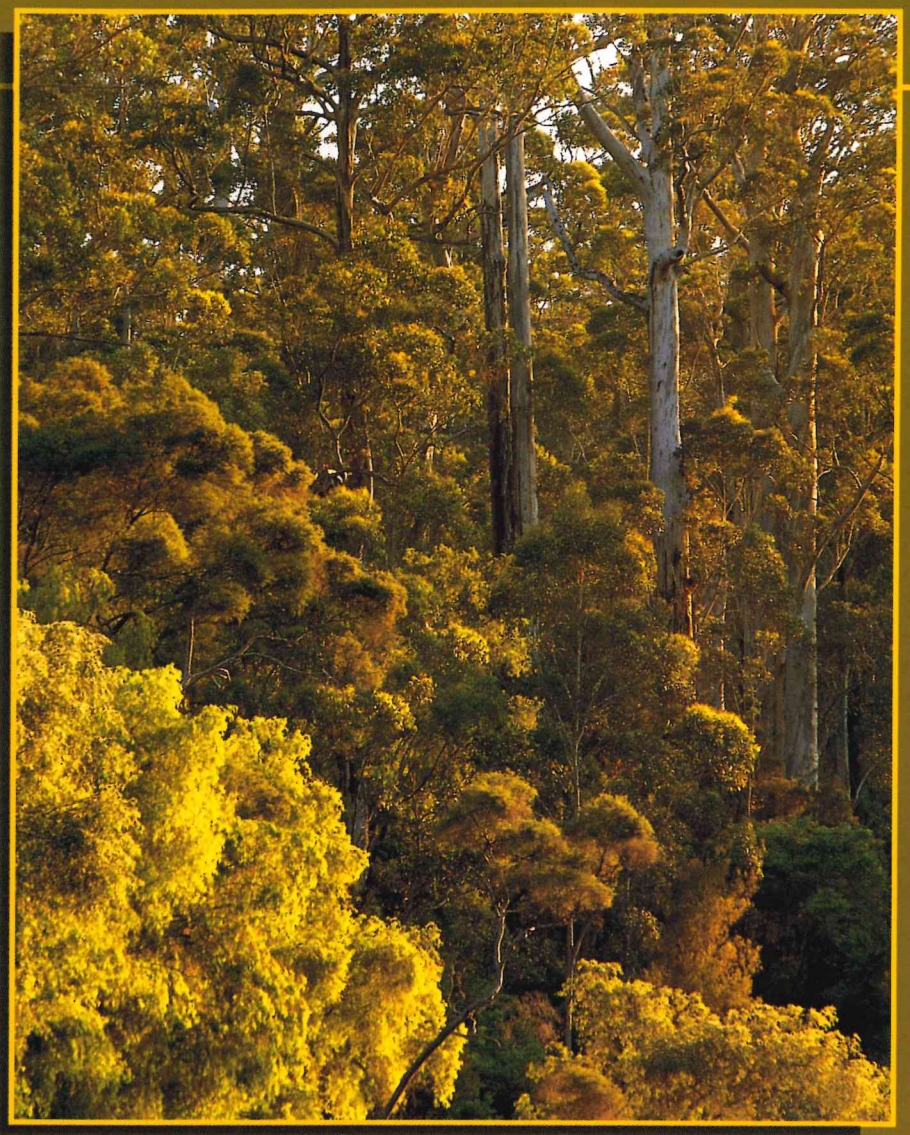
FORESTS FOR THE FUTURE

by Syd Shea
and Roger Underwood

Reprinted from
Landscope, Volume Six, No. 1
Spring Edition 1990

Department of Conservation and Land Management
Western Australia



FORESTS FOR THE FUTURE

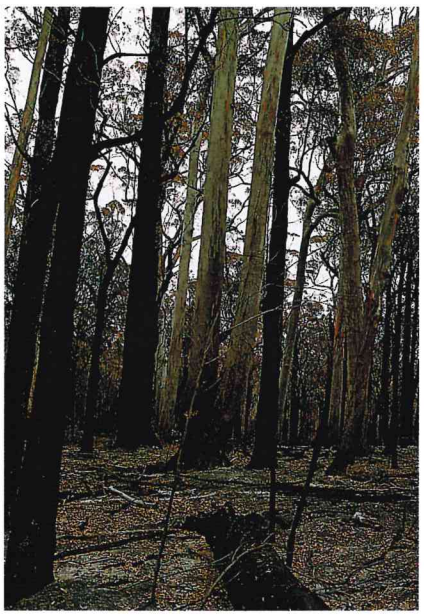
by Syd Shea and Roger Underwood

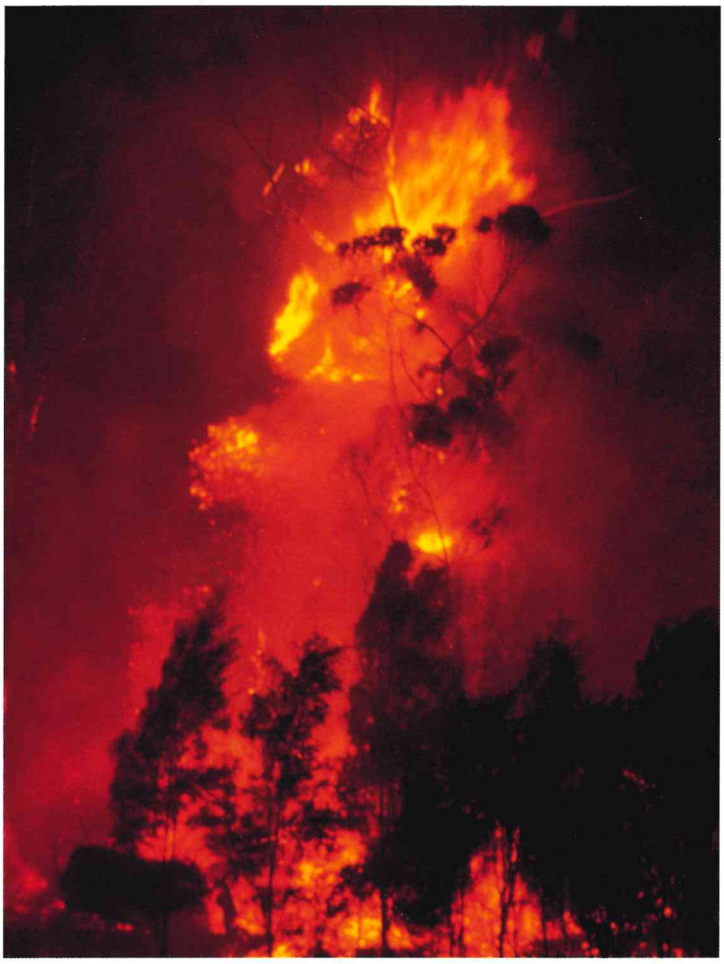
We need our forests. They mean protection for our wildlife, our water, our vegetation, even our oxygen. They are also beautiful and interesting places, with values which we would sorely miss if they were gone. But we have also found a myriad of uses for the timber - and although we may wish otherwise, timber can only be obtained by felling trees. Fortunately, the forests can be sustained - in ways that will protect all our values. Syd Shea and Roger Underwood explain how forests function and how, with good management, they can be used and sustained.

WHEN Europeans first arrived in the South-West of Western Australia, it was densely wooded. It is this fact that encourages some people to believe that the land was virgin - having had no management, no 'interference'. But Aborigines, who had lived and travelled throughout the South-West for at least 40 000 years, had most certainly 'managed' the land. They fired the forests to make hunting easier and to regenerate favoured plants, and they used forest products - including timber - to construct shelter, to use as fuel, and to make canoes.

