthworms, mites and insects, feed on the fallen leaves and branches, so turning forest debris into humus from their droppings. Reptiles (snakes and lizards) and some small mammals (mardos, bandicoots and mice) forage among the forest litter for these decomposers.



Beetle, Termite, Springtail, Cockroach, *Spider* & Centipede

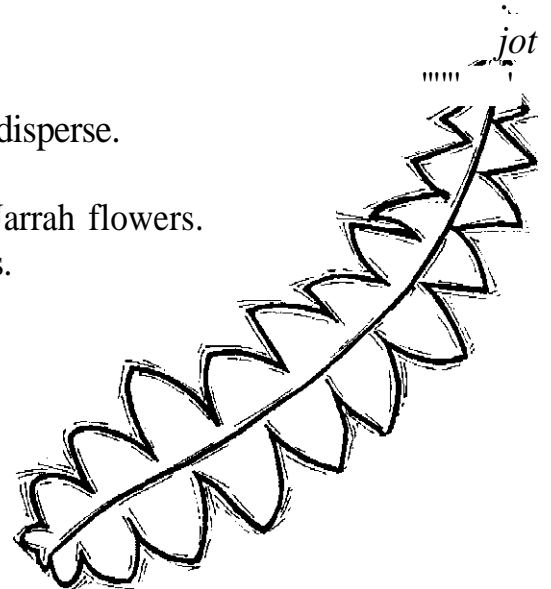
Ideas for further things to do

You may like to try these optional activities to stimulate further interest.

Collect seed pods (fruit), flowers, seeds and leaves from local trees. Try to include a variety of types, including, examples of ripe and unripe pods and different leaves. Identify different species and note the characteristics of each - size, shape, method of disposal and type of seed. *A flora collection licence may be needed.*

1. Flowers, Fruit and Seeds

- * Identify characteristics of a Eucalypt.
- * Buds - made up of cap and cup.
- * Flowers - open when cap is pushed off by stamens and some produce lots of nectar at base of cup.
- * Fruit - hard and woody.
 - formed from cups when seeds develop.
 - seal splits open when ripe to allow seeds to disperse.
- * Identify Jarrah tree.
- * If flowers are unavailable, find illustration of Jarrah flowers.
- * Germinate and grow seedlings from your seeds.



2. Leaves

- * Make a collection of leaves.
- * Identify characteristics of Eucalypt leaves:-
 - Leathery to feel.
 - Eucalyptus smell when crushed.
 - Shiny on upper face.
 - Dull on Lower face.
 - Hang downwards.
 - Leaf edge towards the sun to minimise transpiration (water loss) in hot, dry weather.
- * Identify a Jarrah leaf.
- * Put a plastic bag around some leaves on a tree. Tie firmly. Leave for several hours. What has happened ? Discuss.
- * Create a sensory experience: Place a collection of eucalypt leaves into a bag, and ask students, in turn, to experience and describe a leaf using one specified sense. They could crush it or tear it to release the scent and taste.

Safety: For a safe taste-test: Suggest students place cut edge of leaf on their tongue. Do not allow them to swallow. Care needs to be taken not to use poisonous plants, like the oleander.

3. Birds

Make and display a collection of photos, pictures and/or drawings of birds that use Marri trees or the Jarrah forest.

4. Mammals

Make and display a collection of photos, pictures and/or drawings of mammals that use the Marri tree, or the Jarrah forest.

5. Life in the Soil.

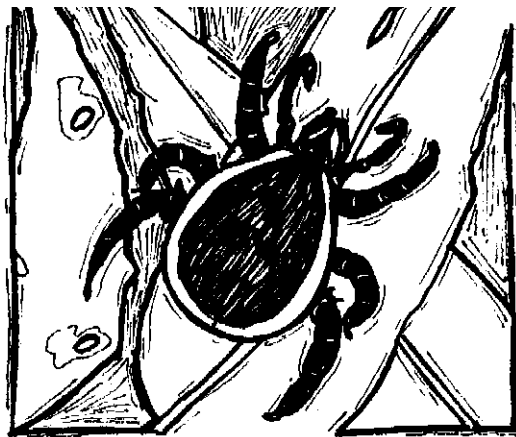
See the National Soil Conservation Program **Landcare for Kids Package**. The Soil Squashers activity on page 23. OUR LAND BOOK (Upper primary). It's available through the Western Australian Department of Agriculture for \$10.

OR

Visit The Perth Zoo's Microworld display.

OR

Try "What's in Our Soil?" Activity on page 39.



Mite

What's in Our Soil ?

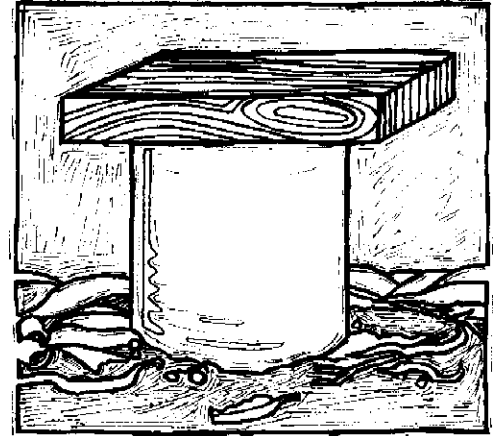
Schedule a soil investigation of your school yard or home gardens in late Autumn or early Winter,

Aim

* To look for invertebrate animal life in local soils.

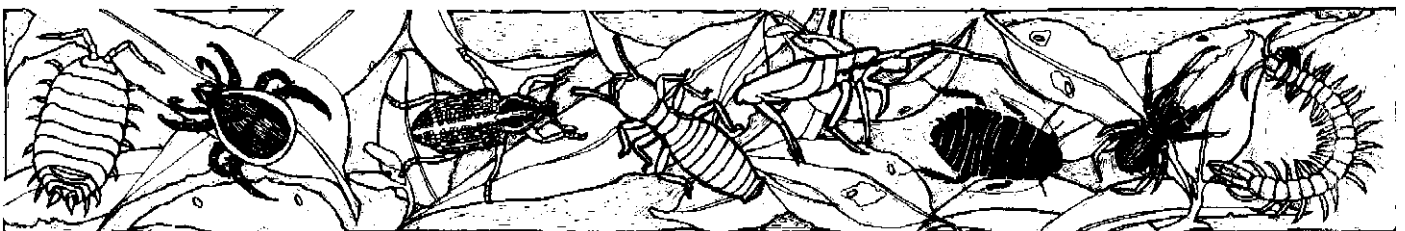
Materials

- Empty, clean old fruit cans (suggest 5 per class)
- A block of wood
- A hammer
- White paper (e.g., butcher's paper or litho paper)
- Light source (a strong torch)
- Hand lenses or magnifying glasses (at least 10)



What to Do

1. Find sites in the school yard and/or in student's home gardens that have moist soil.
2. Collect your samples in the following way: Turn an old fruit can, with its opening on the ground and, with a block of wood on top, hammer the can down through a number of layers of leaf litter and soil.
3. Bring the soil back to the classroom. Tip one sample onto the white paper, apply light source to the top of the soil and watch for animals that leave the soil. Look more closely at each by using a hand lens or a magnifying glass.
4. Describe the animals you see - write a few sentences about their size and numbers. You could include drawings. (You can expect to find animals like spiders, termites, earthworms, ants, mites, springtails, slaters and beetles)



Slater, Mite, Beetle, Termite, Springtail, Cockroach, Spider & Centipede

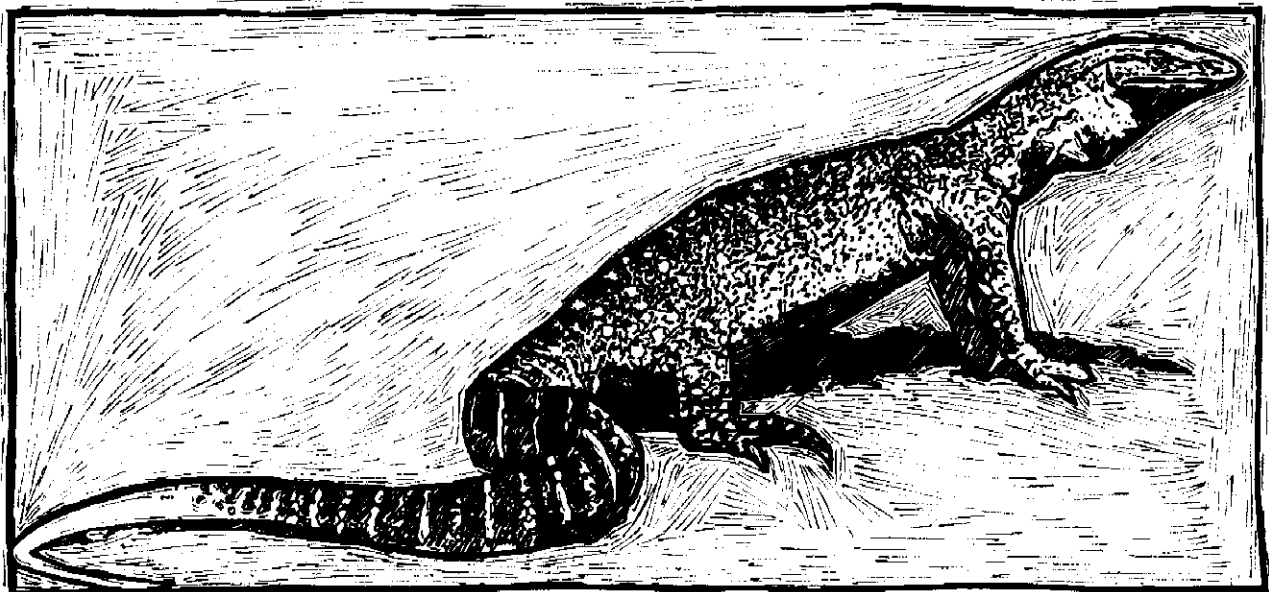
A Forest Community

Teachers' Notes

The group of plants and animals that share an area, such as a forest, form a **community**. The elements of any community are determined by the soils, climate, food and shelter available. A stable community usually occurs when a wide variety of life forms share an area that provides them with all the means they need to survive.

As individual plants or animals have particular needs, some species will be found on the ground, others in the trees; some in open spaces, others in shade; and some in damp places, others in dry areas. That is, they are found where their needs are met. This area is called their habitat.

Within the community each species has its food and shelter needs met, and at the same time supports the needs of other members. For example, during the day the marri tree takes water and nutrients from the soil, combines these with solar energy using the chlorophyll in its leaves to produce "food". Its trunk, leaves and branches provide food and shelter for birds and insects, which in turn provide food for mammals, such as the numbat and chuditch. The animal droppings, together with the decaying leaves, provide nourishment for the decomposers, which enrich the soil and feed the plants. And the cycle continues, and the community survives.



GouU'a Goanna

All Part of the Forest Community

Teachers' Notes

The plants and animals that make up the forest community are unique and of value. Each plant and animal depends on and supports other community members. All community members also depend on other physical parts of their environment, like soil, water, weather, and air, to live.

The Jarrah forest community consists of a large variety of different plants, animals and fungi. It ranges from trees and shrubs to tiny lichens, from kangaroos and possums to slaters, mites and microscopic fungi.

Aims

- * To increase students' knowledge of the names and characteristics of some Jarrah forest animals and plants.
- * To give at least two examples of interrelationships between plants and animals in the Jarrah forest community.

Materials

Copies of "All Part of the Forest Community" Assignment.

The two lists entitled: A Selection of Plant and Animal Species found in The Hills Forest Near Mundaring.

Appendix 2: Suggested References for Research Assignment.

OPTIONAL: Plan for a Written Report on page 26.

Preparation

Give your school librarian a copy of All Part of the Forest Community assignment and Appendix 2 about two weeks before you plan this activity. They can then prepare for your class's research needs.

You may wish your students to use the "Plan for a Written Report" for the All Part of the Forest Community Research Assignment, (see page 26 of this document).

Some Final Thoughts

Perhaps students could share their findings with each other by presenting short talks (three or four a day over a course of two weeks).

All the completed assignments could then be made into a Forest Directory to be kept for reference in the classroom or the school library.

All Part of the Forest Community

Students' Notes

What to Do

1. Let's find out more about the Jarrah forest community living near the Mundaring Weir in a place called The Hills Forest. We will each research one forest plant or animal to increase our understanding of how it lives and how it relates to other forest species.
2. You may wish to select, or your teacher may suggest, a specific species for you to study. For the best results, students in a class need to study animals and plants from a wide range of the groups listed (See pages 44 to 47).
3. See if you can find and present the following information on your species-
 - * An accurate sketch or picture of your subject
 - * A description of your animal/plant - its physical appearance. Does it have any distinctive features?
 - * Occurrence and distribution.
 - * Associated fauna (what depends upon it or supports it).
Associated flora (what depends upon it or supports it).
 - * Role of species within the forest community
 - * Distinctive features/behaviour.
 - * Human uses - present or past, (e.g., food, shelter, medicine).
 - * Response to fire.

Before You Start

Taxonomy is the science of naming animals and plants. Like all sciences, it is dynamic or changing. It changes because -

- * new species are continuously being discovered. In many of these cases some new species look very similar to described species; and
- * the relationship between different species is questioned and revised. Techniques such as new, sophisticated genetic testing enable these relationships to be explored.

Basically, this means that it's not unusual for scientific or generic names to vary from one book to another. For example,

Common Dunnart: *Sminthopsis gilberti* and *Sminthopsis murina*\
the Laughing Kookaburra: *Dacelo novaeguineae* and *Dacelo gigas*\
and Carnaby's Cockatoo: *Calyptorhynchus latirostris* and *Calyptorhynchus funereus*.

When you work on this assignment keep this in mind.

A Selection of Plant Species (or Flora) found in The Hills Forest near Mundaring

Trees

- Jarrah (*Eucalyptus marginatd*) - medium to large tree
Marri or Red Gum (*Eucalyptus calophylld*) - large tree
Wandoo or White Gum (*Eucalyptus wandoo*) - medium to large tree
Bull Banksia (*Banksia grandis*) - 10m
Common Sheoak or Condil (*Allocasuarinafraseriana*) - 8-15 m
Spreading Snottygobble (*Persoonia elliptica*) - 6m

Tall Shrubs

- Blackboy or Balga (*Xanthorrhoea preissii*) - 5 m
Upright Snottygobble (*Persoonia longifolia*) - 1-5 m
Tassel Flower (*Leucopogon verticillatus*) - shrub 1-4 m
Bookleaf (*Daviesia cordata*) - shrub 1.5 m
Wilson's Grevillea (*Grevillea wilsonii*) - shrub 1.5 m
Water Bush (*Bossiaea aquifolium*) - shrub 2 m
Honeybush (*Hakea lissocarpha*) - spreading shrub 1-1.5 m
Prickly Moses (*Acacia pulchelld*) - shrub 1.5m
York Road Poison (*Gastrolobium calycinum*) - shrub 1.5 m

Shrubs

- White Myrtle (*Hypocalymma angustifolium*) - shrub 1 m
Pincushion Coneflower (*Isopogon dubius*) - shrub 1 m
Prickly Bitter-pea (*Daviesia pectinata*) - shrub 1 m
Zamia Palm (*Macrozamia riedlei*) - shrub 1 m
Semaphore Sedge (*Mesomelaena tetragond*) - shrub 70 cm
Hairy Jugflower (*Adenanthos barbigerus*) - shrub 70 cm
Common Pin-heath (*Styphelia tenuiflor*) - shrub 50 cm
Couch Honeypot (*Dryandra nivea*) - shrub 30 cm
Purple Flower (*Patersonia occidentalis*) - sedge 40 cm
Smokebush (*Conospermum stoechadis*) - shrub 50 cm
Yellow Buttercups (*Hibbertia hypericoides*) - shrub 40 cm



Jarrah tree

Creepers

Old Man's Beard (*Clematis pubescens*)

Coral Vine (*Kennedia coccinea*)

Fungi

Dieback (*Phytophthora dnamomi*)

Parasitic Plants

Mistletoe (*Amyema miquelii*)

The 17 different species of mistletoe found growing in Western Australia all belong to the single genus or group called *Amyema*. Find out about this species of mistletoe that can be found growing on Jarrah, Marri and Wandoo trees.



Upper, middle & under storey of forest



Frickly Bitter-pea, Common Pin-heath, Wilson's Grevillea & Yellow Buttercups

A Selection of Animal Species (or Fauna) found in the Hills Forest near Mundaring

Mammals

Western Grey Kangaroo (*Macropm fuliginosus*)

Western Brush Wallaby (*Macropus irma*)

Common Brushtail Possum (*Trichosurus vulpecula*)

Chuditch (*Dasyurus geoffmii*)

Common Dunnart (*Sminthopsis gilberti*) This Western Australian species was previously considered as *Sminthopsis murina*.

Mardo or Yellow-footed Antechinus (*Antechinus flavipes*)

Southern Brown Bandicoot (*Isodon obesulus*)

Western Pygmy Possum (*Cercarteus concinnus*)

Monotremes or Egg-laying Mammals

Short-beaked Echidna (*Tachyglossus aculeatus*)

Introduced Mammals

Fox (*Vulpes vulpes*)

Rabbit (*Oryctolagus cuniculus*)

Feral Pig (*Sus scrofa*)

Feral Cat (*Felis catus*)



Rabbit

Birds

Carnaby's Cockatoo or White-tailed Black Cockatoo (*Calyptorhynchus latirostris*)
This species, together with Baudin's Cockatoo were previously considered as two races or (sub groups) of the single species *Calyptorhynchus funereus*.

