Production and environmental gains from managing salinity

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Introduction

Dryland salinity is widely recognised as a major degrading process affecting parts of the Yass Valley. Surface expression of dryland salinity accelerates secondary soil erosion, causing local loss of production and off-site environmental consequences. Twenty-three years ago, "Talaheni" showed extensive symptoms of dryland salinity, triggering the development and implementation of a salinity management plan. Steps in this plan involved protection of eroded saline areas with graded banks, refencing to soil type, planting trees on high recharge areas, managing native and introduced pastures, and installing and monitoring a network of piezometers to establish groundwater response to actions.

Results

Groundwater levels have been monitored weekly since piezometers were installed in January 1991, and the results (Figure 1) show a persistent and long-term declining trend that extends over 500 m from the perimeter of the hilly recharge area that was planted to trees.

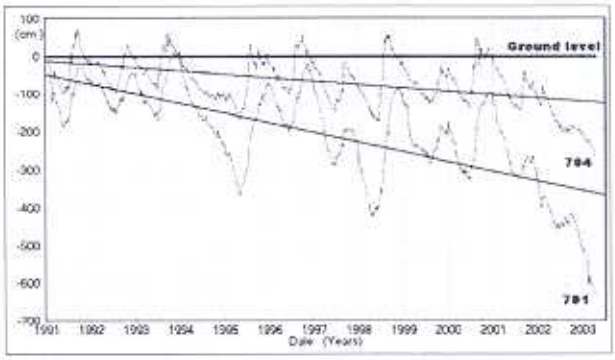

Figure 1: Weekly response of groundwater to planting recharge area with native trees in 1988 over the period from 1991 to April 2003.

Decline across adjoining open pasture ranges from 25 cm/year close (piezometer 701: 30 m) to the trees to 5 cm/year at the monitored point furthest (piezometer 704: 430 m) from the trees. This amounts to a total decline of 3.5 m and 0.7 m respectively over the 13 years of monitoring, sufficient to reinvigorate both native and introduced pastures downslope of the recharge area.

Not only has the groundwater declined in response to the trees established on the recharge area, but salinity levels (in Ec units) of the groundwater have also declined (Figure 2). Again, the greatest decline in groundwater salinity levels has occurred closest to the tree planting. The net result is that groundwater has changed from a shallow, saline liability to a deeper, less-saline asset now delivering increased production benefits via deep-rooting perennial pastures tapping this welcomed resource.

Lowering and quality improvement of groundwater has provided off-site environmental benefits for the surrounding region by reducing the salt and soil loads entering the stream network. However, benefits are not limited only to environmental factors; production benefits have followed success with managing groundwater (Table 1). For every hectare of recharge area planted to trees, it is calculated that groundwater conditions have improved for 47 ha of adjoining pasture land.

It is concluded that managing groundwater successfully has provided significant production and environmental benefits noticeably beyond the targeted recharge area.

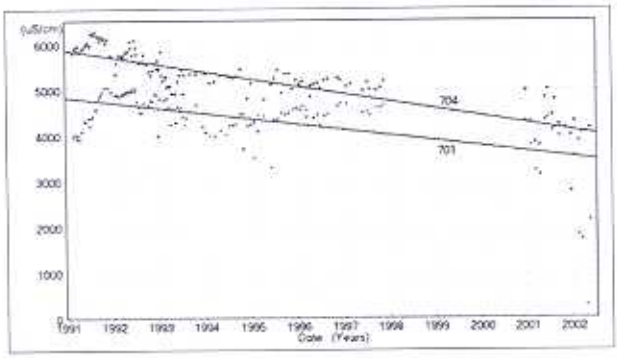

Figure 2: Salinity response of groundwater associated with declining groundwater levels over the period 1991 to April 2003.

Table 1: Annual average production gain from adjoining pasture associated with managing groundwater

Index	Unit	Min*	Current*	Max*	Rate (%/yr)
Stock	DSE/ha	58 (1982)	100 (2002)	100 (2002)	1.8
Wool	CFWt/MFD[3]	65 (1983)	100 (2002)	105 (1999)	1.0
Beef	Wean. wt (kg)	63 (1983)	100 (2002)	128 (1999)	0.9

*Percentage index with current last full year (2002) set to 100; min. and max. are given as a percentage of this figure; year in brackets is year in which min. and max. were recorded.