Even before the Aborigines, the 'virgin' forests were not static, idyllic ecosystems. In the short time since scientific observations of the forest began, catastrophic disturbances of forest ecosystems have been regularly noted. They have come from fire ignited by lightning, and from cyclonic windstorms. These have caused dramatic changes in the forests. In 1961 the Dwellingup wildfire, which was started from 18 lightning strikes, resulted in 200 000 hectares of forest being burnt - causing extensive mortality of flora and fauna.

We will never know in detail the composition of our ancient forests, but we can partially reconstruct it by careful counting of tree ages in different 'virgin' stands and by analysis of historical data. Forest scientist Martin Rayner is one of many to have attempted this task. His analysis of the structure of karri forests, achieved by determining the age distribution of trees in 'virgin' stands, provides us with some objective data.





Wildfires and other major natural catastrophes, such as cyclones, have had a major impact on forest structure and composition.
Photo - Rick Sneeuwjagt ▲

Thousands of old growth karri trees were killed or severely damaged by a wildfire in the Walpole-Nornalup National Park in 1987.
Photo - Lachlan McCaw ◄

Some areas of the forests originated as large stands of trees of equal ages, almost certainly as a consequence of a large high-intensity fire, while in others the patches of such evenly aged forest were smaller. In still other areas there is an irregular distribution of ages, probably as a consequence of a series of smaller, less intense wildfires. Historical measurements of the structure of karri forest stands demonstrate how, as a consequence of rapid growth and intense competition between trees, the structure of a forest stand changes dramatically over time.

