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MARRINUP FOREST TOUR



The Department of
CONSERVATION & LAND MANAGEMENT.

The Marrinup Tour

This car tour is through a working forest, and during it you shall see the forest as it is now -- after 150 years of European use.

It is a journey through time and change, a journey that explores how the northern jarrah forest is used today and how it was used in the past.

Feel free to leave your car at each stop and explore the surrounding bush. On the self-guiding trails you'll

- visit a former prisoner-of-war camp;
- inspect bauxite mining and rehabilitation work;
- discover how dieback has ravaged parts of the forest and how its effects are being controlled;
- see and photograph the wildflowers and waterfalls of the Marrinup and Oakley Brook catchments.

The tour starts at Dwellingup and heads northwest via the Marrinup townsite to Oakley Dam and the edge of the Darling Scarp, a distance of 16 km.

At Oakley Dam, you may return to Dwellingup the way you came, or go on to South Dandalup Dam via North Spur and Del Park roads.

Should you wish to return to Perth, head northwest on North Spur Road (see map).

Depending on how often you stop, you can do the tour in one outing of four to six hours, or you can return many times to explore each part of the Marrinup forest. Most of the tour is along winding forest tracks, so please drive carefully and be prepared to give way to the occasional kangaroo.

There are picnic sites and toilets at Marrinup Townsite, Oakley Dam and South Dandalup Dam.

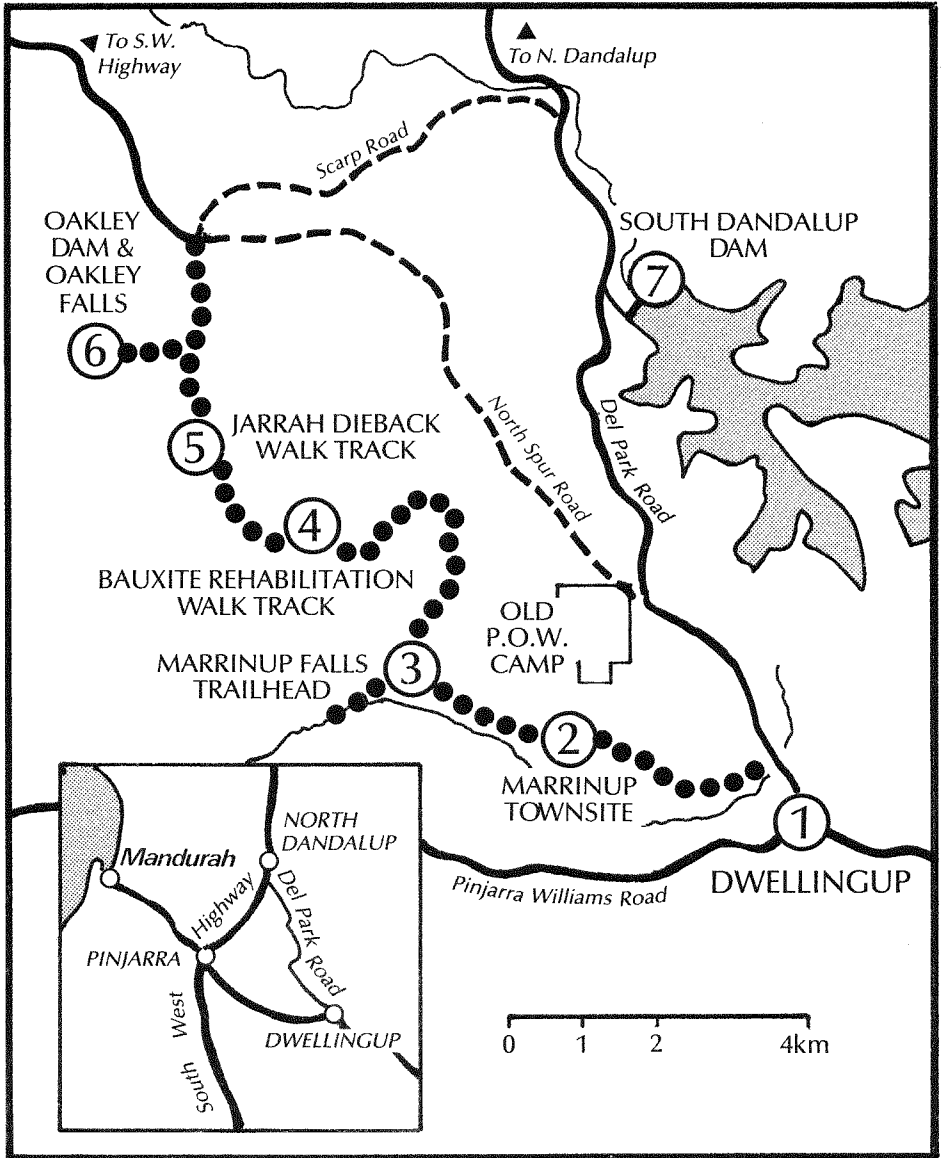
These signs will guide you on tour and indicate points of interest.



