

Agro-forestry and mixed perennials in a low rainfall saline landscape

Location:	North Central Victoria
Region:	North Central CMA
Industry:	Agro-forestry and mixed farming
Group:	Northern United Forestry Group (NUFG)
Issue:	Matching perennial plant species to landscape to sustain production, combat salinity and improve water
Key Outcomes	<ul style="list-style-type: none">• Over 50 families involved in NUGF activity• 50 ha demonstration site with native trees, shrubs, saltbush & grasses• Monitoring of perennial growth rates and the effect on ground water and salinity• Establishment of infrastructure for animal grazing trials• Presentations of information and research via conferences, field days and articles

Background

The NUGF is an incorporated, community-based collective of over 50 farming families who have been working together in northern Victoria since 1998. The group's extensive research into suitable native trees for farm forestry is being used to establish low-rainfall (<450mm) farm forestry as a commercially viable enterprise providing forest products, environmental services and community benefits. The NUGF is committed to establishing permanent systems that bring about sustainable land use change. The group's past research and activity has involved determining which native acacias and eucalypts are suited to Victoria's northern plains that could both revitalise the natural ecosystem and be used in a productive and sustainable farm forestry industry.

In September 2004 the NUGF won the prestigious 2004 Telstra Country Wide National Landcare Research Award.

The Project

The project aimed to demonstrate that perennial plantings hold the key to the future viability of production on salt-affected farming land. The 50-hectare demonstration project was established on the Hay family property at Kamarooka. In 2004 the group established 11,000 trees, 10,000 saltbush plugs, six hectares of direct-seeded saltbush and native grasses and five kilometres of direct-seeded trees. Another 5,000 trees were planted in 2005.

When designing the project NUGF members consulted extensively with the scientific community, including hosting a site visit and 'think tank' with Dr Ed Barrett-Lennard (Department of Agriculture, WA) Dr Richard George (Department of Agriculture, WA) and Dr Nico Marcar (CSIRO Division of Forestry). Dr Clive Malcolm (WA) also advised on species selection for the site.

Phil Dyson, NUGF member and consulting hydro-geologist, manages a comprehensive groundwater monitoring program as part of the rigorous evaluation processes established to support the project. A network of ten groundwater monitoring bores was installed across the project site and earth conductivity (EM38 and EM31) studies were completed to provide highly specific measurements relating to the effects of perennial plants on groundwater and salinity.

Strategic fencing was erected to allow for future grazing management and productivity trials, monitoring of changes in the vegetation, management of the farm forestry trees, seed collecting and other data collection. A biannual field day is held in autumn to share the results of the project with stakeholders, particularly the local farming community.

Outcomes

Groundwater monitoring

Watertable monitoring in the upper catchment has revealed a drop in the watertable from 116.5 metres above sea level (masl) to 111.5 masl. On the project discharge site (111.0 masl), water tables that were at or near the surface have now fallen below two metres from the surface.

Two of the bores in the monitoring network are located within isolated patches of remnant vegetation immediately adjacent to severely salinised land where the watertable is near the surface. The watertable under the remnant vegetation is 5 to 6 metres deep in the north, whilst in the south it is 2 to 4 metres below the surface. The deeper watertable under the remnant vegetation is surprising because the groundwater salinity is almost two-thirds the salinity of seawater. After ten years of prolonged drought the ancient Grey Box trees have to be transpiring at least some saline groundwater.

The extent to which the group's treatments at Kamarooka influence the watertable is still unknown. Monitoring efforts, by chance, coincided with a change in climate that ultimately produced the most substantive change in landscape-groundwater interactions in the last 50 years. This change in background conditions masks the changes that the group might otherwise hope to see resulting from its management systems. At this stage it is not possible to separate climatically driven effects from those that might be expected from the treatments. Equally, the vegetative treatments remain relatively immature in terms of their water use, and there is a need to sustain a monitoring program whilst they continue to develop.

The Kamarooka monitoring program breaks new ground. The climate-vegetation-landscape-groundwater systems are too complex for effective computer modelling. In this instance the group will learn far more from simply continuing to measure and observe. Will the farm forestry trees ultimately lower the watertable to the point where it is obvious that they are making a difference? How long might this take? Will the saltbush make a difference to water tables? Will the groundwater system bounce back with any return

to wetter conditions? These questions have great relevance well beyond the Kamarooka project.

Vegetation monitoring

As well as groundwater and salinity measurements, productivity data concerning trees, shrubs, saltbush and grasses was collected, and their effect on the sustainability, and profitability of farming enterprises examined. This on-going component of the project has recently revealed that the saltbush could sustain 165 wethers throughout the autumn and early winter of 2006 while all other sheep on the Hay property have had to be feed-lotted.

The farm forestry species include wattles planted for craft wood and furniture production, eucalypts selected for feature furniture, flooring and framing. Growth rates have exceeded expectations with some of the Swamp Yates (*Eucalyptus occidentalis*) reaching three metres in height in 18 months. NUGF members have been actively managing the trees and form-pruning them to achieve the best possible sawlogs at the end of the first rotation.

Community development

Both strong communication and community development have been major outcomes of the project as organisations such as North Central CMA, local landcare groups, local schools, government departments and research and development agencies became partners in the work at Kamarooka. Field days and visits from landcare groups and other farm forestry networks, has also provided group members with the opportunity to develop new skills.

In August 2005 three members of the group made a presentation on landcare to the International Union of Forest Research Organisations conference held in Brisbane. The three members were invited by the United States Department of Agriculture and the Australian Department of Agriculture Fisheries and Forestry to speak on how landcare groups help link science and practice through landcare. Their presentation focussed on the Kamarooka project and stressed the value of linking a group of farm foresters with scientists from a range of disciplines. Benefits include improved plantation design and management and greater social cohesiveness of the group.

The Future

With support from a National Landcare Programme Community Support grant, the NUGF research project will continue to provide important local and extended information on the economics and management of growing hardwood species on the northern plains, both in terms of returns for timber products and integrating perennial vegetation into existing cropping and grazing enterprises. NUGF will continue to monitor perennial growth rates and the effect on groundwater and salinity levels on the project site.

The group's new focus on animal production trials, comparing sheep undertaking cell grazing of saltbush and native grass vegetation with sheep undertaking set stocking grazing, will provide crucial data for primary producers planning to establish perennial native vegetation for the purpose of farming sustainably and profitably in saline landscapes.

When predicting the group's future direction, Ian Rankin NUGF President, commented, "We know there is a strong interest in growing trees and other perennials for a range of benefits. NUGF is keen to take a leadership role in providing access to a broad range of production and salinity control information."

Ian Rankin added "The ongoing watertable, salinity and vegetation monitoring combined with the new animal production data to be collected and interpreted over the next three years, will provide important integrated farm management options for farming saline landscapes."

NUGF provides information regarding their vegetation management and animal production trials via field days and their project website at www.nufg.org.au.



Kamarooka site before project

Kamarooka geophysical survey undertaken amongst developing vegetation

Sheep grazing among trees planted on the Kamarooka site

(Photos: Ian Rankin)