W.E. Wood Oration
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Salinity Economics and Policy

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This is a summary of key points from the W.E. Wood Oration. It is a synthesis of a body of economic, social and policy research, conducted with a large number of collaborators, including biological and physical scientists, farmers and regional NRM bodies.

The research highlights the considerable challenge in developing salinity policy. There is a diversity of salinity impacts, with different scientific information relevant to each.

- Land
- Water
- Biodiversity
- Infrastructure

These occur over a diversity of circumstances, in terms of:

- Soils
- Topography/groundwater flow systems
- Farming systems
- Demographic and economic circumstances
- Urgency

Added to the challenge of this diversity are the following challenges:

- The large scale of change needed to effectively contain salinity in most situations
- Momentum/lags in the hydrologic system, so that responses are often slow
- The limited range of suitable perennial plants that are currently available
- Current perennials are not sufficiently profitable in many regions
- Demographic changes away from agriculture in some regions
- The difficulty of selecting and designing policy tools

Some of the key points identified in my research are as follows.

- Selection and design of policy tools should be sensitive to the type of asset at risk, the bio-physical circumstances, and the socio-economic circumstances.
- If targeting is done well, most land will receive no direct financial support. There is a role for empowering landholders through developing improved salinity management technologies. New technologies are needed that are financially attractive to farmers, while managing salinity.

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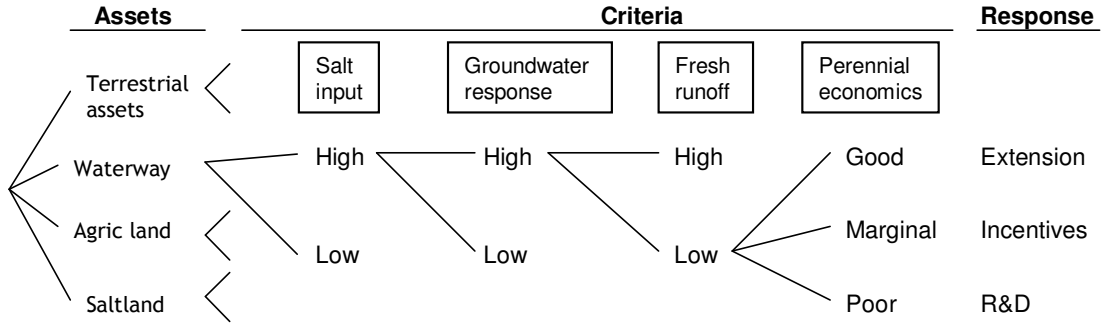
- Salinity policy needs to be more strongly supported by science for (a) planning, prioritising, setting targets, and (b) technology development and testing.
- Careful and sophisticated targeting of investments is required to achieve best outcomes.
- Without sophisticated targeting, perennials can make salinity worse in water resource catchments, while also adversely affecting water yield and economics.
- A broader range of policy tools needs to be brought into play. There is an over-reliance on incentives and extension.

Salinity Investment Framework III

In an attempt to assist catchment managers and policy makers, we have developed the Salinity Investment Framework III (SIF3 – see www.sif3.org). SIF3 uses a decision tree approach to identify appropriate policy tools or investment responses for dryland salinity, depending on the type of asset under threat, and the specific bio-physical and socio-economic context for that asset. The process of identifying the appropriate response to salinity is illustrated in the figure below. It shows how the choice depends on the type of asset and on other factors. The set of influential factors is different for each asset type. For waterways, as outlined in the example, the important factors are salt input, groundwater response, fresh runoff and the economics of perennials. There are different decision trees for the other asset classes. The full decision tree represents 57 distinct cases where a particular response is recommended.



Responses are considered in the following broad groups

- *Extension:* Technology transfer, education, communication, improving networks, and small temporary incentive payments to encourage trialling. Relevant where existing management options are adoptable.
- *Incentives:* Subsidies, market-based instruments, cost-sharing. Relevant to promote existing salinity management options where off-site benefits exceed on-site costs.
- *Regulation:* Transferable water rights, regulation on land use or drainage, zoning, government acquisition. To discourage existing plant-based systems in some cases.
- *Engineering:* Salt interception: pumping saline water to avoid discharge into rivers. Local engineering works to protect assets where problem is generated locally (e.g. many towns).
- *Technology development:* Development or improvement of technological options.
- *R&D:* Research to provide information to support planning and decision making.
- *Land retirement:* Incentive payments to encourage land retirement.
- *No action:* No response is justified where the costs of intervention outweigh the benefits.

Several of these categories would be relevant to the broad category of ‘capacity building’: extension, technology development, R&D, some types of engineering works.

