



**STATE POLLUTION CONTROL COMMISSION**

# **Report on Rainforests**

Issued under the authority of  
**THE HON PAUL LANDA, LL B, MLC,**  
Minister for Planning and Environment





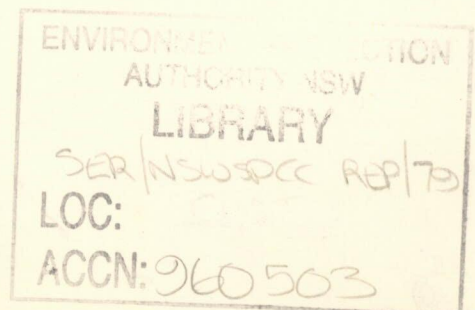
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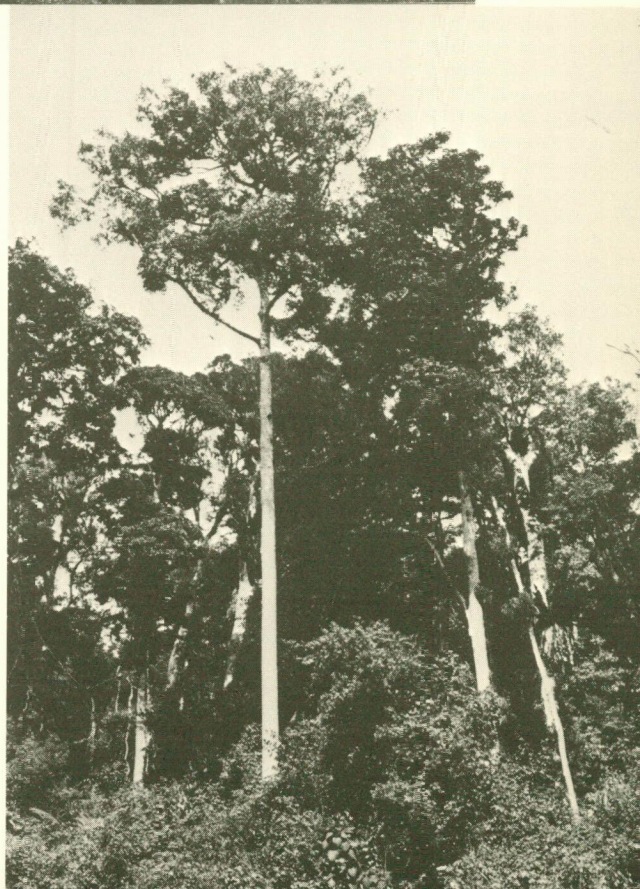
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*Examples of subtropical  
rainforest, Wiangarie  
State Forest*





STATE POLLUTION CONTROL COMMISSION

REPORT ON RAINFORESTS

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*Forestry Commission picnic  
and barbecue facilities,  
Wiangarie State Forest,  
with Negrhead Beech in the  
background. Dieback of the  
crown appears to be a common  
natural occurrence with this  
species*







## STATE POLLUTION CONTROL COMMISSION

### REPORT ON RAINFORESTS

#### 1 Introduction

This report includes a brief description of the distribution and the characteristics of rainforests and the timber industry as it relates to rainforest utilization in New South Wales. The report also examines the possible environmental impact of rainforest logging and sets out some proposals for government policies towards rainforests in this State. The time available for the preparation of this report was limited so that it was not possible to consider in depth this relatively complex matter.

The report is based partly upon a review of the available written material, including the information obtained during the Border Ranges Environmental Review which was completed by the State Pollution Control Commission, in April 1978, and partly upon material published by the Forestry Commission of New South Wales, various other government departments and conservation organizations.

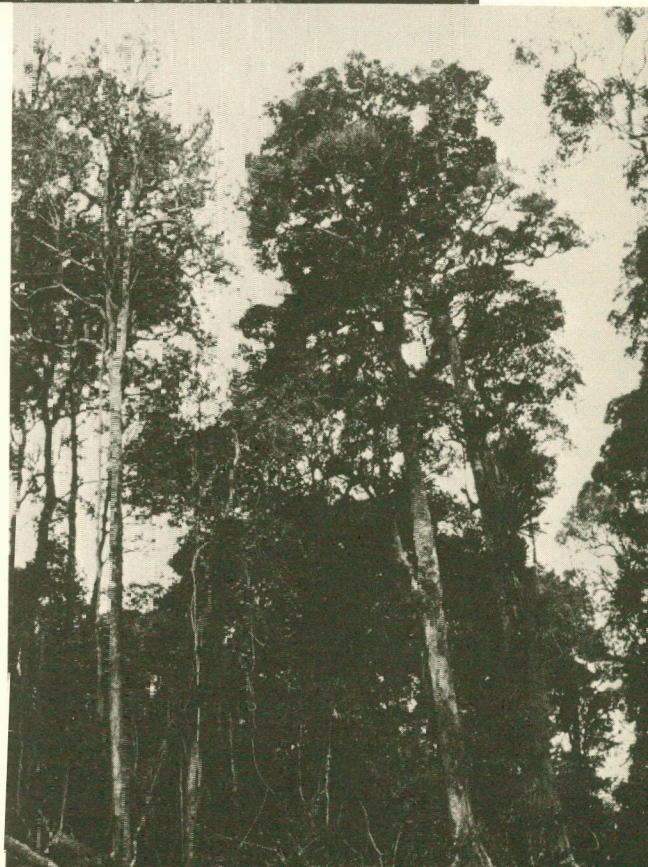
In addition to this, officers of the State Pollution Control Commission visited the north coast of New South Wales and had discussions with representatives of the Forestry Commission and the timber industry. Inspections were made both of State forests where logging has been carried out and mills utilizing the timber obtained from these areas. These discussions and inspections were of use in preparing the report also.

Botanical names of species mentioned in the text are contained in Appendix 3 of this report.





*Recent fifty per cent  
canopy-retention  
logging, Wangarie  
State Forest*





## 2 The Nature and Distribution of Rainforests

Rainforests on a worldwide basis generally grow in those tropical and subtropical areas which have a comparatively high and even rainfall. They grow, in somewhat different forms, in more temperate locations and in certain areas where moisture availability is relatively low also.

The most highly developed rainforest is in the world's equatorial zone where warmth and high rainfall provide good conditions for plant growth. It is estimated that overall, various types of rainforests cover between 9 000 and 15 000 million hectares of the surface of the earth. Lack of knowledge about the extent of current clearing and lack of a precise definition of the term rainforest have caused difficulties in identifying the total area.

On the Australian mainland rainforest is found in the Northern Territory and the eastern part of the continent extending from Cape York in the extreme northeast to Cape Otway in the far southeast. Distribution is not continuous and is restricted mainly to land within 150 kilometres of the coast. It occurs in Tasmania also in locations suited to its growth.

There are several distinct forms of rainforest, each with its own characteristic structural features and botanical composition. Each form of rainforest represents a response to a number of factors including moisture availability, temperature, humidity, wind, soil conditions, site, aspect and any previous occurrences such as fires and cyclones.

Rainforests have some or all of the following characteristics:

- A generally complex structure and luxuriant appearance
- An absence of eucalypt species and other species characteristically associated with eucalypts, except as relics from an earlier community invaded by the rainforest. In these situations the eucalypts usually constitute a relatively old overstorey and their regeneration as young plants is rare or completely lacking
- A mixed composition of predominantly moisture-loving trees whose floristic affinities lie with either the Indo-Malaysian or sub-Antarctic floras
- The frequent presence of buttressed and fluted stems, lianes, strangler vines and vascular epiphytes such as staghorns.



There is no tropical rainforest in NSW but there are four other major kinds of rainforest in the State. These are the subtropical, warm temperate, cool temperate, and dry rainforest; each of which may be divided further into several individual types of rainforest.

- **Subtropical rainforest** contains tall rainforest communities of mixed composition and very luxuriant appearance. It occurs on coastal and escarpment soils of high fertility in areas with plentiful moisture. It is found as far south as the central South Coast but is best developed in the northern parts of the state where booyong is often a partially dominant tree species.
- **Warm temperate rainforest** is distinguished from subtropical rainforest by its simpler structure and the composition. It occurs in the same geographical areas as subtropical rainforest but it occupies sites which are cooler or where the soils are less fertile. Coachwood is the dominant species in warm temperate rainforest.
- **Cool temperate rainforest** is closely allied to warm temperate rainforest but varies in structure and species composition as well as tending to have smaller leaf-sizes. Non-vascular epiphytes such as mosses and lichens are very common in this type of rainforest but lianes and buttressing are usually rare. It occurs in cool to cold misty sites which are characterized by a dominance of negrohead beech in northern localities and pinkwood in southern localities.
- **Dry rainforest** contains a number of relatively diverse types which usually have a relatively low (frequently under 13 metres) closed canopy, above which taller trees may protrude.

