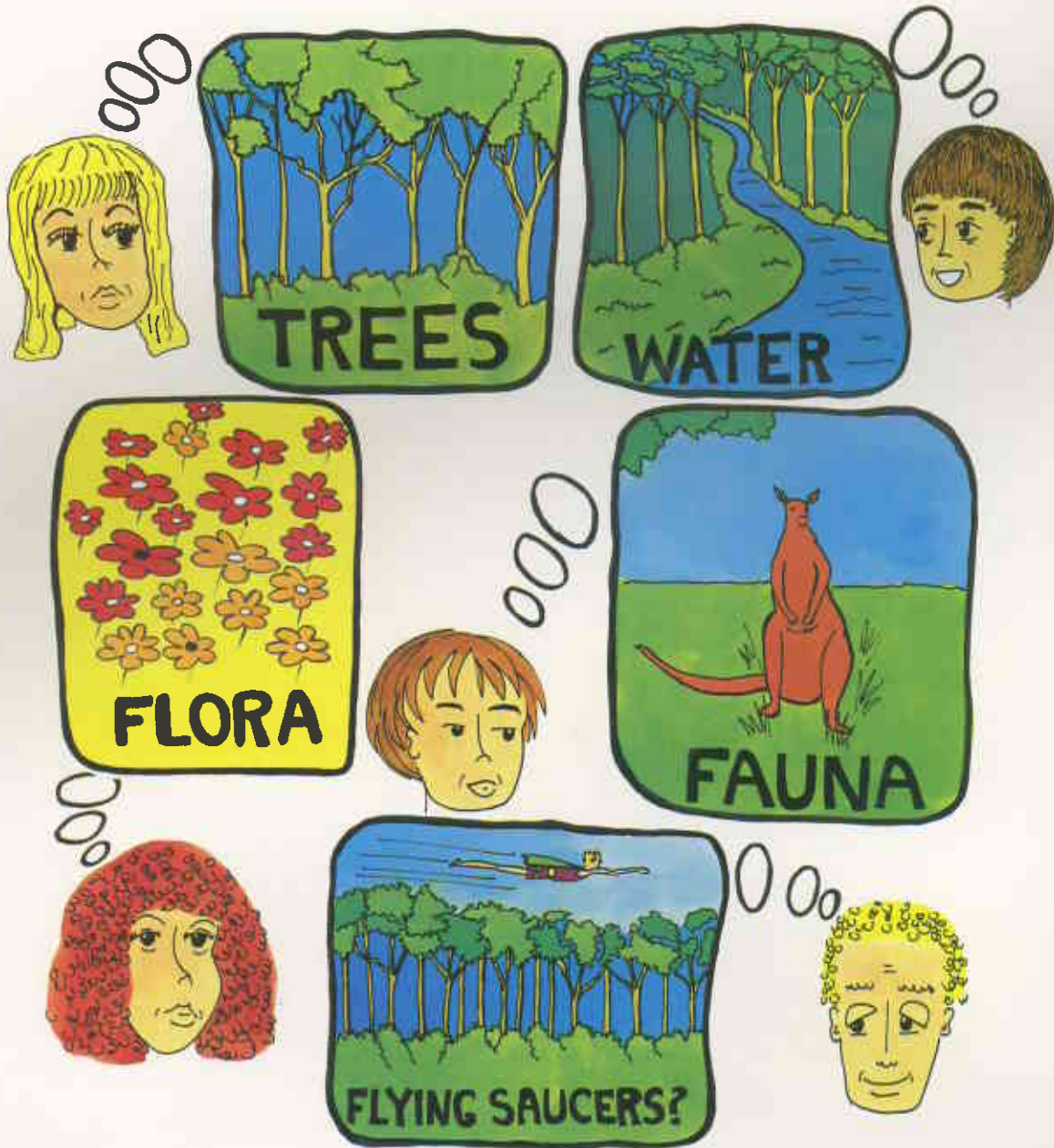




FOR THE FUTURE

TUNING-IN TO TREES

Imagine yourself in the forest . . .





TUNING-IN TO TREES

**Handsome, witty, debonair,
brave and strong~that's
JARRAHMAN, W.A.'s own
Superhero of the forests.**

Published for Mr B.J. Beggs,
Conservator of Forests, Forests
Department, 50 Hayman Road, Como.

As part of the Year of the Tree
celebrations and the ongoing Greening
of Australia project, this issue of Forest
Focus has been written in co-operation
with the Education Department of
Western Australia for use in schools
throughout the State.

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Imagine walking into a forest. Look around you. How do you know it's a forest? Note the things that you sense, and describe them to another student — different colours, looming branches, the scent of Eucalyptus, the feel of rough bark, animal tracks. What different types of plants are there? What season is it? If you're lucky, the water in the creek may be fresh enough to drink.

Now listen, really listen to what you are hearing in this forest. Perhaps there is a river nearby, and there are always birds. These are obvious sounds that you'd expect to hear, but what else is there? Are there echoes? Are there city sounds?

Jot down all the man-made things that you may come across in your forest, like barbecue tables, electric light wires, litter, signs. Do they blend in with the forest setting, or do they stand out and look out of place? What evidence is there of humans having been in this forest?

Perhaps you could take a photograph of that spider's web, or scramble to the top of the rocks, or maybe you'd like to sit down in a shady spot, munch on a sandwich and relax. As

you're sitting, you can take a look at what you're wearing. Jeans protect your legs from the prickly bushes, sandshoes or boots make it easy to get around in the bush. Hats provide shade for your head. Maybe you'll be carrying nets to catch tadpoles or butterflies, or a pencil and pad to make quick sketches. You may even be carrying a tent or a sleeping bag to stay overnight.

The forest is different from our usual home environment of town or city. It's also completely different from a farm, a coastal environment or a desert. It's a total world of its own, and as you will discover, it is complex. There is a lot happening in a forest that affects you as you're walking in it, but you'll see that the forest affects you even when you're at home watching T.V. People affect forests too. We usually change them, sometimes for the worse. Think about yourself as you read about forests or walk under the trees and tune-in to this special environment. There's a balance that has to be kept here. You can be part of it.

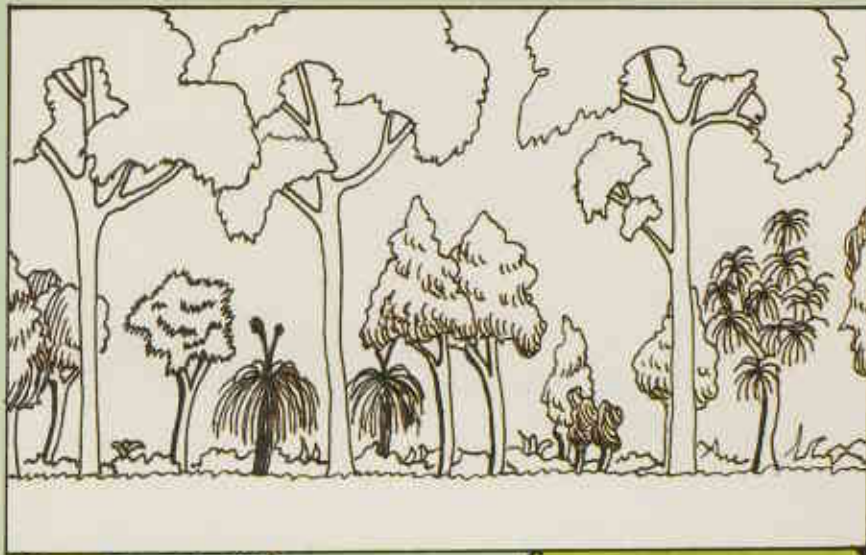
WHAT IS A FOREST?

The first thing to learn is that a forest is not just trees. A forest is a large area of land covered with a community of trees and other plants. A forest is part of the total land environment. It is mainly trees, but many other living and non-living things that depend on each other are also found there. Forests are vital to the earth, its atmosphere and its life. They control the climate near the ground and regulate water resources, they keep the soil intact and re-cycle its nutrients, and they influence the composition of the atmosphere. Forests not only influence climate, soil and water — they are also influenced by them. Forests provide us with timber, fuel and many other products such as medicines and paper. But despite the value of forests, they can be easily abused and destroyed. Careful management and tending is needed to maintain the trees, their environment and their produce.

I'M REALLY GOING TO HAVE TO LEARN TO FLY SOON IF I'M GOING TO KEEP UP THIS SUPER-HERO IMAGE!



