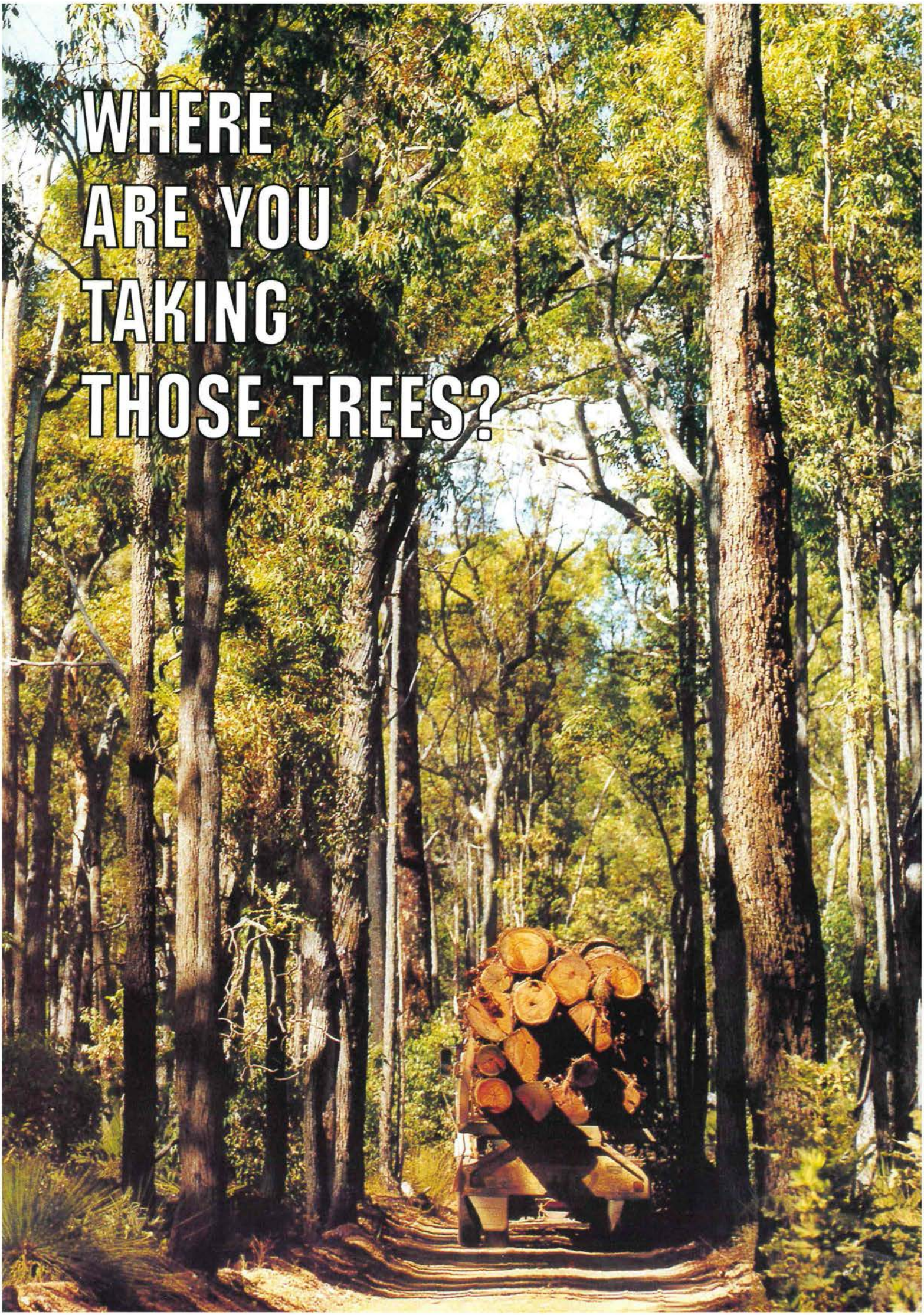

WHERE
ARE YOU
TAKING
THOSE TREES?

• Produced for the Forest Products Association by International Communications Pty. Ltd. Research and script by M. Colquhoun, *B.Sc.(Hons), Dip.Ed.* Artwork was by Bruce Wroth. Pictures were by Floreat Photographers and by courtesy of Bunnings Ltd, Whittakers Ltd, and the Department of Conservation and Land Management.

Where are you taking those trees?

Imagine your life without wood, or wood products. Do you know what would be different . . .

While playing sport?

At work?

In your house?

Shopping?

At school?

You might be surprised if you knew all the things you could use that are made of, or from wood.

So, where does our West Australian wood come from?

From forest trees of many different types.

After the wood is harvested the forests are regrown to ensure that there will be more wood for the future.

What types of trees?

What types of timber?

What uses for timber?

What other wood products?

How is the wood harvested?

How are the forests regrown?

Would you work in a timber or wood-based industry?

The pages of this booklet came from wood. Perhaps these pages can help you answer some of the questions.

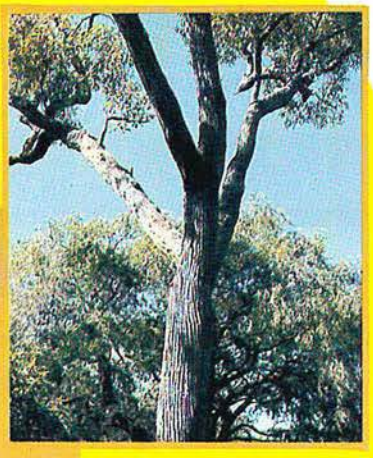
The Timber Trees of W.A.

The State forests of the south west of Western Australia extend from an area east and slightly north of Perth almost to the south coast.

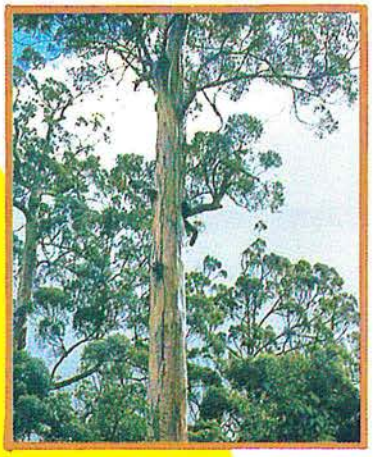
The forest areas shown here are where the indicated tree is dominant. Forest trees usually do not grow in pure stands, rather they grow in mixtures or associations, for example: jarrah/marri.

However, there is generally one dominant species in any area and this is the basis for the classification of forest areas indicated. Marri is generally found throughout the native forests.

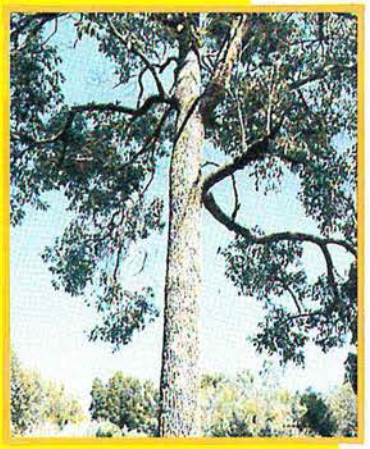
Pine plantations are, of course, pure stands.



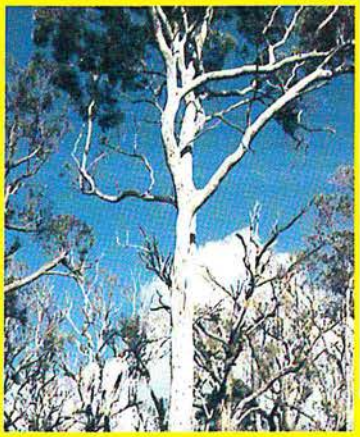
JARRAH



KARRI



MARRI



WANDOO

PINES

WANNEROO

PERTH

MUNDIJONG

DWELLINGUP

NARROGIN

BUNBURY

COLLIE

BUSSELTON

NANNUP

BRIDGETOWN

KOJONUP

MARGARET RIVER

MANJIMUP

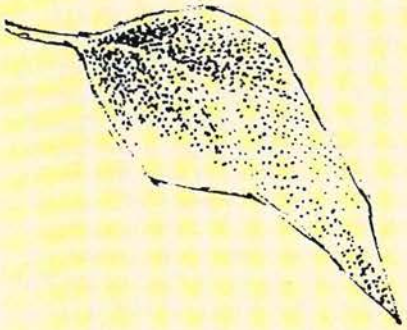
PEMBERTON

WALPOLE

ALBANY

Jarrah
Karri
Wandoo
Pines

Seeing the trees for the wood ...



HARDWOODS

Native West Australian timbers are hardwoods. Scientifically, this means that the trees are flowering plants (Angiosperms) and are easily recognised by their broad, flat leaves. The term 'hardwood' does not really refer to the type of wood at all. However, as if to confuse you, most West Australian hardwood species do in fact have strong, hard wood!

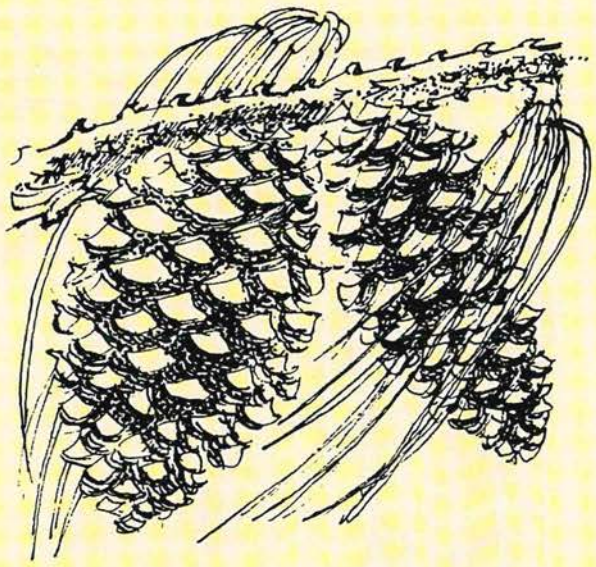
* ***Find or list twenty Angiosperms likely to be found in your area or garden. Indicate what each of these plants is most likely to be used for. Remember, they don't have to be trees.***

West Australian hardwoods belong to the plant family, *Myrtacae,* and are in the genus *Eucalyptus.* You may know these trees better as gum trees — they are the dominant trees in the Australian bush. This generic name, *Eucalyptus,* is derived from the Greek words Eu (well) and Kalyptos (covered), referring to the cap that covers the stamens and stigma in the flower bud. This bud cap is made of fused sepals and petals, and is called an operculum (pronounced o-per-cue-lum).

Some of the ways eucalypts can be identified include:
— the operculum, with a different shape for each species.
— crushed leaves giving the distinctive eucalyptus oil smell.
— woody fruit (often called gumnuts) with a cup or urn shape.
— most eucalypts are trees.

The special characteristics of bark, leaves, flowers and fruit are used to identify different species.

* ***Search for 10 tree form Angiosperms and try to work out if any of them are eucalypts.***



SOFTWOODS

The term softwood also has a specific scientific meaning — that the tree belongs to the Gymnosperm group of plants (plants which produce seed from cones, not flowers). Softwoods generally have needle-like leaves. You may know them better as pines.