FOREST TOUR



DIRECTIONAL MARKER



●●●●● FOREST TOUR

— SEALED ROAD - - - UNSEALED ROAD

Dwellingup (STOP 1) _____

The history of this small country town reflects the history of the surrounding forest, and each phase in its development has its parallel in human impact on the forest environment.

TIMBER

Dwellingup was first settled in the latter years of the nineteenth century by timber getters and farmers. It was one of a dozen tiny mill towns scattered throughout the forest in this area. As the prime tracts of virgin forest were cutover, the smaller towns closed down, and the centre of the industry moved to Dwellingup.

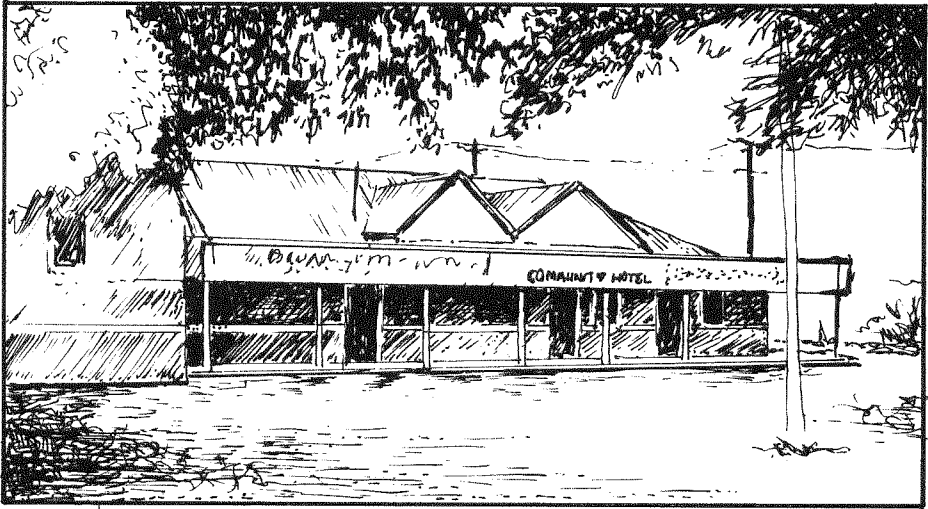
EARLY FOREST MANAGEMENT

The Dwellingup Divisional Office of the Forests Department was opened in 1928, and the main operations there were concerned with control of logging, evolving techniques for improving forest growth, and protecting the forest from fire.

A Forest Phoenix _____

In the midst of a long hot summer in 1961 something happened at Dwellingup that was to have great impact on future forest management in W.A. - the Dwellingup fires.

On the evening of Tuesday, 24 January, an electrical storm struck the tinder-dry jarrah forest. Lightning started fires in five separate places. By the end of the next day 22 separate fires had been located.



Dwellingup Hotel.