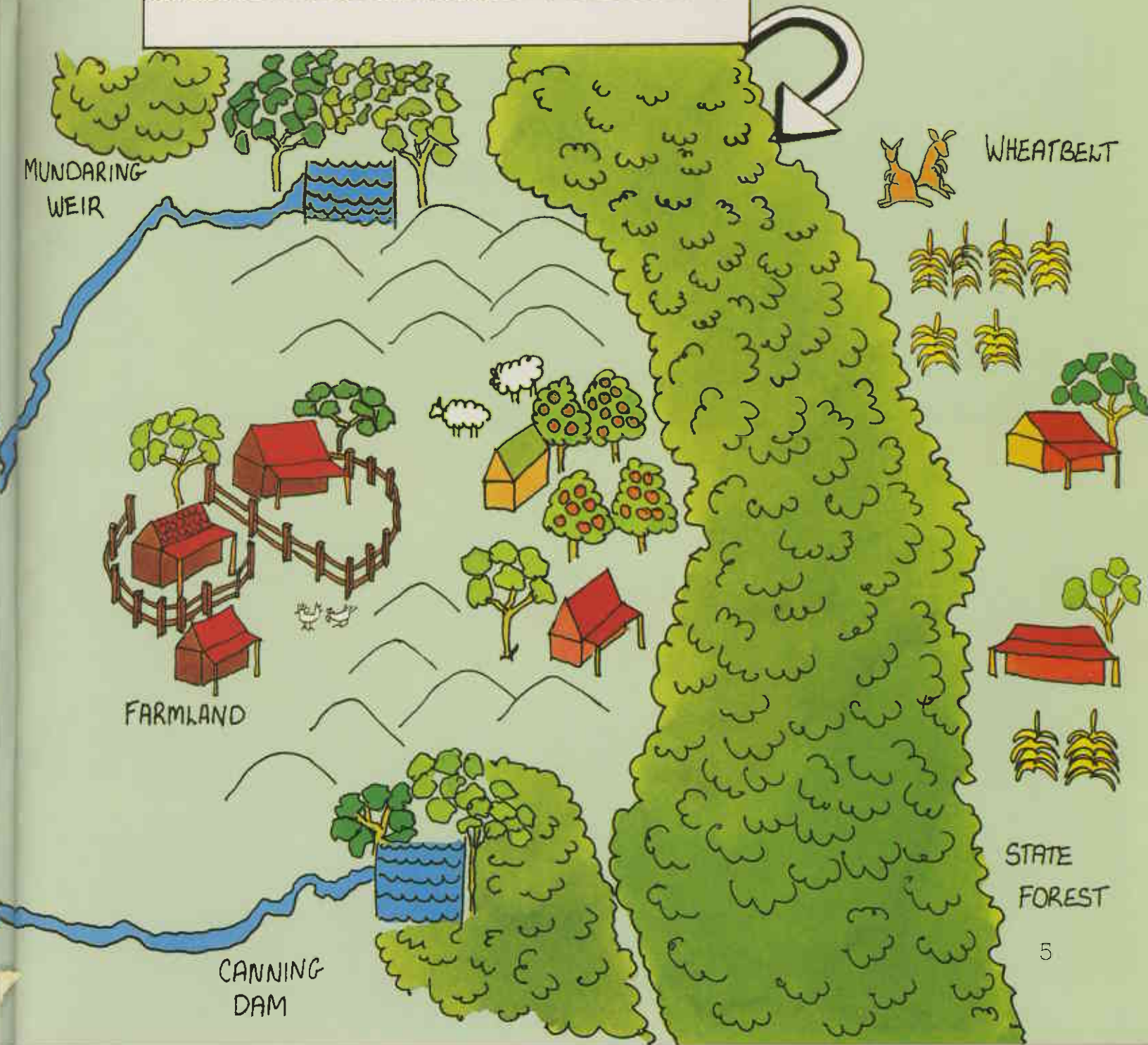
Fig. 1 LEVELS IN A FOREST



Overstorey

Understorey

Ground Cover



MUNDARING WEIR

FARMLAND

CANNING DAM



WHEATBELT

STATE FOREST

Western Australia

About one third, or 33% of the Earth's land surface is forest, but in Western Australia less than 1% of the total land surface is State forest. This amounts to two million hectares. There are about one million people in Western Australia, which means that the proportion of forest to people is two hectares of forest for every person. So you can see that, compared with the total land surface of Western Australia the size of the forest is small, but compared with the population here, the size of the forest is large. In some other countries, for example Japan, the situation is just the opposite. The Japanese have more than half their land surface forested, but they also have an extremely high population.



Tuart (Eucalyptus gomphocephala)



There are no forests in the Pilbara, but many beautiful plants do grow here.



Salmon gum (Eucalyptus salmonophloia)



Tingle (Eucalyptus jacksonii)



Wandoo (Eucalyptus wandoo)



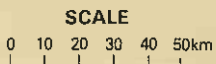
Pine (Pinus pinaster)

FORESTS IN THE SOUTH-WEST OF WESTERN AUSTRALIA

FIG. 2

LEGEND

JARRAH		WANDOO	
KARRI		TINGLE	
TUART		PINE	



Jarrah (*Eucalyptus marginata*)



Karri (*Eucalyptus diversicolor*)

The Development of a Eucalypt Flower



bud



bud cap



flower|stamens



The stamens fall off and leave a hard nut or fruit that contains the seed.

Eucalypts

Forests around the world, and even within Australia differ widely. Our forests in Western Australia are mainly made up of trees from a group called *Eucalyptus*. We call the trees **Eucalypts**. Eucalypts come from a family of woody plants that have leathery leaves, and that grow in a climate with relatively cold and wet winters, and hot and dry summers. This is the type of climate found in the south-west of the State. If you crush the leaf of a Eucalypt you will smell the strong Eucalyptus oil.

"Eucalyptus" comes from two Greek words meaning "well-covered" — a name applied to the little cap that protects the unopened flower. The petals in the flower are replaced by a "bud cap" that protects the miniature stamens (those fine stalks in the flower that hold the pollen).

Eucalypts are typically Australian, and apart from a few isolated species in New Guinea, Timor and other nearby islands, they are found growing naturally only in Australia. Six major Eucalypt forest types grow in Western Australia and no where else. They are found in different areas of the State according to climate, rainfall and soil. Refer to the forest distribution map, Figure 2.



Major Forest Types in Western Australia

Jarrah, (*Eucalyptus marginata*)

Jarrah is the main forest tree species in Western Australia. It grows throughout the south-west in areas where rainfall is higher than 600mm per annum. Jarrah is a tall tree with grey, stringy bark and creamy coloured flowers. It grows to a maximum height of more than 50 metres. Jarrah is unique to Western Australia and has very specific characteristics that enable it to grow on harsh, gravelly soils, in strongly seasonal conditions prone to frequent fires.

The long, straight trunk makes the jarrah tree highly suitable for the production of timber. Its timber is world famous for its hardness, durability and colour. Jarrah poles support our power lines, jarrah sleepers support our rail lines and much of our furniture is made of jarrah. Early settlers to Western Australia called jarrah "Swan River Mahogany" because of its resemblance to another fine timber, mahogany. However its many fine qualities were formally recognized in the 1860s when it became known by its aboriginal name "jarrah".

The timber industry was one of the first industries in Western Australia. Jarrah trees were felled using axe and saw, and the logs were hauled to the timber mill with horse or bullock teams pulling a cart called a whim.



Jarrah's botanical name is *Eucalyptus marginata*, "marginata" referring to the distinctive vein or margin on the edge of the leaf. Although all Eucalypts have this margin, on jarrah it is very pronounced. Jarrah grows slowly, reaching its greatest size after about 500 years. The best jarrah forest is found in the Darling Range between Mundaring and Collie, and around the Blackwood River near Bridgetown. The undergrowth of the jarrah forest is made up of banksias, blackboys, wattles, sheoaks, zamia palms and many other shrubs and plants. Your school library should have more information on the jarrah forest. (See Forest Focus Nos. 7, 11, 14, 21, 22 and 26).

Karri, (*Eucalyptus diversicolor*)

"Karri" is the aboriginal name for the State's tallest tree. It is also one of the tallest trees in the world. The botanical name for this tree is *Eucalyptus diversicolor*. "Diversicolor" refers to the difference in the shade of green between the upper and lower surfaces of the leaf. On days when the wind is strong enough to overturn leaves from their natural hanging positions, the paler undersurface contrasts strongly with the deeper green of the upper surface of the leaf. Karri forests are some of the most magnificent forests in the world, with individual trees towering 60 to 80 metres high. The tallest karri (measured in 1939) reached 90 metres high and was 7.3m around its trunk — truly a masterpiece of natural beauty and engineering.

The trunk is mottled in colour. As karri sheds its bark at the end of each summer irregular coloured patches are left on the trunk giving this mottled effect. The karri's flowers are light yellow in colour, and like all other Eucalypts, are protected by a bud cap when forming. The karri forest grows in the south-west of the State in areas close to the coast that are influenced by southerly breezes and receive some summer rainfall. The main belt of the karri forest lies south of an imaginary line drawn from Yallingup in the north-west, through Manjimup to the Frankland River then to Denmark and Torbay in the south-east near Albany. It grows mainly on loamy soils. Undergrowth in the karri forest is different from that of the jarrah forest, and within the karri belt, varies widely. It is usually very dense and includes karri wattle, karri sheoak, netic, sword grass, karri hazel, tree hovea and several creepers. We value the karri forest for its timber, as a water-catchment, as a popular recreation area, an area for conservation, and an area for scientific study. (See Forest Focus Nos. 1, 17, 24 and 27).



Karri forest is amongst the tallest in the world, with individual trees towering over 60 metres high.