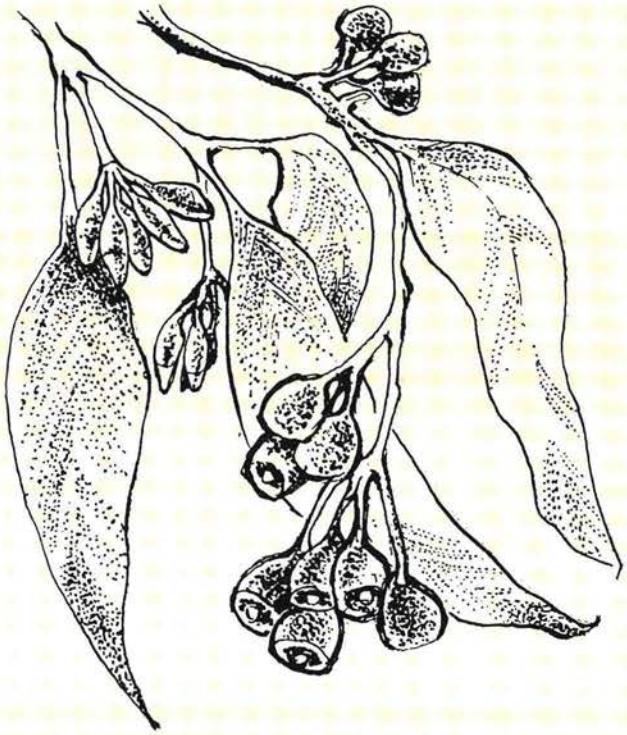
Western Australia has no native softwoods suitable for timber production. Instead, plantations of introduced softwood species, such as radiata pine *(Pinus radiata)* and pinaster pine *(Pinus pinaster)* are grown. Perhaps you use small trees or "thinnings" from these plantations for your Christmas tree each year?

Looking

JARRAH

Eucalyptus marginata

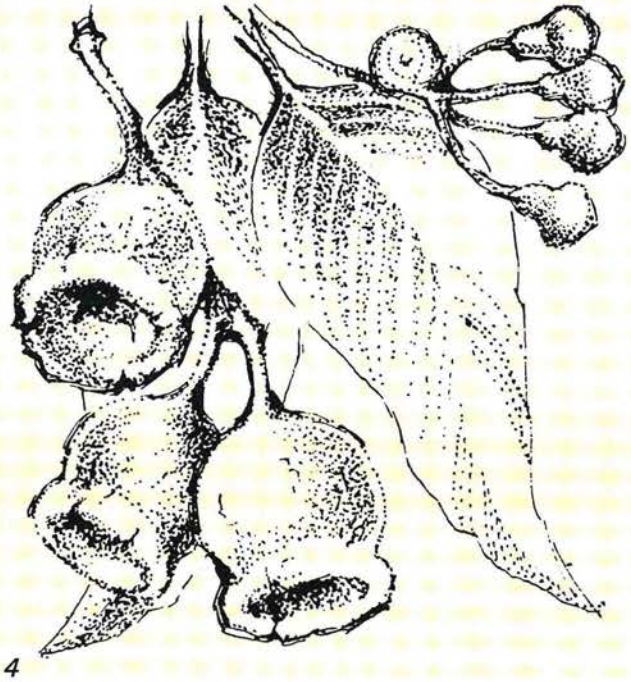
Jarrah timber is dark red to red/brown. Due to its excellent polishing qualities it is in great demand for furniture, flooring and decorative trims. It is also an excellent building hardwood. Jarrah trees can grow to 50 metres tall with ideal soils and rainfall, though the average height would be closer to 30 metres. Tall straight trees can yield boles (trunks) for sawlogs up to 20 metres. As conditions for growth become less ideal, size and straightness of jarrah is generally reduced. Because of its ease of working and good hardwood properties jarrah timber has been in demand world-wide and is Western Australia's most important timber resource. Other main uses include railway sleepers, verandahs, doors, window frames, fences, wharves, jetties, and power poles. In the early days of the West Australian colony, jarrah was shipped back to London to be used as street paving and sleepers in the underground railways. Many of these are still in use today.



KARRI

Eucalyptus diversicolor

If you have ever seen the giant karri forests of the South West you will know that karri is Western Australia's biggest tree, with some individuals reaching heights of 80 metres or more! A more average sized tree would be 50 metres, which is still a very tall tree. Karri gives some of the longest lengths of hardwood in the world with boles of up to 50 metres being recorded. Karri grows in the higher rainfall areas of the South West. The timber is pale pink to deep red and is used mainly for building purposes. It is particularly sought for sawlogs where long straight lengths of very strong timber are required.



MARRI

Eucalyptus calophylla

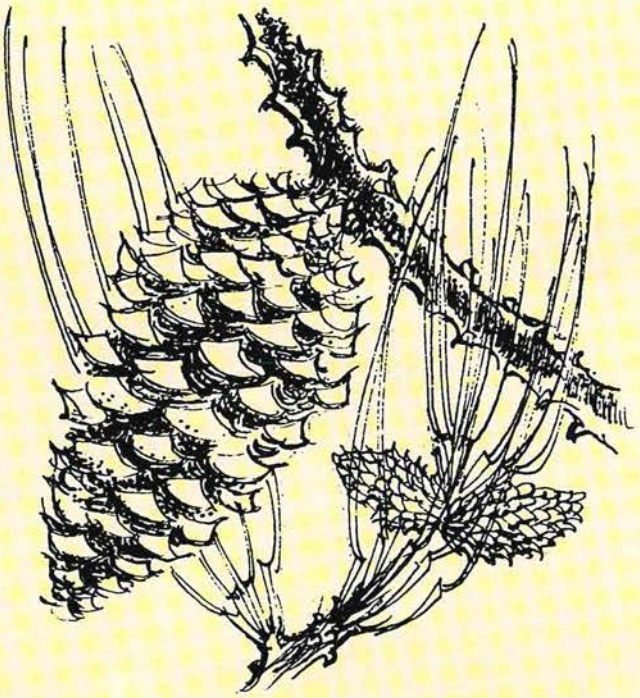
Marri grows widely throughout the South West both on the coastal plain and along the Darling Scarp. It grows in association with both jarrah and karri but is rarely dominant over large areas. Marri timber is pale in colour with characteristics similar to jarrah. However, marri has earned the common name of "red gum" due to the high quantity of gum present in its wood. This gum causes the wood to split easily and combined with other defects makes marri timber generally unsuitable for sawlogs. Marri is predominantly used for chiplogs.

Closer

PINES

Pinus radiata and *Pinus pinaster*

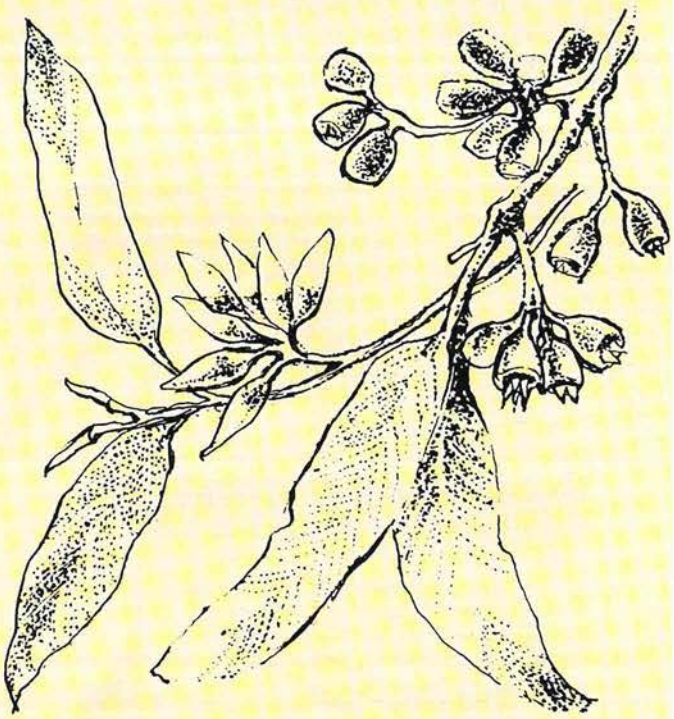
Softwood plantations using exotic (not native) species are found scattered from north of Perth down the coast and western region of the jarrah forest, to the Blackwood River, and through to Albany. Pines grow best in rich, good textured soils with high rainfall and have generally been planted in valleys of watercourses. *Pinus radiata* grows faster than *Pinus pinaster* in Western Australian conditions and both species grow faster than the native hardwoods. Timber of both species is cream to pale yellow-brown with darker coloured knots. Pine is easy to work with and is used as sawlogs for furniture, general building, decorative interior work, and as peeler logs, round woods and chiplogs.



WANDOO

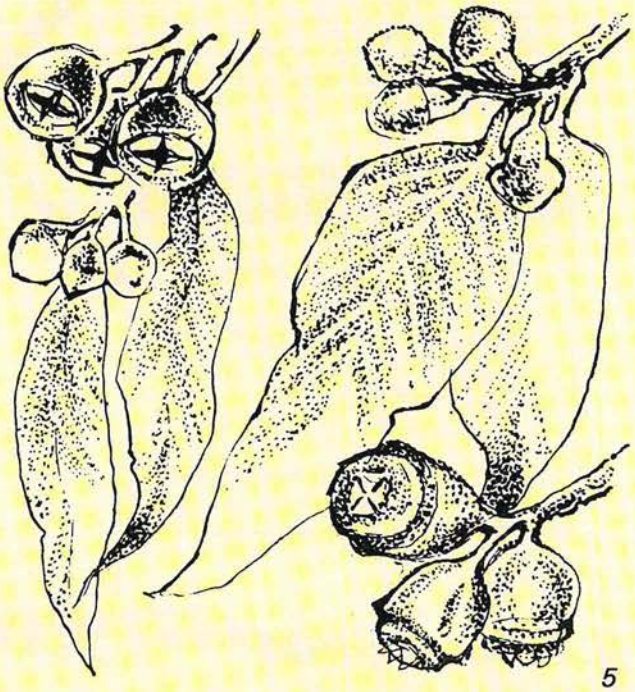
Eucalyptus wandoo

Wandoo is the other major timber tree of the South West, though due to extensive clearing for farming it is now restricted mainly to the eastern margin of State Forests. Wandoo grows in open woodlands rather than in dense forests as do the other species. It can reach a height of 30 metres giving a bole of 10-15 metres but it is generally shorter. Wandoo timber is light brown to light yellow/brown, very heavy and one of the most durable of Australian hardwoods. Wandoo is best used where strength and durability are important, including sleepers, poles, flooring and general building.



OTHER SPECIES

Other Western Australian hardwoods have been important timber species in the past but due to clearing for agriculture and the small areas over which they grow, these species now form only a minor part of the timber industry, or are not harvested. These species include blackbutt *(Eucalyptus patens),* tuart *(Eucalyptus gomphocephala)* and the yellow tingle *(Eucalyptus guilfoylei).*

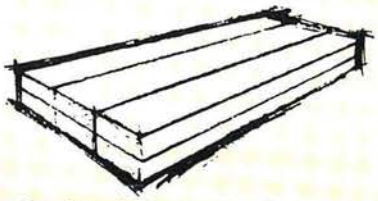


* ***Examine some local eucalypt trees and see if any of them appears to be a timber species. You may find it useful to have a book about West Australian trees to help you look at bark, flowers, buds and gumnuts.***

The tree — and its timber ...

