

*International Review:*

## Land of Grass: the Loss of Australia's Grasslands

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*To a large extent, the Australia of 1788 was characterised not by forests but by open woodlands and grasslands. Yet many of these areas now contain dense forest. Possible explanations for this dramatic vegetational shift include the cessation of Aboriginal burning regimes and the displacement by domestic stock of mammals that ate tree seedlings. While Australia's grasslands were being overrun, elsewhere destructive and wasteful felling of timber continued apace. The problems resulting from such clearance began to be widely articulated in the last two decades of the nineteenth century, but general attitudes to ringbarking and felling have changed only slowly. The result of all this is that Australia's vegetation is now thoroughly disorganised. The grassy woodlands have gone and with them birds, animals and numerous varieties of grass. Any attempt to provide an environment suitable for the majority of native plants and animals in temperate Australia must depend on the restoration of a pre-European-type mosaic of interconnected grassy woodlands.*

In Europe butterflies are the indicators of unwise farming. Of four hundred species, one hundred are in danger of extinction. Nowhere are they in the numbers of twenty years ago. In Australia birds are the living indicators. According to counts by Birds Australia there has been a reduction of 45 per cent of woodland birds in the last six years, a catastrophe that might cost us Red-capped Robins, Blue-faced Honeyeaters, Grey-crowned Babblers (the delightful birds we used to know as Happy Jacks), Regent Honeyeaters, Grey Butcherbirds with their magnificent voices, numbers of others. The reason is that too much of our grassland has

gone under the plough, those areas of perennial, millet- and oat-seeded grasses dotted with a dozen or so sappy, sprawling trees to the hectare, such trees as White Box, Yellow Box, Mugga Ironbark and Yellow Gum inland (*Eucalyptus albens*, *melliodora*, *sideroxylon* and subsp., and *leucoxylon* and subsp.), and Swamp Mahogany (*E. robusta*) on the coast. These imposing trees mass themselves with white or pink flowers carrying heavy pollen, then pour nectar, providing a year-round harvest for the animals that follow the flowering. In the whole of Australia there are less than 5 per cent of these woodlands left, in New South Wales the percentage is probably nearer one.

Discussing Australia at the time of European settlement with David Suzuki for Canadian radio, I mentioned that Koalas, which prefer

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open country, moved into forests because there was nowhere else to go. He said the same thing happened to Canada's Grizzly Bears. Originally they lived on the rich plains where hunting was easy. Settlement moved them into the difficult Rocky Mountains.

What was the state of Australia in 1788? No successful remedy can be made for any area unless we know its history. Because they will not learn any history, too many present-day environmentalists are a danger to the environment. Their idea of saving an area by locking it up has resulted in national parks concentrating on spectacular scenery and forests which provide a very limited environment for the majority of native plants and animals in temperate zones.

In a chapter in a book that he edited, *The Humanities and the Australian Environment*, John Mulvaney told of the attitude of some conservationists during the Tasmanian dams debate of 1982–83. 'I sensed that some ardent pro-wilderness advocates preferred not to know that during ice age times [up to 12 000 years ago] those presently impenetrable rain forests consisted mainly of open and inhabited grasslands. Somehow it spoiled their image of a pristine wilderness to know that it was once populated ...' (Mulvaney, 1991, 118).

Hugh Spencer who established the Austrop Foundation at Cape Tribulation on the coast of far north Queensland took me into a patch of thick, beautiful rainforest. There were a few huge figs, many trees fifty centimetres in diameter. All were so thickly laced together with vines it was hard to walk through. The ground was so spongy I seemed to be walking on thousands of years of mulch. 'A few months ago,' said Hugh, 'I had a party of conservationists up from Sydney. When I brought them in here they were saying "What a magnificent primeval forest, this will have to be preserved — there aren't many places like this." When I told them that only forty years ago the whole area was a run-down dairy farm they didn't want to know.' It is the best example of rejuvenated land I have seen, a marvel to give anybody heart and hope.

There was no wilderness in Australia at the time of European settlement. Even the rainforests of north Queensland, as dense as any forest anywhere, were permanently inhabited by small, lithe people who maintained wide tracks leading to open village sites within it. More agile in the tree tops than the tree kangaroos they preyed on, they had phenomenally developed powers of sight, smell and hearing. They could follow the flight of a *Trigona* bee three millimetres long 22 metres away.

Dean Graetz and his fellow authors of *Looking Back*, published by the CSIRO Office of Space Science & Applications, state that the landcover of 1788 was '... characterised not by forests but by woodlands; in particular, by the low and open woodlands and shrublands where the overstorey is so sparse it covers less than 10% of the ground surface.' (Graetz *et al.*, 1992, 18). This area covered 60 per cent of the continent (Figure 1). Tall closed forest, tall open forest and closed forest covered 1.3 per cent only. The rest was heath and other shrubs of varying density (Graetz *et al.*, 1992, 17).

Efforts to correct the awful destruction that has occurred since that time are being confused by attempts to add more trees to Australia in 1788 than were ever there. In particular, Benson and Redpath (1997) have argued that there is no evidence that grassland and open woodland covered most of the landscape at that time, and that most grasslands are the product of large-scale land clearance since the time of European settlement. The deficiencies of this work are exposed below. The tree counts cannot be argued with. I quote from the men who made them.

