

## Re-framing the debate for public investment in salinity management

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### Introduction

The purpose of this paper is to reflect on Victoria's policy and strategy for managing salinity over the past 20 years and consider how this is influencing future public investment in salinity management. This paper is largely focused on the government response to the salinity problems in Victoria, rather than the actions and approaches of land managers and farmers. I propose that the approach in Victoria, and indeed nationally, has been dominated by a focus on the cost of salinity to agriculture. Both formal research findings and on- ground experience, are driving Victoria towards a broader view of salinity and its management. Two of the key drivers of this change have been the improvement in our knowledge of the biophysical systems that drive salinity in our landscapes and the imperative to consider the impact of salinity across the whole landscape.

### Early government approaches to salinity in Victoria

In response to a perception of a growing salinity problem in Victoria, in May 1988 a State strategy for managing salinity was released. Salt Action, Joint Action (Government of Victoria, 1988) was a systematic approach to addressing salinity with a very strong and explicit focus on the role of regional salinity action plans. Over the ensuing ten years some 22 regional salinity plans were developed covering almost all salt affected areas in Victoria. These plans were notable for their high level of involvement of local communities.

The major rationale for Salt Action, Joint Action was that salinity posed a major threat to agricultural production and the Murray River (as the waterway that supplied much of State's irrigation water). Environmental improvements were described as 'other benefits' from salinity management. This focus is exemplified in reports on the achievements of the strategy highlighted that 91,000 hectares of high value irrigation land had been protected from salinity and that there had been \$62 million invested into new irrigation development. Salt Action, Joint Action was a product of the era which was characterised by calls to action based on an impending disaster for rural Victoria. This disaster was to come in the form of massive losses in agricultural production, and rural social decay and dislocation (Figure 1). The focus for salinity management was on its costs- economic and social.



Figure 1. Cartoon from Victorian salinity program source materials

### Focus on costs

The focus on current and potential costs of salinity as the driving force for government action came to be reflected all the way from local to national approaches to salinity management.

The national focus on costs of salinity is clearly demonstrated in the products from the National Land and Water Resources Audit. The Audit has been one of Australia's most important national initiatives on environmental management. One of the raft of reports and assessments from the Audit was the 'Australian Dryland Salinity Assessment 2000' (NLWRA, 2000).

This assessment is largely built on the same rationale as early strategies like Salt Action: Joint Action. That is, that the most important thing to know is what area of land is, or will be, subject to shallow saline watertables. Having established this, the impacts or costs of salinity are then described in terms of costs to agriculture (\$121.8 million per annum), State and local government (\$30 million p.a.) and households (\$90.1 million p.a.). Environment is again mentioned but with no data.

One of the most compelling figures to emerge from the audit was that 5.7 million hectares of Australia's agricultural and pastoral zone are at risk from dryland salinity. The Audit also notes that this has the potential to rise to 17 million hectares by 2050. There were accompanying maps to illustrate this point even more graphically.

The calculation and validity of these figures has been subject to much debate and there appears to be serious doubts over their accuracy (Pannell, 2004). Regardless of this debate, I raise these figures because they reflect the approach used for justifying calls to act on the salinity threat. They are, again, cost focussed. They may not be exclusively confined to costs to agriculture, but the agricultural losses are far higher than any other.

At the regional level the cost of salinity was central to the regional salinity management planning process employed across Victoria. These plans focussed on building the evidence-base for government investment in salinity management in each region. A centrepiece of this evidence was the benefit:cost analysis. The way in which these benefit:cost ratios were calculated again emphasised the cost focus. Costs were calculated based on the levels of incentives that would need to be paid and the cost of delivering these incentive programs. In some ways even benefits were based on costs since they were calculations of the farm productivity losses that would be avoided.

It was clearly noted in these plans that there are other benefits from salinity management—namely environmental protection. However, the inherent limitations and flaws in the techniques used for calculating non-market values (such as contingent valuation and travel cost methods) lead to the State recommending that they not be considered in the benefit:cost ratio calculations. In the final analysis this benefit:cost ratio, with its inherent dependence on agricultural productivity, became a critical number used to represent each salinity management plan. Ensuring that this ratio was greater than one became a key measure of a successful plan which may have distorted some analyses.