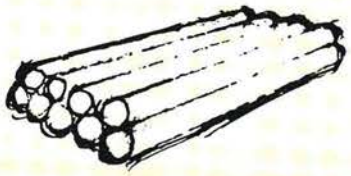
CROWN

SAWLOGS



Good quality logs to produce timber for building materials, furniture, sleepers and many other uses.

ROUND WOODS



Used for posts, poles, uprights, fences and many aesthetic projects.

BOLE

PEELER LOGS

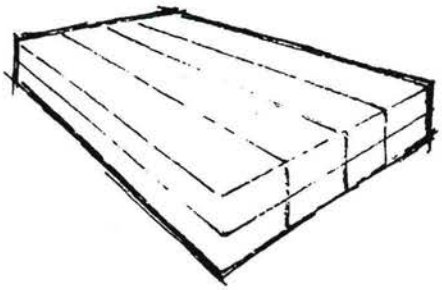
Good quality logs to make plywoods and decorative veneers.

CHIPLOGS

Branches, waste timber off-cuts and poor quality boles (trunks) are chipped for future use in a variety of products including fibre boards and paper products.

BUTT

SAWLOGS

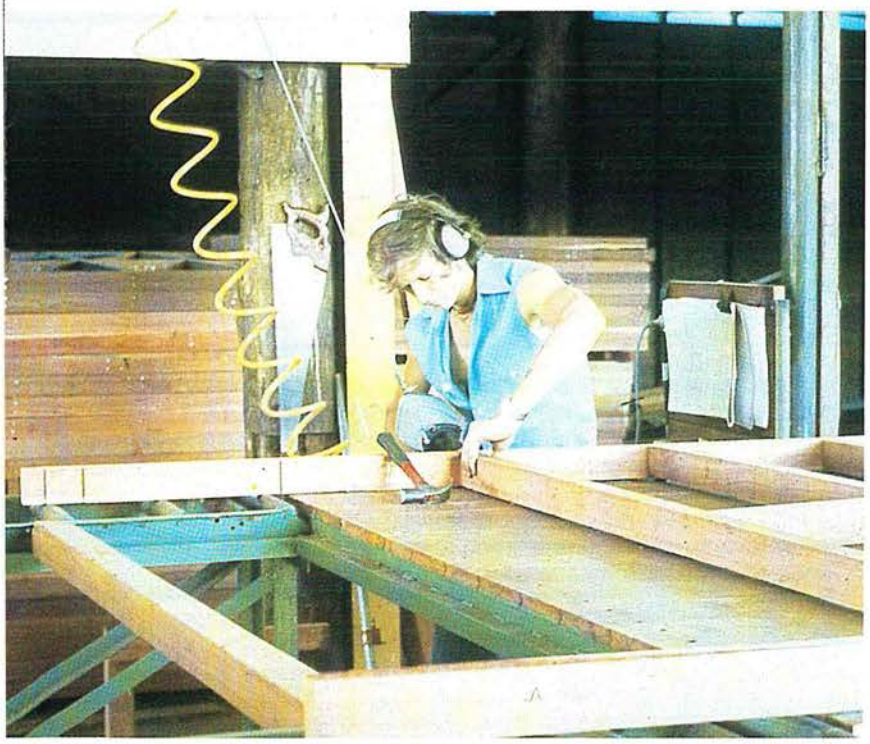


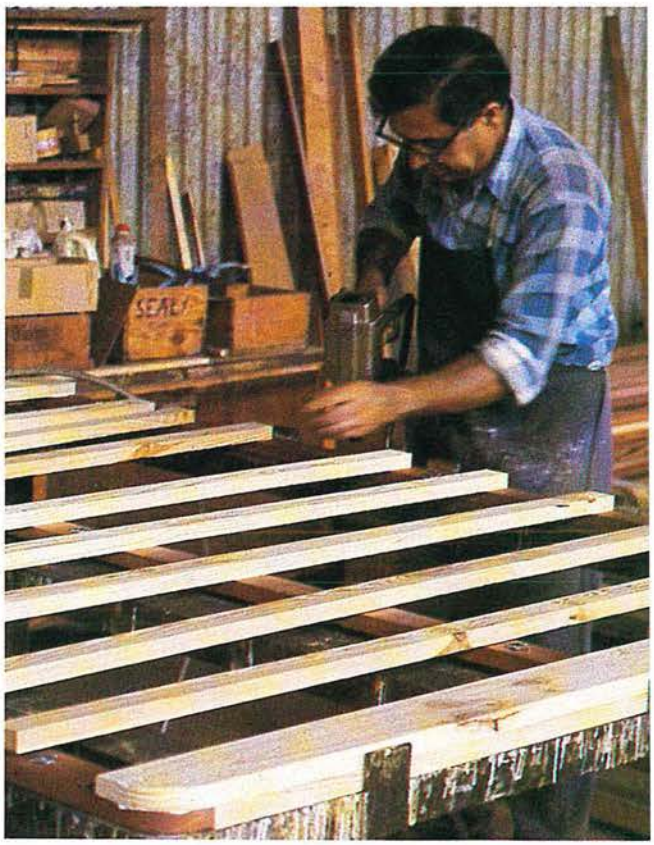
Sawlogs (together with peeler logs) are the highest quality timber logs. These logs must not be wasted on 'lesser' quality products such as round woods or chiplogs.

Only the long, straight bole (trunk) of the tree is used as sawlog. The other parts of the tree can be chipped for the production of paper or fibre boards or be burned on the forest floor to recycle nutrients for forest regrowth.

Long lengths of flat timber (flitches) are initially cut from the logs in a process called "breaking down". These flitches are further cut to the sizes required.

Sawn timber is used mainly for building and furniture.





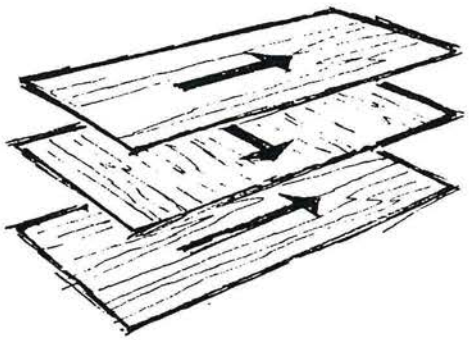
Sawn timber is graded for its various uses by specially-trained workers. Strong timbers, often the longest pieces, are used by builders for roofing and other housing requirements. Other workers in the timber trade, such as joiners and carpenters, use sawn timber for many items including wall frames (above), furniture and bed bases (right). The timber for these purposes may need other characteristics such as interesting grain patterns or rich colours rather than strength.

* ***Look around your house and school and identify some objects or parts of the buildings made of sawn timber. Look closely — don't be misled by non-solid timber or imitations.***

PEELER LOGS

Well shaped logs with good timber quality, and often interesting grain or texture patterns, are suited to use as peeler logs. The products, plywoods and veneers, are obtained after the logs have been debarked and trimmed. The log may be peeled or sliced to give thin layers of wood (veneers) which may then be dried, spread with glue and heat dried to give added strength. Veneers are usually applied to particle board or other panel boards to give decorative finishes to furniture.

• The best of the logs are peeled for veneers.



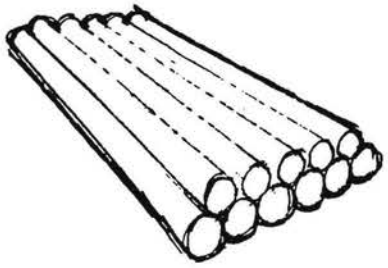
Plywoods have primarily structural uses. To produce plywood, veneer layers are glued and pressed together with the wood grains at right angles. This treatment gives high uniform strength in all directions, minimal shrinkage or swelling, minimal splitting when nailed near the edges and a high strength and stiffness-to-weight ratio. It allows curved shapes to be cut as the wood does not break along the grain. Plywood also has good insulation properties against heat and sound. Plywood is a very useful timber product.

Four main grades of plywoods are produced. Marine plywood, the highest grade, was developed for boats, landing docks, paddles and other aquatic implements but has also found favour for floors and weather-resistant road signs. Exterior and structural plywoods are used for concrete formwork, bracing walls in timber-framed houses, panelled doors and other building purposes. Decorative plywood is used for wall panellings, kitchen cupboards, table tops, wall linings and many types of furniture. Plywood is even used in making boomerangs for tourists!

* ***Examine apparently-solid timber objects or furniture at home and at school. List the "clues" which you can use to help decide if something is solid timber as it appears, or veneered, or made of plywood. Don't forget to look inside or underneath!***

• Workers "lay-up" the sheets of veneer to make plywood.

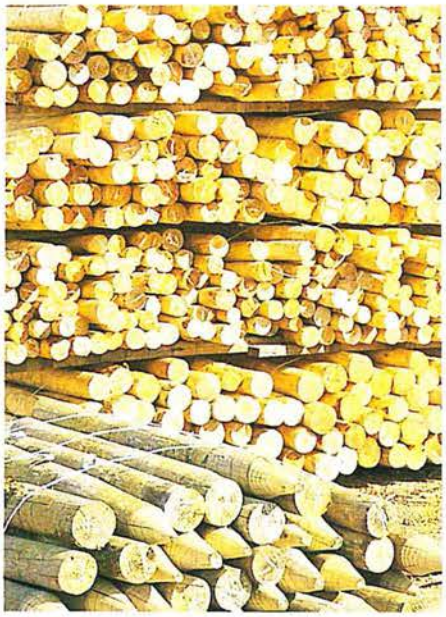
ROUND WOODS



Round woods are straight logs of any length or thickness that can come from thinnings or from the butt and crown of sawlog trees, or from trees of poorer timber quality.

Little processing is required for round woods, other than debarking, perhaps some shaping and then seasoning (drying). As these timbers are often used directly in contact with the ground, chemical treatment to prevent decay and termite attack may be applied. West Australian hardwoods are naturally more durable than softwoods, but still may be soaked with creosote or C.C.A. (copper chrome arsenate). Softwoods are most often treated with C.C.A. which gives the familiar green tinge to such round woods. Though treated wood is quite safe for direct contact, the timber should not be burned as it gives off toxic fumes.

Where a rustic or natural finish is required in outdoor projects, particularly for aesthetic or recreational purposes, round woods are gaining in appeal. More traditional uses for round woods include piling for wharves, jetties and bridges, fence posts and electricity poles.



* ***Design a playground area for young children or furniture for a picnic area, using round woods as the major structural item. A visit to a local park may give you some starting ideas.***

• Children's playgrounds make good use of round woods.