Fire fighters from local communities, volunteer bushfire brigades and the Forests Department spent the next five days fighting a losing battle as the fires converged into one gigantic blaze with a front over 16 km long. The small forest mill towns near Dwellingup were evacuated. By Thursday night Nanga Brook, Holyoake, Marrinup, Banksiadale and Dwellingup had been destroyed. While Dwellingup was subsequently rebuilt, the fire permanently claimed many of these other bush towns.

To protect the forest and towns from wildfires like this, the practice of planned burning-off with low-intensity fires evolved.

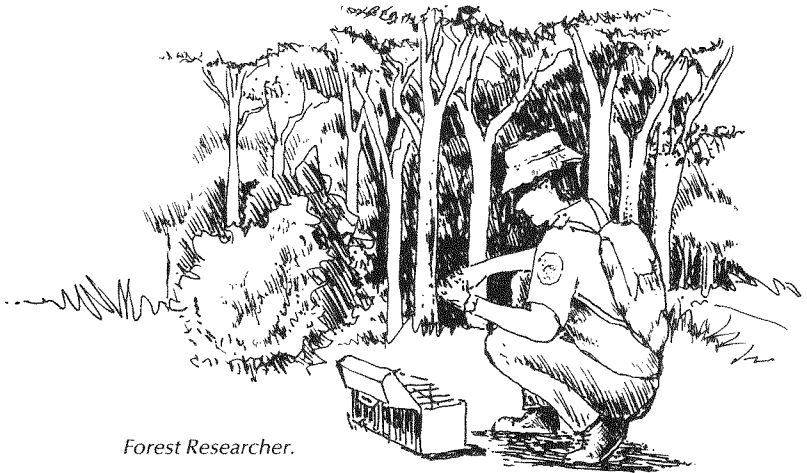
Forest Research

In the 1960s Dwellingup became a centre for research into the fungus that causes jarrah dieback, and into techniques for controlling its spread. Most of the forest which had shown no signs of disease was placed in quarantine, and vehicles were kept out to minimise the possibility of introducing the disease to uninfected forest.

TODAY

With the introduction of bauxite mining during the 1960s consideration had to be given to the reforestation of land cleared by mining, the maintenance of adequate forest cover in the catchment areas, protection from fire and disease, and the siting of roads and conveyor lines. And more and more people were seeking recreation in forest areas.

Dwellingup today is the starting point for this journey through our use and management of the forest - take Del Park Road north-west and follow the signs



Forest Researcher.

The Marrinup Forest (EN ROUTE TO STOP 2) _____

The Marrinup Forest is a complex web of interdependent life forms.

Some of the species here are incredibly successful, and appear throughout the forest. Some however, are so specialised that they can only survive under special conditions of light and moisture. Many are found only in W.A.

The Marrinup Forest is subject to a complex series of demands by our society, and often these demands conflict with one another.

Here many land uses exist side by side: water catchments vie with conservation areas; mining vies with timber production; recreational areas compete with scientific study areas; and amongst all this is the life of the forest. Here we can see the impact human demands have had, and are having, on the forest environment.

At the same time we can see how the forest recovers, and many facets of management, which seeks to understand and conserve this forest both now and for the future.

The Marrinup Townsite (STOP 2) _____

This is the site of the old town of Marrinup, typical of many first settled in the 1850s. Some 20 years after the establishment of the Swan River Colony (Perth), settlers began moving into the forest to develop land for farming and to cut timber.

The young colony had yet to find its financial feet, and sources of new income were eagerly sought. Although the fine quality and amazing durability of jarrah timber was known within the colony, little thought had been given to finding an export market. Methods of processing the logs were slow and primitive and transportation was difficult.

The first sawmill at Marrinup was established in the 1880s by Charles Tuckey. In 1898 a steam-driven, 14 horse-power sawmill was opened by Hannan's Milling Co. and a wooden railway line transported logs to the mill. Soon the forests of the Marrinup, Murray and South Dandalup catchment areas were ringing to the sound of the axe and crosscut saw. Exploitation of the forest had begun in earnest.