Western Rosella (*Platycercus icterotis*)

Red-capped Parrot (*Purpureicephalus spurius*)

Twenty-eight Parrot or Port Lincoln Ringneck (*Barnardius zonarius*)

Wedge-tailed Eagle (*Aquila audax*)

Tawny Frogmouth (*Podargus strigoides*)

Black-faced Cuckoo-shrike (*Coracina novaehollandiae*)

Golden Whistler (*Pachycephala pectoralis*)

Grey Fantail (*Rhipidura fuliginosa*)

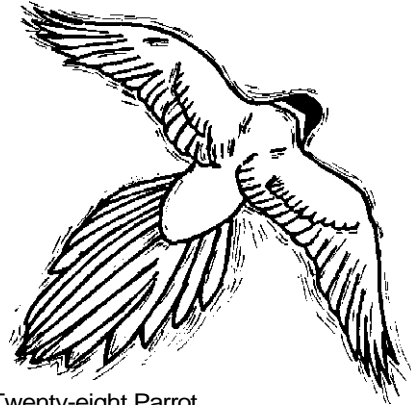
Western Thornbill (*Acanthiza inornata*)

Yellow-rumped Thornbill (*Acanthiza chrysorrhod*)

Splendid Fairy-wren (*Malurus splendens*)

Brown Honeyeater (*Lichmera indistincta*)

New Holland Honeyeater (*Phylidonyris novaehollandiae*)
 Red Wattlebird (*Anthochaera carunculata*)
 Magpie Lark (*Grallina cyanoleuca*)
 Australian Magpie (*Gymnorhina tibiceni*)
 Grey Currawong (*Strepera versicolor*)
 Australian Raven (*Corvus coronoides*)



Twenty-eight Parrot

Birds Introduced to the Jarrah Forest

Laughing Kookaburra (*Dacelo novaeguineae*)
 In some texts it is called *Dacelo gigas*.

Reptiles

Bobtail (*Tiliqua rugosa*)
 Carpet Python (*Morelia spilota*)
 Dugite (*Pseudonaja affinis*)
 Gould's Goanna (*Varanus gouldii*)
 Barking Gecko (*Underwoodisaurus milii*)
 Marbled Gecko (*Phyllodactylus marmoratus*)
 Wall or Fence Skink (*Cryptoblepharus plagiocephalus*)
 Napoleon Skink (*Egernia napoleonis*)
 Red-legged Skink (*Ctenotus labillardieri*)

Amphibians

Slender Tree Frog (*Litoria adelaidensis*)
 Motorbike Frog (*Litoria moorei*)
 Common small ground frogs (*Crinia glauerti* and *Crinia pseudinsignifera*)



Slender Tree Frog

Invertebrates

The Jarrah forest has many invertebrate animals. As yet, few have been given scientific names.

Energy Paths Game: Chuditch, Parrot and Seeds.

"Chuditch, parrot and seed" is a complex game of 'tag', where the players assume the roles of one of three organisms. Through playing the game, students gain an understanding of the path of energy in the form of food.

Aim

- * To develop understanding of the concept of energy flow and food chains in a living community.

Location

School oval.

Materials

- Whistle or Duck-caller
- 15 strips of cloth (1m) for parrot tails
- Two teams of netball bibs (14) for chuditch

What to Do

1. Seat the class to explain the rules of the game. It is essential to give all students background information about each of the forest animals and plants they will become and to reinforce the concept of food chains before playing the game. The role of the Sun as the source of energy to plants should also be stressed.

e.g., Food Chain:

sun—* marri tree (seeds)——> parrot——>chuditch

2. Divide the class into three groups, using the ratio of 3 chuditch: 4 parrots: 3 seeds. The teacher will be the sun.
3. Instructions

The Sun

- * The teacher conducts the game from the centre and represents the sun. Each round of the game starts with the teacher saying: *The sun is the source of energy for all green plants*, followed by a whistle blast.

Seed

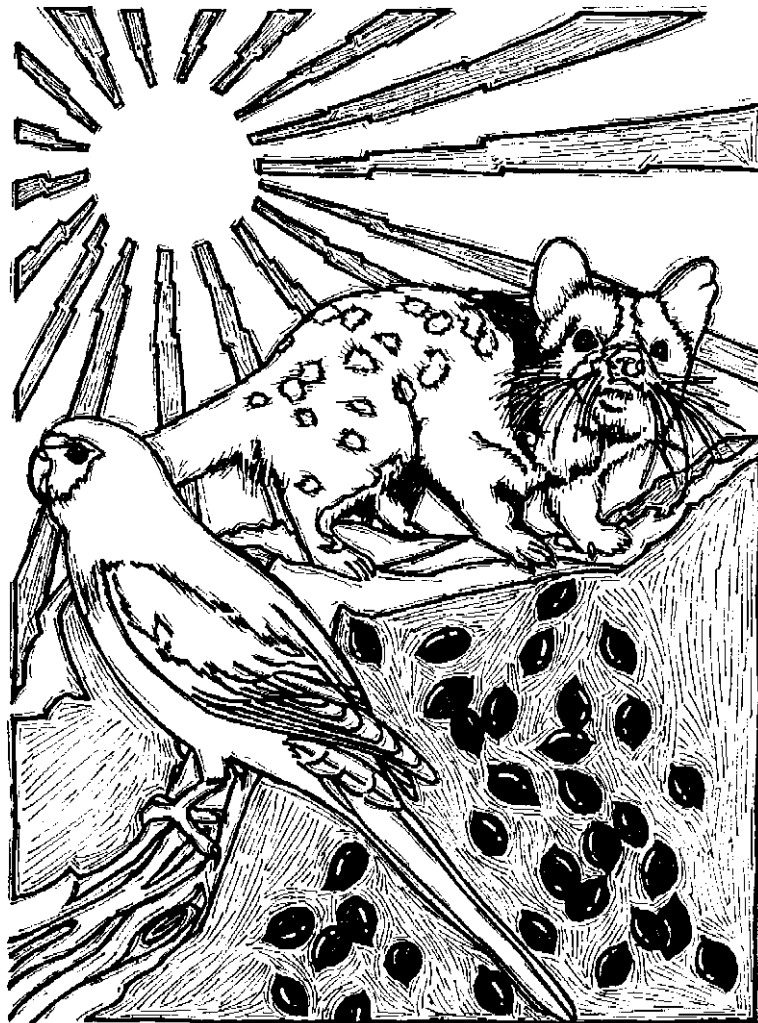
- * Seed is the food for the parrots. Seed shows that it is available for parrot food, by standing with one hand raised.

Parrots

- * Parrots tuck their tails loosely into their clothing at waist height (tying on tail hinders the game).

Chuditch

- * Chuditch feed on parrots. They wear netball bibs to identify them.



Chuditch, farrat & Seeds

The populations are arranged in three concentric circles over a wide area. Parrots form a flock near the centre and crouch down (this is their "safe" position at any stage of the game); the chuditch form a ring around them at a distance of about 10 m; the seeds take up individual positions at the edge of the playing area.

4. When the signal is given, the parrots try to reach the seeds and chuditch try to catch the parrots. A parrot is caught when its tail is pulled out. Parrots are safe whenever they crouch down, but they must be upright to reach food.
5. Both parrots and chuditch must feed in the time allowed - say, one minute. Chuditch may eat only once. Parrots may eat as many seeds as they like. When a seed is eaten, it lowers its arm to show that it is no longer available as parrot food. "Eaten" parrots retire until the "stop" signal is given.
6. At the end of each round, populations are reorganised as follows:-
 - Uneaten seeds remain as seeds;
 - Seeds that were eaten become parrots;
 - Parrots that were eaten become chuditch;
 - Uneaten parrots and chuditch that fed successfully "die" and become seeds.
7. Once the populations are re-organised, members take up the appropriate positions and the next round begins. The game continues for five or six rounds, with a record being kept of the population sizes at the end of each round. These figures can be used as the basis for a later discussion.

Ideas for further things to do

- * Show the energy path or flow.
- * Identify the levels in the food chain, introducing terms such as *producers*, *herbivores*, *carnivores*, *predators* and so on.
- * Tabulate and graph the results of the game. Observe how the populations fluctuate, and hypothesise as to why they do so.

Acknowledgement: The idea for this game came from "Forests for The Future", Department of Conservation, Forests and Lands in conjunction with the Ministry of Education, Victoria (1984).

Who Needs It?

Needs and Wants Sheet 1

Western Pygmy Possum

What does this animal **need** to survive ?

Food

Oxygen



Water

Shelter
- habitat
- fur

Reproduction

Social Order

Who Needs It?

Needs and Wants Sheet 2

A person

What does this animal **need** to survive ?



Who Needs It?

Needs and Wants Sheet 3

Your choice What does _____ **want ?**

Who Needs It?



People are part of the living world: like plants and the other animals we have a number of **needs** that must be met if we are to survive. This activity has students discuss and explore a number of needs that we share with other animals. Students also consider our **wants**.

Aims

- * To understand people's basic needs for survival.
- * To understand that people are animals and that, to survive, we share the same basic needs with other animals.

Materials

Copies of the three student sheets on needs and wants.

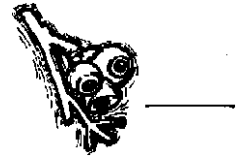
What to Do

1. Discuss in groups the difference between the meanings of the words **need** and **want**. Prepare a list of examples of each and discuss these as a class group.
2. Working in small groups and using the first two sheets, complete the needs of a person sheet.
3. Discuss the needs of a Western Pygmy Possum. How do the needs of a Western Pygmy Possum and person compare?
4. Now look at and discuss the third sheet: human **wants**. Try to make up a **wants** sheet for yourself, or your mum or dad or sister or brother.

Think about the resources used in satisfying each **want** listed. Besides each **want** write a statement describing why you **want** it. Go back and repeat this for the humans **needs** sheet.



The Forest Jigsaw



Teachers' Notes

Forests are complex ecosystems to which all people are ultimately connected. Our use of forest resources and products - from most of the water we drink to the paper we write on - links us to forests daily. Western Australians rely on our local forests and plantations for products and experiences as well as forests products from other countries.

The Forest Jigsaw activity motivates and challenges students to think about and want to know more about their forests, while having fun. It also prepares them for their forest visit. An especially dynamic impact can be achieved if the Jigsaw Kit is specially delivered to your classroom.

Aims

- * To imbibe students with the concept that forests, particularly Western Australian forests, have significant values that play an important role in their lives.
- * To make students aware that they are linked to the forest by the resources they use and the outdoor activities they pursue there.

Materials

Brainstorm chart from 'What is a Forest?' Activity

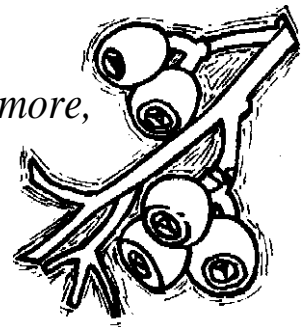
The "Western Australian Forest Jigsaw" kit (two week loan from CALM)

What to do

1. Arrange for the Jigsaw kit to be delivered to your classroom. As a class, solve the riddle on the kit's lid before opening it.

*You will know me by one face for sure,
But beneath the surface there are many more,
I'm Resource, I'm Beauty,
And people have a duty,
To use me, but protect me, evermore
What am I ?*

Solution
The forest



2. Now ask students to think of the *-wordforest*. What do they picture?
 - * Are there any people in your 'picture'?
 - * Are you in the 'picture'?
 - * Do you think that you have any connections or links with the forest?

3. Explore the idea of connections: What is/are your/our connection to the forest? Go back to your brainstorm chart on What is a Forest? Compare, discuss and add to that chart from this discussion. Why not formulate some questions you may wish to know more about?

4. Open the lid. And pull out the envelope entitled The Forest as a Jigsaw: People in the Forest Web.

"Western Australia's forests have many values or qualities. Some belong to the forest community, while others help us meet our needs and wants for resources like water, food, shelter and recreation. We can understand this better if we look at the forest as a huge jigsaw with many pieces. Like any jigsaw, the forest only takes on real meaning if we look at all of the parts that make up the whole picture."

- * Now, introduce each jigsaw piece in turn. Discuss each value described. Alternatively, the 12 objects may be shared among the students for them to talk about and draw their conclusions.
- * Each item is accompanied with the following notes:



1. Wildlife or Nature Conservation Value

The forest is an ecosystem - that means that it is made up of many different living and non-living parts - plants, animals, landforms and soils.

Western Australia's Eucalypt forests are unique - Jarrah, Karri, Tuart and Wandoo forests and woodlands - are not found in any other part of the world. Although our forest soils are mostly infertile and not suitable for agriculture they are rich in native plants.

This special vegetation system means that specific animal species are suited to living in this type of habitat with this type of food.

Our south-west forests are the main habitat of several mammals, including the Western Brush Wallaby, Western Ringtail Possum, Honey Possum, Numbat, Chuditch and Woylie. The importance of our forests has increased over the last 100 years for animals such as the Numbat, Chuditch, and Woylie. This is mainly because activities like land clearing have greatly affected other ecosystems that these animals used to inhabit.

Of course, many other animals live in the forests. Two hundred and thirty-nine native vertebrate species (mammals, reptiles, fish, frogs and birds) live in the Jarrah forest alone. Over half of these are birds. An estimated 20 000 species of insects - bugs, beetles, ants, bees and moths - also live in the Jarrah forest along with about 2 000 species of other invertebrates such as earthworms, mites and slaters.

In order that these species all continue to live in the forests, we must be aware of their needs and make sure that human activity causes minimal damage to their habitat.

2. Water Value

One of the forests most important use is as a harnessed water catchment. This means that water draining through or running off forest land is collected in dams and fed into a supply system to meet human needs. Trees act as pumps and keep the salt level low in the soil. The leaf litter and plant debris on the surface and the plant roots in the soil ensure stream runoff is relatively pure and uncontaminated. These features help to ensure that water from forest catchments is of a very high quality.

Much of Perth's water needs are supplied by three large reservoirs located in the Jarrah forest -

Canning Dam

Serpentine Dam

South Dandalup Dam.

A fourth dam, Mundaring Weir, provides water to the eastern hills, the Wheatbelt and the Goldfields as far away as Kalgoorlie.

The forest that your class will visit is around Mundaring Weir, which is managed primarily as a water catchment.

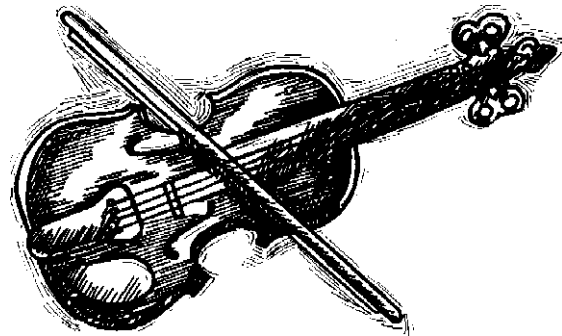
Water catchments have a number of benefits-
 They maintain ecosystems - especially wetlands and streams.
 They provide water-based recreation.
 They have cultural values for education, research, and spiritual activities.
 They provide a water supply for homes and industry.
 They service agricultural needs for irrigation.
 They provide a water source for domestic bores.

* We use water, and products that need water during their manufacture every day.

3. Timber Value

Some forests areas are used for timber production. We all use timber products in many ways

- Furniture
- Paper
- Firewood
- Pencils
- Construction
- Flooring
- Heating.



Jarrah is used in house building for walls, floors, window and door frames, and it is also very popular for making furniture.

Pine plantations provide us with softwoods and are very productive compared to native forest. An area of pine trees can produce up to eight times as much timber as the same area of jarrah trees in the same time. Pine has many uses, such as in buildings, furniture and garden products to name a few.

All of Western Australia's harvested forests are regenerated. That means, new trees and shrubs regrow on these sites. Records show that no plant or animal species is known to have become extinct because of timber harvesting in this State.

one tkirri

Australia imports. A of its timber requirements. We need to produce more of our own, and this can be done by carefully managing our forests and developing new forests.

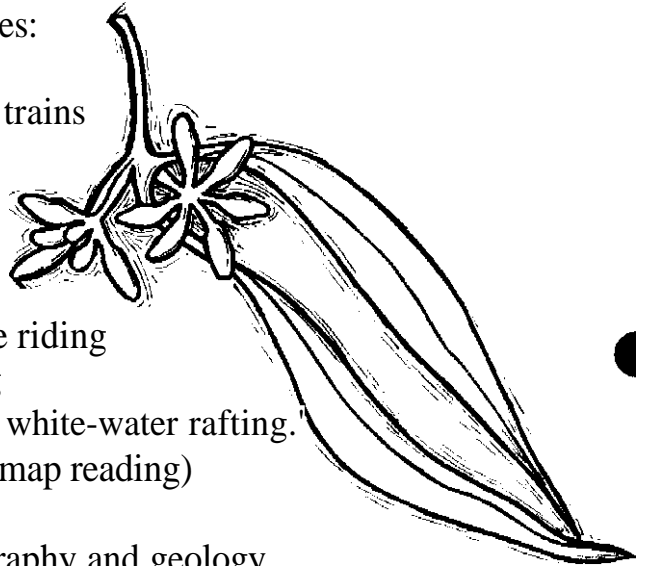
* Wood figures strongly in our natural and built environment, and for our personal comfort. Have you got timber in your house ?

4. Recreation Value

Recreation is special time to play, exercise, learn and be outdoors with our family or friends doing something different that is fun and enjoyable.

The forest provides a range of leisure opportunities:

1. Social activities like family picnics
pleasure trips on buses, trains
horse riding
bird watching
wildflower study
bushwalking.
2. Skill orientated activities like mountain-bike riding
rock climbing
canoeing and white-water rafting.
orienteering (map reading)



All these activities depend upon the forest's geography and geology.

