

# Research Projects

Research Project  
Information from  
CSIRO  
Land and Water

Sheet No. 14  
November 1999



## *New Groundwater Management Guidelines for Healthier Vegetation in Saline Areas*

Over the last ten years, numerous laboratory, lysimeter, field and modelling studies have been conducted to discover more about the interaction between soil, vegetation, groundwater and salt in areas of shallow saline groundwater. A range of vegetation types and environmental conditions have been examined, including soils, groundwater and climate.

With recent advances in technology, these studies have revealed an unexpected variety of vegetation responses to changes in the saline environment. This apparently chaotic behaviour is explicable, and even predictable, once it is looked at in the context of common soil and vegetation processes operating across a wide range of vegetation and environmental conditions.

This collaborative project aims to incorporate these recent breakthroughs in understanding in a form that groundwater managers can put to practical use to better predict likely vegetation responses to a range of management options. CSIRO Land and Water scientists and their project partners believe that this review, coupled with local measurements and understanding, will contribute to the development of local guidelines for levels of groundwater control, flooding regimes, and other key processes.

In the first instance the research findings will be used to evaluate different management options on saline floodplains in South Australia and Victoria. Modelling will be used to extend the range of conditions from those found in the site studies.



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Centre for  
Groundwater Studies



Funded by:

Land and Water  
Resources Research and  
Development Corporation

## The way forward

- The research team intends to produce a readable semi-technical review and synthesis of available literature on the interaction between groundwater and vegetation. This should provide a basis for developing local guidelines for Australian conditions to manage ground and surface water for maintenance of vegetation health. It will include impacts on transpiration and groundwater use by vegetation, vegetation growth and rate of salt accumulation in soils.
- To ensure that the range of conditions covered in the review is as wide as technically possible, the models will be modified where appropriate and will extrapolate from the range of situations included in the current literature. This will be linked to output from groundwater models.
- Principles from the review will be applied to develop local guidelines for saline floodplains in South Australia and Victoria.
- Gaps in the current literature, where further field studies are warranted, will be identified.

## Technical Aspects

### Review

The key elements of the review are:

- an expert panel
- key case studies
- a description of the processes
- an outline of the reasons for varying behaviour of vegetation
- a guide to appropriate model compilation of known field results
- categorisation of vegetation response to salinity
- identification of stakeholders.

### Modelling

Modelling work will encompass:

- application of existing models to field studies
- analysis of vegetation response to salinity
- modification of APSIM
- determining the best ways of linking groundwater output models with vegetation-soil models.

## Field case studies

Two very different case studies will be used:

- *Bookpurnong floodplain on the River Murray*  
The objective in this instance will be to identify critical processes leading to vegetation degradation in different areas of the floodplain and to identify the best form of intervention. Key processes leading to vegetation degradation include changed flooding regime and raised groundwater levels due to irrigation mounds and locking. In some cases waterlogging is the predominant influence; in others it is long-term salt accumulation between floods and the seepage from local irrigation. Management options include groundwater pumping, improved irrigation efficiency and changed flooding regime.
- *Victorian Murray Basin*  
Wetland areas identified in the Murray-Darling Basin salinity audit as being at risk will be used to test the principles from the review.

## Project Outputs

Outputs will include:

- a semi-technical review
- two documented case studies in using the review to develop local guidelines
- documentation and application of APSIM, and a suite of simple models that can be used to analyse local situations
- integration of a number of site studies, contributing to a more general understanding.

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