Marri, (*Eucalyptus calophylla*)

Marri, a large and shapely tree, is the most widely distributed Eucalypt in the south-west, growing with jarrah or karri. The early settlers knew the tree as Red Gum, no doubt because of the red coloured gum that can be easily observed coming out of the trunk. However, marri is the preferred native name, as there are several other Eucalypts known as Red Gum. The botanical name *Eucalyptus calophylla* means "beautiful leaf". It is a very good honey tree and provides excellent shade on farms. Marri is also milled for chips that are made into paper products. Children know marri for its fruit, called "honkey nuts". Marri is a tall tree, growing as tall as 60 metres. (See Forest Focus No. 12).

Marri trees are best known for their fruit known as "Honkey Nuts".



The Tingles (*Eucalyptus jacksonii*, *guilfoylei* and *brevistylis*)

The three tingle species — red tingle (*E. jacksonii*), yellow tingle (*E. guilfoylei*) and Rate's tingle (*E. brevistylis*) are three tall species of tree that grow with karri and on their own in the extreme south-west of the State. On the south coast, in the vicinity of Walpole, is a small pocket of country which has the coolest and moistest climate of the whole State, and which supports the tingle forest. The Valley of the Giants is part of this pocket and is a favourite picnicking area.

Tuart, (*Eucalyptus gomphocephala*)

Tuart, or *Eucalyptus gomphocephala* is a tall tree that grows near the coast northwards from Busselton up to the Hill River, north of Moora. The tuart forest is a very open forest and is much easier to walk through than the karri, tingle or jarrah forests. The undergrowth of the tuart forest near Busselton consists mainly of smaller trees, like peppermints, and a ground cover of grasses. Cattle are grazed on the grasses in some parts of these forests to lower the chance of bushfires which could sweep through the forest in summer when the undergrowth is very dry.

Tuart was early recognized as a very strong timber and was widely used for such things as railway carriage frames. The fine tuart forests near Busselton are being specially managed to protect their value as an area for scientific study and recreation.

Wandoo, (*Eucalyptus wandoo*)

Wandoo, called *Eucalyptus wandoo* is the other major tree species of the south-west, occurring mainly to the east of the Darling Range. It was once found widely throughout the wheatbelt, but is now restricted to the eastern margin of the State forest. Wandoo is a very strong timber and has been used widely in the building industry. It grows, not as a dense forest, but as an open woodland, in low rainfall areas of between 400 and 800mm per annum.

Wandoo has mottled bark, usually quite smooth, and is also known as White Gum because of its pale colour. (See Forest Focus No. 3). The wandoo forest is specially prized for protection of water catchments, for honey production and recreation.



Wandoo timber is very hard and durable, and is prized because it resists termite attack.

The wheatbelt was once forested with wandoo and other types of trees, but has been cleared of its trees in order to plant crops. The clearing however, has caused rivers and streams in the wheatbelt to become salty. In some areas the clearing of forest has caused the destruction of the soil by wind erosion. Trees need to be replanted in the wheatbelt to prevent further damage.



Inland Eucalypts

The last major woodland type is composed of many species of Eucalypts growing together. This type is found in the Goldfields and other semi-arid areas of Western Australia. The Eucalypts in these areas are very slow growing because of the small amount of rainfall, and produce very beautiful flowers. Salmon gum and gimlet are two of the main species in this dry woodland area. Other species, such as sandalwood are not Eucalypts, but are found growing with the inland Eucalypts. The timber from salmon gum is used in the construction of the shafts for gold and nickel mines. (See Forest Focus No. 15).

The Kimberley Region

The Kimberley vegetation is not yet as well known as that of the south-west part of the State. Only recently has survey work been commenced to assess the range of trees growing in the extreme north of the State. Many of the trees in the Kimberley are not Eucalypts, but are more like trees of Asia.



The boab tree (above) is just one of the trees in the Kimberley.

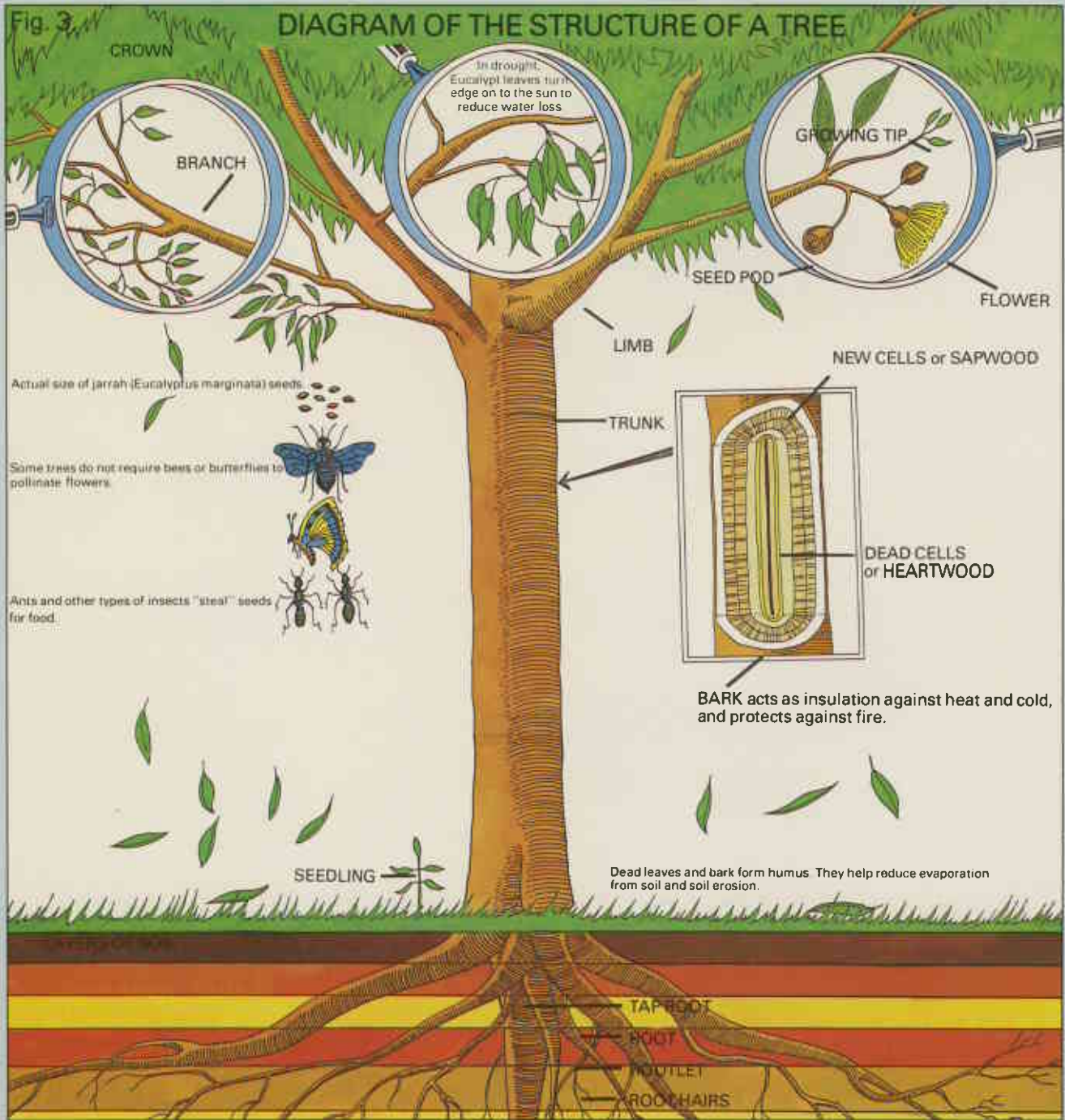
Pine Forests

Some trees from other parts of the world are planted in large numbers in Western Australia for the purpose of supplying wood to the community. Two main species of pine, *Pinus pinaster* and *Pinus radiata* are planted in the Donnybrook Sunkland, the Blackwood Valley and along the coastal plain near Harvey and Perth. The wood from pine trees is known as softwood and is very much lighter in colour and weight than the wood of the Eucalypt trees. In Western Australia we use pine for the manufacture of crates and cases, as well as for furniture. Larger sizes of pine timber can be used for house and roof frames. (See Forest Focus Nos. 5, 9, 16, 20, 28).



Even Superheroes have to work during the summer holidays!

HOW A TREE LIVES AND GROWS



A tree may be defined as a woody, upright plant having three main sections: the roots, the trunk (stem or bole) and the crown (branches and leaves). The crown is generally supported by a single stem so that the plant, when mature, is taller than 2m. This definition separates the tree from all other members of the plant kingdom.

Sections of a Tree

The Root System

The roots are the underground part of a tree. They have two main functions: to support the trunk and crown and more important, to absorb from the soil the water and minerals required for growth.

Root types vary from species to species and from tree to tree. Some trees send a tap root deep down into the soil. Other trees spread their roots outwards, shallowly through the soil.



The nutrients in the ground water, when absorbed, are carried up, via the trunk, to the crown to be converted into the food materials necessary to sustain life and growth.

