



case study salinity



addressing salinity in the Goondoola Basin



Above: counting the cost. This bare, damp patch in a wheat crop in the Basin is a result of rising groundwater bringing salts to the root zone.

location: Goondoola Basin, south-east of St George

project: to lower the water table and prevent salinity by planting deep-rooted perennial pastures

the landscape

The Goondoola Basin is an ancient lakebed, surrounded by rocky jump-ups. Underlying it is an impervious layer of dense clay and sheer rock. A saline water table at 4 to 5 metres has been known to exist here since early European settlement. The basin floor is extremely flat, with less than one metre difference in elevation from the highest to the lowest points.

This combination of poor drainage, ancient salts and rainfall has seen the formation of salt seeps and a salinity problem which has the potential to affect large areas in the Goondoola sub-catchment.

the problem

Jeff and Wendy Betts have been addressing the salinity issue in the Goondoola Basin. They bought an additional area in the Basin in the early 90s and while they were aware of an underlying saline water table in this area, it was not considered an issue. Jeff said, "There was always a bit of wet seepage on the side of a jump-up but because salt was not considered an issue in Queensland, it was initially disregarded."

It wasn't until a chickpea crop planted in the Basin in 1991 began to fail, that the true nature of the problem began to emerge. Soil cores were taken and sent away for analysis. The tests showed that while there was no visual evidence of salt at the surface, at a depth of 30 – 45 cm it was too hostile to grow chickpeas. Later tests showed that the underground water in the same area was as salty as seawater.

"From there on I really started thinking about it and began noticing a lot more than I would have before. Along the road, wherever it was bare I started to notice damp spots. Two to three hundred yards of road would be permanently damp. Not so damp as to get bogged but just a different colour," Jeff said.

the search for solutions

Jeff and Wendy Betts knew they had a problem that needed to be addressed but information on how best to tackle salinity, particularly in Queensland, was difficult to find. With assistance from staff at the Department of Primary Industries and Department of Natural Resources they began exploring the options.



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"Most of the information we were getting at that stage was from Western Australia and South Australia, but it's different here and we couldn't just do what they'd done there and expect it to work," Jeff said.

What was needed was a practical and effective way to restore the water balance. Rather than installing large earthworks and pumps, the Betts family turned to the natural pumps found in deep rooted perennial pastures. These pastures had been cleared from many parts of the Goondoola Basin in the 1980s when grazing country was turned over to produce wheat and chickpeas. This change in land use had resulted in summer fallows and an accumulation of moisture in the soil profile.

Jeff and Wendy identified a need to restore the water balance by replanting perennial pastures and began testing different plants for their resilience and ability to establish quickly. "One of the first things people said to try was lucerne, but it didn't handle our real saline areas as well as I thought it might have," Jeff said. "I'd probably have a list as long as my arm of things we've tried." That list includes florin blue grass, buffel grass, medic, saltbush, lucerne, silk sorghum, fine cut Rhodes grass, digitaria and unica.

While time limitations and practicalities prevented rigorous monitoring of the different pastures, anecdotal evidence and the results from a number of piezometers, installed to monitor ground water, suggested the conversion to pastures was helping to lower the salty water table. "We had one piezometer in the fallow cropping country and one close by in the grass country and, without a doubt, the one in the grass country was consistently a lot lower," Jeff said.

the long term plan

The plan in the Goondoola Basin now is to convert around three-quarters of the potential cropping country back to grass. In 2004, wheat was undersown with legumes, including lucerne, medics and unica. The aim was to establish the legumes while still producing some income from the wheat.

Jeff says, "The most important thing, prior to planting my grasses, is to establish a nitrogen fixing plant. The idea is to get the nitrogen fixer (legumes) established first and then get the grasses going. By under sowing legumes into the crop I've got stubble residue left on the ground to protect it and then I'll plant my grass seed on top of that."

The intention is to plant a mix of perennial grasses, including digitaria, buffel, blue grasses and Rhodes grass. While the preference is for the native grasses, Jeff is considering buffel grass because of its ability to do well under the harsh conditions and to remove water from the system



Above: Jeff Betts measures the depth of the water table by lowering a length of tape with a plopper, into the piezometer.



year round. Rhodes grass is also favoured as a pioneer species, because of its capacity to handle salty soils.

The last few years, however, have been extremely dry, making the conversion process frustratingly slow. "If I could just get in and do it, I think we could get on top of it," Jeff said. "What really worries me is that in a season as dry as we've just had, there are still wet spots in the wheat paddock."

the group approach

Salinity is also a concern for other property owners in the Goondoola Basin. Some years back, Jeff and Wendy got together with a few of their neighbours to form the Goondoola Basin Best Practice Group. There are now five farming families represented in the group.



Above: comparing notes. Dave Toohey from QMDC (left), Jeff Betts (centre) and Nick Cristodoulou, from DPI, inspect the progress of medics undersown into the wheat.

Over the next three years, the group aims to convert more cropping country to deep rooted perennial pastures, continue pasture trials and ultimately, lower the groundwater table and reduce the salinity threat in the Basin. To help achieve this goal, the Best Practice Group is working with staff from QMDC, Landcare and the Department's of Natural Resources and Primary Industries. The group also receives financial support through the Federal Government's National Action Plan for Salinity. This helps to cover the cost of pasture establishment, which the group estimates will cost around \$70 - \$80 per hectare.

But working in a group is not always easy, as Jeff explains. "Getting a lot of landholders to pull together in the same direction can be difficult," Jeff said. "We've gone along the track of not trying to convert anyone, we'll just stick to the core people who are keen and if someone else wants to come on-board, that's fine."

This gathering of support and changing attitudes has been a long, slow process. When the issue of salinity first emerged in the Goondoola Basin, the response from the community was very negative. "I felt like a leper," Jeff said. It was the first official reporting of salinity in the Waggamba Shire and people feared that making it public, would reduce land values and draw unwanted attention to the region.

For many years, they were reluctant to speak publicly about their experience. Now Jeff and Wendy feel they are ready to share their story, in the hope that it will help others to find a way of dealing with salinity.

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