

THE IMPACT OF MAN ON THE VEGETATION OF THE WEST COAST REGION

by J.B. Kirkpatrick

Geography Department, University of Tasmania

ABSTRACT

Both aboriginal and western man appear to have grossly altered the nature of the vegetation of the West Coast through their use of fire. The shift of human activity from the coast to the inland parts of the West Coast following white settlement has resulted in a considerable reduction of the area of fire-susceptible communities. Prospecting, mining, smelting and logging have all contributed to this change, and air and water pollution from mining towns has laid bare previously vegetated land. Mining exploration, logging and forestry activities are continuing to change the landscape.

INTRODUCTION

This paper provides a general description of the causes, nature and extent of man-induced vegetation change in the West Coast region. The description is qualitative rather than quantitative; a necessity given the nature of the available data sources. The broad trends and nature of vegetation change since white settlement were gauged from historic sources and the nature of the present vegetation (Kirkpatrick this volume). The impact of the aboriginals on the landscape was deduced from meagre historical data relating to their culture and utilization of the land, and from the ecology and extent of the major vegetation types.

THE IMPACT OF PREHISTORIC MAN

Aboriginal hunters and gatherers were present in Tasmania when the climate was considerably colder than today. Thus, any concept of 'natural' or non man-influenced vegetation on a regional scale lacks reality. The hostile vegetation that greeted the first white traversers may have been an equilibrium vegetation, but had equilibrated in response to human activity as much as in response to the environmental complex, in which man is perhaps most appropriately included.

Known archaeological remains of the aborigines are concentrated near the coast where they utilized the resources of the littoral zone, and where food plants such as *Apium prostratum*, *Carpobrotus rossii*, *Geranium solanderi* and *Acacia sophorae* were found within the salt spray zone, and other plants with edible parts such as *Coprosma quadrifida*, *Dicksonia antarctica*, *Pteridium esculentum* and *Eleocharis acuta* were easily gained in nearby forests and swamps. Game would probably have been more abundant near the coast than further inland, as the fertility of the coastal zone is enhanced to some extent by inputs of nutrients from salt-spray and shells, allowing the growth of soft herbaceous plants mostly absent from the oligotrophic inland soils. However, although there are grounds for believing that most aboriginal activity was concentrated near the coast, there is no reason to believe that the inland areas of the West Coast were totally devoid of activity. The aboriginals encountered by Robinson showed familiarity with the land away from the coast, and there appeared to be certain routes along which aboriginals travelled from the west to the east and vice versa, as witness the apparent responsibility of the Port Davey tribes for raids in the New Norfolk area (Plomley 1966).

The gathering of plants and shellfish and the killing of animals may have had some impact on the vegetation, but the expression of this impact could only have been seen



PLATE 22. - Logging roads and fire scars in the rainforest south of Mt. Read.

on first occupation, when any extinctions or vegetational shifts would have taken place, or after the disappearance of the aborigines, when their absence from the ecosystem almost certainly contributed to vegetation change. Unfortunately, the invasion of western man and his animal and plant camp-followers has obscured any such changes, even if we had an exact idea of the vegetation patterns evolved during aboriginal occupation. However, one result of the gathering of shellfish was the creation of shell middens which can often be recognized by a more herbaceous vegetation than the surrounding areas, the input of calcium carbonate having an ameliorating effect on the acid soil.

The major impact of the aborigines on vegetation appears to have been through their use of fire. There is little doubt that the Tasmanian aborigines used fire for warfare, hunting and clearing of dense vegetation to allow easy travel. There is also historical evidence that fire was used as a tool to manipulate the environment in order to favour useful game and perhaps even plants. For instance, Robinson describes the deliberate creation of copses by protection from burns which were lit to attract game. These copses provided necessary shelter for the marsupials attracted to the burn (Plomley 1966). The mixed blood descendants of the Tasmanian aborigines on Cape Barren Island burn as frequently as possible in an apparently haphazard manner, with the general goals of improving grazing for game and domestic stock and maintaining the openness of the land. This is a habit that may have derived from either their Tasmanian or European parentage, as many contemporary Tasmanian graziers use fire with equal liberality. There is no doubt that fires were frequent in Tasmania before white settlement. The early navigators and explorers make frequent mention of clouds of smoke, often associated with sightings of aborigines, and old even-aged stands of eucalypts, and the spread of the fire sensitive rainforest community into former grasslands attest to pre-European fires.