Dry rainforest includes the hoop pine type which, as the name implies, contains hoop pine, a commercially important timber species. Some other types such as those growing on coastal locations can be important in contributing to soil stability but contain little or no commercially valuable timber. Dry rainforest occurs under a wide range of conditions and in a number of localities in New South Wales.

The total area of different major forest types in Australia was estimated for the last Forestry and Wood-based Industry Development Conference (FORWOOD) which was held in Canberra in 1974. The figure given was 42.5 million hectares of which 1.861 million hectares was rainforest. On a state

by state basis the figures were:

Queensland . . . . .	1.068 million hectares
New South Wales . . . . .	.300 million hectares
Tasmania . . . . .	.456 million hectares
Northern Territory . . . . .	.037 million hectares

The limited occurrence of rainforest in Victoria was not recorded.

It should be noted that, on the basis of these figures, rainforest in New South Wales constitutes 2 per cent of the total forest area of 15.1 million hectares. The total area of State Forest in New South Wales is 2.2 million hectares, of which .136 million hectares, or approximately 4 per cent, is rainforest. Dry rainforest constitutes a significant proportion of the total rainforest areas as indicated in subsequent tables.

It is estimated that there were about one million hectares of rainforest in New South Wales at the time of European settlement. Therefore, about 30 per cent of the original area still exists although in a number of instances the rainforest remnants have been subject to heavy logging. The proportion logged cannot be readily ascertained.

The occurrence of rainforest in New South Wales in June 1971, listed by geographic region and tenure and expressed in hectares was:

Region	State Forest	National Park	Other Public	Private	Total
Casino	46 700	7 500	—	9 800	64 000
Coffs Harbour	36 900	6 800	6 800	18 100	68 600
Glen Innes	10 500	1 500	16 600	3 800	32 400
Wauchope	24 100	—	14 300	12 800	51 200
Dungog	13 500	3 000	15 000	18 800	50 300
Gosford	—	700	4 500	800	6 000
Nowra	3 800	3 800	7 500	12 000	27 100
Eden	700	—	—	—	700
Total	136 200	23 300	64 700	76 100	300 300

The National Park category used in the above table includes publicly-owned land permanently reserved for purposes other than timber production, such as certain water catchments and Nature Reserves. *Source: Forestry Commission*





*Forest access road and logging operation,  
Cangj State Forest*





The occurrence of rainforest in New South Wales in June 1971 listed by form and tenure, and expressed in hectares is set out in the table below. The discrepancies in the sub-totals and totals are believed to be caused by "rounding off" of individual values.

Tenure	Sub-tropical	Warm Temperate	Cool Temperate	Dry*	Total
State Forest	30 000	37 000	10 000	59 000	136 000
National Park	8 000	2 000	3 000	5 000	18 000
Vacant Crown Land	1 000	9 000	8 000	20 000	38 000
Leasehold-State	1 000	—	—	25 000	26 000
Leasehold-Private	—	—	—	8 000	8 000
Private Industrial	—	1 000	—	—	1 000
Private	5 000	6 000	13 000	44 000	68 000
Other Forested	—	3 000	1 000	2 000	6 000
<b>Total</b>	<b>44 000</b>	<b>58 000</b>	<b>34 000</b>	<b>163 000</b>	<b>301 000</b>

\*The category "Dry Rainforest" includes various depauperate rainforest stands of no commercial significance and areas of vine scrub.

Source: Forestry Commission

These figures, while apparently correct in their general order of accuracy, should be regarded now as being approximate because of changes in land tenure and possible clearing. For example, significant additional areas of rainforest are or will be in national parks following the dedication of Wirrikimbi National Park, which incorporates some 1 500 hectares in the Wauchope area, and the Border Ranges National Park in the Kyogle area. It is understood that the National Parks and Wildlife Service has more recent statistics on areas.

Five major centres of rainforest in New South Wales have been identified. These are:

- **Richmond-Tweed Centre:** Including the "Big Scrub" and the forests of the Border Ranges. Rainforest in this centre, is, or was, mainly subtropical and dry. Most of the Big Scrub itself was cleared away last century but this centre still includes the largest existing expanse of rainforest in New South Wales.





*Recent logging operations, Cangli  
State Forest*





- **Dorrigo Centre:** Extending around the head of the Bellinger River. Warm and cool temperate and subtropical forms are all present. Most of the subtropical stands and a significant section of the warm temperate rainforest stands on the Dorrigo Plateau have been cleared for settlement.
- **Hastings Catchment:** Mostly warm temperate and subtropical, but extensive stands of cool temperate rainforest are present, including probably the largest single occurrence of this form. Areas such as Comboyne and parts of Bulga Plateau have been cleared for farming but most areas still exist.
- **Barrington Tops and Foothills:** Cool temperate on the tops and upper slopes, giving way to subtropical on the foothills. These rainforests mostly still exist.
- **Illawarra:** Only small remnants now remain. Subtropical and warm temperate rainforests occur in this area.

Rainforest occurs in the eight coastal Forestry Districts and in the Glen Innes Forestry District. At this stage, the Forestry Commission has virtually phased out rainforest logging operations on State Forests in the Eden, Bateman's Bay, Newcastle, Taree, and Kempsey Forestry Districts, and in most of the Glen Innes District. Rainforest logs may on occasions be obtained in these districts as a result of road clearing or from hardwood (essentially eucalypt) logging operations in stands where there is a rainforest component beneath the eucalypts. However, there is now little or no commitment by the Forestry Commission to supply "brushwoods" (rainforest timbers) to local mills and any such supply is avoided by the Forestry Commission as far as practicable.

Commitments to maintain supplies of rainforest timbers to local mills still exist in the Wauchope, Coffs Harbour, and Casino Forestry Districts and in the Armidale Subdistrict of Glen Innes District.

### 3 Current Logging Practices in Rainforest Areas

Logging practices in State Forests come under the specific control of the Forestry Commission and they may vary from one locality to another depending on the type of forest being logged and any other relevant considerations.





*Heavily logged forest,  
Cangi State Forest,  
showing number of large  
non-merchantable trees  
and other vegetation*







*Eucalypt seedlings  
planted as cover  
crop following  
logging, Cangli State Forest*

The "Indigenous Forestry Policy" prepared by the Forestry Commission in 1976 states:

*"The broad objective for all rainforest areas is to reduce harvesting to selective fellings for speciality logs, at a level low enough to maintain canopy and rainforest structure. This would require the phasing out of general purpose timber harvesting in most rainforest areas. The rate of selective logging of speciality timbers would generally be too low to support mills now primarily dependent on rainforests.*

*Where selection logging is successfully carried out without destroying the ecological viability of the rainforest, this may be continued to meet current market commitments. However, these commitments should be reduced where necessary in time to avoid the need for logging above the sustained yield level after the first cutting cycle.*

*Where market commitments or the nature of the forest type force a continuation of intensive logging in rainforests, rehabilitation should be carried out by planting openings at a stocking sufficient to provide an acceptable tree cover. In types which originally carried hoop pine, this species may be used, otherwise eucalypts suitable to the site should be planted."*



The eucalypts are intended to provide a cover crop for future rainforest growth rather than starting a conversion to eucalypt forest.

Standard erosion mitigation conditions have been prepared and they apply to all land clearing, logging and forest operations controlled by the Catchment Areas Protection Board and the Forestry Commission. In catchments of water storages and in areas where the erosion hazard so warrants, other restrictions on the method and intensity of all forest operations may be imposed by either of these organizations. A copy of the conditions is attached to this report. (See Appendix 1)

Some examples of current logging practices in the Casino, Coffs Harbour and Wauchope Forestry Districts, where almost all of the rainforest logging on State Forests is undertaken are described below more specifically. This description is based on information currently available.

Logging practices in the Casino Forestry District, particularly in the Kyogle area are well documented. The first logging operations involved the selection of prime trees by the millers. Subsequently, log size limits were imposed to retain immature trees and a pricing system was introduced to foster the use of less desirable species and more faulty logs.

*Tree stump resulting from earlier logging, Cangji State Forest*





In 1962, selective logging of the subtropical rainforest was introduced, with the logging being controlled by tree-marking carried out by staff of the Forestry Commission. This system now aims at retaining 50 per cent canopy cover and maintaining the full species diversity in the remaining stand. The timber cutters are reimbursed by a payment called a "reject tree allowance" when they fell a tree which is found subsequently to be non-merchantable. Determination of the condition of the trees is based on criteria established by the Forestry Commission.

In accordance with the standard erosion mitigation conditions, unlogged strips are retained along permanent watercourses and usually along the major access tracks also. Following completion of logging in an area the logging tracks are drained to reduce the risk of erosion. At times some enrichment planting of seedlings of hoop pine and other rainforest species may be carried out along logging tracks and on log dump clearings.

As a matter of Forestry Commission policy, negrohead beech normally is not logged in State Forests, There are occasional exceptions to this practice, for example, the trees may be removed in the course of road construction when this course of action cannot reasonably be avoided.