Water absorption is carried out by young fine rootlets and root hairs. They are the only part of the root system that does this. Their small absorbing ends have a short life and, once they have completed their work, break up and are replaced by the new rootlets formed at the growing tips. A layer of protective bark develops around the older non-absorbing roots, and they serve the dual role of anchoring the trees in the soil and as a pipeline to pass the water and minerals (sap) taken up by the tips back to the trunk.

Most root systems are extensively branched to allow the rootlets to spread through the soil in the search for water and minerals.

The Trunk

The trunk of the tree carries out a twofold role in the life of the tree. It serves as a support to thrust the crown up and out into the light, and allows the water and nutrients picked up by the roots to be passed up into the crown. The trunk also transports the plant foods produced in the crown down to the roots.

All tree trunks are woody and capable of radial growth, that is, they grow outwards as well as up. Bark completely encases the trunk, protecting the vital conducting and growing tissues from damage.

A tree grows by the formation of new cells rather than by the extension of existing cells. A tree grows in height by adding new cells upwards on top of the existing tip. A nail placed at the base of a tree will not move upwards as the tree grows, as is often believed; it will remain at the same distance from the ground throughout the life of the tree.

The size of a tree's trunk or bole depends to a large extent on the particular type of tree, but it is also an indication of the quality of the site where the tree grows. Karri has a bole length often exceeding 30m, while the woodland wandoo is normally found with a bole of approximately 8m.

Wood

The body of a tree is made up of small cells composed of **cellulose**, the building material of plants. These cells are usually relatively short-lived and are rapidly replaced by new, younger cells used for growth. In the **heartwood** of the tree trunk, the majority of the cells have completed their living function and serve purely as mechanical support for the living parts. The new cells in the trunk form the **sapwood** just under the bark. Wood is made up of both heartwood and sapwood. The heartwood is usually a darker colour than the sapwood, and is the most durable part of a piece of timber.

Growth Rings

Each year the tree adds a layer of wood around the outside of the layer formed in the previous year. If growth is interrupted annually by cold weather or dry seasons, the character of the cells at the end of each year's growth and the beginning of the next is sufficiently different to define sharply the annual layers or growth rings. The age of a tree may be determined by counting the number of annual growth rings. Growth rings can be seen more clearly in some trees than others.

The Tree Crown

The leaves of the crown form the "factory area" of the tree and the processes of food production (photosynthesis), transpiration and respiration are all functions of the leaves. Seeds for reproducing are also formed in the crown.

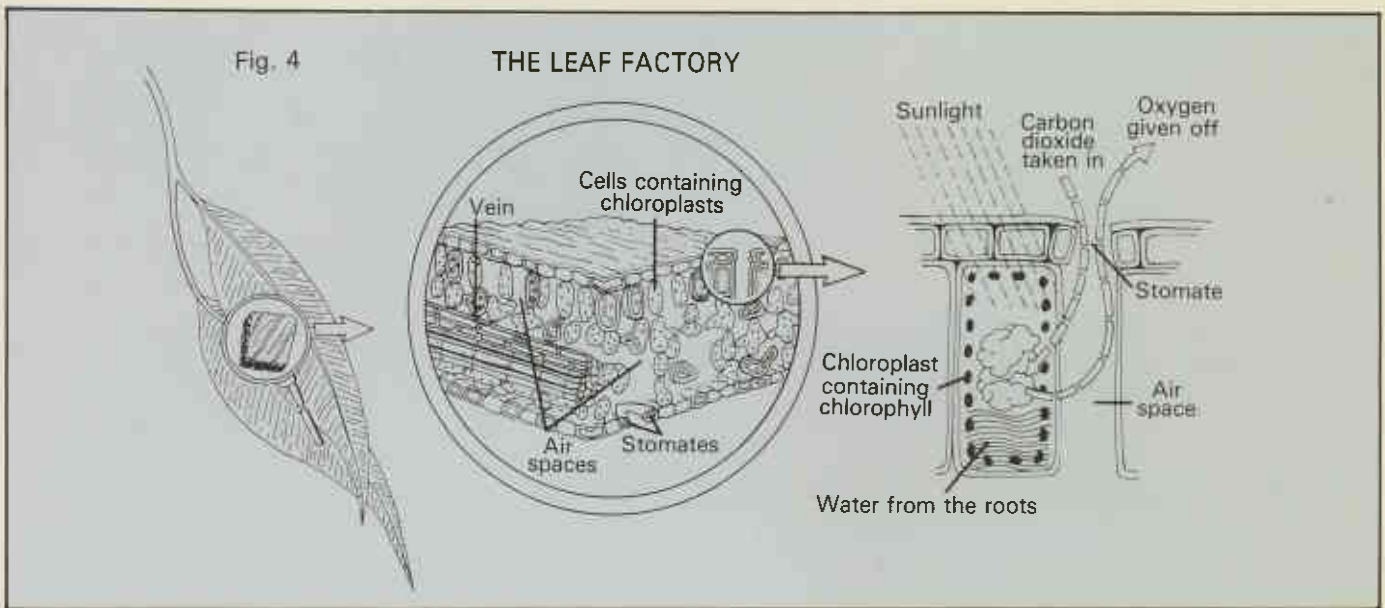


Plants are Chemists

Plants are the sustenance of all life on earth, for they alone are able to produce from simple, naturally occurring substances, the complex organic foods necessary for the life of organic cells. This depends entirely on the action of sunlight on the green colouring matter (chlorophyll) of the leaves. It is called **photosynthesis**. Green plants use sunlight to convert carbon dioxide and water into useful food. Animals cannot make their own food so they must either eat plants or other animals to get their requirements for life.

The basic materials needed for food production come from two sources: the air and the soil. In all, nine elements — carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium and sulphur — are required by all plants in fairly large quantities. Other elements are called trace elements and are required in much smaller amounts. Of all these elements, carbon and oxygen in the form of carbon dioxide are taken from the atmosphere and all others are derived from the soil, in the form of mineral solutions in water.

A fertile soil will supply all of the major trace elements while an infertile soil lacks one or more of them. The fertility of the soil can be seen in the health and vigour of the tree.



The leaves in the crown of the tree carry out the processes of photosynthesis, transpiration and respiration. The leaves are like factories because it is here that all the raw materials are made into food products for the tree to live on.

Like all living things trees and other plants breathe. This is called **respiration** and is the opposite to photosynthesis. Respiration uses food and oxygen to produce energy for growth. Respiration is a continual process whereas photosynthesis only occurs in the presence of sunlight.

Transpiration

Another important function necessary to the life of the tree occurs through the leaves of the crown. It is known as **transpiration**, or the release of excess water from the tree into the atmosphere.

Less than 1% of the water taken up by the roots and transported up to the leaves as sap is used by the plant cells. The bulk of the water is used to carry the mineral nutrients, which are dissolved in it, from the soil to the leaves. Once the nutrients have been removed from the sap, the water is of no further use and must be removed from the plant to allow room for more sap to be moved up from the roots. This excess water is released into the atmosphere through special breathing pores, called **stomates**, in the leaves. The water passing through the stomates is in the form of a gas or vapour.

Reproduction

Nature makes sure that a species continues to survive. All trees, when they come to maturity, bear flowers. Within the flowers pollination occurs and in time they develop into fruit with seeds that fall to the ground, germinate and grow to form new trees.

Jarrah flowers, for example, are pollinated during the summer months. Twelve months after pollination, the fruit contains mature seeds. In the hot months of the summer the ripe fruit opens while still attached to the tree and the seeds drop to the forest floor. During their travel from the height of the crown to the floor, air currents may spread or carry the light seeds some distance from the parent tree.

On the forest floor the seed germinates when conditions of temperature, light and moisture are favourable for the growth of the young seedling. Of the thousands upon thousands of seeds that germinate on every hectare of forest soil, only a few survive competition from weeds and neighbouring trees, and the long dry summer to eventually become mature trees.

Besides reproduction by means of seed, many trees, like jarrah, are able to regenerate by shoots (coppice) which arise from the stump after the parent tree has been felled, or by suckers from the roots.

WHAT TREES PROVIDE

The whole forest and its inhabitants form an **ecosystem**. An ecosystem can be defined as living and non-living things interacting with each other to produce cycles of raw materials. The raw materials are mainly nitrogen, carbon, water and oxygen. These things make up the food for all living things within the forest. The raw materials are exchanged between air, plants, soil and animals in **balanced cycles**.

Living Things in the Forest

In the forest ecosystem, there are communities of living things. The dominant community is of course, the trees. But there are many other plant communities in the undergrowth (for example, shrubs and flowers) and on the forest floor (for example, mosses and creepers).

There are many communities of animals, birds and insects living in the forest. The forest provides a **habitat** for these living things. The raw materials in the forest are passed through the living communities in a **food chain**. So we see that larger animals feed on smaller animals, birds feed on insects and small animals and insects feed on plants. When the living things in a forest die they decay and are broken down to become part of the soil which in turn provides nutrients to the trees and other plants. All members of the forest community produce wastes (gases and chemicals) which are returned to the environment to be used by other members of the community.

