

Maintaining trees enhances grazing potential

Six new principles have been proposed for sustainable grazing in grassy eucalypt woodlands. In the second of a two-part feature, CSIRO Sustainable Ecosystems scientists Sue McIntyre, John Mclvor and Neil Macleod explain the benefits of maintaining trees, wildlife habitats and watercourses on farms. Last month's *Farming Ahead* looked at the role of property management planning and how producers can manage soils and pastures to prevent erosion and maintain production.

Farmers are encouraged to retain local native trees, set aside wildlife areas and carefully manage watercourses to minimise land degradation and enhance grazing production.

Although replacing a grazed area of land with a woodlot, a watercourse buffer or a dedicated wildlife refuge is unlikely to result in an immediate increase in farm profit, these changes will help avoid resource loss and degradation in the long term.

Resources can be lost through topsoil erosion, product harvesting, reduced infiltration, pasture acidification and salinity. This results in a decline in potential grazing and stocking capacity.

A collaborative project involving CSIRO Sustainable Ecosystems and producers in the Moreton and Burnett areas of southern Queensland has proposed a set of principles for sustainable grazing management. The principles cover property planning, soils, pastures, trees, wildlife management and watercourses.

Proposed guidelines

As discussed in *Farming Ahead* (No. 120) the principles include a maximum threshold of 30 per cent intensive land use (including cropping, sown pastures and heavy grazing) on properties, a maximum of 30–40% bare ground and a minimum of 60–70% dominance by tall and medium tussock grasses in pasture. Other critical thresholds include a minimum of 30% woodland cover, at least 10% of the property would need to be managed for wildlife and minimum patch sizes of 5–10 hectares for woodland. Managing watercourses is also considered important and requires careful management.

Although the research has focused on grassy woodlands in Queensland, the principles can be applied to many grazing areas in Australia.

Woodland retention

Most producers value their trees for livestock shelter, timber resources and aesthetic qualities. Trees also play a vital role in controlling salinity, creating wildlife habitat and supplying structural support for river and creek banks.

To sustain healthy woodlands on a farm, a minimum number of trees need to be maintained. Researchers believe at least 30% of the area of properties need to be covered by woodland.



Photos: CSIRO Sustainable Ecosystems

Trees are vital for controlling salinity, creating wildlife habitat and preventing riverbank collapse. To maintain a viable tree population, at least 30 per cent of the farm area needs woodland cover.

To maintain tree populations, a balance is needed between trees and their pests. The most common symptom of unhealthy woodland is dieback. Tree dieback occurs as cycles of severe defoliation, re-sprouting and eventually tree death. The most common direct sources of damage are leaf-eating and leaf-sucking insects, although mistletoe infestations may also cause local tree deaths.

The main cause of tree decline is agricultural development such as clearing, grazing, crops, fertiliser application and sown pastures, which all directly or indirectly affect the health of native tree populations.

Although knowledge is limited, eucalypt woodland depends on native fauna for certain functions such as pest control and pollination.

Fauna need minimum amounts of habitat to survive and provide these services. If trees are isolated in small woodland patches they can suffer from inbreeding and edge effects (more exposure to wind and nutrients) and they will also suffer from the loss of services provided by wildlife.

Tree diversity

Maintain a full range of tree species on the property, including the same species occurring on different land types.

Some tree species occur on a range of land types and different genetic forms may be adapted to different growing conditions. This genetic resource may be important for the future of the trees.

To conserve all species it may be necessary to monitor stands for changes in species composition. Some species may not survive certain management practices even if the percentage of woodland is maintained overall. For example, they may be particularly susceptible to chemical control or grazing of seedlings.

Natural regeneration of existing trees is always preferable to planting and re-creating habitat. Planting trees is costly and successful establishment is not guaranteed. To have young trees coming along is essential to maintain tree populations and natural regeneration provides a source of genetic material which is already adapted to district conditions. Regeneration occurs best in a native understorey and rarely in crops or sown pasture where heavy grazing and cultivation kill young trees.

One look at a stand of trees and its age structure will indicate its future. If all the trees are mature and no young ones are growing, the population will die off in the long term. Aim to retain trees of different ages within stands to ensure the long-term viability of tree populations.

Woodland patches

Many producers leave small isolated stands of trees in paddocks for stock shelter and shade. Because there are relatively few trees around, these trees suffer from increased amounts of animal dung, understorey grazing, trampling and trunk rubbing. Trees do not survive these stresses for long.

Studies show to survive, an isolated stand of trees needs to be a minimum size to withstand the effects of the surrounding environment. Woodland patches should be a minimum of 5–10 hectares to be viable in the long term.

At a glance

- To enhance the long-term ecological health of farms it is important to maintain local native trees, create wildlife areas and manage watercourses carefully.
- Retain trees of different ages over about 30 per cent of the property to ensure the viability of tree populations.
- Manage at least 10% of the farm for wildlife and select special refuge areas.
- Excluding livestock from sensitive watercourse areas will reduce soil erosion and maintain water quality.

If the surrounding land use is intensive the woodland patch needs to be larger. Forest or woodland stands in unfertilised native pasture tend to be more viable.

Woodland patches left in cleared areas need to be as large as possible and compact in shape to maximise their long-term survival. This is to reduce the impact of climatic effects (wind), weed invasions and nutrient movement into the remnant.