A team from the CRC Salinity is working closely with the North-Central CMA in Victoria and SCRIPT (South Coast Regional NRM body) in WA to (a) Test SIF3, (b) adapt it for practicalities and existing processes, and (c) understand its usefulness/limitations. We believe it has great potential to provide useful input to salinity policy design and implementation.

Suggestions for national salinity policy

These suggestions are based on findings from a broad range of research on economic, social and policy aspects of dryland salinity, integrated with findings from biological and physical research. They are intended to provide practical advice on institutional and program design issues. I believe that the cost-effectiveness of salinity policy can be improved with:

1. A patient approach, so that we do not get trapped with small short-term benefits at the cost of larger long-term benefits. Operate around realistic time-frames for catchment planning, and for development of improved salinity management technologies. One element of this more patient approach is recognition that on-ground works are not always the best investment.

2. Stronger support to CMAs for targeting of salinity investments with an outcome focus based on latest knowledge. Need support with: data, analysis, tools, and guidelines.

3. Development of guidelines (for use by both CMAs and those doing accreditation) on the implications of recent research findings for the types of salinity investments that are appropriate (or not) in different circumstances. Guidelines could include the following:

    - Research indicates that locations for on-ground works or MBIs need to be very carefully selected. Many CMAs require a more targeted approach.
    - A more critically selective use of extension/education activities would enhance program effectiveness substantially. Research indicates that these approaches do not always provide worthwhile salinity outcomes, often because existing salinity management practices are not adoptable by landholders on the required scale.
    - Salinity mitigation usually requires a highly intensive and probably expensive effort at any location to achieve improved dryland salinity outcomes.
    - To underpin investment planning, it is crucial to have the capacity to analyse the trade-off between on-farm economic impacts, and off-farm salinity impacts, primarily through computer modelling.
    - Where the main issue is protection of water resources, CMAs additionally need access to the capacity to analyse trade-offs between farm economics, on-farm and off-farm salinity, and water yield. Research shows that badly planned placement of perennials can have adverse impacts on all three objectives: river salinity, water yields and farm profits.

4. A stronger accreditation process for regional strategies and investment plans. Our aim should be for investment plans to (a) use science well to inform decision making, (b) be outcome-focused, (c) be designed around an understanding of landholder motivations for adoption of conservation practices, and (d) incorporate community values and processes. Currently CMAs deal with (d) reasonably well, but many struggle with (a), (b) and (c).

5. Better integration into the program of investments that are better handled at state or national scales, including those listed below. Research indicates that they are often highly cost-effective responses.

   - Legal/regulatory approaches (e.g. the need to purchase water rights to plant perennials in water resource catchments, as discussed in the National Water Initiative).

   - Development of improved technologies, such as more profitable (more adoptable) farming practices for salinity management.

   - On-ground works on public lands (e.g. pumping in nature reserves, engineering responses to protect infrastructure).

   - Research to provide improved data for subsequent planning. Includes bio-physical and socio-economic research.

Additional reading

Adoption of conservation practices by landholders

Pannell, D.J., Marshall, G., Curtis, A., Vanclay, F., Barr, N., and Wilkinson, R (2004). Understanding and promoting adoption of conservation technologies by rural landholders. *Australian Journal of Experimental Agriculture* (forthcoming). see http://www.general.uwa.edu.au/u/dpannell/dp0502.htm

Using incentives

Pannell, D.J. (2005). Using incentives to buy land-use change in agriculture for environmental benefits, *Pannell Discussions*, No 66, http://cyllene.uwa.edu.au/~dpannell/pd/pd0066.htm

Using extension, communication and education

Pannell, D.J. (2005). Using communication and education to encourage land-use change in agriculture for environmental benefits, *Pannell Discussions*, No 67, http://cyllene.uwa.edu.au/~dpannell/pd/pd0067.htm

Pulling it all together for policy

Pannell, D.J. (2005). Salinity: new knowledge with big implications, http://cyllene.uwa.edu.au/~dpannell/dp0504.htm

Ridley AM and Pannell DJ (2005). SIF3: An investment framework for managing dryland salinity in Australia. SEA Working paper 1901. CRC for Plant-based Management of Dryland Salinity, University of Western Australia, Perth. http://www.sif3.org

Pannell, D.J. (2001). Dryland salinity: economic, scientific, social and policy dimensions, *Australian Journal of Agricultural and Resource Economics* 45(4): 517-546. http://cyllene.uwa.edu.au/~dpannell/dpap0101.pdf

See papers on other aspects of salinity and NRM at www.davidpannell.net.