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SALTLAND IN AUSTRALIA
OPPORTUNITIES AND GOALS FOR ACTION
Saltland Opportunities : Profit for our community and the environment

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INTRODUCTION

In 1993 a National Conference on Land Management for Dryland Salinity Control was held in Bendigo, Victoria as part of the launch of the National Dryland Salinity Program established by Land and Water Resources Research and Development Corporation.

At that conference, it was emphasised that salinity was an increasing part of the landscape in Australia and that the results of research and development will not eliminate salinity from the landscape, it will only assist us to manage it (Robertson 1993).

In the early 1990s, salinity was just being recognised as a national issue, rather than a Western Australian focussed problem. It was noted at that time that the area of dryland salinity had apparently trebled over the previous decade, increasing from an estimated 426,000 ha to 1.2 million ha. The increase was due to both an actual increased area of salinity, as well as an increased ability and willingness to look for and recognise it.

By the last PUR\$^L Conference in Western Australia in 1996, the estimated area affected by seepage or dryland salinity nationally was 2.165 million ha, with a prognosis that by 2000 Australia would have 2.495 million ha of dryland salinity (Robertson 1996). Again, the increase in area reported being significantly influenced by greater awareness and more thorough survey as much as by increase in actual salinity.

Again, at the conference, it was concluded that research and development would not solve the salinity problem in the foreseeable future and that Australia would be faced with a large amount of saline land that would have little or no commercial value, and which would have a detrimental impact on environmental values. The challenge would be to develop productive and beneficial uses of this degraded or degrading resource.

The 1996 estimate of 2000 salinity proved to be an under-estimate; the National Land and Water Resources Audit "Australian Dryland Salinity Assessment 2000" report (2001) estimating that there were 3.106 million ha of saline land in 2000. Further, it is expected that the area of secondary saline land in Australia would reach 4.426 million ha by 2020. While definitions of saline land vary, and the definition used in the Land and Water Resources Audit is soil where the salt in the soil profile adversely affects yield, rather than bare salt scalds, the inevitable conclusion is that saline land as a problem, or a resource, will not be limiting in the foreseeable future. Hence, an appropriate framework and support for productive use of and rehabilitation of saline land is critical for the future.

OBJECTIVES FOR PURSL

'Oils ain't Oils', also "Saltland ain't Saltland".

Firstly, salt land has a range of soil types which vary across the nation. In addition, the saltland varies in both concentration of salinity, the degree of waterlogging and the variations in these across seasons. In particular, this interaction of salinity and waterlogging has a very significant effect on the ability of plants to survive and grow. While it is possible to superficially clarify saltland as

severely affected

moderately affected

mildly affected

the variation in its properties and the effects of its location in various agricultural zones demand that approaches and treatments will be very much site specific and easy to use assessment tools are essential.

The community, the government and the farm business may have different perspectives on dealing with saltland, it is important that we work at achieving agreed objectives and an understanding of responsibilities. For discussion purposes I will outline what I think these objectives should be and what the respective roles and responsibilities should be.

SEVERELY AFFECTED SALT LAND

Severely affected or bare saltland has negative environmental impacts, specifically

- enhances runoff and downstream flooding
- accelerates erosion on site resulting in loss of top soil and irreversible damage to soil condition
- transfers sedimentation to waterways
- enhances salt accumulation at the surface and its transport to waterways
- has no biological productivity and no chance of producing useful biomass
- is an ecological desert

On the other hand, revegetating bare saline land stabilises the soil, uses some water in the catchment, reduces runoff and provides some biomass which can be used for food or fibre.

There is, in my view, an overwhelming case for all bare saltland, in the interests of the community and the landholder, to be revegetated with salt tolerant plants. This can be achieved by fencing out and allowing natural colonisation or by establishing halophytic plants. Hence, the objective should be to revegetate all severely affected saltland by 2010. This task will deliver shared benefits to the community and to farming businesses and there is a strong case for shared investment.

MODERATELY AFFECTED SALINE LAND

Generally, moderately affected saline land still is able to produce a vegetative cover, although it may be of little economic value. Hence, it generally is not rapidly eroding, nor producing excessive run off. Technologies exist to produce moderate quantities of biomass on these areas with salt tolerant, and often waterlogging tolerant plants. These plants will

- increase water use on the site
- provide useful biomass which will usually have an economic value
- stabilise the area and reduce rate of salinisation
- provide some ecosystem benefits

As it is easier to revegetate mildly saline land than severely affected saline land, there is a strong case to intervene now rather than later. It is in the interests of both the community and the landholder to revegetate moderately affected saltland with salt/waterlogging tolerant plants. The presence of some economic benefits in addition to environmental benefits suggests a weaker case for community investment than in the case of severely salt affected land. The objective for moderately salt affected land should be to define potential economic and environmental benefits from revegetation and encourage and support the landholder to revegetate these areas.