In past years, methods of timber extraction included the use of flying foxes. However, the usual method now is to use a track-type tractor to move the logs from the forest where they are cut to a log-dump where they are loaded onto a truck and taken to a sawmill.

Not all the rainforest areas can be logged, for various reasons such as the presence of flora reserves, inaccessibility or uneconomically located timber.

In the Grafton area, which is part of the Coffs Harbour Forestry District, the rainforests are mainly of the warm temperate type rather than the subtropical type of the Kyogle area. One forest in the Grafton area, Cangi State Forest, is at present supplying some 6 260 cubic metres net of rainforest timber to Big River Timbers Pty Ltd at Grafton. All the timber considered by the Forestry Commission to be available in this forest to this mill probably will be utilized within the next year.

The Forestry Commission claims that the 50 per cent canopy retention concept has not been wholly successful in the Cangi State Forest because the remaining trees, particularly the dominant species, tend to suffer die-back of their crowns. Therefore, every effort is made to remove all merchantable trees while at the same time ensuring that damage to the





*Heavily logged rainforest in the Wauchope Forestry District. The bare areas will be planted with a cover crop of eucalypt seedlings with the intention of restoring the rainforest in due course*







remaining vegetation is minimal.

*"Enrichment planting"  
Wiangarie State Forest  
with Hoop Pine seedling*

The trees to be cut are not pre-marked but the operation is closely supervised by Forestry Commission staff and no "reject tree allowance" is paid. Therefore, there is no incentive to the cutters to fell non-merchantable trees. Logging is undertaken with a relatively small tractor such as a Caterpillar D5, which makes a relatively narrow track and does not push down the larger trees, that are not commercially valuable, in the logging operation. In other words, there is a tendency to curve around the trees rather than making a straight track by pushing them down. For this reason damage to such trees is minor in both the track making and the actual logging operation.

Logging is carried out in accordance with a pre-determined harvesting plan which takes into account the standard erosion mitigation conditions and other criteria considered relevant by the Forestry Commission.

Usually, log dumps are located some distance from the main roads and are not normally visible from such roads, thereby reducing the visual impact



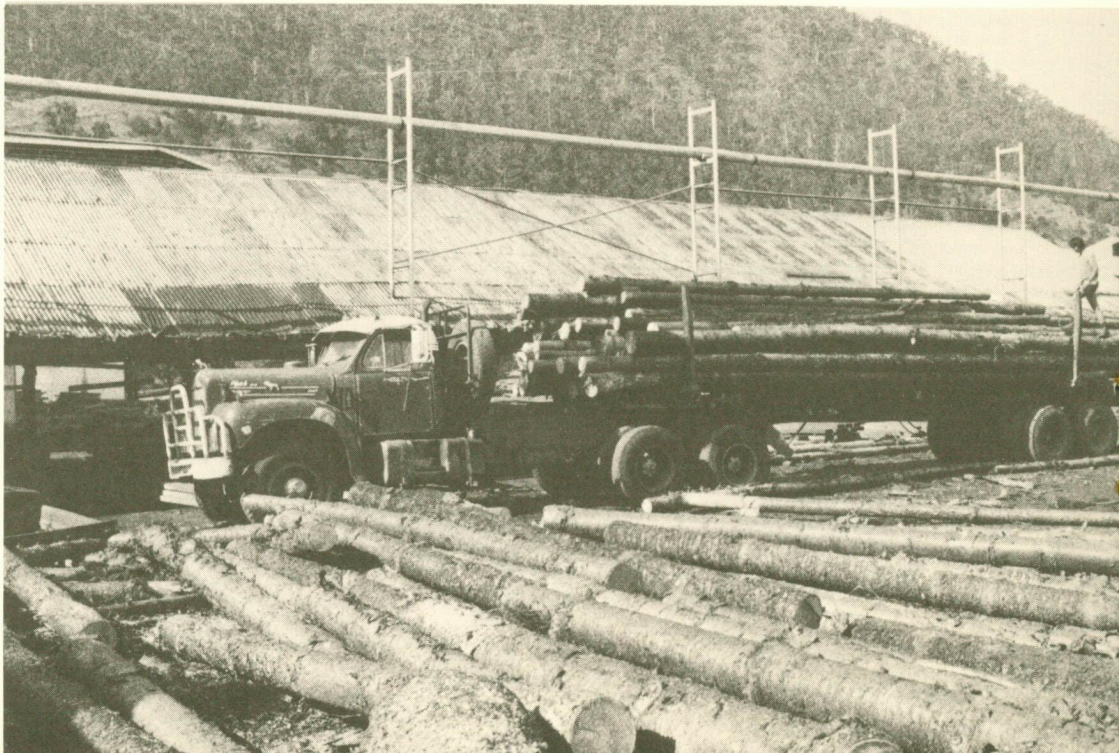
upon users of the roads. Following completion of the logging, unvegetated areas such as log dumps are planted with eucalypt seedlings. The Forestry Commission expects that, in time, the rainforest species will re-establish under the cover of eucalypts as usually occurs under natural conditions.

During a recent inspection of logged areas by officers of the State Pollution Control Commission it was noted that the forests still had a relatively dense stand of trees after logging because of the large number of non-merchantable trees. Most of the understorey of the rainforest remained also. Nevertheless the impact of logging was not insignificant and this is discussed in a subsequent section.

In the Wauchope Forestry District, which now extends from Urunga to Taree, rainforest logging has finished in all but the Wauchope management section and a section of the Wingham management area. There are some 480 hectares of rainforest in the Wauchope management area that will not be logged, since they occur in Flora Reserves, Forest Preserves or special prescription areas where logging is excluded. In addition, a further 500 to 1 000 hectares of rainforest may not be logged because of its location in filter strips or in areas not economically accessible at present.

Subtropical, warm temperate and cool temperate rainforest all occur in the Wauchope management area.

*Small Hoop Pine logs at Munro and Lever's mill, Grevillea.*





In the warm temperate rainforest in particular, selective logging is not considered practicable by the Forestry Commission because of the possibility of crown die-back of the remaining stand. Consequently, a logging technique of maximum economic utilization has been adopted. As the experience of the Forestry Commission has been that the rainforest does regenerate, eucalypts are planted where necessary to hasten recovery of the rainforest and to help restrict the growth of exotic plants. As yet, insufficient time has elapsed for the effectiveness of this approach to be fully assessed.

The Forestry Commission emphasizes that this logging method is not an attempt to convert rainforest to a eucalypt forest. The aim is to rehabilitate the rainforest.

In the cool temperate rainforest the major species are negrohead beech and coachwood. The Forestry Commission's previous experience has led to the conclusion that this type of rainforest can be selectively logged without destroying the ecological viability of the forest. Current practice is not to remove the negrohead beech trees except for road construction purposes or unless the trees are damaged as a consequence of roading or logging. The understorey, which is predominately coachwood, is selectively logged and sufficient trees are retained to provide at least 50 per cent canopy cover. The impact of this practice on the future form and composition of the forest has not been documented as yet.

According to the forest-management practices, in instances where hardwood forests with a rainforest understorey are to be logged the understorey should be logged, prior to the commencement of the hardwood logging. This reduces damage to those rainforest trees suitable for logging although it probably does not reduce the overall impact of logging.

The management practices made specific provision for the minimizing of environmental impacts, such as soil erosion and visual impact, as well as taking account of the standard erosion mitigation conditions referred to previously.

Based on the present quotas of 27 500 cubic metres net of timber per annum, the Forestry Commission has estimated that the supply of rainforest timbers will not last beyond 1986 in the Wauchope management area.

As far as is practical, the Forestry Commission ensures that all suitable logs in the Wauchope area are used for veneer production. The Forestry



Commission is co-operating with the timber industry in exploring alternative resources of raw material suitable for veneer production.

As set out in Appendix 2, a relatively small quantity of rainforest timber is obtained also from private property in the present Casino, Coffs Harbour and Wauchope Forestry Districts. During 1977/78 and 1978/79, the volume of timber totalled 5 828 and 5 602 cubic metres net, respectively. Since 30 mills are involved, the volume utilized by each mill is small in absolute terms. A number of these mills have Crown timber quotas as well.

In the time available to prepare this report it was not possible to identify and inspect any of the privately-owned rainforest areas involved. Such an inspection would have enabled the extent of impact of the operations to be gauged and preliminary conclusions on their acceptability on environmental grounds to be drawn. Therefore, this is a matter which requires further consideration.

#### **4 Uses of Rainforest Timbers**

New South Wales rainforest timbers of suitable quality can be peeled or sliced for veneer or sawn for timber production. Whether a particular log is used for veneer or sawn timber is dependent upon the demand for the end-products, having regard to the quality and characteristics of the timber also.

