

## **The adequacy of the science base, research needs and funding**

6.1 This chapter addresses three issues:

- the adequacy of the Australian Government's investments in salinity science and the need for further research (paragraphs 6.2-6.30);
- research needs and prioritisation (paragraphs 6.31-6.82); and
- funding for salinity research (paragraphs 6.83-6.128).

### **The need for further salinity research**

6.2 The Committee concluded its overview of the salinity science base in chapter four with the observation that a wealth of salinity research has been undertaken by a wide range of nationally funded agencies and programs. An array of research products and salinity management tools have been developed. The first section of this chapter develops further the Committee's views on the adequacy of the salinity science base.

6.3 Given the volume of salinity research that has been undertaken to date, a few submitters questioned the necessity for significant additional research, and suggested that the immediate priorities are to fund on-ground works and address barriers to the adoption of existing research.

- The Australian Institute of Agricultural Science and Technology (AIAST) argued that:

The production of "information" on the salinity problem is now such that dealing with this information is a problem in itself. The large array of leaflets, booklets, scientific papers, data bases and

maps have now exceeded the capacity of most filing cabinets and arguably have long since overflowed into waste paper baskets. This is wasteful of resources and may be creating a 'switch-off' mentality among the target audience.

It has been much easier to get funding to "do more research" on salinity than to actually deal with the problems of mitigation and rehabilitation. The result is a flood of researched "solutions" but almost no action on the ground.<sup>1</sup>

- The Central Queensland University (CQU) also suggested that there is 'a significant body of research already available and that the major challenge is in the need for a greater focus on real time change in practice and attitude'.<sup>2</sup> For CQU however, the central issue is the barriers to uptake of available research by CMOs and land managers. Many of the latter are said to be 'operating under a dependency and avoidance model, with the expectation that someone else or the Government should pay for, compensate or solve the problem.'<sup>3</sup>
- AgForce argued that 'existing research has identified a range of land management practices which can limit or cease the spread of salinity' and that adequate funding is being provided for salinity research.<sup>4</sup> Rather, the priority is 'implementation of site-specific land management practices' and greater assistance for landholders to manage salinity at the property level.<sup>5</sup>

6.4 Other submitters also suggested that '[t]here is a considerable body of knowledge in existence that can already contribute to some positive landscape change' and that the current level of salinity knowledge is sufficient 'to commence some action now.'<sup>6</sup>

6.5 Notwithstanding the knowledge and management tools that have been developed, a majority of submitters stressed the need for on-going salinity research and identified critical research gaps:

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1 AIAST, *Submission no. 76*, p. 1.

2 CQU, *Submission no. 57*, p. 1.

3 *ibid.*, p. 2.

4 AgForce, *Submission no. 70*, p. 1.

5 *ibid.*

6 National Dryland Salinity Program (NDSP), *Submission no. 35*, p. 8; Western Australian Salinity Research and Development Technical Committee (WA SRDTC), *Submission no. 54*, p. 1.

The level of scientific knowledge is not adequate to address the salinity problem. A continued emphasis on R&D, especially in relation to profitable solutions to dryland salinity is required.<sup>7</sup>

National reports have recognised that there are significant knowledge gaps in our understanding of salinity and its mitigation and remediation. It is recognised that if these knowledge gaps are not addressed now, they will reduce the effectiveness of the \$1.4 billion investment in the National Action Plan for Salinity and Water Quality.<sup>8</sup>

### Imbalance in national salinity science investments and research shortfall

- 6.6 As indicated in the overview provided in chapter two, several submitters argued that the Australian Government's investment in salinity science is imbalanced and neglects research into new salinity management methods and technologies.<sup>9</sup>
- 6.7 The Western Australian Salinity Research and Development Technical Committee (WA SRDTC) argued that the 'portfolio of Commonwealth science investment in salinity needs to be more balanced' and 'the Commonwealth's current investment is not matching the State needs for strategic intervention and developing new systems.'<sup>10</sup>
- 6.8 These conclusions followed the findings of the Western Australian Salinity Taskforce, that effective management of salinity in Western Australia requires large scale land use change and broadacre solutions. The Taskforce report, *Salinity: A New Balance* (2001), recommended that governments should invest in and support major actions on private land by developing new technologies and industries, in addition to supporting

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7 Grains Research and Development Corporation (GRDC), *Submission no. 29*, pp. 1, 10. See also: CSIRO, *Submission no. 42*, p. 1; Mr Kevin Goss (MDBC), *Transcript of Evidence*, 7 November 2003, p. 40; Mr Kevin Goss (NDSP), *Transcript of Evidence*, 3 November 2003, p. 2; Dr Martin Blumenthal (GRDC), *Transcript of Evidence*, 7 November 2003, p. 71; Cooperative Research Centre for Plant-Based Management of Dryland Salinity (CRC PBMDS), *Submission no. 8*, pp. 3-4; Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME), *Exhibit no. 128, Salination models*, p. 3.

