

**The Contribution of “Vegetation
Thickening” to Australia’s Greenhouse
Gas Inventory**

A Report prepared by
Professor Ian Noble
of the
Australian National University
for the
Department of the Environment, Sport & Territories

Printed
6 March, 1997

Executive Summary

In many parts of Australia trees and woody shrubs are increasing in density in areas that were previously open woodlands or grasslands. This process is called “vegetation thickening” in this report but is also known as “woody weed increase” and “woody regrowth”. The phenomenon is not confined to Australia but also affects large areas of North and South America and Southern Africa. A workshop in October 1996 brought together experts in relevant science and policy fields from throughout Australia and overseas to discuss the causes of “vegetation thickening”, its extent within Australia, and its potential contribution to national greenhouse gas inventories.

Vegetation thickening typically results from changes in management practices that accompany the introduction of domesticated stock. There is usually an increase in grazing intensity and constancy, which leads, along with other management actions, to a decrease in grass cover and a decrease in the frequency and intensity of fires. These changes provide the opportunity for many tree and shrub species (both native and exotic) to establish and grow to dominate the site. The workshop regarded alternative explanations of the phenomenon – such as the effects of increased CO₂ concentration in the atmosphere or changes in weather patterns – as secondary or insignificant compared with the deliberate changes in land management practices.

It is estimated that over 60 million hectares of Australia are affected by vegetation thickening. Most of the areas identified are in Queensland but there are significant areas affected in the northern parts of the Northern Territory and Western Australia. Significant sections of more arid regions are also affected but they probably contribute little to greenhouse gas budgets.

In sites affected by “vegetation thickening” the biomass of woody plants increases and additional carbon is stored (sequestered) in these plants and in the soil. It is estimated that about 2 tonnes of CO₂ is sequestered per year by each hectare of land affected by vegetation thickening. This means that over 100 million tonnes of CO₂ are being stored per year in Australian landscapes affected by this phenomenon. This carbon sink is currently not included in the National Greenhouse Gas Inventory. A significant portion (25 Mt CO₂/yr) of the CO₂ emissions from land resources reported in the National Greenhouse Gas Inventory is a result of clearing carried out by graziers to combat the loss of stocking capacity caused by vegetation thickening.

It was concluded that there is a strong case to include the sequestration of CO₂ resulting from the management actions leading to “vegetation thickening” in the National Greenhouse Gas Inventory. The net effect, after allowing for the CO₂ losses through clearing affected areas would almost balance the emission from other activities relating to land-use change and forestry practices and is roughly a fifth of Australia’s net greenhouse gas emission (576 million tonnes of CO₂ in 1994).

The report documents the many uncertainties that remain in more accurately quantifying the fluxes of CO₂ associated with vegetation thickening. It points to the need for a coordinated, long-term program to monitor changes in areas affected by vegetation thickening and in the carbon stored at these sites.

If this sink is included in the National Greenhouse Gas Inventory there may be a potential conflict between land management goals and greenhouse gas reduction goals. An effective campaign to change management practices to reduce the occurrence of vegetation thickening

and the associated loss in stocking capacity would lead to the loss of a significant sink for greenhouse gases.