The major mills on the North Coast of New South Wales usually do not produce sliced veneers and most use more timber for veneers, than for sawn timber. Overall, the extent of veneer production by the mills, by volume, varies from 60-95 per cent of log intake, with some mills indicating a willingness to take more logs of "peeler quality" if they become available. The extent of sawn timber is mostly a reflection of the quality of the log supply, as relatively high-quality logs of suitable species are required for veneer production.

Sliced veneer is obtained by slicing logs in parallel sheets to highlight the grain and pattern where possible. This type of veneer is used mainly as a decorative overly on panels such as particle board. Only a very small amount of timber is sliced for veneer production.

Most of the veneer is produced by the peeling process. Logs are rotated on a peeling lathe to form, as far as possible, a continuous sheet. About 75 per cent of rotary-peeled veneers are dried, glued and pressed to produce plywood. The remainder is used mostly for overlaying other materials.



Substitute materials such as fibreglass, aluminium, fibrous plaster and cement should be available to meet most, if not all, of the present uses of rainforest timbers. However these alternative may have practical disadvantages or be more costly. In many instances, substitution would have far-reaching environmental, social and economic ramifications meriting further consideration.

## **Plywood**

Plywood is classified into two broad categories — interior and exterior. Interior plywood is bonded with adhesives resulting in strong joints in a dry state but with relatively limited resistance to water. Exterior plywood (or waterproof plywood) is used mostly for structural purposes. The types of plywood and their major end-uses are set out below.

### ● Ply used for external work:

- Overlay — structural support in building operations, ie, formply for suspended concrete slabs
- Exterior — panelling (lower price than marine ply)
- Marine — boatbuilding, exterior panelling, ie, where appearance is of importance
- Structural — buildings, where structural strength is important and poor quality appearance of lesser concern, eg, bracing, catwalks, hoardings, etc.

### ● Ply used for interior work:

- Interior — partitions, panelling, furniture, cupboards
- Sliced — veneers used as overlays for decorative situations
- Overlays
- Random — mismatched random-grooved wall panelling
- Grooved
- Blockboard— counter tops, joinery work, and doors, ie, overlay
- Overlays veneers on glued timber sections
- Flooring — tongued and grooved flooring panels, types being available for use in wet and dry areas.

The following table indicates the volume of plywood recently produced by Australian manufacturers and delivered to distributors and end-users in New South Wales. These plywoods include some imported veneers but not imported plywood.



**Plywood Production – Australia**  
(By Volume)

Material	Quantity (cubic metres)	
	1977/78	1978/79
Overlay	14 362	15 025
Structural	4 581	7 229
T & G Flooring	2 882	4 533
Interior	3 517	3 231
Exterior	1 823	2 237
Marine	926	1 002
Sliced Overlay	761	682
Blockboard Overlay	385	407
Random Grooved	31	24
Total	29 268	34 370

This information was obtained from the Plywood Association of Australia schedule showing deliveries to respective States.

Plywood distributed in New South Wales in 1978/79 accounted for approximately 37 per cent of the national total of 86 870 cubic metres. Export of plywood in the same period accounted for about 700 cubic metres.

Imports of facing veneers are important because of the inadequate supply of high quality local material. Imported facing veneers include Tasmanian oak, black bean, teak, Queensland maple and blackwood. Imports of finished plywood have declined due to the trend in South East Asia towards producing completed or part-completed products. In addition, most Australian plywood is regarded as being of superior quality. However, in the past the local producer was unable to compete on the basis of cost despite the 40 per cent tariff protection which has applied for some years and is expected to continue to apply in the short-term at least. However, it is understood that the plywood mills, which are integrated with other operations based on plantation timber supplies, have been able to utilize new technology and introduce economies of scale in the past few years. Therefore, they have become more cost competitive.

Small quantities of plywood are produced for use in the photo-engraving, stereotyping and printing trades. However, this is a declining market because of changes in printing technology.



Apart from rainforest timbers, which are regarded as including hoop pine, other species are used in plywood manufacture. V. B. Trapp and Co Pty Ltd and G. L. Briggs Pty Ltd in the Coffs Harbour area are both reported to produce veneers from certain eucalypt species, poplars and radiata pine. These materials are not suitable for use in all forms of plywood and consequently facing veneers from rainforest species are used as well. For example, eucalypt veneers may be used in formply as the weight of the eucalypt layers and certain defects are acceptable, provided a suitable facing veneer of an appropriate species is available.

Frequently, alternative materials are not located near existing mills or these alternatives may be in short supply themselves in the near future. Nevertheless, mills on the North Coast are continuing to review alternative materials. However, in several cases this would involve relocation to a new resource area and improvements in glueing technology before an acceptable product can be obtained.

Plywoods have remained in reasonably high demand despite the availability of some substitute materials which may be less expensive. Plywood has a number of advantages such as its high strength/weight ratio, its ease of use, its good appearance and its suitability for use in external situations, provided an appropriate type of ply is utilized.

### **Sawn Rainforest Timber**

Rainforest timbers are in demand for purposes other than plywood production. In fact, some local species, such as rosewood and teak, are unsuitable for use in plywood because of the specific properties of the timber. Therefore, the usual practice is to produce sawn timber from logs considered unsuitable for veneer production wherever possible.

Sawn rainforest timbers are used for a variety of purposes depending on their availability and such physical characteristics as their strength and appearance. The following lists set out a range of end-uses for sawn timber. The lists are not intended to be exhaustive.

#### **The major uses of sawn timber from rainforest species include:**

- Furniture production
- Turning for decorative and structural materials
- Joinery work, including drawers and cabinet frames
- Mouldings
- Sills
- Boat building



- Laminated exposed beams
- Desks (The Education Department has a continuing demand).

**Other uses of sawn timber include:**

- Squash court floors
- Caravan frames
- Musical instruments
- Containers such as instrument boxes
- Handles for axes and tools
- Draughtsmen's T-Squares
- Crutches
- Billiard cues
- Backs of brushes.

Information is not readily available on the volume of material used for these various purposes. However, a significant amount is used for high quality furniture and other specialist applications. For example, coachwood is regarded as one of the best, if not the best, of all available timbers for turning.

## **5 Extent of Dependence of the Timber Industry on Rainforest Species**

At present, part of the timber industry depends heavily on the supply of rainforest timbers for a number of purposes and these are discussed below. The yield of rainforest timbers and the mills utilizing these timbers have been documented.

In New South Wales during 1977/78, the yield of rainforest timbers in cubic metres, net volume, for each of the Forestry Commission Districts concerned was as follows:

<b>Forestry District</b>	<b>Crown Land</b>	<b>Private Property</b>	<b>District Totals</b>
Casino	29 893	2 100	32 003
Coffs Harbour	30 829	2 094	32 923
Glen Innes	2 717	—	2 717
Kempsey	2 477	567	3 044
Newcastle	171	—	171
Taree	10	—	10
Wauchope	32 937	1 057	33 994
<b>Overall Totals</b>	<b>99 034</b>	<b>5 828</b>	<b>104 862</b>

*Source:* Forestry Commission



It should be noted that Taree District was disestablished from 1 January, 1978 and parts of that District were transferred to the Newcastle and Wauchope Districts.

The future rainforest timber yields cannot be predicted with a high order of accuracy for a number of reasons, some of which are:

- In some instances the yields of rainforest timber in the Casino District are not fixed by quota but represent a portion (not strictly specified) of the total yield which also includes hardwoods
- Mills do not necessarily cut their entire quota in any given year, because of market conditions, wet weather or some other reason
- Mills usually cut and utilize an additional but variable quantity of timber which, because of its relatively low quality or small size, is not included in the Crown quota and is termed ex-quota timber. For example, the Forestry Commission's Annual Report for 1977/78 indicates that the total actual brushwood cut from Crown property in the Wauchope District was 32 937 cubic metres net, whereas the quotas totalled 27 520 cubic metres net. Conversely, the actual cut of timber in quota may be less than allowable by the quota for the reasons noted above
- The yield of timber from private property is obtained mostly through the initiative of mill operators and the activities of land owners which may result in variable quantities being available each year.

An estimate of the total future yield of rainforest timbers can be obtained by adjusting the 1977/78 yield to take into account the following relevant matters:

- The rainforest timber (or brushwood) yield of Standard Sawmills in the Kyogle Management Area has been withdrawn. This yield was about 9 000 cubic metres net.
- During 1979/80 there will be a reduction in the yield of rainforest timbers in the Coffs Harbour District to 11 260 cubic metres net, plus any ex-quota volumes. After 1979/80 there will be a further reduction to approximately 6 260 cubic metres net until the remainder of an existing allocation, at present totalling some 70 000 cubic metres, has been utilized.

On this basis the maximum yield in 1979/80 is likely to be 75 000 cubic metres net and thereafter 70 000 cubic metres net. The yields might be less as the reduction in Crown quotas will probably result in proportionately less ex-quota logs being utilized. In addition, small parcel sales of timber may be made available by the Forestry Commission, from time to time, according to specific circumstances.