8 CRC LEME, *Submission no. 64*, p. 2.

9 See for example: Associate Professor David Pannell, *Submission no. 13*, p. 4; CRC PBMDS, *op. cit.*, pp. 3-5; CSIRO, *loc. cit.*

10 WA SRDTC, *Submission no. 54*, pp. 5, 3.

smaller on-ground works on private land and targeted interventions to protect high-value public assets.<sup>11</sup>

6.9 Specifically, the Taskforce urged the Australian Government to direct investment through the NAP towards targeted protection of public assets (for example, rural towns and threatened high-value conservation areas) and develop new technologies and industries for salinity management, particularly:

- profitable perennial vegetation for recharge areas (for salinity prevention);
- engineering works (for example, in discharge areas or where there is impending loss of high value infrastructure or natural resources);
- salt-tolerant plants to make use of saline land; and
- methods to utilise saline water economically.<sup>12</sup>

6.10 The need to develop options for productive use of salinised land and water follows the research finding that the off-site benefits of establishing perennials can often be long-delayed (by decades or centuries), 'since most of the salinity that has already occurred will not be reversed, and a significant proportion of the prospective salinity is not practically preventable.'<sup>13</sup>

6.11 Accordingly, the Taskforce recommended:

a better balance be struck between capacity building (strongly supported in the NAP and NHT programs), strategic intervention to save public assets (for example, rural towns, biodiversity and water resources) and developing new land and water use systems (for example, woody and herbaceous perennials, adaptation to salinity, innovative engineering solutions).<sup>14</sup>

6.12 Differences in the geology and landscape characteristics between the east and west of the continent may require distinct salinity management approaches and dictate different research and development (R&D) priorities.

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11 Mr Tim Sparks (Western Australian Department of the Environment), *Exhibit no. 111, Salinity: A New Balance*, pp. 15-17.

12 *ibid.*, p. 16. These research priorities were also identified by CRC PBMDs, *op. cit.*, p. 3, and Associate Professor David Pannell, *loc. cit.*

13 Associate Professor David Pannell, *op. cit.*, p. 3.

14 WA SRDTC, *op. cit.*, p. 3.

6.13 The Australian Government Departments of Agriculture, Fisheries and Forestry (DAFF), and the Environment and Heritage (DEH) argued that technological developments, particularly airborne electromagnetic (AEM) salinity mapping, combined with the heterogeneity of the geology and the localised nature of salt, mean that targeted interventions are likely to be successful in combating salinity in the east of the continent (that is, the Murray-Darling Basin). Mr Mike Lee of DAFF stated:

particularly on the eastern side of the continent, the salt in the landscape is very spatially distinct ... So interventions, firstly, need to be highly targeted and closely targeted, and the overall picture is much more optimistic than we thought.<sup>15</sup>

6.14 The Bureau of Rural Sciences (BRS) argued that the results of its mapping in ten catchments in eastern Australia demonstrated:

Salt is much more localised in the landscape than previously thought and ... specific management interventions can be tailored to individual situations, substantially reducing the cost of managing salinity and minimising potential disruption to agriculture.<sup>16</sup>

6.15 For example, the BRS predicted that land use change on only 17 per cent of the Billabung catchment will achieve a 50 per cent reduction in salt exported to the Murrumbidgee River.<sup>17</sup>

6.16 In contrast, with a far more homogenous geology and different landscape characteristics, it was argued that targeted interventions will not achieve significant and widespread improvements in salinisation in the west of the continent.<sup>18</sup> In Western Australia, management actions are said to be required on a large scale—and perhaps elsewhere in the country. The Western Australian Salinity Taskforce concluded:

In recent years, we have lost earlier hopes that large-scale preventative impacts on salinity could be achieved by clever

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15 Mr Mike Lee (DAFF), *Transcript of Evidence*, 7 November 2003, p. 57.

16 DAFF and DEH, *Submission no. 72.1*, p. 1

17 *ibid.*, p. 4.

18 Evidence of the distinctiveness of the geology and landscape characteristics of Western Australia was presented in chapter three. Dr Don McFarlane (WA SRDTC), *Transcript of Evidence*, 12 November 2003, pp. 47-48: 'the flow of the major drainage systems in the wheat belt is very poor. The gradient of them is often less than one in 1 000 and sometimes it is one in 1 500 ... we also have a very thick layer of clay which is able to accumulate very large quantities of salt.'

selection and placement of relatively small-scale treatments, or by changes to the management of traditional annual crops and pastures.

The new scientific consensus is that large proportions of land in threatened catchments would need to be revegetated with deep-rooted perennial plants for at least part of the time.

Even with massive changes in land use, the long-run potential to prevent salinity is believed to be limited in many catchments of Western Australia, particularly in low rainfall areas. This is because the catchments in low rainfall areas tend to be larger, flatter and less well drained than elsewhere.<sup>19</sup>

- 6.17 The *National Dryland Salinity Program* (NDSP) reached similar conclusions. While noting that some exceptions do exist, a key message from the Program's research efforts was that:

The notion that salinity will be comprehensively fixed with targeted revegetation treatments ... 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.<sup>20</sup>

- 6.18 The need for large scale actions explains the calls for profitable, plant-based management options that are available for widespread adoption, and for new industry development to ensure adoption on a large enough scale. However, a number of submitters suggested that there are currently very few profitable perennial systems:

- CSIRO Land and Water stated:

there is a limited range of robust, profitable farming biological systems that will reduce recharge to the extent required to make a difference to the salinity problem, that are commercial and that will make sufficient income to generate a healthy rural community. What we need are solutions that address the cause of the problem in land uses that make money. We do not have very many and we do not have enough research directed towards finding them.<sup>21</sup>

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19 Mr Tim Sparks (Western Australian Department of the Environment), *Exhibit no. 111, op. cit.*, p. 23.

