

Forest change

Some of the most dramatic examples of human impact on the natural vegetation are seen at the abrupt boundaries between the forests and the farmlands. Here, towering complex formations give way to grazed swards of exotic pasture species. This has been the fate of large areas of former forest, but in other areas partial clearing and thinning have created woodlands and open woodlands.

In general, forests grow in areas climatically suited to agriculture and it is those on arable lands which have been cleared. The loss of the lowland rainforests (**xT4**) in northern Qld for sugar cane and the almost total clearance of the brigalow open forests (**wM3L**) for sown pasture and seasonal cropping are prime examples. The map below shows the former distribution of brigalow forests. Numerous areas of rainforest along the east coast, and large areas of eucalypt

open forest have also been cleared for agriculture. Many of the forests that remain are on rugged terrain and about half are currently managed for timber production.

In terms of the structural classification the total area of all forest types has declined by about 40%, from 688 000 km² to 395 000 km². The actual difference in area is somewhat greater because the total forested area includes some forest plantation areas. The

greater part of this reduction has been the loss of about half of the open forests (**M3**) through clearing or thinning.

The total area of plantation forests, which are shown on the map opposite, has more than doubled over the last twenty years. Plantations are providing an increasing proportion of Australia's timber and pulp needs and their expansion is seen as an important potential supplement to timber extracted from native forests.

The variety of present uses of former forest lands includes: perennial cropping, such as sugar (**vG4**) along the Qld coast; exotic tussock grasslands (**yG3**) and summer seasonal crops, chiefly sorghum and sunflower, in central Qld; and

improved pastures (**yfF4**, **eM1yF**) in the east and south-west of the country.

The structure and floristic composition of some forests have been affected by timber extraction and forest management practices. Fires, both wildfire and controlled burning of the lower strata, have tended to establish and maintain grassy understoreys. Grazing, mining and recreation have also made localised impacts within the forests.

Not all forest decline has been the direct result of human activities. The dieback within the jarrah forests of WA, for example, is linked to the spread of a fungus disease inadvertently transported by movements of machinery and people.

Brigalow country

In its natural state brigalow (*Acacia harpophylla*) covered about 6 million ha of central Qld and northern NSW, occurring either in dense uniform forests or in association with a number of other trees such as belah (*Casuarina cristata*), gidgee (*Acacia cambagei*), eucalypts and bottle trees.

These forests remained largely unaltered well into the 20th century, apart from the dramatic infestation by prickly pear (*Opuntia*) and the equally dramatic

biological control of this pest in the 1920s and 1930s. Although it was known that the fertile clay soils of the brigalow country were well suited to cropping or pasture, brigalow proved very difficult to clear because it grew densely and regenerated vigorously from suckers.

It was not until the 1950s, when the ring-bark barkers were replaced by bulldozers, that large scale clearance began in the southern section of the brigalow lands. Only after 1962, when the Commonwealth and

Queensland governments introduced the Land Development (Fitzroy Basin) Scheme to encourage clearing, were the northern brigalow lands opened up. Under the 'Brigalow Scheme', as it was better known, more than 100 000 ha were cleared annually until the mid 1970s.

Early clearing aimed to increase the carrying capacity of the land by encouraging the growth of native grasses. However, it was the introduction of exotic pasture species which gave the greatest impetus to the development of

the brigalow lands. The most successful of these was buffel grass (*Cenchrus ciliaris*) which is still the most widely sown pasture type in these areas.