In *Australia's First Frontier*, T.M. Perry (1963, 19) found the original vegetation of most of the Cumberland Plain, west of Sydney '... an open eucalypt woodland, in which the trees were widely spaced and the ground between grass covered.' Writing in the early 1820s, Peter Cunningham in *Two Years in New South Wales* described Eden Forest, between the junction of the Cookabundun and Wollondilly Rivers southwest of Moss Vale, as having trees '... so



Figure 1 The understorey is exotic but this photograph of a property on the Loddon River in Victoria in the 1920s gives a good idea of tree cover in the temperate regions of Australia 200 years ago (Source: Mitchell Library, State Library of New South Wales, Sydney).

sparingly scattered as to resemble more a nobleman's park than a natural forest ...' (Cunningham, 1827, 126). Unlike many of his contemporaries, Cunningham used 'forest' in its modern sense. Most of the first settlers had strangely gone back to a meaning no longer used in England based on the original Latin. *Foris*, corrupted in everyday Roman speech to *forestis*, meant 'outside', that wide protective strip of grass between the city wall and the wood, cleared of all trees except those too big to cut down. It means every early reference to 'forest' has to be read carefully to see whether the writer is talking about trees or grass.

'Plain' has changed its meaning too. The early plains are not the great black flats between Baradine and Coonamble or Narrabri and Moree, they are low rolling hills, 'plain' because they are bare of trees. So around Bathurst there are King's Plains, Evans', George's, O'Connell, Macquarie, Bathurst,

Pretty Plains; around Goulburn are Gundary (formerly Goulburn) Plains, Breadalbane, Molonglo, Limestone, Yass. Scattered about on the Shoalhaven, Cudgong and Hunter Rivers are Nelson's, Paterson's, Wallis's and Patrick Plains.

Riding from Hobart to Launceston in December 1811 along a route much the same as the present road, Governor Lachlan Macquarie noted plains all the way (Macquarie, 1956, 63–67). The narrow *Chart of Van Diemen's Land* drawn in 1821 (Macquarie, 1956, facing p. 202) marks fifteen. There was a small 'Tea Tree Brush' in the south and 'Epping Forest' in the middle, 'all very poor bad soil' wrote Macquarie (1956, 66).

Between that big area of open country in central and north-eastern Tasmania and a narrow strip of grassland in the north-west, there was formidable scrub. In April 1860 Ronald Gunn, botanist and politician, forced

his way between the Native Track Tier and the Leven River in the central north.

...the greater portion...covered with the horizontal scrub (*Andopetalum biglandulosum*) ... the only means of progress being that of crawling on all-fours under the trunks or walking many feet above the ground ... The wire scrub (*Bauera rubioides*) is even more difficult ... 6 to 10 or 12 feet high [1.8 to 3.6 metres], in one dense mass; the stems like wire, tough and interlacing ... (Gunn, 1987, 23).

But only 25 kilometres to the west, Henry Hellyer, exploring for the Van Diemen's Land Company in February 1827, had named the Hampshire and Surrey Hills because

They resemble English enclosures in many respects, being bounded by brooks between each, with belts of beautiful shrubs in every vale ... The whole country here is grassy ... The trees are, in many places, 100 yards [90 metres] apart ... There are many open plains of several square miles without a single tree. (Hellyer, 1987, 30).

By 1860 Ronald Gunn was reporting 'A very considerable extent of the Surrey Hills is also becoming rapidly covered with forests of young *Eucalypti* ...'. It was the same lower down the Leven and on the Hampshire Hills (Gunn, 1987, 23). All through that wild, difficult country other explorers reported open grasslands among dense timber and scrub, most of them now heavy forest. Tasmanian Aboriginals used fire as expertly as Aboriginal mainlanders to keep tracks and hunting grounds open.

It is not only in Australia that trees come away aggressively if given opportunity. In the United Kingdom, the Hampshire branch of the Butterfly Conservation Society found Magdalen Hill in the original downlands overrun with scrub: 'Cessation of grazing had allowed its abundant short-sward limestone flora and fauna to be crowded out by invading hawthorn, privet and bramble' (Anon., 1992). They restored the area to productive grassland (that favoured by butterflies) by cutting back the invaders in wide,

irregular strips while leaving belts of them as protection against wind.

The seasonal journals of that Society frequently refer to coppicing of woodland to allow light to generate flowers and shrubs, to the strategic burning of gorse to produce clearings, and to the mowing of tree seedlings (see, for example, Anon. [1993]). The Society stresses that all areas have to be managed for wildlife, shutting them up and forgetting them produces nothing but thickets useless for the majority of birds and insects. Even myxomatosis was a disaster for British butterflies. By eating tree seedlings, rabbits kept country open.

