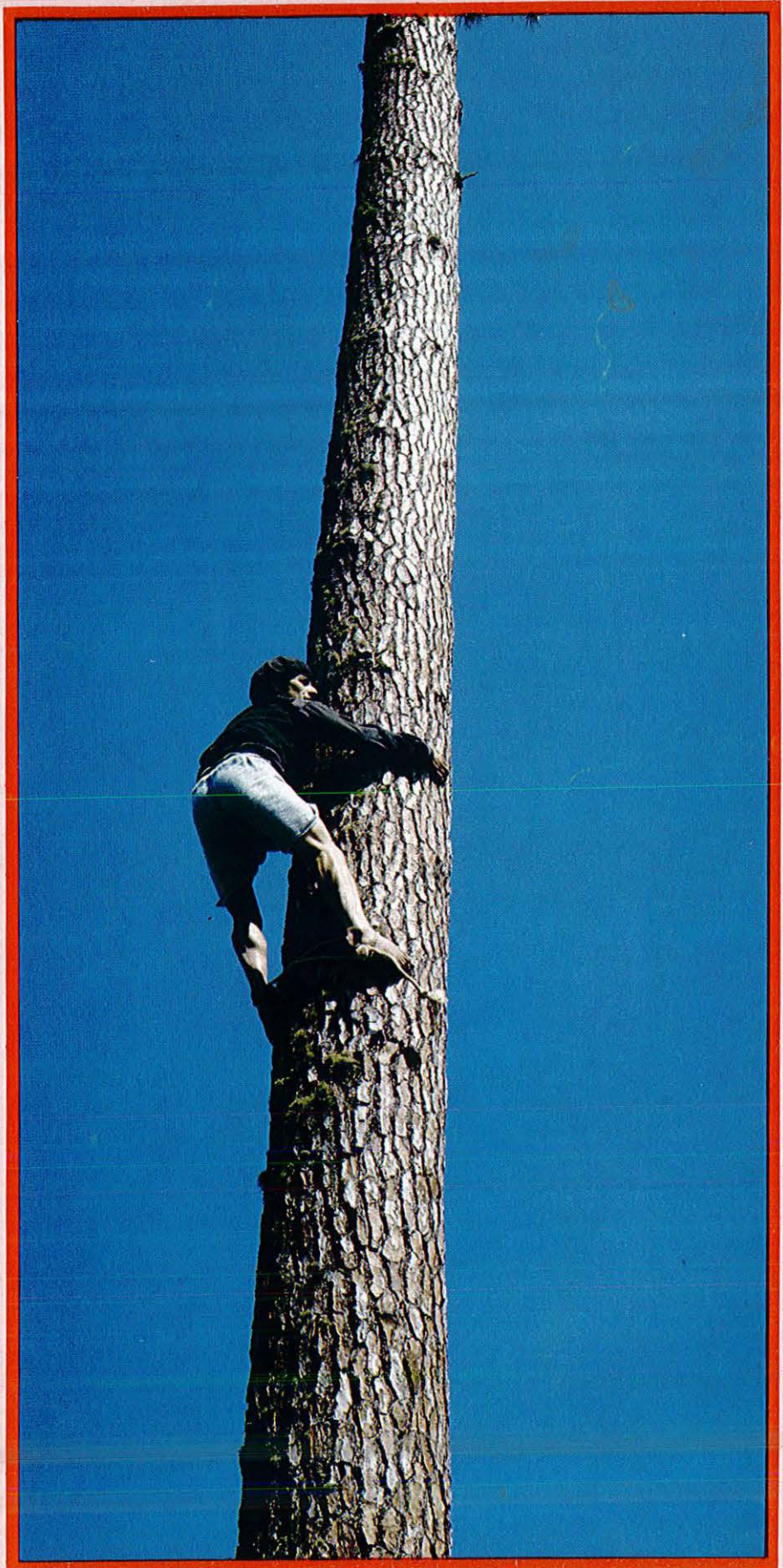


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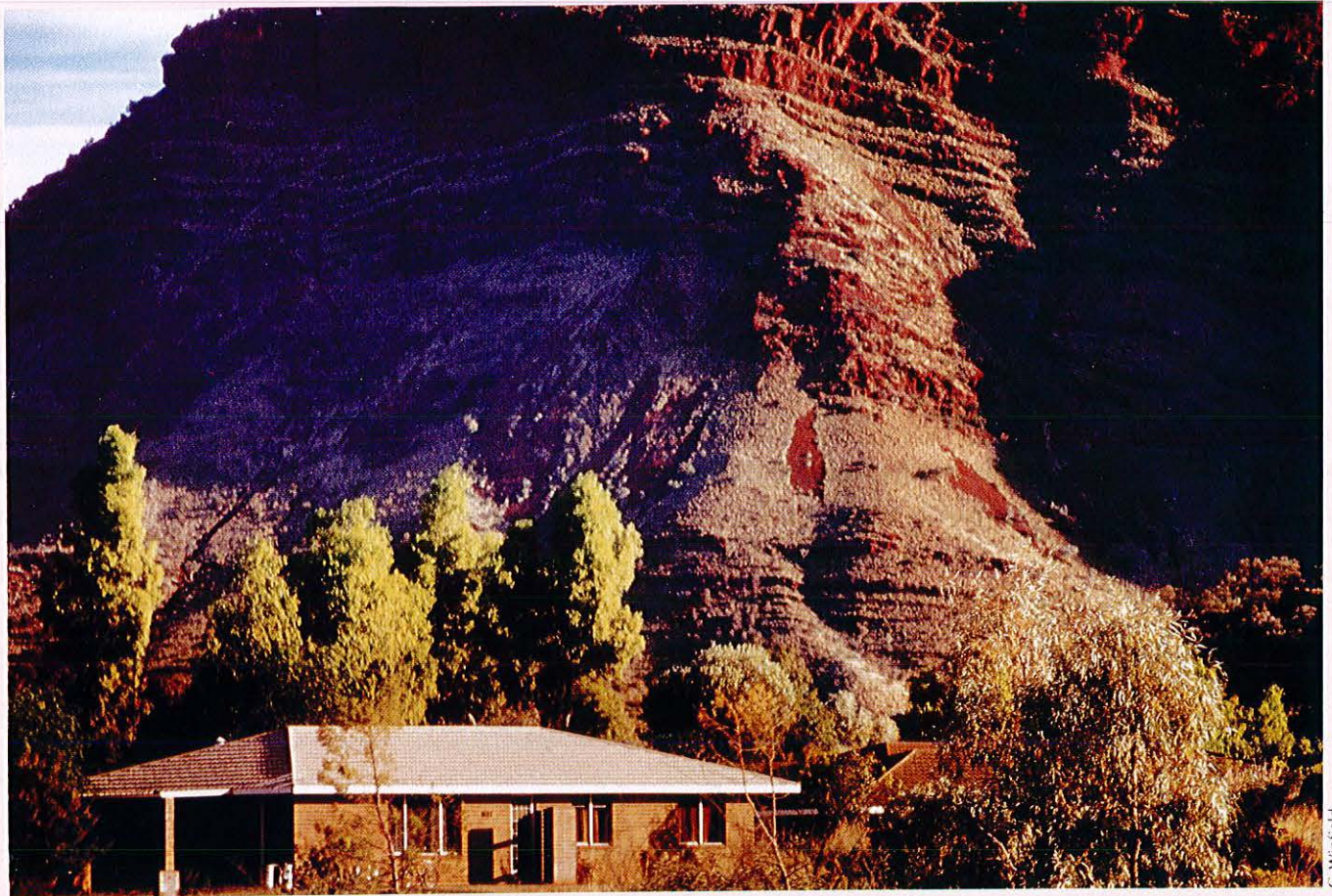
# FOREST FOCUS



NO 28 MARCH 83

**Front Cover**

The towering *Pinus pinaster* trees of Portugal which are now growing in Western Australia were traditionally climbed with a single rope looped around the feet of the climber. In this way, seeds and scions were collected for transporting to Australia. See "Pioneers: A Profile", page 11.  
Photo: D.H. Perry.



C. Winfield

The Pilbara environment - dramatic beauty.

#### Award for Conservator

The Conservator of Forests in Western Australia, Mr Bruce James Beggs, was awarded the Imperial Service Order in the Queen's New Year Honours list.

The citation said in part that Mr Beggs has had a distinguished career in the public service of the State. His personal contribution over some thirty years to the development of forestry has been of inestimable value.

Conservator of Forests since 1972, Mr Beggs has been most successful in bringing forestry into the "environmental age" through active promotion of the principles of multi-use management of the State's forestry areas.

As Conservator, he has had an active involvement in timber utilization and the promotion of a policy of integrated timber harvesting, stimulation of research into the broad aspects of land management and co-ordination of research efforts.

At both the State and National levels Mr Beggs has played a prominent role with a variety of forestry and conservation related organizations, and is held in the highest regard by all within this field.

Ian Laurance, M.L.A.  
Minister for Forests

Forest Focus No. 28, March, 1983

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

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# PILBARA GARDENS FOR FUNCTIONAL BEAUTY

by Wally Edgecombe

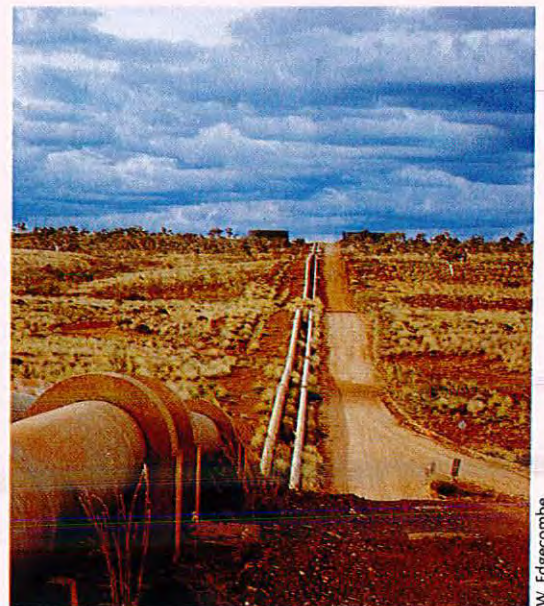
The Pilbara - vast, hot, harsh, subject to sudden torrential cyclonic rains and to extended periods of drought. To the European visitor it is a desert, yet in this environment, a variety of vegetation flourishes, perfectly adapted to the arid conditions. Here and there the land is dissected by rivers that flood overnight, creating deep gorges - the oases of the Pilbara. Or there may be billabongs and waterholes that are refuges for animals and birds, providing water for them and for the people who inhabit the area. In these oases may be found pockets of lush palms, paperbarks and other plants unique to the area and of great botanical interest. There are also the rugged ranges, such as the Hamersleys, and like Mt Whaleback, Mt Tom Price and others, they contain the world's richest deposits of iron ore.