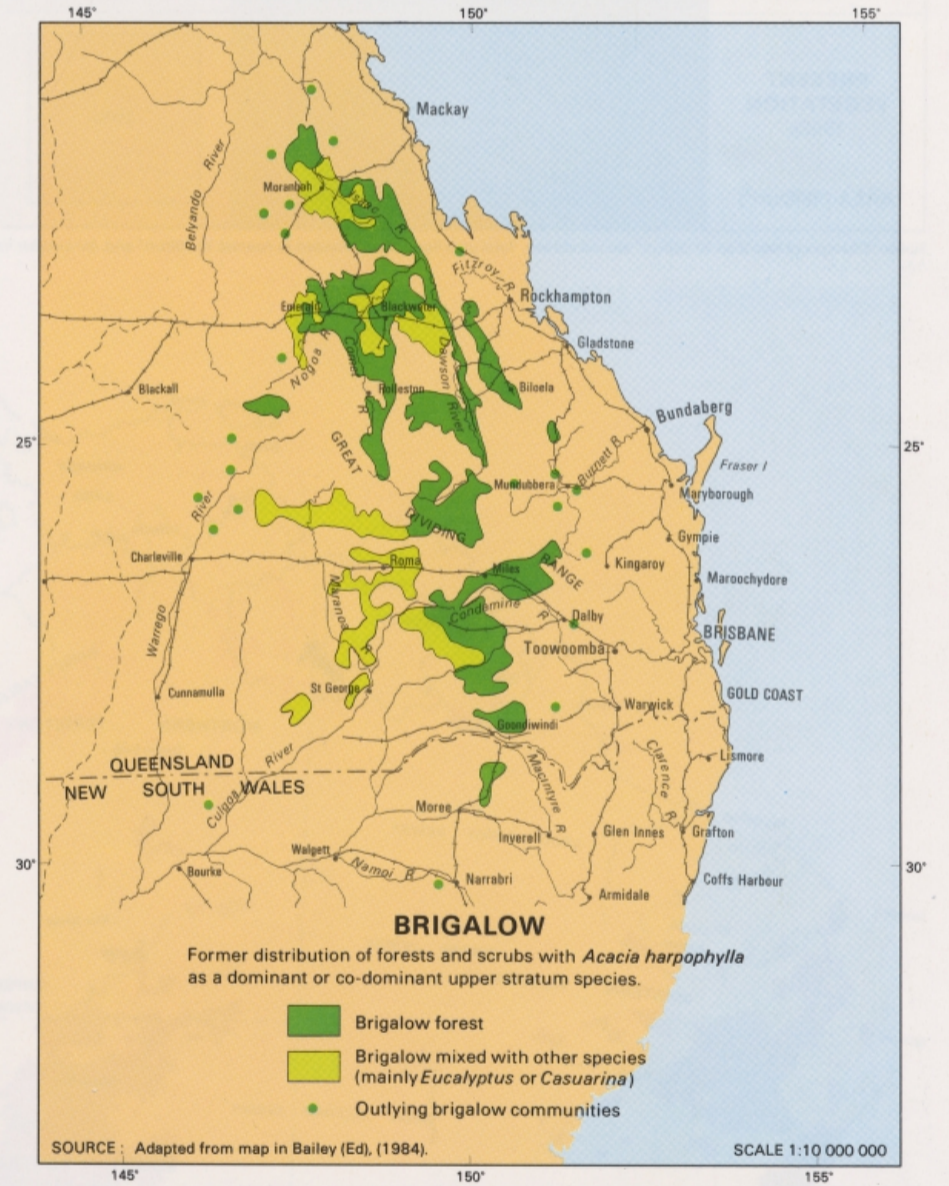
Between 1961 and 1976 the area of sown pastures in Queensland's brigalow belt rose from 335 000 to 2 146 000 ha and cattle numbers increased by some half million. Since that time most of the brigalow clearance has been for cropping, for both fodder and cash crops such as oilseeds and cereals.

The development of

the brigalow lands has been an agricultural success story—so successful in fact that most of the brigalow lands have now been cleared. The clearing of mixed brigalow scrubs is continuing and many of the surviving patches are regrowth from previous clearing attempts. With less than 1% of the original brigalow lands now in national parks and other reserves, the few remaining examples of natural forests may have a greater value in conservation than in agricultural production.



Brigalow forest
The photo at right shows brigalow forest (**wM3L**) photographed in the 1960s prior to clearing, showing a dense understorey of low trees. In contrast, the only evidence of the natural vegetation in brigalow country cleared for cropping (far right), is the remaining bottle trees (*Brachychiton rupestris*).



Plantations

Total area of plantation forests has risen from 3000 km² in 1967 to almost 10 000 km² today. *Pinus radiata* (pic-

tured) forms the bulk of forest plantations across southern Australia. *P. elliotii* and *P. caribaea* and the native *Araucaria*

cunninghamii are the main species grown in Qld. The total area of *Eucalyptus* hardwood plantations remains small; around 600 km², not including enrichment

plantings of harvested natural forests. The main species planted are *E. regnans* in Vic., *E. nitens* and *E. delegatensis* in Tas. and several other species in NSW.



Dieback

Dieback, or vegetation crown decline, was noticed as far back as 1880 and is a result of stress-induced ailing (Old and others 1981). The stresses which may destroy the plant crown include drought, insect attack, fungal disease, salinity, increased exposure, changes in soil nutrient status and root trampling.

No single factor, or combination of factors, seems to be

consistently the cause of dieback, since plant susceptibility to stress varies in time and place. Plant species are affected differently through their geographical ranges. A species at the limit of its distribution already endures greater environmental stresses than in the middle of its range and may therefore be more susceptible to dieback.

The largest area of dieback in Australia occurs in the graz-

ing country on the New England tablelands where the disease seems to be largely caused by insect attack, especially after frequent and severe attacks by scarab beetles, stick insects, psyllids or sawflies. This problem may have been increased by tree clearing and the establishment of pastures for grazing. In recent decades dieback has contributed to the change from woodland to open woodland in this area. The photo

(left) shows severe dieback of woodland trees on farmland near Armidale.

In WA the dominant cause of dieback is contact with *Phytophthora cinnamomi*, a fungal disease which prefers poorly drained, infertile soils. The notable example of dieback in the jarrah (*Eucalyptus marginata*) forests (eM3L) in the south-west has created large areas of eM2Z in the present vegetation. The disease has affected not

only the eucalypt forest but also the heathlands and *Banksea* woodlands in the south, endangering communities of rare shrubs. The fungus is naturally spread through the soil and, with increasing use of vehicles in the forests, it has been transported rapidly. The current attempts to control further spread are through effective hygiene measures such as washing down vehicles and restricting public access.