This pattern was repeated throughout the northern jarrah forest, and timber exports became the main income earner for the State, until the discovery of gold.

The first goods rail was built from Pinjarra to Marrinup in 1902, transporting people and commodities in and timber out. This line is still used today by the Hotham Valley Tourist Railway.

Marrinup gradually declined in size during the 1920s, and nearby Dwellingup became the region's major timber town. Marrinup was destroyed in the 1961 bushfires.

Prisoners in a Foreign Land _____

A curious chapter in the history of the Marrinup area was the establishment of a prisoner-of-war camp during the 1940s.

Between 1943 and the end of World War II some 200 German and 1300 Italian P.O.W.s were either housed at or supervised from Marrinup.

The camp was primarily a staging post for Italian prisoners enroute to work on wheatbelt properties. Those prisoners who lived permanently at the camp were employed as firewood cutters.

Follow the walktrail (a 4½ km round trip) to the old campsite. You can still see the foundations of the original buildings, and perhaps experience a hint of the isolation of life as a prisoner-of-war, thousands of miles from home, in a place where even the plants were strange.

Power for the People (EN ROUTE TO STOP 3) _____

HALT! Before you stand the steel trees of power.

Line after line, they lope across the ancient forest, humming with the urgency of the twentieth century.

Coal mined at Collie is used to fire the Muja Power Station. From there the State Energy Commission transmits electricity to Perth and many of the towns of the South-West.

This is a social need, and several thousand hectares of forest have been cleared to accommodate these power lines. They are a radical intrusion into the forest landscape, but no alternative exists within our current technology and we demand electricity!

Marrinup Falls (STOP 3) _____

In front of you are trees of a family that has been evolving for over 20 million years.

Eucalyptus marginata - jarrah trees -- and *Eucalyptus calophylla* - marri trees -- found only in W.A.'s south-west.

It is extraordinary that a forest exists here at all.

The soil of the Darling Plateau is old and shallow and often highly saline. The summers are hot and dry, and further east the landscape becomes increasingly arid and inhospitable for tall forest.



Marrinup Falls.

FIRE IN THE FOREST

See the blackened stems of many of the trees in the forest? The charred logs lying on the forest floor?

The forests of W.A. have evolved with fire, and in many instances fire has become an integral part of their life-cycles.

Because the leaves of eucalypts contain a volatile oil, Australia's forests are highly flammable. Trees such as marri and jarrah drop about one quarter of their leaves every year. Nearly one tonne of leaves and twigs per hectare fall onto the forest floor.

The climate is too dry for this litter to rot, except over a long period of time, and there it remains, gradually building up. The result is a forest in which fire is inevitable, but prescribed burning ensures that fire is not catastrophic.

Mining in the Forest

Arguments for and against mining focus not on whether mining is of a short-term benefit to the community - it undoubtedly is - but on whether the long-term effects on the environment are acceptable.

THE LONG AND SHORT OF IT?

Time scales change radically from one human enterprise to another.

To a mining company, 'short-term' covers initial exploration and the establishment of mining and transport facilities -- the period needed to recoup initial capital outlay. This may be between three and five years. 'Long-term' is the period from capital recovery to resource exhaustion -- 20 to 40 years.

During the 'long-term' investment a more complex mining infrastructure is evolved to improve efficiency. At the same time local community dependence on the mining enterprise increases.

To a forester, 'short-term' is the period from planting to the first commercial returns from thinning. In a jarrah forest this is at best 40 years. Long-term may refer to either the life of a complete tree crop (100-200 years for hardwoods), or even to the establishment of the second and third tree crops: between 200 and 400 years.

As with mining, local community dependence on the timber industry is greatest while the resource is being extracted. These two major land uses in the northern jarrah forest both extract a commercial resource, but the end point of these uses is re-establishment of the forest environment, rather than simple removal of the resource.

This is a change in social attitudes that has occurred over less than 50 years: a change in attitudes that is now being put into practice in the management of the forest.

The Ore Cycle (STOP 4) _____

Bauxite is the ore from which aluminium is extracted.