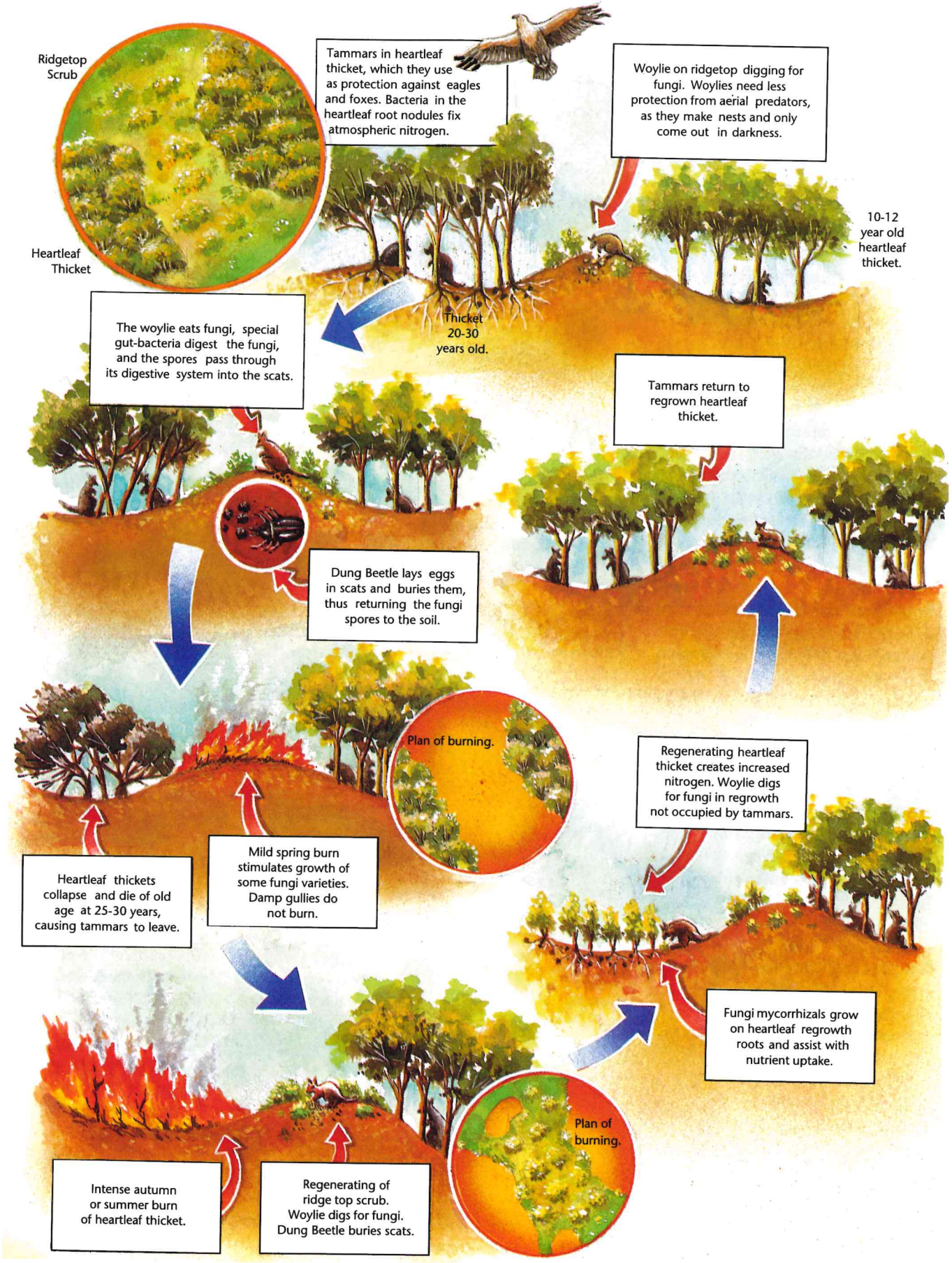
Fire and other catastrophes have played a major role in forest structure and composition, but superimposed on these random events is the response of site characteristics and the forest ecosystem to disturbances. For example, on more fertile sites there is greater accumulation of litter, making them more prone to frequent high-intensity fires. In the karri forest, the seed-cycle is a further factor. Karri trees are killed by hot fires but do not produce abundant seed crops annually; after a hot fire, therefore, the karri would regenerate either abundantly or hardly at all, depending on the state of the seed crop in the tree crowns.

Even before Aborigines began to manage the forest, its age and structure would have been constantly changing. At any one time, the karri, jarrah and wandoo forests probably consisted of a mosaic of stands of different ages and structures. The size of each patch of forest would have fluctuated over time, and the trees could have been young, old or mixed, depending on the sequence of natural events in the preceding years. The only constant factor in our forest ecosystems is change.

How do animals and plants survive in such a ruthless environment? Individual plants and animals don't; but nature's compensation for its terror is to develop bizarre synergistic processes that help to ensure the survival of the species. The benchmark work of CALM forest ecologist

THE COMPLEX WEB

CALM's FIRE MANAGEMENT IN THE FOREST MAINTAINS THE COMPLEX WEB OF INTERACTING NATURAL PROCESSES



Dr Per Christensen on the ecology of the tammar wallaby and the woylie demonstrates how plants and animals have developed systems that enable them to survive in these forest ecosystems.

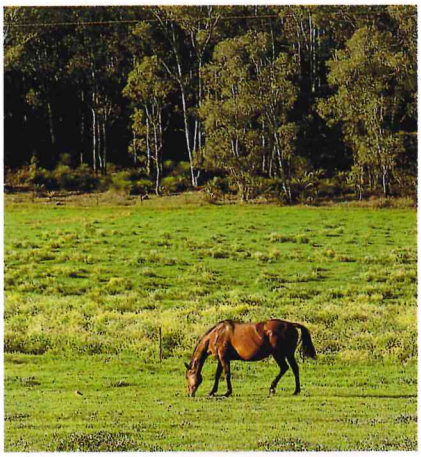
This complex web of interacting processes, far from being fragile, needs the trauma of periodic hot fires to function. This system is vulnerable - not to violence, but to changes that impose uniformity, and to the introduction of factors not subject to nature's checks and balances. Imposing a no-burn regime in this ecosystem would eventually eliminate the tammar and possibly the woylie, while introducing the fox to WA has posed a threat to these animals second only to the clearing of native vegetation.