The focus on costs even extends to the programs that work with landowners to manage salinity on farms. By far the most widely used policy tool in salinity management in Victoria has been extension combined with incentive payments. These payments are based on a 'cost-share'. The "cost-sharing principle" recognises that there can be multiple winners including the landholder themselves, so it is fair that the costs are shared between those who benefit (Pannell, 2006), which in most cases is both the landholder and the public.

The cost-share focussed approach may not adequately recognise that all landowners are different, and therefore the benefits (and the costs) they might experience from the same action will vary. In the cost-share based approaches we estimate a cost of building a fence or planting a tree and then further estimate what would be a 'fair' share of those costs. There is no rigorous analysis of the respective types or levels of benefits to either the landholder or the public. The threshold seems to be set at establishing that there is likely to be a benefit to both parties in the transaction.

Again this focus on costs overlooks the other major motivator in any transaction— the benefits. Costs might only be considered high if the benefits are not correspondingly high.

This focus on the cost side of the equation has been inadequate in another way. Despite being focussed on the costs of salinity, the focus was still not specific enough. An important criticism of the approach used in dryland salinity management is that it focuses too strongly on the area of land, without considering what's on that land. The assumption embedded deeply in the whole salinity policy arena has been that the larger the area of land at threat from salinity, the larger the problem. Superficially this is true, but our growing knowledge of

salinity has long been suggesting that this was far too simplistic. What matters more is what's on that land, or in other words, what assets are threatened by salinity. The intersection of the asset in a landscape with the saline watertable is the most critical determinant of whether salinity is, or should be a concern to the community.

### **Understanding saline landscapes**

At the risk of a gross simplification of some extraordinary research achievements in the last 20 years, I would like to suggest that a major learning has been that our landscapes and the associated salinity are not uniform. They do not behave or respond in the same ways across the State.

This is clearly demonstrated in considering the first split in salinity management- that of irrigation driven salinity and dryland salinity. The recognition of the differences between these processes was a bellwether of what we would learn from our early research investments.

It is further developed by the development of the groundwater flow systems (GFS) conceptualization (Walker et al, 2003). This work, supported by the National Dryland Salinity Program (NDSP), has been pivotal in improving our understanding of how salinity develops in a landscape and how we might approach treating it. The characterisation of systems as local (relatively responsive), intermediate and regional (slow to respond if at all) gives us both a temporal and spatial framework. This framework has been adopted across the nation and is now considered part of the base knowledge for everyone from farmers to catchment managers and even policy makers. It is worth noting that the pioneers of this work warned that this information needed to be used with care. As they noted in their 2003 publication 'Groundwater Flow Systems Framework- Essential tools for planning salinity management',

'in such a vast and diverse landscape, ... some catchments might not fit neatly into our catalogue of salinity provinces.'

And

'In some instances we might find that the variability within a groundwater flow system is actually greater than the variability between different systems'

As the originators of this concept warned, we are now learning that in some landscapes this in itself is an over-simplification of the complex natural system. I mention this not to be at all critical of this excellent work but to highlight that this work exemplifies the heterogeneity of our landscapes. Simple characterisations are just that- simple, and they can be used beyond their capability.

In the excellent set of reports that wrapped up the NDSP, this view was very much supported. Among the six key messages from the 10 years of the NDSP was the conclusion that 'there is no one salinity problem: It challenges us to look beyond the traditional policy instruments'.

A related and no less critical finding was that 'profitable options for reversing the trend (in salinity) are lacking, but under development.' This might be thought of as a polite way to warn that the simple solutions that have emerged from applying the GFS model have not delivered widespread results.

The challenge that emerges from this critical research is to match our policy and programs to the reality of the variability of the biophysical systems.

### **Shifting to a benefits focus**

A salinity benefits index has been proposed by the New South Wales Department of Infrastructure, Planning and Natural Resources (Herron et al, 2004). This index aims to measure the relative change in stream salinity predicted for a land-use change or suite of land use changes. This is a positive early step towards developing a more balanced investment decision-making process.

A comprehensive salinity benefits index should include measures of what the potential benefits from salinity management work. These include:

- terrestrial habitat (vegetation quality and quantity) improvements
- water quality improvements
- aquatic habitat improvements
- amenity improvements
- increases in agricultural production

While this range of benefits may not have equal value to all parties involved it is important to provide a means of making the benefits explicit.