CHIPLOGS

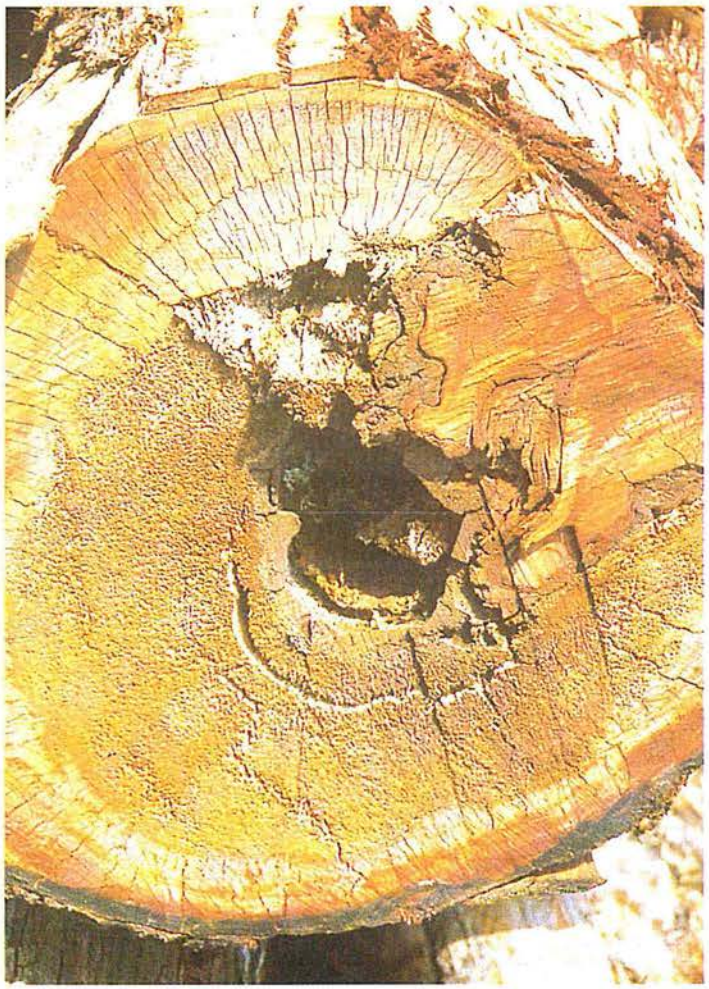
Many of the trees in the forest and pine plantations are not suitable for sawlogs, peeler logs or round woods because they are too small, crooked, knotty, or are suffering from some other defect such as termite (white ant) attack.

Chiplogs can be used to make two main types of wood product: fibre boards and paper.

The first step in the manufacture of these products is chipping — cutting the logs into small chips. Perhaps you've seen layers of woodchip mulch used as a surface covering in gardens? This is generally a mixture of bark and woodchips rejected as unsuitable for paper or fibre board production.

The next step in the processing of suitable woodchips is to break them down to a pulp. (This process is explained in the section 'Putting it to paper'.)

Fibre boards: Masonite and particle board are examples of fibre boards made by adding resins, hardeners or sizing agents to broken down wood and then hot pressing and drying. Masonite uses a uniform hardwood pulp, while particle board generally has layers of fine softwood chips surrounding an inner layer of coarser chips. High density fibre boards, such as masonite, are water resistant and suitable for doors, furniture, wall linings, ceilings and exterior claddings. Low density fibre boards, including particle board, are generally used for furniture, building fitments and partitions, with better quality boards also used in flooring, form-work and cladding. Particle boards are often covered with timber veneer or man-made finishes.



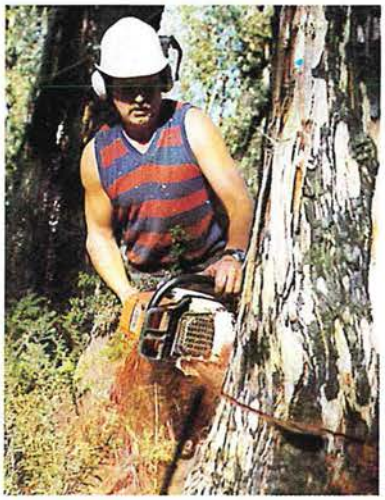
* ***Look at a piece of particle board or some masonite under a microscope. Can you see the individual wood fibres? Examine furniture at home and at school to see if it is made of solid wood or veneered chipboard.***

• *THE log pictured above cannot be cut for sawn timber. Its faults are obvious. It is this sort of log that goes to the chipmill. Once, before chipping, it was left in the bush to rot or burn. The tree on the right exaggerates the sort of faulty bole that would also be chipped. A small number of trees are unsuitable for any processing, such as those that have too much charcoal in their wood from bushfires.*

From the forest, to you ...

In the forest

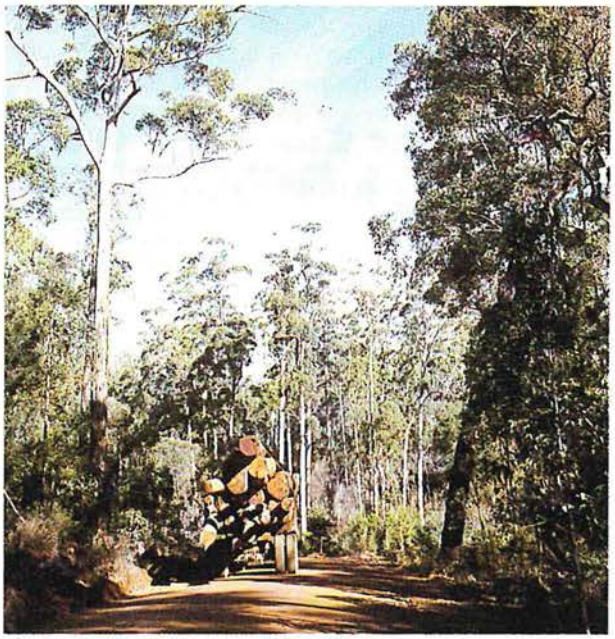
• *TREES are selected and marked for felling by trained forestry workers. The tree faller skilfully uses a chainsaw to cut into the butt of the tree, giving the longest log possible.*



• *THE branches are removed, leaving a long straight log.The snigger operator then "snigs" or drags the log to the roadside landing.*

• *AND here, good sawlogs like these are selected by experienced workers and stacked for the sawmill. Others, such as poor quality karri and marri are stockpiled for the chipmill.*

• *AND so to the mill.*



• *THE log truck driver receives a load of logs for the trip to the sawmill. Special log roads are built for access to these timber roadside landings. These roads may be made available for public use once timber harvesting and log haulage in an area has been completed and regrowth begun.*

At the sawmill

This is what happens to a sawlog as it is processed at a modern sawmill.

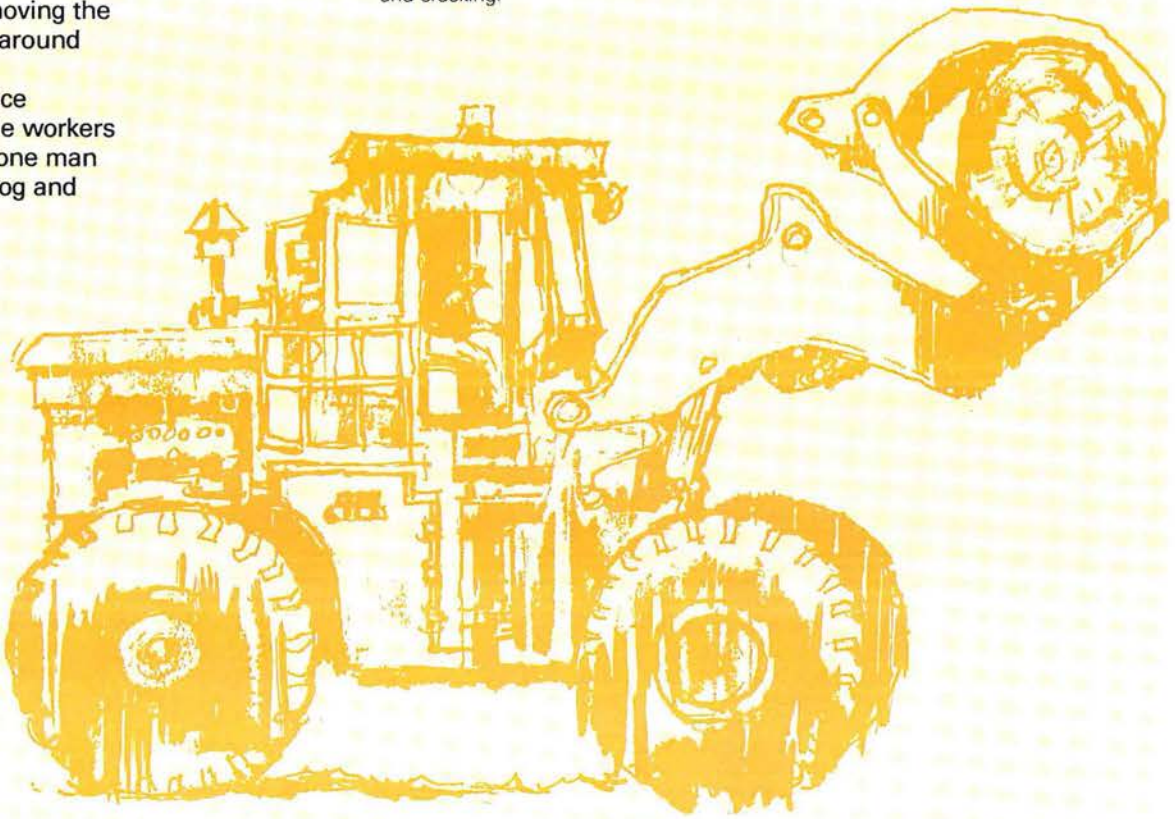
Timber workers have not always had the advantage of machines to do the hard work of timber cutting and of moving the heavy pieces of timber around the mill.

Sawn timber was once produced in sawpits, the workers using a long saw with one man standing on top of the log and the other in a pit under the log. Railway sleepers were "hewn" with a broad axe.

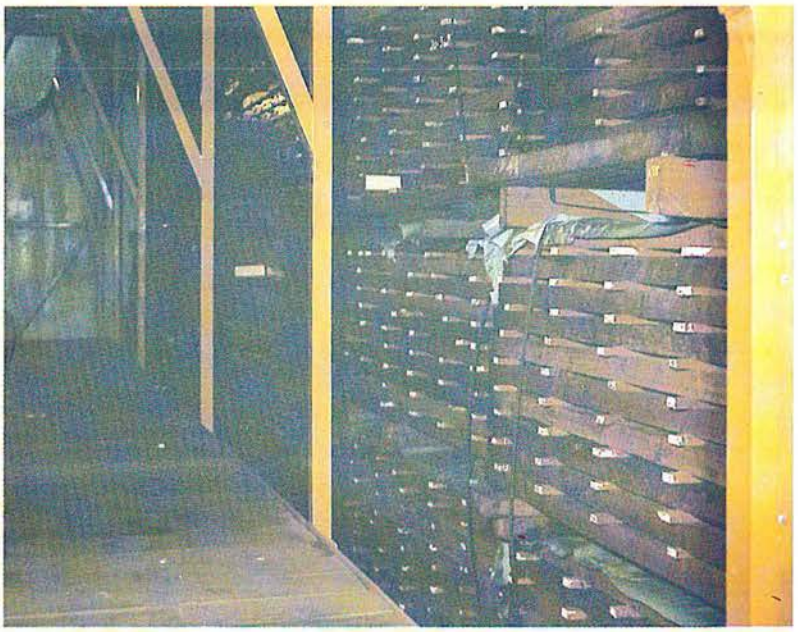
You can learn about the history and development of the WA sawmilling industry by visiting the Timber Museum and Timber Park at Manjimup.