In the Pilliga forests of northern New South Wales it was possums and the plentiful Rufous Rat-kangaroos reported by Oxley (1820) that ate the tree seedlings generated by Aboriginal fires. Once out of the boggy sands of that area, across the plenty of the Liverpool Plains and east of the Peel River, Oxley marked on his map 'Fine open Country', 'Good open Forest Hills'. East of the river he named Sydney (it is now the Muluerindie or Macdonald), he marked 'Lofty Hills clear of Timber' to the south while he was passing through 'noble forests of stringy bark growing generally on the sides and ridges of stony barren hills'. After that there was thick myrtle scrub (*Cadellia pentastylis*) with Rough Tree-fern (*Cyathea australis*), Manna Gum (*Eucalyptus viminalis*), two or three stringybarks and various shrubs laced together with vines. He skirted that into a small open valley then, on the way down the escarpment to Mount Seaview and the coast, ran into forest so dense it was difficult to get through.

Oxley's *Chart of Part of the Interior of New South Wales* dated 1818 (Oxley, 1820) describes the full extent of the now heavily timbered Liverpool Range as 'Open elevated Country thinly covered with Wood' and 'Lofty Hills clear of Timber'. The Liverpool Plains of the 1830s were described by William Telfer Junior (c. 1900; c. 1915) in a pair of remarkable manuscripts held in the Dixon Library at The University of New England and the Mitchell Library in Sydney. Telfer was not born until 1841 but he had the stories from his father who

was manager of the Australian Agricultural Company's sheep at Warrah Creek. There were clumps of Myalls (*Acacia pendula*) on the plains that were all gone by the time Telfer Junior could take notice, 'This timber has entirely disappeared (*sic*) the last forty years what with droughts and lopping for starving stock there has been no young trees grown'.

However he did see the Quirindi country at its best.

The plain to the westward of Quirindi looked very picturesque scrubs of myall timber with large belts of myall all around the Edges of the plain with large flocks of Emu in the middle feeding and a lot of cattle camped under the trees ... the hills around were covered with pine scrub and undergrowth of shrubs any amount of wild pigeons parrots and other birds Telfer, *c.* 1915)

Early in 1833 his father lifted 6000 ewes in lamb from the Australian Agricultural Company's run at Stroud, north of Newcastle, and drove them over the Barrington Tops to the new run at Warrah Creek. He lost six ewes only on the way. Such is the present growth of timber, native scrub and weeds it would now be impossible to drive half a dozen sheep by that route.

When Oxley tried to flounder north through the spewy sands of the present Pilliga forests in the extraordinarily wet year of 1818, he ran into dense ironbark saplings (Oxley, 1820, 268–269). From the description of his difficulties the area sounds enormous. The exact point at which he turned back can be calculated by the work of John Whitehead (1970), the Coonabarabran Shire engineer, on his route. In 1974 I pushed my way in there along an overgrown track. The ironbarks (*Eucalyptus crebra*) had thinned themselves out and grown into a magnificent stand covering about fifteen kilometres by fifteen. That forest comprised less than a third of the run Garrowramere, taken up as good grassland in 1837 by twenty-one year old John Robertson, later state premier five times. An overseer on his father's station on the Namoi

River since 1835, he had had two years to look about and assess the value of the land.

The whole area now looks like primeval scrub, even a lot of the ironbarks are protected by a savage growth of *Acacia triptera*. But Edward Lloyd bought it after Robertson abandoned it. With partners he owned Namoi River country from Manilla to Narrabri then north towards Moree, some of the best country ever put together. He would not have bought scrub. Later Frederick York Wolseley bought it as a sheep run where he intended to perfect his shearing machine. He fenced in 4000 hectares with a twelve-wire fence 28 kilometres long to protect his sheep from dingoes. One man, Bert Ruttley, who gave me much information when I was writing *A Million Wild Acres* (Rolls, 1981), repaired this fence when he was young. He knew some of the men who erected it; he told me that they did not have to do any clearing to run the line.

The good grasses that attracted graziers to the whole area of the present forests and nature reserve can still be found: sixty-odd species and variants in at least 32 genera, principally summer-growing perennials. But none is now common, some like *Eulalia fulva*, a grass so palatable to stock it was known as Sugar Grass, is very rare, Brigalow Grass, *Paspalidium caespitosum*, almost disappeared when the Brigalow was cleared. Inferior species of *Stipa* and *Aristida*, formerly insignificant members of the pasture, now dominate the few clearings where any extent of grass can grow.

There are numbers of records which, when added together, give an accurate idea of tree growth over the whole area of the present Pilliga forests when it was taken up by graziers (Figure 2). Both the number of trees to the hectare and the species can be gauged. In two important series held by New South Wales State Archives, Central Division Occupation Licences (Anon., no date) and Central Division Pastoral Holdings (Anon., 1885–1914), there are forty-odd maps of the runs. Some show no more than the boundary, some like the big 1886 map of Goorianawa show great detail. Plains are



Figure 2 About 300 years old with no more than ten per cent of its top growth alive in 1996, this is one of the last two Old Greys (slowly-grown White Cypress Pine) in the Pilliga forests (Source: E. van Kempen).

marked and areas of open box, ironbark and pine plus fifteen patches of scrub varying in size from 2 kilometres by 400 metres to 15 by 5.5 kilometres. Yarrigan, an open area on the map, is now thick pine forest.