Modern settlement of the Pilbara since the iron ore "boom" of the 1960s brought with it a new group of settlers. They arrived from overseas countries and all States of Australia bringing with them landscaping and gardening

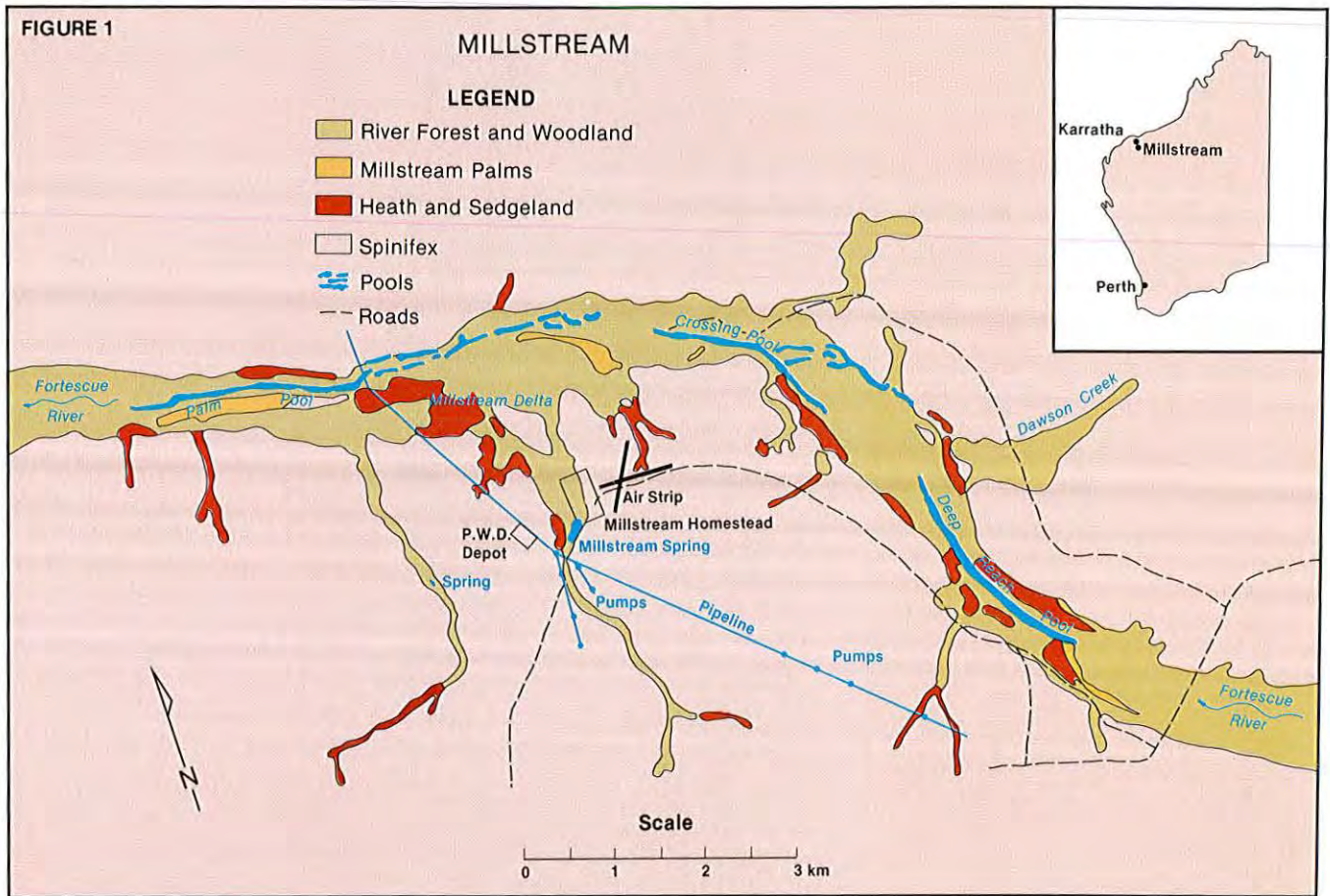
attitudes more akin to temperate high rainfall areas. Company towns have been established inland to tap the ore deposits, and along the coast, new towns of the West Pilbara, including Karratha, have developed along with the iron ore industry and in advance of the development of Woodside Petroleum's natural gas deposits offshore. Karratha is one of the fastest growing towns in the State. But the Pilbara is arid. Rainfall is unreliable, and although water is available for industries and domestic use, it is an expensive resource to develop. The major companies, such as Hamersley Iron Pty. Ltd., and Cliffs Robe River Iron Associates provide water at no charge to their workers, to attract families to the area and provide a pleasant working and living

Rainfall in the Pilbara is unreliable, being brought sporadically by tropical cyclones during the late summer. Here the clouds of cyclone 'Ian' build up near Karratha in March 1982. Note the pipeline connecting Karratha with the Millstream aquifer.

environment. A considerable volume of water, particularly at Cape Lambert and Dampier is used by industry. But in Karratha and other towns the majority of scheme water is used by domestic consumers. Green, lush gardens and lawns make Karratha's homes and streets attractive, but this luxury has its price in dollars and the cost to the environment.



W. Edgecombe



The answer to the problem of water supply is constant vigilance to reduce unnecessary water use. Of special interest are landscaped areas in towns, and especially domestic supplies which account for over half of the water used in the Pilbara. Studies by the Forests Department and others demonstrate clearly that domestic consumption can be reduced to less than 700 kL/annum for an average domestic house and garden in the Pilbara. This is half the current estimated annual usage per household.

The Forests Department is promoting a programme of reduced garden water use which is based on:

- \* budgeting water use to an amount that the plants can utilize effectively (preventing over watering),

- \* redesigning gardens using appropriate arid area plants and eliminating water demanding species,
- \* promoting water conservation technology such as the use of mulch, the use of tap timers and trickle reticulation.

### Millstream Water

The Millstream area, which supplies water to the towns of Dampier, Karratha, Wickham and Point Samson, has unique qualities. It has a fascinating collection of vegetation including the unique Millstream palm (*Livistona alfredii*) and the date palm, presumably introduced by Afghan camel trains traversing the State. The vegetation and the major pools are fed by springs from the deep aquifer which lies alongside the Fortescue

River. This area includes the Crystal Pool and the delta area with its rare wetlands.

Most of the area around the Millstream pools is destined to become National Park. Prior to 1976 some of the area was a timber reserve based on the large cajuput tree (*Melaleuca leucadendron*). Millstream has become a focal point for tourism because of its outstanding natural beauty.

Water from Millstream is piped 120 km to the coastal towns of the West Pilbara. This large draw on water resources has led to concern that there could be an adverse effect on the vegetation at Millstream. Consequently the Public Works Department has constructed a special bore to supplement spring flows into Crystal Pool to ensure the existing ecosystems are maintained.

Because the Millstream system is now at the limit of its safe water yield, another source of water has become necessary and a new dam on the Harding River has been chosen as the solution. This dam and its associated facilities will cost 40 million dollars.

## Low-water Gardens

In 1980 the Forests Department appointed an officer to Karratha to investigate and advise on tree establishment and maintenance in the Pilbara region. As part of this programme the feasibility and costs of establishing low-water consuming gardens is being investigated in an attempt to provide householders with a viable attractive alternative to the lush high-water consuming gardens currently planted. The first low-water garden was planted in October 1980 and has been monitored since with some very encouraging results. In the ensuing two year period, a number of demonstration gardens exhibiting a range of designs and native plants has been created.

The Forests Department has assumed control of the Government Nurseries at Karratha and Broome. Plants are being raised at Karratha for this programme. Arid area and Pilbara plants are being screened for suitability and most are flowering and growing better in gardens than in their natural habitat. Trees and plants are being dispatched for trial in all Pilbara towns.

Of paramount importance are the concepts of strict water budgeting to avoid waste, the reduction of thirsty lawn areas and the selection of appropriate plants for landscaping.

## Water Conservation

Water conservation begins with appropriate designs for towns, streets, drainage, homes and recreation areas. The extreme heat

Trickle irrigation system in use at 49 Padbury Way Karratha. Wastage of water by run-off and excess watering is reduced by this method.



▲ Lawns and tropical trees and shrubs are high-water consuming and are unsuited to the arid climate of the Pilbara.



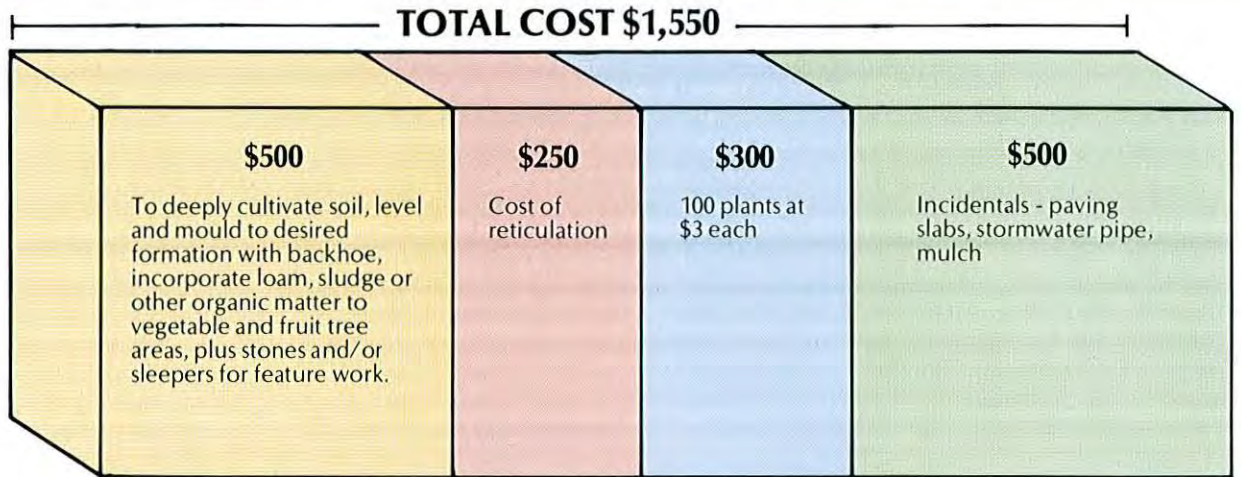
▲ Arid area plants were used to establish this low-water consuming garden at 8 Cowan Way, Karratha.



