8. SOIL CONSERVATION

The aim of soil conservation is to enable man to make productive use of land without causing unacceptable increases in rates of deterioration of that land. Generally the predominant concern is with soil erosion. Even the land that appears most stable is losing soil, but the rates of loss are generally imperceptible. Estimates of soil loss from undisturbed forested land in the Buffalo River area are as low as 2 kg per ha per annum (5.2 m^3 per km^2) (Bren *et al.* 1979); in other parts of Australia, annual rates of 4.3 to 11.0 m^3 per km^2 have been cited (Douglas 1979). However, other land in its natural state is obviously eroding more rapidly, and Strakhov (in Douglas 1979) has reported annual rates of up to 80 m^3 per km^2 in south-eastern New South Wales, although Douglas regarded this estimate as excessive.

Obviously the nature of the land plays an important role in the rate of erosion. The way the land is managed is the other major factor affecting that rate.

Other kinds of land deterioration considered under soil conservation are leaching of plant nutrients, loss of organic matter, loss of soil structure and salting.

Effect of land type

Within the study area, most of the land is relatively stable under undisturbed conditions. Areas with deep soils and deeply weathered rock mantles are highly susceptible to gully erosion, but do not appear to have suffered until disturbed by the land development associated with European settlement. These are mainly the older parts of the landscape such as the upper fans of the Myrtleford land system and particularly those areas on granite, such as the Yackandandah land system.

Densely forested areas located on granite parent materials — for example, the Mudgeegonga-Rosewhite locality in the Pinnacles land system — probably suffered occasional gully erosion when heavy rain occurred soon after severe fires started by lightning strikes.

The steeper slopes of the escarpments in the Buffalo, Cobbler, Drum Top, King and Koonika land systems are unstable, as indicated by the abundance of bare rock slopes and scree or talus cones. Mass-movement erosion may also occur under natural conditions on the steep margins of the well-weathered basaltic residuals of the Myrrhee and Mahaakah land systems.

Earth flow and stock terracettes are forms of mass movement

There is evidence of landslips on steep cleared slopes at Everton in the Bowman land system, and also near Myrtleford in the Porepunkah land system, where track construction to enable harvesting of mature pine has created unstable subsoil conditions.

Other steep slopes throughout the mountains have the potential for rapid surface erosion, but the climatic conditions promote rapid vegetation growth, so severe disturbance of the protective ground cover must occur before sheet erosion can become serious. The soils in these areas are generally relatively stable.

Severe gully erosion occurs on deeply weathered soils in the north.

The sub-alpine zone of the Buffalo and Cobbler land systems and the Feathertop land system suffer a much more severe climate, with a relatively short season for plant growth because of low temperatures during most months. Sheet erosion is more likely in these areas than in lower areas, and both wind and water erosion can be serious. The organic loams of the alpine and sub-alpine areas are very susceptible to wind and water erosion.

Another zone of natural erosion borders the main streams: stream incision is occurring at low rates in the mountain tracts, and meandering in the broad valley tracts in the north of the study area would result in stream-bank erosion and deposition under natural conditions. (This type of erosion became very pronounced during the three successive above-average-rainfall years 1973-75.)

Effects of land use

The most widespread change brought about by European settlement was the clearing of the native vegetation and its replacement with pastures, usually of introduced grass and legume species. This commonly resulted in a reduction in the use of soil water by plants because many of the new species have much shallower root systems than the native species. Increased soil-water availability results in excessive wetness in drainage lines and may lead to the initiation of gully erosion. Another possible consequence is the development of dryland salting; however, only in the north of the study area are there indications of salting damage. The relatively high rainfall over the area has resulted in leaching of salt from much of the landscape.

Although overgrazing, which leads to sheet and gully erosion, may occur, the climate over much of the less-steep land in the north is reasonably mild, with a 50% probability of a growing season of up to 10 months. The steep hills at the northern margins of the study area are the least favoured climatically, and overgrazing in the Bowman land system has led to severe sheet and gully erosion and some tunnel erosion in the past. Better control of grazing and the use of contour ripping, and in some cases diversion banks, to control surface run-off have improved the situation in the worst-affected areas. Various types of gully-head structures have also been used to control large gullies. Emphasis is now being placed on pasture improvement and vegetative control of actively eroding land.

Another area that has suffered severe gully erosion is the Yackandandah land system in the Mudgeegonga area. Intensive soil conservation is under way in this area.

Sensitive sub-alpine vegetative ground cover may be damaged by excessive grazing and tramp-ling by both grazing animals and recreationists, and this can lead to wind and water erosion. The hazard is most severe on the highest alpine areas, such as Mounts Feathertop, Speculation and Howitt.

Areas of intensive cultivation mainly occur in the Ovens and Myrtleford land systems, where summer crops, mainly tobacco and to a lesser extent maize, are grown under spray irrigation. Potatoes, strawberries and market-garden vegetables are grown in the basaltic soils of the Mahaakah and Myrrhee land systems. Some sheet and rill erosion may occur in all these areas, particularly on the more sloping land. Continuous cultivation leads to loss of soil structure and, under irrigation, can result in surface sealing, which retards infiltration.

Alpine soils are very susceptible to wind and water erosion when vegetation cover is damaged such as occurs on walking tracks.

Clear-felling to harvest the relatively even-aged stands of alpine ash and the subsequent burning to establish the desired seed-bed for regeneration of the forest appear to be potentially hazardous for sheet erosion, but the rapid vegetation growth in these areas and the relatively stable soils seem to minimise the problem.

Construction, and maintenance, of access roads and logging tracks has a greater potential for causing erosion and sedimentation of streams. Careful siting of roads is necessary and regular maintenance of road drainage helps to reduce the severity of these effects. Log-haul or snig tracks can also cause erosion problems if water is not diverted away from them.

The cutting of roads across steep slopes reduces the strength of the soil mass above the road and may result in landslips, and the unconsolidated fill batters are readily eroded until they settle and are revegetated. Similar problems may develop in areas being converted from natural forests to pine plantations. As the main plantations are in the somewhat drier areas in the north of the study area, the potential for erosion is probably greater because of the shorter growing season and less-vigorous vegetative regrowth. The access roads and other tracks cause the greatest risk of erosion in these areas also.

Extraction of gravel from bodies of colluvium at the base of steep slopes, such as at the margins of the Myrtleford and Bungamero land systems, has caused erosion problems. Extraction of gravel from streams may also cause instability in the stream bed and banks. Better control of the location and management of extractive industries in recent times is aimed at reducing this problem.