20 NDSP, *Submission 35.1*, pp. 1-2.

21 Dr John Williams (CSIRO), *Transcript of Evidence*, 7 November 2003, pp. 82-83.

- Similarly, the Cooperative Research Centre for Plant-Based Management of Dryland Salinity (CRC PBMDs), told the Committee:

there are no perennial pasture plants for the wheat belt that are sufficiently attractive for widespread adoption. Similarly, farming systems involving agroforestry are not well understood.<sup>22</sup>

- Presenting a landholder's perspective, the Western Australian Farmers' Federation stated:

we do not have a big array yet of options ... particularly in saltland pastures, to be able to make a big impact on the problem and turn around some of our saltland—which is of no commercial value to us—into something productive.<sup>23</sup>

6.19 However, the WA SRDTC asserted that CMOs are:

currently being encouraged to deliver salinity outcomes that could not be attained without sending many landholders bankrupt due to the lack of feasible economic options which compete with currently profitable industries and landuses.<sup>24</sup>

6.20 Despite the lack of profitable solutions to salinity, it was submitted that the 'paucity of current profitable options reflects an absence of past research in this area, rather than fundamental barriers to success.'<sup>25</sup> It was also noted that '[t]here are a number of promising vegetation and engineering options' but these 'require long-term investment before they can be widely adopted.'<sup>26</sup>

6.21 Moreover, submitters argued that national salinity programs have not adequately supported this R&D activity. For example, the CRC PBMDs argued that 'research of this type has received minimal funding from the Commonwealth's NRM programs ... and so far none at all from the NAP', and that this 'reflects poorly on the capacity of certain Commonwealth agencies to assess the real needs for salinity management.'<sup>27</sup>

6.22 A similar argument was advanced by the WA SRDTC:

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22 Professor Philip Cocks (CRC PBMDs), *Transcript of Evidence*, 13 November 2003, p. 15.

23 Mr Colin Nicholl (WAFF), *Transcript of Evidence*, 13 November 2003, p. 5.

24 WA SRDTC, *op. cit.*, p. 2.

25 CRC PBMDs, *op. cit.*, p. 4.

26 WA SRDTC, *loc. cit.*

27 CRC PBMDs, *op. cit.*, p. 4.

The current Commonwealth provision of knowledge is focussed on mapping and monitoring groundwater systems and salinity hazards at the expense of ... developing new technologies and systems, engineering systems and new industries for saline resources.<sup>28</sup>

- 6.23 Other submitters agreed. For example, Engineers Australia criticised current Federal directions in salinity research as 'dominated by a focus on mapping, monitoring, evaluation and capacity building'.<sup>29</sup> Associate Professor David Pannell argued that the emphasis in the NAP on airborne geophysics to assist with regional planning:

reflected a failure to understand the real factors limiting large-scale land-use change. It is not lack of such information, but lack of profitable land-use options and systems that can be widely adopted by land managers to manage groundwater recharge. Airborne geophysics has an important role to play in some situations, but its application needs to be carefully considered and targeted.<sup>30</sup>

- 6.24 In the priority research areas identified by these submitters, several national agencies, such as BRS and Geoscience Australia, are said to be inactive.<sup>31</sup>
- 6.25 The CRC PBMS recommended that, in addition to supporting salinity mapping, the Australian Government adequately resource salinity research focussed on developing new land and water use systems, such as those listed above. The Federal Government was also urged to encourage industry groups, notably the Research and Development Corporations, to take a leading role in supporting research activity of this type.<sup>32</sup>
- 6.26 Similarly, the Australian Conservation Foundation (ACF) argued that the Australian Government should maintain its support for quantifying processes, but also substantially upgrade its support for research 'focussed on developing technologies and tools for salinity prevention and

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28 WA SRDTC, *op. cit.*, p. 5.

29 Engineers Australia, *op. cit.*, p. 2.

30 Associate Professor David Pannell, *loc. cit.* Murray Irrigation Ltd (*Submission no. 27*, p. 3) expressed a similar view and urged that rather than continue to emphasise mapping techniques, 'salinity research needs to devote the majority of research effort into innovation that improves techniques to prevent or control salinity.'

31 WA SRDTC, *op. cit.*, p. 6.

32 CRC PBMS, *op. cit.*, p. 4.



management'.<sup>33</sup> It was argued that 'the Commonwealth's investments in salinity management are unlikely to achieve more than small-scale impacts unless backed up by R&D for profitable new technologies for salinity management.'<sup>34</sup>

- 6.27 Notwithstanding the weight of evidence to the contrary, DAFF argued that, in many cases, the tools to address salinity are in fact well researched and that the key issue remains where to make targeted interventions in the landscape.<sup>35</sup> However, DAFF conceded that whereas in eastern Australia salt stores are localised, '[t]hat is very different from Western Australia ... where there are much larger homogenous systems and landscape salt. But things are looking up for the eastern seaboard.'<sup>36</sup>
- 6.28 In essence, contrasting views emerged in the evidence: between the efficacy of targeted interventions (at least in eastern Australia) aided by the use of mapping technologies, versus calls for broadacre solutions supported by the development of new technologies and industries, and deployment of engineering works.
- 6.29 The Committee notes that at least 70 per cent of the nation's salinity problem occurs in Western Australia. Requests from this State, and a range of other submitters, are for a 'new balance' in the Australian Government's investment towards developing new land and water use systems, and strategic interventions to save key public assets such as rural towns. While welcoming the potential for targeted salinity management in some locations, assisted by mapping technologies, the Committee urges that these research priorities be given greater support in Australian Government funded salinity R&D programs and science investments. The Committee examines further the evidence in relation to mapping technologies in chapter seven.

