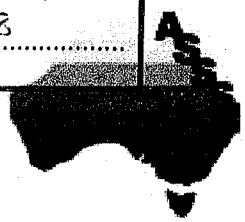
Australian Society of Soil Science Inc (ASSSI)



House of Representatives Inquiry into Coordination of the Science to Combat the Nation's Salinity Problem

Introduction

The *Australian Society of Soil Science Inc. (ASSSI)* believes that soils play a central role in the manifestation of salinity problems. Soils moderate the hydrology of the landscape, they store salt and can be managed in ways that minimize its movement through runoff and deep drainage. Soils can also control the plant species that thrive in regions of water re-charge and discharge in the landscape. *ASSSI* believes a good understanding of soil science and its related disciplines (e.g. hydrology, ecology, plant physiology and genetics) in the Australian environment are crucial tools for solving our country's salinity problems. Our members are nationally and internationally recognised for their work on salinity, and are employed variously by universities, government agencies, as well as by community- and private-sector organisations. Among other things, they engage in research, communication, policy-development and regulation of science related to saline soils. Many of them are professionally accredited through the *Certified Professional Soil Scientist (CPSS)* scheme, and as such, they are in an excellent position to provide input to this *House of Representatives Inquiry*. Information about *ASSSI* is listed on the web: http://www.asssi.asn.au/asssi/flash/.

The President of *ASSSI*, Dr Cameron Grant (University of Adelaide), invited key members of the Society to provide feedback using the *Terms of Reference* from the *Inquiry Information*. Contributors were asked to focus particularly on the coordination of science associated with Australia's salinity programs. All feedback was coordinated by Mr Adrian Webb (Webbnet Land Resource Services Pty Ltd, Queensland) and evaluated by the Federal Council of *ASSSI* prior to submission. Our comments on the *Terms of Reference* conclude with five recommendations in bold-face print as follows:
***ASSSI* recommends...**

The Society thanks the *House of Representatives Standing Committee on Science and Innovation* for giving us the opportunity to provide input to this inquiry, and if its members have questions about our submission, we invite them to contact either the President of *ASSSI*, or the coordinator of this submission (contact details below):

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Term of Reference a)

[Use of the salinity science base and research data (including the development of new scientific, technical and engineering knowledge) in the management, coordination and implementation of salinity programs.]

A. Issues related to Strategic Management

As noted in the explanatory documents for the *Inquiry*, salinity is a complex issue that requires knowledge and understanding of a wide range of sciences reflecting the different components of the landscape and how it is used. *Soil science* and *hydrogeology* are key disciplines that underpin research into the evaluation of management options, and these are affected by:

1. *A critical mass of people* engaged in the disciplines of science, its communication and policy-development.
2. Development and maintenance of corporate knowledge.
3. Collection and maintenance of data.
4. An environment of co-operation (versus competition) among government departments, scientists, communicators, and policy-makers.

1. *A critical mass of people*:

A competent science-base requires a critical mass of people in related disciplines. This has been significantly depleted over the past several years across Australia in our universities, government agencies and in private/community organisations. The depletion of expertise has resulted in a loss of capacity to respond to strategic threats such as the spread of salinity at a time when natural resource scientists are desperately needed to manage these problems.

It is typical of State-government agencies to re-allocate staff to (often disjointed) projects receiving external funds, which last for only between 2 and 5 years. As an example, many of the salinity extension-staff in New South Wales are funded only until the end of 2003. Similarly, the Queensland Department of Natural Resources & Mines has gradually cut its salinity staff to the point where there remain only a handful of scientists for the whole of Queensland. Funding cuts, re-allocation and departure of staff invariably deplete the critical mass of valuable experience and knowledge gained during periods of short-term funding. These cuts highlight our nations' failure to recognize the need for a long-term critical mass of scientists engaged in research to help governments and communities fight salinity.

The development of regional bodies under the *National Action Plan for Salinity and Water Quality (NAPSWQ)* has done little to resolve this problem, particularly because many of the staff employed by regional bodies are extension officers rather than scientists. Because they are employed on short-term contracts (typically < 2 years) they are often inexperienced and must be trained in the broad range of natural resource systems (often across large geographic regions). For this reason, they are often unable to contribute much before their positions are terminated.

A nation-wide casualty of the short-term nature of funding arrangements is often the transfer and application of knowledge and skills in the areas of *salinity risk-assessment* and land-use change. There is a critical shortage of specialists, for example, with skills in landscape analysis and the application of geophysical data (e.g. *airborne radiometrics*, *magnetics*, and *electrical conductivity*). An understanding of

how these data sets can be used to develop frameworks to assess, monitor and evaluate changes to land use is crucial – this requires a long-term commitment to the development of a critical mass of trained people.