FIGURE 2

### COST OF ESTABLISHING A LOW-WATER GARDEN

Based on experience in Karratha, the following could be a guide to costs once a plan is prepared. Costs are estimated at 1982 prices if the tenant is prepared to assist with landscaping.

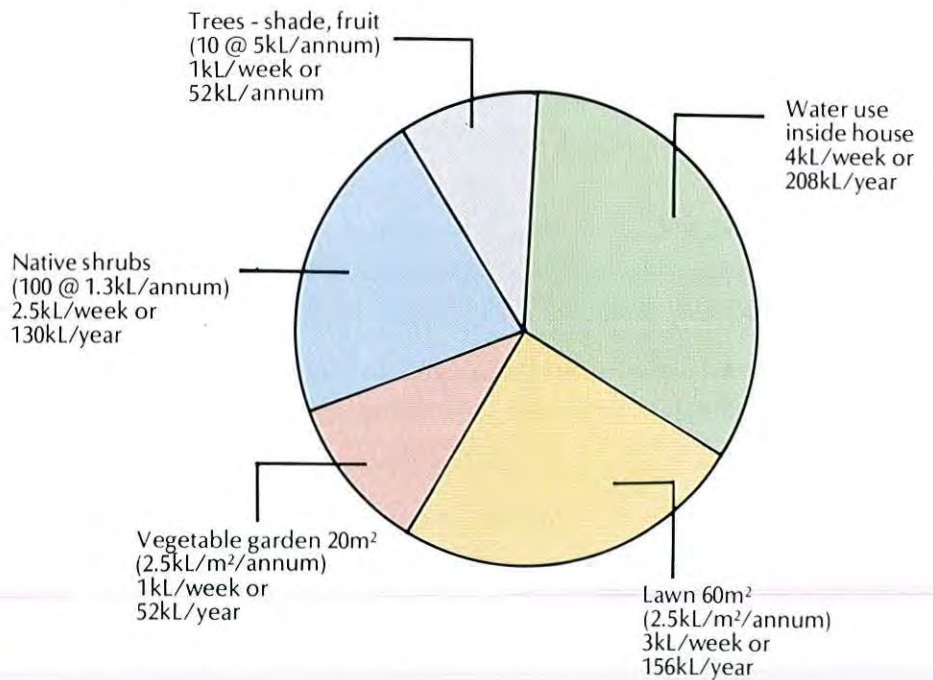


- NOTE
- Tenant to plant trees and shrubs, install reticulation and spread mulch.
  - If a simple design is required the costs would be greatly reduced.
  - Most new houses need a shady pergola in the North-west. Trees start to provide shade after about 5 years. A pergola kit plus brick paving would cost about \$1,200.

FIGURE 3

### WATER USAGE IN A LOW-WATER GARDEN

The household with the first low-water garden in Karratha has two adults and four children and the garden features a lawn that is quite small, requiring 50mm/week of reticulation watering. The vegetable garden is seasonal, but is averaged out at 50mm/week also. Native shrubs, once established, are given an average weekly watering of 25 litres (1.3 kL/annum). Trees, once established, will be allocated 100 litres per week. The water directly applied may be less because tree roots will forage for water.



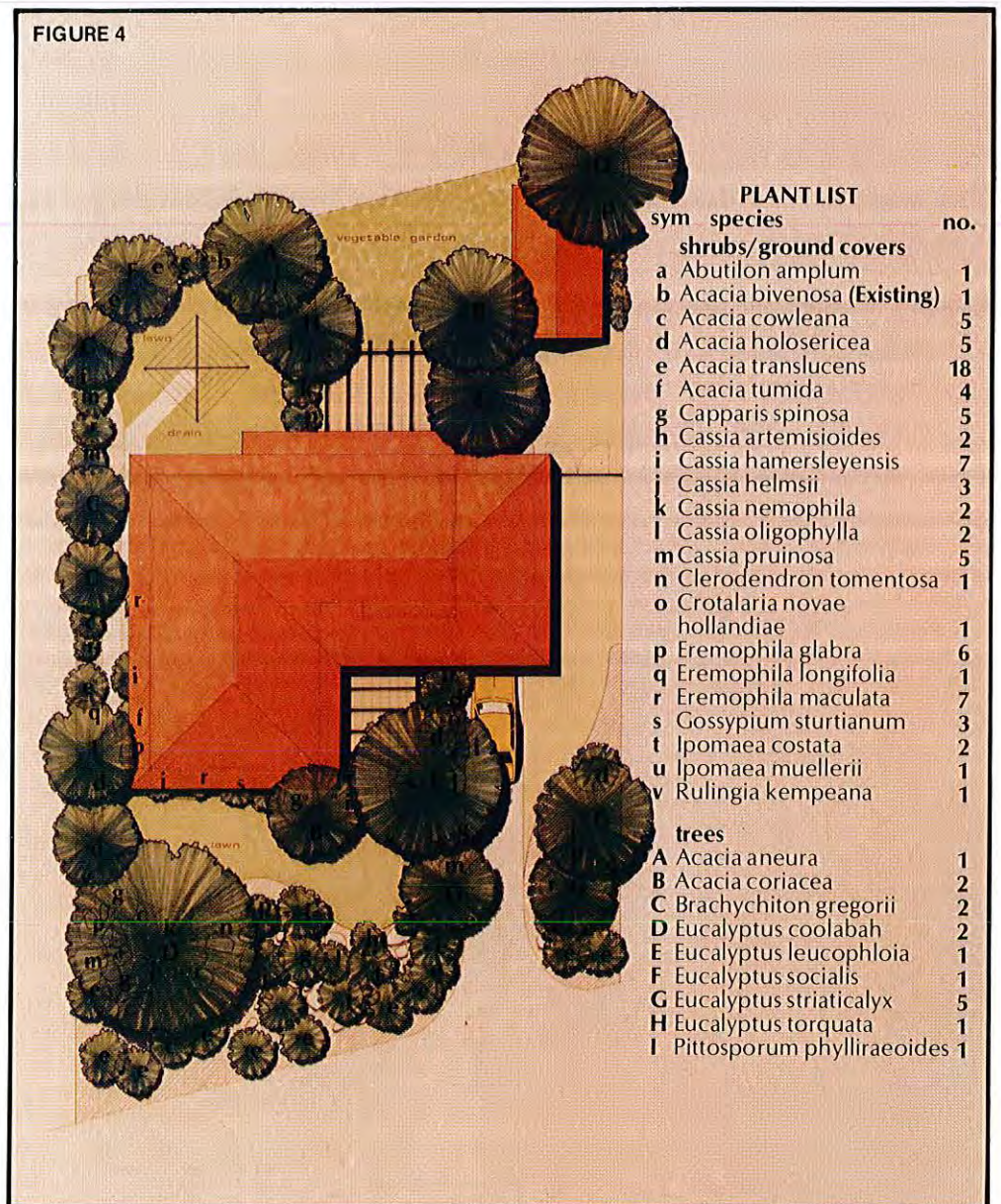
**TOTAL USAGE 11.5kL/week or 598kL/year**

and aridity of the Pilbara can be partially ameliorated through the careful design and layout of homes and gardens. Verandahs and patios may be extended to provide outdoor living areas and initial shade while trees develop. And most importantly, water from rainfall should be collected from the roofs and directed onto the garden instead of being wasted as run-off down into the streets. Passive water harvesting could provide water for selected plants for a considerable time.

Practical gardening for the arid areas involves the selection of native shrubs and plants that consume far less water than introduced plants, but which nevertheless provide a beautiful floral display. Plants and advice about plantings are available at the Forests Department nursery. Soil structure should be improved and mulching techniques introduced to hold water. Covering the soil with stones or shredded vegetation after planting will further reduce water loss from the garden. Finally, designing the garden for a rigid water budget depends on minimum wastage. A trickle irrigation system prevents excess water loss, as does the introduction of timers on all water outlets into the garden.

### Handy Hints

There are many factors involved in a successful garden but some of these are particularly important in the dry north-west. Often householders have little idea of how much water a garden needs. Over watering is as wasteful as forgetting to turn off the tap. Many trees and shrubs are best watered once a week or less. What small areas of the garden are retained for lawn should be watered only twice weekly and perhaps three times during extra hot spells. Householders should read their water meters and plan water use to keep within the low annual budget of 600kL/annum. As a guide for average north-west households the following categories can be suggested (right).



Forests Department site plan of the first low-water garden project in Karratha.

DOMESTIC WATER USE		
PER WEEK (kL)	PER YEAR (kL)	CATEGORY OF WATER USE
9.6 - 14.4	500 - 750	low
14.5 - 19.2	750 - 1000	high
19.3 - 28.8	1000 - 1500	very high
28.9 plus	1500 plus	wasteful





W. Edgecombe

Low-water garden at 8 Cowan Way Karratha in 1980 and six months later (right). Native shrubs make a shady pathway in little time.



W. Edgecombe



W. Edgecombe



C. Winfield



C. Winfield



C. Winfield

The striking beauty of the local flora has only recently been 'discovered' by residents of the Pilbara. Here *Grevillea wickhamii* (above left), *Eremophila maculata* (above right) and *Acacia translucens* are shown in full bloom.