THE EUROPEAN IMPACT

The arrival of Europeans in Western Australia had a traumatic impact on the forests of the South-West. For them, forests were either an impediment to agriculture or a seemingly endless storehouse of valuable timber. Between 1830 and 1930, millions of hectares of forests and woodlands were cleared for crop and pasture, and further millions were taken up for sheep and cattle grazing. The hardest hit were the Wheatbelt, with its magnificent York gum, salmon gum and wandoo woodlands, and the karri country, where group settlers ringbarked over 20 000 hectares of prime forest to create dairy farms. During the same period a large timber industry was established, producing timber for export, for building work in the growing cities, and for the railway lines snaking off across the new farmlands of the State.

It was not the tree-clearing in itself that had a great impact. It was the extent of the clearing. What took place allowed men and women to settle the country, and they and their successors' endeavours have created much of our wealth today. But one cost was a large reduction in the area of native forest.

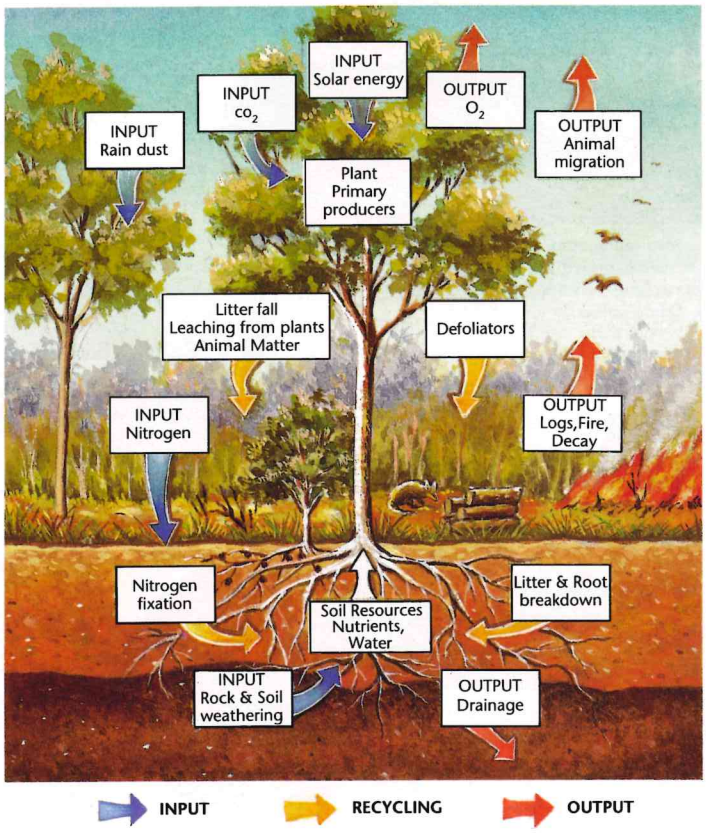
Every Conservator of Forests, since that position



was created in 1896, has fought to secure the native forest. The battle became so bitter that early foresters like Charles Lane Poole were forced to resign because of the stand they took to protect the forests. Farming interests, miners, industry groups and shire councils saw the creation of new State forests as a land grab, with areas of potential development being locked away. Unlike today, there was no vocal community voice in support of conservation.

In the early days of European settlement, millions of hectares of forest were cleared for agriculture.
Photo - Jiri Lochman ▲

Forests are solar powered and are the ultimate example of recycling.
Illustration - Yeon Hee Kim ▼



By 1933, however, the area of State forest had increased to 1.2 million hectares. There was a setback in the years immediately following World War II, when superb wandoo forests in the Tone River area were cleared for soldier settlements (against the recommendation of the Forests Department) but by 1970 1.8 million hectares of forest were at last permanently reserved and made secure.

SUSTAIN THE YIELD, MAINTAIN THE FOREST

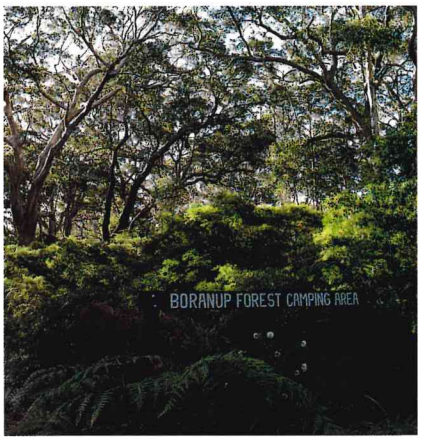
The success of the earlier foresters in securing the forest estate was not only signficant for conservation and the forest industries. If large areas of the forest had been cleared for agriculture, it is probable that the water that now comes from forests and catchments of the South-West of the State would have been too salty for human use. Ironically, whereas the forest managers of the past fought bitter battles to secure the forest estate, today they are portrayed by some as the enemies of forest conservation.