All communities in a forest depend on each other. Trees cannot grow satisfactorily unless certain soil and climatic factors are present. They cannot continue to reproduce and thrive unless animals, insects and birds are available to aid the process and maintain soil fertility. Within the forest ecosystem trees in their turn provide many things.

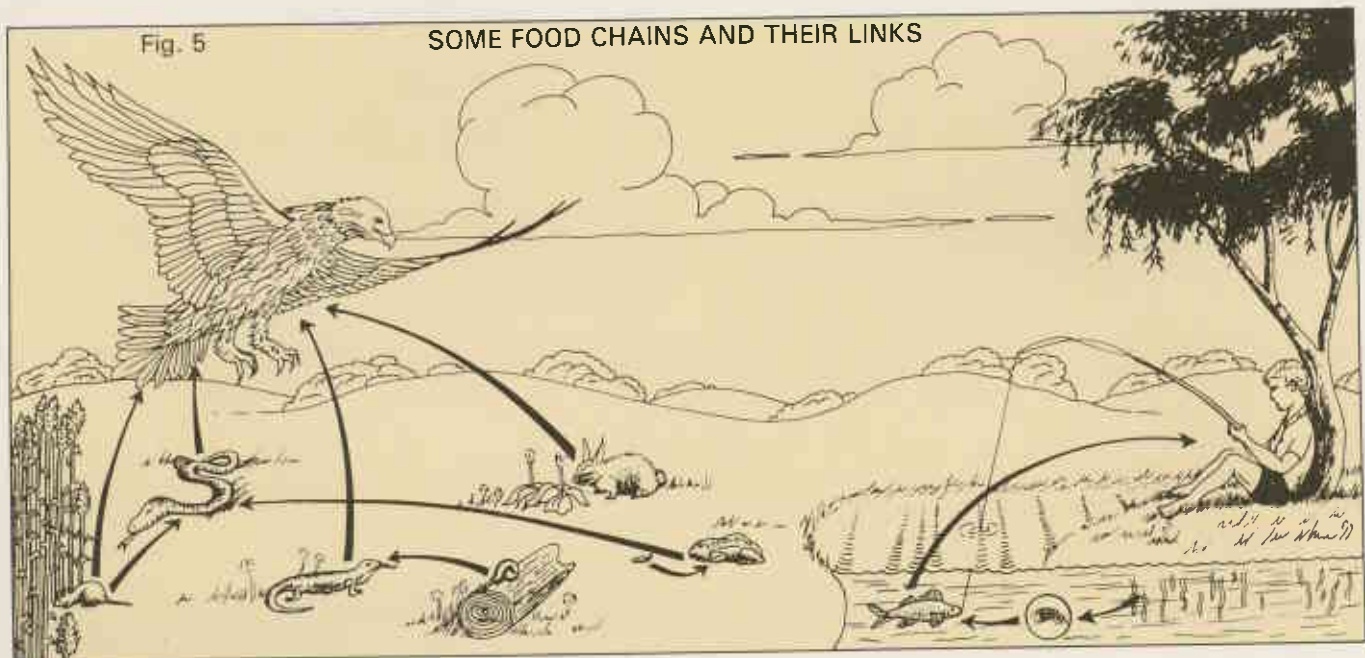


Fig. 6

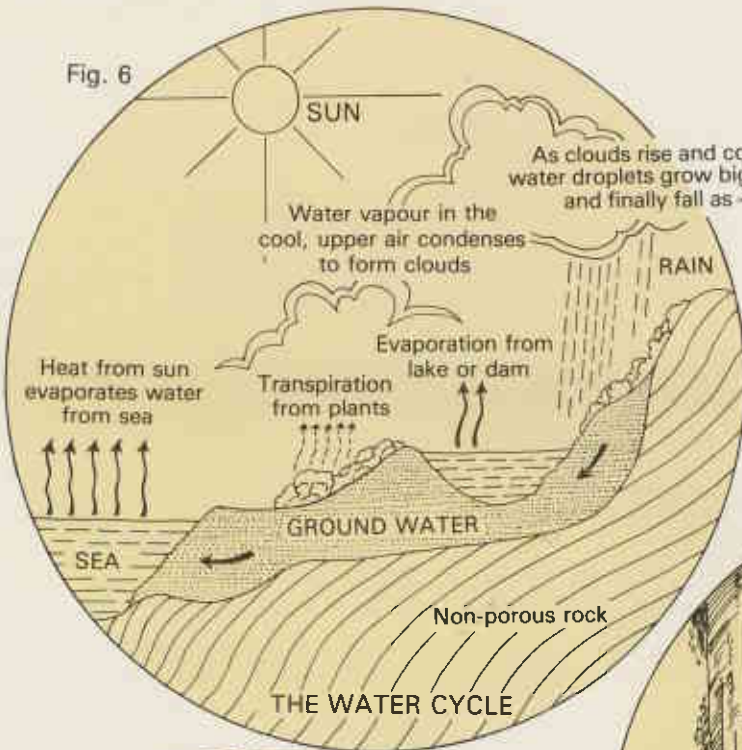


Fig. 7

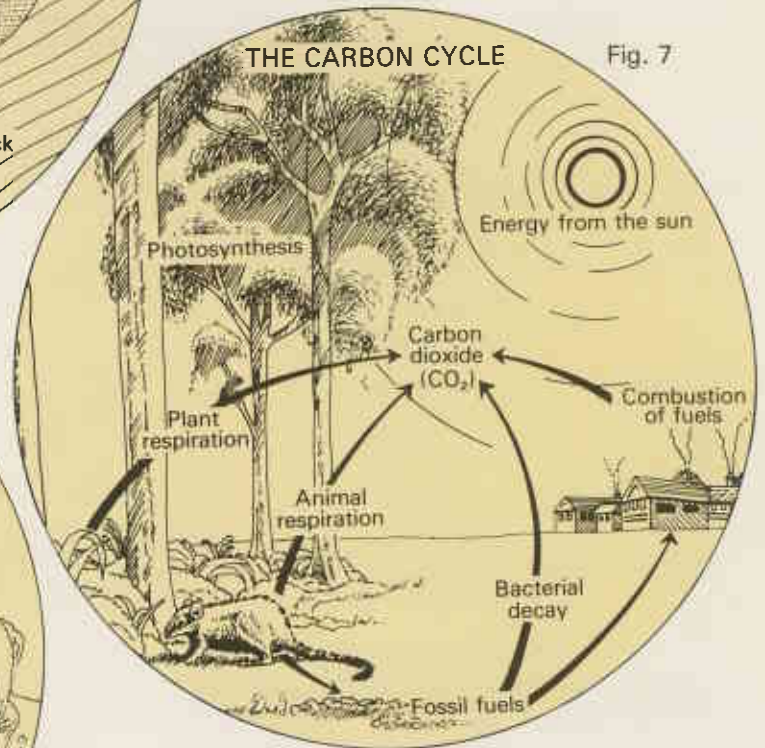
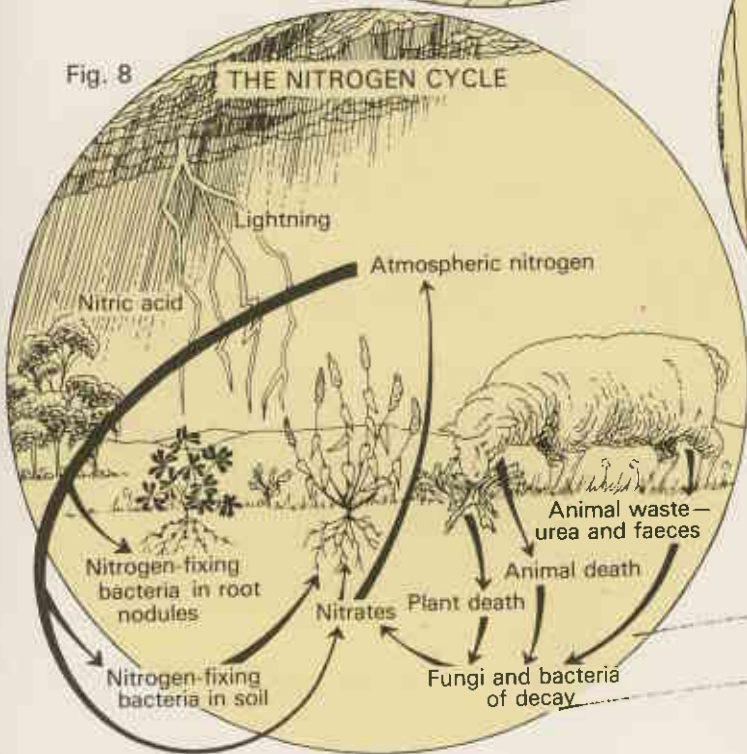


Fig. 8



The forest ecosystem is composed of many living and non-living things depending on each other.