The *First Annual Report upon the Occupation of Crown Lands* for the year 1879 put out by the Department of Mines gives the count on the first two reserves declared in the Pilliga area. (As in Victoria the huge amount of timber used in mining initially put forestry matters in the hands of the Department of Mines [Figure 3].) On the 64 200 acres (26 000 hectares) of Robertson in the County of Baradine there were 1½ mature

pinus and 15 young pinus to the acre (4 and 38 to the hectare) on 30 000 acres, and one ironbark and 19 young ironbarks to the acre (2½ and 48 to the hectare) on 3500 acres. The rest held little worthwhile timber. On the Wee Waa reserve of 17 280 acres in the County of White there were two mature trees to the acre (five to the hectare) of either pine, ironbark or gum, with from forty to fifty young pinus to the acre (100 to 125 to the hectare) on 6000 acres plus an area of dense pine scrub.

The highest count given in that report (only a few forests were estimated) was in the Auckland reserve near Bega in south-east New South Wales where there were 32 mature trees to the acre (80 to the hectare), a mixture of ironbark, White Box, hickory, stringybark, bloodwood, Spotted Gum, White Gum, Mountain Ash and messmate. The gums dominated with six each. That density is about one third of a modern thinned stand of White Cypress Pine.

There was one rare, beautiful, dense forest in the northern inland. Arthur Dewhurst, District Surveyor, made a separate accounting of the Nundle Forest Reserve of 15 600 acres (6240 hectares) declared in 1872. It was true old growth. Dewhurst was enthusiastic:

The various descriptions of stringybark, so valuable for building purposes, which are growing so closely together, and to such a prodigious size, together with the wattle for its bark, mark this reserve as one of the finest hard-wood forests in New South Wales.

Taking the mean of several counts to the north-east and south-west of the reserve, I should estimate the number of such trees as sixty to the acre, cutting on an average 600 feet surface [1.4 cubic metres], but of this number twenty have passed their prime and are now in process of decay, and twenty are ready for the axe ... (Dewhurst, 1879, 657).

Farther north, in now heavily timbered parts of New England, there was much open woodland. The evidence for tree growth on open country there is displayed by the many kilometres of aqueducts put in by Chinese



Figure 3 Mining made enormous demands on timber. This is a mine tunnel at Red Hill in the 1920s (Source: Government Printing Office Collection, State Library of New South Wales, Sydney).

miners last century at Surface Hill 20 kilometres south-east of Tenterfield. If the present growth had been there they could not have pegged their lines, let alone dug the channels. They had to decide a considerable distance before a gully whether they would bridge it with fluming or alter the line to curve the aqueduct around its head, the preferred method. Trees and undergrowth are now so thick that I fell into one gully that they bridged before I saw it. To peg the levels Chinese engineers used an A-frame with legs three to four metres apart. It would not now be possible to swing that instrument, so thick are trees and undergrowth.

That 1879 forest report (Department of Mines, 1880) contained stories of dense new growth of trees in the central south of New South Wales. The Commissioner of Crown Lands at Bourke reported box scrub coming away on recently flooded land; in the Riverina, pine was '... springing up in dense scrub in places before quite free from it.' R.B. Dawson, Commissioner of Crown Lands at Casino,

reported 'I think my district is gradually becoming more densely timbered.'

There had been much earlier reports of tree growth on disturbed land. The Bonwick transcripts of the Bigge Report (1819–21) contain references to gum saplings and Native Blackthorn (*Bursaria spinosa*) coming up at Camden, 55 kilometres south-west of Sydney, in the early 1800s; Andrew Brown's diaries (1838–54, 29) tell of '... young trees much closer than the original forest ...' springing up on abandoned farms near Kurrajong in the Blue Mountains in 1839; in a chapter on Aborigines at the back of *Journal of an Expedition into the Interior of Tropical Australia* published in 1848, Thomas Mitchell wrote of thick forests of young trees near Sydney '... where, formerly, a man might gallop without impediment ...' (Mitchell, 1848, 413).

By 1884 new growth was obvious on the Pilliga reserves. One section was 'thickly timbered with young trees in good condition'. Another held 'a healthy growth of young pine

and ironbark' (Anon., 1884). And soon inspectors of runs like Charles Batty and managers of runs like M. Wright of Yearinan were telling of scrub 'increasing very fast, principally pine and wattle' (Anon., 1885–1914).

That growth which eventually drove men and their stock out of the area was occasioned by the breaking of the 1877–79 drought followed by good rains in the mid-1880s. As an old man, W.C. Cormie, nephew of Alexander who held the run Cumble at that time, told a reporter from the *Wee Waa Echo*: 'This disastrous drought broke in the early morning of 4th March, 1879. The rain commenced about daylight. The clouds seemed to burst. By midday up to sixteen and a half inches [420 millimetres] had fallen at Baradine. Well I remember this rain — I was in it.' (Anon., 1969). His memories are confirmed by Cumble diaries in private hands.