Bauxite occurs in 'pods' throughout the rock strata on which the jarrah forest grows. These 'pods' are fairly small, usually between 2 and 80 ha, and exist mainly in the upper flanks of ridges and hills. Some 3½ per cent of the jarrah forest is underlain by economically viable ore bodies and so far about 0.3 per cent of the forest has been mined, cleared, and rehabilitated. The mining cycle contains ten stages.

MINING

1. All usable timber is removed from the mining area. The remaining scrub and waste is burnt.
2. The 10-20 cm of topsoil in any landscape is the most vital part of the soil. In a forest, this layer contains most of the nutrients plants need to grow. In W.A. forests, the topsoil is also a reservoir for the seeds of all the fire-dependent scrub and understorey plants.

Before mining starts this layer of topsoil is 'stripped' back and placed on a mine pit that is to be rehabilitated. Once the ore has been removed topsoil from a recently stripped site is put on the pit.

3. The remaining soil and rock overlaying the ore is stripped off.
4. Large plates of the cap-rock are broken up by blasting.
5. The exposed ore is trucked out to a mobile crusher. From the crusher an extensive conveyor belt system carries the ore to the alumina refinery near Pinjarra.

REHABILITATION

The mine pit is an inhospitable environment for any plant. What was once a freely drained piece of upland is now a hole in the ground, prone to waterlogging in the winter and dehydration in the summer.

Rehabilitation must recreate an environment in which a new forest can grow and sustain itself.

6. The steep faces of the mine pit are reshaped with bulldozers and scrapers and blended into the adjoining landscape.
7. Banks of earth following the contours of the slopes are formed to prevent erosion while the new forest is being established.
8. Topsoil is bulldozed back over the area, and cultivators are used to 'rip' the soil and rock to a depth of 1.5 m to allow water to penetrate.
9. At the start of the winter rains, the mine site is sown with native scrub and jarrah seed and the area is planted with seedlings.

10. Research scientists monitor replanted mine areas to follow the development of the new forest.

Take the Mining Walk Track to see the bauxite mining rehabilitation process. The 1 km walk will take about 30 minutes.



Bauxite Rehabilitation Site.



Dying Trees Suffering from Dieback.

A Graveyard of Trees (STOP 5) _____

The forest is dying. Look around you. Notice how open the forest is, how many of the large trees are dying back from the uppermost branches?

This is a patch of forest attacked by jarrah dieback. Many of the understorey plants such as banksias, blackboys and zamia palms are dead. The larger jarrah trees struggle on, but every year they lose more roots, and it becomes harder to get the water and nutrients they need.

'Jarrah dieback' is the local name for a plant disease that has spread throughout the world. The 'disease' is caused by a microscopic fungus, which grows and breeds in moist, warm soils. *Phytophthora cinnamomi* - the cinnamon fungus.

Jarrah dieback had been noticed in the forest since the early 1920s, but before World War II patches of dying trees were few and far between, and often the effects of the disease were probably less severe than the natural death and decline of trees through fire or drought.

The causes of dieback were not known then and little attention was paid to what seemed a small problem.

THE WHEELS OF PROGRESS

The 1950s and '60s saw an influx of motorised transport into forests. Many roads were constructed for timber industry and forestry use, the first SEC power lines were established, new and more efficient rubber-tyred logging machinery moved into the forest, mining areas were allocated for bauxite extraction - W.A. was entering the minerals 'boom', and economic growth was again the first priority.

Gradually, and then more rapidly, the disease spread. In the moist soil clinging to vehicles and in the gravel used to surface roads, the spores of the cinnamon fungus spread quickly throughout the western forest.

By the mid-1950s forest managers were worried. Thousands of hectares of jarrah forest were dying, and no-one knew why.

Research programs were launched by both Government and private organizations, and in 1965 Frank Podger of the CSIRO identified *Phytophthora cinnamomi* as the primary cause of death in afflicted jarrah trees.

DON'T PANIC!

The identification triggered alarm amongst forest managers, research scientists and conservationists.