#### **Recommendation 4**

- 6.30 **The Committee recommends that the Australian Government give greater emphasis through its investments in salinity science to develop new, economically viable land and water use systems.**

33 ACF, *Submission no. 62*, p. 4.

34 *ibid.*

35 Mr Mike Lee (DAFF), *Transcript of Evidence*, 7 November 2003, p. 62.

36 *ibid.*

## Salinity research needs and prioritisation

*The central R&D challenge is to develop farming systems that reduce recharge and maintain profits; as well as developing profitable farming systems that incorporate salt-affected land and water.<sup>37</sup>*

- 6.31 Although the Committee's inquiry was concerned with national salinity science coordination and the terms of reference did not seek comment on research priorities, approximately 70 submitters identified specific research needs. The array of salinity research needs included:<sup>38</sup>
- additional basic research, including into the sources of salt and salinisation processes;<sup>39</sup>
  - improvements in groundwater mapping and monitoring methods that can be used and responded to by land managers and CMOs;<sup>40</sup>
  - improvements in modelling techniques to provide more useful guidance on targeted responses, rather than widespread landscape change responses;<sup>41</sup>
  - better understanding of the effectiveness of different engineering solutions for treating rising groundwater levels, and improving design

37 GRDC, *Exhibit no. 79, Economic Evaluation of Salinity Management Options in Cropping Regions of Australia*, p. v.

38 NDSP, *Exhibit no. 134, National Priorities for Salinity Research and Development*, pp. 10-11. See also CSIRO, *op. cit.*, p. 6: Drawing on its own research findings, which were summarised in chapter four, CSIRO have identified nine key science needs to address salinity, several of which are incorporated in the list provided.

39 See for example: Dr Jerzy Jankowski, *Submission no. 60*, pp. 2-3; Associate Professor Robert Creelman, *Submission no. 16*, pp. 1-2; Mr Kim Wright (Centre for Salinity Assessment and Management), *Transcript of Evidence*, 29 October 2003, p. 60; Dr Mike Dyall-Smith, *Submission no. 77*, p. 1.

40 See for example: AgForce, *Submission no. 70*, pp. 1-2; Mrs Margaret Thompson, *Submission no. 53*, p. 1; Dr Baden Williams, *Submission no. 1*, pp. 4-5; NSW Farmers' Association (NSW FA), *Submission no. 45*, p. 3; Institute of Public Affairs (IPA), *Submission no. 41*, p. 2; Australian Salinity Action Network (ASAN), *Submission no. 39*, p. 5; Agrilink Holdings Pty Ltd, *Submission no. 25*, pp. 6-9; The Pelham Group, *Submission no. 11*, pp. 3-4; Centre for Salinity Assessment and Management (CSAM), *Submission no. 19*, p. 1; Chinchilla Shire Council, *Submission no. 47*, p. 4; Fitzroy Basin Association, *Submission no. 48*, p. 2; CRC LEME, *Submission no. 64*, pp. 2, 6; Australian Society of Soil Science Inc., *Submission no. 68*, p. 3.

41 See for example: Lower Murray-Darling Catchment Management Board, *Submission no. 2*, p. 2; CSAM, *op. cit.*, p. 3; NSW FA, *op. cit.*, p. 2; Chinchilla Shire Council, *op. cit.*, p. 4; Murray-Darling Basin Commission (MDBC), *Submission no. 51*, p. 10; Murrumbidgee Irrigation Ltd, *Submission no. 52*, p. 4.

of future engineering options (for example, to deal with saline effluent from groundwater pumping);<sup>42</sup>

- better understanding of the impact of salinity on freshwater environments, biodiversity and the relationship between landscape and waterscape processes;<sup>43</sup>
- intensification of urban salinity research, particularly pertaining to assessment and risk evaluation, options for treatment and management and development of appropriate building codes;<sup>44</sup>
- intensification of research into vegetative solutions, including perennial plant-based systems for recharge and discharge systems;<sup>45</sup>
- development of technologies for making productive use of salinised land and water resources, with specific emphasis on generating marketable products and industries;<sup>46</sup>
- combined systems research into multiple benefits from perennial vegetation, in particular biodiversity, carbon sequestration and aquatic systems;<sup>47</sup>