MILDLY SALINE LAND

Mildly saline land has less impact on the environment than the two other two classes. Its main impacts are

- reduced production of crops and some pasture types
- reduced water use
- it is usually deteriorating to moderately saline land

There are many options for managing mildly saline land, including alternative crop types and varieties and pasture species. In general, the options have a number of positive effects

- increase biomass and economic return
- enhance water use
- reduces rate of salinisation

The objectives of enhancing production from mildly saline land is more in the interests of the landholder than the community. The objective for mildly saline land should be to ensure that technologies with positive economic returns are available for use in the areas and support landholders to adopt them.

While the above is a superficial approach to considering production from saline land, work within the Department of Agriculture is codifying options for managing salt affected land across classes and rainfall zones. (Nulsen R.A. and George R.J. unpublished). These options indicate the technologies that can be applied, the costs and benefits, and will enable the land user and the community to consider responsibilities and cost sharing.

Tables, 1, 2 and 3 outline some of the options for the three classes of saltland across the three rainfall zones of the south west of Western Australia.

These options should be considered and incorporated into the regional plans that will be part of the National Action Plan for Salinity. Those plans should address the details of sites, benefits and costs and cost sharing.

Table 1: Options for managing salt affected land in the >600mm rainfall zone of the South West of Western Australia

Category	Options	Costs and benefits	Comment
Severely affected	Fence, allow saltwater couch to establish.	Low value from grazing; sites stabilised, sediment trapped.	Permanently wet, weed potential, sediment blockage of stream, worms in sheep.
	Surface water management; bedding and mounds.	Installation costs of \$100 - \$500/ha;	Improves cover and allow leaching, may lead to conversion to moderate category.
Moderately affected	Perennial pastures (tall wheat grass-balansa)	Establishment cost of \$100 - \$150/ha; Summer/deferred grazing, nutrition. Yield < 5 T/ha.	Productivity can be higher when combined with legumes (balansa: Farmnote 44/00)
	Trees for watertable management and habitat (salt and waterlogging tolerant e.g. <i>A. saligna</i> ; <i>Casuarina</i>)	Establishment cost up to \$1000/ha. Grazing, firewood, shelter?	Site stabilisation, habitat, amenity
Mildly affected	Perennial pastures (phalaris, tall wheat grass-balansa, kikuyu others)	Planting costs of \$100 - \$150/ha; Summer/deferred grazing, nutrition. Yields > 5 t/ha.	Productivity can be higher when combined with legumes (strawberry clover)
	Plant to Eucalyptus <i>camaldulensis</i> (hybrids), <i>occidentalis</i> and other salt tolerant species.	\$1000/ha for establishment. May give a wood return (10 m ³ MAI) from land with low marginal value.	Markets, distance (external risks), may also stabilise the area, use water, provide a wildlife habitat and improve visual amenity of the farm.
	In areas of low salinity groundwater plant other Eucalyptus (e.g. <i>E grandis</i>).	\$1000/ha for establishment. May give a wood return (15 m ³ MAI) from land with low marginal value.	As above.
	Groundwater drainage (open drainage systems)	\$500+/ha to install. May modify options from saline pastures to conventional pastures.	Benefits depends on permeability and area managed, high variability

Table 2: Options for managing salt affected land in the 600 - 400mm rainfall zone of the South West of Western Australia