The way our public forests are managed and used must ultimately be decided by the owners - the community. It is the role of forest managers to provide the options, explain the scientific basis for them, and describe the environmental, economic and social consequences of each.

Australia is trying to balance environmental protection and economic development by creating strategies for ecologically sustainable development. This concept is still being debated, but the broad principles set out in the Commonwealth Government's discussion paper on the subject would be accepted by most community members. The principles are:

- integrating economic and environmental goals;
- valuing environmental assets;
- providing for future as well as present generations;
- dealing cautiously with areas of risk and irreversibility; and
- recognising the global dimension.

The endangered tammar wallaby needs vegetation aged 4-30 years to survive.
Photo - Jiri Lochman ▲



Boranup campsite, near Margaret River. Recreation is an important use of the forest, along with protection of water catchments, timber production and conservation.
Photo - Marie Lochman ◄

In forest management, the principles of ecologically sustainable development are fairly easily implemented (see box). Forests are fuelled by the sun and most of the fuel additives (nutrients) are perpetually recycled. Nitrogen, the additive that can be lost to the atmosphere because it is volatilised by fire, is replaced as a consequence of 'joint ventures' between specialised forest plants and micro-organisms. The plants provide food, the micro-organisms provide nitrogen from the limitless supplies in the atmosphere. Water is used by forests but eventually is recycled, and the interest for the loan comes in the form of pure streams and stable soils. The great bulk of the forest, and specifically the timber products that can be derived from it, is recycled carbon obtained from the atmosphere. Finally comes the bonus, one of the most important by-products of forest activity: pure oxygen.

NO MANAGEMENT - NO FOREST

No matter what balance of uses is decided for Western Australian forests, there is no option but to manage them. The natural processes that make our forest resilient are vital, but to leave them unchecked would be unacceptable to the community and would ultimately lead to severe degradation of forest ecosystems. Fauna which once had vast areas of suitable habitat are now confined to small areas of forest, because of forest clearing and predation by introduced animals. If fire alone is left to run its course, in addition to loss of life and property, whole populations of rare mammals such as the tammar wallaby, woylie and numbat could be destroyed. Furthermore, introduced pathogens such as the fungus that causes dieback have the potential, if left unchecked, to degrade forest ecosystems further.

The social and economic factors which impinge on the way our forests are used and managed rival the complexities of our forest ecosystems. But there are two major critical issues that need to be resolved if we are to achieve the goal of ecologically sustainable development of our forests.

The balance of uses. The principle of equity demands that each use of the forest - water catchment protection, recreation, conservation and timber production - is fairly provided for. With skilful management, it is possible to achieve this. Some uses, such as the production of high-quality water, can be accommodated in the same areas of forest all the time. Other uses can be accommodated by distributing them in time and space. At the time of timber harvesting, the forest cannot be used for recreation and conservation, but so long as the forest is regenerated, it can provide recreation and conservation values too. Unmanaged recreation can conflict with conservation values, but by dispersing, managing and alternating recreation sites, recreational use can be made compatible with other values.

The major forest use conflict today concerns the proportion of old growth or 'virgin' forest to be protected from timber harvesting. Even though the regrowth stands of today are the old growth stands of the future, there must be a proportion of old growth forest protected from timber harvesting and, where possible, from natural traumatic disturbance to provide for the aesthetic and conservation values that have a special significance to the community.

Sustainability. Achieving a balance of uses at one point in time, even over a full generation, is not enough. Each use of the forest must be sustainable, to ensure that future generations enjoy the same forest values.

The concept of sustainable yield in the forest is as old as the profession of forestry, and is its basic tenet. Each year, a forest produces a given quantity of wood. If the forest is to be sustained, the quantity harvested each year cannot exceed the annual increment. Where there is a succession of age classes, the concept is relatively easy to apply. But in most native forest systems, there is often imbalance between different age classes. Consequently, while overall forest growth

Boranup Forest has regenerated since the area was virtually clearfelled nearly 100 years ago. The WA Parliament has recently approved the exclusion of this forest from State forest and its inclusion into the Leeuwin-Naturaliste National Park. It will become old growth forest for future generations.
Photo - Marie Lochman ▲

is usually much greater than the amount of timber taken from it, the actual harvest of forest products may vary over time because the proportion of different ages and sizes of trees is different.

The concept of sustainability must also be applied to forest values. For example, to conserve the tammar wallaby and the woylie, we must maintain a perpetual succession of habitats. If we are to sustain all the habitats needed for flora and fauna, and to ensure that future generations can experience old growth forests, it is essential that the full range of age classes are represented. Thus the peculiar habitat requirements of flora and fauna will be met, and as the old growth forest eventually declines it will be replaced by the regrowth forests of today.

The processes that maintain the forest should not be degraded. Soil fertility must be maintained by ensuring that the soil nutrient levels are sustained and that the physical soil structure is maintained. Water quality and the flow of water through the ecosystem must be maintained at levels which perpetuate the ecosystem.