The period of time over which these yields are maintained depends partly on the future availability of rainforest timber in existing State Forests and in such areas as the Gradys Creek Flora Reserve. In broad terms, and allowing for specific exceptions, it is likely that for the first-cutting cycle most of the rainforest timber considered by the Forestry Commission as being available to meet existing commitments will be utilized within the next 8 to 21 years. This will depend on the specific area and the mill concerned. However, regrowth of the forests may provide enough timber for further cutting to occur subsequently but at a much lower level than in the past. It should be possible to set this level so as to maintain a sustained yield, provided this is acceptable on environmental and other grounds.

In the Casino Forestry District, the brushwood resource is expected to last until 1996 to 2000 depending on the mill concerned and the continued availability of the existing designated resource. In the Coffs Harbour and Wauchope Forestry Districts, supplies are expected to last until approximately 1986. This reduction in resources will require the phasing out of general purpose timber harvesting of rainforests at least. The rate of logging timbers, then, will be generally too low to support the milling industry in its present form.

The timber mills utilizing rainforest species fall into three broad categories depending to varying degrees on rainforest timbers:

- **Mills in the metropolitan areas** which are characterized by a flexibility in operations both in terms of the source of their raw material and in their product mix
- **Non-metropolitan mills which have Crown quotas** and access to some private property materials
- **Non-metropolitan mills, mostly on a small scale**, which are basically dependent on sources other than Crown quotas. Occasionally, these mills have access to small parcel sales which become available from Crown property during road construction or during logging of hardwoods (eg. rainforest species under hardwoods).



The non-metropolitan mills usually do not receive log inputs conducive to economies of scale. Their often widely dispersed logging areas increase transport costs thus lessening the potential benefits of mill amalgamations although, to some extent, this is compensated for in the pricing of Crown timber supplies.

The following table identifies those timber mills which use an appreciable quantity of rainforest timbers drawn from Crown Lands. The letters S, V and P indicate whether the timber is utilized in sawn timber, veneer and/or plywood production respectively. Inquiries directed to the mills concerned have ascertained the total employment numbers for each mill. These numbers may be regarded as being directly dependent on continued rainforest logging. Where hardwoods are used by the mill also, those employees concerned primarily with these species have been excluded. The numbers include administrative, forest and actual mill employees.

Forestry District	Company and Location	Nature of Mill Operation	Employment
Casino	Munro & Lever P/L Grevillia	S, V, P	95
	Robb & Brown P/L Urbenville	S	11
	Standard Sawmilling Co P/L Murwillumbah	S	47
Glen Innes	Bruce Roper P/L Armidale	S	30
Coffs Harbour	Big River Timbers P/L Grafton	S, V	95
	*V P Trapp & Co P/L Coffs Harbour	S, V, P	(excluded from total)
	*Pilkington ACI Operations P/L, Grafton	S	(excluded from total)
Sub Total			278

Forestry District	Company and Location	Nature of Mill Operation	Employment
		<i>Brought forward</i>	278
Wauchope	Cemac Oxley P/L Yarras and Wauchope	S, V, P	151
	Hancock Bros P/L Wauchope	V	31
	C L Brown & Sons P/L Wauchope	S	8
	Veneer & Timber Products Wauchope	S, P	32
	Total Estimated Employment		

*\*These companies have only small Crown quotas for rainforest species and will be phased out of rainforest logging operations on Crown Land during 1979/80. ACI has arranged supplies of slash pine and hoop pine from plantation sources. It is understood V B Trapp & Co Pty Ltd will be seeking further supplies of eucalypt species suitable for peeling and any infrequent parcel sales of rainforest species from Crown property. Eucalypt species suitable for peeling include flooded gum, scribbly gum, silver top stringybark, New England blackbutt and manna gum. However, these veneers can be used only in a limited range of products and there is concern about the long-term availability of these species.*

Apart from those companies noted in the table, there are a number of smaller companies engaged in rainforest scavenging operations and/or removal of some rainforest species during hardwood operations. These operations may increase the above employment figures by a further 10-20 per cent.



In addition to direct employment by the mill operators, it may be anticipated that a significant number of people are engaged in occupations which are dependent on rainforest operations to some extent. For example, these would include:

- Road hauliers (transport of mill products)
- Plywood manufacturers (Sydney and Brisbane)
- Furniture, joinery operations, etc. (Sydney, Melbourne, Brisbane)
- Local service agents (machinery mechanics, etc)
- Local retail outlets.

Of the mills located in country towns, most may be regarded as major employers in those towns and there are few other suitable employment opportunities.

As noted previously, several mills have substituted other timber species for rainforest timbers in plywood manufacture. However, the substitution is limited to use in certain product types and, for some mills, economic utilization of the alternative species may require relocation to new sites. There is no information available to assess the nature of such a change (in terms of availability of resource), particularly if this occurred over a short time period. Furthermore, the limited available data suggest that, in the short-term, there are insufficient supplies of alternative species, suited to peeling, particularly from plantations.

With respect to the use of sawn rainforest timbers, a number of alternative materials could be substituted. However, there may be a shortage of timber suitable for high quality speciality uses, particularly where there is a strong user preference for a product made of a particular type of timber.

## **6 The Environmental Impact of Rainforest Logging**

In considering the environmental impact of rainforest logging for this report, two specific sources of information were used. The first was the extensive amount of written information on the attributes of rainforests and the environmental impact believed to be associated with its logging, and the second was the information obtained by Commission officers during recent inspections of logged areas.

At the outset, it must be emphasized that very little formal environmental impact assessment of rainforest logging has been carried out. This situation is now under review and the Forestry Commission has undertaken to prepare an environmental impact statement to cover logging operations in the Washpool area. This may be extended to other areas in due course.

The lack of any rigorous and formal assessment in a publicly available form, in accordance with Environmental Standard EI-4, *"Principles and Procedures for Environmental Impact Assessment in New South Wales"*, has resulted in a situation where it is not possible to comment objectively, in detail, on the environmental impact of rainforest logging in this report.

During the course of the Border Ranges Environmental Review, a large amount of material was presented to support the view that rainforest should not be logged because the resultant environmental impact was too high to be acceptable to many people. Submissions to this effect were presented from officers of CSIRO and also the Nature Conservation Council of New South Wales while the National Parks and Wildlife Service opposed logging also and favoured the dedication of an extensive national park in this area.

In the report on the review it was noted that there was no serious dispute from any quarter that the Border Ranges possessed attributes of outstanding value for scientific, educational, recreational, and conservation purposes, nor that segments worthy of preservation for these purposes should be preserved. The arguments related to how much should be preserved and to the form of management of these preserves. These arguments were compounded by the economically fragile nature of the associated timber industry and the communities dependent on the industry.

While the above comments were written in the specific context of the Border Ranges issue, it is felt that they are equally applicable to other rainforest areas in New South Wales.

Dr Webb and Mr Tracey of CSIRO expressed the view that the remaining unlogged rainforests and associated sclerophyll forests of the Border Ranges are unique and of unsurpassed scientific interest. They felt that Australia was obliged to preserve its remaining rainforests. They were critical of the case presented by the Forestry Commission for continued logging also.

Other organizations, notably the Nature Conservation Council of New South Wales, also were critical of both the proposals for continued logging in the Border Ranges area and the specific management techniques adopted by the Forestry Commission.



A further perspective on the impact of rainforest logging was provided in the report of the Inter-Departmental Committee on Land Use in the Border Ranges Area. This report canvassed a possible management option which involved replacing the selective logging of rainforest by a complete logging to the limits of utilization, coupled with a new conifer plantation programme in the district.

The Committee concluded that if this option were adopted, it might be many centuries before there was a recovery of the forests to a mature climax state and there was some risk that certain rainforest types would never regenerate. It should be noted that this comment was directed towards heavy logging of rainforest rather than the existing 50 per cent canopy-retention technique although this technique was widely criticized too.

As indicated previously, no comprehensive assessment of the environmental impact of rainforest logging is available for reference. However, on the basis of the available information and first-hand impressions gained during field inspections, the following environmental impacts may occur. The impacts would vary in significance from area to area, depending on such factors as the nature of the forest, its location and the type of logging involved.

### **6.1 Soils and Soil Stability**

Logging involves the construction of roads, log dumps, snig tracks and the creation of gaps in the forest canopy by removal of trees. Bare soil usually is more susceptible to erosion than undisturbed soil. It is recognized that measures are adopted to minimize the soil erosion associated with logging but at the same time, if there is heavy rain soon after the soil has been exposed, some erosion appears likely to occur. This is confirmed in many instances by the visible scouring of roads, table drains, embankments and snig tracks.

Some of the soils on which rainforest grows are prone to bulk slumping so that this is an ever present risk. However, it is probably a small one in a well-managed forest, particularly where selective logging is undertaken.