Lightning is the cause of a relatively small percentage of fires in Tasmania, but causes sufficient to ensure that, even without man, Tasmania would not be a fire free environment. Certainly there is evidence of fire in deposits dating back at least as far as 30,000 BP in Tasmania (Colhoun, pers. comm.). Thus, while the impact of aboriginal firing on the vegetation of the West Coast was undoubtedly great, there is no way of assessing its proportionate contribution to the genesis of the pre-European vegetation characteristics and patterns. In the absence of aboriginal firing rainforest could have been more extensively distributed on the poorer soils occupied on the arrival of Europeans by sedgeland, heath, scrub and eucalypt forest and woodland, as siliceous, acid soils and impeded drainage do not in themselves preclude its occurrence, and most of the West Coast region is within its climatic range. Early accounts and photographs suggest that the major features of the distribution of plant communities were not radically different from today, with rainforest and eucalypt forest most extensive in highly dissected country and the treeless communities being found on the higher peaks and the major plains, being most extensive near the coast.

THE IMPACT OF EUROPEAN MAN

The prospectors and miners

Although we have little direct evidence of the firing habits of the West Coast aborigines, we know that the prospectors who filled the gap left by their departure to Flinders Island used fire to both penetrate difficult scrub and expose rock outcrops. Blainey (1954) recounts the tale of the mineral explorations of Charles Gould

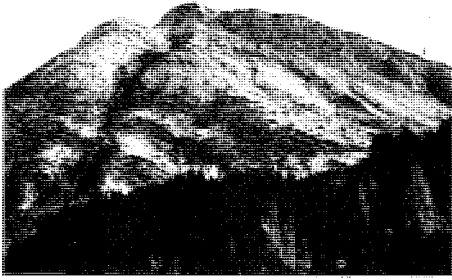


PLATE 23. - The northeastern slopes of Mt. Owen. The main invading shrub species is *Acacia mucronata*.



PLATE 24. - The King River near its mouth. The stumps of dead *Melaleuca* can be seen emerging from the grey tailings sediment.

and his party in 1862. The party was mistakenly thought lost and a search party was sent out to find them. The search party had little difficulty in following their route by the trail of burnt country. The use of fire as a prospecting tool has continued almost to the present day and fire has also accompanied more modern mining exploration activity. The Lake Dora plateau was almost completely burnt out in 1972 by fires started during the construction of a mining exploration road, and the heavily drilled Red Hills area has been the scene of many recent fires. The exploration tracks soon become impassable even to four-wheel drive vehicles, but unlike the tracks constructed by the early prospectors which are now largely overgrown; they seem highly unlikely to revegetate (plate 22). The organic material rich upper layers of the soil are completely stripped by the bulldozers leaving sterile sand and gravel which is rapidly eroded on the steeper slopes. Bulldozers have also left scars on many slopes where they have been used to bare underlying rock. These scars often run directly upslope, ensuring maximum erosion and minimum revegetation.