The context for a salinity benefits index is also important. Given the comments made earlier in this paper regarding the importance of linking salinity work to other natural resource management work, the use of a salinity benefits index should be in conjunction with a broader environmental benefits index. The salinity aspects of the benefits may be a separate identifiable element within this broader benefits index. This would assist policy maker and program designers to address one of the major shortcoming of current salinity programs- that is, the ability demonstrate that they are managing salinity and doing so in an efficient and effective way.

### **Victoria's evolving approach to salinity management**

There are a few critically influential things that are shaping salinity investment in Victoria. The major factors are:

- The 'easy' wins have been won. This is not intended to imply that achievements to date were easy, but rather that, in relative terms, it was easy to figure out what needed to be done and that it would give results in a relatively short timeframe. This would include tremendous achievements like managing irrigation based on the high and low impact zones and identifying and intervening in highly responsive local groundwater flow systems.
- In some places we can do very little about salinisation. The combination of naturally saline ecosystems, biophysical systems that are slow to respond and a lack of profitable options on salt affected land means that there significant areas of the landscape where the best policy option may be to do nothing.
- Salinity management is not only about agricultural production. While historically the rationale for public investment in salinity management has centred on preserving agricultural land, we now know that, in some specific areas, salinity represents a major threat to native biodiversity (by terrestrial and aquatic). In some areas the threat to biodiversity represents a stronger case for public investment than the threat to agricultural land.
- Prioritising efforts towards high value assets threatened by salinity is critical. These assets need to be identified clearly and will often be very specific local features like a wetland, a reach of a river, a patch of native vegetation or a tract of agricultural land.

As a result of these important factors I am suggesting that there will be several changes in Victoria's approach to salinity management. These shifts can be considered as either strategic or operational.

Strategic shifts are:

1. Salinity investment will be strongly focussed on outcomes. Salinity management is not an end or outcome in itself. Outcomes from salinity management will be in the form of assets protected (for least cost). Indices, such as a salinity benefits index or an environmental benefits index, will be used to measure relative benefits from investment.
2. Salinity investment is part of the broad program of threat management (along with weeds and pest animals for instance). There will not be a 'salinity program' as such.

Investment in a natural resource management program or project will be dependent upon management of the range of threats that may degrade an asset. It will not be sufficient to deal with the salinity that threatens an asset if other threats are not managed.

3. Public investment in dryland salinity management for farm productivity outcomes alone will rarely be justifiable (because of the relatively low value of production from the dryland areas affected by salinity in Victoria) so it must be in context of other outcomes such as water quality and biodiversity.
4. Investment in salinity will be based on the measurable and specific impact on land, water and biodiversity. There are substantial knowledge gaps in some of these areas such as salinity threat to biodiversity (terrestrial and aquatic) and these will need to be addressed.
5. Investment will depend on being able to understanding how the biophysical system will respond to the interventions being proposed. This will mean that in some situations there will be a deliberate decision to not invest.

Operational changes will include:

1. Selection of the policy tool to be applied in a given situation will be based on an analytical framework (like the public-private benefits framework of Pannell 2006) where the public benefit of an action needs to be explicit.
2. Basing on-ground actions on local conditions and local landscapes rather than on a general model of how landscapes are expected to operate.
3. Calculation of benefits indices will become standard practice across environmental programs. A salinity benefits index will be among that set of indices that will influence on-ground investment.

## References

- Government of Victoria (1988) Salt Action. Victoria's strategy for managing the salinity of land and water resources.
- NLWRA (2000) Australian Dryland Salinity Assessment 2000. National Land and Water Resources Audit, Land and Water Australia, January 2001.
- Pannell, D.J. (2006). Using incentives to buy land-use change in agriculture for environmental benefits. Presentation to International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006.
- Pannell, D.J. (2004). Politics and dryland salinity, In: Proceedings of the Conference "Salinity Solutions: Working with Science and Society", 2-5 August 2004, Bendigo, Victoria, Eds: Ridley, A., Feikema, P., Bennet, S., Rogers, M.J., Wilkinson, R. and Hirth, J. (Cooperative Research Centre for Plant-Based Management of Dryland Salinity: Perth).
- Walker, G., Gilfedder, M., Evans R., Dyson, P. and Stauffacher, M. (2003) Groundwater Flow Systems Framework. Murray-Darling Basin Commission Publication 14/03.