

FORESTRY

FORESTS OF VICTORIA

Introduction

Forests are complex and dynamic ecosystems of living organisms and their physical habitat. The living organisms include plants, animals, birds, fungi, and a vast collection of micro flora and fauna. The physical components of the ecosystem include those associated with the atmosphere, the soils, and the rock formations from which the soils have been derived.

The objectives of forest management vary according to the demand for the benefits that a forest ecosystem can provide and the capability of the ecosystem to supply the desired benefits without detriment to its long-term productive capacity. Forests owned by the community, such as the State forests of Victoria, provide a wide range of benefits both tangible and intangible. The efficient management of forest ecosystems to produce these benefits is a demanding task involving considerable resources of skilled manpower, finance, and equipment. The services of a wide range of expert personnel are required, including foresters, botanists, zoologists, pathologists, entomologists, hydrologists, engineers, surveyors, management specialists, economists, sociologists, landscape architects, and administrators.

Approximately 35 per cent of the total land area of Victoria is occupied by forests. This represents an area of 7,930,000 hectares, of which 6,740,000 hectares are State forest being managed by the Forests Commission, Victoria. While 2,279,069 hectares of the State forest are classified as reserved forests, the remaining 4,450,000 hectares are protected forests. The reserved forests are permanently reserved as forest land and can be excised or alienated only in exchange for other areas of Crown or private land. The protected forests are not permanently reserved although the Forests Commission is responsible for their management.

The major belt of forest in Victoria is located in the eastern half of the State extending from a point to the north of Melbourne to the New South Wales border. This area forms the southern end of the vast and continuous belt of forest that straddles the Great Dividing Range along the length of the east coast of Australia. Other extensive areas of forest in Victoria are situated to the north-west of Melbourne, in the South Gippsland Ranges, the Otway Ranges, the south-western region, the Mallee, and the northern and central parts of Victoria where forests of red gum, ironbark, and box are present.

Types

The forests of Victoria embrace many types ranging from the tallest of hardwood forests in the world, which occupy the cool mountain regions in the east, to the stunted mallee heathlands of the arid north-west. The main types recognised within State forests are mountain forests, stringybark forests, red gum forests, ironbark and box forests, arid woodlands, arid heathlands, and forest plantations. The majority of native forests are hardwoods, while most forest plantations are of softwood species.

Mountain forests

The mountain forests occupy about 773,100 hectares of the cool, high rainfall country in the Central and Eastern Highlands, the South Gippsland Ranges, and the Otway

Ranges. The forests comprise two main types, namely, sub-alpine woodland, and ash forests of alpine ash, mountain ash, and shining gum.

The sub-alpine woodland occupies the highest elevations in the State ranging from approximately 1,400 metres to 1,800 metres. It covers about 124,900 hectares in Victoria and typically consists of snow gum forests interspersed with snow grass and herb plains. Because they occupy an area where the climate is severe, sub-alpine woodlands must be carefully managed to ensure the protection of vegetation and soils.

The sub-alpine woodland yields large quantities of water which is used for domestic, irrigation, and hydro-electric purposes. It also provides an environment suitable for specialised recreational use, including intensively developed ski resorts, scenic roads, and walking tracks. The alpine walking track, which is planned to extend along the total length of the Great Dividing Range, passes through sub-alpine woodland for a considerable portion of its length.

The ash forests of alpine ash, mountain ash, and shining gum extend from the lower limits of the sub-alpine woodland down to elevations of approximately 600 metres, or lower on some southern aspects. They occupy the cool, moist regions to the east of Melbourne and in the South Gippsland and Otway Ranges, and cover a total area of approximately 650,000 hectares, of which 280,000 hectares are reserved forests and 320,000 hectares are protected forests.

The mountain forests play an important role in Victoria's economy because they are among the most productive forests in the State, yielding large quantities of wood and water, and providing an environment for recreational activities. They produce large volumes of timber of seasoning quality, and the majority of the hardwood pulpwood used by the paper making industry in Victoria. They occupy significant portions of the catchment areas used to supply water to major population centres. The very tall trees and dense understorey of shrubs and ferns found in ash forests provide magnificent scenery, and afford an excellent habitat for well known wildlife species, such as lyrebirds, possums, and wallabies.

