

Farm Forestry for Landscape Repair

Many of Australia's farming landscapes are in trouble. They're suffering from rising salt, erosion, declining biodiversity and falling productivity. Farm forestry is believed to be an option that can address many of these issues. Appropriate revegetation has the potential to diversify a farmer's income while stabilising or even reversing some of these threatening processes.

Farm forestry generally refers to the integration of perennial woody plants with other farm enterprises for commercial, environmental or social outcomes. This fact sheet focuses on how farm forestry can be used to help repair the landscape.

Landscape is defined here as an area of several kilometres or more in width, and usually contains a variety of patches of land being used in different ways. This scale usually refers to an entire farm or several farms, and is best appreciated in an aerial photo of the region. By taking this 'bigger picture' view it's easy to appreciate that problems like dryland salinity, that afflict the broader region, need to be addressed with a strategic, targeted approach. It's not just a question of planting trees anywhere so much as understanding where in the landscape you should be focusing your effort.

Greening Australia believes that farm forestry has an important role to play in sustaining and nurturing rural landscapes. Here are some specific areas that might be addressed.

Salinity

Salt, whether in soil or water, is an increasing problem for both rural and urban Australians. Salinity is usually a result of the widespread removal of perennial deep-rooted, native vegetation. The vegetation normally uses almost all of the rainfall, unlike the agricultural crops and pastures that have replaced them. Without this cover of native vegetation, excess water runs through the soil and causes the groundwater to rise, bringing with it a load of salt that was previously locked away in the deep sub soil. When the salt reaches the root zone of the surface vegetation, including crops or pastures, the result is dryland salinity. When it reaches river systems, it becomes a major environmental problem for livestock, irrigation, rural towns and the health of the natural environment of the river itself.

Strategic revegetation through farm forestry can reclaim saline land and prevent salt expanding into new areas. Trees are deep rooted and act as pumps to lower groundwater. By planting in recharge areas it's possible to reduce groundwater inflows. Some tree species are well adapted to saline land and will provide a productive use for degraded areas.

An understanding of the geology and groundwater movement of the catchment is important in knowing where tree plantations might have the greatest impact. The catchment's discharge capacity, variations in groundwater recharge rates, scale of the groundwater system, and the salinity of that



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groundwater are also important. Once salinity has been identified, it's important to seek advice on the most appropriate strategic location and configuration of a plantation.

Plantations aren't necessarily the answer in all situations. In some cases, establishment can actually increase river salinity, through reducing run off that dilutes the salt in stream water. The Joint Venture Agroforestry Program has produced an excellent guide on how to use trees to control salinity. *Trees, water and salt - An Australian guide to using trees for healthy catchments and productive farms* (Stirzaker, et al, 2002) is available from Rural Industries Research and Development Corporation (RIRDC) (see references for contact details).

Water quality

Salt is not the only environmental problem for rivers and creeks. Many tonnes of agricultural chemicals, including fertilisers, herbicides and pesticides, end up in natural waterways. The extra nitrogen and phosphorous from fertilisers and urban sewage changes the nutrient balance of freshwater aquatic ecosystems. Blooms of blue-green algae can arise from a combination of high nutrient loads, low flow rates and high temperatures. Soil erosion adds tonnes of sediment to rivers, affecting water quality and causing alteration to the natural pool and rifle (gravel banks) sequences that support Australian native fish (e.g. Australian Bass).

Farm forestry plantations can play a valuable role in maintaining water quality in streams and rivers. Plantations can be placed in the landscape at strategic locations to act as buffers to filter water prior to it entering watercourses and the sub-surface water table. For instance, plantations can be placed in low-lying areas in the landscape, adjacent to drainage features to act as nutrient, pollutant and sediment traps. Such plantations will also effectively reduce the velocity of water run-off, protecting areas prone to active water erosion as well as reducing in-stream turbidity.

A good source of information on using trees to improve water quality and stream stability is another RIRDC publication: *Managing riparian land for multiple uses* (Robins, 2002).

Biodiversity

Biodiversity in our farming landscapes is under enormous pressure and has experienced catastrophic declines in recent years. Much of this is due to the clearing of land for agriculture and the resulting loss of habitat for our native animals, plants and microbes. Biodiversity underpins agricultural productivity, as it is the ultimate source of critical ecosystem goods and services such as pollination of crops, provision of clean air and water, maintenance of healthy soil, and pest control.

Tree plantations can have a positive impact on biodiversity if they can provide some of the resources required by native plants and animals (i.e. improve habitat suitability by providing food or refuge). These resources are more likely to be present if the plantation contains a mix of local native plant species, structural complexity and patchiness. For these resources to be used by native animals and plants, the plantation needs to be close enough to native vegetation so that native species can cross over into the plantation.

