

## Key lessons from the NDSP

The recent review of ten years of NDSP research investment found that for policy makers, NDSP tells us:

- there is still much to be done;
- the focus has shifted to include impacts on infrastructure – roads, bridges, buildings and other engineered structures;
- solutions are not easy to find and their impact may not be felt for decades; and
- in some cases we will have to live with salinity and must find the institutional and practical means to make that possible.

More specifically, the review found that six messages emerge that must be faced if salinity is to be managed effectively in future. The messages follow:

### **Salinity costs are significant and rising, resources are limited and hence protection must be strategic**

- Costs of dryland salinity are projected to increase by 60-70 per cent over the next 20 years.
- New findings suggest the best we can hope for from recharge control treatments (which manipulate recharge levels to restore water table equilibrium to slow salinity damage) is a slowing of the rate of future salinisation. Rehabilitation of existing salinity damage is generally not economic owing to the sluggish response of water tables to recharge reductions.
- The focus should be on preventing future damage to high value assets — using cost effective treatments. NDSP has shown it will be imperative to prioritise on-ground investment carefully to prevent wasting money.
- Close attention will need to be paid to the cost-benefit of protecting public versus private assets. The challenge will be to put in place policies that direct the right balance of public and private funds towards meeting public and private benefits.
- Engineering works will be an important and inevitable part of protecting high value assets. Such works should proceed with caution, but knowledge and tools exist that can assist design of such interventions to minimise downstream consequences.

### **Profitable options for reversing the trend are lacking (but under development)**

- The notion that salinity will be comprehensively fixed with targeted revegetation treatments or discharge management should be dispelled. There is no silver bullet. Hopes of finding a clever, low cost solution such as planting a relatively small part of the landscape

with trees in strategic areas no longer hold credibility (of course, a very few exceptions do exist).

- The hydrogeology of the Australian landscape is extremely complex, with multiple processes at work. Thus, there will be parts of the landscape (principally overlying local aquifers) where treatments could yield a net benefit.
- To make major progress in extensive treatments to prevent further salinisation, it will be important to develop solutions that are profitable for those managing the greatest area of land: farmers and graziers. Improved farming options that increase perennial vegetation may remain the most likely means of attaining salinity management responses at the scale needed. Research will be critical.
- Living with salt will also become an inevitable consequence of not having profitable plant-based solutions immediately to hand. Some saltland pasture systems already have proven to be viable, as well as profitable, but these systems need refinement and a mindset change for many farmers.

**There is no one salinity problem: It challenges us to look beyond traditional policy instruments**

- Results from Groundwater Flow System modelling that analyses flow and recharge patterns, confirm that the many forms of salinity expression require a corresponding diversity in response (including no response). NDSP has advocated strategic responses based on prevention, recovery and adaptation (which may have to take into account engineering approaches and living with salt strategies).
- NDSP has developed a range of strategies from analysing responses using the Groundwater Flow System and Flowtube, a rapid catchment appraisal model able to assess the impact of recharge control strategies on water tables. These strategies take into account perennial farming systems, engineering works and productive uses of saline lands.
- The externality concept, whereby the actions of some people impose a net cost on others, may not always be valid for dryland salinity. Hence encouraging landholders to internalise off-farm 'costs' by creating markets in recharge credits and debits may not be appropriate for all areas. For example, 'leaky' farming systems in cleared catchments can cause salinity but they can also provide twice as much water for consumptive use compared with the amount of water available pre-clearing, and can provide significantly more water than low-recharge farming systems. Socio-economic benefits generated from the 'excess' water, and from the 'leaky' farming systems themselves, may outweigh salinity impact costs or the net benefits of recharge control.
- Even for regional and intermediate aquifers, where discharge sites are more remote from recharge areas, the externalities principle does not always hold. This is because in these aquifers the lateral

movement of groundwater tends to be very slow (up to thousands of years), meaning that benefits of recharge control are usually localised — at least in the short term. Again, the gains from internalising off-site costs by defining salinity credits (or recharge rights) and allowing trade between farmers appear to be smaller than previously thought.

**Integrated catchment management must be seen as only one approach to deal with dryland salinity**

- New information on groundwater flow systems highlights the need to develop institutional options other than integrated catchment management in some parts of Australia. In some regions, groundwater flow systems (for example, some regional and intermediate systems) transcend surface catchment boundaries, requiring cross-catchment action to achieve co-ordinated surface and groundwater outcomes. In other regions, salinised land is a higher priority issue than salinised water resources. In these areas, planning and management on a more localised ‘community of common concern’ basis may be more appropriate.
- Tools exist at regional and catchment levels that can help target specific interventions and predict their likely responses. In particular, modelling can support better vegetation management decisions.

**Vegetation management remains the key to managing water resources, although the benefit-cost of revegetating catchments requires careful analysis**

- Salt carried by surface water run-off and saline groundwater discharge into waterways imposes costs on downstream users. In water supply catchments, revegetating cleared land can reduce water yield and increase stream salinity due to less dilution.
- Benefit-cost analysis is needed before revegetation policies are implemented to protect water resources. Where water is scarce, desalination may be more cost-effective (given the problem here is more likely to be a groundwater than surface water problem).
- There is a significant difference in water use between trees (or woody perennials) and grasses (perennial or otherwise). In some parts of the landscape, only trees (or woody perennials) may reduce leakage to required levels. These trees are best placed where leakage contributes significantly to groundwater recharge. In much of the remaining landscape we may need to provide high volumes of clean water. Managing native grasses as low input systems may provide high volumes of clean water and biodiversity benefits as well. These systems need to be explored as much as the more popular perennial-based pasture systems such as lucerne.

**Lack of capacity is an important, but secondary constraint, to managing salinity**

- NDSP findings indicate that lack of skills, management expertise, poor access to information and financial difficulties are by no means the most significant factors in constraining land use change. In the absence of commercially attractive treatment options, it is unrealistic to expect farmers to change their current annual farming systems in favour of perennials or agroforestry. Under these circumstances no amount of capacity-building or training will facilitate change.
- Other constraints for moving forward lie in the lack of clarity of rights and responsibilities, ascribing cause and effect and clearly specifying the benefits and costs of different courses of action.

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