Stringybark forests

The stringybark forests of Victoria include a wide variety of forest types in which various stringybark eucalyptus and associated species occur. They are the most extensive of the Victorian forest types and occupy practically all of the forest land on the coastal plains, and in the foothills to the north and south of the Great Dividing Range up to elevations of 900 metres. The total area of stringybark forests is 4,752,000 hectares of which 1,500,000 hectares are reserved forests and 2,510,000 hectares are protected forests.

The presence of the root-rot fungus *Phytophthora cinnamomi* (Rands) in the stringybark forests is currently causing concern. Sections of the coastal silvertop forest in eastern Gippsland and other stringybark forests in south-west Victoria have been damaged, and in some cases killed, by the fungus. A detailed research programme is currently in progress, and in the meantime controls have been imposed to restrict the spread of the fungus through transfer of soil by trucks and tractors.

The stringybark forests provide wood, water, and recreation. They yield some 65 per cent of the total volume of timber produced from State forests. The principal uses of the timber are for house framing, general construction, and wood pulp for hardboards, paper, and packaging material. A large portion of the total yield is now coming from the extensive forests of eastern Gippsland. Some areas of intensively managed stringybark forest in the central part of Victoria have been producing regular timber yields for up to eighty years. In western Victoria, where they are practically the only reserves of original native vegetation, they are an important source of timber for farm buildings, fencing, and fuel.

Stringybark forests occupy the water catchments of many cities and towns in Victoria. They are rich in birds, animals, and wildflowers, and their distinctive character makes them an attractive location for recreational activities. They attract large numbers of day visitors throughout the year, and are frequently used for fishing, camping, and hiking, especially during the early summer and autumn months.

Red gum forests

The red gum forests are the most widely distributed of the Victorian forest types although their total area is relatively small. Extensive areas of river red gum can be found along the flood plains of the Murray River downstream from Cobram, and along the northern reaches of its tributaries. Savannah woodlands of red gum occur on the western plains and the species is common along watercourses throughout most of Victoria.

The red gum forests produce substantial quantities of wood and are extensively used for recreational pursuits. In addition, they play an important role in the control of water flows along the Murray River system and its tributaries. The forests have supported a viable timber industry since the earliest days of settlement. Red gum timber is used for sawmilling, sleepers, posts, and piles, and because of its strength, durability, and attractive appearance it is keenly sought.

The open woodland and gentle slopes of the red gum forests are well suited for outdoor recreation. Roads and tracks are inexpensive to construct and there are many suitable sites for camps and picnics. Streams and billabongs are focal points for recreation and the numerous species of birds and animals associated with the water are major attractions. The red gum forests also provide an excellent grazing area for domestic stock and native animals.

Ironbark and box forests

The major areas of ironbark and box forests occur on poor soils in the north-central regions of Victoria where low rainfall and hot, dry summers are characteristic of the climate. The main forests are mixtures of red ironbark and box eucalypts with the species mixture generally being determined by the fertility and water holding capacity of the soil. The ironbark and box forests are used for fencing timbers and fuel, and they are highly valued for honey production and recreation.

Arid woodlands and heathlands

The arid woodlands and heathlands occupy large areas of the Murray Basin plain in the north-west of Victoria. They are forests of tremendous diversity with a wealth of plant species and many distinct associations. The diversity of these ecosystems is mainly a result of variations in soil type and the history of the areas they occupy. The arid woodlands and heathlands offer environments suitable for recreation and they are of considerable scientific and aesthetic interest. Because they occupy low rainfall areas, and are of a stunted form, they are of relatively minor value for water and wood production.

Forest plantations

The lack of native species suitable for the commercial production of softwood and the presence of derelict farmland have led to the development of extensive forest plantations in Victoria. The total area of these plantations (including privately owned plantations) now exceeds 100,000 hectares, with more than half of the area having been established since 1960. Early planting trials covering a wide range of softwood species indicated that radiata pine was eminently suited to the medium rainfall environments of Victoria, and it has been used in the majority of plantations. Small areas of Corsican pine, maritime pine, ponderosa pine, and Douglas fir have also been established. Mountain ash is the only native species that has been used on any significant scale for plantation purposes.

The prime use of forest plantations is for wood production, but they also provide valuable cover for water catchments, and recreational benefits, such as those obtained from driving, picnics, and general scenic enjoyment. Another benefit from plantation development has been the reforestation of abandoned farmlands.