◀ *E. camaldulensis*, or river gum, grows along creek beds and waterholes throughout the Pilbara. It has been planted as a street tree in Karratha and other towns in the Pilbara, but is generally unsuitable as it grows too large and is a hazard during cyclones.

A low-water garden does not mean a low-maintenance garden, neither does it mean that exotic plants should be totally excluded. Plants of similar water-consuming capacity should be grouped together. High-water consuming plants can be planted in close proximity to lawn areas where water applications are more frequent. Small areas may be included in this manner where variety is desirable. Fertilizing and pruning not only improves the growth of exotic plants and vegetables, but also improves the growth of native plants.

## Investment

An investment in a low-water garden can provide just as much beauty and interest as its luxuriant water consuming counterpart, and will soon pay for itself in reduced water bills. A low-water consuming household using 700 kL/annum would cost the householder \$138 at 1982 water prices. In comparison a high-water consuming household using 2000 kL/annum costs the householder \$1008.



Millstream is an oasis and water supply for the West Pilbara. These cajeput trees (*Melaleuca leucadendron*) & Millstream Palms (*Livistona alfredii*) are part of the unique environment, worth preserving. C. Winfield.

Many trees of the Pilbara, if planted in the towns, are excellent for shade and shelter and require little water.

▼ *Eucalyptus aspera*



W. Edgecombe

*Acacia coriacea*. Note the attractive weeping habit of this tree growing in Sampson Way, Karratha. ►



W. Edgecombe





# PIONEERS: A Profile

It was 1919, and early spring in the karri country - a time when the forest drips with misty rain, and the dank scent of wattle and bossiaea mingles with the ever-present smoke from wood stoves and sawdust piles. Wood was the mainstay then - the "never-ending" source of most trade and employment in the south-west. Ex-servicemen queued at scattered mill offices around the south wanting work, and getting it. Manjimup, although quite small, was the centre of the timber trade in this region, and was

sited at the junction of several rail lines from places like Deanmill and Jardee and Pemberton further to the south. On one side of the main street was the railway station from where the felled giants lurched off down the track in hundreds of sawn sections to the capital and the ports. Opposite was the hotel where other felled "giants" lurched through swing doors after too much beer and too many days in the bush, or the war that had ended the year before - or both.

# The Training of Foresters

by

C. E. Lane-Poole

first Conservator of Forests.

Published 1921

... In every one of the States of Australia there is a vast quantity of work to be accomplished in repairing the damage done by generations of exploitation and in protecting and extending the forested areas so that they shall remain permanent assets. But without men who have had some special training for the work, it is useless to entertain hopes for the accomplishment of the task. So necessary is this training that in every State arrangements have either been made or are in progress for imparting the necessary knowledge to those who may enter a forest school as apprentices, with a view of reaching higher grades. Forestry as a life calling for youth offers many attractions. Almost the whole of the work is in the open air and under conditions eminently suited to physical and mental health...

The course of instruction for apprentices at the school will extend over a period of four years and the following outline furnishes some idea of the scope and nature of the training:-

First Year - The successful applicants will proceed to the Forest School for Apprentices.

Subjects for the first year:-

1. Elementary mathematics.
2. Geology and Physiography.
3. Botany (elementary).
4. Entomology.

While engaged in practical work in the field printed lectures will be forwarded to the apprentices fortnightly in the subjects set out for each year.

Second Year - In the second year the apprentices will return to the school for two months' training.

On returning to practical work in the bush, the boys will be placed, as far as possible, in localities where they will receive training in nursery and plantation work.

The subjects to be studied during the second year are:-

1. Soils.
2. Botany - systematic and economic.
3. Surveying.
4. Forestry - History and Value.

Third Year - In March of the third year the apprentices will return to the school for a further two months' instruction.

On returning to the bush the apprentices will, where possible, be employed in classification and working plan survey work.

Subjects for third year:-

1. Sylviculture (including nursery work).
2. Mensuration.
3. Valuation.
4. Protection.

During the fourth year the apprentice will be attached to a district in order to learn, under the District Forest Officer, the whole of the routine work, including clerical work, general work and timber inspection. He will be required to submit independent reports on matters receiving consideration in the district. Opportunities will be given for visiting various mills and wood-working industries and provision made for continuous employment in at least one sawmill.

Subjects for fourth year:-

1. Forest Management and Working Plans.
2. Utilization.
3. Transport and forest engineering.
4. Forest Policy.

Rate of Pay - Subject to an apprentice passing the necessary examination, the following rates of pay will apply:-

First Year	12s. 6d. plus 18s. subsistence allowance per week.
Second Year	17s. 6d. plus 18s. subsistence allowance per week.
Third Year	22s. 6d. plus 18s. subsistence allowance per week.
Fourth Year	30s. 0d. plus 18s. subsistence allowance per week.



The five original apprentices at the Ludlow Forestry School, were, from left to right, D.H. Perry, W.A. Ross, C.V. Kinsella, J.A. Thomson and H.G. Clover. The Forests Department continues to train cadets for employment as Forest Guards.

The last goods train to Pemberton steamed its way out of Manjimup and into the surrounding forest. Several men sat awkwardly in an open truck near the front of the train, hunched up with the swags, portmanteaux and camping gear of the team who would be working in the forest of the Dombakup Brook and the Shannon and Gardner basins. They weren't loggers, but foresters, and would be camping for eight months in the uncut karri classifying the quantity and quality of timber in the region to the south and east of Pemberton. There was no European settlement in the country due south of Pemberton then, except the Moon family on the Dombakup and, of course, the Brockmans on the Warren nearer to the town, who had been driving cattle to the coast every summer for years.

"Watch it Dick!", someone shouted, and the young man jumped out of his reverie to dive at the nearest swag. It had caught alight from the rain of red-hot charcoal spurting out from the engine as it steamed uphill. Even their clothes would catch alight, but there was nothing else for it - the long walk out to the Dombakup started tomorrow early. Dick settled back in his place, back to the engine, hat pulled down, flannel shirt covered by a heavy jersey, and boots and dungarees protecting his feet and legs from the cold and the ash.

Dick Perry, the youngest member of the team, was seventeen at the time, had been in Australia seven years and was the eldest of four children. His father had been the head coachman on a large estate in the south of

England. Horses were his father's entire life, and when the motor car was introduced to the estate by his Lordship, he had declined the offer to become chief mechanic and driver, electing instead to try his luck in Australia working still with the beloved horses. Out in Western Australia his son Humphrey, later called "Dick" in this land of nick-names, was popular, even as a "poor little Pommie boy", was sprightly of mind and build, and quite determined. He would be a farmer he told his parents, when he left primary school at fourteen. But when the advertisement for apprentices with the Department for Woods and Forests appeared in the paper, his parents urged him to apply.

Security they said, was very important and in 1917 with so many people looking for work, the

opportunity for a paid apprenticeship was too good to miss. Out of 60 or 70 lads Jack Thomson and Dick Perry were chosen by C.E. Lane-Poole, later to become the first Conservator of Forests. They could ride well and knew how to care for horses, and these skills they were soon to discover, were vital...

The train jerked around a corner, and Dick glanced up at the looming karri, overwhelmed by his first view of some of the tallest trees on Earth. The sun had come out and filtered through the glistening leaves down through the dense, pungent understorey and onto the rich red loam of the forest floor. He was very observant, training himself to see many parts of the living forest in all its detail, committing it to memory. In the jarrah forest of the Sunkland he had done this, chain by chain, acre by acre, mile by mile, observing the world around him, noting the condition of the resource, judging

the real amount of timber along this area near the Blackwood River. He had spent most of 1919 in the camps along the Blackwood, his first assignment in the bush.

It had been exciting alright. Forester Gordon Parkes had met him at the Ship Inne at Busselton, and they had ridden all that day down the Jalbarragup Road to the river, only to discover that the rest of the team had moved on. So they camped the night then and there, wrapped in grey wool army-issue blankets, with only a fire and a morsel of food between them. And then late in the night the howling had started, and eyes ringed the dying fire, and young Dick woke up alarmed.

"Don't worry, Dick", Gordon had said, "just dingoes. They'll do you no harm".

They were good days in the bush then, those days in the Sunkland. There was no dieback, and much of the forest hadn't yet been exploited.

Lane-Poole was fighting to get control of all the timber cutting both here and in the north. The twenty-five-year long concessions of large tracts of forest to the timber companies were unregulated, and had to be changed. The extent of the jarrah forest was actually unknown, despite the exaggerated estimates of the timber harvesters. That we'd never run out of jarrah was the common belief, and the wastage of fine timber enormous.

The Blackwood River, even twenty miles from the mouth was fresh then, drinkable, and teeming with life, providing a diet of fresh marron to the foresters. Evidence of aboriginal occupation of the area was still easily seen, and like them, the men of the classification camps hunted the abundant game in the area. Kangaroos were a source of fresh meat for the camp, relieving the poor diet of salt beef and pork brought in from the

The timber industry was very labour intensive, providing employment for returned servicemen after the first World War. Note the size of this huge karri log.



**Landscape No.5.** Trees in Australia often grow in striking relief to the harsh landscape. *Eucalyptus dichromophloia*, known as the variable-barked bloodwood was photographed near Mt. Bruce by Cliff Winfield from the Forests Department, Como.





nearest town every week. The eight-man team was working through the Sunkland forest for most of the year, then was transferred south to karri country.

Dick worked in the deep south for the next eight months, into autumn of 1920. Many incidents coloured the team's progress, and the work was slow, because, unlike the jarrah forest, the karri was difficult to penetrate. Carts would bog down or even tip over, streams and rivers would have to be crossed and re-crossed by swimming and wading, vital provisions such as sugar and tobacco would be unavailable from Pemberton, and even the cook "disappeared" one day, 50 miles out of Pemberton. An excellent cook but an alcoholic like others who had returned from the war, he was discovered later back at the hotel. But the work did progress, forming in Dick Perry's mind a respect and love for the living forest, and his work in it. His first years of forestry were the first years of the new Forests Department established in 1919. During these years Lane-Poole was to resign in protest at the extension of the old give-away timber concessions which were virtually exempt from the provisions of the new Forests Act. This stimulated a Royal Commission of Enquiry into forestry in Western Australia. Along with other apprentices young Dick was trained in all aspects of practical forestry, but most importantly, he was taught how to plant and grow trees. Other people would be cutting them down, but he would be planting them.