Mining operations in themselves have a severe impact over a small area, but need not necessarily effect the vegetation outside this area. Unfortunately, however, the mining towns have tended to be both a source of intentional and unintentional incendiaries and have also had considerable impact on surrounding forests utilized for timber. The major devegetation resulting from mining activity has occurred around Queenstown. From 1896 to 1922 sulphur-rich smoke poured from the smelter chimneys. In the early days of smelting frequent fires burnt through the vegetation surrounding Queenstown (Blainey 1954). While devegetation may have been partly caused by extremely frequent firing, air pollution was the main cause, as evidenced by the limited amount of bare country to the west and northwest of the smelters, the prevailing winds carrying the emissions to the east and southeast. The main role of frequent firing in causing devegetation may have been in the destruction of relatively emission resistant old foliage. Seedlings and new shoots may have been more sensitive, and their death through fumes and further fire eventually ensured accelerated soil erosion which removed the necessary base for plant growth over a large part of the slopes of Mts. Lyell and Owen. Whether sulphur dioxide or metals were responsible for most dieback remains a point open to investigation. Jordan (1975) produced strong evidence that zinc and possibly cadmium toxicity was causing the bare zone around the zinc smelters of Palmerton, Pennsylvania rather than sulphur dioxide. However, the fumes from the Queenstown smelters were apparently toxic enough to cause plant death in a single bad day (Blainey 1954), suggesting sulphur dioxide rather than metal toxicity to be the main culprit, as metal particles entering through the stomata of plant leaves are apparently largely biologically inert (Jordan 1975). Nevertheless, metals in the soil may be part of an explanation for the slow pace of invasion of vegetation into the bare areas since 1922.



PLATE 25. - The initiation of logging in *Athrotaxis selaginoides*-*Nothofagus cunninghamii* closed-forest on the southern slopes of Mt. Read.

The pioneer species have been largely native. *Acacia mucronata* has formed thickets on previously bare slopes (plate 23), *Restio tetraphyllus* has successfully invaded the wetter areas, and near the margin of the bare areas, a number of shrubs and trees such as *Pomaderris apetala*, *Cassinia aculeata*, *Acacia dealbata*, *A. melanoxylon* and *Atherosperma moschatum* have established themselves.

The substitution of the flotation process for pyritic smelting in 1922 removed the clouds of fumes from the Queenstown air, but, almost as if in compensation, turned the Queen and lower King rivers grey with tailings which are still being deposited along their course and in Macquarie Harbour (plate 24). The effect of the deposited sludge has been to kill much riverine vegetation. The cause of death has probably been root suffocation, as seedlings and young trees, including *Dacrydium franklinii*, are growing on the grey sediment in places.

Timber getters and foresters

Timber getting on the West Coast commenced in 1819 when Captain Feen obtained Huon pine from the Gordon (Whitham 1949). The Sarah Island convict settlement established in 1822 provided a base for further exports of this timber. By 1952 the Huon pine suitable for logging was virtually worked out (Casson 1952), although the species is far from extinct in the area. *Dacrydium* has regenerated after logging where the rainforest has avoided fire, and fire avoidance has been aided by the propensity of 'beds' of *Dacrydium* to be situated on moist river flats.

Extensive exploitation of the forest resources of the West Coast began with the initiation of mining and smelting in the late 19th century. Four hundred tons of wood a day fed the Mt. Lyell smelters over their quarter of a century life. Much of the forest felled for mines, smelters and mining towns was rainforest, a substantial proportion of which was dominated by *Athrotaxis selaginoides*, the King Billy pine. Clear felling and selective logging was almost invariably followed by firing of the slash (Casson 1952), with fires often spreading beyond the areas actually logged. Where seed trees were available such firing resulted in eucalypt regrowth. Where eucalypts were absent some sparse regeneration and resprouting of the more fire-resistant rainforest species occurred, along with invasion of shrubs such as *Phebalium squameum*, not normally found in this vegetation type. *A. selaginoides*, *A. cupressoides* and *Phyllocladus* were eliminated over large areas in which they were formerly abundant, and have little prospect of returning in the short term.

The ready availability of mechanical equipment in the last two decades has allowed the spread of logging into previously inaccessible areas (plate 25), most notably the *A. selaginoides*-dominated forests lying to the south of Rosebery and to the east and west of the Henty River. This formerly continuous rainforest is now a patchwork quilt of burns of various ages (plate 22). In the parts of the logged forest that have escaped burning, regeneration of rainforest tree species is confined to sites where the organic layer of the soil has not been removed by bulldozing. The bulldozed portion of the forest, usually between ten and twenty percent of its area, remains bare and eroding or supports only *Gahnia grandis* (plate 26). *A. selaginoides* is the least prolific regenerator of the forest dominants, while regeneration of *N. cunninghamii* and *Eucryphia lucida* is dense in suitable situations.