Management

The State forests of Victoria are managed by the Forests Commission under the *Forests Act 1958*. This Act provides for State forests to be managed to produce a sustained yield of wood, and to provide protection for water catchments, recreational and educational opportunities for people, a habitat suitable for native flora and fauna, and a range of minor forest products such as forage for grazing, honey, essential oils, gravel, and stone. The Forests Commission also has explicit responsibilities under the Act to protect State forests from misuse and damage by fire, insects, and fungi.

In order to fulfil its obligations under the Act, the Commission is organised into functional and territorial divisions. The functional divisions cover administration, forest management, forest operations, economics and marketing, forest protection, and forestry education and research. Territorial organisation is based on seven field divisions each of which is subdivided into a number of forest districts. The forest district is the basic territorial unit through which the management of State forests is implemented. There is a total of 47 districts in Victoria, each of which is under the control of a professional forester.

Establishment and tending of forest plantations

The establishment of plantations to meet future requirements for wood and to reforest derelict areas of farmland continued on a major scale in 1977-78. A total of 1,201 hectares of native hardwood plantations was established during the year, the main planting being mountain species in the eastern Strzelecki Ranges of South Gippsland. During 1977-78, a total of 4,136 hectares of new softwood plantations was established, the whole area of which was radiata pine. Softwood plantings were again concentrated in each of eight development zones, where it is planned to establish an area of plantation sufficient to support large and integrated wood-using industries.

The establishment of softwood plantations on a major scale in Victoria has many beneficial effects including provision of much needed timber supplies, an environment suitable for picnics, pleasure drives, scenery, etc., and reforestation of derelict farmland. However, the establishment of new plantations may involve major environmental changes, and before a plantation is established a considerable amount of research and planning is carried out to minimise undesirable effects. Where a new plantation is to be established within an area of native forest an ecological survey is conducted, and the plantings are located so as to minimise their influence on the environment. Types of native forest that are limited in extent, or are of special ecological significance, are excluded from the planting area. In addition, substantial blocks and corridors of the original vegetation are retained to provide undisturbed habitats for native flora and fauna.

VICTORIA—STATE FOREST SOFTWOOD PLANTATIONS:
ESTABLISHMENT AND TENDING ACTIVITIES
(hectares)

Activity	Area				
	1973-74	1974-75	1975-76	1976-77	1977-78
New planting	5,204	3,546	3,889	5,000	4,136
Re-planting felled areas	296	413	486	388	545
Thinning—					
commercial	1,054	1,026	760	934	396
non-commercial	14	9	32	65	112
Pruning	215	470	391	131	387
Fertilisation	870	1,817	2,110	2,764	3,006
Firming	329	358	430	—	—
Cleaning—					
ground	3,946	7,094	5,090	6,738	5,263
aerial	3,816	2,486	1,915	1,107	1,751

Regeneration and tending of native forests

The regeneration and tending of native forests is aimed at maintaining them in a healthy, productive condition so that they can continue to supply benefits to the community in perpetuity.

During 1977-78, a total of 20,275 hectares of native forest was subjected to regeneration or other silviculture treatment. Labour made available through Commonwealth Government employment schemes assisted considerably in this work.

VICTORIA—TREATMENT OF NATIVE FOREST TYPES IN STATE FORESTS,
1977-78
(hectares)

Treatment	Area treated					Total
	Ash forest	Stringy-bark gum	Box iron-bark	Red gum	Native pine	
Aerial seeding	1,244	410	—	—	—	1,654
Hand seeding	484	596	—	—	—	1,080
Induced seed fall (a)	20	2,798	—	275	—	3,093
Regeneration felling/natural seed fall	10	2,353	100	1,748	—	4,211
Liberation felling	344	1,351	—	670	—	2,365
Thinning	3	1,527	1,537	972	445	4,484
Coppicing	—	20	1,230	—	—	1,250
Other	—	1,797	341	—	—	2,138
Total	2,105	10,852	3,208	3,665	445	20,275

(a) Artificially induced seed fall from standing trees.