Our forests are popular recreation sites. About three million visits are made to our forests each year. In the Mundaring Weir/John Forrest National Park area alone, half a million visits were made in 1991.

* People enjoy recreating in the forest space. What do you enjoy most about the forest?

5. Mining Value

Five primary minerals are mined in Western Australia's Jarrah forests, under the Mining Act or Special Agreements Act. They are:

Bauxite (for alumina)
Coal
Gold
Tin and Tantalite
Mineral sands

The value of these minerals is currently over \$3 000 million a year.

Bauxite (for alumina)	\$2 358 million
Coal	\$ 214 million
Gold	\$ 303 million
Tin and Tantalite	\$ 179 million
Mineral sands	\$ 20 million

Western Australia is a mineral-rich State, and these minerals are important to our economy. However, they have to be mined with as little detrimental effect as possible to our forests. To ensure this the Government has instituted strict laws guiding the activities of mining companies and has clearly outlined what must be done after mining to restore the land.

* How many minerals do you use each day?

Look at some of the objects that you use regularly and work out how many different metals/minerals were used to make them. (The Chamber of Mines has an excellent free poster illustrating this point.)

6. Spiritual Value

The forest is a place where many people feel they can leave the pace of their everyday lives and renew their spirit and refresh themselves. Some forest areas are of cultural and personal significance to certain groups of people. The Noongar Aboriginals of Pinjarra speak of how the Sacred Waugal (Rainbow Serpent) formed the Murray River which flows through the forest. That area has special importance for them; it has Aboriginal spiritual value. It is a place they can be alone.

* Do you enjoy being among trees, or just looking at pictures or films about them?

Noongar is the spelling of the name for South Western Aboriginal groups used by the Noongar Language and Culture Centre, (Aboriginal Corporation) Bunbury, 1992.

7. Honey Production

About 80 percent of Western Australia's honey comes from apiary sites located in the forest. The richness of the nectar and pollen gathered from the forest vegetation is important for successful beekeeping.

Honey production in 1991 was valued at about \$7.5 million. Other side-products such as wax, pollen, and royal jelly are part of this industry.

Honey bees also pollinate fruit and vegetable crops in surrounding areas.

* Do you enjoy honey?

8. Wildflowers. Blossom and Seeds

Wildflowers occur naturally in Western Australia's forest areas and are also cultivated on farms. About 45 percent of the State's production comes from public forests. It is an important export industry.

Much of the native plant seed for new cultivation comes from native forest stands. Most of it is used locally for rehabilitation work, and sold to local Shire Councils and mining companies.

- * Who enjoys the beauty of flowers?
- * How many of you have dried wildflowers at home?

9. Tourism Value

Western Australian forests attract local, interstate and international travellers. These visitors enjoy seeing and experiencing our unique native wildlife and natural landscapes. Increasing numbers of people are drawn to these forests each year.

The forests' attractions include majestic scenery, large unique trees, wildflowers, wildlife and inland water bodies.

Industries associated with the forest, like wood crafts, provide additional tourist attractions. Many leisure activities are provided by local tourist operators using forest land, including -

- horse trekking
- canoe expeditions
- 4WD tours
- wildflowers bus tours
- horse-drawn caravan tours.

The south-west of Western Australia is the fastest developing tourist area in the State.

- * Do you enjoy a forest visit, a visit to a craftsperson's workshop or a horse ride through the forest?

10. Education Value

Forests provides sites and opportunities for people to learn about the intrinsic beauty and value of the natural environment and their role in maintaining it. It is important for people to understand more about the various aspects of forests, and our use and management of them.

Schools use forests extensively for excursions and camps. Many courses are available using forests, including expedition training, survival training and bushcraft.

* We can learn about the forest to enrich our knowledge of our natural environment, and appreciate our part in it.

11. Research Value

Many groups study our forests, including CALM (Department of Conservation And Land Management), C.S.I.R.O. (Commonwealth Scientific Institute and Research Organisation) and various Western Australian universities.

CALM conducts extensive research in forest ecosystems, studying the plant and animal populations and the on-going effects of each on the other and the human impacts. Researchers are continuously looking at dieback disease and the effect of fire on the Jarrah forest community.

The information gained adds to the body of knowledge on forests, and helps guide management decisions. The more information we have on forests, the more wisely forests can be used and managed for present and future generations.

12. Aesthetics Value (landscape)

Landscape combines the visual elements of the natural and built environments. It includes elements such as landform, vegetation, waterform, land use and architecture.

A natural beauty is found in the forest region with the eucalypt (gum tree) being the common, unifying element.

For many Western Australians the "landscape" or aesthetic value of the forest is their most direct experience of the forest.

Managing afforested landscapes in the south-west is very important. Forest aesthetics - or beauty - is important to both tourists and local residents.

* Beauty is something we all enjoy.

We enjoy the beauty of the forest in our lives from paintings, pictures, films, pot pourri, dried flowers and woodcraft or by actually being out in the forest.

13. What other values do you place on the forest?

Can you suggest any more values people place on the forest?

Conclusion

So you can see that even though you may have thought that the forest only affected you on the occasions when you visited it, it actually affects you every day.

You also have an affect on the forest in the way you consume its products, and in the attitudes that you hold towards it and pass on to others.

As people in Perth's community, we all use or link with our forests many times a day, even though we may not live or work or go to school near the forests.



MarD tree

Section 2: Visiting the Living Forest

An outline of the activities conducted during the visit to the Jarrah forest in The Hills Forest.



Twenty-eight Parrot, Australian Magpie, Brown Honeyeater & Splendid Fairy Wren

Excursion Outline



The Living Forest

Morning session

Theme: Introducing a Natural Ecosystem.

Concept: The forest is a natural ecosystem, that can be enjoyed and experienced.

This part of the program will be conducted by Environmental Educators. The class will be divided into two groups and taken through a series of Earth Education Activities, which collectively make up an "Earth Walk".

The principal components of this session are:-

1. **The Senses** (feelings) - All activities are designed to sharpen the learner's perceptions - to "wake up" their senses of sight, hearing, taste, touch and smell.
2. **The Concepts** (understandings) - The program focuses on helping students explore and develop their understanding of the basic ecological concept of interrelationships. In this case, we explore interrelationships in our Jarrah forest ecosystem.
3. **The Mechanics** (learning process) - People learn when they take something in, do something with it, and then use it. These activities are organized to involve the learners, and allow them to assimilate and process the information step by step.
4. **The Solitude** (appreciation) - In this world of constant activity and noise, we need to help people to sharpen their non-verbal skills - skills like watching and waiting, being silent, listening, and being open to receive new experiences and feelings. We need to offer students time for Solitude.
5. **The Magic** (effect) - Magic acts as the "glue" between all the other components. By grabbing the students' imagination as they participate in something special and different, we are producing, and helping them to produce, "Magic".

In the first session students will experience the forest more fully. They will absorb and enjoy the atmosphere of the forest by acquainting themselves sensually with its' parts. The activities will include: Waugal Scales, Microtrails, Meeting the Forest, and Magic Spots.

Our Forest Connections

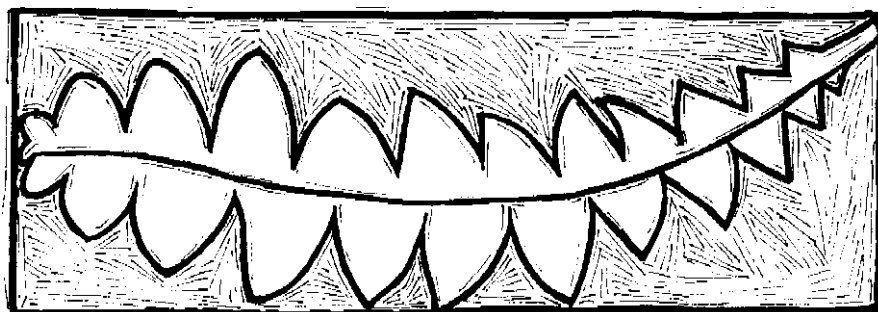
Afternoon session

Theme: Our Links to the Forest

Concepts: Forests are used by our community for many different purposes. Because of this use, forest land has to be managed in order to maintain it.

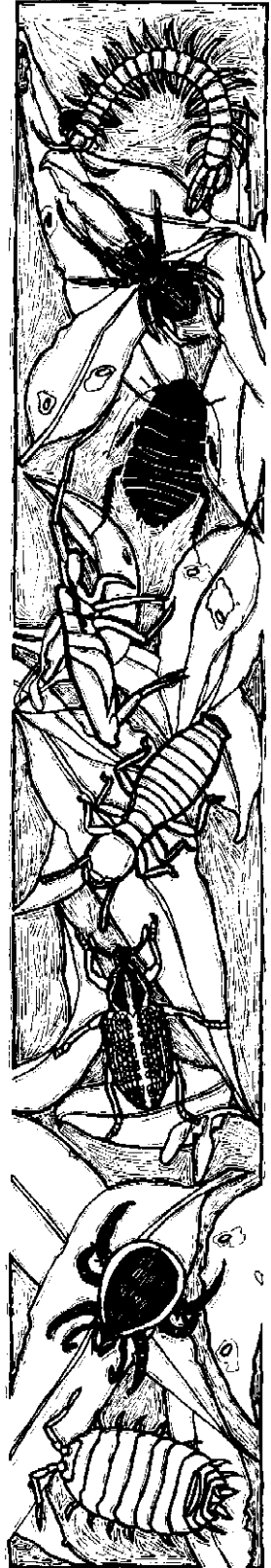
In the second session, CALM Field Staff will introduce the concept of forest land use and management. Students will explore the part people play in the forest ecosystem by participating in an enjoyable activity. They will also learn about aspects of Jarrah forest management with which CALM deals. The focus will be on land use and management in The Hills Forest.

A Resource Note accompanies this package to assist teachers understand some of the key components of Land Use and Management within the Northern Jarrah Forest.



Section 3: Human Connections: Lessening Your Impact

Suggested post-visit activities.

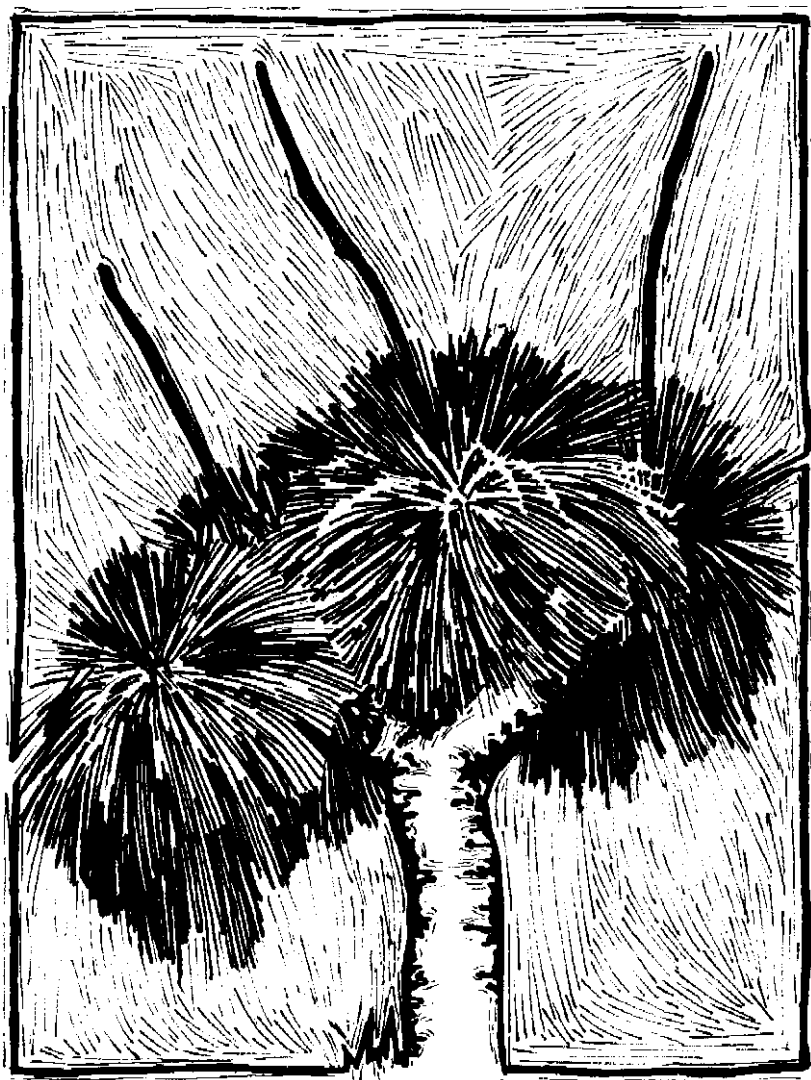


Human Connections: Lessening Your Impact

Introduction.

After their forest visit, the students will have a better understanding of, and feeling for, the features of one place in the Jarrah forest: The Hills Forest, Mundaring. Each child will respond to the area, and to their experience in a unique way.

The following activities have been designed for you and your students to explore more deeply some forest attributes relevant to your lives. They also address some crucial environmental and moral issues that their future actions and attitudes can affect.



Blackboy

How Do I Feel?

Try this activity straight after your forest visit.

Aim

* To increase each students awareness of their feelings about forest landscapes.

Materials (Per student)

A pencil

A copy of the *How Do I Feel ?* chart



Common Pin-head, Wilson's Grevillea & Yellow Buttercups

How Do I Feel?

What to Do

1. Look at the paired words below. Tick the dash you feel best matches your response to forest scenery and happenings. For example, you may feel that the forest is very colourful. You would tick the dash nearest to the left on the first line.

If you have mixed feelings about a landscape, or no opinion, tick the dash in the middle of the line between the two words.

How Do I Feel ? Chart

Colourful	_ _ _ „ _	Colourless
Simple	_ _ _ _ _	Complex
Bright	_ _ _ _ _	Dull
Flat	_ _ _ _ _	Hilly
Impressive	_ _ _ _ _	Unimpressive
Obvious	_ _ _ _ _	Mysterious
Pleasant	_ _ „ _ _	Unpleasant
Artificial	_ _ _ _ _	Natural
Orderly	_ _ _ _ _	Chaotic
Varied	_ _ _ _ _	Monotonous
Distant views	_ _ _ _ _	Limited views
Known	_ _ _ _ _	Unknown
Welcoming	_ _ _ _ _	Hostile
Uniform vegetation	_ _ _ _ _	Diverse vegetation
Degraded	_ _ _ _ _	Healthy

2. After you have placed a tick on each line, discuss your choices with several people.
3. Compile the results of the entire group. Discuss.

Adapted from an idea from Project Reef-Ed Great Barrier Reef Educational Activities (1988) by the Great Barrier Reef Marine Park Authority.

Promote the Forest



This is a revision exercise with a difference. Students review and report on some of the concepts and feelings that they have encountered by designing and producing a promotional product like a brochure, a poster or a radio or television advertisement. They can also learn about an advertising medium and help other people to enjoy the forest's attractions.

Aim

- * To have students express their understanding of forest values based on their forest visit and studies to date. Students promote the forest by highlighting its major attractions. This activity can involve mapping skills, written language, value judgements, geographical research, mathematics, science and art.

Suggestion: Divide the class into groups of two or three and ask each group to collect samples of either a brochure, a poster or review radio or television advertisements in readiness for the activity.

Materials

A4 paper

Pictures of plants, animals, reptiles, insects and birds
and /or reference books containing the above

Atlases

Samples of other brochures to use as models (supplied by students).

What to do

1. During a follow-up discussion on their forest visit, blackboard students' ideas on visit highlights and key attractions. Ask students to identify which of these would attract tourists.
2. In small groups, ask children to examine some advertising mediums like a tourist brochure they have collected. Which do they find appealing? Why? Ask them to identify the information that would be useful in wanting to visit a particular location and in planning that visit.
For example,
 - 1) information about interesting places to go
 - 2) how to get to those places they want to go
 - 3) how to prepare adequately for that trip.

Topics they could consider are -

- * what information is displayed
- * how the information is displayed
- * what form the finished brochure takes.
- * use of colour
- * use of photos / illustrations

Outline the task to the students, emphasizing the importance of both clear and interesting information with attractive presentation.

A checklist of features

- a) Indicate how to get there, and a map of the forest area with the main surrounding towns and access routes
- b) Show how far is it from Perth
- c) Detail facilities that will make your visit fun and comfortable
For example, barbecues and camping sites
- d) Suggest activities that can be pursued in the forest like
bird watching, walking, camping, painting/drawing and plant study
- e) Describe the forest itself- its scenery/landscape, trees and shrub types, birds and animals
- f) Provide information about land uses in the forest:
 - * what industry / production goes on
 - * what measures are taken to ensure the forest is conserved
 - * who works there and what people do
 - * Water Catchment Area - how is it protected
 - * Conservation area - disease-risk areas set aside for protection against dieback.
- g) Show the value of a forest visit and why should you go. Consider the forest's
 - * Peace
 - * Beauty
 - * Education values,
- h) Outline ideas on forest care, like:
 - * take nothing but photos
 - * leave nothing but footprints
 - * use established walk tracks
 - * obey fire rules
 - * limit dieback spread by cleaning down your boots and car tyres
- i) Suggest necessary equipment like a first aid kit, a torch or juniper
- j) Illustrate with photos, or your handdrawn pictures.

Promote the Forest

You are a forest tour operator and your task is to encourage more people to visit The Hills Forest area.

1. Design and produce a brochure or use another form of advertising. You may wish to produce a television or radio advertisement or a poster that will attract a wide variety of visitors. In pairs, problem-solve what information is needed in this brochure or advertisement.
2. Your brochure design/advertising design needs to present the most useful and appealing information in the "friendliest" form.

To Test This Out

a) Look at your rough draft.

b) Would you pick this brochure out of a rack from among 10 others?