Because the good grasses gave out so quickly, the Pilliga was never consistently or heavily stocked. Not all reports are extant but it is unlikely that the area ever carried more sheep and cattle than the totals at the end of June 1851 (Bench of Magistrates, Armidale, 1845–57). Considering only the stock running within the present area of state forest and nature reserve, there were then 6077 cattle and 19 120 sheep on about 300 000 hectares, not heavy stocking on the good pasture since it allows about 21 hectares to the beast. These returns were given so accurately that cattle stations holding three or four sheep for rations listed them.

When Elaine van Kempen (1997) was working on a forest history of the Pilliga for State Forests, she found records of transect surveys carried out in the 1920s by Gordon Burrow and B. Priestman. These inordinately valuable documents were in a broken cardboard box in a back shed in the forestry yard at Baradine. Despite the frantic growth of the 1880s, the trees were still not thick. In Pilliga West, always noted as holding the finest timber, Burrow recorded '... two White Cypress Pine trees to the acre [5 per hectare] of 10 inches and 11 inches [25 centimetres and 28 centimetres]

diameter and two more of 12 inches (30 centimetres) and over ... Priestman perceived eight or so mature pines to the acre as a thick stand.' One area he described as 'magnificent advanced Pine forest' held 20.4 to the hectare of trees 25 centimetres and over. The ironbark forests were thinner, Burrow found 5.68 per hectare, Priestman four to 5.68.

This vast area of open country in the Pilliga does not discount the long wide belt of Brigalow (*Acacia harpophylla*) originally on the heavy soils in the north-east (there are now only small disturbed areas left) and the heavy mixed scrub in the east and the central south. It was there when Oxley went through — he found several acacias and '... a vast variety of other flowering shrubs of the most beautiful and delicate description ...' (Oxley, 1820, 267). It has been modified since only by occasional opportune stocking and wildfire.

The run Coormore in that central area was forfeited in 1861 (Moriarty, 1861) and offered for public auction on a five-year lease in 1863 (Robertson, 1863, 1818). The *Gazette* notice described it as

... lying easterly from Gibbean and commencing from a marked gum tree in the centre of Middle Creek, and from thence by a line in an easterly direction about five miles through scrub, and crossing Coormore Creek, to a marked tree in the thick scrub; bounded on the south by unoccupied Crown Lands, from thence by a line in a northerly direction about five miles through thick scrub, to a marked tree ... (Robertson, 1863, 1818).

Gibbean (or Gibbican or Gebian) in the heavy scrub on the western boundary passed through several owners of other blocks who probably used it as winter relief for cattle — lightly stocked, the few edible shrubs would maintain body weight — until it was taken up by the Boyle brothers, scrub dashers, hard-riding men always on the lookout for cleanskins. A herd of elephants could have been hidden there. That scrub was used to hide stolen cattle until the 1950s or even later.





Figure 4 1953–54 growth of White Cypress Pine in Yarrigan Forest in the Pilliga taken in 1970. At this density pine ‘locks up’ — it will not compete for room. There are 100-year-old pines in the Pilliga with butt diameters of three centimetres (Source: F. Bailey, State Forests of New South Wales).

Down the Lachlan and Murrumbidgee Rivers, pine scrub had come up earlier, thicker and more extensively than in the Pilliga (Figure 4). On 3 February 1880, after a memorial was received from runholders about the clearing of pine and scrub from leased lands, John Futter, Commissioner of Crown Lands for the Lachlan District, reported that he had recently visited the country between the Lachlan River and Merool (now Mirrool) Creek which flows into Barren Box Swamp north-west of Griffith:

Young pine are now springing up over large tracts of country so thickly that in a very

short time they will form a dense scrub where no grass can possibly grow; in fact, in many places, such is already the case ... The cause of this rapid growth, which is of comparatively recent date, is ascribed to the discontinuance of bush fires, which were formerly periodical, but which now, from the fact of the runs being all fenced with (in many cases) brush or log fences, are carefully guarded against. (Anon., 1882, 254–255).

Charles Lockhart, Commissioner of Crown Lands in the Darling District, reported that since 1875 the spread of scrub on the Murrumbidgee



Figure 5 The intensive clearance of timber was widespread throughout the country: a bleak and damaging destruction by settlers at Springfield, north-east Tasmania (Source: Mitchell Library, State Library of New South Wales, Sydney).

had increased amazingly (Anon., 1882, 255–256).

C.F. Bolton, District Surveyor at Wagga Wagga, reported ‘... extensive tracts of country, which fifteen years ago were beautifully grassed open downs, are now so overgrown with young pines that sheep can hardly make their way through them, whilst the original grasses have almost entirely disappeared...’. He thought that sheep had trodden pine seeds into the dust during the drought of 1866. ‘I may add that this alarming spread of pine scrub is not at all confined to sandy land, the natural habitat of pine, but has extended to rich undulating country, and even to the alluvial land along the rivers and creeks.’ (Anon., 1882, 256).

There are similar stories from Goulburn, Condobolin and Narrabri (Anon., 1882, 254).