Logging inevitably increases runoff which significantly affects the immediate area around the logging. It may produce increased soil erosion as well as changing the existing nutrient balance, at least in the short-term. The nature and extent of such changes have not been fully investigated.

The use of heavy equipment tends to compact the soil but these effects should be relatively small except in a few places such as log dumps and access tracks.

## **6.2 Hydrology**

Although rainforest logging is expected to increase both total runoff and the rate of runoff, areas logged are usually relatively small in proportion to total river catchments and any effect would probably be localized.

Soil disturbance may result in an increase in suspended sediment which is too fine to be deposited in the drainage system or filter strips. This sediment could be carried downstream and adversely affect water quality. However, once again, this impact may be so small as to be insignificant in many instances. It is important to recognize that sediment comes from land used for other purposes also.

## **6.3 Air Quality**

Under dry conditions the use of forest roads generates dust, some of which settles on roadside vegetation or is blown further afield. Other users of forest roads may be adversely affected by dust generated through logging operations.

There may be some impact also, through exhaust emissions from motorized equipment used in logging operations. Although this impact may be small in an absolute sense, it might cause specific problems to people living near roads used for activities such as hauling timber.

While not directly associated with rainforest logging as such, forest-management techniques may involve the use of controlled burning which would adversely affect air quality through the emission of smoke and particulate matter.

By removal of part of the forest tree canopy, logging has a significant impact on the climate. This may affect flora and fauna requiring shady, humid conditions.

## **6.4 Noise**

The logging and extraction of timber generates noise through the operation of equipment such as chainsaws, bulldozers and trucks. The impact of this noise may affect other users of the forest and adjoining landowners. The background-noise level in forests is usually relatively low so that the noise of logging can have a marked effect on people seeking quietness in the forests.

Also, it is possible that noise may affect forest fauna but the extent and duration of any such effects are not well documented.



## 6.5 Flora

Obviously, rainforest logging has a very significant impact on the species composition and the structure of existing rainforests. The duration and extent of this impact has been extensively considered and widely divergent views on its acceptability have been presented. In some instances, authorities have expressed the view that rainforest will regenerate successfully while there is another body of opinion holding that this will not be so, or that a long period of time will be required for regeneration. This has been estimated at between 200 and 1 000 years. It is relevant to note that the available information is inconclusive since insufficient time has elapsed to observe the long-term results of logging.

First-hand observation confirmed that in many situations rainforest species grow relatively quickly following logging. In those areas where the logging has been selective and comparatively light, the visual impact may be insignificant some 20 years after logging. However, this does not mean that the forest will return to its original structure and species composition. As it is likely that the environmental conditions would be different from those in which the forest originally was established, it is probable that, frequently, logging would result in a permanent change in species composition and structure. The consequences of this change may only be assessed in relation to future management objectives for a particular forest.

As indicated previously, rainforests are relatively complex and tend to vary with latitude and specific environmental conditions. Therefore, the logging of any particular area of rainforest has a significant effect on the overall representativeness of types of rainforest.

## 6.6 Fauna

There is little doubt that logging operations have a significant impact on wildlife. This may be adverse for a number of species, for example through habitat destruction. However, for some species, such as those that are highly mobile, the change may be beneficial. For instance, it may provide a favourable environment for certain plants and insects which, in turn, are sources of food for kangaroos and certain birds respectively.

The effects of logging on fauna have been considered in a number of written articles, including those relating to the Border Ranges Inquiry. It is not proposed to review this material in this report.

## **6.7 Land Use**

One impact of logging is that it closes certain options for future land use. For example, logged areas are not suitable as scientific preserves or natural areas where an environment undisturbed by man is required. Similarly, the value as future national parks is reduced.

Conversely, logging has a beneficial impact in providing a source of income to those engaged in forest management and in timber-associated industries.

## **6.8 Recreation**

Both beneficial and adverse impacts of logging on recreation may be identified.

Logging is beneficial in that it may provide an economic basis for road construction so that vehicular access is more readily available than would otherwise be the case. Also road access allows picnic areas and other facilities to be developed and utilized.

In contrast, bushwalkers, as well as some photographers and other interested people, wish the forests to be kept in as natural a condition as possible. The value of an area for bushwalking in particular may be diminished through the creation of gaps in the forest and heads of trees on the ground which may make walking difficult or unpleasant.

## **6.9 Aesthetics and Human Interest**

Logging has a significant visual impact because of the construction of roads, snig tracks, and log dumps and also because of changes in the forest composition and structure. Logging operations result in heads of trees and commercially useless timber being left in the forest or near roads and snig tracks. The available information suggests that this is visually unattractive to many people, especially those who are not aware of the minimum requirements for timber to be suitable for use in the milling industry. In addition, activities such as transportation of the logging workforce or the timber may create dust, safety and traffic problems or damage roads and bridges that are not suitable for heavy traffic.

On the credit side, logging provides a significant source of income. Also, an inspection of logging operations may be a worthwhile educational experience.



## **6.10 Ecological Relationships**

Logging undoubtedly affects existing ecological relationships and a number of potential drawbacks were touched upon in earlier sections of this report. One possible problem is the invasion of logged areas by exotic plants, including weeds which may play a part in disturbing the existing ecological balance.

However, as the possible effects are wide-ranging, it is felt that they would best be documented in relation to each specific logging proposal.

## **6.11 Environmental Implications**

It is obvious that rainforest logging may have certain adverse unavoidable environmental impacts, although these should be minimized with careful management techniques.

Before a decision is made to log a particular rainforest area, all relevant factors should be considered and alternative proposals canvassed. This may be done through the established environmental impact assessment procedures.

## **7 Proposals for Government Policies towards Rainforests**

The Commission has adopted the following as its policy towards rainforests and recommends it to the Government for consideration.

- The overall question of rainforest logging should be related to land-use planning and resource allocation at the state, regional, and local levels.
- Land-use planning should have regard to the views of the National Parks and Wildlife Service on the adequacy of existing national parks and the various types of reserves for the preservation and appropriate management of suitable representative samples of the different kinds of rainforest. The views of other interested organizations and individuals should also be taken into account in this process.
- Any necessary surveys or other preliminary work required by the National Parks and Wildlife Service to provide a basis for the selection of adequate representative areas should be completed and the recommendations of the Service on this matter be formulated for consideration as a matter of urgency.

- Prior to finalizing its recommendations on this matter the National Parks and Wildlife Service should continue to consult with the Forestry Commission, as well as the State Pollution Control Commission and other interested authorities. In particular, the Service should give early attention to those areas proposed for logging in the near future.
- Until the overall question of the future land use of rainforest areas can be adequately resolved, further logging of rainforests should be avoided or restricted as far as possible to less controversial areas. Inherent in this approach is a recognition that the logging of rainforests has a significant adverse impact on the existing environment.
- Previously unlogged areas or areas deemed to have high conservation values should be given priority for preservation when decisions are being made on which areas, if any, are to be logged in future.
- The utilization of rainforest timbers should be delayed for as long as possible with a view to finding suitable substitute materials or developing an approach which would avoid rainforest logging.
- In accordance with the established procedures for environmental impact assessment of forestry projects, the Forestry Commission should continue to consult with the State Pollution Control Commission on the preparation of environmental impact statements for all forestry proposals, including those involving the proposed logging of rainforests. This approach provides for public comment to be taken into account in the assessment process.
- In reviewing any proposal for rainforest logging, the Commission will have regard to environmental factors as well as necessity for the timber which would be produced from the logging operation. The Commission will need to be satisfied that no suitable alternatives are available and a definite requirement exists for the end product.
- Where appropriate, assistance should be given to transfer of the existing workforce engaged in rainforest utilization to other occupations, aided by retraining where necessary.



- The Forestry Commission should re-examine its present "Indigenous Forest Policy" with a view to further restricting rainforest logging where practicable in the event of the first cutting cycle being completed, and to limit further rainforest logging to trees required for highly specialized uses in specific circumstances which should be clearly stated in a revised policy.
- There should be a general examination of the sawmilling industry concerned with rainforest utilization, with a view to phasing out supplies of rainforest timbers, providing suitable alternative timbers where possible, and having regard to the provision of adequate compensation where existing commitments for the supply of rainforest timbers are terminated.
- As an interim measure, the existing pricing structure of rainforest timber supplied from Crown Lands should be reviewed and an additional charge made for rainforest timbers deemed suitable by the Forestry Commission for use in plywood production and other specialist purposes where the end product has a high value.
- Where the circumstances are found to be such that rainforest logging is unavoidable, the best possible management practices should be applied. In the case of sub-tropical rainforest, there should be at least 50 per cent canopy retention. In all kinds of rainforest, disturbance to the canopy and also to other vegetation in the rainforest should be minimized and adequate measures taken to regenerate the forest as soon as possible following completion of the logging.