* ***What is Swan River Mahogany and what part did it play in the development of Western Australia during the last century?***

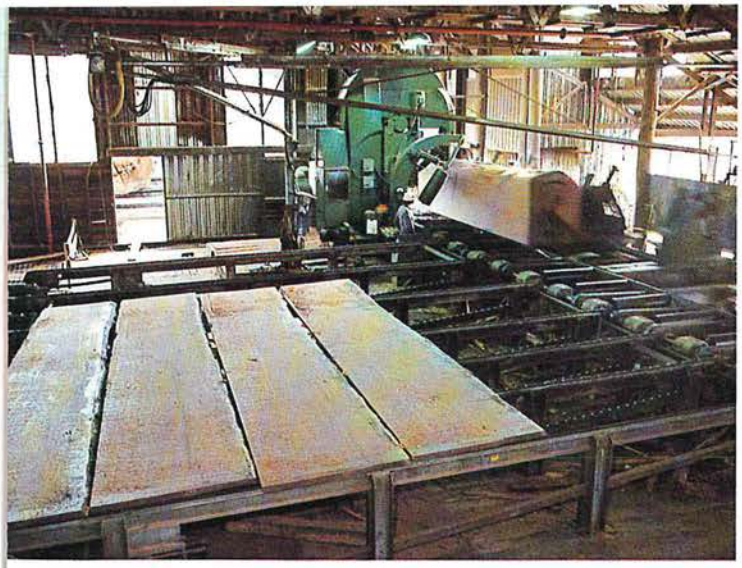
1. Yard workers use machines to stack the sawlogs at the mill log landing after haulage from the forest. As it may be many weeks before the sawlogs are processed at the mill, they are often wet by sprinklers to prevent the wood drying and cracking.



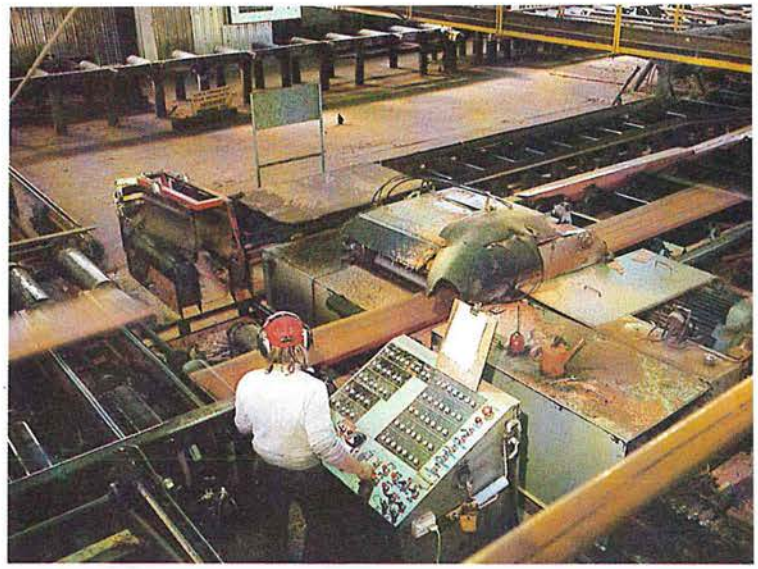
6. Selected good quality 'green' timber is often seasoned (dried) in the yard. It takes about a year to air dry a 25mm thick piece of timber.



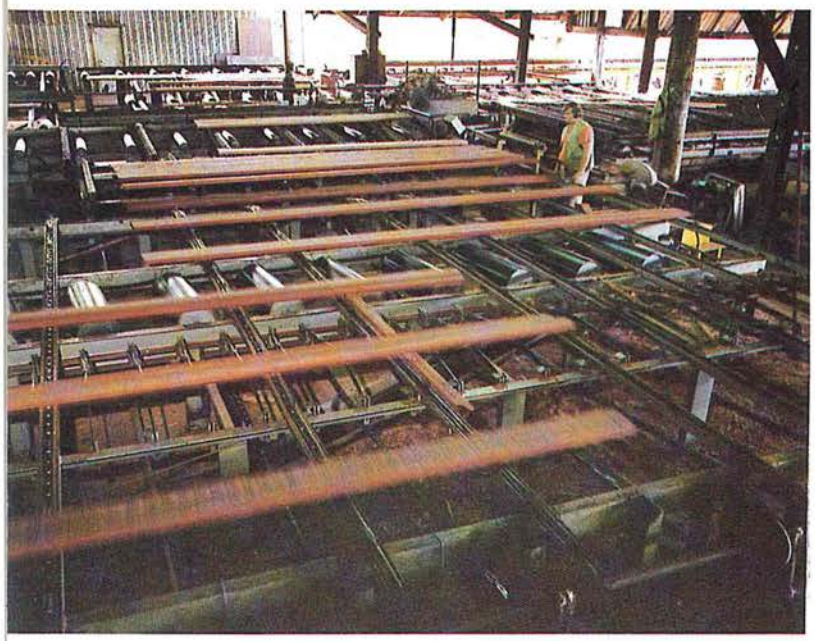
7. Quicker seasoning, over a few months, is done in the kilns where heated air is passed over the timber to draw the moisture out. The operator must control the rate of drying to avoid damaging the timber.



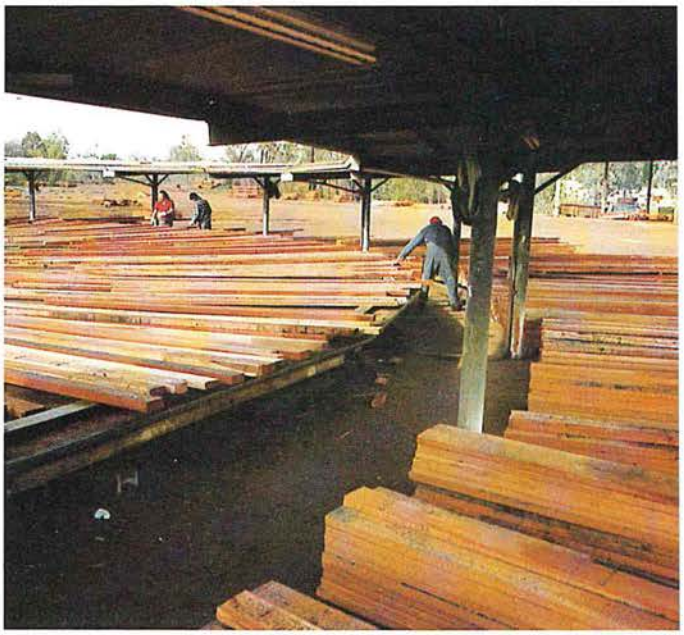
2. The "breaking down" saw operator cuts the log, which is held on a carriage, into large planks or "flitches" of timber.



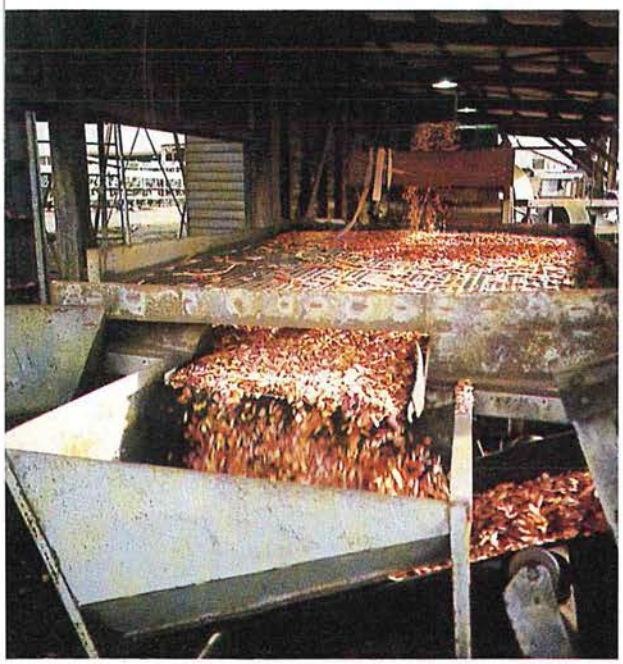
3. The secondary saw operator cuts the timber to the desired sizes. Other saw operators cut out defects in the timber which could make it unsuitable for use.



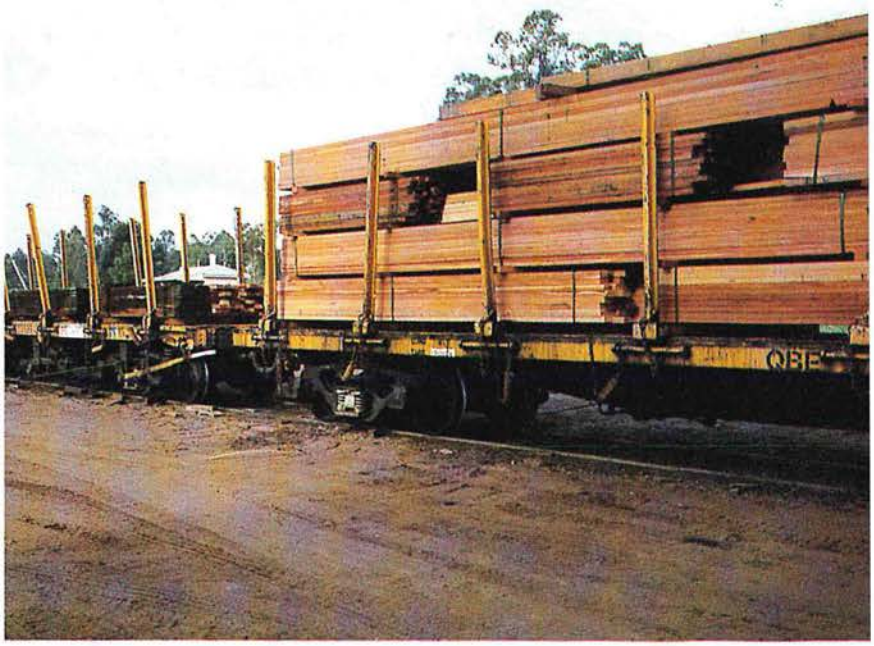
4. The timber in a modern sawmill is moved around the mill on mechanised conveyors. The mill operators decide whether each piece should go to another saw for further cutting or to the sorting tables.



5. Trained graders are working at this "round table" sorting the timber according to quality and size. The round table turns slowly and is constantly receiving more timber as it is cut.



8. Karri offcuts and residue are automatically diverted to the chipper where they are cut into woodchips. Before the establishment of a chipping industry in Western Australia this waste wood was burned.