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... "Senhor Perry, this way", said Senhor Amoral, hurrying his way through the narrow streets of the beautiful medieval town of Leiria in Portugal. It was 1965, and Dick Perry, now 63 years old, was very much involved with growing trees. He followed the Portuguese forester who was in charge of the forest of Leiria. Dick and his wife, Katharine, had been in Portugal for two years. This was their last spring in this country.



The first Forests Department head office picnic was held at Point Walter, Perth in 1922. Dick Perry is in the back row at the left, and the young, second Conservator, Mr. S.L. Kessell is seated on the ground, third from the right.



A young Dick Perry does the washing at the forestry topographical survey camp near Mundaring Weir in 1923. Throughout the many years of his career he camped in this manner until horses were superseded by motor vehicles. Note the bush pole construction of the tents, the sawn-off blackboy used as a table, and the sturdy basin stand.

“Manuel, he is in here, the prison”, said Snr Amoral, as they rounded the white-washed stone wall of the gaol. The two foresters entered the gateway and the iron doors were immediately clanged shut behind them. The warden rose to meet them, then Snr Amoral began the long process of persuasion to get Manuel out of prison, for this young peasant boy was vital to the Perrys’ work in the *Pinus pinaster* forest of Leiria. This boy was one of the last people in Portugal to have been taught the traditional way of climbing the towering, straight pine trees. With just a single rope looped around his feet in a figure of eight, the lad would almost run up the trunk reaching the top of the tree a hundred feet from the ground in less than half the time that Dick

would take using the cumbersome climbing ladders and irons. Even at 63, Dick Perry was fit enough to climb up to a dozen trees a day, but this was not enough. The Perrys were coming to the end of their collecting programme and still had many seeds and scions to collect. No-one else could climb trees like Manuel, and without his help and ability they would never have gathered the buds for grafting, cones for seed and pollen of 85 trees, that finally reached Australia. The Perrys would walk miles through this huge forest in search of the particular trees that would provide perfect breeding stock for the tree-breeding programme being conducted at home in the nursery at Wanneroo. Dick and Kath would establish their bearings, and march off down

through the maze of trunks on the watch for the perfect tree, in genetic terms, the “plus phenotype”. Out of every quarter of million trees that they looked at only one was good enough to provide the grafts for future pine plantations in Western Australia. Furthermore, they could only collect the growing tips in spring, so Manuel’s immediate help was essential.

“Yes, we may take him, Senhor Perry”, said Snr Amoral eventually, after painstakingly explaining to the warden the importance of Manuel to the international project now in hand. “But you are charged with the responsibility of picking him up from the gaol and bringing him back every night”.

The Portuguese have used maritime or pinaster pine in ship building for centuries. Here the villagers haul the longboat in after a fishing expedition. The hull and oars are all made of pinaster.



The next day Dick and Kath drove to the prison in their Volkswagen, with the packed lunch of cheese, bread, wine and fruit, prepared for them by the three girls at the boarding house in Marinha Grande where they were staying. Marinha Grande and many of the other towns and villages that they had seen, was high-walled and colourful, and under the Mediterranean sunshine shone like a new pin. They drove out of this village and into the narrow streets of nearby Leiria, passing the neat stone houses with gay geraniums peeping out from flower pots and window boxes. Like the ancient forest, everything in the town of Leiria was very neat and clean and ordered - the pavements swept, the centuries-old fountains flowing cleanly. Centuries of civilization had developed in the Portuguese a respect for all aspects of their culture, both man-made and natural. Forests there were far from their wild state, yet so well-managed and cared for by every one, that the supply of wood was assured. All products of the forest were used in sensible amounts, and exploited in their correct order. Resin for example was collected from the base of the biggest and healthiest trees three years before they were felled. Firewood was collected methodically by villagers whose ancestors 600 years before had been granted the right by King Dennis to collect the dead or pruned branches or other fallen debris. And in time the final crop of mature trees would be cut to supply the Portuguese with the timber that made their fishing vessels, their housing frames, their furniture. The areas of forest harvested would be sown again by broadcast seeding. Although this traditional method of seeding was slow, the forest re-grew, and a continuing yield of wood was provided.

At the prison gates Manuel appeared wearing the old cloth trousers and thread-bare shirt that the Perrys had noticed the spring before. The shirt fitted snugly and was to become more ragged over the ensuing weeks during the intensive climbing programme. If Kath hadn't made the boy a tough canvas vest he would eventually have been sliding down the rough pinaster bark on his bare skin.

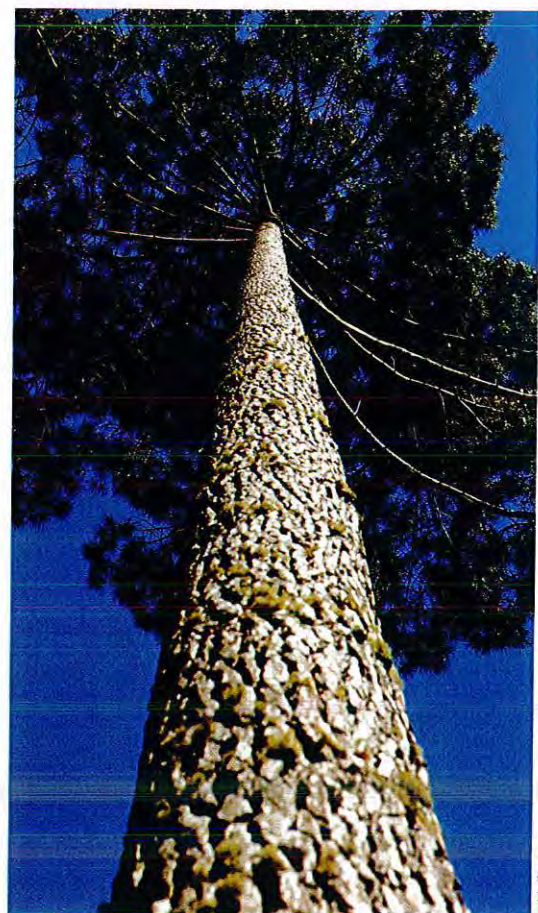


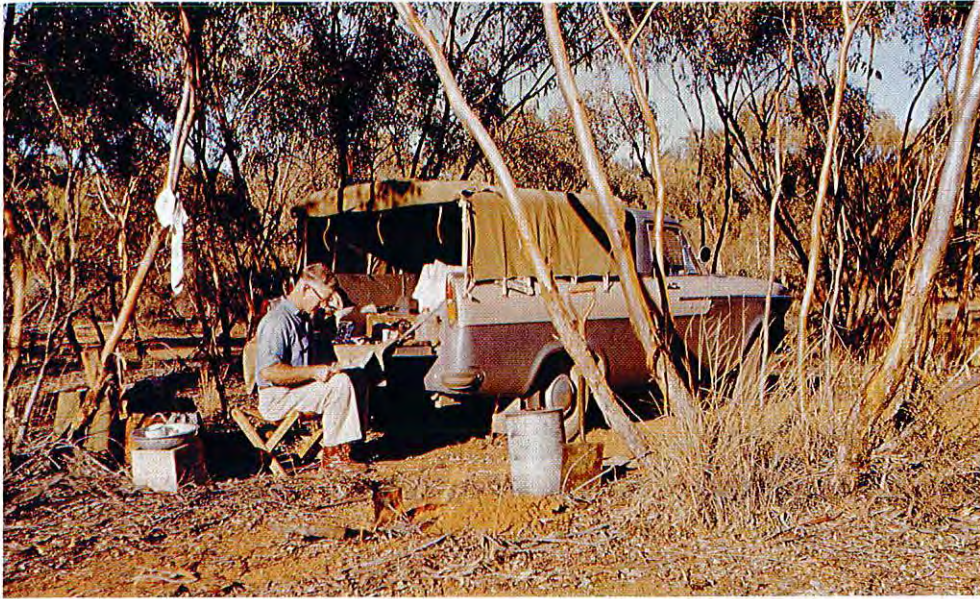
Dick and Manuel in the *Pinus pinaster* forest of Leiria sort through the growing tips, ▲ or scions, collected by Manuel from the top of the towering pine trees.



Kath Perry assisted in finding, ▲ measuring and marking the "plus phenotype" trees in Leiria. Only one in every 250 000 that the Perrys looked at was good enough to provide stock for Western Australia.

▶ A *Pinus pinaster* "plus phenotype" showing its straight trunk and evenly branching canopy.



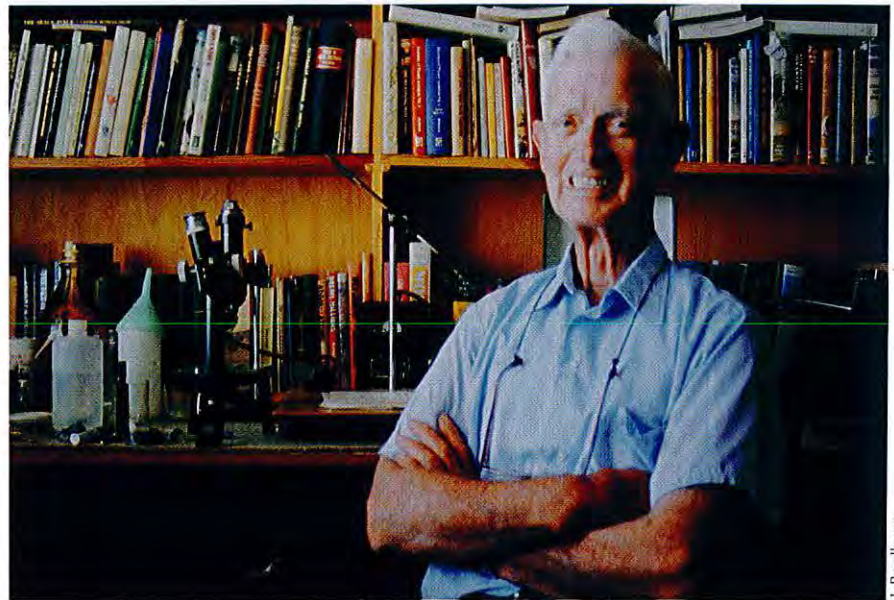


After his retirement in 1967, Dick Perry became more actively interested in termites, and his study took him into the arid regions of Western Australia. Always at home in the bush, he is pictured here waiting for the billy to boil.