In some quarters, dieback was heralded as the end of the jarrah forest. The number of plant species affected by the fungus was frightening. Not only jarrah, but a host of understorey plants and wildflowers including banksias, blackboys, zamia palms and sheoaks, were highly vulnerable, and in some areas all the vegetation collapsed in a single season. These areas became known as dieback graveyard sites.

After the initial alarm it was noted that only a small percentage of the infected areas became 'graveyards'; in others, even susceptible species clung on year after year, and although some trees started dying back, they seemed able to resist the disease.

The susceptibility of different sites is currently being studied at CALM's Dwellingup Research Centre.

The Dieback Walk Track (a 500 m walk) will show you the effects of this destructive fungus.

Oakley Dam and Granite Outcrop (STOP 6) _____

Oakley Dam is perched on the western edge of the Darling Scarp amidst large granite boulders.

The plants growing here are unique amongst the vegetation of W.A. Many are adapted to conditions on granite rocks: exposed to wind, waterlogged in winter and dry in summer.

Many species of flora grow on granite rocks. Trees and shrubs take root in the soil pockets in narrow rock fissures and most small plants complete their whole life cycle in the few wet months before the summer drought.

Here you will find orchids (Orchidaceae) and the insectivorous sundews (*Drosera*). Cushion plants (*Borya nitida*) are also common. The aquatic flora includes the mudmat (*Glossostigma drummondii*), *Crassula* and the water milfoil (*Myriophyllum*), and tall sedges (*Lepidospermum*).

Granite rocks are often refuges for plants which were once more widespread. A number of rare Western Australian plants are restricted to granite rocks and their vicinity.



Granite Outcrop (Oakley Falls).

South Dandalup Dam

The Dam

This valley, now underwater, once supported the small but vigorous community of Banksiadale. Traces of gold were found in the 1890s, and a great deal of prospecting was done without much success. The valley was a supply route between farms in the east and markets in Fremantle, and many loads of sandalwood found their way along this path.

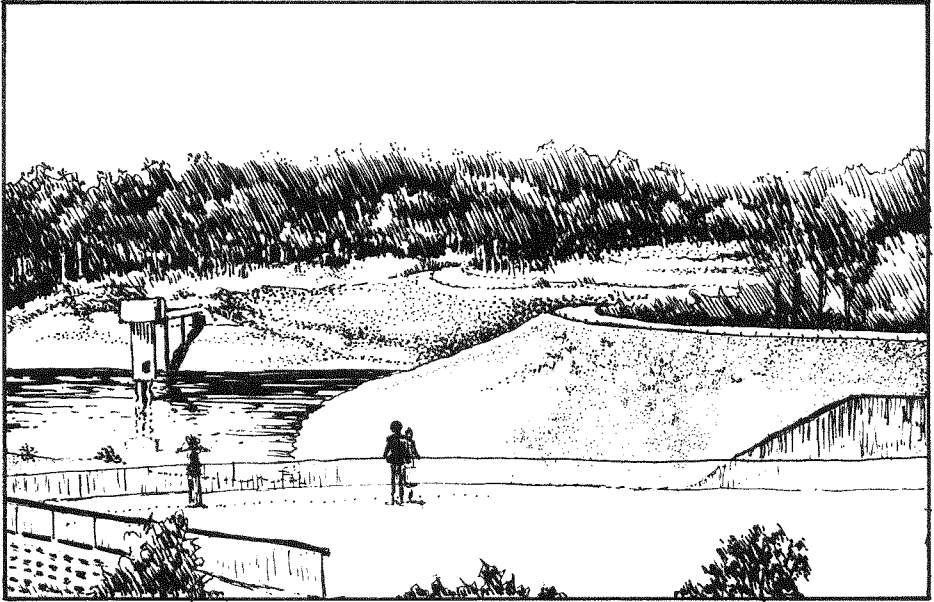
The dam was begun in 1968. Its foundations are on a natural rock bar below which the river falls steeply to the coastal plain. Above, the stream flattens out to provide good storage capacity. Opened in 1974, it has a capacity of 208 million cubic metres, more than a third of the total capacity of dams in the Darling Range.

