Salinity management in a variable landscape

John and Robyn Ive certainly found the challenge they were looking for upon purchasing their property *Talaheni* in 1980. After 25 years of persistence and hard work the family has transformed a severely degraded landscape into a productive agricultural enterprise. John Ive explains to *Elizabeth Madden* how saline groundwater is managed to achieve production and environmental benefits on *Talaheni*.

Case study: The Ive family (John, Robyn, Steven and Carolynn)
Location: Murrumbateman, NSW (between Yass and Canberra)
Property size: 250 ha
Mean annual rainfall: 740 mm
Soils: Variable from poorly developed lithosols to deeply weathered silty clay loams
Enterprises: Sheep (superfine wool), Angus cattle for feedlot and farm forestry

Talaheni is located in a major dryland salinity 'hotspot' between Dicks Creek and Williams Creek in the Yass River Valley. The signs of salinity were very obvious when we looked at buying the property with saline seeps covering 23 per cent of the land, large areas of bare soil, dams with water ranging up to 10 deciSiemens per metre (dS/m), declining pastures, limited tree cover and actively eroding gullies. Productivity was pretty poor at this stage and as is common around here, the soils were quite acid.

On *Talaheni* we produce superfine wool which averages 15.2 microns from Sharlea wethers and we finish feedlot steers from an Angus herd. Over the last 25 years our carrying capacity has steadily improved with dry sheep equivalent (DSE) increasing by an average of 1.7% each year along with an improvement in product quality, be it wool or beef.

Photo: E Madden

John Ive with 15 year-old red box plantation

We've taken a multi-pronged approach to managing salinity on *Talaheni*. Firstly the nine original square paddocks gave way to 38 paddocks fenced on soil and slope type which helps with our grazing management. Three kilometres of graded and contour banks and dams intercept overland flow and protect the lower slopes and flats from erosion. We also noticed that the graded banks intercept shallow groundwater moving down hill slopes.

Of the major 'salt drivers' on this place - rainfall, geology and vegetation - we can really only alter vegetation. All the vegetation across *Talaheni* contributes to the sustainability of the property by reducing recharge. However to establish pastures for production we had to deal with both saline and acid soils as low as pH_{Ca} 3.6. We've used sewage ash and now lime to control soil acidity, and soil salinity has improved as the water table has fallen.

Pastures consist of a mix of native (predominately microlaena based) and exotic (primarily phalaris) perennial-based pastures, all with a legume component.

We have used salt-tolerant species (crested wheat-grass, puccinella, strawberry clover) to get vegetation cover on bare areas and also acid-tolerant species such as serradella. However now we use more productive and higher water-use efficient perennials such as phalaris, caucasian clover, chickory and plantain.

The geology on *Talaheni* influences why we have salinity and how it can be managed and is a good example of how reading the variation in the landscape improves management decisions. *Talaheni* sits on Ordovician metasediments which have been lifted and steeply tilted. As a result we can get potential recharge ranging from 3 mm on the heavier flats to an astonishing 3000 mm per hour on our hills. To deal with this, our ongoing tree planting program targets the low productivity and highest recharge hills to 'turn off the hill-top recharge tap'. We've also planted trees for their timber value in some of these sites.

Native remnants are managed for multiple benefits. They have been linked with mixed-species corridor plantings mostly

Key points

- Large areas of productive land can be put at risk by small, unproductive recharge areas
- Geology influences groundwater on this property
- Small increases in plant water-use can have major effects on water tables and expression of dryland salinity
- An integrated approach is needed across the landscape
- Stay positive, be proactive and committed to your management plan but be flexible

along the rocky ridge lines. As a result, threatened woodland species such as hooded robins, Jackie winters and double-barred finches have returned to this landscape. We undertook break-of-slope plantings when we saw the amount of subsurface groundwater intercepted by the graded banks.

Increasing vegetation cover on *Talaheni* has helped lower water tables and improve dam water quality as well as providing wildlife habitat and wind protection for stock and pastures. The 12,000 *Eucalyptus polyanthemos* trees planted in 1989 have improved dam water quality by reducing salinity to less than 1 dS/m, significantly lowered water tables, and reduced waterlogging and groundwater salt levels on the northern side of the property. These changes are confirmed by the piezometer, groundwater and dam water data collected each week over the last 16 years. It also allows us to estimate that for each hectare planted to trees some 50 ha of downslope pasture is now benefiting.

We aim to continue with our on-farm activities while remaining proactive, positive and committed to our management plan - but also flexible. Some of the issues we'll be looking into include the effect of sheep camps on nutrient redistribution and groundwater quality, salinity and ferrihydrite scavenging, developing a website, hosting a virtual field day, and linking our piezometer readings to our spatial water balance model.

Talaheni, December 2002 shows hills well covered by native revegetation, break-of-slope tree planting, vigorous perennial pastures on valley floor and area in view now fenced to nine paddocks based on landscape characteristics.

INSET: *Talaheni,* December 1973 shows poor tree cover, declining tree health and low recruitment on hills, salinity and erosion in drainage line and poor pasture cover.

CONTACT

Elizabeth Madden, CRC Salinity,
Communications Coordinator (NSW)
Tel.: (02) 6938 1985
E-mail: elizabeth.madden@agric.nsw.gov.au

The science behind the story

By Dr Peter Orchard

The response of John and Robyn Ive to salinity on their property is a great example of understanding that salinity is a symptom and not the problem. As such, land management changes need to be made on an integrated landscape basis. Managing the water balance to control salinity was the key to remaining productive in this situation.

The first task on *Talaheni* was to identify the assets and hazards across their landscape and to gain a significant degree of control of grazing management and therefore groundcover and pasture composition. This was achieved by redesigning paddock layout based on landscape characteristics.

Addressing soil acidity increased pasture production and plant water-use which lowered saline water tables. Integrating strategic tree planting on low productivity and high recharge hills and improved pastures came from an understanding of geology and landscape processes. These strategies clearly minimise forgone pasture opportunities from land given over to trees while maximising the environmental benefits and in time, delivering the sought after production benefits.

John and Robyn's property is a prime example of the need to understand the implications of variation in slope, aspect, soil depth, geology and vegetation and their impact on landscape processes to successfully manage salinity. The NSW Department of Primary Industries has recently developed a landscape management course titled LANDSCAN to enable land managers to interpret and manage their landscapes using many of the principles which the Ive family has been applying for 25 years.

• *Dr Peter Orchard, NSW Department of Primary Industries, leads the CRC Salinity project* Promoting salinity solutions through agribusiness *in collaboration with Landmark AWB.*

CONTACT

Dr Peter Orchard, NSW DPI
Tel.: (02) 6938 1895
E-mail: peter.orchard@agric.nsw.gov.au