An important component of structural complexity and patchiness is the presence of older trees and dead trees. Maintain isolated trees and standing dead trees, as even single trees or small clumps have a valuable role to play in biodiversity conservation.

It's important to remember that tree plantations can have a negative effect if their establishment results in the loss or degradation of remnant native vegetation. A plantation will never offer all the resources provided by the native vegetation and the management of a plantation (e.g. pesticide and herbicide use) can degrade the natural values of adjacent patches of remnant vegetation.

Here are some additional points to consider:

- Waterways are particularly important areas of a landscape in relation to biodiversity. Where possible, minimise the disturbance to the soil within 20-40 m of any waterways and you will reduce the impact you have on aquatic biodiversity. Consider planting a buffer around waterways.
- Plan a rotational or selective harvesting regime - plant a little at a time and later on, harvest a little bit at a time. That way your impact is spread out. Structurally diverse vegetation (in terms of different sizes and ages) is good for biodiversity.
- Minimise the spread of exotic seed and pollen into nearby natural vegetation. Your farm forestry trees can become weeds in nearby bushland. If you use native species, minimise their opportunities to hybridise with local stands of similar species.
- Incorporate a diversity of plant structures into your plantings. Trees, shrubs, grasses, mistletoe and other plant forms increase the diversity of food and habitat for other plants and animals.
- Use local indigenous species as the commercial species. It's possible there may be local species that are suitable for commercial production.
- Incorporate water, logs, fallen timber, rocks and leaf litter into your farm forestry site. These structural elements create a diverse environment with lots of shelter and food opportunities for different plants and animals.
- Plant large, block-shaped areas to maximise the habitat areas for animals. Small or thin areas are often prone to colonisation by aggressive or exotic species.
- Control feral animals and weeds.
- Use farm forestry blocks to link or buffer patches of native vegetation.

The Joint Venture Agroforestry Program has produced a guide on how to use farm forestry to enhance biodiversity. Trees and biodiversity - *A guide for Australian farm forestry* (Salt et al, 2004) is available from RIRDC.

Soil erosion and decline of soil structure

Soil erosion is the loss of soil particles through the effects of wind and water. It can result from loss of vegetative cover, trampling and compaction from livestock, over-cultivation and decline in soil structure. A healthy soil has clusters of soil particles (called peds) that hold water, allow air water to be channeled down into the soil through pores, and support healthy populations of animals, plants and fungi. Soils with poor structure hold less water, have fewer nutrients available to plants, can become waterlogged and acidic, and will be less able to grow pasture or crops.

Trees affect soil in a number of ways and plantations can be specifically designed to increase the health of the soil at specific locations. Trees buffer against extremes of soil pH by adding organic matter to the soil horizon, improving soil structure and increasing soil biota. Timberbelts or alley plantations can provide the benefits of deep-rooted trees in cropping and pasture situations, although they may have the disadvantages of competition with adjacent pasture or crops. Scattered trees are suitable for grazing, but will need protection from stock (adding to the cost of establishment). Some species of trees (such as Acacias and Casuarinas) have associations with symbiotic microorganisms and can contribute significant amounts of nitrogen to the soil.

Finding the balance

Getting the balance right between establishing trees for landscape repair and agricultural productivity is a matter of careful planning. The key is to successfully blend farm forestry with agricultural systems, rather than considering them as two forms of separate land use. When planning your farm forestry, be clear about what it is that you hope to achieve.

- What is the land degradation problem or problems that require repair?
- What is the most appropriate location in the landscape for tree planting that will best serve the immediate land degradation problem?
- What other plantation design principles need to be considered, including markets, species, species mix and spacing?
- What other purposes could the plantation serve, including wind protection or enhanced farm biodiversity?
- What are the trade-offs between increased production and increased environmental outcomes? Are they complementary or mutually exclusive?

Farm forestry has the potential to play an important role in repairing our rural landscapes. How might you apply it to best address your situation?

Repairing the landscape at Bream Creek

Bream Creek is a small local community 65 km east of Hobart. It has a rich history of agricultural production in dairying, beef cattle and forestry dating back to the 1830's. Forty years ago the area around the Ragged Tier (a fertile range of basalt hills) was home to more than 100 farms and maintained the small towns of Copping, Kellevie and Bream Creek. There was a butter factory, a sawmill, two schools, three post offices, a footy team and a pub. All of these have now closed, and the region has experienced a range of land degradation problems.

The area originally had stands of tall blue gum (*Eucalyptus globulus*) forest. These were cleared, and the land was converted to pasture. This resulted in extensive landslip areas and significant gully erosion. Stream sides are degraded and water quality is often poor.

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Over the past 15 years a quiet transformation has occurred in the area as trees have been re-established in strategic parts of the landscape.