The role of the jarrah forest in water catchment.

Fresh water is the most important product of W.A.'s jarrah forest. For more than 80 years, jarrah forest catchments (the area of forest that supplies the dams with water) have been a major source of fresh water for the South-West and Goldfields regions. More than 80 per cent of Perth's water supply comes from this forest.

The movement of water in the forest is a cycle. Rain falls on the forest. Part of it evaporates almost immediately, the rest reaches the ground and percolates down through the soil. Some of it is absorbed by plant roots and taken to the leaves where it is evaporated (transpiration). Water that is not evaporated directly or transpired by plants flows underground (groundwater) via rivers to the ocean, and the cycle begins again.

Salty water is a major problem in W.A. Large amounts of salt are stored in some forest soils just above the



South Dandalup Dam.

groundwater. Western Australia's rain, which comes from the Indian Ocean, contains much salt. Plants absorb only the water in the soil, and over thousands of years, large quantities of salt have built up. When forest plants are disturbed or removed, more water moves through the soil and salt is washed into the streams.

In the western parts of the Darling Range where rainfall is high, soils generally contain less salt. Removing the forest here can increase the yield of fresh water to the streams, and mining and logging in the west do not affect the amount of salt in the State's water supply. In the east where rainfall is lower, the soils hold large amounts of salt and large areas of landscape are 'salt affected'. To combat the salt problem agricultural clearing has been stopped in some catchment areas, and badly affected areas are being revegetated.

The Forest and Recreation

The urban sprawl in W.A. is spreading. Every year more and more people leave the city on weekends and holidays seeking recreation in the forest.

Camping, hiking, fishing, canoeing, picnicking and sightseeing are just some of the activities that people seek space for in the forest.

FAR FROM THE MADDING CROWD

Gradually the forest is assuming a new importance in our society. Looking out from the windows of suburbia, the bush becomes a symbol of many things. It is the ideal setting for a barbecue, the home of marron and trout, the place of clean air, the smell of gum leaves, natural living: this is the great Australian outdoors.

DECREATE

Twenty years ago or more, the number of people seeking a 'bush experience' of the picnic kind had little effect on the environment. Areas that were used regularly had time to recover during winter.

What does the forest need to recover from? A barbecue seems an innocuous enough activity, fishing is a passive and relaxing sport,

The impact of people on a delicate environment can be subtle - and not so subtle. On a typical long weekend as many as 5 000 campers and forest visitors have been counted in less than 10 km of riverfront.

Vehicles erode tracks and crush vegetation, the soil in heavily used areas becomes like concrete, so compacted that native vegetation cannot regrow in it. Litter and waste disposal becomes a serious problem from aesthetic,



environmental, and health points of view. Insensitive off-road vehicle and trail bike users may cut swathes through untouched areas and spread plant diseases into unaffected forest. The indiscriminate lighting of camp and cooking fires creates a serious fire hazard, particularly during summer months. Over several seasons the most popular spots become more and more degraded - dustbowls in summer, and mud wallows in winter.

..... AND RECREATE

Forest managers must cater for the demand for forest recreation, yet at the same time must keep to a minimum the potential damage to the environment. The secret is controlled access: the selection of areas specifically for recreation which can withstand heavy use, and will recover from it.

Upgraded roads prevent erosion and withstand more traffic. Parking areas allow access for people, without the destruction caused by cars. Fireplaces and tables lower the fire risk and focus people use on the resilient spots. Walk trails limit the indiscriminate trampling of unique and rare plants, while enabling people to get into the bush.

Toilets and rubbish bins help to minimise the waste disposal problem. Staff clean up areas after long weekends and holidays. Cut firewood helps to dissuade campers from cutting down the nearest tree.

All are tactics for helping to conserve the environment, but without the co-operation of forest visitors they are merely fingers in the dam wall.



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