STRATEGY AND PLANNING

Western Australia's forest management practices and the way that the forests are used are set out in Forest Management Plans and the Timber Strategy, which was endorsed by the Government in 1987 after extensive community participation.

One of the major achievements of these management plans was to set up secure conservation reserves that represent every major forest ecosystem. When the reserve system is completed, there will have been a 340 per cent increase in the conservation estate within the South-West forests. In these reserves the priority use is maintenance of the ecosystem and use of the forests for recreation. All timber harvesting activities are excluded. Thirty-one per cent of jarrah reserves and 76 per cent of karri reserves are old growth virgin forests, the majority of which represent the finest examples of this age-class of forest.

The remainder of the unreserved forests are managed under the principle of multiple use, which includes timber harvesting. Features of this multiple-use strategy are:

- Every hectare of forest which is harvested (less than one per cent of State forest is harvested each year) is regenerated.
- The systems of harvesting and regeneration simulate the dynamic processes that caused changes in the structure and composition of the forest before the arrival of Europeans.
- All available scientific evidence indicates that if the forest is regenerated, the succession of animals and plants in the regrowing forests duplicates what would have occurred under natural processes.
- There is no evidence that any plant or animal species is endangered by any forest management practice, including timber harvesting.
- Extensive research and monitoring shows that managing the forest has not degraded the water quality of any stream or river in any forested catchment.
- There is no evidence that any ecosystem process (e.g. nutrient recycling) in forests managed for multiple use has been disturbed sufficiently to degrade the ecosystem.

Warren National Park, near Pemberton. A large proportion of WA's forests, representing every major ecosystem and including the best old-growth forest, are now in secure reserves.
Photos - Jiri Lochman

- The quantity of wood products removed from the native forests managed for multiple use is significantly less than the annual increment of wood.
- The area of the native forest estate has been maintained.

THE VISION - AN EVERLASTING FOREST

While existing forest management practices and uses meet most, if not all, of the principles of ecologically sustainable development, forest management, like forest ecosystems, is continually changing and improving. As a consequence of the success of the Timber Strategy (see p.42) more resources are available to refine forest management, and the greater use of forest products provides the opportunity

TREES CAN HELP TO SUSTAIN AGRICULTURE

In Western Australia agriculture has achieved high levels of production in a difficult natural environment. But there is now widespread appreciation that the replacement of native vegetation with shallow-rooted annual crops and pastures has caused a disruption to the hydrological system, which has a major adverse effect on the environment.

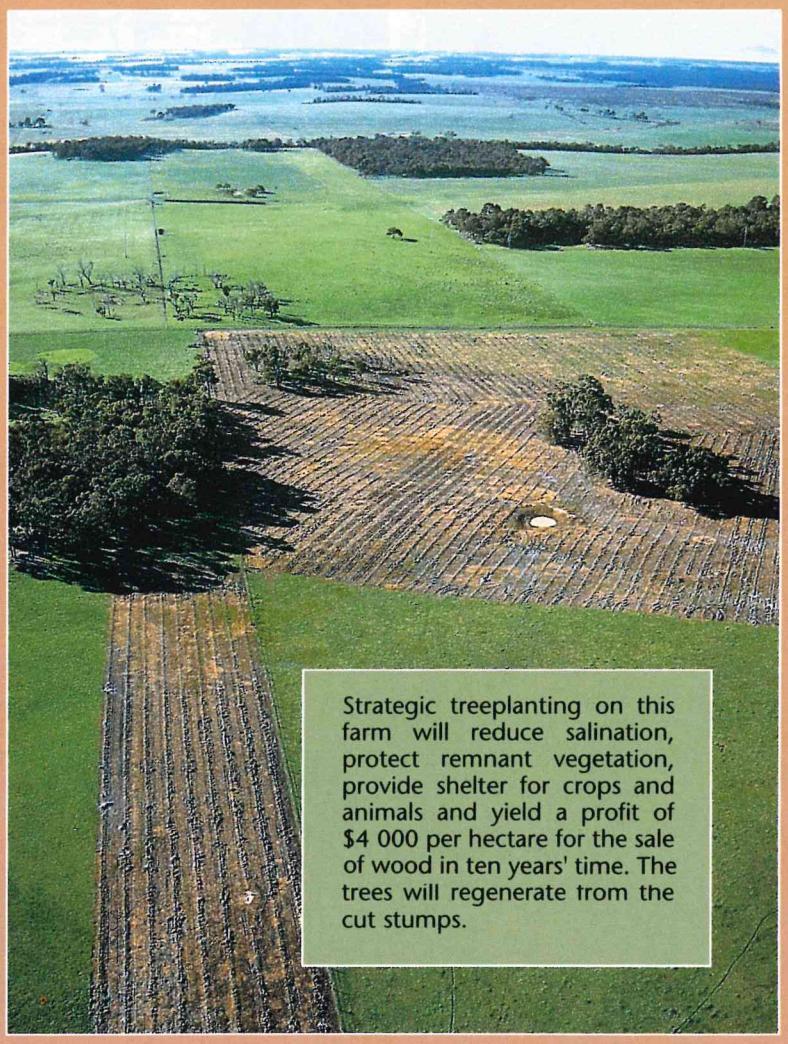
The agricultural crops consume less water than native vegetation, and as a consequence there have been marked increases in water table levels. In many areas this has led to salination of streams and rivers, and the loss of fertile valley soils because of salination and/or waterlogging. It is also one of the causes of significant degradation of native vegetation on farms.