## STANDARD EROSION MITIGATION CONDITIONS FOR LOGGING AND CLEARING IN NEW SOUTH WALES

### 1 General

(a) These conditions for mitigation of erosion shall apply to all land clearing, logging and forest operations controlled by the Catchment Areas Protection Board and the Forestry Commission of New South Wales. The Catchment Areas Protection Board authorizes these operations under provisions of Section 21 of the Soil Conservation Act 1938, as amended. The Forestry Commission of New South Wales exercises control of these operations on Crown timber lands under provisions of the Forestry Act 1916, as amended.

(b) The person authorized by the Catchment Areas Protection Board shall ensure that all activities connected with the clearing and/or logging operations on the authorized area shall be conducted in such a manner that erosion is not aggravated and shall carry out any instructions given by the Catchment Areas Protection Board or its nominee with a view to minimizing or preventing erosion.

(c) Notwithstanding the following conditions, in catchments of major water storages and in areas where the erosion hazard so warrants, restrictions on the method and intensity of all forest operations may be imposed by the Catchment Areas Protection Board or the Forestry Commission of New South Wales.

### 2 Conditions for Logging

#### (a) Roothing

Roads shall be located where practicable on ridges. They shall not intrude into filter strips beside streams except where the road crosses the stream.

Roads are defined as those maintained on some regular basis so that they are generally available for use.

A minor road is defined as one that is constructed for a short-term specific purpose, eg, for timber haulage from log dump or for access during clearing and is used at most, intermittently.



(i) **Roads**

Roads shall be properly formed, and they shall be gravelled if the density of traffic so warrants, and this is specified.

All batters shall be constructed to a stable slope. Positive consolidation may be necessary on fills to minimize subsequent slumping and erosion of fill batters. Revegetation of batters may be required on some roads, and this shall be carried out when specified.

Adequate pipe drainage shall be provided in roads consistent with sound engineering practice so that erosion of the road surface and table drains is minimized. Pipes should discharge water onto undisturbed vegetation.

The use of borrow pits for the provision of extra material during road construction should be kept to an absolute minimum. Where use of a borrow pit is unavoidable, topsoil shall be stockpiled and subsequently replaced to aid revegetation. The bottom of pits should be graded and levelled, sides should be battered and shaped to conform to the surrounds and the replaced topsoil fertilized and seeded where necessary to establish a vegetative cover.

Maximum grades on roads shall be kept below 10°.

Bridges and culverts on roads shall be designed to transmit peak discharges consistent with the standard of road. Bridge approaches shall be stabilized and revegetated where necessary following construction. Culvert outlets should be located or designed to minimize scour and erosion.

Maintenance grading shall be carried out only where necessary and disturbance to vegetation should be minimized.

(ii) **Minor Roads and Logging Tracks**

Wherever the type of operation permits and as far as practicable, minor roads and tracks should be constructed with crossfall drainage.

Immediately after the logging operation has ceased (even if it is planned to use the road at any time in the future) the road or logging track shall be drained by cross banks where necessary. The channels of these banks must be constructed with a minimum gradient to ensure that

there is positive lateral drainage onto the surrounding vegetation. Cross banks must not direct water directly on other tracks or roads. The exits of these banks must allow water to escape readily from the track or road. The spacing of these banks will depend on the grade of the road or track and on the erodibility of the soil. Unless otherwise specified bank spacings to be employed are those in clause (ii) and the table under "(d) Snigging".

For any operation the height of the cross banks shall be specified.

Immediately after operations have ceased on minor roads and logging tracks, the surface material shall be replaced as far as practicable and they shall be drained by banks unless otherwise specified. Seeding and/or fertilizing shall be specified where necessary.

The use of borrow pits should be kept to an absolute minimum, and if employed, should be dealt with as under "(i) Roads".

Minor roads and logging tracks shall not cross running streams unless a causeway, bridge or pipe culvert designed to transmit peak flows has been provided. They may cross dry stream beds via causeways, temporary culverts or log crossings provided there is minimum disturbance to the surrounds.

"Blading-off" on minor roads and logging tracks shall be permitted only where track damage is minimal and where subsequent drainage and repair is possible.

Each "blading-off" operation must be specifically approved.

The use of minor roads should be minimized during wet weather. They should carry no traffic at times when there is runoff from the road surface.

**(b) Filter Strips**

- (i) A filter strip is defined as a strip of existing vegetation retained along both sides of a stream.
- (ii) A filter strip of existing vegetation shall be retained to extend at least 20 m on each side of a stream, and shall be provided downstream from the point on that stream where its catchment area exceeds (at most) 100 ha. Both the width of filter strip and the catchment area



may be varied if, in the opinion of the Forestry Commission or Catchment Areas Protection Board, slope, soil erodibility or stream conditions so warrant, in which case width and area shall be specified.

(c) **Felling**

- (i) No tree shall be felled into a watercourse within a filter strip.
- (ii) Trees may be felled into or within a filter strip. Tractors shall not enter the filter strip to remove logs.
- (iii) No logging operations shall take place within 100 metres of the top water level of any major water storage.
- (iv) No tree shall be felled within 20 metres of a prescribed stream as defined under the Water Act 1912, without specific authority.
- (v) Logging operations should be carried out so that there is minimum disturbance within any watercourse.

(d) **Snigging**

- (i) As far as it is practicable, snigging should be uphill. Downhill snigging should not be practiced in areas of more erodible soils or where specified.
- (ii) The drainage of snig tracks shall be carried out in the same way as for minor roads. The height, width and spacing of the cross banks shall be specified. Unless otherwise specified, the following table shows the maximum bank spacing required for each grade and erosion class:—

Grade of Snig Track or Road	Maximum Spacing of Banks Along Track or Road	
	Average Erosion Class	Extreme Erosion Class
Less than 15°	60 m	50 m
15°–20°	40 m	30 m
20°–25°	20 m	15 m
25°–30°	15 m	

Snig grades on extreme erosion class soils shall not exceed 25°, and on other soils should exceed 25° only where specified.

The extreme erosion class contains soils formed on granites (particularly deeply-weathered granites) and on coarse sedimentary rocks such as easily weathered conglomerates and sandstones.

In the case of "outrow" extraction tracks in plantations, drainage shall be carried out when necessary as specified.

- (iii) Snig tracks shall not cross the beds of defined streams without application of the same conditions which apply to minor roads and logging tracks.
- (iv) Snig tracks shall not intrude into filter strips, except in (iii) above.
- (v) A tractor blade should not be used to remove soil from a snig track except during initial track construction and during track drainage. "Blading-off" on snig tracks shall be permitted only where subsequent track drainage is possible. Each "blading-off" must be specifically approved.
- (iv) The use of snig tracks in wet conditions shall be minimized.
- (vii) As far as practicable, surface material should be returned to the track immediately after logging ceases on that track to aid in revegetation, and at the same time, to re-establish crossfall drainage. In circumstances where it is considered necessary the method of revegetation shall be specified.
- (e) **Log Dumps**
  - (i) Log dumps should be located as far as practicable in accordance with an uphill extraction pattern. In any case, they shall not be located closer than 10 metres from a filter strip or drainage line.
  - (ii) When ungravelled dumps are constructed and unless otherwise specified, topsoil is to be stockpiled in a recoverable position. Upon completion of logging (even if further logging is contemplated in the near future) dumps are to be levelled where necessary, drained so that runoff is directed onto surrounding vegetation, and the topsoil spread evenly out over the dump. The dump shall be revegetated and/or ripped where specified.
  - (iii) Gravelled dumps shall be drained upon completion of logging so that runoff is directed onto surrounding vegetation.



**(f) Burning**

Any burning associated with logging operations shall be carried out only in accordance with the provisions of the Bush Fires Act, 1949.

**3 Conditions for Clearing**

Clearing for pasture or agriculture is defined as permanent clearing, while clearing for plantations of pine or eucalypt is defined as temporary clearing.

No clearing operation shall take place within 100 metres of the top water level of any major water storage.

No clearing shall take place within 20 metres of a prescribed stream, as defined under Water Act 1912, without specific authority.

**(a) Permanent Clearing**

**(i) Clearing Method**

Destruction of timber by ringbarking, felling or poisoning shall be limited to areas with slopes not exceeding 27° unless otherwise specified.

Destruction of timber by the use of a bulldozer or other tractor shall be limited to areas with slopes not exceeding 18° unless otherwise specified.

Where retention of trees may be required, this shall be specified.

Clearing shall not be carried out between the banks and within strips at least 20 metres wide along each side of any creek, entrenched water-course or defined depression, or as specified.

In areas with risk of mass movement or in areas with soils of extreme erosion class, conditions for clearing shall be specified.

**(ii) Roads and Tracks**

Conditions are to be applied in the same way as for logging.

**(iii) Windrowing, Stacking and Burning**

Windrows shall be directed on the contour unless otherwise specified.

Timber shall not be stacked or burned within 20 metres of a drainage line, stream or standing green timber unless otherwise specified.

Destruction of felled timber by burning shall only be carried out in accordance with the provisions of the Bush Fires Act, 1949.