Would this poster catch your eye? Would you stop talking to listen to this radio advertisement? Does this television advertisement show the best features of The Hills Forest?(Maybe ask mum or dad or other students what they think).

Now each of you need to put together your own Hills Forest promotion based on your draft and advice. Would you "head for the hills" after listening to your advertisement on radio or seeing it on television?



Looking at Land and Resource Use



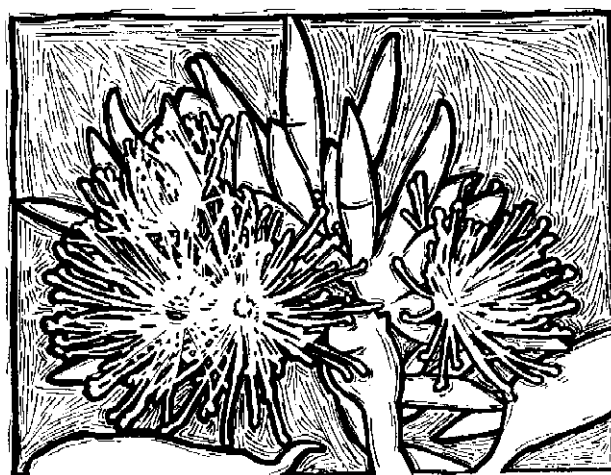
Aims

- * For students to understand that the forest provides physical and aesthetic resources for the animals and plants that live there and for the people of Western Australia. These resources can be managed for present and future use.

Materials

1. "People in the Forest" Map showing part of The Hills Forest area and some main land uses. The forest provides the following values or uses -

- Wildlife
- Timber
- Water
- Minerals
- Recreation
- Tourism
- Spiritual renewal
- Aesthetic pleasure (beauty)
- Orchards - farming
- Education
- Research
- Honey
- Floriculture - flowers and seed.



This map illustrates at least one or two areas where each land use occurs. It is important to point out to students that these are just representative examples, and that many overlap and are multi-purpose areas.

2. Resource Note on "Land Use in the Jarrah Forest".

What to Do

1. Ask your students to study the land use and values map entitled "People in the Forest".
2. Have them read the Resource Note on "Land Use in the Jarrah Forest". You may wish to use First Steps strategies.
3. Discuss.

Using a Land Use Map of The Hills Forest



Aim

* To develop map-reading skills to locate various features.

Materials

"People in the Forest" Map
Paper

What To Do

Provide students with copies of the map and make sure that they understand the key. Using the grid references ask students to identify:

1. The principal water reserve
2. Two camping areas
3. An area rich in wildflowers
4. An education centre: The Hills Forest Activity Centre
5. A pine plantation
6. A timber production area
7. A firewood collection area
8. Two feeder water courses
9. A place where the view would be spectacular
10. A honey producing area
11. Orchards
12. A place where mining or gravel extraction is being or has been carried out

You may wish to conduct this activity with a whole class in an oral format. Afterwards, ask students to plan a camping area.



A Forest Resource: Exploring Land Uses

Aim

* To find out about land use in the Western Australian forests.

Materials

Reference books and telephone book

What To Do

Working either individually or in small groups, students study a particular land use. Possible topics for research assignments include -

1. Discuss an area's **recreation** facilities and the impacts of such recreation to the forest.
2. Discuss how one mineral is **mined** in the forest area.
3. Discuss how and where **food is grown** in the forest area.
(Consider fruit orchards)
4. How is honey produced in the forest ?
- 5. How are wildflowers** collected in the forest? What is their market? How is seed collected, and who uses it?
6. Find out who uses the forest for **research and education** purposes.
7. Investigate an aspect of the **forest wildlife** that was not included in your Forest Directory.
8. Explain the value of the forest as a place of **beauty and spiritual** renewal.
- 9. How is tourism** encouraged and catered for in the forest. Investigate other practical ways of encouraging tourism. Are there any negative aspects of tourism in the forest ? What are they ?
10. Find out about the work of the Department of Conservation and Land Management (CALM). What is this department's responsibility, and how is it organized to deal with its responsibilities ?
11. Where and how is **timber produced** ? Discuss the uses of this timber.

Year 7 students who study bauxite-mining, would enjoy the clear link to the Mineral Resources (Social Studies) Unit. Please note, that while bauxite mining occurs within the Northern Jarrah Forest, it occurs in areas well south of The Hills Forest.

Ask students to explore their personal connection to the forest through their use (consumption) of forest products and experiences. On a map, encourage them to locate the sites where these products come from and where they have their forest experiences.

Design a Day in the Forest

Aims

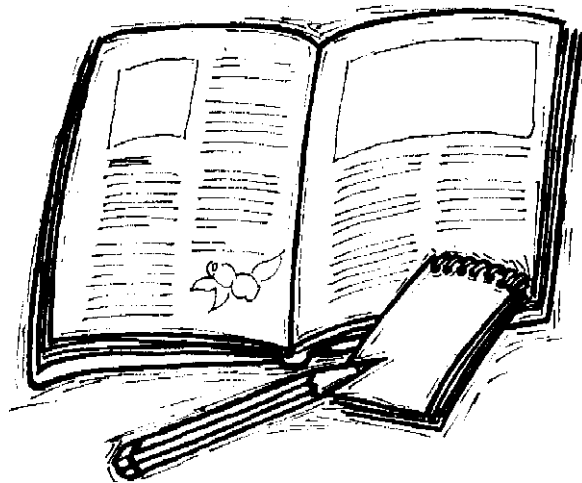
- * To design and schedule an enjoyable one-day visit to the forest.
- * To show the route taken during the visit by drawing a map.

Materials

"People in the Forest" Map
Paper

What to Do

1. Using the map, plan a day in The Hills Forest that includes as many aspects or values of the forest as possible. Refer to the values described in the Forest Jigsaw.
2. Indicate for whom the visit is designed: family, class of primary school students, pensioner group or university research students.
3. Time-table the day from your arrival at The Hills Forest, and ensure that you include an appropriate amount of walking, (not too much for small children or pensioners) stops for refreshments, and that you complete your trip at the point where your transport will meet you.
4. Explain as fully as you can:
 - what type of area you will pass through,
 - what plants and other sights you might encounter
 - what activities you may include
 - where you might stop to enjoy the view,
 - where there is evidence of employment/work going on.
5. Draw your route on your map, and clearly mark the important features of your visit.



Forest Management, Uses and Issues

Forest managers are faced with a number of issues or concerns. Some are posed by different community groups, each of which has its own perspective on how they would like to see the forest used and managed. Other issues are posed by continued population growth and changes in community demands and values.

Here is a list of some issues that affect forest management.

1. Urbanisation
2. Fire Policy
 - Prescribed burning
 - Spring/Autumn burning
3. Firewood collection
4. Environmental needs
 - Road, river and stream reserves
 - Habitat trees and logs
5. Domestic and feral animals
 - dogs (in National Parks)
 - pigs, foxes, cats, dingos
6. Commercial Wildflower-picking
7. User pays, like
 - paying for camping fees
 - National Park entrance fees
8. Preserving cultural sites and uses
 - Aboriginal hunting rights
9. Mining-
 - Bauxite
 - Coal
 - Tin
 - Gold
 - Gravel
10. Flora and fauna conservation
11. Plantations
12. Utilities corridors
13. Recreation
 - bushwalking
 - horseriding
 - mountain bikes
 - trail bikes



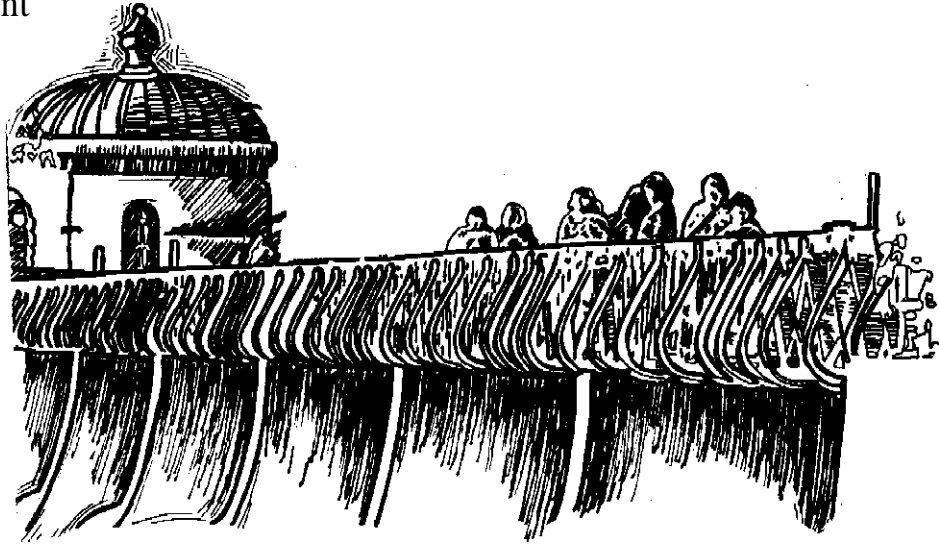
14. Hardwood timber production

15. Dieback management
quarantine area

16. Water supply
flooding valleys
conserving valleys

17. Off Road Vehicles
trail bikes
four wheel drives

18. Car rallies



Your Decision



Our community is made up of people who often have a range of different ideas on any one subject. Try this activity to investigate your ideas about the forest and to compare them with those of other people.

Aim

* To show that individual class members feel differently about a range of forest management issues. The classroom is like a small community with differing values and ideas on any subject.

What to do

1. Read each of the following statements carefully.
Decide which response you like best: eg strongly agree, agree, no opinion, disagree, strongly disagree

Statements	Strongly agree	Mildly agree	No opinion	Mildly disagree	Strongly disagree
1. I feel burning the forest is a bad thing.					
2. Car-rallying should be allowed in our Jarrah forest as it's fun and it brings people and money to WA.					
3. I can learn more about the Jarrah forest by visiting it than by studying a good book about it.					
4. I feel that I have a responsibility to do something to help conserve the Jarrah forest.					
5. Horseriding should be allowed in all our forested National Parks.					

Statements	Strongly agree	Mildly agree	No opinion	Mildly disagree	Strongly disagree
6. South-West Aboriginal people need access to the forest to continue their cultural activities such as hunting and camping.					
7. If scientists find a chemical in a rare plant that could cure heart disease, they should not make any attempt to to extract it for use by heart disease patients.					
8. Our community should not continue to spend money on research into dieback disease because we still don't have a cure for it.					
9. Timber production destroys the forest forever more.					
10. More tourist resorts should be established in the jarrah forest to give as many people as possible the chance to enjoy the forest.					

2. In groups of 3 or 4, discuss and compare each of your ideas. Are there strong differences of opinion in the group.
3. One person from each group briefly tell the class about the range of opinions.



Australian Magpie

Based on an activity in Project Reef-Ed Great Barrier Reef Educational Activities (1988) produced by the Great Barrier Reef Marine Park Authority

Forest User Roles and Planning Game : A Role-play Activity



Exploring peoples' values and interests can be very stimulating. Try this role play with your class. (Year 7 teachers will find this very relevant to the Cooperation and Conflict Unit.) This hypothetical situation models the conflict generated between individuals and groups with different points of view and gets students to search for ways in which such conflicts may be resolved. Students play the roles of people attending a public meeting concerning the uses and activities allowed in a forest area.

Aims

* To explore the various attitudes people have about our forests.

Materials

The role cards for the groups
Map of forest area
Overhead transparency of map and pens
Large sheets of paper (attached to the wall)
Felt pens

This game investigates how people might put across their points of view about the activities they would like to see in an area of community-owned forest.

Maxine Millionairess has bequeathed an area of Jarrah forest to the people of Western Australia. Her last legal will and testament specified that the land could become part of the community-owned forest managed by a Forest Management Group, on the condition that the use of this part of the forest be determined through community consultation.

What to do

1. Your teacher will decide how many students will be in each role-play group and prepare the role cards. You will each draw a role card and group from a random selection in a hat.
2. Each group then meets and decides on a strategy, using the role cards. You may wish to dress the part for your groups presentation.
3. The chairperson (your teacher), following their role card, will ask a representative from your group to present your groups ideas. Each group will be given an equal and limited amount of time to speak.

MAXINE MILLIONAIRESS' FOREST

KEY:

PROPOSED CAR RALLY ROUTE



PINE PLANTATIONS



WORTKOORLINYA[^]
(ABORIGINAL WALK TRAIL)



BEE KEEPING SITES



KINGIA ROAD

MT. POLLOCK

SAND MINE

JARRAL RIDGE

MT. KEPPEL

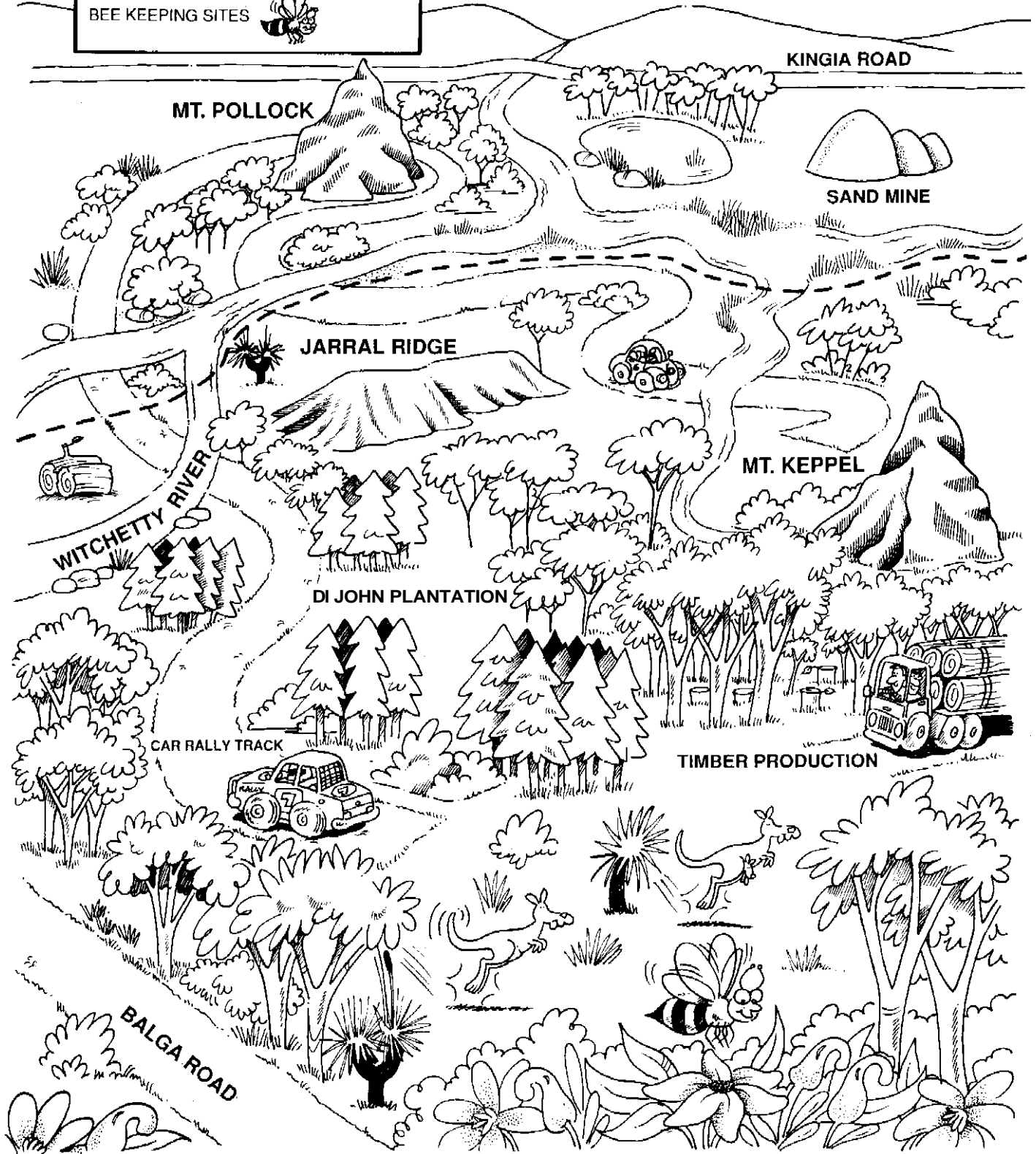
WITCHETTY RIVER

DI JOHN PLANTATION

CAR RALLY TRACK

TIMBER PRODUCTION

BALGA ROAD



4. When the meeting is convened, each group, dressed according to their roles, presents their case about forest land use. Speakers need to refer to the projected map or to a copy on paper. The secretary will record your points on large sheets of paper or on the blackboard. The meeting could be livened up by some heckling.
5. The Forest Management Group will make a decision about the type and location of the uses or activities allowed. They will announce it at the end of the presentation, or following day, whichever is possible. This group will explain their decision by outlining their reasoning.
6. After the decision has been announced, spend some time in a debriefing session. Discuss things like
 - a) Your views on the decisions made by the Management group.
 - b) How you feel the decisions were influenced by the presentations of community members?
 - c) Discuss the role of the Management group. What factors do you think influenced their decision?
 - d) The actual role-play game.
 - e) How do you feel about the final decision?
 - f) Discuss the roles of each group in the role play.

Suggested group members for roles for 30 students and teacher

The Forest Management

Group:

Chairperson 1 (the teacher)
 Secretary 1
 Artist 1

Community Members

Conservationist
 Bushwalking group
 Timber Millers
 Aboriginal group
 Car rally organisers
 Alternative health-practitioner
 Sand-mining company
 Wheatbelt farmers
 Reporters

Role Play Cards

1. Conservationists Group

You are a Research Scientist with a large federal government agency and President of the local Field Naturalists Society which has 75 members. Your club is an affiliate to the Association of Conservation Groups that has 42 affiliates and a membership of 2 000.