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- 42 See for example: Australian Institute of Agricultural Science and Technology (AIAST), *Submission no. 76*, p. 9; Associate Professor David Pannell, *op. cit.*, p. 4; Murdoch University, *Submission no. 24*, p. 9; CSIRO, *op. cit.*, p. 6; Grains Research and Development Corporation (GRDC), *Submission no. 29*, p. 1; Dr John Williams (CSIRO), *Transcript of Evidence*, 7 November 2003, p. 83; Mr Colin Nicholl (Western Australian Farmers Federation), *Transcript of Evidence*, 13 November 2003, p. 9.
- 43 See for example: Deakin University, *Submission no. 17*, pp. 1-2; Cooperative Research Centre for Freshwater Ecology, *Submission no. 26*, pp. 3-4; NDSP, *op. cit.*, p. 9; Dr Ben Kefford, *Submission no. 33*, p. 1-3; Australian Conservation Foundation (ACF), *Submission no. 62*, p. 3; Dr John Williams (CSIRO), *Transcript of Evidence*, 7 November 2003, p. 83; Mr Michael Watts (ACF), *Transcript of Evidence*, 31 October 2003, pp. 21-22.
- 44 See for example: New South Wales Government, *Submission no. 61*, p. 9; Western Sydney Regional Organisation of Councils (WSROC), *Submission no. 20*, p. 6; Hawkesbury-Nepean Catchment Management Board (HNCMB), *Submission no. 21*, p. 1; Mr Colin Kandan-Smith (WSROC), *Transcript of Evidence*, 29 October 2003, p. 15; Mr Bryan Short (Wagga Wagga City Council), *Transcript of Evidence*, 30 October 2003, p. 28; Mr Rex Edmondson (WA SRDTC), *Transcript of Evidence*, 12 November 2003, p. 45; Mr Michael Watts (ACF), *Transcript of Evidence*, 31 October 2003, pp. 30-31.
- 45 See for example: Forest Products Commission of Western Australia (FPCWA), *Submission no. 63*, pp. 1, 6; Associate Professor David Pannell, *op. cit.*, p. 4; CRC PBMDs, *op. cit.*, p. 4; Murrumbidgee Irrigation Ltd, *op. cit.*, p. 1; Mr Clive Malcolm, *Submission no. 78*, p. 1; GRDC, *op. cit.*, p. 1; Chinchilla Shire Council, *op. cit.*, p. 8; Namoi Catchment Management Board, *Submission no. 65*, p. 1.
- 46 See for example: WA SRDTC, *op. cit.*, p. 4; AIAST, *op. cit.*, pp. 8-9; CSIRO, *op. cit.*, p. 6; NSW Government, *op. cit.*, p. 11.
- 47 See for example: FPCWA, *op. cit.*, p. 4; CSIRO, *op. cit.*, pp. 5-6.

- socio-economic analysis to improve resource allocation and better understand constraints to the widespread adoption of technologies;<sup>48</sup>
- developing innovative policy instruments to deal with the diversity of management regimes required to address salinity;<sup>49</sup> and
- encouraging the emergence of new industries and environmental management system frameworks for existing industries that will increase the adoption of salinity management technologies as they develop.<sup>50</sup>

6.32 The Committee notes that the Australian and state governments have made commitments under the NAP to fund projects which address some of the research needs identified above, such as market based instruments and engineering options:

- In December 2003 the Natural Resource Management Ministerial Council announced a \$360 000 project for CSIRO to establish a pilot trading and offset scheme to address dryland salinity in Victoria's Avoca-Loddon-Campaspe region. The project is to be funded under the first round of a \$5 million *National Market Based Instruments Pilots Program*.<sup>51</sup>
- In December 2003, Federal and Western Australian ministers announced the allocation of \$2 million to identify the most effective engineering options for salinity management. The projects will be funded under the *Engineering Evaluation Initiative (EEI)* to be established

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48 See for example: CRC PBMDs, *op. cit.*, p. 6; Murdoch University, *op. cit.*, pp. 2-3; HNCMB, *op. cit.*, p. 2; ASAN, *op. cit.*, p. 8; Western Australian Farmers Federation, *Submission no. 36*, p. 2; Murrumbidgee Catchment Management Board, *Submission no. 43*, p. 2; Saltgrow Pty Ltd., *Submission no. 71*; Mr Michael Watts (ACF), *Transcript of Evidence*, 31 October 2003, p. 21.

49 See for example: CSIRO, *op. cit.*, p. 6; Grain Growers Association Ltd, *Submission no. 44*, pp. 1, 3; Murdoch University, *op. cit.*, p. 3; GRDC, *op. cit.*, p. 12; Murrumbidgee Irrigation Ltd, *op. cit.*, p. 3; AgForce, *op. cit.*, p. 2; Saltgrow, *op. cit.*, p. 1; Dr John Williams (CSIRO), *Transcript of Evidence*, 7 November 2003, p. 83.

50 See for example: Saltgrow Pty Ltd, *op. cit.*, p. 6; Associate Professor David Pannell, *op. cit.*, pp. 2-3; FPCWA, *loc. cit.*; Natural Resource Intelligence Pty Ltd, *Submission no. 32*, pp. 11-12; Dr Don McFarlane (WA SRDTC), *Transcript of Evidence*, 12 November 2003, p. 42; Mr Kevin Goss (MDBC), *Transcript of Evidence*, 7 November 2003, pp. 39-40.