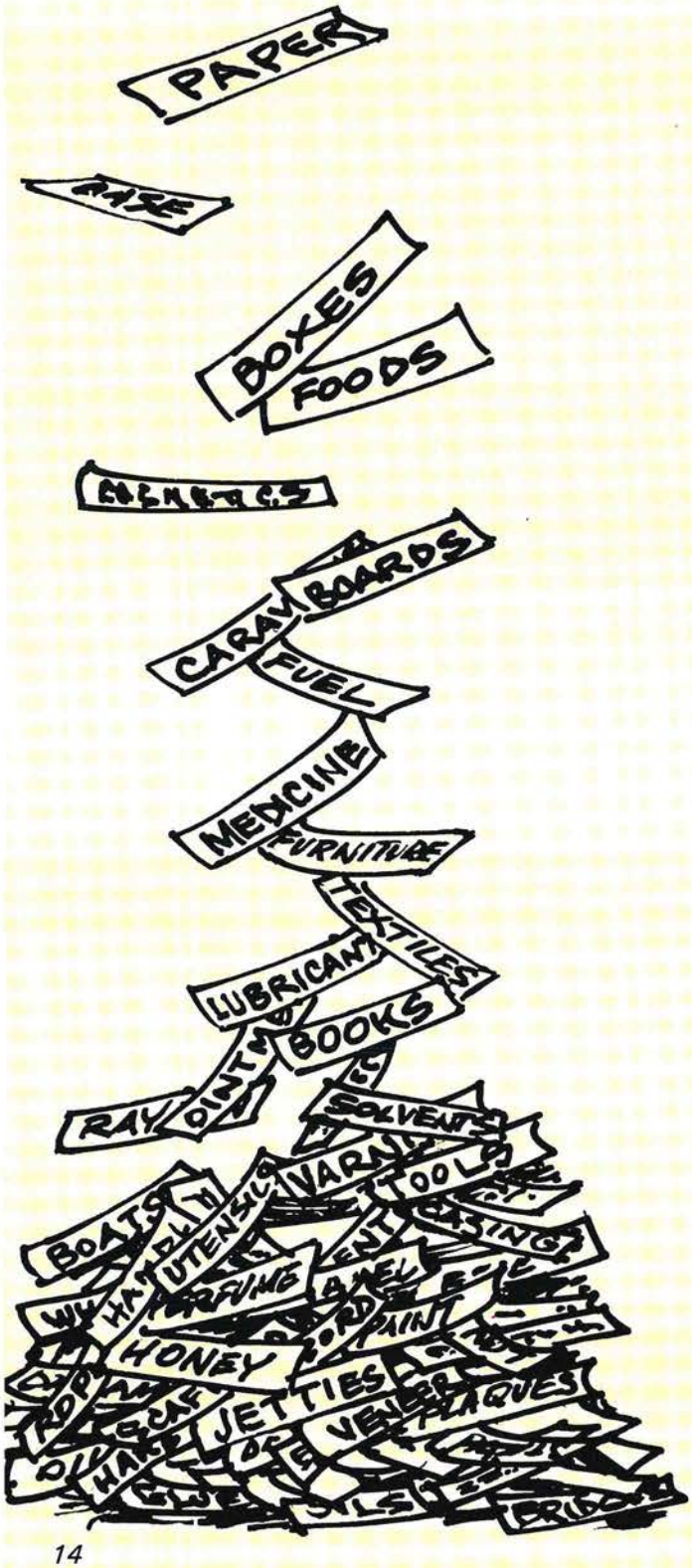


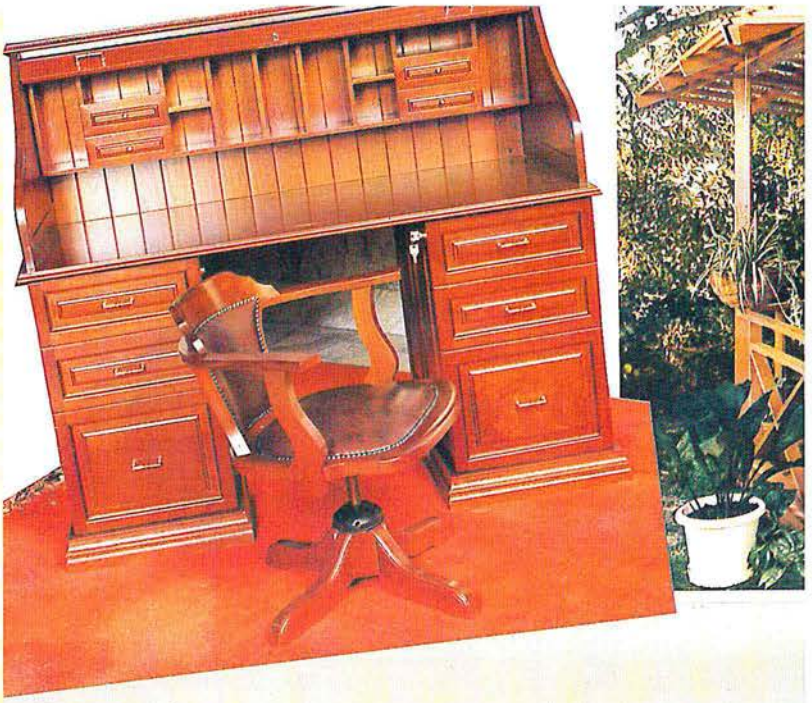
9. Meanwhile the timber from the sorting bench has been strapped into bundles and loaded aboard rail wagons or road trucks to be taken to the customer.

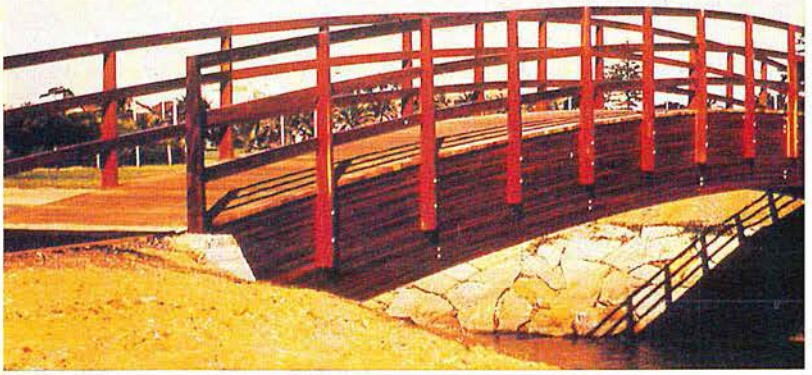
* ***How does seasoned timber differ from green timber?***

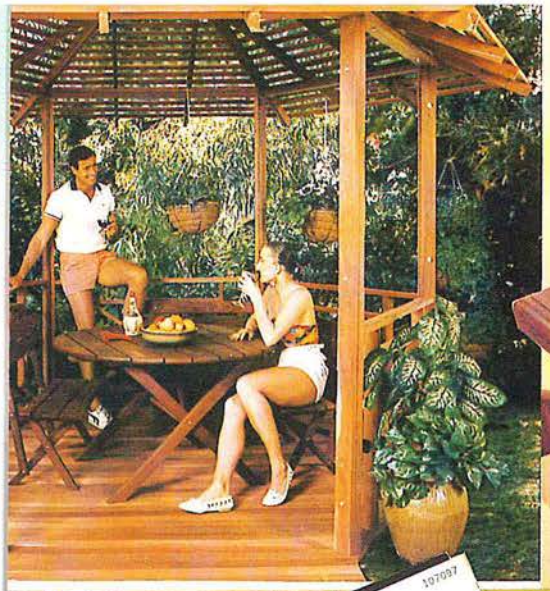
And so, to you!

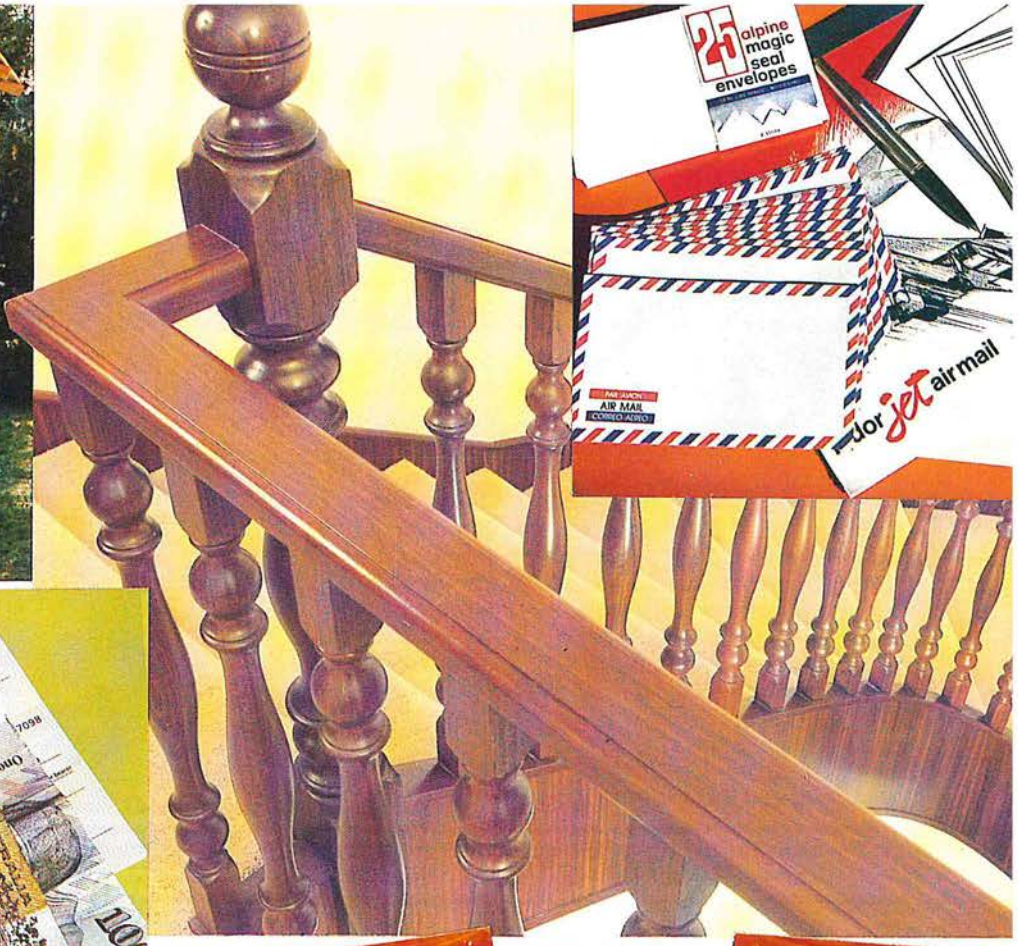
Not all these products come from each type of tree and not all of them come from Western Australia. Can you add to the examples given here? You might be surprised at the number of tree-based products we use!