Forest protection

The fire danger during 1977-78 was relatively low in the north of Victoria, but very high in the north-east and southern areas of the State. During the season, Forests Commission personnel attended 643 wildfires. These fires burnt a total of 68,610 hectares of State forest and national parks. The area of State forest and national parks burnt in the five fire seasons up to and including 1977-78 is shown in the following table:

VICTORIA—AREAS OF STATE FOREST AND
NATIONAL PARKS BURNT BY WILDFIRES
(hectares)

Year	State forest	National parks	Total
1973-74	16,153	2,060	18,213
1974-75	91,335	3,655	94,990
1975-76	51,166	2,144	53,310
1976-77	118,461	10,379	128,840
1977-78	68,151	460	68,611

The wildfires occurring in the State forests originated from a variety of sources. Of the total number of outbreaks, 19 per cent were attributed to landholders and householders, lightning caused 26 per cent, and deliberate lighting accounted for 16 per cent. The causes of fires attended by Forests Commission personnel during the years 1973-74 to 1977-78 are shown in the following table:

VICTORIA—CAUSES OF FOREST WILDFIRES

Cause	Number of fires				
	1973-74	1974-75	1975-76	1976-77	1977-78
Grazing interests	—	—	1	—	2
Landowners, householders, etc.	37	78	58	41	117
Deliberate lighting	54	56	68	43	94
Sportsmen, campers, and tourists	23	56	50	41	67
Licensees and forest workers	11	8	14	5	27
Smokers	6	10	6	5	29
Lightning	24	101	48	95	158
Tractors, cars, trucks, locomotives, and stationary engines	12	46	26	8	23
Children	8	15	14	6	22
Sawmills	6	6	1	5	8
Miscellaneous known causes	15	33	28	30	42
Unknown origin	15	34	20	11	17
Total	211	443	334	290	606

Forests along the Great Dividing Range

The Great Dividing Range forms the spine of the Eastern and Western Highlands of Victoria. The Eastern Highlands are heavily forested and include most of Victoria's tall fast growing native forests. Snow gum woodlands predominate at the higher elevations. At elevations between 1,400 and 900 metres, the forests are usually tall stands of single species such as mountain ash, alpine ash, or shining gum. At lower elevations the foothill forests contain mixtures of messmate, peppermint, gum, stringybark, or pure stands of silvertop.

The Western Highlands rarely exceed 600 metres and consequently do not contain significant areas of tall, fast growing mountain species. The forests are similar to those in the foothills of the east, but may also include red-ironbark, grey box, red gum, and other slow growing species. In contrast to the continuous belt of forest to the east, the western forests occur in blocks separated by land cleared for agriculture. The largest blocks are the Grampians State Forest and the Wombat State Forest. Other major blocks occur near the South Australian border, at Mt Cole, and Ballarat. Plantations of softwoods, mainly radiata pine, have been established near the Divide at Scarsdale, Ballarat, Creswick, and Macedon.

The wood based industry is the largest decentralised secondary industry in Victoria. Most of the raw material for the industry, including practically all the high quality ash-type timber, comes from forests on or near the Divide. Many country towns such as Omeo, Swifts Creek, Heyfield, and Mansfield depend mainly on this industry for their existence, while in others such as Ballarat, Daylesford, Bacchus Marsh, Myrtleford, Wodonga, Morwell, and Traralgon, the industry contributes significantly to the local economy.

Harvesting the forests and the silvicultural techniques needed for successful regeneration of harvested areas are designed and controlled to ensure that any adverse effects on soil, water quality, and landscape are minimal and short-term. Of particular interest are the methods taken to ensure successful regeneration of alpine ash. This species is a "fire climax" which probably owes its existence to fire. In the total absence of fire for a time longer than its life span, the species will be replaced by other species. Successful regeneration of alpine ash is usually associated with an intense fire which kills the trees and, at the same time, produces the seed-bed conditions which allows the new crop to establish and survive.

Harvesting is organised by felling all or most of the trees on small blocks, burning the debris, and sowing seed either by hand or from aircraft. If for some reason such as safety, it is not possible to burn the debris, the area is planted with seedlings. Many of the fine re-growth alpine ash forests which can be seen today along the Divide are results of these techniques.

Recreation is the fastest growing use of the forests along the Divide and access by foot and road is available. The Alpine Walking Track traverses the higher ridges on or near the Divide from the New South Wales border to Walhalla. Walking tracks are also available at Mt Disappointment, Mt Cole, and in the Grampians.

There is an extensive network of forest roads and tracks established in these forests, primarily for forest management including timber extraction and fire protection. These roads and tracks are being increasingly used by recreationists visiting forests to sightsee, tour, fish, hunt, walk, ski, or pursue other voluntary activities. This network of access is a valuable community asset and caters for a very significant proportion of the total outdoor recreation in Victoria. Some roads have become major tourist routes; others are constructed to a low standard and are unsuitable for regular traffic. Some of these are closed to all but essential management vehicles and others are closed seasonally.