51 Joint statement by the Australian Government Minister for Agriculture, Fisheries and Forestry, The Hon. Warren Truss MP and Australian Government Minister for the Environment, The Hon. Dr David Kemp MP, issued 8 December 2003. Media release available online, DAFF, Canberra, viewed 16 December 2003, <[www.affa.gov.au/ministers/truss/releases/03/03363wtj.html](http://www.affa.gov.au/ministers/truss/releases/03/03363wtj.html)>.

in the Western Australian Wheat Belt. The EEI is a priority project under the NAP.<sup>52</sup>

## Research prioritisation

- 6.33 The Committee recognises that prioritising the array of research needs for future R&D investment is the responsibility of CMOs and technical committees at the state and national levels, such as the Science and Information Working Group of the Natural Resource Management Standing Committee, and others described in the previous chapter.<sup>53</sup>
- 6.34 The NDSP has conducted a detailed analysis of the research needs identified in the Committee's submissions and factored these into the development of an R&D priority set, which also synthesises the research priorities identified in state salinity strategies and other reviews.<sup>54</sup> However, the Committee also received some evidence relating to the process of establishing research priorities in the new NRM context.
- 6.35 The NDSP noted that the emphasis in the NAP for on-ground works investments through regional groups has marked a 'major shift in the research supply-demand relationship':<sup>55</sup>

Until recent times research priorities for dealing with salinity were largely determined by research, management and regulatory agencies, not always in consultation with affected members of the community. Since the advent of the NAP, it is now the community that has the purchasing power to determine research priorities specific to individual regional circumstances ... such an approach

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52 Joint statement by the Australian Government Minister for Agriculture, Fisheries and Forestry, The Hon. Warren Truss MP, Australian Government Minister for the Environment, The Hon. Dr David Kemp MP, Western Australian Minister for Agriculture, Kim Chance, and Western Australian Minister for Environment, Dr Judy Edwards, issued 8 December 2003. Media release available online, DAFF, Canberra, viewed 16 December 2003, <[www.affa.gov.au/ministers/truss/releases/03/03362wtj.html](http://www.affa.gov.au/ministers/truss/releases/03/03362wtj.html)>.

53 See for example: Glenelg Hopkins Catchment Management Authority, *Exhibit no. 21, Future Directions for Integrated Catchment Research in South West Victoria*; NSW Government, *Exhibit no. 43, A Strategic Framework for Salinity Research and Development in NSW*, and *Exhibit no. 44, NSW Salinity R&D Investment Portfolio*.

54 NDSP, *Exhibit no. 134, op. cit.*, pp. 16-28. See also: NDSP, 'Salinity R&D priorities feature in House of Representatives Inquiry', *Focus on Salt*, issue 30, March 2004, pp. 1, 6. Available on the NDSP web site, viewed 12 April 2004, <[www.ndsp.gov.au/15\\_publications/20\\_focus\\_on\\_salt/focus\\_on\\_salt.html](http://www.ndsp.gov.au/15_publications/20_focus_on_salt/focus_on_salt.html)>.

55 *ibid.*, p. 1.

should enhance the ownership of the results of purchased research and, in theory, increase the likelihood of adoption of the results.<sup>56</sup>

6.36 Given the need for research activities to be directed and conducted at appropriate levels—catchment, state, Murray-Darling Basin and national—CSIRO proposed a two-stage process to identify research priorities and develop a salinity research portfolio, as follows.

■ Bottom-up analyses of research needs:

The investment strategy of each CMO requires some research and investigation to support the regional plan. There is a need at the state and national levels to provide a ‘bottom-up’ analysis of the research needs to support national program implementation. CSIRO emphasised that not all the answers are currently available. Some identified research needs are likely to involve an application of existing knowledge and techniques. Some research needs will be regionally specific, while others will have some generic similarities with other regions.

Developing programs that are adequately regionally specific yet having broad similarities across state borders is likely to be a challenge. It was suggested that programs such as the *Sustainable Grazing Systems for Saline Land and Commercial Environmental Forestry* are good examples of the way forward in this regard.<sup>57</sup>

■ Combining top-down with bottom-up analyses:

CSIRO argued that merely aggregating from the regional plans will not necessarily allow new scientific knowledge or techniques to be incorporated into management practice, nor will it satisfy national objectives. Thus, in addition to the ‘bottom-up’ approach, there is a need for an additional process that canvasses new ideas or emerging technologies, and proceeds to phase in an appropriate implementation. There is also a need to incorporate lessons learnt from past studies and adopt a national perspective.<sup>58</sup>

6.37 CSIRO noted that it is not clear which agency or organisation could conduct this analysis. However, submitters suggested that ‘science users’ ought to be consulted or represented on research prioritisation

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56 *ibid.*

57 CSIRO, *op. cit.*, p. 12.

58 *ibid.*, p. 13.

committees, to ensure an appropriate balance between basic research and the development of practical tools that can be used by land managers.<sup>59</sup>

- 6.38 A similar prioritisation process was proposed by Murrumbidgee Irrigation, which suggested that ‘a top-down approach’ be ‘complemented by a bottom-up approach at local and regional levels.’<sup>60</sup> The Committee’s recommendation, in chapter four, for an audit of existing salinity research may assist in the process of accurately identifying research gaps and establishing priorities at the appropriate levels.
- 6.39 Other than the matters identified in the first section of this chapter, the Committee does not wish to propose a detailed list of salinity R&D priorities. However, issues associated with new industry development, urban salinity and, more generally, the importance of multidisciplinary research are matters the Committee addresses in the sections which follow.