You want the area to remain as it is with no disturbance to the natural environment except for four field excursions a year, and for research that the club is carrying out on a numbat colony in an rare blue-powder barked Wandoo stand.

You don't want any more roads into the area. In fact, you would like to see nearly all existing tracks closed and rehabilitated, and an electrical powerline moved. All burning in the area must cease and reclaimed swamps to hold water.

You have a program sponsored by International Conservation Union to reintroduce the Chuditch to the area, and the Patron, Prince Philip is visiting Perth next spring and you hope to show him the area.

You feel you have responsibilities not only to your club members but also to your two children and all future generations to protect our unique vegetation and wildlife.

You have power under the Conservation Act and Endangered Species Act to protect the land on which the rare blue-powder barked Wandoo grows.

2. Bushwalking Group

You want to be able to walk wherever you wish and see as few people and unnatural structures as possible. You want peace and quiet, good views, easy to medium walking and occasional water sites. A campsite would be good to use. You want to see native animals and little disturbance to natural landscape except for your three metre wide track that needs to be signposted and maintained.

You argue that bushwalking is a natural activity that caters for the physical - good for the heart; the emotions - with wonderful views and natural discoveries; the mental - it clears the head and creates interest in the natural environment; the spiritual - offering the quiet and aloneness so important to the soul.

Your local club has 200 members who want access all year round especially from July to December. You have no legislative power but your cousin is the local member but in the opposition party.

3. Timber Millers

You operate a small local timber mill that has been in your family for three generations. It used to be a big mill but now it supports four families and employs six workers. Producing timber is all you know and all you have been doing all your life.

Because of bigger operations making more money with better equipment to the south, you are the only operator in the vicinity of the area to be bequeathed. You have spent a lot of time experimenting with methods to extract more timber from logs and using logs that other millers would leave for firewood or to be burnt.

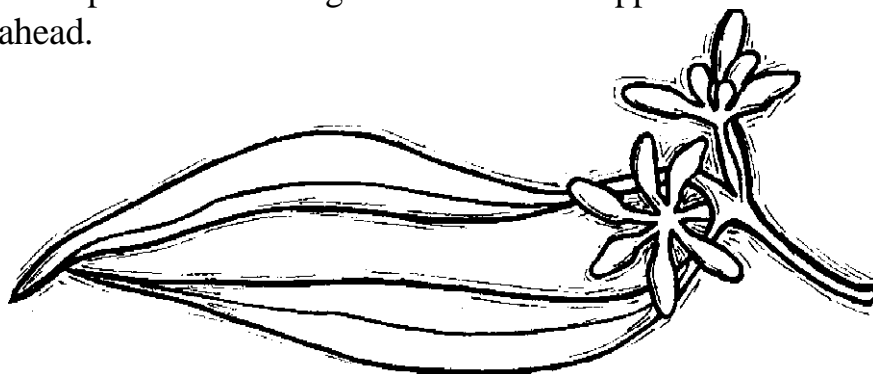
You work with the local forest manager to select and remove trees that enhance the future diversity and growth of the forest. You are not permitted to log or work near creeks or rock outcrops.

You want to be able to fell and remove some of the trees from the area for timber. Fencing and construction timber are in demand as more and more people move up to the hills to live and want rustic outdoor settings and big gardens. Opportunities to get the timber from other areas is decreasing and transport costs are expensive.

Some excellent sheoak trees, which are common in the area, are wanted to make into sawn timber to sell to local craftspeople for export as beautiful finewood furniture to the United States.

You do not want the area closed to logging. You can now only get logs in summer due to the risk of spreading dieback in wet winter.

You are part of an important Western Australia industry that creates \$100 million a year for the State and employs people. You are also supplying a budding export industry. State legislation supports the continuity of your industry, but the resource must be sustained. The Western Australia timber industry has recently agreed to reduce annual production of logs so that timber supplies are now secured for decades ahead.



4. Aboriginal Group

You are members of a local Noongar family group who historically have Aboriginal custodianship over this area, and for a large part of the surrounding forest. One member is the recognized elder of the family group (currently 65 people) that has been affiliated with the area for 40 000 years.

Although no major meeting or spiritual sites have been recorded, there is part of an ancient trail through which Aboriginal people moved from east to west in the summer. A heritage trail protects the western part of this ancient trail. Engravings and rocks sculptures are expected in the area but none have been found. No extensive survey has been undertaken.

You do not want any of the trail disturbed or developed. You also want a comprehensive survey conducted and all archeological sites protected. Under the State Heritage Act all Aboriginal sites of significance are protected. You want year round access for cultural activities such as hunting and camping, and also want to develop and operate Aboriginal cultural tourism in the area.

5. Car Rally Organiser

You are from Sydney and fly into Perth each year for two months to plan the World Rally section of the international circuit for rallying in Australia.

The rally attracts tourists who spent \$5 million last year in the State and the figure is growing yearly. The rally only runs for five days a year, with two weeks practice beforehand. All damage caused to the roads is repaired which allows the local land managers to maintain roads that they don't otherwise have the money to do.

The rally organisers want to use existing tracks and are committed to minimise damage to the natural environment. But you need to build one short section through the bush. Two sites will also be used for spectators but they will be transported by buses and the area will not become a large car park. The race is noisy and exciting and enjoyed by a growing group of people interested in this sport. You want the bush and forest to basically remain but you don't care if some is logged or mined as long as some trees remain to drive through. Road repair gravel is removed from a gravel pit in the area.

Specific state legislation caters for your event and all government ministers are keen to see an increase in tourism as an industry in the State.

6. Alternative Health Practitioner

You own a clinic that treats and heals people using alternative medical techniques such as acupuncture, herbal cures, flower remedies and vitamins. You are successful, have a growing business and some doctors come to your free lectures on alternative medicines. You have developed extensive flower remedies by collecting native flowers and extracting their oils.

You have a "deep ecology" perspective to the way we live on the planet and believe all life has an equal share of it and humans should not just plunder the planet because they want things - they should just use what they need. You have prompted the local shire to begin a recycling programme and currently sit on the shire as a councillor. You are a member of a number of local conservation groups. You believe that the area should be left untouched and no-one should be allowed to enter. You believe it is the nearest we have to wilderness near Perth and it should be allowed to exist without human intervention. You don't want paths, roads, facilities or any burning or logging to occur. You can get Federal funding to simply fence the area with no gates.

You have power under the Conservation Act to protect the area and support from the strong conservation minded local residents. However, you only have limited support from the local conservation group because they want access for research.

7. Sandmining Company

Your company has an existing mine in forest close to the area in question. On this small focussed minesite you work within hygiene restraints: that is, you manage your activities to legally imposed limits that reduce the possibility of spreading dieback disease.

You want to expand your operations into the northern part of this area. You are seeking year round access to the prized white sands. These sands will be mainly used by the building industry; however, the highest grade sands can be sold to the Japanese market for making spectacle lenses and silicon chips for computers.

Your activities will generate money for the depressed State economy in the form of mining royalties by creating jobs. However, you do acknowledge that this maybe at a cost: the bright white of the sand deposits will visually impact on the forest. You argue that because of the small scale of your operations you will not significantly disrupt the water flow and its quality into local creeks and streams.

Your activities are supported by the State's Mining Act.

8. Wheatbelt Farmer

You are a fourth generation farmer who has a wheat crop and sheep property 30 km from Merredin. Apart from a small bore all your water comes from the pipeline that runs from Mundaring Weir to Kalgoorlie. All the water for your stock, and a new experiment crop of nuts, comes from the Weir that is fed by water from the area to be bequeathed. Although you are 250 km away your survival depends on clean, cheap water. Any disturbances in the area that would increase the levels of salinity in the water and increase the cost of treating the water.

Farmers like you provide the food for the people of this State and export dollars for roads and hospitals to be built.

You have strong government power and legislation to protect your water source.

9. Reporter

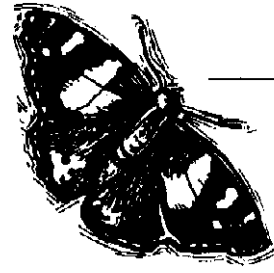
You are a recently qualified journalist who started work six months ago with a local newspaper. You are ambitious and do not like living out so far from the city and are looking for an opportunity to prove yourself, get noticed and get a better job in Perth that pays more money.

You know the local politics well and the hypocrisy of some of the things that representatives have been saying about the proposed bequeathal of the land. You are looking for some evidence or a statement that you can use as a big headline to catch attention and get people to buy the newspaper.

You don't really care who gets to use the land. You do want a good story.

Your newspaper is read by 25 000 local people.

By your code of ethics you must report fairly and accurately. Legislation protects you reporting on the arguments that must erupt from all these groups wanting access to the land.



Background Information

1. The area could be used seasonally, for example, certain uses may happen only in certain times of the year.
2. Not all users need to be accommodated.
3. As many users as possible should be accommodated as it is public land.
4. Environment constraints such as protecting rare and endangered plants and animals, and not spreading dieback exist.
5. The management of the land needs to be continuous with the surrounding area and vice a versa.
6. No money is available to manage the area, so all users need to pay for their activities, especially for long-term maintenance.
7. The area must be managed for perpetuity, that is for future generations use.



Adapted from an idea from Project Reef-Ed. Great Barrier Reef Educational Activities, produced by the Great Barrier Reef Marine Park Authority (1988).

Everyone Lives in a Catchment

Teachers' Notes

Aims

- * To develop the understanding that a catchment is an area that feeds a water supply.
- * To highlight the importance of trees to a catchment.
- * To show that changes within a catchment can alter the water quality.
- * To be able to demonstrate the effects of erosion.
- * To consider the likely future effects of people's present actions on local catchments.

What is a Catchment?

A catchment is an area of land where all the water drains to one point. It is generally bounded by ridges. It can be vast in size or quite small. Large catchments can generally be divided into a series of smaller catchments or subcatchments.

A catchment is more than a piece of land or an area marked on a map. It is a dynamic and living area that can have forests, crops, grasslands, orchards and wildlife. It can also include city or country, farms and forests, homes and hospitals, roads and railways, schools and towns, rivers and streams.

We all live and work in catchments, and depend on them for survival. All elements of a catchments are to a large extent interdependent.

Trees, grasses and other vegetation protect the soil from erosion and help keep the rain that falls on the land from becoming contaminated. Erosion is the loss of soil due to wind and / or water. When it rains, the fallen leaves, grasses and small plants on the ground help stop the soil being washed away. More water in the forest soaks into the soil than on bare ground. Then it slowly seeps into the streams that feed the water supply. The water does not take the soil with it into the streams, nor can the wind carry it away as it is covered. The soil remains and continues to sustain life in the catchment. So in a well vegetated / forested catchment the water remains suitable for human and animal use.

Animals, birds and people benefit from the food supply in a stable catchment.

A stable catchment with all its elements in balance will continue to supply food, fibre, construction materials, clean water, places to recreate and attractive landscapes.

Total catchment management involves the coordinated management of land, water and other physical resources and activities to avoid degrading the environment.

Total catchment management manages soils, water and vegetation to ensure that future generations can enjoy sustainable use and productivity,

Try some activities from Our Land Book, in Landcarefor Kids from the Department of Conservation and Environment, Victoria. Look under the section Everyone Lives in a Catchment, pages 5 to 14. Landcarefor Kids is available through the Western Australian Department of Agriculture.

Ideas for Further Things to do

1. A severe drought has hit the south-west of Western Australia. Each household must reduce its water consumption. Discuss what changes you would have to make.

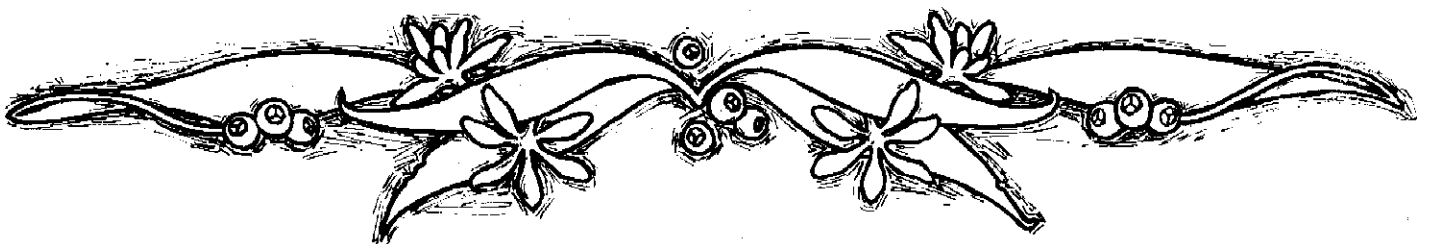
2. Further study could be made into the development of Mundaring Weir.

The history of -

- * When and why the site was chosen
- * The physical changes made to Helena River
- * The reason for supplying the Goldfields with water
- * The people who made the project a reality

are all very interesting, and pertinent to upper primary Social Studies.

For teachers wishing to pursue these topics, a great deal more resource material is available from the Water Authority of Western Australia and the C.Y. O'Connor Museum, Mundaring. The Ministry of Education (WA) has produced a computer package on C.Y. O'Connor.



3. Another appropriate topic is to investigate how water is treated and supplied to homes, farms and industry.

Contact the Education Officer at the Water Authority of Western Australia for information, and for suggestions for practical classroom experiments to demonstrate water catchments and supply.

OR

Contact the Ribbons of Blue Coordinator, Office of Catchment Management to find out about the Ribbons of Blue water quality monitoring program linking schools to their local government authority, the Waterways Commission, Water Authority and the Agriculture Department and with landcare groups.

4. Many West Australians live in the Avon River catchment. Consider an excursion to the Avon Valley (taking in York, Toodyay and Northam) and a study of the Avon Ascent. Contact ALCOA or the York Tourist Bureau for an informational brochure.



Upper, middle & under storey of a forest

Study of One Resource in Detail



Teachers' Notes

Trees

Trees are the most obvious element of the forest. A multi-faceted resource, trees provide shelter, food, and a large range of products, while stabilising the soil and producing oxygen.

The posters: *"All This From a Tree ?"* and *"A World Without Trees?"* show how strongly trees impact and contribute to our daily lives.

Wood

In our daily lives we are surrounded by materials produced from trees: from newspapers and books to cardboard cartons, from rayons, plastics and chemicals to chipboard, plywood and timber for furniture and construction. The basic raw material in each case is wood or wood fibre. Once a tree is felled, the wood that can be used is known as timber.

Timber is used very widely because it is versatile and easy to use as a construction material. We also value timber for its beauty in wall panelling and furniture. It is easier and cheaper to produce timber than it is to produce other construction materials such as concrete, steel and aluminium.

Wood is also **renewable**. We can replant trees once they have been cut down to ensure a continuing supply of wood products. This is called **regeneration** of the forest.

We can also plant areas of land that are not naturally forested. This is called a **afforestation**. This is done using softwood trees such as pines that are grown in plantations for timber production. Pines are also used in some areas to protect underground water resources, for example, at Gngangara.

Other Products

Apart from timber, tree products are used to produce rubber, wood turpentine, tannin, cork, medicinal oils, charcoal, wood chemicals, dyes, firewood and paper pulp.

Ensuring the supply of all these resources needs careful management. In Western Australia our State forests are managed by the Department of Conservation and **Land Management**.

Study of One Resource in Detail

1. A World Without *Trees*

It is hard to imagine a world without trees. Trees enrich our lives in many ways.

Aim

* To raise students' awareness of the diverse uses of wood and wood products and our dependence on these products.

Materials (per student)

Poster of "A World Without Trees"

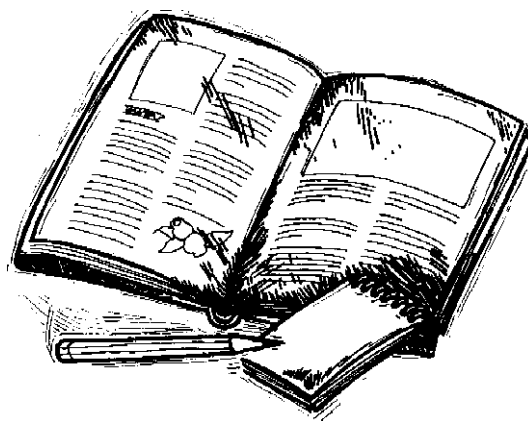
(Optional) Poster of "All This From A Tree?"

What to do

1. Look at the two cartoon pictures in the poster "A World Without Trees". One shows a typical busy backyard, but what has happened in the other? This poster illustrates some of the ways that we (and some of our animal friends) use trees and tree products everyday.

You may wish to use this poster in conjunction with "All This From A Tree?"

2. Use the list of Tree Statements printed on the back of the poster and place numbers on the picture where you think the description is best shown.



Study of One Resource in Detail

2. Home survey of tree products

Aim

* To determine the use of wood products in students' homes.

What To Do

1. Discuss the "Tree Products" poster.
2. Ask students to carry out a survey of the tree products in use in their homes.

Using the information contained in the "Tree Products" and "A World Without Trees" posters, inspect your home to see the extent to which your family is using tree products. List them on this activity sheet under the headings provided.