But there was old timber to be considered in the New South Wales parliament as well as new. On 29 March 1881 during debates in adjourn-

ment on *Ring-barking as an Improvement* (whether or not ringbarking, like buildings and fencing, was an improvement that a selector had to pay for), John McElhone, Upper Hunter, told the house, ‘Any one who had travelled from Sydney to Wagga Wagga, and from Maitland to New England, must have noticed that all the trees were destroyed.’ (Figure 5). ‘So far had this destruction of timber been carried on by the lessees that a selector at Murrurundi was compelled to take up 100 acres on the mountains so as to secure timber.’ (McElhone, 1881, 1205).

However pine scrub usually led the debates. When considering *Ring-barking on Crown Lands* (a new name for the former bill) on 3 August 1881, Thomas Garrett, Camden thought the bill gave a ‘favourable opportunity’ to deal with pine scrub: ‘The spread of these scrubs throughout the country was leading to the withdrawal every year of large tracts of land from use.’ (Garrett, 1881).



Figure 6 Mulwalla Forest on the Murray River in the 1920s. It was such magnificent River Red Gums that occasioned Australia's first declarations of forest reserves (Source: Mitchell Library, State Library of New South Wales, Sydney).

More figures on the extraordinary growth came the next year in discussion of a *Forests Bill*. On 7 September 1882 Robert Bliss Wilkinson, Balranald, told of 10 000 000 acres (4 000 000 hectares) taken over. Of one man's 280 000 acres '... some 230,000 acres of it are overrun ... and rendered almost useless ...' (Wilkinson, 1882).

But there was other discussion about the wasteful taking of bark for roofing. Since it was much cheaper than corrugated iron it was the popular choice but, instead of cutting the trees down and using the timber as well as the bark, settlers were stripping standing trees and killing them (Kidd, 1882, 327).

The awful waste of Red Cedar and the extraordinary speed at which it was eradicated from the near districts of early Sydney made governors and governments realise the necessity of licensing timbergetting as some sort of control, but it was 1871 before the first timber reserves were proclaimed '... to protect some of the magnificent forests of brush and hardwood in the

Clarence Pastoral Districts, and the flooded red-gum forests on the Murray River.' (Piper, 1884, 801) (Figure 6). By 31 December 1881, 461 reserves had been gazetted in New South Wales with an area of 3 401 447 acres (1 377 586 hectares) (Piper, 1884, 801).

The report on forests for 1883–84 has two notable examples of official regard for trees. One Tree Reserve of half an acre was declared in the Riverina County of Waradgery as 'A landmark on an immense plain ...' (Anon., 1884, 821), and under General Remarks about Six Islands in the Richmond River carrying oak, pine, bangalow, gum and mangroves, there is the comment 'Thickly timbered; the foliage is of great beauty, and very ornamental to the river.' (Anon., 1884, 818).

During 1888 in the Victorian parliament there were persistent moves to present a *Conservation of Timber Bill*, but J.L. Dow, Minister of Lands, was unwilling to bring it forward (Anon., 1888). In 1891 Harry Armytage, member for Grant,

asked the Minister for Mines 'Would it be possible to supply the occupiers of houses in the poorer parts of the metropolis with two eucalyptus trees each?' He was told that there was already a free distribution of trees (Anon., 1891).

South Australia was also distributing trees at that time. At the *Royal Commission of Inquiry on Forestry* (RCIF) held in 1908, Walter Gill, Conservator of Forests in South Australia, was asked 'You have distributed plants to settlers and to public institutions?' 'Yes,' he replied, 'roughly, about 7,000,000. If you will refer to my last annual report, you will see that the fact is mentioned that trees have been distributed for twenty-five years ...' (RCIF, 1908, 560).

The three energetic commissioners took evidence from 558 witnesses in the colonies of Queensland, New South Wales, Victoria and South Australia, travelling '... over 13,000 miles, viz., about 8,500 miles by train, nearly 3,700 by coach, 400 by steamer and launch, 316 on horseback, and about 400 on foot.' (RCIF, 1909, vi).

Evidence from the Riverina was fascinating. Opinions on pine had changed radically. Hugh Andrew of Berrembed, near Narrandera, told the commissioners 'Pine is becoming very scarce in this district, and it is necessary that we should conserve every bit of it we can. In our own property we ringbarked a lot of pine, and we very much regret it, for we know the value of the pine now.' (RCIF, 1908, 528).

John MacPherson, manager of Deepwater near Wagga Wagga, was asked for an estimate of the value of the pine destroyed during the last ten years: 'Perhaps thousands of pounds worth ... It seems criminal to destroy it as it has been done ... but under the conditions of our lease we were compelled to do it.' (RCIF, 1908, 529).

There was criticism because the New South Wales Minister for Lands had thrown open the Ganmain pine reserve for settlement. James Bayliss, licensed surveyor and grazier at Wagga Wagga thought 'It should certainly have been retained for forestry purposes. As a matter of fact, there is more profit in pine than in grass.' (RCIF, 1908, 535).

James Gormly, member of the Legislative Council for Wagga Wagga, said 'In my early days you could travel 15 miles and not see a pine tree ... and although there were no pines to be seen for thirty years, still when a bush fire came along the seeds came up in millions. That shows the seed will lie dormant in the soil.' (RCIF, 1908, 535).