2. *Development and maintenance of corporate knowledge:*

A critical mass of trained people has the responsibility to maintain the so-called 'corporate knowledge'. In relation to salinity, much of this is 'grey knowledge' (i.e. that which accumulates over time through research, field observation, and through communication with colleagues and landholders). Data about salinity tells only a small portion of the salinity story. The power of good science lies in its ability to evaluate the relevance of information, to place it in context, and to convert data into useful strategies for making decisions about land management and risk assessment.

3. *Collection and maintenance of data:*

The science to combat salinity is only as rigorous as the data that underpins it. A significant amount of this data has been lost due to declining numbers of research staff caused by regular shifts in government funding. Two key issues concern the maintenance of existing (historic) databases and the ongoing collection of new data. Failure of our nation to recognise the value of key salinity-databases as scientific tools will significantly hinder the science that underpins our dispersed salinity programs. As only one example, the assessment of the condition of our natural resources and land-use-change was severely constrained by the lack of current and historical data used by government agencies in preparing the *National Land & Water Resources Audit* in 2001. The *Audit* in relation to salinity was based upon incomplete, disjointed and partial sets of data, and so in many respects is not very useful.

4. *An environment of co-operation:*

Good science requires an open, sharing environment. The increasingly competitive environment for funding has hampered collaborative research efforts among scientists in CSIRO, State-government departments, and universities (although there are notable exceptions to this, particularly where funding is not a central factor). We must recognise the benefits that result from collaboration among different research bodies to develop skills and data to maintain the long-term knowledge base in the nation's salinity and water quality problems. An environment of co-operation will be essential for the success of, for example, the *NAPSWQ*.

B. Issues related to Delivering Information

All regions of Australia possess unique characteristics that are the major driving factors for salinity (e.g. climate, landscape and hydro-geological characteristics). Information from salinity research therefore needs to be packaged and developed for different regions, and this is not being done properly.

For example, the outputs from the *NAPSWQ* are currently being delivered to regional groups, which have responsibility for planning and coordination of activities. These regional groups, however, have inadequate scientific training and increasingly must rely on expertise, advice and recommendations from CSIRO Land & Water, State agencies, which are decreasingly supported to do this kind of work.

The *National Dryland Salinity Program (NDSP)* has attempted to provide relevant scientific information to regional groups and State agencies, but to date this has been

only variously successful. Some material from the *National Land & Water Resources Audit (NLWRA)* and its on-line version, the *Australian Natural Resources Atlas (ANRA)*, has been incorporated into the communications program of the *NDSP*, but we are aware there is a lot more material (used to prepare the *NLWRA* and *ANRA*) which has NOT been made available. This material, which is highly relevant to managing dryland salinity needs to be uncovered and made accessible. Another important output from the *NDSP* was an evaluation of how data from *airborne geophysics* can help to produce maps of *salinity risk assessment*. A cost-benefit analysis of *airborne geophysical data* is also available, but little of this has been promoted to potential users. An evaluation of the methods currently used to assess and map salinity is being undertaken for the *Department of Agriculture, Fisheries & Forestry Australia* (*AFFA*) and *Environment Australia* (*EA*), and this may provide an objective assessment of the utility of *airborne geophysics*. We recommend these findings be widely promoted when they surface.

C. What about an Australian Centre for Salinity Research?

As indicated in the **Introduction,** combating salinity requires an understanding of soil science, hydrology, ecology, plant physiology and genetics in the Australian environment. However, knowledge is being pursued in only some of these areas, and in those – only partially. For example, most research currently focuses almost exclusively on dryland salinity (i.e. that induced by shallow water tables – where up to 16% of the dryland cropping areas may be affected by 2020). Even here there is a great lack of scientific knowledge on dryland salinity, particularly in relation to how hydrogeological characteristics of the regolith of major landscapes (at an appropriate scale) can be used to manage salinity in whole-catchments. Furthermore, many soils used for cropping and grazing have salt-levels in the root-zone that restrict plant production. This is sometimes called "transient salinity" (Rengasamy 2002; Fitzpatrick et al. 2003), and may affect up to 67% of our cropping areas and cost the Australian farming economy up to $1.3 billion annually.

To deal with these Australia-wide problems, it has been proposed that Australia consider the USDA-ARS model (*United States Salinity Laboratory, USSL)* and develop a *Centre of Excellence in Salinity* that could coordinate efforts to combat salinity nationwide, particularly in relation to the science required. The *CRC for Plant Based Management of Dryland Salinity* currently occupies this role, but its funding needs to be substantially enhanced to cover all the issues that the *USSL* covers. Such an organisation could create links with people conducting related research (e.g. on soil acidification, which is increasingly linked to salinization in Australian landscapes).