Logging of the rainforest has many of the characteristics of an extractive industry.

The slow growth rate of the most important species, *A. selaginoides* and *Dacrydium*, have mitigated against any attempts at perpetuation of a potentially renewable resource. The area of remaining *A. selaginoides* rainforest suitable for logging operations will be insufficient to last a decade at the present rate of exploitation. To fill the gap created by the cessation of rainforest logging and the relative shortage of millable eucalypts, the Forestry Commission has established and is extending *Pinus radiata* plantations on the Holocene dunes to the rear of Ocean Beach, eliminating almost all of the eucalypt heath which is their natural vegetation.



PLATE 26. - a logging track twenty years after the removal of trees. *Gahnia grandis* occupies the scraped area.

Invasion of exotic plants

Very little of the West Coast has been cleared for agriculture. Small areas of land near Strahan, Zeehan and Granville Harbour have been cleared on some of the best available soils. These areas, and others where disturbance has resulted from mining activity or road construction, have been the scene of establishment for many introduced species including *Ulex europaeus*, *Rumex acetosella*, *Sarothamnus scoparius* and *Holcus lanatus*. *Lupinus arboreus* and *Amphiphila arenaria* dominate the foredune along much of Ocean Beach. However, exotic species have usually not penetrated far from roads, tracks, towns and farms. Even the ubiquitous and vigorous blackberry (*Rubus fruticosus* agg.) has not reached far into the forests.

DISCUSSION

The major impact of both aboriginal and western man on the vegetation of the West Coast has been through the medium of fire. If western man had confined his activities to the coastal fringe of the region, the vegetation of the West Coast might be little different from that present under aboriginal occupance. However, there are few parts of the region that have escaped all of prospecting, mining, and timber getting, and the greater part of this activity has been in the interior rather than near the coast. Queenstown and Rosebery, currently the two largest towns of the West Coast, Williamsford, Gormanston, and a host of extinct towns such as Linda and Crotty were established along the flanks of the West Coast Range within or adjacent to a major belt of fire-susceptible rainforest and alpine communities. The greater part of logging and prospecting activity has occurred in the same belt. Consequently, the fire-susceptible communities have been dramatically reduced in area since white settlement.

The survival of the remaining unburnt rainforest and alpine communities is far from assured. The remaining rainforests containing commercial timber seem certain to be selectively logged. The forest remaining after logging is more open, and therefore more inflammable, than the original forest, and access for potential fire sources is created through the maze of logging tracks, even if the forests avoid firing during logging and track construction. Past logging fires have created large patches of highly inflammable scrub and sedgeland in the midst of unburnt forest, thus increasing the probabilities of firing. Mining exploration activity continues in both the rainforest and some alpine areas such as Mt. Read, and is the direct cause of both mechanical destruction and an increased fire incidence.

The prospects for recovery of destroyed rainforest and alpine communities are poor in the absence of total fire exclusion. The inflammability of the vegetation increases each time an area is fired as a result of species substitution, structural change and considerable nutrient losses to both groundwater and atmosphere (Jackson

1968, Harwood and Jackson 1975). Even if fire were totally excluded, the limited dispersal ability of most of the fire-susceptible species would ensure extremely slow recovery. However, a part of the areas logged and burnt during the lifetime of the Queenstown smelters may recover to *Nothofagus cunninghamii* closed-forest, as myrtle is a major understory component of the closed-scrub which occupied the area after logging, and much of the closed-scrub has avoided fire in ensuing years.

The relationship of man and vegetation on the West Coast would repay much deeper study. The region would have few equals as a study area for exemplifying the impact of exploitative man on directly little-modified natural landscapes. It also provides a striking lesson on what changes can be expected if mining and logging extend into the South-West wilderness.

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