What makes this region significant is that there have been many different approaches taken by landowners with most of the funding for the work having a strong commercial focus. The outcome is a mosaic patchwork of trees integrated into the landscape. One landowner commented, "When you're out in Marion Bay fishing and look back at the Tier, it looks significantly different and better."

- More than 100 hectares of landslip areas have been planted out, predominately with blue gums, shining gum and radiata pine. These plantations are being managed for production and protection.
- Areas of remnant vegetation are now managed for sustainable forest production and / or conservation. (The remaining remnant vegetation is a significant habitat for the rare swift parrot.)
- Riparian areas have been fenced from stock to prevent erosion and enhance water quality.
- Gully erosion has been revegetated and stabilized.
- A commercial seed orchard has been established using trees scientifically selected for superior production qualities.
- An active Landcare group exists which plants over 1000 local native trees a year.
- A small native plant nursery operates in the area.
- 20 hectares of vineyard with tree shelterbelts, an olive grove and a hazelnut plantation for truffle production have all been established.
- Smaller landowners, often commuters from Hobart, have increased the diversity by planting areas for windbreaks, aesthetics and habitat.

Transforming Lyndfield Park

Lyndfield Park is a farm located near Canberra. Over the last two decades the property has undergone a dramatic transformation as its owners, John and Jan Weatherstone, have turned from grazing sheep to growing trees. In the process they've turned around many of the chronic environmental problems threatening the farm, significantly increased its resilience to the stresses of drought, improved its financial turnover, dramatically increased its capital value and created an attractive and pleasant place in which to work. On top of this, Lyndfield Park has more species of native birds on it than any other property in the area.

John Weatherstone changed the direction of his management of Lyndfield Park following a major episode of drought. At the height of the drought of 82/83, John saw that despite applying what was considered best practice, he was working the land too hard and it had lost its resilience. The drought had exacerbated a host of problems such as poor soil, dieback of trees, decline in biodiversity and a loss of productivity. John believed that if Lyndfield Park was to have any future he needed to take greater care of the land.

In the years following the drought, John reduced grazing pressure, minimised soil cultivation, cut back on the application of farm chemicals and established more than 80,000 trees and shrubs. Indeed, selling native trees, shrubs and seeds have become the main enterprises of Lyndfield Park though they still graze cattle (at higher stocking rates than prior to the 82/83 drought but with significantly less impact on the land).

Farm forestry with a range of native trees for timber products is also being developed, and John is running a number of trials of natives to test their growth and marketability. These include plantings of she oak, red box, yellow box, red stringybark, red ironbark and black oak. He's finding that the strength of his farm enterprise lies in the diversity of his projects so he's always willing to try new ideas.

There are several keys to John's approach to restoring habitat. To begin with he knew that the bigger the area he could revegetate with native plants, the greater his chances of providing adequate areas of habitat to support some species of wildlife. He also knew that an area containing

existing trees and native shrubs was a good place to begin. Consequently, in 1988 he set aside 15 hectares in the middle of his farm in which to undertake a long-term habitat restoration project. This area was on light shale country and didn't support many sheep so he wasn't losing much income by setting aside the land. Also, the site contained 20 natural trees, some native grasses and a few native shrubs. Not much, but better than nothing.

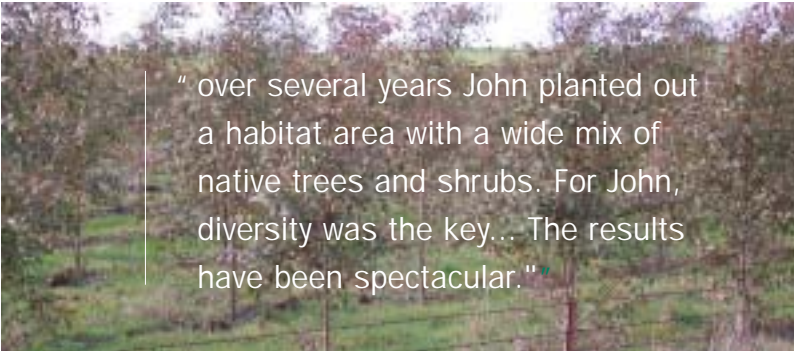
Over several years, John planted out this area with a wide mix of native trees and shrubs. For John, diversity was the key. Variety in plant species, and variety in plant shapes and sizes. Variety in what's available through the year. One of the factors he employed to assist birds and other animals to use the farm is to have a variety of plants flowering at all times of the year. Because many of the birds and insects rely on nectar as part of their diet, it's important to have a source of nectar available all year round. They now have at least one or two species of wattle flowering in every month of the year, as well as a range of other flowering trees and shrubs. Another important factor was to establish some prickly shrubs in many areas, as these plants provide secure nesting sites for birds and a safe haven from predators.