### New industry development

- 6.40 Submitters who emphasised the need for substantial land use change and establishment of perennial vegetation on a large scale also urged that R&D into profitable salinity management methods:
- should be part of a strategy of industry development to complement the role of regional NRM bodies ... There seems to be no prospect of adoption of perennials on anything approaching the desired scale without outstanding success from industry development efforts.<sup>61</sup>
- 6.41 The example held up to the Committee is the attempt at developing mallee eucalypts as a large-scale crop for the Wheat Belt in Western Australia:
- if you explore the process by which that experiment has been put together you will find ... a case history, in how R&D, combined

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59 FPCWA, *op. cit.*, pp. 2, 7; Lower Murray Darling Catchment Management Board, *Submission no. 2*, p. 3; Murray Irrigation Ltd, *Submission no. 27*, p. 4.

60 Murrumbidgee Irrigation, *Submission 52*, p. 1. The GRDC (*Exhibit no. 79, op. cit.*, p. xiii) proposes nine criteria for prioritising R&D for salinity management in cropping regions.

61 Associate Professor David Pannell, *op. cit.*, p. 3. See also: Dr Don McFarlane (WA SRDTC), *Transcript of Evidence*, 12 November 2003, pp. 42-43; AIAST, *op. cit.*, pp. 8-9; CSIRO, *Exhibit no. 80, Dryland Salinisation: A Challenge for Land and Water Management in the Australian Landscape*, p. 470.

with very smart thinking around market driven industry development, is a blueprint to follow, regardless of the outcome.<sup>62</sup>

6.42 Efforts to develop tree crop industries in Western Australia have been underpinned by a recognition that while reforestation is an effective preventative treatment for salinity (that is, trees can effectively reduce groundwater recharge), these industries are most likely to succeed if the new forests or tree crops represent a commercially viable use of the land. A consistent finding of reports into salinity in Western Australia, including the Salinity Taskforce Report cited earlier in this chapter, has been that:

the State must develop commercial perennial crops for agriculture to be able to moderate the salinity problem. These reports indicate that commercial perennial crops will be the only effective means to reduce groundwater recharge on the necessary scale.<sup>63</sup>

6.43 This understanding saw the successful development by the Western Australian Department of Conservation and Land Management (CALM) of a commercial bluegum industry in the higher rainfall (>600 mm/year) zone of the lower south west of Western Australia from the late 1980s.<sup>64</sup>

6.44 From the early 1990s, CALM began developing 'a commercially viable woody crop for the extensive low rainfall (<500 mm/year) wheatbelt region, where potential damage to natural resources and infrastructure from salinity is greatest.'<sup>65</sup> Having evaluated the potential of a range of low rainfall crops, CALM invested in the commercial development of mallee eucalypts. Since 1993, CALM has invested more than \$6 million in mallee industry development, 'based on recognition that in the absence of any existing commercial wheatbelt crop a substantial effort was required to create one.'<sup>66</sup>

6.45 CALM involved all interested parties, notably farmer representatives who formed an incorporated industry association, the Oil Mallee Association, which then assumed control of industry development in 1997. The Association subsequently formed the Oil Mallee Company (OMC) to

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62 Mr Kevin Goss (MDBC), *Transcript of Evidence*, 7 November 2003, p. 35. See also: Professor Philip Cocks (CRC PBMDs), *Transcript of Evidence*, 13 November 2003, p. 19; Mr Kevin Goss (NDSP), *Transcript of Evidence*, 3 November 2003, p. 19.

63 Mr John Bartle (Western Australian Department of Conservation and Land Management), *Exhibit no. 87, Development of mallee as a large-scale crop for the wheatbelt of WA*, p. 3.

64 *ibid.*, p. 2.

65 *ibid.*

66 *ibid.*, p. 4.



facilitate development of commercial operations. The majority of investment (in excess of \$10 million) has come from some 900 growers, who have now planted in excess of 21 million mallee trees.<sup>67</sup>

- 6.46 In 1998, the OMC attracted support from Western Power Corporation and the Rural Industries RDC to investigate the feasibility of new mallee processing technologies. A demonstration scale facility (20 000 tonnes of mallee biomass/year) has now been constructed to test the commercial viability of integrated processing for the concurrent production of eucalyptus oil (more precisely, cineole, which is a major constituent of eucalyptus oil), activated carbon and electricity. The feasibility study concluded that:

the venture could sell products at prices that would open large market volume and strong revenues as well as pay growers a price for mallee feedstock competitive with other land-use options.

Using cautious assumptions of market prospects it was estimated that some 9 full-scale plants (100 000 tonnes/year) could be constructed in the WA wheatbelt.<sup>68</sup>

- 6.47 The Committee inspected the demonstration facility at Narrogin (depicted in photograph 6.1), which was substantially complete but non-operational and in need of additional finance. Nonetheless, the CRC PBMDs expressed enthusiasm for the venture and argued that similar facilities would be applicable in eastern Australia:

That sort of plant, multiplied 10 times in the Western Australian wheat belt, would make a very significant contribution to renewable energy, would have a significant effect on regional communities by providing employment and would address the salinity problem. Furthermore, I think that particular technology is more appropriate to eastern Australia where you have substantial regional communities than ... here in Western Australia where most of our regional communities are pretty small and do not require that sort of decentralised generation of power in the same kind of way.<sup>69</sup>

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67 *ibid.*, pp. 3, 4.