Leonard Fosbery, land agent at Wagga Wagga, remembered Ganmain Forest of 35 years before as an open box forest with large pines in scattered clumps (RCIF, 1908, 537).

Almost a hundred years later, a slowly grown White Cypress Pine with a butt diameter of 30 centimetres or more is worth A\$100 as a standing tree. Landowners wise enough to have saved them are now finding them considerable assets. The return more than doubles if the owner does his own cutting and snigging to a dump.

The story is much the same in Victoria as in New South Wales. After crossing the Murray River in November 1824, Hume and Hovell found plains and forests most of the way as they travelled south-west through present Beechworth to the western shores of Port Phillip. William Hovell used the old definitions of both 'plain' and 'forest' in his eccentrically spelt journal (Andrews, 1981). In the Beechworth district '... we came to a forest {the grass good} ... but thinly covered with timber, which is excellent Stringy Bark, and Box Gumb ...' (Andrews, 1981, 151).

Mount Disappointment (60 kilometres north-east of Melbourne) marked an abrupt change of country. They struck Cutting Grass, probably *Gahnia sieberiana*, 'Sharp as a Butchers Knife ...' and '... scrub ... worse than any Jungle ... we could not see either over, or under, nor two yards before, some times we were on the top of dead logs, lying 5 or 6 feet above the ground at other times in holes full as deep ...' (Andrews, 1981, 189–191).

A.W. Howitt, a meticulous observer and outstanding bushman, left a valuable record of eucalypts taking over grasslands in Gippsland. In 1890 he wrote:

The valley of the Snowy River, when the early settlers came down from Maneroo to occupy it, as for instance, from Willis downwards to Mountain Creek, was very open and free from forests. At Turnback and the Black Mountain, the mountains on the western side of the river were, in many parts, clothed with grass, and with but a few large scattered trees of *E. hemiphloia* [White Box, *Eucalyptus albens*].

The immediate valley was a series of grassy alluvial flats, through which the river meandered. After some years of occupation, whole tracts of country became covered with forests of young saplings of *E. hemiphloia* [*albens*], *pauciflora*, *viminialis*, *amygdalina* [*radiata*], and *stellulata*, and at the present time these have so much increased, and grown so much, that it is difficult to ride over parts which one can see by the few scattered old giants were at one time open grassy country ... Similar observations may be made in the Omeo district, namely, that young forests of various kinds of Eucalypts are growing where a quarter of a century ago the hills were open and park like. (Howitt, 1890, 109–110).

And so it was also from Mount Wellington to Castle Hill in the upper valley of the Moroka River (rising near Mount Wellington). At the Wellington, Caledonia and Macalister Rivers, both ranges and valleys, originally grasslands, were clothed in dense forests of mixed eucalypts 20 to 25 years old. Different species were overcoming western and southern Gippsland (Howitt, 1890, 110–111).

In the east, the Cann River country was always thickly timbered and scrubby as shown by an exacting study of lowland Gippsland by Ian Lunt, published in *Australian Geographical Studies* in July and November 1997. He found that there were originally 600 square kilometres of grasslands. Almost half carried no trees at all, the rest grew about nine to the hectare. The good soil that flooded in wet seasons carried 59 to the hectare and another area marked on a map as 'thickly timbered ...

gum and she oak' carried 18 to 30. The grass is nearly all gone. Lunt (1997b, 345) makes the observation that 'Notions of "light" and "heavy" timber are entirely relative and are likely to have changed over the past century.' They certainly have, as witness the above mentioned assessments of the Pilliga in the 1920s by Burrow and Priestman (Elaine van Kempen photocopied most of these precious documents and lodged them with State Forests of New South Wales at Pennant Hills). It would take scientists of many disciplines to move into country whose history is not known to reconstruct what it might have been like in 1788. Even with the vast extent of modern knowledge their conclusions would be doubtful — so much of what one discovers from old descriptions is startling. When working on 'The north coast story' for *From Forest to Sea* (Rolls, 1993) I expected the Big Scrub to enclose the Richmond River. Oliver Fry, first Commissioner of Crown Lands for the Clarence District, produced a different world. The Big Scrub occupied the north bank; on the south bank for 60 kilometres of its winding path a strip of country 20 kilometres wide (120 000 hectares altogether) grew nothing but grass. 'Although surrounded by trees of a hundred varieties,' wrote Fry in the 1840s, 'still, in surveying the vastness, the eye seeks in vain for even a single shrub upon which to rest.'

Even the Big Scrub was not 75 000 hectares of unbroken rainforest. Apart from belts and patches of wet eucalypt forest along ridges there were several hundred hectares of strange treeless areas known as Grasses (Hewitt, 1923, 21). Of ten to twenty hectares in extent — a few might have been bigger — these well-scattered places were probably natural but Aborigines made sure that they stayed open by burning them. Nobody knows how many there were; some were given European names and nine still show on detailed maps. Clearing of the Big Scrub with axe, saw and scrub-hook began seriously in the 1880s, by 1900 it was gone (Figure 7). A stand of some of the finest timber



Figure 7 Clearing a rare remaining pocket of Big Scrub, soldier settlers at Mullumbimby in far north-east New South Wales after World War I (Source: Government Printing Office Collection, State Library of New South Wales, Sydney).

the world has known was destroyed for no gain. It would now be worth hundreds of millions of dollars. Rosewood (*Dysoxylum fraserianum*), a supreme timber now in short supply, would not burn. Settlers built houses, sheds, pig sties, fences with it just as they did with Cedar. When they had no use for the rest of the fallen logs they towed them into gullies, even dug trenches in the loose soil and buried them below plough depth.