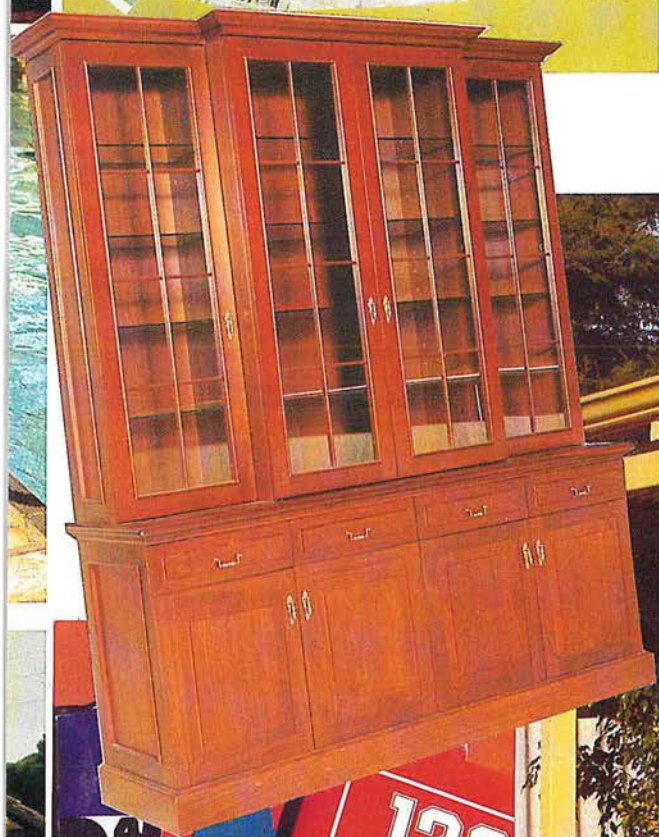


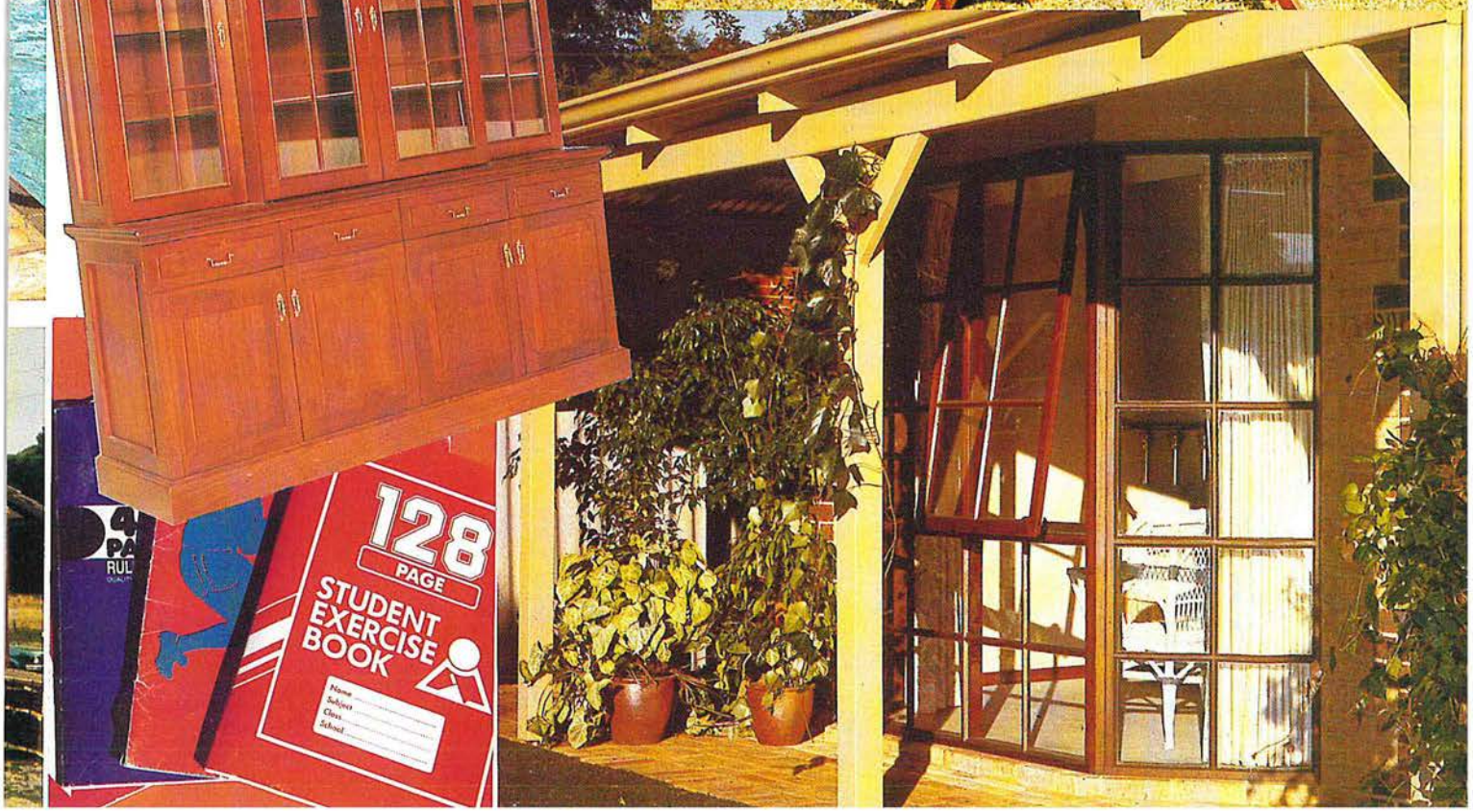




25
alpine
magic
seal
envelopes
AIR MAIL
CORREO AEREO
for jet air mail


Westpac Banking Corporation
TWO DOLLARS
AUSTRALIA




128
PAGE
STUDENT
EXERCISE
BOOK
Name
Subject
Class
School

Putting it to paper!

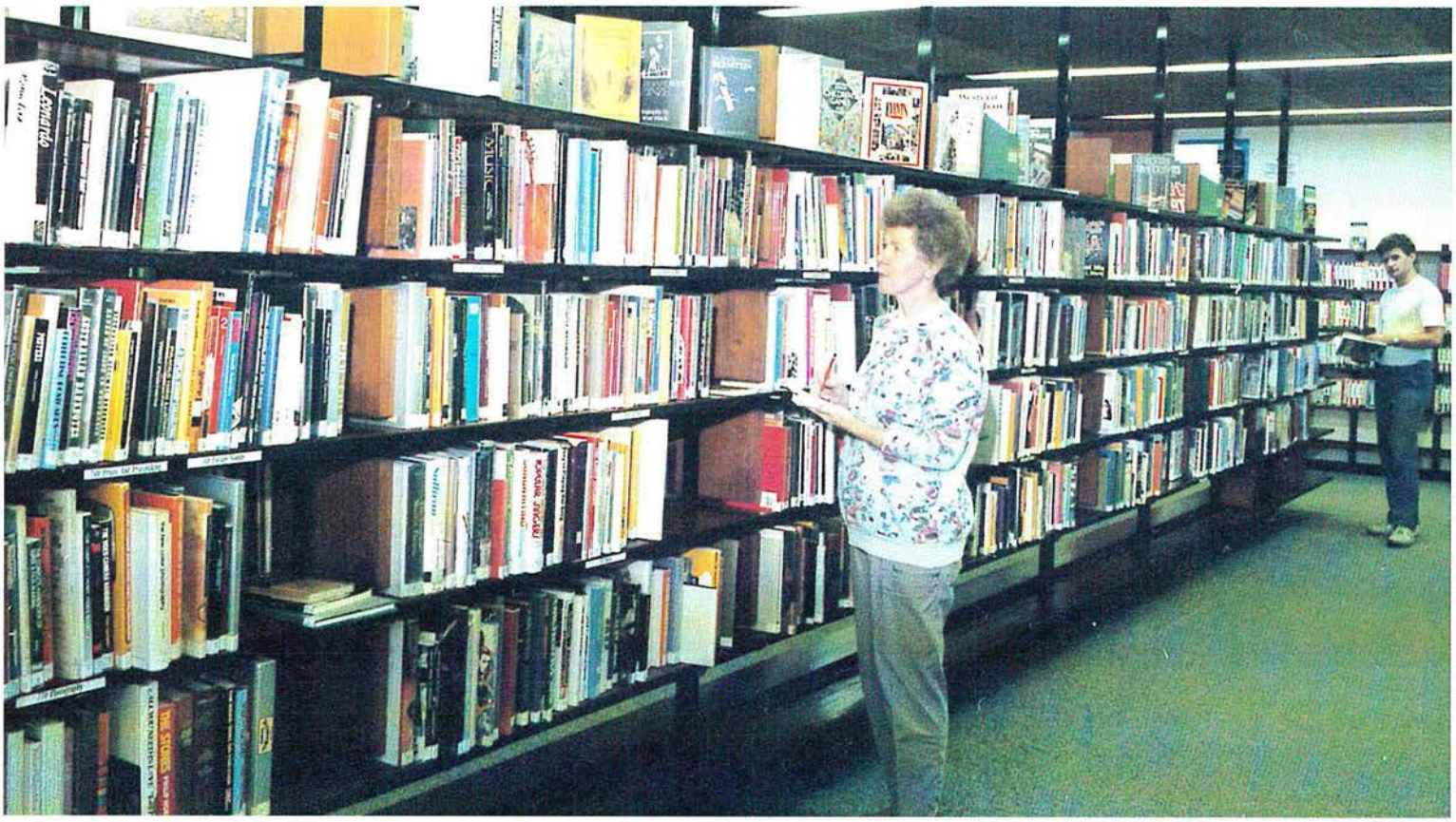
If you look closely at a piece of wood you will see that it is made up of many strands or fibres. These visible fibres can be broken down into smaller fibres by two pulping processes. Both processes use woodchips as the raw material. One is a mechanical method where the woodchips are ground into the smaller fibres; the other is a chemical process where the wood is cooked in special digesters to dissolve the substances holding the fibres together. Using the two processes separately or in combination gives differing quality 'pulp' for varied uses. In general, chemical pulping produces finer fibres than mechanical pulping.

Layers of the pulp are then pressed and dried. Different end-products can be produced by varying the type and mixture of wood fibres, the quality and size of fibres, the thickness of the pulp layers and the additives used. Softwoods generally give coarse, long fibres which have good strength. (Tear a piece from a cardboard box and look for the softwood fibres.) Hardwood fibres are shorter with reduced strength but give smoother finished layers of paper. Most West Australian hardwood pulp is destined for writing and printing paper. (Try to see the fine fibres that make up this page.)

The main Western Australian hardwood species used for pulping is marri as only 2 to 3 per cent of harvested marri is suitable for sawlogs. Low quality karri logs and waste karri from sawmills are also chipped and pulped. Jarrah is not chipped because its wood is unsuitable for pulping.

• Perhaps of all things produced by man none has as many different uses as paper. There are many grades of paper depending upon the quality and size of the wood fibres (see left).

* ***The uses we find for paper and paper products are many. How many such uses can you list?***



...and there is more

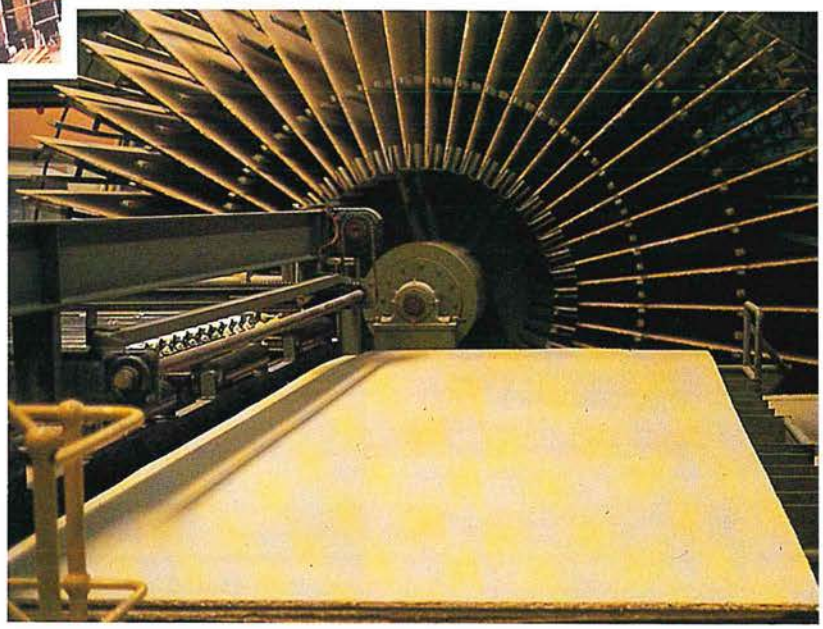
• These huge beams (above) show what can be done with glue-laminated timbers. They are also used widely as "exposed beams" inside buildings. The picture at right shows part of the manufacturing process of particle board.