List items using or consuming the following:-

Timber/ wood	Paint/varnish/ polish	Paper	Glue/resin/ adhesives	Other

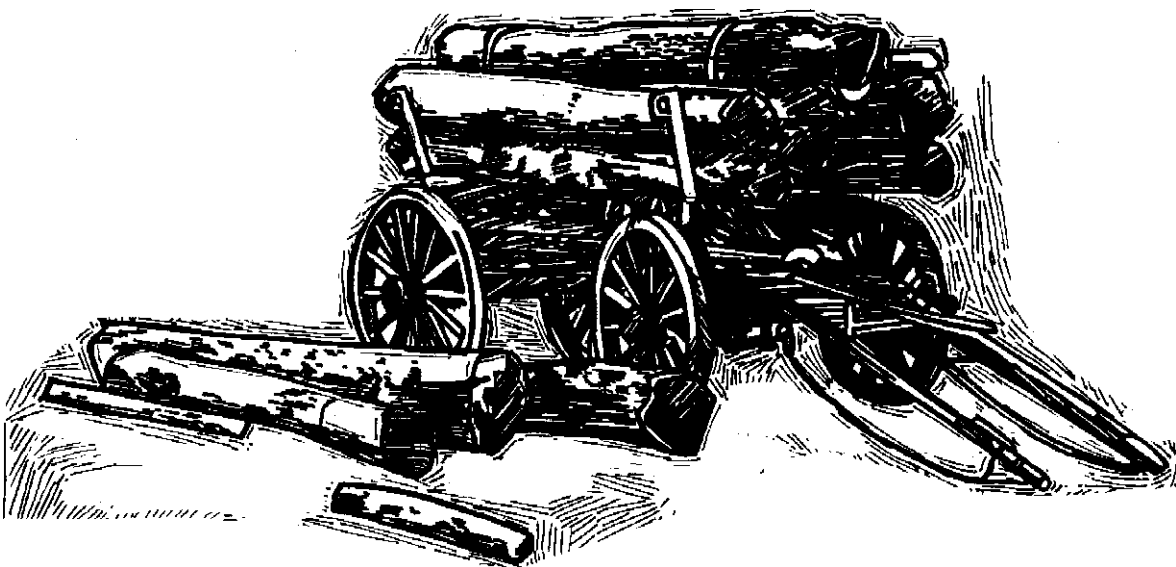
Could any of these items be made from other materials?

Explain giving at least two examples.

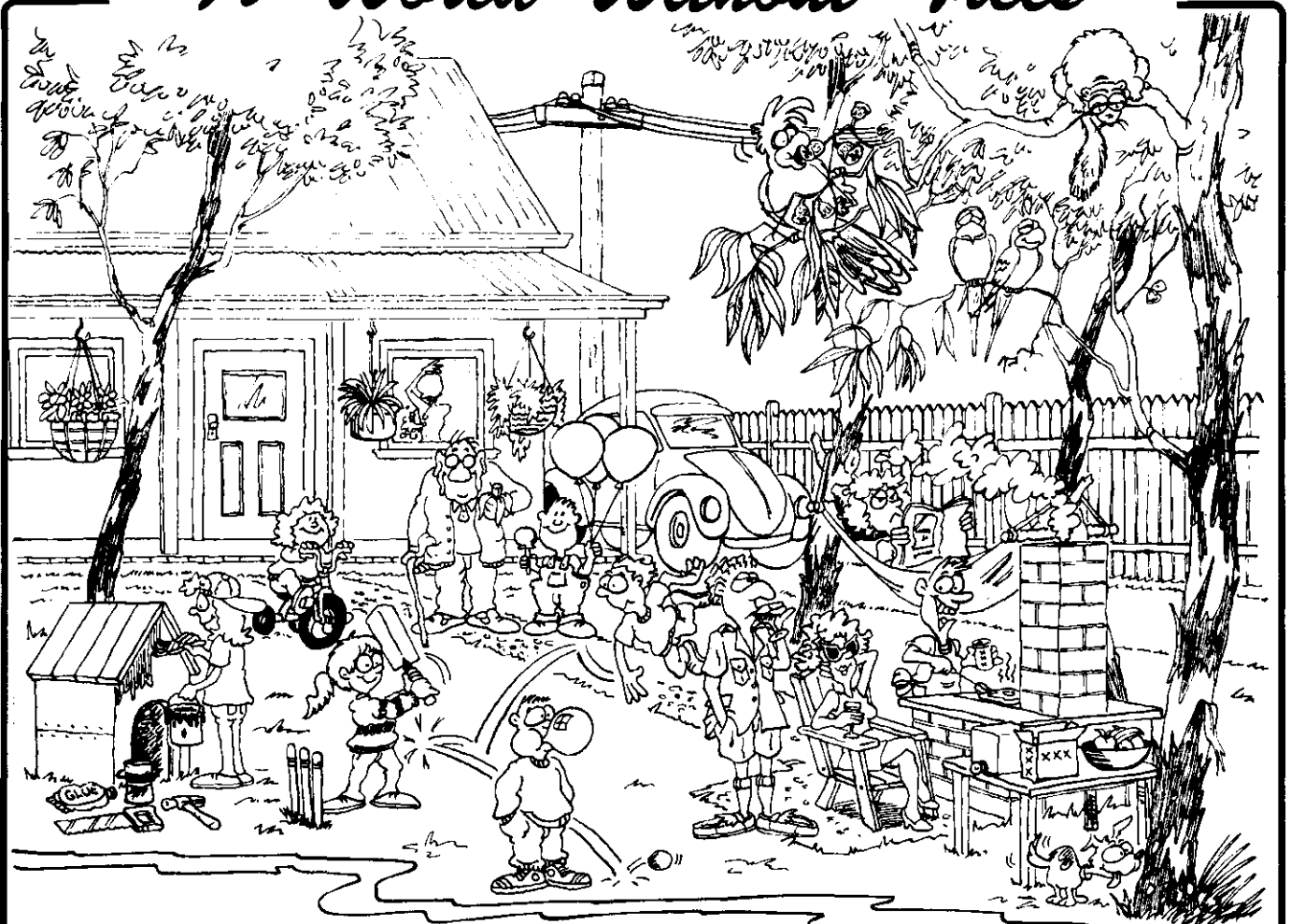
A Challenge: Find out about the cost of making some of these items from different materials. Can you find out about the cost of making them in terms of money and in costs to the environment? Is this resource renewable or is it non renewable?

Ideas for further things to do

1. Create a large tree collage on a classroom wall, and use it as a background to display the results of your survey. Find magazines, pictures, photos, small models/samples of the wooden products that you may have at home. Hang or stitch them onto your tree, attaching labels to help categorise them.
2. Think of a wooden object in your home, and explain in writing why it is better made out of wood than any other material.
3. Write a poem about trees and the ways in which we use them.
4. Dramatise, or show in cartoon form, the steps in the life of a tree, between being felled and ending up as a table, a clothes peg or a cork in a bottle.
5. From a scientific point of view, find out about the role of trees in exchanging gases in the air to provide humans and animals with essential oxygen. Find out about Photosynthesis.
6. Find out about how past logging has affected The Hills Forest. How has the population in this region been affected by changes to the timber industry?



A World Without Trees



The Department of Conservation and Land Management

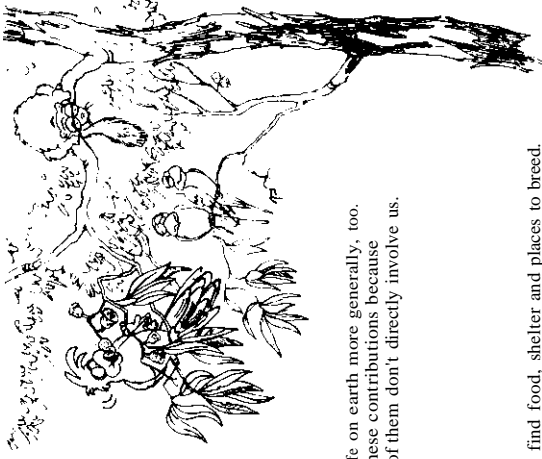
Caring... Naturally



.... A WORLD WITHOUT TREES

It's hard to imagine a world without trees! Trees enrich our lives in many ways. This poster illustrates some of the ways that we (and some of our animal friends) use trees and tree products everyday.

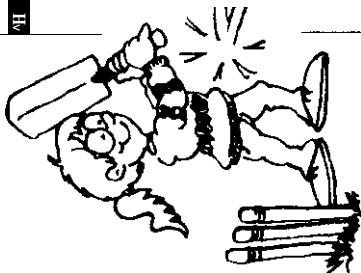
4 Use the list of tree statements below and place numbers on the poster (or colour it in) where you think the description is best illustrated.



Trees From Our Point of View

STUDENT ACTIVITY SHEET

Number	Tree Statement
1.	FOR SHELTERS AND STRUCTURES: Many building materials are made from timber.
2.	Timber is used widely in furniture-making.
3.	FOR PRODUCTS: Wood is also used for sporting equipment.
4.	People use many paper and cardboard products.
5.	Rubber comes from the sap of the rubber tree. (Can you spot all the rubber products?)
6.	FOR FOOD: Trees provide a lot of human food.
7.	Some of the energy used to cook our food comes directly from trees.
8.	FOR BEAUTY: Trees beautify, shade and protect our surroundings.
9.	FOR LESS OBVIOUS THINGS: Many products, such as paints, and glues contain wood turpentine. Wood turpentine comes from wood and bark.
10.	Polyester is a textile made from some of the compounds in wood.
11.	Plant extracts are used In some soaps and dyes.
12.	Trees take in carbon dioxide and give out oxygen.



Trees

Trees contribute to the quality of life on earth more generally, too. It's harder for us to acknowledge these contributions because we often can't see them and many of them don't directly involve us.

Let's give it a go now....

Trees for Other Life

Trees provide habitat for wildlife to find food, shelter and places to breed.

Trees purify the air by recycling carbon dioxide into oxygen.

Tree roots bind soil together, reducing erosion and filtering the water that then makes it's way into rivers and streams.

There are many others....

STUDENT ACTIVITY SHEET

On Your Own....

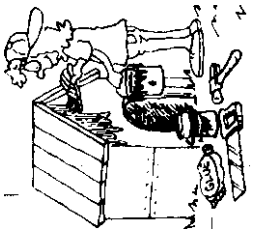
Go exploring the flowers, fruit, trunk, bark and leaves of a tree in your backyard or in a nearby park.

Food: "Look for the tiny life...like the insects which chew, suck or nibble their way through the food stores of trees.

Habitat: "Keep your eyes peeled for the living places of the wildlife! Bird nests and tree hollows are the most easily found.

Trees for Their Own Sake....

We can all appreciate trees for their coolness, complexity, beauty and diversity...



STUDENT ACTIVITY SHEET

Explore a tree in your school ground. Sit under it, lie under it, put your arms around it, smell it, draw it....

What can I do to help sustain our worlds forests?



Paper Consumption: Personal Action and Decision Making

Aim

- * To assist students to become better informed and more responsible in their use of a valuable natural resource.

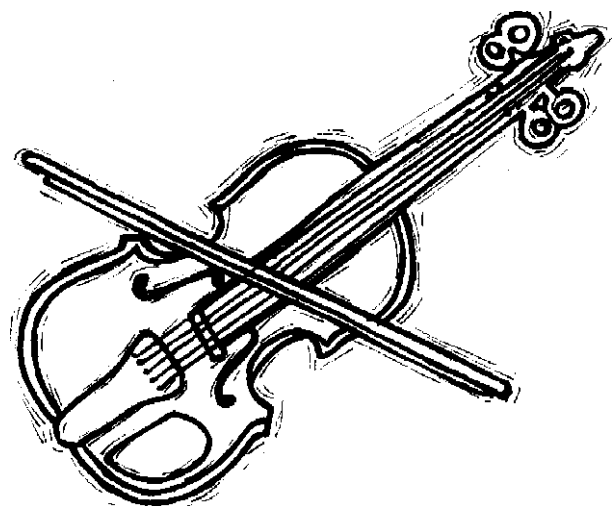
Teachers' Notes

All the resources we use come directly or indirectly from the natural world: from plants, animals, soil, water or air. Paper is a resource that comes directly from forests and plantations. Its use can be controlled by consumers. A great deal of paper is needlessly thrown away when it could either be used more efficiently (for example, on both sides) or recycled.

Schools are places with a relatively high paper use and a "captive" population who can be coached and monitored in their paper consumption. As educators we can model and foster positive feelings and actions for the environment in our students. By focussing on the use of one resource, for example paper, we can create and reinforce habits that will reduce our demand for resources in general.

Concepts

- * Everyone uses resources from the world's forests and, therefore, we are all responsible for ensuring their survival.
- * Our actions directly and indirectly affect forests. So simple changes in our habits can help reduce environmental change and damage.
- * Waste is unnecessarily changing and destroying some of the world's forests.



Analysis of Current Consumption

Aims

- * To understand what kind and how much material is thrown away by the class.
- * To reduce the waste of these materials.

Materials

Yesterday's classroom rubbish collected in a garbage bag.

What To Do

1. Introduce the lesson by presenting yesterday's rubbish for students to view.
What is there? Sort the rubbish into different materials.
2. Do they think there is any waste here?
3. Focus on paper products and discuss which items could have been more efficiently used and which were "used up".
4. Introduce the Three R's:-
 - 1 **Reduce** the amount of single-use paper you use, such as tissues, hamburger cartons, cards and wrapping paper.
 - 2 **Re-use** paper as much as you can. You can
 - Stick new labels on envelopes and re-use.
 - Write on the back of every sheet of paper.
 - Make "scribble pads" from half-used paper.
 - 3 **Recycle** unusable paper through commercial recycling programs, or by mulching. Explain / discuss these concepts.
5. Weigh paper products and record weight. Create and display a chart to record daily paper rubbish weights. To make daily recording easier, introduce a two-bin system so that waste paper/card goes into one, and other rubbish goes into the other. (Another way to monitor paper waste is by volume. Can students suggest ways of measuring volume? Can they suggest other ways of monitoring waste?)
6. Set students the task of deciding how the class waste paper could be disposed of efficiently and responsibly. Once they have considered and discussed this in small groups, brainstorm their ideas. Try to come to a consensus on what action the class could take.
7. You may like to widen this out to involve the whole school, but a one-class piloted and proven scheme might be more valuable to begin with. Once action has been taken, monitoring of the waste paper bin will be rewarding.

Create a Paper Recycling Station:

Aim

- * To create a classroom-based recycling station for paper.

Materials

Packaging tape Scissors
Glue Wall paper/contact
Four to six strong cardboard cartons of varying sizes

What to do

1. Remove flaps from cartons and fit them together to form a unit that will hold the different categories of classroom paper and card that was previously thrown away.
2. Glue flat faces together with wood glue and cover joins with packaging tape to make the structure as rigid as possible.
3. Cover the unit with wallpaper, contact, or plain art paper that can be colourfully decorated.

The unit must be able to hold trays labelled:-

1. Re-useable cardboard.
2. Re-useable paper.
3. To be recycled.

It must be -

- * large enough to hold the trays.
- * be safe to use.
- * be friendly and colourful.

Note:

- * When it is introduced for class use the students must commit themselves to the principle of efficient paper use.
- * Everyone must sort their own scrap paper into it properly.
- * Everyone needs to use paper from it whenever possible for any draft work, such as rough maths calculations, to save using new paper.
- * Ensure students understand why they you are doing this. That is, they are making a difference because their actions directly mean that less trees will be cut down.

Acknowledgement: Adapted from "Don't Rubbish Our World" (1991) by Iris Flenady, Martin Education Publishers.

Ideas for further things to do

How Paper is Made

- * Study the Paper-making process. Provide students with resource information on the paper-making industry. This can be obtained from paper manufacturing companies - see the Resource List - as well as encyclopedias and reference texts. When students have gathered and organized their facts, ask them to set their findings out as a "Paper Recipe".

For example,

- * Set the scene - from commercial papermills to home-made papers.
- * Ingredients list.
- * Method - including dispersal of finished product, and re-starting over.

Recycling paper

- * Students could investigate commercial paper recycling. What types of paper are easily recycled? What types of products can be produced from recycled paper? What are the disadvantages of recycled paper and, therefore, what can it not be used for?
- * Numerous paper making workshops are held in Perth. Why not take one yourself? Investigate the possibilities through the Community Education programs at the Perth Zoo.

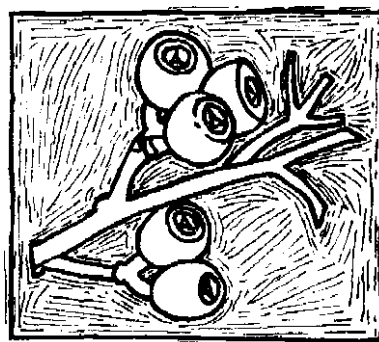
Recipe For Paper Making

Paper is made in large factories called paper mills. Increasingly, people are making their own paper at home. Find out what is needed to make new paper. (Consider factors like the energy needed for things like fuel to power felling machinery, and to supply the factory, the amount of raw wood fibre (the number of trees) needed to make paper).