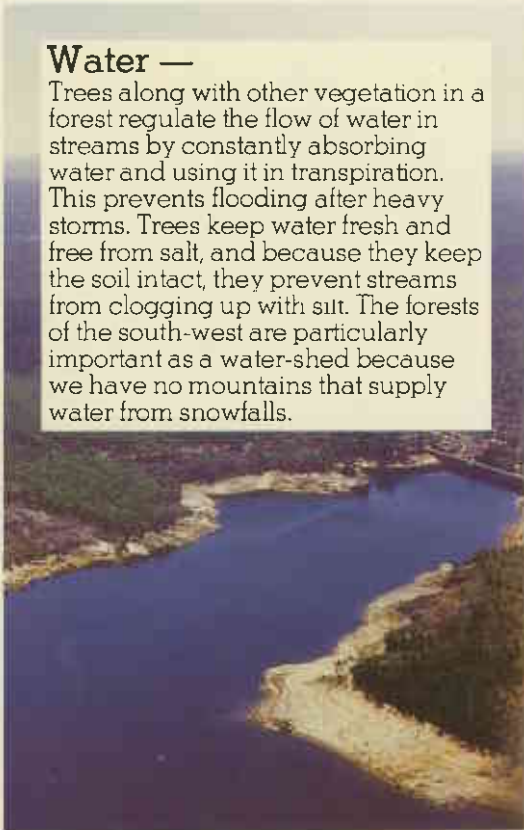
Soil —

Trees protect the soil from strong winds and rain. They hold the soil intact with their far reaching root systems. Trees prevent erosion and improve the composition of the soil. Trees also help to put back into the soil the nutrients that they use for food. Dead leaves, bark and branches fall to the forest floor where they decay back into the soil. This improves the mineral content of the soil and its capacity to hold water.

T. Whittaker

Water —

Trees along with other vegetation in a forest regulate the flow of water in streams by constantly absorbing water and using it in transpiration. This prevents flooding after heavy storms. Trees keep water fresh and free from salt, and because they keep the soil intact, they prevent streams from clogging up with silt. The forests of the south-west are particularly important as a water-shed because we have no mountains that supply water from snowfalls.



Plants —

Trees provide shelter from harsh sun and winds for many other plants to grow underneath them.

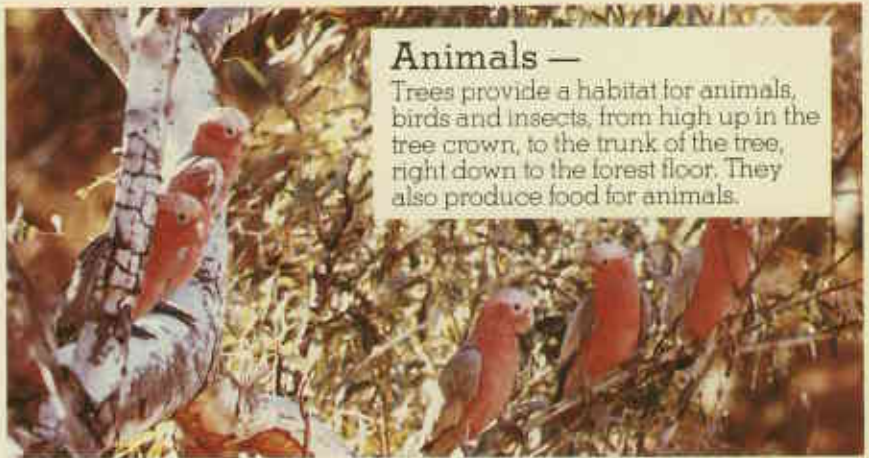
G. Powell





Air —

Trees and all green plants filter the air for the entire earth. They use up the carbon dioxide and circulate the oxygen. There is a constant cycle of gases going on in the atmosphere and all green plants, including trees, keep the cycle going. Animals in the forest and humans on the earth breathe the air filtered by the trees and other plants.



Animals —

Trees provide a habitat for animals, birds and insects, from high up in the tree crown, to the trunk of the tree, right down to the forest floor. They also produce food for animals.



Climate —

Forests regulate the climate near the ground protecting the land from excessive heat and drying out, and from excessive cold. The temperature in a forest is more constant than in a cleared area. Forests are shelters for many living things.

In summary, we can say that a forest is a **balanced** but **dynamic** ecosystem. Dynamic means moving, and there is a lot of action in a forest that we don't see. We don't see the trees or other plants grow and decay, we don't see the nutrient cycles, yet these things are continually happening in all parts of the ecosystem. There are millions of intricate food chains in which

the raw materials are transferred from organism to organism, between the atmosphere and the soil. At any one time we may study a forest and record a given amount of oxygen or nitrogen, or a certain number of trees or possums. The numbers, generally speaking, remain constant, but small changes occur all the time. The forest is **balanced, dynamic and complex**.

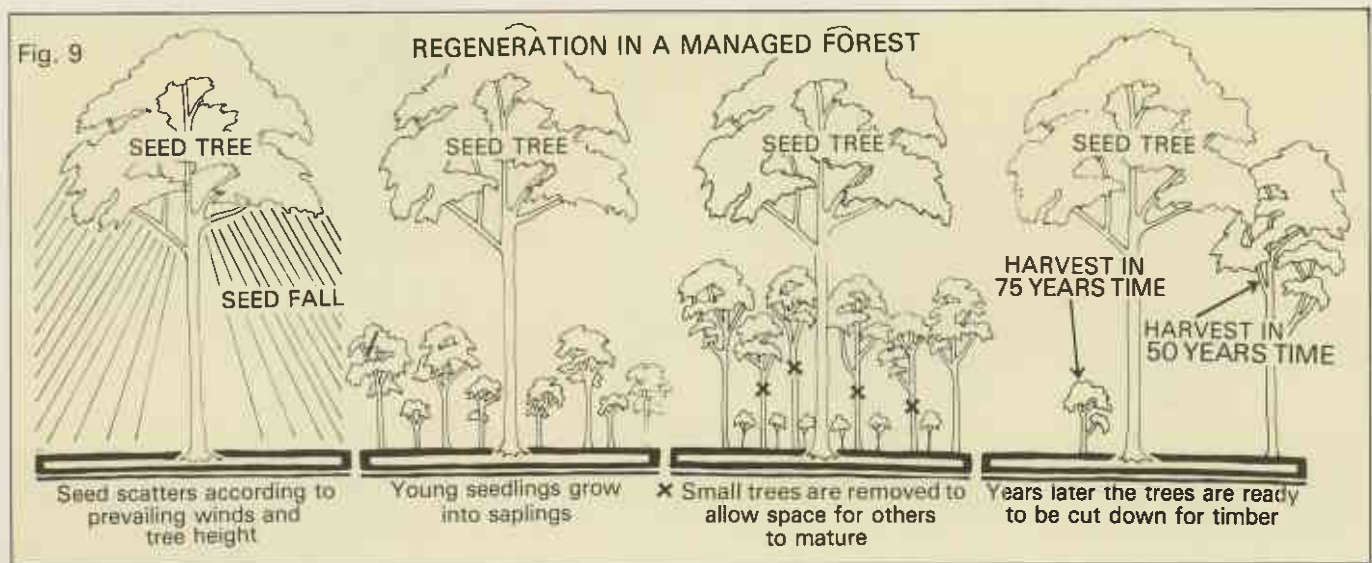
PEOPLE USE FORESTS

Not only do forests form an important part of our environment, but they are used by people for many products and activities. Forests need to be carefully managed to provide a variety of products and values for all time.

Wood

In our daily lives we are surrounded by material produced from trees. From newspapers and books to the cardboard carton, through the long range of rayons, plastics and chemicals to the more obvious chipboard, plywood and sawn timber for furniture and construction. The basic raw material in each case is wood. 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 or furniture. It is easier to produce timber than it is to produce other construction materials such as concrete, steel and aluminium. Most importantly the production of timber produces very little pollution, and requires a lot less energy than concrete, steel or aluminium. (Refer to Fig. 10).



Adapted from the magazine From Forest to Home with permission from Hardboards Australia Ltd.



People use forests in many ways. Here people at work use timber from our forests to make furniture and repair a fishing boat.



The outstanding characteristic of wood is that it is **renewable**. We can re-plant trees once they have been cut down, to enable a continuing supply of wood products. This is called **regeneration** of the forest. We can also plant areas of land that don't normally have forests on them, with trees. This is called **afforestation**. An example of afforestation in Western Australia is the pine forests planted along the Blackwood River. These pine forests have been planted to provide us with timber on land that was cleared for farming.