The challenge is to retain the benefits of agricultural production while at the same time addressing these major environmental problems.

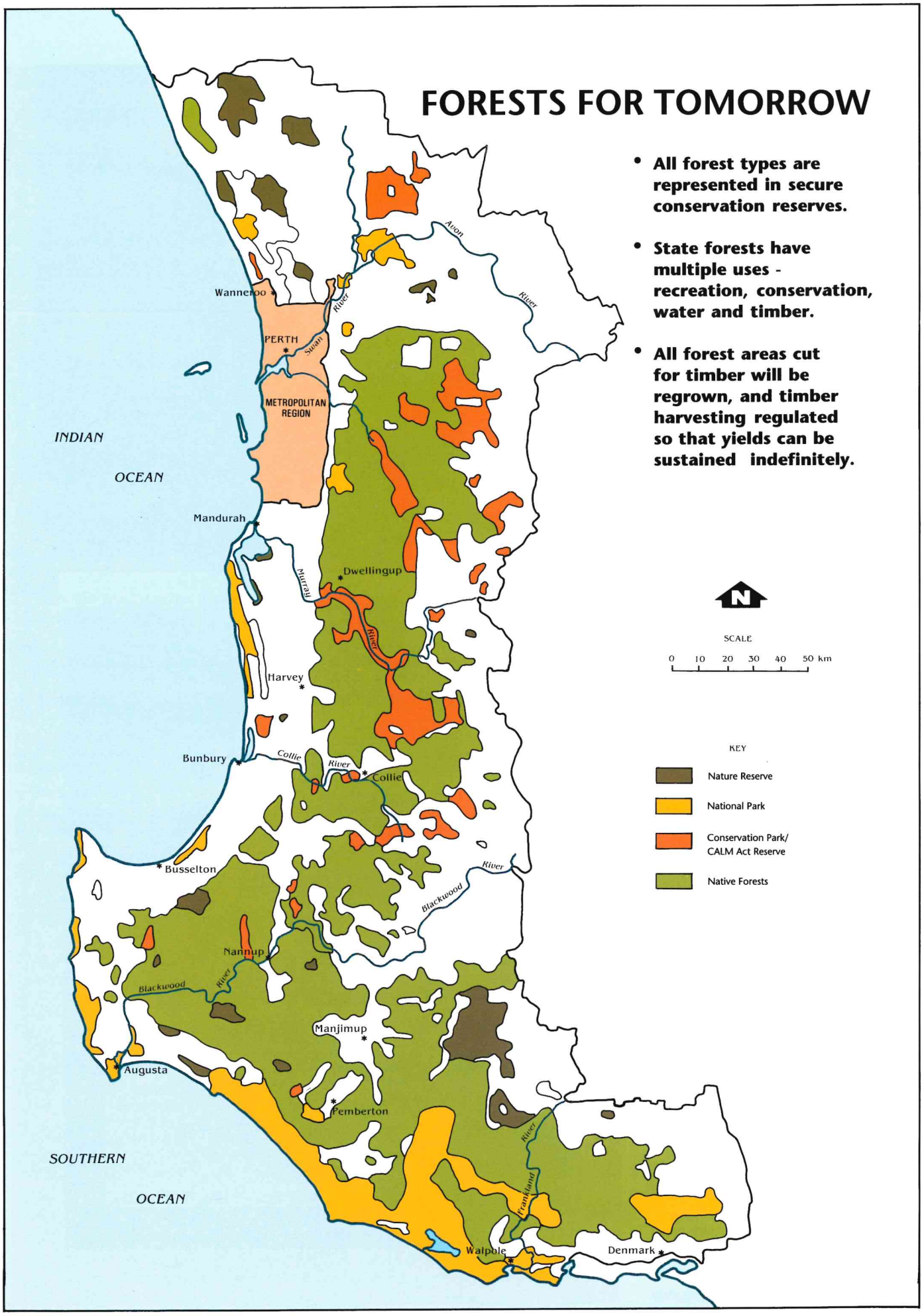
Over the past decade, major progress has been made in developing economic tree crops that can be integrated into farming practice.

It has been demonstrated that these tree crops can rapidly restore the hydrological balance by reducing the water table. In addition, research has shown that the combination of tree crops with agriculture can, if carefully planned, result in higher agriculture production because of the beneficial effects that tree shade and shelter have on crops and stock.

Over the past four years, CALM has established more than 8 000 hectares of trees on farms in partnership with farmers. In addition to solving the major regional and on-farm environmental problems resulting from the clearing of native vegetation, this project can provide a new source of income for farmers.



Strategic treeplanting on this farm will reduce salination, protect remnant vegetation, provide shelter for crops and animals and yield a profit of $4 000 per hectare for the sale of wood in ten years' time. The trees will regenerate from the cut stumps.