Extractives: Natural compounds taken directly from timber or bark by dissolving in solvents or by steam distillation are called extractives.

Tannin, from bark, is used in adhesives for plywood and for glue-laminated timbers. Glue-laminated timbers are made of pieces of sawn timber glued together to produce greater width or length timbers of increased strength and beauty, which are also waterproof and heatproof.

Other extractives include terpenes to produce wood turpentine and eucalyptus oil distilled from the leaves of eucalyptus trees.

* ***Rayon is a clothing material and is a product of wood. Find out how a rayon dress comes from a tree!***



Derivatives: Natural wood chemicals are changed chemically to produce derivatives. For example, cellulose and lignin (from cell walls) are used to make a wide variety of products. Some of those from cellulose include cellophane, sausage casings, shatterproof glass, moulded plastics and explosives whilst lignin products include fertiliser, plastics, tanning materials and vanillin, for medicines and food preservatives.

Where are you taking *those* trees?

FORESTS FOR TOMORROW

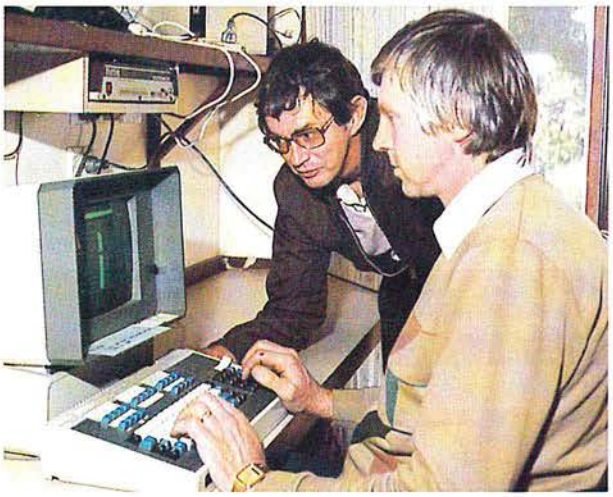
Unlike many other natural products we need and use, timber is a renewable resource. This means that as long as we carefully manage the forests and plantations we will always have timber available for use. In Western Australia not all forests are available for timber production. Many areas are reserved for conservation or recreation, so it is very important that timber production areas are well managed.

The overall aim of production forest management is to adjust log removals to a level that can be balanced by forest regrowth. Not only does the initial selection and log removal need to be carefully controlled but satisfactory methods of regeneration for each timber species need to be employed.

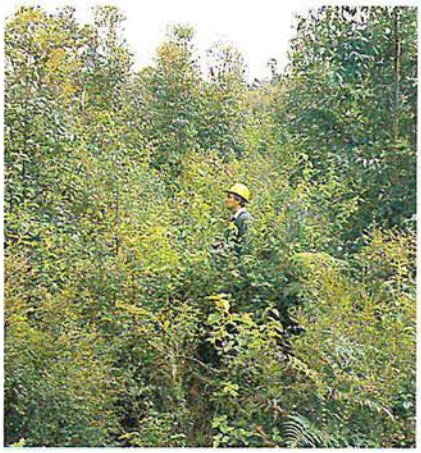
Different species show best regeneration response to different methods of harvesting.

In a jarrah dominated forest, individual jarrah and marri trees are 'selectively felled'. Regeneration of these species can then occur as the canopy is opened up and space has been made to allow new trees to grow. This regeneration may be from seedlings already present in the understorey or from the rootstock of felled trees.

A different method of harvesting is used within the karri forest to ensure the best regrowth of both the karri and associated marri trees. The area designated for timber is clearfelled except for a number of good quality timber trees left as 'seed trees'. These well spaced trees provide the seed for regeneration. After the timber logs are removed, unusable branches and logs are burnt on the ground. The fire stimulates seed fall and the nutrient rich ash bed provides ideal conditions for young seedlings to grow. Additional hand seeding and planting of nursery-grown karri seedlings may be done if seeding density is too low. These harvesting and regeneration techniques produce good regrowth karri forest, as these pictures show.



1. Forest management begins with careful planning at the desk and computer. After harvesting the new forest will be grown.



2. This series of pictures shows the regrowth of the karri-marri forest after clearfelling techniques have been used. Above, the regrowth is two years old.

3. Growth rates are fast in the newly regenerated karri/marri forest. Only four years old, already some of these dominant trees are more than seven metres tall.

4. With the good return of native flora since harvest this nine-year-old karri regrowth at Pine Creek is an example of successful regeneration.

Growing to maturity

5. At 15 years the young trees push skywards, competing vigorously for the sunlight.

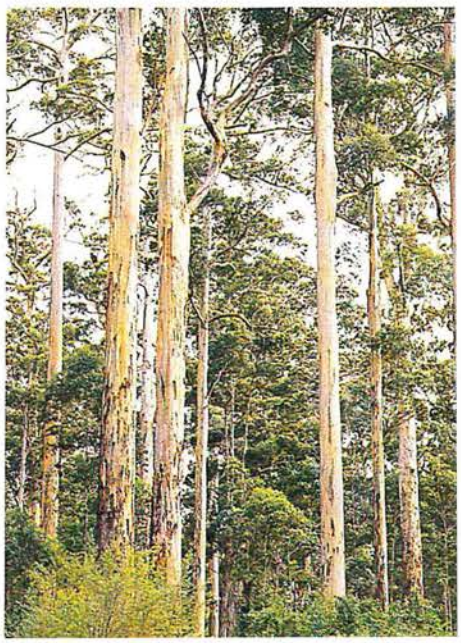
In all new forests, the young regrowth must be protected from wildfire. Whenever an area is regrown with karri and marri, as shown on these pages, a buffer zone up to 5 km wide is kept around it. Within this zone, the dry fuel of leaf litter, branches and fallen trees is kept to a minimum by burning different areas in rotation. This means that even the fiercest wildfire can be kept under control within the buffer zone because there is not enough dry fuel to let the fire spread rapidly.

Other management processes, such as thinning will also be carried out. The spacing of trees in regrowth karri forests is too close to allow all the trees to grow rapidly to maturity. With thinning, smaller trees are removed and therefore do not compete with the larger trees for light, water, soil nutrients and space. The remaining trees can grow more vigorously and produce better quality timber.

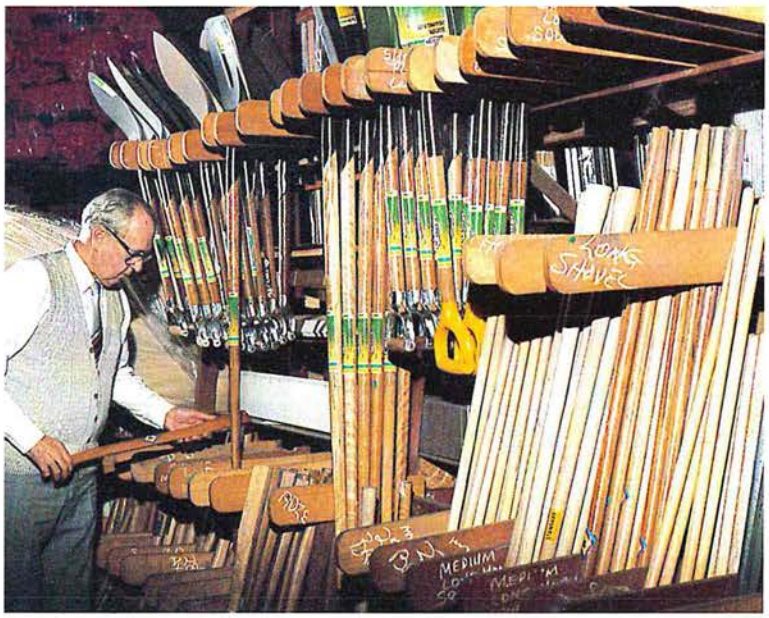
6. This 50-year-old forest is being 'thinned' so that the growth of the better quality trees remaining will be improved by reduced competition.

7. After thinning, reduced competition encourages more vigorous regrowth. This 60-year-old stand is alongside the new (1986) Big Brook dam near Pemberton.

8. Examples of regrowth karri forest around one hundred years old can be seen near Manjimup and at Boranup near Margaret River.



Where did you get *that* from?



• Do you realise how many people in different walks of life deal in products of the tree? The hardware man above, for instance has a very wide range of products to sell that are made of, or are partly of, wood. They include many things for use in the home.

• The postie handles paper products all day — not only the letters, but the stamps, money orders, postal notes and various other forms that are used in our post offices — even the notes in the post office till!

• Then there is the timber merchant and his assistant (left), the wood processor (centre) preparing the wood for others, like the joiner, cabinet and furniture makers and the newsagent (at right), whose printed wares number into the thousands.

* ***Do a survey in your class and find out who has immediate family or relatives working in a timber-based industry. Think carefully! Separate into occupations which are directly timber-based and those which just depend on timber-related products.***

* ***CHALLENGE!!! Can you think of any occupations which do not involve, in some way, the use of wood-based products?***

WORDS, WORDS, WORDS

Hardwoods:	*trees which reproduce by seeds from flowers and generally have broad, flat leaves. (Angiosperms)*
Softwoods:	*trees which reproduce by seeds from cones and generally have needle like leaves. (Gymnosperms)*
Sawlogs:	*best quality timber logs used for sawn timber.*
Peeler logs:	*best quality timber logs used for veneers and plywoods.*
Round woods:	*lesser quality or smaller logs used for poles, posts etc.*
Chiplogs:	*poor quality logs unsuitable for use as sawlogs, peeler logs or round woods.*
Thinning:	*the removal of small or poor quality trees from a forest or plantation to reduce competition for light, water, nutrients and space with better quality trees.*
Bole:	*main trunk of a tree up to the first major branches.*
Native:	*plant species which occur naturally in Western Australia.*
Exotic:	*plant species growing in Western Australia which were introduced from outside Western Australia.*
State Forest:	*forest owned by the State of Western Australia and managed by State Government authorities.*
Flitches:	*planks of timber cut from sawlogs.*
Chipping:	*the cutting of poor quality logs and waste timber and branches into small pieces.*
Pulping:	*the mechanical or chemical breaking down of woodchips into wood fibres.*
Green timber:	*recently cut timber retaining a high moisture content.*
Seasoned timber:	*timber which has been dried naturally or in kilns.*
Regeneration:	*regrowing of individual trees and whole forests after harvesting for timber or natural events such as bushfires.*
Selective felling:	*the selection of individual trees or groups of trees within a forest for harvesting.*
Clearfelling:	*the total harvesting of wood from a forest by felling all trees except for selected seed trees. Clearfelling is done in 'coupes', areas of forest that can vary in area from 50 or 60 hectares up to 200 hectares.*
Defects:	*of timber: features of wood which reduce the quality of timber. For example knots reduce strength, insect attack affects appearance.*
Snigger:	*tractor equipped to lift one end of a log and 'snig', or drag it, to the roadside landing.*
Jinker:	*a log-hauling road truck with a trailer that can be extended according to the length of its load.*

FOREST INDUSTRIES

Growth and regrowth for Australia.


Now, where are you taking those trees?
Forest Products Association
Perth W.A. 1988