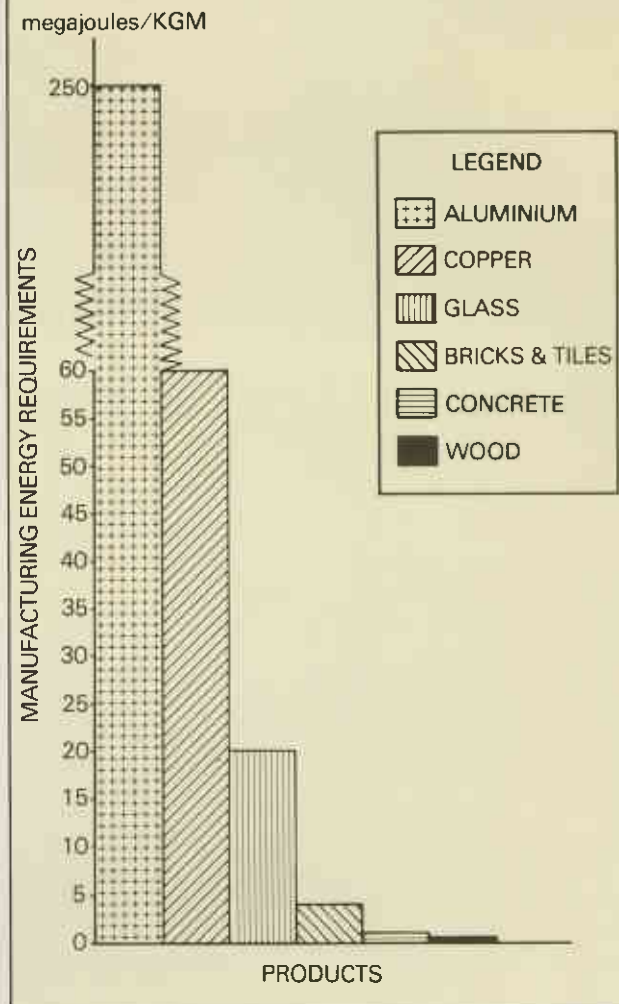
Other Products

Apart from timber, forest products are important to several industries in the form of such resources as rubber, turpentine, tannin, cork, honey, edible fruits and seeds, medicinal oils, charcoal and carbon. In Western Australia, honey collection, charcoal, wood chemicals, fuel supply, tool handles and tannin extraction are examples of industries that have depended on the forest.

It takes less energy to make timber products than it does to make concrete or metal products that do the same thing as timber.

Fig. 10.

WOOD SUBSTITUTES AND THE ENERGY REQUIRED FOR THEIR MANUFACTURE





Some towns in the south-west depend on the timber industry for their livelihood. Here is an aerial view of a timber mill at Dwellingup, where the logs are sawn up into planks and beams for use in construction or furniture building.

Employment

From the time that a seed germinates in the forest or the seedling is planted, to the time that the tree is fully grown, thousands of people are employed working in or with the forests. People are employed by industries such as sawmills, to cut the trees for timber supply. Beekeepers work in the forest, collecting honey made from tree blossoms.

The jobs of managing, tending and protecting the forests are done by foresters. Foresters are men and women who study the forest, who guide the timber industries and who make areas in the forest into picnic spots for everyone to use on weekends or holidays. Foresters fight bush fires, and try to prevent the spread of forest disease, such as jarrah dieback. An important part of the forester's job is to grow and plant trees.

The forest is an exciting place to visit. You can go canoeing, bushwalking or picnicking in State forest.



There are many towns in the south-west whose main industry is timber. Some of these are Jarrahdale and Dwellingup in the jarrah forest of the Darling Range, Nannup and Kirup near the pine forests along the Blackwood River, and Manjimup, Pemberton and Walpole further south in the jarrah and karri forests.

Recreation

We have all been for picnics in the forest, near rivers, dams or rocky outcrops. Managing a forest for recreational purposes is a very important part of forestry as growing numbers of people are seeking the beauty of the forest environment. Australians use forests as places for relaxation, walking, canoeing, picnicking and studying the bird-life, animals or wild flowers.

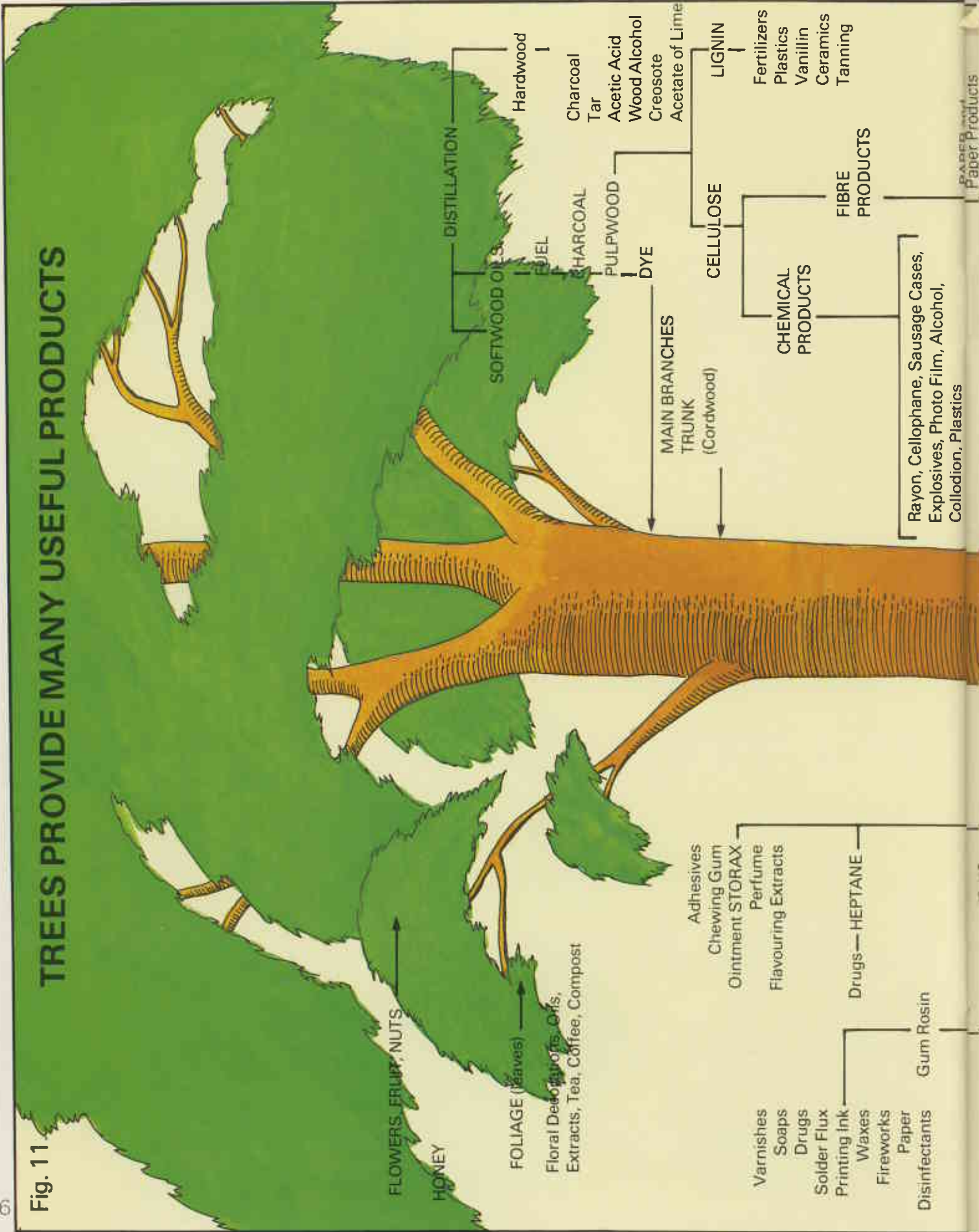
Forest Fauna

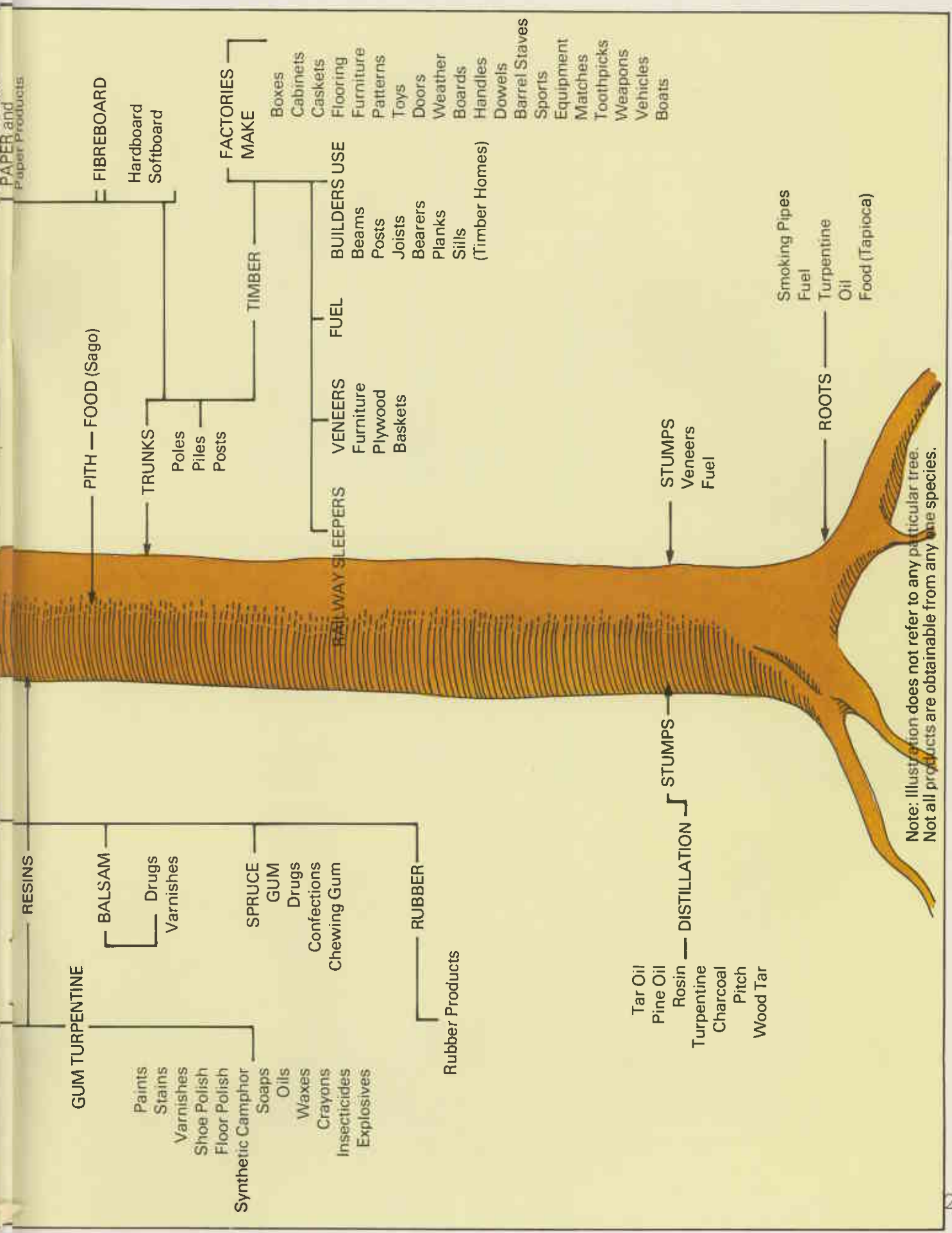
Forests provide a habitat for many birds, animals, insects and aquatic life. In order that we disturb communities of animals and birds as little as possible when felling trees for timber, we leave tracts of forest uncut as refuges and corridors for fauna. Some areas of forest support unique populations of fauna, such as the numbat, the woylie, the native cat, the fire-tailed finch and others. It is important that Western Australians value the fauna and flora as well as the timber in the forests. (See Forest Focus Nos. 23, 24, 25, 26 and 27).