Write your Recipe below:-

Ingredients

* _____
* _____
* _____
* _____
* _____
* _____



Method

*

*

*

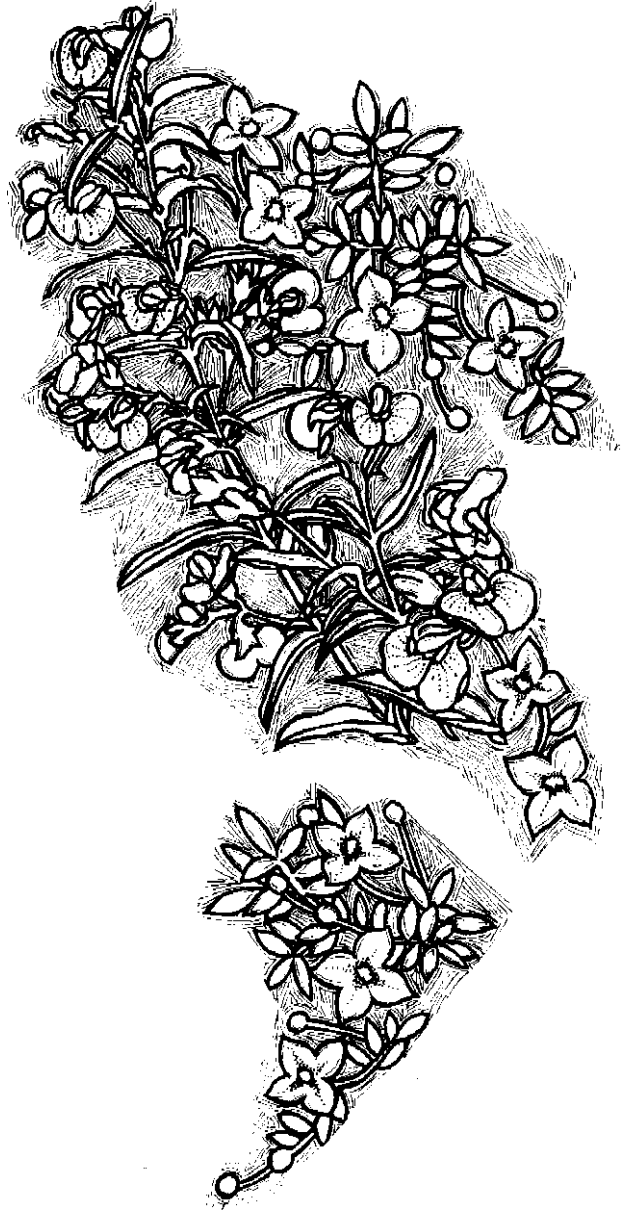
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Acknowledgement: Adapted from "Don't Rubbish Our World"(1991) by Iris Flenady, Martin Education Publishers.

Summary

Students can continue to develop a deeper understanding of the local forest and of their relationships with it. The concept of integrating people and forest is essential, and can be reinforced if the work carried out from this package is integrated with other classroom activities.

This program lends itself to be extended into many curriculum areas. Students will find it most meaningful if it becomes a theme integrated into as many other disciplines as possible. The Overview and Curriculum Links sheets outline how this can be done within the parameters of the primary school curriculum. Several enjoyable and effective art activities will make the topic visually prominent and maintain student interest, for example -

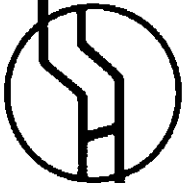
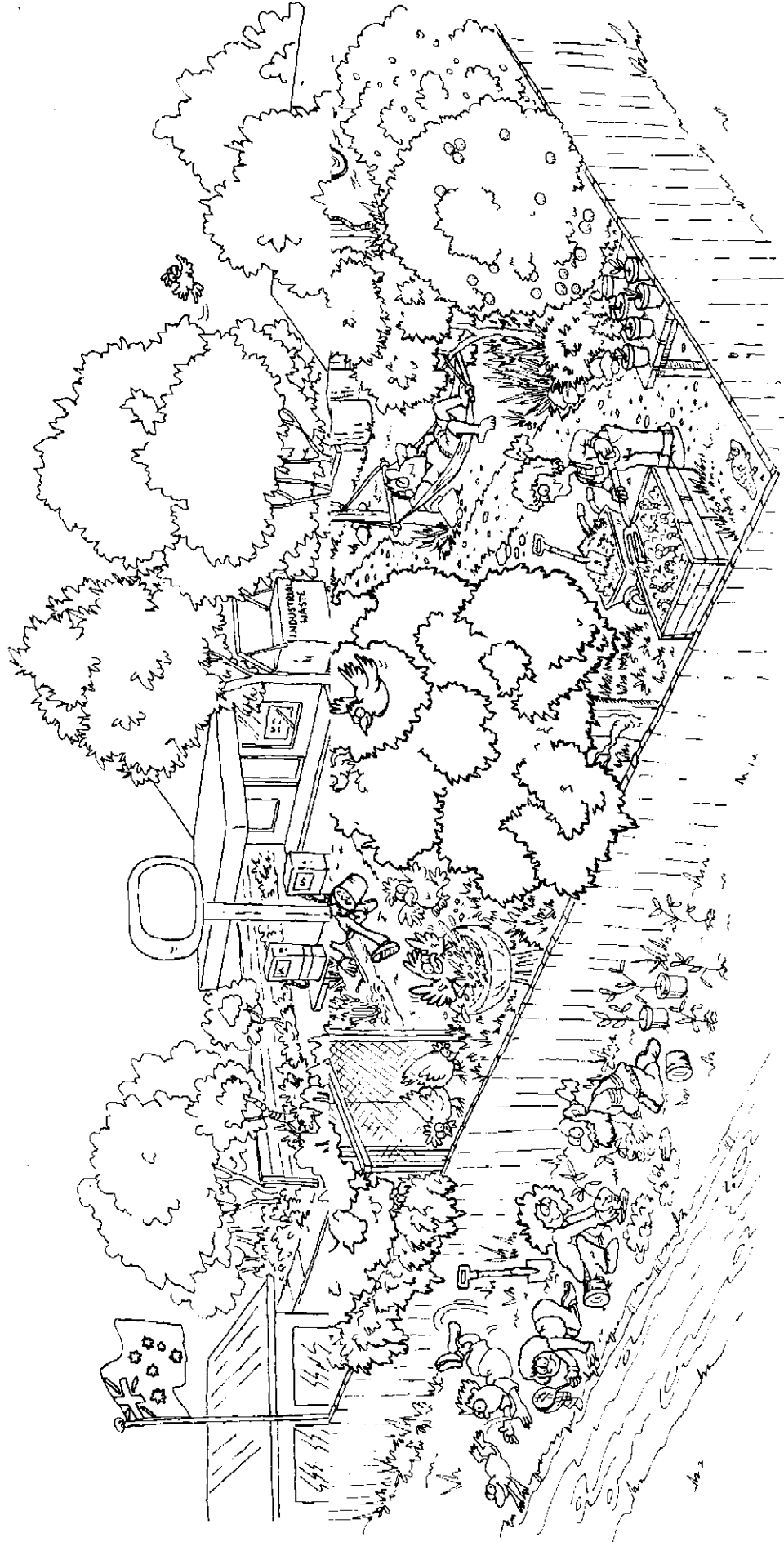
- * Create a mural depicting forest scenes including plants, animals, people and landscapes.
- * Weave bush materials onto a forked branch loom.
- * Construct a mobile of fruits and leaves.
- * Design a publicity poster to promote The Hills Forest.
- * Mould clay and plasticine models of forest animals and forest products.
- * Make animals from fruit and nuts.
- * Print with fruits and leaves.
- * Make bark and leaf rubbings.
- * Sketch forest scenes, products or wildlife with pencil or pen.
- * Weave bush-baskets and bush hats

It is also important that we relay positive messages and courses of action to students.

This package explores the use of timber from the forest for wood and paper products. You could explore ways of reducing use of other forest products like - water and aluminium. A study of "Minimum Impact Recreation" - of how people can recreate safely and carefully, in the forest is another possible area of study. Your imagination is the only limit.....

Try to emphasise things that are being done, both locally and around the world, to protect forested areas. Also stress the importance of responsible and positive actions on their part, and on cultivating good, ongoing environmental practices in their lives.

Greening your Neighbourhood



The Department of Conservation and Land Management

Caring... Naturally

RHOOD

our impact on the environment and
place to live. The 'poster' illustrates
me you shouldn't.

al actions and place numbers on the
ink the description is best illustrated.



Earth Caretakers is an action-packed environmental programme from the Institute for Earth Education and sponsored by the Department of Conservation and Land Management (CALM).



STUDENT ACTIVITY SHEET

Environmental Actions List	Number	do at		can do at	
		home	school	home	school
Provide bush corridors through community lands	15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take time to sit and feel the force of nature	16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make time for exploring the bush	17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Discover your special place	18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nest boxes provide homes for possums, birds and bats when hollow trees are scarce	19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
One good turn deserves another - birds help control garden pests	20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

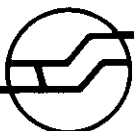
- ◆ Identify with a tick which positive actions you
 - (a) do take at home
 - (b) can take at home
 - (c) do take at school
 - (d) can take at school
- ◆ Collate class responses to actions list by counting who ticked which box.
- ◆ Discuss the results, then consider which actions we could take as individuals and as a group
 - * Choose one of these 'actions' and outline how you would go about doing it at home or school.

Consider - information and materials needed, labour, funds, source of funds, preparation time (works program), maintenance of project.

or

Outline how you would go about 'greening' your home or school by planting trees and shrubs.

Greening your Neighbourhood



The Department of Conservation and Land Management

Caring... Naturally

... GREENING YOUR NEIGHBOURHOOD

There are many things we can do to lessen our impact on the environment and to make it a cleaner, safer, more pleasing place to live. The 'poster' illustrates some of those things you can do, and some you shouldn't.

4 Use the list of positive environmental actions and place numbers on the poster (or colour it in) where you think the description is best illustrated.



STUDENT ACTIVITY SHEET

Environmental Actions List	Number	do at home	do at school	do at home	do at school
Compost food scraps for mulch for your garden	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grow you own fruit and vegetables	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drip water your garden and save water	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make a space for local wildlife	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raise seedlings to green your garden and neighbourhood	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chickens can turn your scraps into eggs and nutrient rich manure for your compost	6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enjoy your bush backyard	7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bush gardens attract birds and insects	8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conserve energy with solar power, skylights, verandah shade and shade trees	9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bicycle for food, fun and fitness: save fumes and fuel costs of a car	10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A bird in the bush is worth two in a cage	11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recycle paper, glass, tin and plastic	12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Return reusable bottles	13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observe nature, go bird-watching	14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



STUDENT ACTIVITY SHEET

Environmental Actions List	Number	do at home	do at school	do at home	do at school
Provide bush corridors through community lands	15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take time to sit and feel the force of nature	16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Nest boxes provide homes for possums, birds and bats when hollow trees are scarce	19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
One good turn deserves another - birds help control garden pests	20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Identify with a tick which positive actions you

(a) do take at home
(b) can take at home
(c) do take at school
(d) can take at school

* Collate class responses to actions list by counting who ticked which box.

^ Discuss the results, then consider which actions we could take as individuals and as a group

* Choose one of these 'actions' and outline how you would go about doing it at home or school.

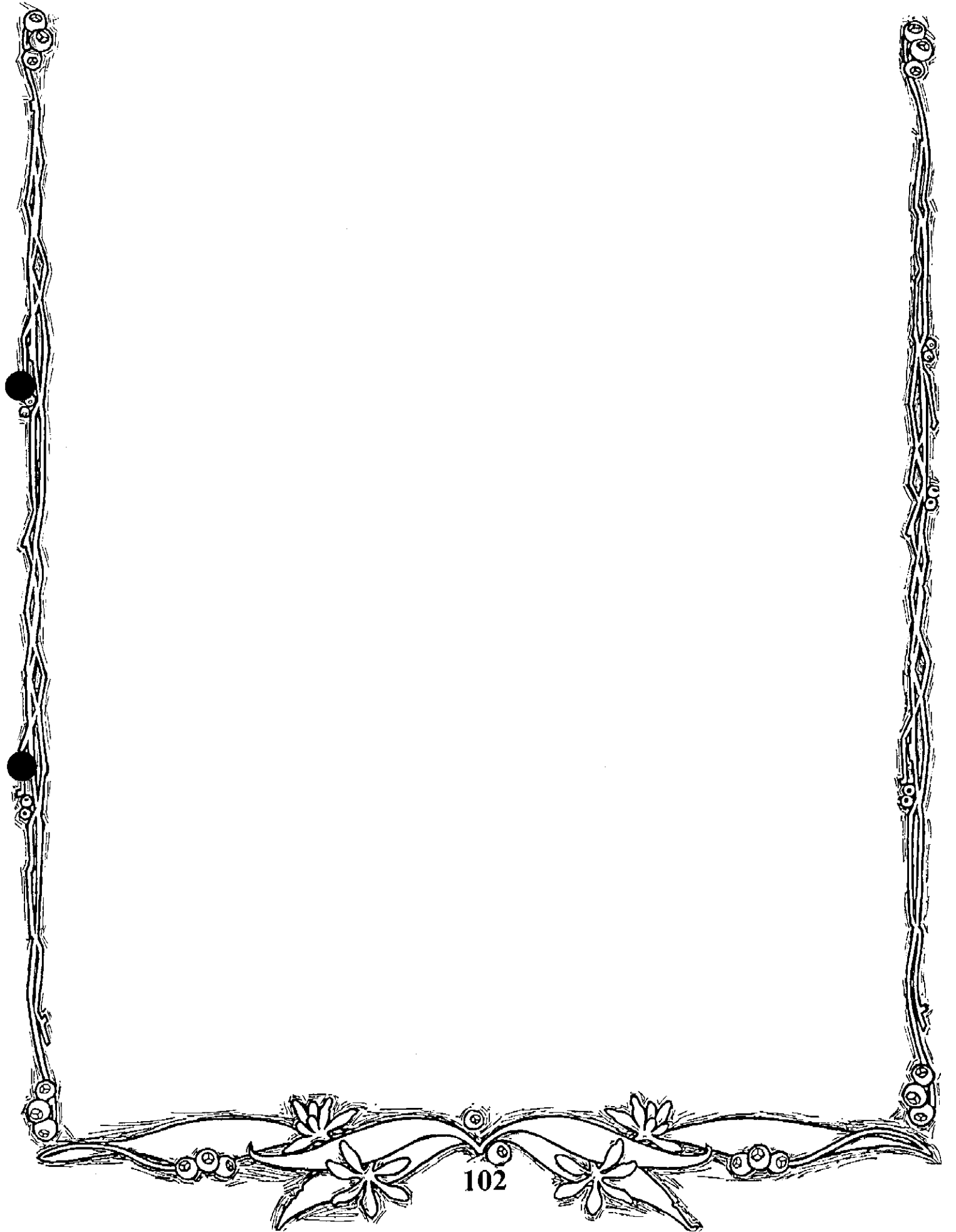
Consider - information and materials needed, labour, funds, source of funds, preparation time (works program), maintenance of project

Outline how you would go about 'greening' your home or school by planting trees and shrubs.



Earth Caretakers is an action-packed environmental programme from the Institute for Earth Education and sponsored by the Department of Conservation and Land Management (CALM).

Appendices



Appendix 1

Following a First Steps Sequence

First Steps is a Language Development program devised by the Ministry of Education (WA) for Years K to 7. It empowers students to learn through a number of techniques,

Easy Steps for Your First Steps

The First Steps Program is organised into four Language areas. The supporting modules each develop an area of language. Outlined below are a number of steps or strategies that help students to read and write factual or informational text' (from the two modules: Teaching Children How to Write Informational Text and Reading Comprehension).

These examples are based on the text "Appendix 1. Following a First Steps Sequence " and "The Jarrah Forest".

Before reading

Step 1: Graphic Outline

The way information or text is laid out on a page gives us many clues as to the messages it contains. To get the most information from a text, students can examine and analyse text layout through a graphic outline before they start reading.

A graphic outline is a clear diagram of text organisation and the location of important information. It is made by scanning the text and listing the features as they occur, for example, headings, diagrams, maps and tables.

The next task is for students to make box sizes of various sizes that show the comparative importance of the information in the boxes. Students may also write in main text features where practical. *For example, Map - Distribution of Jarrah Forest in WA.*

A Graphic Outline of Appendix 1 page 1.

HEADING	Appendix 1
SUB-HEADING	Following a First Steps Sequence
TEXT - PARAGRAPH	*First Steps Language Development Program *Learning techniques for Years K to 7
SUB-HEADING	Easy Steps for Your First Steps
TEXT - PARAGRAPH	*Four language areas *Teaching Children How to Write Informational Text *Reading Comprehension
SUB-HEADING	Before Reading Step 1: Graphic Outline
TEXT - PARAGRAPH	*The way information is laid out on a page gives us many clues
TEXT - PARAGRAPH	*Graphic outline is a clear diagram of text organisation and important information
TEXT - PARAGRAPH	*Make boxes of text features

Adapted from *First Steps Language Development Project: Teaching Children How to Write Informational Text and Reading Comprehension Modules*. Ministry of Education (WA) from the original source: *Learning to Learn From Text* by A Morris and N Stewart-Dorc, published by Addison-Wesley, North Ryde, NSW.

During Reading

Step 2: Interesting Words Chart

Charts can be used during reading to identify key words and clarify vocabulary within the context of a text. This activity requires the student to paraphrase, a useful technique for note- and summarising.

The teacher needs to lead and monitor this activity until students are able to use context clues independently.

Interesting Words Chart

Word	Paragraph	Any help given in text?	Dictionary meaning	Own explanation
Context	8 (Appendix 1 page 2)	Yes. Vocabulary meaning within text.	The parts of a sentence or a paragraph surrounding a word or passage and determining its exact meaning.	Understanding the meaning of a word in a sentence because of clues in the words around it.
Paraphrase	8	Yes. Note taking and summarising.	A rewording of something written or spoken.	Rewrite a phrase using your own words.

Adapted from *First Steps Language Development Project: Teaching Children How to Write Informational Text and Reading Comprehension Modules*. Ministry of Education (WA) from the original source: *Learning to Learn From Text* by A Morris and N Stewart-Dore, published by Addison-Wesley, North Ryde, NSW.

After Reading

Step 3: Structured Overview

After reading, a structured overview can be used to form an overview of a topic in a logical format, like "The Jarrah Tree" and "What is a Forest?"