No account of the forests of the Great Divide is complete without mention of their role in protecting the valuable water catchments of Victoria. Practically all the water harvested for domestic, industrial, and farm purposes comes from forests on or near the Divide. Even the large irrigation schemes in the Murray Valley and in Gippsland depend on water from forests along the Divide. Forests are the best type of water catchment; they increase infiltration of water into the soil and even out the highs and lows in stream flows. Forest management recognises the importance of forests in protecting water catchments and all

activities such as harvesting, recreation, grazing, road works, etc., are controlled and organised so that any adverse effects on the catchments are minimised.

Research and development

The Forests Commission maintains a research programme to ensure that factual information is available for planning for monitoring forest management practices to meet changing community needs. Both short and long-term studies are in progress into many aspects of silviculture of both native hardwood and exotic softwood forests, and also into genetics and tree breeding, entomology and pathology, protection, hydrology, other environmental effects, and planning techniques.

In nurseries, studies are being made of the nutritional and soil physical requirements of both eucalypts and conifers, the treatment of seeds and seedlings, methods of site preparation, planting and seeding, fertiliser and nursery techniques, and the identification and control of pests, weeds, and diseases, for the efficient production of seedlings.

Investigations are being conducted to develop cultural practices for optimal establishment and growth of first and second rotation *Pinus radiata* plantations and maintenance of long-term site productivity. A tree breeding programme with *Pinus radiata* is now yielding improved seeds for general planting purposes, and crossbreeding is proceeding to further develop the desired characteristics. Outstanding individuals of various eucalypt species are also being sought for use as future sources of seed in extensive field studies of the natural variation of these species. The selected trees are propagated by grafting and their offspring are planted in progeny trials and seed orchards.

Other silvicultural studies concern the use of native trees as an effluent disposal system; the tolerance of trees and shrubs to salinity for reclamation of salt-affected land; the regeneration of burnt sites and high-elevation forests; the reforestation of former pine plantation sites; and the effects of thinning on growth and wood quality of eucalypts and conifers.

Continuing surveys of the mechanisms of, and factors controlling, the biology of major pests and diseases of forests, are concerned with specifying the timing and type of control procedures to be adopted; monitoring and evaluating the effectiveness of these measures; assessing the likely environmental impact of control measures; and providing service information within and outside the Department.

The major emphasis in entomological research is directed at the siren wood wasp (*Sirex noctilio*) and its impact on the management of *Pinus radiata* plantations; and at populations of the stick insect (*Didymuria violescens*), which causes defoliation damage in ash-type eucalypt forests. Pathological research continues on the cinnamon fungus (*Phytophthora cinnamomi*) and honey fungus (*Armillaria*), including assessment of site and stand characteristics associated with eucalyptus-crown dieback, and the rate of spread and effect of the fungus on different species in mixed eucalypt forests; while in softwood plantations the needle cast fungus (*Phoecocryptopus goemannii*) is being monitored.

Research into the ecology of birds and animals in the forests is being conducted to assess the influence of management practices on forest flora and fauna. Studies look at the distribution and abundance of species and their habitats in the various layers of forest vegetation, especially in streamside reserves and corridors of native vegetation in plantations, and in plantations and adjacent beds after utilisation. Emphasis is also being given to evaluating the effect of harvesting, flooding, pesticide application, fire, and controlled burning on water quality and yield, nutrient status, site productivity, and flora, fauna, and wildlife habitats. This information is used to develop forest management procedures which allow for the efficient production of wood consistent with the conservation of other forest values such as water quality, recreation, and wildlife habitat.

Information for planning forest management is assembled by computer analysis of growth habits of major commercial species under various cultural regimes. This data enables prediction of the quantities and sizes of future timber supplies as stands develop under different patterns of use.

Further reference: Fire protection, *Victorian Year Book* 1965, pp. 553-4; Economic aspects of forests, 1967, pp. 361-2; Commonwealth State Reforestation Agreement, 1969, pp. 372-4; Forest fires, 1970; Forests of Victoria, 1972, pp. 1-26; Victorian School of Forestry, 1977, pp. 399-400; Victoria's forests and man, 1979, pp. 1-35; R. J. Hamer Forest Arboretum, 1979, pp. 313-4

BIBLIOGRAPHY

ABS publications

Victorian Office

Value of primary commodities produced (excluding mining) (7501.2)

Central Office

Agricultural sector, part 1 — structure of operating units (7102.0)

Building materials (8327.0)

Manufacturing commodities, principal materials used (8210.0)