Fig. 11

TREES PROVIDE MANY USEFUL PRODUCTS





Note: Illustration does not refer to any particular tree.
Not all products are obtainable from any one species.

FORESTS — LET'S KEEP THEM



So, the forests of Western Australia provide us with many things, some that we see and some that we don't see. There is the unseen ebb and flow of nutrients, oxygen and water in the forest ecosystem. There are also complex interactions between plants and animals within the forest. Then there are the benefits that we can easily see that are provided by forests, such as timber supply, employment and recreation. It's easy to appreciate that the forests of Western Australia are a valuable resource.

As our population expands there is more and more pressure being put on the forests to provide the things we want. As well as

use for timber production and recreation, there is pressure to use forest land for other purposes, such as for farming, for mining and for public utilities like roads, reservoirs and powerlines.

Of course we need roads, reservoirs and powerlines, but we should place them in forests only if there is no alternative, and we should use land efficiently. For example, we could use one access way through forest for both a pipeline and a powerline instead of having two access ways.

We also need some minerals found in State forest, but the mining should be carefully planned to minimize forest disturbance.



The construction of powerlines (below) and roads (above) in State forest are examples of the stress placed on the forest by human society. Note the dead trees near the road. They have died from jarrah dieback disease, which is spread on vehicles travelling through the forest



To make the Collie river fresh again, areas of land around the river that were cleared of trees have been re-planted.



Wherever possible the mining operation should be directed to poorer quality forest areas or areas of forest affected by disease. After mining is completed the mine operator should always reforest the area that has been disturbed — and this already happens with some mining operations in Western Australia.

We should avoid any further use of forest land for farming. In many areas, the permanent clearing of the trees from the land can cause rivers to become salty. The water is then less useful or even completely useless for plants and animals.

It is important that we protect the forests we have from harm, and **use them wisely**. With proper care and management, our forests can be there forever, but for this to happen we must all understand and appreciate the life of the living, ever-changing forest, and value the great benefits it can provide.

This does not just apply to us here in Western Australia. Forests are part of a global resource. Forests and other natural resources such as fisheries are under increasing pressure everywhere because of growing populations all over the world. Because of this pressure, a **World Conservation Strategy** has been developed to guide countries in the management of their natural resources. For forests, the World Conservation Strategy recommends:

managing the forests so that they give the greatest long-term benefits to people now, and at the same time caring for the forests so that they will be able to meet the needs of future generations of people.

Forest conservation includes setting aside from harvest some parts of the forests, **wise use** of other parts for production of wood, water and other products and the restoration of disturbed areas of forest.

Here in Western Australia we are trying to do just this. We are planting trees to take the place of those we fell and we protect and manage different areas of forest to produce other forest values for the years to come.



*"Let's replenish what we take away,
And plant a tree for W.A."*

SOME KEY WORDS

FOREST —	a large area of land covered with a community of trees and other vegetation.
COMMUNITY —	plants and animals which live in an area and depend on each other for survival.
ENVIRONMENT —	the total surroundings (living and non-living) that affect an organism. There are two main environments — water environment and land environment.
ECOSYSTEM —	an area of living and non-living things interacting with each other to produce cycles of raw materials.
CYCLES —	the continual movement of raw materials within an ecosystem, from plants to animals, to soil, water and air.
FOOD CHAIN —	that part of the cycle of raw materials that includes living things
HABITAT —	all the things that make up the place where an organism lives.
RESOURCE —	a reserve of a product from which we can draw when need be.
RENEWABLE —	a resource that can be restored to its original size or capacity.
REGENERATION —	the process of forest renewal, by planting or by natural reproduction.
REFORESTATION —	the regeneration of a previously forested area with forest trees.
AFFORESTATION —	the planting of forest trees, on areas of land on which forests do not normally grow.

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FURTHER FOREST FACTS

Information about the forests may be obtained from your school or local library, or from the Forests Department, or the Department for Conservation and the Environment.

Forest Focus

- | | |
|---|---|
| No. 1 — Focus on the Karri Forest
Karri Botanical Notes
The Growing Importance of Pine | No. 15 — Focus on Inland Eucalypts — A Valuable
Biological Resource
Recreation Characteristics of Western
Australian Forests |
| No. 2 — Focus on Forest Conservation
Invitation to the Rainbow Trail and Nearby
Karri Forest
Eucalypts — A Simplified Key to 17 W.A.
Species | No. 16 — Focus on Sunlands Multiple Use Land
Management |
| No. 3 — Focus on Controlled Burning for Forest
Conservation
Wandoo Botanical Notes
Hauling Past and Present | No. 17 — Focus on Forest Policy
Karri Life Cycle |
| No. 4 — Focus on Loss of Productive Forest
Jarrah Root Rot
Trees for Country Areas | No. 18 — Focus on Southern Recreation and
Conservation Management |
| No. 5 — Focus on \$30 Million Integrated Forest
Products Complex
Summary of Main Plantation Development
Operations for Blackwood Valley
Forest Recreation | No. 19 — Managing Jarrah Forest Catchments
No. 20 — Agro-forestry Trials in the South-West
No. 21 — Dieback Hygiene . . . first steps
An Ecological Approach to the Control of
Jarrah Dieback |
| No. 6 — Focus on the Jarrah Forest
Bushfire Survival
Trees of the Arid Zone — Goldfields
Sand Mallee | No. 22 — Focus on Northern Jarrah Forest
Conservation and Recreation Areas |
| No. 7 — Early History of Jarrahdale
Birds of the Jarrah Forest
Flight Line One
Prescribed Burning in W.A. Forests | No. 23 — A Sad Day for Native Fauna
Tree Lookouts — A Unique Chapter in
Western Australian History
The Remarkable Whim |
| No. 8 — Focus on Shifting Sands
Dryandra An Ecological Oasis | No. 24 — Aircraft of the Forests
Clear Felling and Native Fauna in South-West
Forests
Re-Cycled Towns |
| No. 9 — Natural Rounds — Here to Stay —
The Push-Button Age
Timber Industry and the National Economy | No. 25 — Bush Pasture in the South-West
Fire Management for Forest Fauna
Summer Canoeing |
| No. 10 — Focus on a New Concept in Forestry —
Fauna Priority Areas
Some Ecological Aspects of Jarrah Dieback | No. 26 — On Rational Grounds — a precis of a study on
the W.A. Murray River
Playing Possum |
| No. 11 — Focus on Land Use Conflicts in the Northern
Jarrah Forest | No. 27 — Towards the Greening of Australia
From Germinants to Giants — The Manjimup
Nursery
Trees for Badgingarra
New Light on the Numbat
Sites for Sore Eyes |
| No. 12 — Focus on the Marri Woodchip Project | No. 28 — Pilbara Gardens
Pioneers: A Profile
Timber for the Future — Pine
Notable Trees of Perth. |
| No. 13 — Fire in the South-West Forest Ecosystems
Bibbulmun Bushwalking Track | |
| No. 14 — Focus on Jarrah Dieback — A Threat to W.A.'s
Unique Jarrah Forests | |

Note: Forest Focus Nos. 1-21
are out of print but are still available in your school library