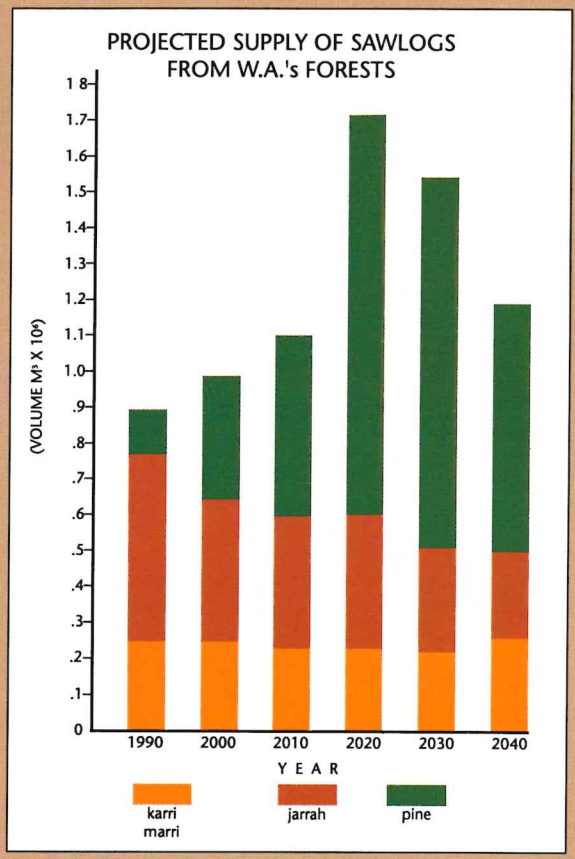

FORESTS FOR TOMORROW
• All forest types are represented in secure conservation reserves.
• State forests have multiple uses - recreation, conservation, water and timber.
• All forest areas cut for timber will be regrown, and timber harvesting regulated so that yields can be sustained indefinitely.
INDIAN OCEAN
SOUTHERN OCEAN
Wanneroo
PERTH
METROPOLITAN REGION
Swan River
Avon River
Mandurah
Murray River
Dwellingup
Harvey
Bunbury
Collie River
Collie
Busselton
Blackwood River
Nannup
Blackwood River
Manjimup
Augusta
Pemberton
Frankland River
Walpole
Denmark
N
SCALE
0 10 20 30 40 50 km
KEY
Nature Reserve
National Park
Conservation Park/ CALM Act Reserve
Native Forests

WESTERN AUSTRALIA'S TIMBER STRATEGY

The 1987 Timber Strategy was Australia's first long-term strategic plan for any forest industry. This Strategy complemented the Forest Management Plans (which gave security to the conservation estate) and other strategies for recreation and conservation management of the forest.

Just as those concerned with forest conservation required security of the conservation estate, the forest industry's principal concern was security of its resource base. Without it, the timber industry was unable to improve its use of the forest by investing in research and new equipment and by developing new markets.

The Timber Strategy gave security, for the first time, to the timber industry's resource. In exchange for that security, the forest industry accepted the need to pay an increased price for the resource. An essential part of the Strategy was to achieve significant increases in timber royalties. When the phasing of the increases is completed in 1992, the real increase in log prices over the period since 1987 will be in excess of 38 per cent in real terms. In addition, a differential in prices paid for high and low grade logs was introduced. The increase in price and the new structure of royalty payments provided a major incentive for better use of forest resources and an increase in production of value-added products, such as furniture.



As a direct consequence of the Strategy, more than $200 million is being invested by the WA forest industries in new plant or equipment. A major proportion of this investment is directed towards increasing the value of products derived from the forests. Already there have been major improvements in forest use (logs previously burnt or directed to woodchipping are now being sawn) and a major increase in the proportion of sawn timber being produced for value-added products.

Apart from the major increases in revenue to the Government, which has assisted the funding of more sophisticated forest management techniques, the improved use of the forest is providing opportunities for more flexible approaches to forest management strategies. The current restructuring of the forest industries will ensure a more stable industry with increased employment opportunities, and will increase the wealth of the State.

to refine existing practices. It will be possible in the future to disperse forest harvesting operations further, and incorporate into forest management a much more sophisticated stream, river and road reserve system which will enhance conservation values and improve the aesthetics of harvesting operations.

We will never succeed in duplicating exactly the forces of nature which shaped the forest we inherited. But the option of leaving nature to take its course would not be acceptable anyway. However, by understanding the processes of nature in these magnificent forest ecosystems, we can employ management systems that mimic nature. While the community's demands on our forests are often conflicting and will change over time, provided that we continue to manage forests so that they are sustainable, we will ensure that, like our predecessors, we will pass on a forest with the same values as those that we inherited. ◘

Jarrah forest surrounds the Collie River in the Darling Range, providing a pleasant setting for canoeists.
Photo - Jiri Lochman

Dr Syd Shea is the Executive Director of CALM; Roger Underwood is CALM's General Manager. They can be contacted at Crawley on 09 386 8811.

0854-0692-3M