Category	Options	Costs and benefits	Comment
Severely affected	Fence, control surface water and let regenerate naturally.	Cost of fencing. Some minor direct economic benefit in long term.	Exclusion of stock, regeneration, reduce erosion, use water and provide wildlife habitat, amenity.
	Establish to 'low input' saltbush/bluebush or similar (no legumes possible).	Establishment costs (excluding fencing and water supplies) of \$100 - \$150/ha. Production likely to be low (~ 1.0 t/ha/yr) and uneconomic?.	Opportunistic grazing; Reduced erosion, some increased water use, some wildlife habitat and improved appearance.
Moderately affected	Control surface water (run-on) to improve site conditions and reduce waterlogging and inundation (on-site)	\$< 100/ha, benefits from improved productivity (below)	Required to prevent inundation and excess waterlogging
	Establish saltland pastures (saltbush-balansa or bluebush systems if not waterlogged).	Establishment cost of \$100 - \$150/ha (not including water supplies and fencing); benefits from meat/wool income; deferred grazing. Return variable but may be \$30 - \$75/ha	
	Revegetation of <i>Eucalyptus</i> (e.g. oil mallee), <i>Casuarina</i> , <i>Melaleuca</i> , and related species	Establishment costs could be >\$500/ha, Benefits (oil mallees, melaleucas) from oil and associated products; few if any timber products, seed; unlikely to be productive (short term).	Break-even option included sale of timber, added grazing. Very few businesses using these options at present (long term; high risk)
	Groundwater drainage options	Installation costs >\$1000/ha. Benefits dependant on salt leaching and extent of watertable lowering	Most applicable in highly permeable soils and high value assets at risk. Safe disposal required.
Mildly affected	Install permanent raised beds and crop with barley and oats.	\$1000/ha; increase crop yields	Gives a cropping option. The fate of raised beds in a grazing situation not yet clear.
	Sandplain and related seeps can be reclaimed using strategic drainage and tree planting.	Up to \$500/ha establishment; each ha established can reclaim 5-10 ha.	Salinity of water determines benefits (stock water, tree water use)
	High risk tree-crops (<i>E. camaldulensis</i> , hybrids), others.	\$1000/ha establishment. longer term tree crops for specialty timbers or fibre	Increased salinity over time, distance, markets
	Groundwater drainage options	\$1000+/ha to install. Benefits depend on salt leaching and extent of watertable lowering	Most applicable in highly permeable soils and high value assets at risk. Safe disposal required.

Table 3: Options for managing salt affected land in the < 400mm rainfall zone of the South West of Western Australia

Category	Options	Costs and benefits	Comment
Severely affected	Fence and let regenerate naturally.	Cost depends on size and shape of saline area. Direct benefit depends on likely harvest of seed etc.	Exclusion of stock and regeneration will reduce erosion, will use manage local water and provide some wildlife habitat, amenity.
	Establish to 'low input' saltbush/bluebush or similar (no legumes possible).	Establishment costs (excluding fencing and water supplies) of \$100 - \$150/ha. Production likely to be low (less than 0.5 t/ha/year). Likely to be uneconomic.	Reduced erosion, some increased water use and some wildlife habitat, amenity.
Moderately affected	Control surface water (run-on) to improve site conditions and reduce waterlogging and inundation (on-site)	\$< 100/ha, benefits from improved productivity (below)	Irregular inundation may threaten site viability, waterlogging control required to prevent severe impacts of salt on plants
	Establish saltland pastures; saltbush-balansa or bluebush (if not significantly waterlogged). Wetter sites may allow puccinellia and/or newer species (<i>Distichilis</i>).	Establishment cost of \$<100 ha; benefits from meat/wool income.	Farmnote 47/200 quotes annual return of \$76/ha.
	Engineering options	\$500 to \$1000+/ha to install. Benefits depend on salt leaching and extent of watertable lowering	Most applicable in highly permeable soils and high value assets at risk. Safe disposal required.
Mildly affected	Sandplain and related seeps can be reclaimed using strategic drainage and tree planting (longer term - salt tolerant? sp.).	\$>1000 to <500/ha establishment; protects 5-10 ha.	Salinity of water determines benefits (stock water, tree water use).

CONCLUSIONS

Undoubtedly there will be ongoing expansion of the area of salt affected land in Australia. While in the short term options to restrict its expansion are limited, we should not stand by and observe saltland expanding and causing economic and environmental damage. We need to intervene and apply known technologies to stabilise the land and enhance its environmental and economic contribution. There is a strong case for all severely affected saline land in Australia to be revegetated in both community and landholder interests. As implementation of this will only give a low return to the farm business, there is a case for community support for managing this land.

In the moderately saline situation, both the community and the landholder benefit and a case can be mounted that landholder benefits should cover costs.

The benefits from managing mildly saline land flow largely to the landholder and its management should be considered in the context of sound business decision making. There is little role for community input into this area, except to assist in developing and evaluating new technologies.

It is important that the community and landholders work together to define the options and the models for intervention and agree on a way forward.

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