The results have been spectacular. Greening Australia has been surveying what bird species use areas of revegetation around Canberra, and their surveys found that 51 species of native birds use the site at Lyndfield Park, making it one of the best sites in the region. Another pleasing aspect of the bird observations is that more than half of the species observed were listed as 'declining' in the general area. At Lyndfield Park these species have either been increasing in numbers, or at least stable, over the past five years of the surveys.

Since 1996 just on 120 species of native birds have been identified on Lyndfield Park. Many of these species have not been seen before, many others had disappeared during the previous few decades.

For all this success, John acknowledges that there's one component of habitat that he can't easily recreate. "Probably our greatest habitat deficiency is the lack of trees with hollows," says John. "Regretfully, we removed most of the old trees long before we recognised their value. Now there's little we can do in the short term to rectify that."

Source: Weatherstone, J (2003) Lyndfield Park: looking back, moving forward. Land and Water Australia.



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Greening Australia's vision for farm forestry in Australia

Greening Australia believes farm forestry provides Australia with a range of unique opportunities to build socially, environmentally and economically healthy communities. This is done by creating links between people, the landscapes they live in and commercial investment.

Greening Australia's farm forestry is not just for farmers or foresters, it enables the whole community to contribute to a sustainable future for regional Australia. It provides urban investors with opportunities to generate wealth, and allows urban communities to engage with rural Australia through direct involvement in environmental improvement and economic development. It promotes government investment in the environmental benefits of farm forestry which provides a return to all Australians.

Farm forestry in Australia is broadly defined. It sits in the space between revegetation and industrial forestry. It combines many elements of both, and has no single model to define it. A spectrum of farm forestry models exists, ranging from those with an emphasis on nature conservation to those with a production emphasis. Greening Australia's farm forestry embraces the full range of this spectrum.

Working across the whole spectrum of farm forestry, Greening Australia aims to achieve multiple benefits and the integration of production and environmental outcomes at the farm scale. Regionally, Greening Australia focuses on the farm forestry needs of the community, but emphasises that all values, including environmental benefits, must be considered when evaluating farm forestry.

"Greening Australia's farm forestry links people, landscape and investment"

The community, business and government contribute a great deal of money and time to solving environmental, economic and social problems. Often they are tackled in isolation from each other. Greening Australia's farm forestry has the potential to maximise the economic and environmental returns Australia receives from investment in farm forestry. Money spent to grow timber or a range of other farm forestry products can also be an investment in salinity mitigation, soil and water improvement and biodiversity conservation. The reverse also applies. Vegetation established primarily for salinity mitigation or biodiversity conservation can also provide commercial returns.

Large-scale industrial plantations are the most visible manifestations of the increasing production of wood in line with Plantations for Australia: The 2020 Vision. They play an important role in meeting our future wood supply needs and generating wealth for Australia. They can have significant environmental, social and aesthetic implications for the farm and the regional landscape.

Greening Australia farm forestry offers a way of increasing the social and environmental values of large plantations as well as providing real alternatives at smaller scales for diverse, farm-integrated commercial revegetation.

Greening Australia believes the "high value and low volume" approach as most suitable for a large number of participants growing a diverse range of products in a variety of systems. However, Greening Australia also recognises the value of "low value and high volume" systems in addressing landscape scale land degradation and in attracting external private investment in farm forestry. Greening Australia acknowledges the importance of developing markets for new products and new markets for existing products.

Greening Australia does not support the elimination of native vegetation for farm forestry development. Native forest and woodland, even when substantially modified or degraded, provides significantly higher nature conservation values than plantations. Some native forest on private land can be sustainably managed for both timber production and improved nature conservation values and this is an area for priority attention.

Greening Australia works with other farm forestry organisations and individuals to maximise the benefits of farm forestry. This commitment to a cooperative approach is outlined in the Joint Position on farm forestry of Greening Australia, National Association of Forest Industries, Australian Forest Growers and National Farmers' Federation (1996). Greening Australia recognises that strong partnerships between these, and other, organisations and individuals are essential to ensure the success of farm forestry.

Guiding principles

Greening Australia farm forestry is:

Sustainable:

economically; socially; environmentally.

Diverse:

products and markets; species; operating scales; growers and other participants.

Integrated & planned:

within the farm business; into the farm landscape and operations; within the regional landscape; with the community; with nature conservation and with industry

Greening Australia's approach to Farm Forestry offers multiple benefits:

income enhancement and diversification;
local employment and business;
commercial products;
salinity mitigation;
soil, air and water quality improvement;
biodiversity conservation;
carbon sequestration; and
improved farm agricultural ecology.



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