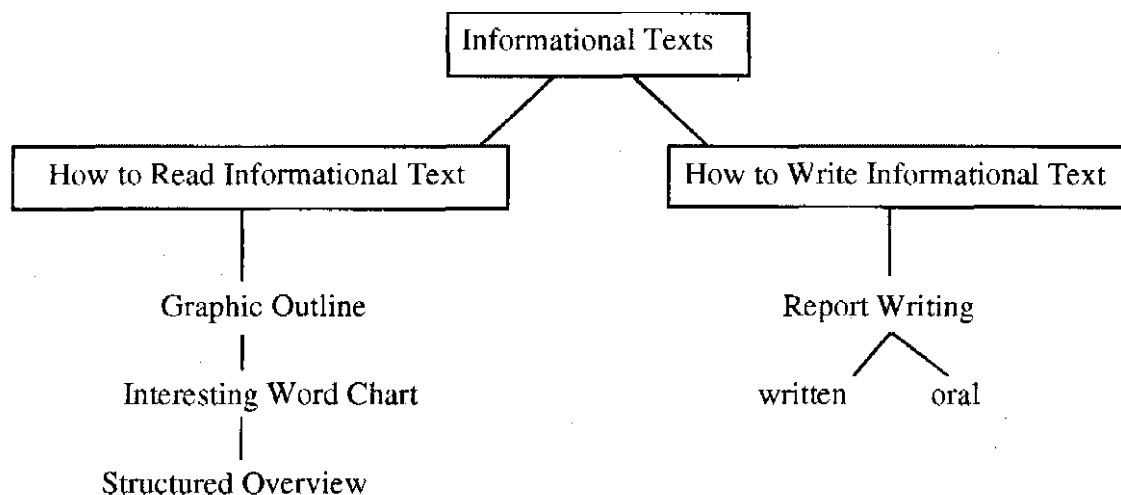
Structured overviews can be used to make notes, extract and organise information, substantiate information, make judgements and include new information to gain an understanding of the topic.

Making a structured overview involves identifying the key words that are essential for understanding the main ideas and supporting detail of a text. Arrange these ideas and words into a pattern that shows their relationship in the text. See the examples of "What is a Forest?", "The Jarrah Tree" on pages 22 and 31.

How to Use Structured Overviews

Teachers can develop a structured overview when presenting a plan of a topic or when students are unfamiliar with the topic. When the topic is familiar, structured overviews can be developed by teachers and/or students. Or they can be prepared by students when they can classify and organise information and independently.

A Structured Overview of Appendix 1



Adapted from *First Steps Language Development Project: Teaching Children How to Write Informational Text and Reading Comprehension Modules*. Ministry of Education (WA) from the original source: *Learning to Learn From Text* by A Morris and N Stewart-Dore, published by Addison-Wesley, North Ryde, NSW.

Step 4: How to Write a Report

Having analysed one or several texts, students need to be able to write a report in their own words. The following format is suggested for report writing: one paragraph must be written about each heading, no matter how brief.

1. **Classification:** Tells what the object is. That is *what group it belongs to*. e.g., marsupial.
2. **Description:** Tells what features the object has. That is *What the object looks like* (*size, shape, colour, features*)
3. **Location:** Locates the object in terms of place and time. That is *where it is found*.
4. **Dynamics:** Explains what the object is, how it works or functions.
5. **Summarising Comment:** Can be an evaluative or an interesting comment that effectively closes off the topic.

Examples of written reports: "The Jarrah Tree" and "A Tree for All - Marri". The Report Framework can be used by students to prepare written or oral reports.

Adapted from *First Steps Language Development Project: Teaching Children How to Write Informational Text and Reading Comprehension Modules*. Ministry of Education (WA).

Appendix 2

1. A Selection of References for Use with the Research Project on Animals and Plants of The Hills Forest near Mundaring

Reference Books and Information Notes

Please note:

Some of these references are fairly technical. They are valuable sources of information when used in conjunction with less technical documents.

Mammals

- * **Strachan, Ronald (1991)** Complete Book of Australian Mammals: the National Photographic Index of Australian Wildlife. Edited by **Ronald Strachan**. Cornstalk, North Ryde, N.S.W.
- * Agriculture Protection Board: **Agdex Notes and APB Infonote**. Various titles.

Birds

- * Seymour, Olive (1972) **Birds for Beginners**. Jacaranda, Milton, Qld.
- * Reader's Digest (1990) **Reader's Digest Complete Book of Australian Birds** 2nd ed., 1st revision. Reader's Digest, Sydney
- * Pizzey, Graham; Doyle, Roy (1980) **A Field Guide to the Birds of Australia**. Collins, Sydney
- * Storr, G.M; Johnstone, R.E.; Thompson, M. (1985) **Field Guide to the Birds of Western Australia**. 2nd ed. Western Australian Museum, Perth.
- * Slater, Peter; Slater, Pat; Slater, Raoul (1989) **The Slater Field Guide to Australian Birds**. Rev. ed. Weldon, Willoughby, N.S.W.
- * Simpson, Ken and Day, Nicholas (1989) **Field Guide to the Birds of Australia: A Book of Identification**. Viking O'Neil, Ringwood, Vic.

Reptiles and Amphibians

- * Dell, John and Turpin, Margaret (1992) **Frogs of the Perth Area - Western Australia** Museum. Perth W.A.
- * Cogger, Harold G. (1992 revised ed.) **Reptiles and Amphibians of Australia** Reed, Chatswood, N.S.W.
- * CALM Resource Notes (Titles include **Marsupials in the Forests of South-West WA and Birds You Are Likely to See or Hear in the Jarrah Forest of WA**)
- * Western Australian Museum Information Sheets (Titles include **The Dugite and Wedge-tailed Eagle**)

Flora

- * Bennett, E. M. (1991) **Common and Aboriginal Names of Western Australian Plant Species** Wildflower Society of Western Australia: Eastern Hills Branch
- * Bennett, E. M. and Dundas, P.J. (1988) **The Bushland Plants of Kings Park, Western Australia**. Kings Park Board, Perth, W.A.

- * Erickson, R; George, A.S; Marchant, N.G. and Morcombe, M.K. (1973, revised edition 1986) **Flowers and Plants of Western Australia**. Reed, Sydney.
- * George, A.S. (undated) **The Banksia Book**.
- * Griffiths, K. (1986) **A Field Guide to the Larger Fungi of the Darling Scarp and South-West of Western Australia**. K. Griffiths, Parkerville, Western Australia.
- * Hoffman, N. and Brown, A. (1984) **Orchids of South-West Australia**. University of Western Australia Press, Nedlands, Western.Australia.
- * Kelly, S. (1969, reprinted 1977) **Eucalypts 1**. Nelson, Melbourne.
- * Kelly, S. (1978) **Eucalypts 2**. Nelson, Melbourne.
- * Marchant, N.G. et al (1986) **Flora of the Perth Region - Parts 1 & 2**. Western Australian Herbarium, Perth.
- * Meagher, S.J. (1974) **The Food Resources of the Aborigines of the South-West of Western Australia**. Records of the Western Australian Museum 3(1): 14-65.
- * **Wildflowers of the Western State** (undated) Rolsh Productions, Albany, Western Australia.
- * Powell, R. (1990) **Leaf and Branch: Trees and Tall Shrubs of Perth**. Department of Conservation and Land Management.
- * Sainsbury, R. (1987) **A Field Guide to Dryandra**. University of Western Australia Press. Nedlands, W.A.
- * Sainsbury, R (1990) **A Field Guide to Isopogons and Petrophiles**. University of Western Australia Press. Nedlands, Western.Australia.
- * Sharr, F.A. (1978) **Western Australian Plants and Their Meanings: A Glossary**. University of Western Australia Press, Nedlands, Western.Australia
- * CALM (1991) **Wildflower Country**. Department of Conservation and Land Management, Como, Western Australia.'
- * King, Peter and O'Neill, Gerry (1985) **Wildlife Identikit: Common Animals of Central and Arid Australia**. Conservation Commission of the Northern Territory, Alice Springs, Northern Territory
- * CALM (1987) **Mistletoe in South Western Australia Identification, Spread and Control**. Information Sheet No.4-87. by Hart, A.J.

2. Teachers' Resources

2.1. Publications

- * **Our Wild Plants** - Greening Western Australia
- * **Greening the West: Resource File for Schools** - Greening Western Australia
- * (1992) **Sowing the Seeds for Change: Plant Activities for Secondary Science Students**. Greening Western Australia, West Perth, Western Australia.
- * **City Bushlands Education Resource Package**. (Western Australian Museum)
- * **Granite Outcrops** - CALM (Booklet)
- * **The Feral Animal Information Kit** is available from the Endangered Species Unit of the Australian National Parks and Wildlife Service. (ANPWS) Phone (06) 250 0285 or Fax (06) 250 0214.
- * **Five Trees, Southern Cross Series, Level 3**. Howes, J. Available in large book (\$29.95) and small book(\$5.25) format. Level 3 Teachers Resource Book (\$29.95).
- * **Don't Rubbish Our World**, Flenady, I (1991). Martin Educatkm, Cammeray, NSW.

2.2. Programs and Services

- * **The Perth Zoo** has a fulltime teacher-librarian on staff in their Education Section.
Phone (09) 474 0360.

- * **The Western Australian Museum:** Did you know that the Education Services of the Western Australian Museum has a collection of 'hands on' resources available for loan? The Western Australian Museum Loan Collection includes the following Jarrah forest animals:
 - Brushtail Possum
 - Echidna
 - Pygmy Possum
 - Twenty-eight Parrot
 - Tawny Frogmouth.

Direct your enquiries to Education Services on (09) 427 2792.

3. Reference articles from *LANDSCOPE* Magazine

LANDSCOPE is a quarterly magazine, published by the Department of Conservation and Land Management. Each edition has stories, pictures and information about Western Australia's natural world.

LANDSCOPE makes a useful school library acquisition. Contact CALM Front Counter Enquiries on (09) 367 0481 for subscription details.

TREES

Jarrah (*Eucalyptus marginata*)

Vol. 6, No. 4 (1991) - When Jarrah Was King (p. 24-27)

Vol. 7, No. 4 (1992) - Pink Flowering Jarrah (p. 8)

Marri or Red gum (*Eucalyptus calophylla*)

Vol.3, No. 4 (1988) - Marri Blossom Time (p. 23)

Vol.4, No. 4 (1989) - Marri For Money (p. 50-53)

General Related Articles

Vol. 7, No. 4 (1992) - The Hills Forest (p. 10-15)

TALL SHRUBS

Vol. 6, No. 2 (1990/91) - Leaf and Branch (p. 22-27)

SHRUBS

Zamia Palm (*Macrozamia riedlei*)

Vol. 7, No. 1 (1991) - Exotic Palms Invade (p. 8)

FUNGI

Dieback (*Phytophthora cinnamomi*)

Vol. 1, No. 2 (1985) - Dieback On The South Coast (p. 6-11)

Vol. 5, No. 1 (1989) - Tree Killer: The Fight Against Jarrah Dieback (p. 38-44)

Vol. 6, No. 4 (1991) - Dieback Threat To Fauna (p. 6)

Vol. 6, No. 4 (1991) - Dieback - Prone Plants Of The Eastern Stirling Ranges (p. 43)

General Related Articles

Vol. 3, No. 3 (1988) - From Field And Forest: Edible Fungi In WA (p. 49-53)

Vol. 4, No. 1 (1988) - Gather No Moss (p. 54-55)

Vol. 7, No. 4 (1992) - Fungi: Winter Wildflowers (p. 33-36)

PARASITIC PLANTS

Mistletoe

Vol. 6, No. 2 (1990/91) - Much Ado About Mistletoe (p. 50-53)

MAMMALS

Western Grey Kangaroo (*Macropus fuliginosus*)

Vol. 2, No. 1 (1986) - Managing Kangaroos - Striking A Balance (p. 26-30)

Vol. 3, No. 1 (1987) - Red Kangaroo Rescue (p. 7)

Vol. 6, No. 2 (1990/91) - Spotted Kangaroos (p. 7)

Western Brush Wallaby (*Macropus irma*)

Vol. 5, No. 1 (1989) - Rare Wallabies Sighted (p. 8)

Vol. 7, No. 3 (1992) - Spectacled Hare-Wallaby (p. 48)

Common Brushtail Possum (*Trichosurus vulpeculd*)

Vol. 2, No. 3 (1987) - Urban Antics - A Haunting In Suburbia (p. 15)

Vol. 7, No. 3 (1992) - Possum In Peril (p. 22-27)

Chuditch (*Dasyurus geoffroii*)

Vol. 2, No. 4 (1987) - The Chuditch: A Spot-On Marsupial (p. 36-39)

Vol. 8, No. 2 (1992/93) - Return Of The Chuditch (p. 10)

General Related Articles

Vol. 5, No. 3 (1990) - Trappings Of Success (p. 35-40)

Vol. 6, No. 1 (1990) - The Disappearing Mammals (p. 28-34)

INTRODUCED MAMMALS

Fox (*Vulpes vulpes*)

Vol. 3, No. 1 (1987) - Eating Up The Past (p. 44-48)

Vol. 4, No. 2 (1989) - Outfoxing The Fox (p. 12-17)

Vol. 5, No. 3 (1990) - Trappings Of Success (p. 35-40)

Vol. 7, No. 4 (1992) - Vexing The Vixens (p. 16-22)

Rabbit (*Oryctolagus cuniculus*)

Vol. 7, No. 4 (1992) - Vexing The Vixens (p. 16-22)

BIRDS

Red-capped Parrot (*Purpureicephalus spurius*)

Vol. 5, No. 4 (1990) - The Ground Parrot (p. 41)

Vol. 7, No. 4 (1992) - To Catch A Thief (p. 28-32)

Twenty-eight Parrot or Port Lincoln Ringneck (*Barnardius zonarius*)

Vol. 5, No. 4 (1990) - The Ground Parrot (p. 41)

Vol. 7, No. 4 (1992) - To Catch A Thief (p. 28-32) '

Brown Honeyeater (*Lichmera indistincta*)

Vol. 4, No. 3 (1989) - In Search Of - Honeyeater Aerobatics (p. 40-42)

Australian Magpie (*Gymnorhina tibiceni*)

Vol. 2, No. 2 (1986/87) - Urban Antics - Four And Twenty Magpies (p. 54-55)

BIRDS INTRODUCED TO THE JARRAH FOREST

Laughing Kookaburra (*Dacelo novaeguinaea*)

Vol. 7, No. 3 (1992) - What A Laugh (p. 54)

REPTILES

Carpet Python (*Morelia spilota*)

Vol. 4, No. 2 (1989) - Snakes and Adders (p. 51-53)

Other Related Articles

Vol. 4, No. 2 (1989) - Snakes and Adders (p. 51-53)

Vol. 5, No. 2 (1989/90) - Lounging Lizards (p. 54)

Vol. 6, No. 2 (1990/91) - Bugs At The Bottom Of The Garden (p. 5)

AMPHIBIANS

Slender Tree Frog (*Litoria adelaidensis*)

Vol. 5, No. 1 (1989) - Forest Frogs (p. 17)

Vol. 6, No. 4 (1991) - Frogs (p. 54)

Motorbike Frog (*Litoria moorei*)

Vol. 5, No. 1 (1989) - Forest Frogs (p. 17)

Vol. 6, No. 4 (1991) - Frogs (p. 54)

Common small ground frogs (*Crinia glauerti*) and (*Crinia pseudinsignifera*)

Vol. 5, No. 1 (1989) - Forest Frogs (p. 17)

Vol. 6, No. 4 (1991) - Frogs (p. 54)

Appendix 3

Linking with Other Sources for Environmental Education Programs and Information Resources

(Time sensitive information) Correct as of May 1993

* **Department of Conservation and Land Management (CALM)**

*Community Education Section phone 364 0777

*Swan Region Interpretation and Education Section phone 390 5977

*Forest Sciences Library phone 334 0324

*General Enquiries phone 334 0437

• **Community Landcare Group**

Department of Agriculture

phone 368 3333

• **Centre for Economic Education**

(supplies Topic Sets on recycling - free)

P.O. Box 334

ALBERT PARK

* **Mineral Resources**

Chamber of Mines

' phone 325 2955

* **Social Impact Unit**

CSIRO

phone 387 0200

• **Historic Water Issues**

C.Y. O'Connor Museum

MUNDARING WEIR W.A. 6073

phone 295 2455

Environmental Protection Authority

*Information Branch

*Recycling Unit

*Ecoplan

phone 222 7000

*Library

phone 4813992

- **Forest Industries**
Forest Industries Federation
phone 322 2088
- **School-based Environmental Education Program**
Help Our Precious Environment (HOPE) Club
Glengarry Primary School
phone Robin Bigwood 448 4481
- **Gould League (Inc)**
Herdsman Lake Wildlife Centre
phone 387 6079
- **Greening Western Australia**
Education Manager & Landcare Education Officer
phone 481 0024
- **"Greenteach"**
(Primary and Secondary Teachers active in Environmental Education)
c/o Scotch College
Vicky Houghton
phone 3841466
- **Education Manager**
Keep Australia Beautiful Council
phone 474 2266
- **Revegetation Programs**
Men of the Trees
phone 2501888
- **Minister for Environment**
phone 325 9422
- **Ministry of Education**
Environmental Education Consultant
phone 2644111
- **Australian Association for Environmental Education**
State Convenor
Karen Majer
phone 4809151

- **City Bushlands Program**
W.A.Museum
Education Services
phone 3284411
- **Tammin Alcoa Landcare Centre**
Northam District
phone (096) 224 224
- **Water Issues**
Ribbons of Blue Program
Office of Catchment Management
phone 221 3840
- **Soils Microworld & Schools Landcare Program**
Perth Zoo
phone 474 0365
- **Water Issues**
Western Australian Water Authority
RoyHallam phone 4202420
- **Wildflower Society**
phone 383 7979

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