Wildlife habitat

It is proposed farmers manage at least 10% of their property specifically for species which do not tolerate normal management.

Wildlife is more than fur and feathers; it includes insects and spiders which help maintain pest insect populations at acceptable levels.

Planning for wildlife needs to consider existing vegetation and wildlife resources. It is difficult to turn a lucerne paddock into a wildlife habitat but most farms have some areas with native plant and wildlife communities which would benefit from sensitive management. Maintaining and improving existing wildlife habitat is more effective than re-creating it.

Selecting suitable areas

Historically wildlife reserves have tended to be located on the least productive land. But increasing evidence shows wildlife need access to habitats on productive land as well. Vegetation in good quality soils needs to be included in the 10% of the property managed for wildlife.

Selection of areas for wildlife is most effective if the chosen area comprises a range of habitat features. This includes a tree layer with a range of tree ages, mature trees with hollows, a shrub understorey and mid-layer (wattles and wilga), fallen and standing dead timber and a native understorey including medium to large tussock grasses.

A source of water nearby is also beneficial. These all provide useful foraging, nesting and sheltering opportunities for wildlife such as birds, insects and reptiles.

The relationship of special wildlife areas with other vegetation and features on the farm and in the district is important. If wildlife areas are connected to other areas of vegetation on the farm and in the surrounding area, wildlife can move when necessary.

Protecting watercourses

Watercourses and their associated riparian areas are important in property planning, as the overall health of the farm can depend on their condition.

A riparian area is land beside small creeks and rivers, including riverbanks, gullies and dips which sometimes run with surface water, lake edges and wetlands on river floodplains.

Often the most useful resources for grazing enterprises (water, productive soil and gentle



Creating woodland patches will help to enhance the ecological health of farms.

topography) are at and near watercourses. Understandably, producers have often developed these areas to the maximum extent and are unwilling to lose productive land.

But excluding livestock from sensitive watercourses is one of the most important ways to reduce soil erosion and maintain water quality.

Intensive use of riparian areas encourages water run-off which leads to flood-outs, removal of topsoil and increased bank erosion. Even when a paddock is conservatively stocked, riparian areas can suffer as their shade, water and quality forage attract heavy use by livestock.

It may not be necessary to take riparian areas out of production but they need to have good ground cover and livestock should not directly impact on water quality through dung, urine or trampling muddy banks.

Fencing is an obvious solution to reduce the impact of livestock in riparian areas. But for large, extensively used areas significant cost and management issues may be associated with fencing.

The solution may vary significantly according to the characteristics of the watercourse, for example, the steepness, rockiness and accessibility of the creeks.

The higher the stocking rate the more urgent the need to protect riparian areas and watercourses. The provision of alternative water points such as troughs may keep livestock away from watercourses even without fencing. Locate these water points well away from drainage lines.

Watercourse vegetation

Watercourse bank vegetation helps to improve water quality and provides a wildlife refuge, shade and shelter.

Roots of vegetation, particularly fine roots, provide structural stability to the banks of watercourses and are the most important safeguard against bank collapse.

Do not clear vegetation up to the edges of watercourses. Leaving vegetation along watercourses is important for maintaining plant and animal species in and beside the stream. Natural vegetation and grass in riparian areas can also filter a large proportion of sediments and prevent it from entering the water.

Retaining buffers

Retaining existing trees is a critical issue for riparian management. Where riparian buffers have been lost, the cost of their re-establishment is high.

For example, re-creating a 100 x 50-metre buffer along a bare stream bank would require the planting and management of about 140 trees. The cost per tree would range from \$3–\$10 depending on whether they were machine- or hand-planted and the bank conditions (steep, weedy, rocky). Additional costs would also be required for ongoing weed, fire, wildlife and stock management. Fencing to ensure the survival of young trees from grazing can add an extra \$150–\$250 per 100m to the cost.

The recommended amount of vegetation retained depends on the watercourse size. Generally, watercourses are described, in order of increasing size, as gullies (first and second order streams), creeks and streams (third and fourth order streams) and rivers (fifth and sixth order streams). Gullies need to have a 40m buffer each side, creeks a 50m buffer each side and rivers a 100m buffer each side.

Plan carefully

The proposed guidelines for sustainable grazing management are based on precaution. Do not take hasty action because there can be severe or irreversible outcomes (such as species loss, salinity or gully erosion) or uncertain benefits and restoration costs.

The economic benefits of woodland conservation are not easily defined as they vary greatly between regions and properties. A large part of the benefit is in preventing future damage to natural resources, which result from current practices. This particularly applies to practices which directly impact on the ability of vegetation to provide pasture for future grazing.

Although economic constraints have placed consistent pressure on grazing viability, land resource degradation can place equal pressure on enterprise viability over time – it may just take longer. The main aim of the sustainable grazing principles is to avoid resource and land degradation or even restore their condition. This needs to be carried out in a cost-effective way.

Ongoing research will look at further refining the principles and how they can be managed in different grazing environments.

Acknowledgements: The project is supported by Land and Water Australia, Environment Australia and Meat and Livestock Australia. For more information contact Sue McIntyre, CSIRO Sustainable Ecosystems, by email on sue.mcintyre@cse.csiro.au, phone (07) 3214 2391 or fax (07) 3214 2288.



Further reading

For part one of this series, see *Farming Ahead* No. 120, pages 27–28.