***ASSSI* recommends:**

1. **The Commonwealth & State governments consider establishing longer term funding arrangements for salinity programs (eg. ≥ 5 years). This will avoid losing data and corporate knowledge about salinity and its management.**

2. **The Commonwealth government consider establishing an *Australian Centre for Salinity Research (ACSR)* with a mandate along similar lines to that of the USSL. The *ACSR* could organize regionally specific research and management strategies as required across Australia.**

Term of Reference b)

[Linkages between those conducting research and those implementing salinity solutions, including the coordination and dissemination of research and data across jurisdictions and agencies, and to all relevant decision makers (including catchment management bodies and land holders)]

The networks between those undertaking research and those delivering technical support to landholders are generally well developed in southern Australia. The networks occur through conferences, *Community Landcare Coordinators*, catchment groups, special newsletters, web-sites and field days. In northern Australia, however, the linkages are somewhat weaker, and dissemination of information is poorer due to a decline in the number of skilled and experienced staff.

A. The National Dryland Salinity Program has made important contributions

The *Communications Program* of the *NDSP* has played a central role leading R&D activities across Australia. It has been a ready vehicle for linkages to enhance research and share information across State- and agency-boundaries, although much more could have been done by the participating States. If the *NDSP* ceases to operate in its current form, this will almost certainly cripple the transfer of information and skills, because State-based programs are unable to justify such cross-linkages.

The *NDSP* has provided formal and informal opportunities to communicate information to those implementing salinity-management programs. It produced regular newsletters, held workshops, promoted salinity-research reports, sponsored workshops and conferences (e.g. the *Productive Use & Rehabilitation of Saline Lands Conferences*). Collaborative projects with the Murray-Darling Basin Commission (e.g. *TOOLS* for managing dryland salinity, *Groundwater Flow System* development, economic valuation methodologies and estimation of costs of dryland salinity) all provided skills and tools to those implementing dryland salinity management activities. The current thrust of the *Communication Program* of the *NDSP* is an excellent example of effective packaging and delivery of information to industry-, regional-, technical- and local-government-groups that manage dryland salinity across Australia.

B. Readily available (and credible) information is essential

A key requirement for effective linkages across groups is ready access to information on salinity and its management. A common constraint faced by regional groups and government agencies working at property scales is the lack of appropriate-scale data on soil and landscape attributes and *Digital Elevation Models*. Either the available information is too general (wrong scale) for specific regions, or the information is hidden in libraries or it hasn't yet been done – and even if the research has been conducted, it is often out-dated before it sees the light of day. Information based on rigorous science tested in 'real' situations is desperately lacking, and it has been suggested that a series of well documented case studies across representative landscapes and production systems would go a long way toward filling the knowledge-gaps in salinity field-research. An essential element of this field research would be a set of consistent standards for measuring salinity.

ASSSI recommends:

3. **If the *NDSP* is discontinued, the Commonwealth government make provision for its responsibilities to be taken over by either the *CRC for Plant-Based***

***Management of Dryland Salinity*, or the proposed *Australian Centre for Salinity Research* (see above). It is crucial that the best aspects of the *Communications Program* of the *NDSP* are maintained.**

4. **Commonwealth & State governments consider establishing a set of say 20 *Salinity Case Studies* on representative landscapes and production systems across Australia. These would provide a focus local research and extension activities and ensure new research was relevant and applicable.**

Term of Reference c)
[Adequacy of technical & scientific support in applying salinity management options]

Provision and delivery of technical support to implement salinity management strategies varies from State to State. Under the *NAPSWQ*, State-agencies are committed to provide some technical support, but most State-agencies lack the expertise and are themselves dependent on external R&D organizations. With most State-extension services depleted, the networks for delivering information are sparse, and this has reduced the ability of some regional groups to plan and act within reasonable timeframes.

The technical support available for servicing the demands of all the regional groups is considered to be quite inadequate. In fact, there is insufficient technical expertise to even meet the basic requirements outlined in *NAP*-agreements.

It has been suggested that groups of salinity specialists be resourced to offer support to regional groups or to provide specialist advice to the existing technical support services.

***ASSSI* recommends:**

5. **Commonwealth & State government consider setting up a group of *Salinity Specialists* capable of offering advice to regional groups as required. These specialist could be supported either through the current *CRC for Plant-Based Management of Dryland Salinity* or through the proposed *Australian Centre for Salinity Research.***

References cited:

Fitzpatrick RW, Merry RH, Cox JW, Rengasamy P, Davies PJ (2003) Assessment of physico-chemical changes in dryland saline soils when drained or disturbed for developing management options. CSIRO Land & Water, Technical Report 2/03.

Rengasamy P (2002) Transient salinity and subsoil constraints to dryland farming in Australian sodic soils: an overview. *Australian Journal of Experimental Agriculture* **42** 351-361.

Acknowledgements

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