When we drive out to buy good wine at the Broken Bago vineyard south-west of Wauchope, we fit into a pocket between the dense and seemingly ageless Broken Bago State Forest. On 6 November 1830, Samuel Perry, Assistant District Surveyor, set out from the penal colony at Port Macquarie on the coast of mid-north New South Wales to inspect a site for a township at Hay (now Sancroix) on the south bank of the Hastings. He climbed the Broken Bago range then returned along the river. He reported many swamps and very

heavy brush on the banks of the river and creeks. But the rest of the country was 'lightly timbered' or 'fine open forest country ... moderately undulant and thinly timbered without underwood' (Perry, 1830–31). Now dense trees have overcome the grass and almost all the beautiful, protective brush along the river and creeks is gone.

The Hunter River country is widely believed to have been cedar brush. Exploring it in 1820, John Howe '... came thro as fine a country as imagination can form & on both sides of the River for upwards of 40 miles (I may say) will at least average two miles wide of fine land fit for cultivation & equally so for grazing ...' (Howe, 1820). The cedar brush that he did not mention outlined the boundary and certainly must have broken the grass in places.

Tiffany Knott and her co-authors (1998) had a thorough look at the lower Hunter for a Koala survey. They used many sources including the essential, but too often overlooked, interviews

with people who have seen changes. Before European settlement and consequent heavy clearing, there was a three-kilometre wide Y-shaped stretch of vine forest at the junction of the Paterson with the Hunter and another circle about three kilometres in diameter on the Williams above present Clarence Town. The main area measured about 35 kilometres by 35, of which shrubby, tall open forest occupied two thirds, the rest was swamp and open swamp forest on lowlying ground.

In far north Queensland, Grassy Hill at Cooktown is now scrubby hill. So named by Cook because not a single tree broke the outline of its grassed dome, it is now so overgrown it is difficult to find any grass. Shooters on the rifle range at Maytown, the principal town on the Palmer River, aimed at targets spaced from 100 to 600 yards on a gentle treeless slope. When we saw it in 1987 one would have had to bring in a bulldozer to clear an alley to a target 40 metres away. Early reports of geologists and gold wardens stress the shortage of timber for mine props, boilers, even for camp cooking. Now there are generally a thousand trees to the hectare.

South Australia and Western Australia offered similar alternations of grass and trees or shrubs. George Fletcher Moore, in a diary that he began in 1830, gave an excellent account of the land along the Avon River. The first settlers regarded it as open country, convenient farming. But as on the coast of northern New South Wales, the open areas were monitored by forest. Here is Moore's description in 1831 of the land behind his house:

... a plain of perhaps two hundred acres, upon which large trees are not numerous, or more than sufficient for ornament. There is one spot looking like a cleared field, of eight or nine acres, not encumbered with a single tree or shrub. In other places a tree resembling a larch of four or five years' growth, is thinly scattered. This large plain is skirted by a thick border of red gum trees, intermixed with banksias, black wattles, and other shrubs. (Moore, 1884, 33).

In 1884, A.C. Gregory on a Settlers' Expedition northward from Perth came out of a 'cheerless aspect' of scrub on to 'excellent grass of various kinds' on the Bowes River (Gregory, 1884, 23–24).

The Mortlock River inland of Perth was first known as Salt River. Robert Austin crossed it in 1854 when he made a trip from near Northam up along the eastern bank of Lake Cowcowing. He travelled through much of the present wheatbelt. He reported 'jam and York Gum forests', 'a dense thicket of cyprus and casuarina scrub', 'a broad expanse of undulating sand plains, studded with clumps of gum forest and thicket', 'white gum-forest with, an undergrowth of prickly scrub', 'sand plains, swarming with kangaroos, alternating with gum forests' (Austin, 1855, 6–8).

In 1851, Eliza Brown travelled from York, east of Perth, with her husband and their sheep to a new farm at Champion Bay (Geraldton). Just south of the Irwin River '... we first crossed an extensive flat, containing many thousand acres, upon which there is not a single tree or shrub' (Brown, 1977).

The social history of a stretch of land demonstrates its environmental capacity. The social history of Australia began about 120 000 years ago. Everything one reads of country two hundred years ago in any area reveals a wondrous mosaic: grassland lightly wooded or bare of trees fringed with forest and dotted with individual shrubs or broken by mixed belts, 'a wildflower garden'. Australia's vegetation is now thoroughly disorganised. Too many trees grow on what was open grassland, exotic grasses and clovers grow on recharge areas once guarded by dense scrub. Our farming has been so exploitative that salt and erosion threaten our existence. A first, elementary but vital step in improving our methods is to reestablish at least 20 per cent of connected grassy woodlands on all agricultural lands.

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