(iv) **Cultivation**

Cultivation shall not be carried out on slopes in excess of 18° unless otherwise specified.

(v) **Revegetation**

Immediately on completion of operations, disturbed ground and other bare areas shall be sown with seed and fertilized or otherwise vegetated. Where necessary, the method of revegetation shall be specified.

(b) **Temporary Clearing**

(i) **Roads, Tracks and Filter Strips**

Conditions are to be applied in the same way as for logging.

(ii) **Clearing Operation**

Clearing shall generally be restricted to slopes of 18° or less, and only in exceptional circumstances should exceed 25°. The method of clearing slopes over 18° shall be specified.

In areas with soils of extreme erosion class, clearing shall not be carried out on slopes in excess of 18°.

(iii) **Windrows**

Windrows shall not be located within or across the bottom of drainage lines. They shall be located on the contour where slopes and soil erodibility dictate, and where this is specified.

Windrows should be separated from filter strips and other retained forest stands sufficiently to minimize damage during burning of the windrows.

(iv) **Burning**

Destruction of felled timber by burning shall be carried out only in accordance with the provisions of the Bush Fires Act, 1949.



(v) **Ploughing**

Ploughing shall not be carried out in the bottom of drainage lines. Ploughing shall be confined to slopes of less than 18°, except where specified.

In areas with soils of extreme erosion class, the conditions for ploughing and planting shall be specified.

**PRIVATE PROPERTY BRUSHWOOD LOGGING  
FOR THE YEARS 1978/9 AND 1977/8**

Brushwood logging from private property occurred in four Districts (Kempsey and Wauchope Districts have now been amalgamated).

	<b>1978/9</b>	<b>1977/8</b>
Casino District .....	421 m <sup>3</sup>	2110 m <sup>3</sup>
Coffs Harbour District .....	1175 m <sup>3</sup>	2094 m <sup>3</sup>
Kempsey District .....	3070 m <sup>3</sup>	567 m <sup>3</sup>
Wauchope District .....	936 m <sup>3</sup>	1057 m <sup>3</sup>
Total	5602 m <sup>3</sup>	5828 m <sup>3</sup>
 <b>Casino District</b>		
Casino/Casino West Subdistrict .....	—	77 m <sup>3</sup>
Kyogle Subdistrict .....	145 m <sup>3</sup>	218 m <sup>3</sup>
Murwillumbah Subdistrict .....	276 m <sup>3</sup>	1815 m <sup>3</sup>
Total	421 m <sup>3</sup>	2110 m <sup>3</sup>
 <b>Casino/Casino West Subdistrict</b>		
Bentley Sawmilling Co .....	—	4 m <sup>3</sup>
A W, N J & M E Jagers .....	—	16 m <sup>3</sup>
K. E. Yabsley .....	—	57 m <sup>3</sup>
Total	—	77 m <sup>3</sup>
 <b>Kyogle Subdistrict</b>		
A L, A J & N M Ferris .....	26 m <sup>3</sup>	16 m <sup>3</sup>
H K McIntosh & Sons .....	53 m <sup>3</sup>	42 m <sup>3</sup>
Munro & Lever Pty Ltd .....	66 m <sup>3</sup>	160 m <sup>3</sup>
Total	145 m <sup>3</sup>	218 m <sup>3</sup>



	1978/9	1977/8
<b>Murwillumbah Subdistrict</b>		
E. B. Bryant & Sons Pty Ltd .....	51 m <sup>3</sup>	117 m <sup>3</sup>
Connoly's Sawmilling Pty Ltd .....	92 m <sup>3</sup>	427 m <sup>3</sup>
B. V. Flaherty .....	31 m <sup>3</sup>	106 m <sup>3</sup>
James Hurford & Co Pty Ltd .....	91 m <sup>3</sup>	4 m <sup>3</sup>
Walker Bros. ....	11 m <sup>3</sup>	19 m <sup>3</sup>
Lowe, Lowe & Rann .....	—	24 m <sup>3</sup>
Standard Sawmilling Co Pty Ltd .....	—	1118 m <sup>3</sup>
Total	276 m <sup>3</sup>	1815 m <sup>3</sup>
<b>Coffs Harbour District</b>		
Dorrigo Subdistrict .....	130 m <sup>3</sup>	171 m <sup>3</sup>
Ulong Subdistrict .....	915 m <sup>3</sup>	1647 m <sup>3</sup>
Grafton Subdistrict .....	130 m <sup>3</sup>	276 m <sup>3</sup>
Total	1175 m <sup>3</sup>	2094 m <sup>3</sup>
<b>Dorrigo Subdistrict</b>		
R S & M J Hodgson .....	130 m <sup>3</sup>	171 m <sup>3</sup>
Total	130 m <sup>3</sup>	171 m <sup>3</sup>
<b>Ulong Subdistrict</b>		
Chapman D B .....	9 m <sup>3</sup>	—
Corfe P E & B I .....	716 m <sup>3</sup>	1106 m <sup>3</sup>
Pilkington ACI, Operations Pty Ltd .....	28 m <sup>3</sup>	140 m <sup>3</sup>
Rhodes W J, C W & M W .....	—	44 m <sup>3</sup>
J W Seccombe & D C Hayes trading as Nashan Pty Ltd .....	145 m <sup>3</sup>	317 m <sup>3</sup>
Shipman F T .....	—	10 m <sup>3</sup>
Timms L E H & Co .....	17 m <sup>3</sup>	30 m <sup>3</sup>
Total	915 m <sup>3</sup>	1647 m <sup>3</sup>
<b>Grafton Subdistrict</b>		
J Notaras & Sons Pty Ltd .....	19 m <sup>3</sup>	—
F M Forests Pty Ltd .....	111 m <sup>3</sup>	276 m <sup>3</sup>
Total	130 m <sup>3</sup>	276 m <sup>3</sup>

	1978/9	1977/8
<b>Kempsey District (now amalgamated with Wauchope District)</b>		
Kempsey Subdistrict .....	3058 m <sup>3</sup>	567 m <sup>3</sup>
Macksville Subdistrict .....	12 m <sup>3</sup>	--
Total	<u>3070 m<sup>3</sup></u>	<u>567 m<sup>3</sup></u>
Kempsey Subdistrict		
Coachply Pty Ltd .....	3058 m <sup>3</sup>	567 m <sup>3</sup>
Total	<u>3058 m<sup>3</sup></u>	<u>567 m<sup>3</sup></u>
Macksville Subdistrict		
J W Hutchinson .....	7 m <sup>3</sup>	--
R G Notson .....	5 m <sup>3</sup>	--
Total	<u>12 m<sup>3</sup></u>	<u>--</u>
<b>Wauchope District (figures are prior to amalgamation of Districts)</b>		
Wauchope District (formerly Bellangry Subdistrict) .....	936 m <sup>3</sup>	1057 m <sup>3</sup>
Total	<u>936 m<sup>3</sup></u>	<u>1057 m<sup>3</sup></u>
Wauchope Subdistrict		
Cemac Oxley .....	289 m <sup>3</sup>	--
Hancock Bros. ....	55 m <sup>3</sup>	887 m <sup>3</sup>
R T, D R & D W Rumbel .....	9 m <sup>3</sup>	--
Veneer & Timber Products .....	583 m <sup>3</sup>	170 m <sup>3</sup>
Total	<u>936 m<sup>3</sup></u>	<u>1057 m<sup>3</sup></u>

Source: Forestry Commission  
September, 1979



## BOTANICAL NAMES OF SPECIES MENTIONED IN TEXT

Common Name	Botanical Name
Bean, Black	<i>Castanospermum australe</i>
Beech, Negrohead	<i>Nothofagus moorei</i>
White	<i>Gmelina leichhardtii</i>
Blackbutt, New England	<i>Eucalyptus andrewsii,</i> <i>E. campanulata</i>
Blackwood	<i>Acacia melanoxylon</i>
Booyong, Black	<i>Heritiera actinophylla</i>
White	<i>H. trifoliolata</i>
Coachwood	<i>Ceratopetalum apetalum</i>
Gum, Flooded	<i>Eucalyptus grandis</i>
Gum, Manna	<i>Eucalyptus viminalis</i>
Gum, Scribbly	<i>Eucalyptus micrantha</i>
Maple, Queensland	<i>Flindersia brayleyana</i>
Oak, Tasmanian	<i>Eucalyptus obliqua, E. regnans</i> or <i>E. delegatensis</i>
Pine, radiata	<i>Pinus radiata</i>
Pine, Hoop	<i>Araucaria cunninghamii</i>
Pinkwood	<i>Eucryphia moorei</i>
Rosewood	<i>Dysoxylum fraseranum</i>
Stringybark, Silver Top	<i>Eucalyptus laevopinea</i>
Teak, Imported	<i>Tectona grandis</i>
Teak, Native	<i>Flindersia australis</i>

NOTES