Employed in 1917 Mr Dick Perry worked for fifty years in the Forests Department through the formative years of forestry in Western Australia.

The programme was winding up and the Perrys worked hard to record all field data and package the samples for air freighting out of Lisbon. Of all the forest services in Australia and New Zealand that were sent the scions, only the Western Australian Forests Department had success at grafting and propagating the Portuguese stock. Dick Perry is an old man now and one of his greatest pleasures is to visit the plantations north of Perth at Gngara and Yanchep and observe the beautiful straight, sometimes perfect form of the trees growing there. He selected the parents of them all.

In 1983, you may see Dick Perry, healthy and busy. He may be cycling around Rottnest Island observing the reclamation of the sand dunes, or collecting firewood from the forest in his utility, or setting out in the brand new car for a trip in the country. Or there'll be a knock at the door of his Perth home, and someone will arrive with a bucket of termites for Dick to identify. Over the years, Dick Perry has become one of Western Australia's leading authorities on termites, has collaborated in the writing of a book on these interesting insects, and advises on their habits and characteristics. You may even find him, the boy whose formal education stopped two years short of the junior certificate, bent over his



H. Bradbury

microscope in his study, surrounded by books - on entomology, poetry, forestry, botany, history, genetics, and so on. The diaries of Ernest Giles and John Forrest, pioneers and explorers, are near one end. He and Kath, Dick casually mentions, recently followed part of the actual route taken by Giles in his attempt to cross Australia. Dick describes the thrill of following the explorer, of finding one of the party's cairns. His animated, expansive and often humorous conversation flows on, exploring many subjects, touched with the wisdom of 80 years of learning.

"But remember, I'm nothing special," he says. "We're all pioneers still in Western Australia you know".

*Helen Bradbury*





# *Timber for the Future - Pine*

C. Winfield

by Dr Frank McKinnell

In these "high technology" days of space shuttles and optical fibres, why do we continue to use an old-fashioned "soft technology" material like timber? We use it because we appreciate its versatility and ease of use as a construction material and its beauty for decoration in panelling or furniture. Timber is a renewable resource which is readily recyclable and biodegradable. It has a very low energy requirement for its production, unlike its main competitors (concrete, steel and aluminium) and its production and processing involve very little atmospheric pollution.

In Western Australia there are two basic reasons why we are planting pine trees - to provide a type of timber for local uses that our natural timbers are unsuited to, and to provide a sufficient resource

of timber products to enable the State to be more or less self-sufficient.

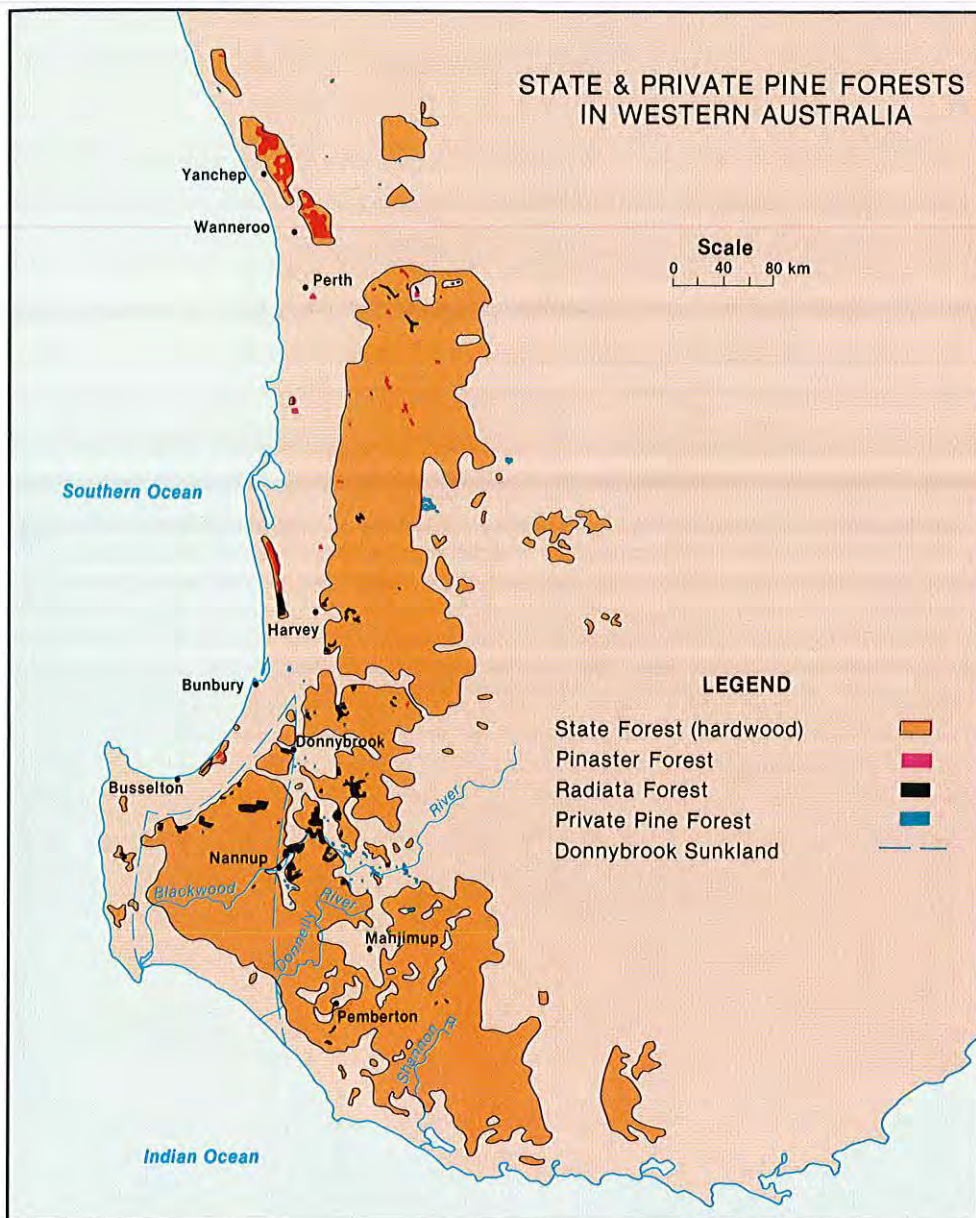
All the types of trees that occur naturally in Western Australia in sufficient quantity to be of use for timber are eucalypts. That is, their timber is of the type known as hardwood. In other parts of the world the main timber resource is normally conifers, or softwoods.

There are many timber uses for which hardwoods are either not suited at all, or are wastefully employed. For example, it is wasteful to use high quality furniture grade jarrah timber for making fruit cases, yet this did happen for many years. It is a long-held principle of good forest management that a commercial timber should be directed to the highest quality use for which it is suited.

## Timber Production

Since about 1900 the timber industry has been a major economic force in the south-west of the State. In the early days the forest resource must have seemed limitless and the industry was seen as one of the most important ways of developing the south-west.

Since then, about half the area of good quality forest has been lost to agriculture and today only about two million hectares have been set aside as State forest. Only 10 per cent of this area is covered by fast growing trees like karri or pine. Most State forest carries jarrah which is very slow growing. This combination of small area and slow growth over the majority of the forest means that our timber resource is inadequate for our needs in the future.



## Forest Management

Our forests are managed for a variety of uses, as there are many other demands on them besides the production of wood. They provide the water catchment area for dams serving the metropolitan and south-west areas and they ensure that the water is clear and of low salinity. The forests are also used for recreation, for the preservation of representative samples of our unique flora and fauna and the protection of the visual qualities of the landscape. Some parts of the forest are used for mining operations for the production of bauxite, coal, tin and ilmenite. A considerable area of forest has also been cleared for powerlines, roads and dams.

All these things mean that although we have some two million hectares of State forest, only about half of that area can be used primarily for wood production. In order that we can set aside some forest to preserve scenic vistas and examples of natural and undisturbed vegetation, we must manage the remaining forest intensively to maximize its wood production and meet consumer demand.

One of the methods used to grow sawlogs faster is to plant pines, which we are able to grow 20 or 30 times faster than jarrah forest. Pines can produce logs suitable for sawmilling in 30 years, whereas jarrah takes 150-300 years to mature.

Another method of growing sawlogs faster is to convert part of our native jarrah and karri forest to what the forester calls a managed forest. In a properly managed forest the yield of timber can be maintained forever. This is called sustained yield. Unfortunately, it will take us many, many years to achieve that goal in our native forests, and in order to achieve it, we must drastically reduce the sawlog cut in these forests over the next 30-60 years.

In order to remain more or less self-sufficient in sawn timber products, it is intended to offset this decline in hardwood supplies with Western Australian grown pine.

It is sometimes argued that we should not be too concerned at this and that we can always import the timber we need from somewhere else. However, foresters maintain that we should aim to be more or less self-sufficient in timber products as it is expensive to transport timber to Western Australia and future overseas supplies are uncertain. Also we can grow the timber here more cheaply than it can be imported under most normal circumstances, and growing and processing timber in Western Australia is a valuable way of

maintaining much needed jobs in rural areas.

It should also be remembered that it is not possible to create a forest overnight. To meet a foreseen gap in timber availability 30 years hence it is necessary to plant today.

If after several years of planting, new evidence comes to hand to suggest that the projected demand will be less than forecast, it is easy to adjust the rate of planting or cease planting altogether. Unfortunately it is impossible to remedy the opposite situation of "too little and too late".

