Salinity swamped at Woomargama

The Woomargama area in southern NSW was originally called Dixon's Swamp and, true to its title, Chris Mirams, who has managed *Woomargama Station* for the Darling family for the past 13 years, says that until recently waterlogging was a significant issue. But with only 190 millimetres of rainfall during the year until October, the challenge lately has been to manage the lack of water rather than the excess.

Chris Mirams talked to Matt Crosbie about the on-going development of the property.

"This area used to be called Dixon's Swamp, which gives you an idea of how wet it can get in a more normal run of seasons . There are a few smaller pockets of salinity, but the main one is in a 32 hectare gully, in the floor of a large valley.

There was a large area of bare ground, where the white powdery salt was quite visible. In the winter the run-off from the saline area measured approximately 3 dS/m. The immediate area around the bare ground was fenced off, sprayed and ripped and 9000 trees were planted. The recharge area of around 200 ha was limed and sown down to perennial pastures. The saline area is gradually drying up and the bare ground is almost completely covered now and coming back into productivity.

Reclaiming the saline area basically involved using the same processes we have used to increase water-use efficiency and farm productivity over the whole property.

Case study: Chris Mirams
Location: *Woomargama Station*, Woomargama, NSW (north of Albury)
Property size: 2700 ha
Mean annual rainfall: 750 mm (winter dominant)
Soils: Predominantly granite and sedimentary soils with a pH 4.0–4.2 (natural pre-liming) with high aluminium
Enterprises: 10,000 fine wool Merino self-replacing flock; 550 Hereford cows
Carrying capacity: 20–25,000 DSE

Photo: M Crosbie

Chris Miram and dogs on *Woomargama Station*

This involves subdividing the farm into land classes and managing each area to the best of its potential. We sow deep-rooted, high-performance, perennial pastures where possible. The pasture mix is selected to match the land classification and our enterprise requirements.

We have planted more than 50,000 trees during the past few years, particularly on the break-of-slope, designed to reduce run off and reclaim wet areas.

We have also entered into a number of land management agreements. In fragile areas, where there were enough desirable species present, the land was locked up for five years or more to encourage natural regeneration. Interestingly, since we commenced rotational grazing we have found these areas can now be selectively grazed. This stimulates regrowth and aids in the management of pests and weeds and provides valuable grazing at certain times of the year.

In 1993 we carried out a major soil testing program, which identified low phosphorus and soil acidity as significant issues. Many paddocks tested had a pH of 4.0 to 4.2 (calcium chloride) and associated high aluminum. This is natural as well as induced. The soils in the surrounding bushland have a similar acidity.

It became apparent through benchmarking that in our environment, where carrying capacity is a significant driver of profit, and a major liming and pasture improvement program was required to lift production.

Due to the fragile nature of much of our country, we use direct drill techniques to establish pastures. As we cannot incorporate lime we initially sowed a lot of country to acid-tolerant species such as cocksfoot. With time the lime works through the soil profile and we replace the cocksfoot with other perennials such as phalaris, which suits our environment particularly well.

On some of our best country we sow specialist pastures such as high-performance ryegrasses, fescue, lucerne, chicory and plantain. We also sow fodder crops such as oats and millet for our young stock and stock in a fattening program.

Key points

- Increasing production pays for environmental projects
- High water use the key to production and sustainability
- Perennial pastures and break-of-slope tree planting beat salinity.

We monitor the carrying capacity of each paddock and match the fertiliser application to the pasture species and stocking rate potential of each area.

The increased production creates efficiency of scale. Our cost of production has reduced significantly, as our overheads are spread over larger enterprises. Without increased production it would be very hard to fund the wonderful soil conservation projects we undertake.

The rotational grazing system has helped us better manage plant growth, improve pasture utilisation, maintain perenniality and manage ground cover.

Prior to embarking on a rotational grazing system we did a lot of research, looking at all sorts of systems, from simple four-paddock rotations to cell grazing. We settled on setting up three grazing blocks or cells, one for the cows, one for the ewes and one for the wethers. Each cell includes 15 to 20 existing paddocks and we aim to achieve a minimum of 40 days rest between grazing, perhaps requiring further subdivision.

Photo: M Crosbie

Part of a 32 ha salt scald being rehabilitated on *Woomargama Station*

The rotation started off in a very structured system, but as we have gained confidence the system has become more relaxed. In the winter the rotation acts as a mechanism for rationing the feed and provides extended rest periods. In the spring the aim is to extend the period of high pasture growth and quality by keeping the pastures in Prograze growth stages 2–3.

We have a very strong long-term focus on the 'real estate' component of the business — the productivity, health and value of the land. This makes sense, as in many rural enterprises the land value makes up around 85 per cent of the total investment, with stock and plant about 15%.

We drive our enterprises as hard as we can, with the aim of generating the funds required to further develop the property, from production, aesthetic and sustainability perspectives."

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The science behind the story

By David Mitchell

The concept of using perennial grass pastures coupled with tree plantings on the break-of-slope to reduce run-off and recharge and to lower water tables has been promoted for a number of years, but long-term data regarding its effectiveness is hard to come by.

Researcher, Russell Crosbie from NSW DPI, has been studying the results of land use change on a small saline subcatchment on *Allendale*, Boorowa.

After 13 years of monitoring, the 129 ha trial is probably the longest running in NSW, and possibly Australia.

Originally the site was used for annual cropping, but in 1993 a change was made to alley farming, using rows of trees planted on the contour with spacings of 75 m. Annual cropping continued in a wheat/lupin rotation.

In 1999 the cropping enterprise ceased and a similar grazing management system to that being used on *Woomargama Station* was instigated. Permanent pastures of phalaris, cocksfoot and some lucerne were sown and grazed under a rotational system to maintain 100 per cent cover with the aim of retaining 2 t/ha biomass.

Five years after the move away from cropping and into perennial pastures, there is almost no recharge, run-off has been reduced and the salt output has halved. Significantly, the research shows these results have been achieved irrespective of the dry conditions over the past few years.

The salt input:output ratio has fallen from 22:1 to 11:1 and salt discharge per unit area has fallen from an annual 57 tonnes per square kilometre down to 27 tonnes. This is due to the reduced volume of water being discharged off the site rather than a reduction in the EC of the water.

Numerical modelling suggests the benefits of the land-use change in terms of groundwater levels will not be fully realised for several more decades.

Modelling studies of the Boorowa River catchment highlight the need for targeting high recharge, high salt export sub-catchments. This sub-catchment is identified as having a high salt export per unit area and high salt output to input ratio relative to the Boorowa River catchment, which in turn is high relative to the Lachlan River catchment at Cowra.

Further land-use changes similar to those implemented in this study targeted to other high salt export sub-catchments are likely to have a large cumulative effect on stream salt loads and stream flow in the Boorowa River catchment.

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