Figure 6 shows the estimated output of hardwood and softwood (pine) in Western Australia over the next 70 years, equivalent to the lifetime span of a child born today.

It can be seen that the hardwood output falls off rapidly over the next 30 years, then levels off for a time, and then later begins to rise again as our regenerated hardwood forests mature. To maintain the total estimated requirement for sawn timber, the pine output rises rapidly over the next 30 years and this illustrates the need for our pine planting programme.

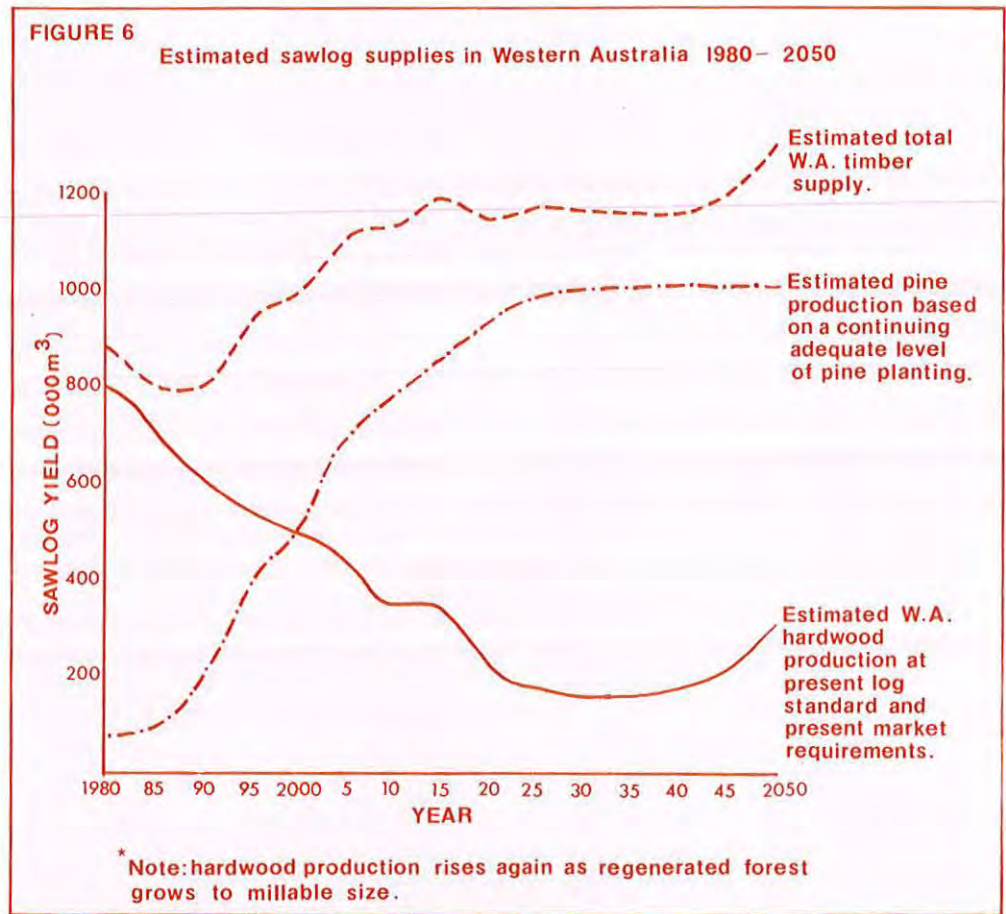
## Pine Forests in Western Australia

Two species of pine are planted in Western Australia. They are monterey pine or radiata pine (*Pinus radiata*), which comes from a small area along the coast of California, and maritime pine or pinaster pine (*Pinus pinaster*), which comes originally from the Mediterranean area. Most pinaster pine in Western Australia uses stock that came originally from the forest of Leiria in Portugal.

Radiata pine grows much faster than pinaster and is preferred for that reason, but the pinaster will tolerate much poorer and drier soils, so we use both species here on the soils that are most suitable for them. It is also desirable to have more than one species of pine in case a disease or insect problem were to arise with either species at some time in the future. This is called spreading the biological risk.

There are a large number of small areas of pine forest in the south-west, often where the original forest has been killed by dieback disease. These small areas are uneconomic to manage and are being replaced gradually by eucalypts that are resistant to the disease.

Efficient forest management for wood production requires that the pines be planted in large contiguous areas. Most pine plantings in Western Australia now take place on the coastal plain



▼ Watering points for fire fighting are maintained throughout the forests.



C. Peard.





C. Winfield.

▲ Farmland in the Blackwood Valley has been bought by the Forests Department to be planted with pines. The soils in this area are excellent for growing *Pinus radiata*



C. Winfield

▲ These eight-year-old radiata pine have been high pruned to improve timber quality.



C. Winfield

◀ A skyline cable logging system is employed to thin pines in the steep country of the Blackwood Valley.

north of Perth around Yanchep and Wanneroo, or south of Busselton on the low plateau known as the Sunkland.

Other areas have been planted in the past on the coastal plain near Harvey, around the Stirling Dam and Wellington Dam and along the Blackwood River and Balingup Brook. By far the longest of these areas is that through the Blackwood Valley where most plantings have taken place on former farmland purchased by the Forests Department. There are also some privately owned forests in that region.

## The Sunkland

Because there is insufficient farmland readily available and because funds for land purchase are limited, the pine forest establishment programme is now concentrated in the Sunkland. This project involves the conversion of some 60 000 ha of the 283 000 ha of native forest in the Sunkland to pines, over a period of about 30 years. The project has been examined and approved by the Environmental Protection Authority. In this region there are large areas of soil suitable for pines, provided that fertilizer is applied. The native forest is generally of low quality and some of it is affected by dieback disease. Conversion of parts of this original jarrah forest to pines has no significant adverse affect on stream salinity. The area is also favourably located for efficient and economic future processing of the timber.

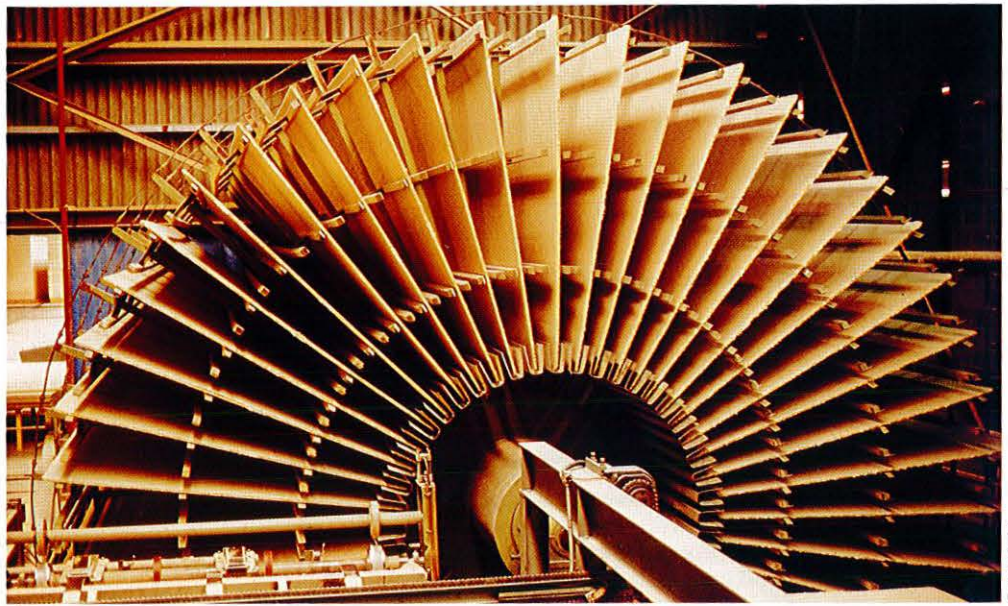
Because only some of the soils are suitable for pines, the area will eventually be a mosaic of pines and jarrah. This will minimize any negative impact on native fauna in the area. In fact, some native fauna, especially the kangaroos, are undergoing a population "boom" due to the additional food provided by the clover used to improve the soil fertility in the early years of pine growth.

## Uses of Pine Timber

The products we get from the pine forest are many and varied. The best large logs are used for the manufacture of pine veneer for wall panelling or for furniture. The bulk of the output from mature pine forests is sawlogs for the production of building timber of various types. For this purpose it is easier to use than the jarrah we are used to using in Western Australia. Properly prepared pine building timber is less inclined to twist, does not shrink and is much easier to cut and nail than jarrah. Already pine timber can be seen being used in many new homes under construction.

Young pine forests also yield large quantities of small, low quality logs that are removed from the forest to promote the growth of the best trees that are kept until they are mature. These small logs are used for the production of particle board in large automated modern factories such as the Wesfi plant near Bunbury, or they are treated with preservative and used for fence posts and rails. Treated pine posts and rails are often used in parks and recreation areas, as well as for farm fencing.

In the future, it is possible that some of this material may be used in a paper pulp factory.



C. Winfield

▲ Particle board, made from pine thinnings, is produced at the Dardanup Particle Board factory.

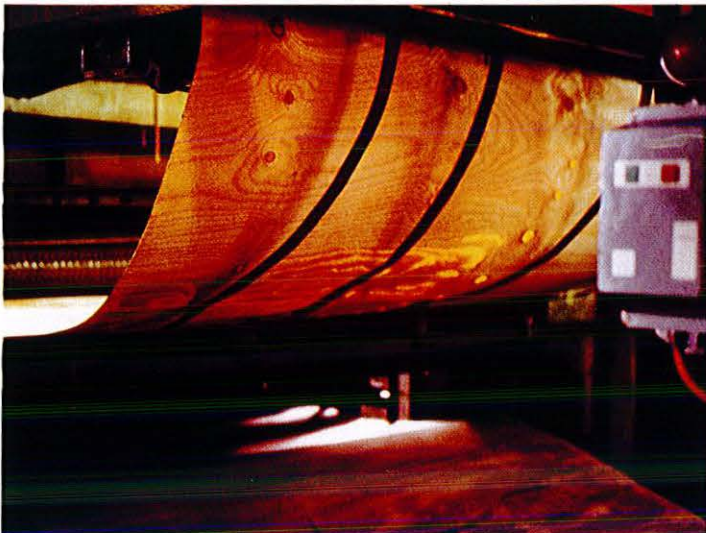
Clover is planted to improve soil fertility at the time of planting pines in the Sunkland. ▶

▼ A pine log is peeled for making veneer (bottom left).

▶ Pine veneer drying immediately after production. The veneer is popularly used for furniture and wall panelling. ▼



H. Chevis



C. Winfield



C. Winfield



H. Bradbury

▲ In the pinaster pine forest at Gnangara near Perth, areas have been set aside for recreation purposes. Trail bike riding is one of those activities.

## Other Functions of Pine Forests

Although the pine forests have one main function, which is to produce wood for us in the most efficient way, they do have other important functions and values. Some pine forests, such as those on the coastal plain north of Perth, play an important additional role in protecting the quality of some of Perth's underground water supplies.

These same forests are also used in some areas for horse or trail bike riding, or just for walking. Young pine forests are not too attractive for recreation (although they are attractive to some native animals and birds) but as the forests are thinned and grow older they become increasingly attractive to people.

Pine forests do not have the same range of active animals and birds as native forests, but they do have some species. Young pine forests are especially attractive to kangaroos. The presence of

pinaster forests has enabled the white tailed black cockatoo to build its population to far greater levels than it was before. In some pine forests the native understorey shrubs are present most of the time, so that native insects and the small birds which feed on them flourish. However species of fauna which require old eucalypts, such as hole nesting birds or animals, do not generally occur in pine forests. In some areas, such as the Sunkland, the mosaic of pine and jarrah forest provides a great diversity of fauna habitat.

Another value of pine forests which is frequently not appreciated is their potential for generating employment. This potential is of course, only fully realized when the forests are mature, as is the case in South Australia, where it has been found that the forests will support one worker for every 20 hectares. This is a much higher employment ratio than for the less productive native forests or for most types of agriculture.

## Exotic Trees

The pines may be welcomed in those areas such as the coastal plain where tall forests have never grown. But in some areas where native forest is being converted to pines the verdant colour of the exotic conifers contrasts with the duller greys and greens of our native trees, and may be an unwelcome sight to some people. However, they are being grown to provide a resource we need, in much the same way as we clear woodland in the wheatbelt to grow wheat. In the long term, the total amount of pine forest is unlikely to exceed 100 000 ha, which is only 5 per cent of the total area of State forest. Pine forests are performing the vital function of buying time for our hardwood forest to regrow, and for foresters to bring it to its maximum productive capacity. They also permit us to take large areas of native forest out of production for other purposes, such as recreation, preservation of flora and fauna and landscape values.

Green pines contrast with the duller grey/green eucalypts of the native hardwood forests. This area in the Blackwood Valley has been planned to provide strips of native forest as corridors for fauna.



C. Winfield



# NOTABLE TREES OF PERTH

by Barney White



G. Peard.

New settlers in strange lands bring with them new influences, be they ideas, skills, animals, plants, etc. The Swan River Colony, later to become the metropolitan area of Perth, the capital of Western Australia, was no exception. The harsh feel and smoky blue colour of the native vegetation, so well adapted to the rigours of an ancient, sun scorched, nutrient drained landscape must have made the new settlers yearn for the softer greens of their homelands. The planting of many exotic tree species, for amenity as well as commercial purposes, was predictable. Surprising, however, is the fact that even the early introductions were not confined to species of European origin.

Of the earlier introductions two species stand out - Moreton Bay Fig (*Ficus macrophylla*) and Norfolk Island Pine (*Araucaria excelsa*). Neither of these species comes from Europe. The fig is native to the tropical and sub-tropical seaboard of Queensland and New South Wales, and the pine is endemic to Norfolk Island, some 1400 kilometres off the Australian

◀ The Moreton Bay Fig arching over Murray Street forms part of this historical locale in the city.



G. Peard

◀ The largest and one of the oldest trees in Perth is this Moreton Bay Fig growing near the Swan River in Bassendean. It was probably planted in the 1830s.

east coast. Presumably the first seeds or seedlings were brought west from the parent colony of New South Wales, where both species probably had been successfully propagated. Both came from areas of summer rainfall to endure the summer drought of the typical mediterranean type climate of Perth. The opulent green of the leaves and the density of the shade cast by the figs would appeal to anyone seeking shelter from a hot sun. The unbelievable symmetry of the crown and its equally incredible ability to grow arrow straight in the teeth of winter gales make the Norfolk Island Pine a landmark tree of distinction, and would have enjoyed special favour in the days of multi-masted sailing ships.



G. Peard

◀ Trees are part of our heritage and are often planted to mark important occasions.

It is surprising how many notable trees of historical and ornamental significance in Western Australia are in fact Moreton Bay Figs. The best known example is the one growing in Murray Street near the centre of the city outside the nurses quarters of the Royal Perth Hospital. The National Trust of W.A. sees this tree as being an essential component of the historical Murray Street East Precinct, a locale containing many fine examples of early West Australian architecture. The date of planting of this tree is not known. The largest and probably the oldest known individual Moreton Bay Fig is the tree growing in the yard of 2 Thompson Road, Bassendean, near where Captain Stirling, the founder of the Swan River Colony, is reputed to have landed. This area is some of the very first land to be taken up by the new settlers. The

Tree Society of W.A. believes this tree was planted in the first few years of the colony, making it now about 150 years old. "Proclamation Tree" growing at the junction of Queen Victoria Street, Adelaide Street and Parry Street in the port of Fremantle is a Moreton Bay Fig. Other fine examples of the Moreton Bay Fig can be seen in the Supreme Court Gardens, along the Esplanade, and in parks and the grounds of older homes and establishments throughout the metropolitan area.

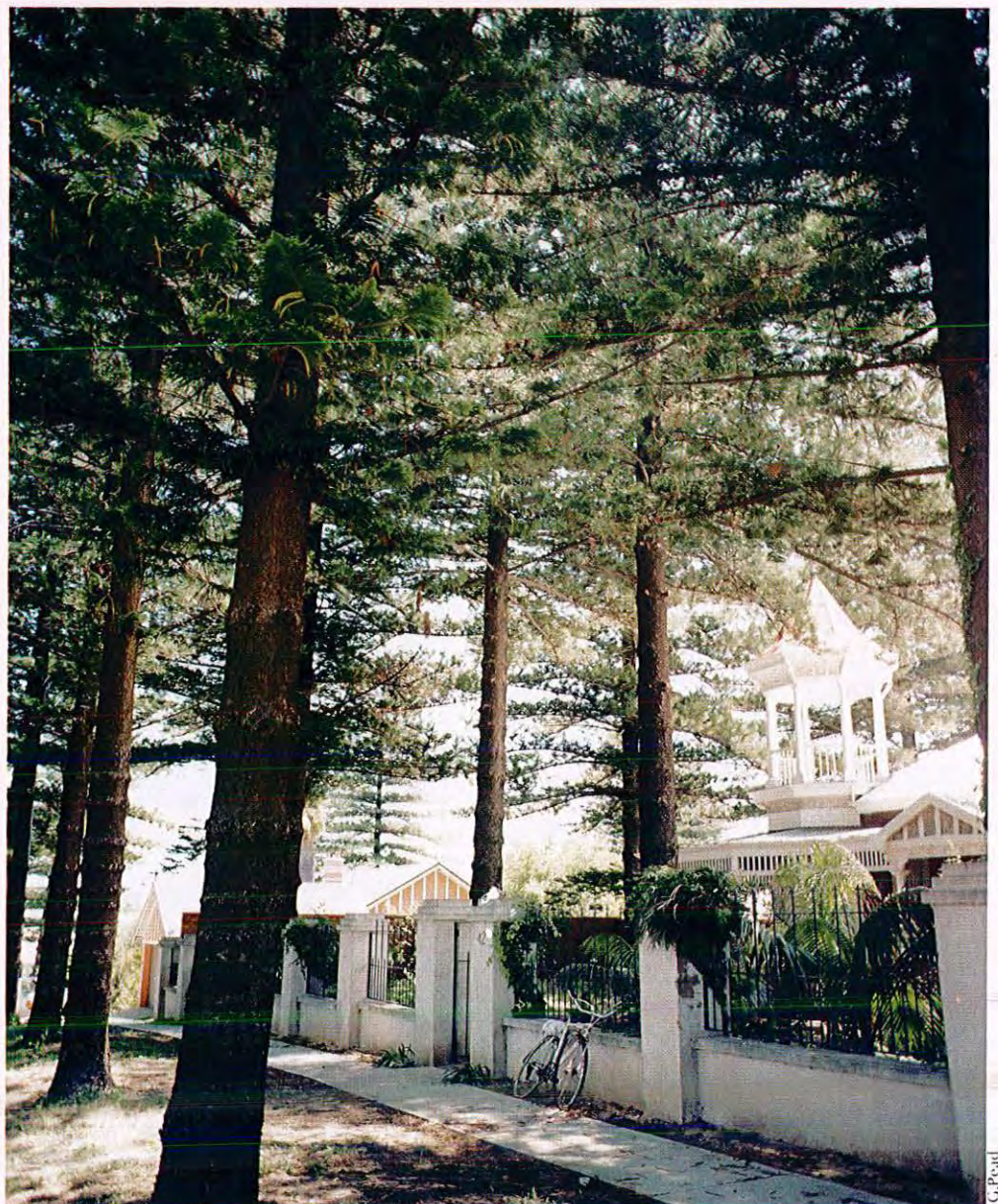
Perhaps the best known Norfolk Island Pines in Perth are those comprising the "Cottesloe Skyline". The oldest known examples are two trees growing in the yard of the pioneering Roe family in West Swan. Like the Figs, other fine examples of the Norfolk Island Pine exist in Hyde Park and in other parks and private gardens throughout the metropolitan area.



The tall, straight forms of the Norfolk Island Pines are a familiar part of Perth's coastal environment, particularly at Cottesloe.



G. Peard



G. Peard