68 *ibid.*, p. 1.

69 Professor Philip Cocks (CRC PBMDs), *Transcript of Evidence*, 13 November 2003, pp. 19-20.

**Photograph 6.1** Use of mallee eucalypts as a preventative treatment for salinity, and for concurrent production of eucalyptus oil, activated carbon and electricity in a bioenergy (demonstration) plant constructed by Western Power Corporation, at Narrogin in Western Australia



- 6.48 Despite the work that is still necessary for the production systems to compete effectively in world markets (for the activated carbon and cineole), the MDBC stated that the oil mallee experiment ‘is a very good lesson in sustained R&D and industry development.’<sup>70</sup>
- 6.49 The MDBC conceded that supporting industry experiments of this sort ‘is inherently risky, and probably four out of five of these things might not get up. But one will, and that is an approach that we urge you to follow.’<sup>71</sup> Specifically, the MDBC urged the Australian Government to show leadership and innovation by encouraging investment driven forestry in the Basin, which needs to be ‘on a scale that a regional catchment authority really cannot deal with.’<sup>72</sup>

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70 Mr Kevin Goss (MDBC), *Transcript of Evidence*, 7 November 2003, p. 35.

71 *ibid.*

72 *ibid.*, p. 39.

6.50 A similar argument was advanced by Saltgrow, a company engaged in commercialising salt-tolerant eucalypt hybrids. It was argued that land use change at the scale required to significantly impact on salinity and deliver new, sustainable land use industries will require a radical change from current land use practices. Notwithstanding the potential of commercially-driven tree production systems to enhance farm profitability, Saltgrow expressed concern at the ‘failure of the catchment management planning process to embrace and seriously promote the adoption of commercially driven agroforestry despite extensive rhetoric of its benefits’.<sup>73</sup>

Without a dedicated industry development planning framework supported by adequate, long term funding to foster the establishment of such industries until they reach a critical mass to become self supporting and generate their own internal confidence, then the aim of commercially-driven tree production systems on the scale necessary to deliver real salinity impacts will remain rhetoric, and the goal of sustainability will remain unattainable.<sup>74</sup>

6.51 Saltgrow argued that to foster the adoption of new industries, involving substantial land use change from current practices, requires CMOs and national NRM agencies to introduce industry development planning into the NRM planning and funding prioritisation processes. To overcome the barriers to adoption of new land use practices at the regional level, Saltgrow specifically recommended that:

- CMOs introduce resource or industry development planning into their NRM planning and funding prioritisation processes; and
- CMOs be required to establish a framework for allocating expenditure between different categories of land use options in order to give new enterprises some level of funding scope and security, and thereby encourage investment in new, science-based land use industries.<sup>75</sup>

6.52 The Forest Products Commission of Western Australia (FPCWA) also noted that, in addition to selecting profitable tree species and developing new markets for wood products, such as bioenergy and industrial oils noted above:

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73 Saltgrow, *Submission no. 71*, p. 3.

74 *ibid.*, p. 5.

75 *ibid.*, p. 6.

considerable effort is also required to develop environmental markets, such that payments are made for the collateral NRM benefits of reforestation such as improvements in land and water quality, carbon sequestration and biodiversity conservation.<sup>76</sup>

6.53 The FPCWA noted that processes to achieve this (including standardised methods for measuring changes in condition, monitoring the changes and reporting to investors), are relatively advanced for carbon, but less so for other environmental credits.<sup>77</sup>

6.54 In general, the FPCWA recommended that significant scientific investment be made to develop:

- new industries (for example, bioenergy) that will require large-scale use of products from forestation. This development will involve research that ranges from selection of the most productive species, low-cost establishment and harvesting systems, yield prediction and economic and social analyses; and
- methodologies that will allow the valuation of environmental benefits such as improvements of land and water quality and biodiversity, so that these can be sold to investors. This is analogous to the emergent carbon market and will involve steps such as the development of a unit of trade, prediction of likely delivery, measurement and reporting.<sup>78</sup>

6.55 AIAST also urged that greater support be given to emerging industries that make use of saline water resources (for example, aquaculture, energy production, mineral harvesting and desalination). AIAST supported the use of market-based instruments and 'friendly' investment capital as a means of encouraging private sector investment:

the establishment of new industries to use saline groundwater will mean that future pumping programs can be funded privately instead of continuing to require a source of public revenue.<sup>79</sup>

6.56 CSIRO and DAFF noted that the Australian Government is currently supporting forestry initiatives, such as the joint CSIRO/DAFF Commercial Environmental Forestry (CEF) project funded by the NHT, and the Joint Venture Agroforestry Program.<sup>80</sup> DAFF stated that the CEF will include:

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76 FPCWA, *op. cit.*, p. 4.

77 *ibid.*

78 *ibid.*, p. 6.

79 AIAST, *op. cit.*, p. 8.

80 DAFF and DEH, *op. cit.*, p. 11; CSIRO, *op. cit.*, p. 8.

commercial outcomes for the low to medium (500-800 mm per year) rainfall zone based on species selection, location in the landscape, plantation management, product decisions and the assessment of environmental values. The project will also develop tools to predict the impact of farm forestry expansion on salt interception.<sup>81</sup>

- 6.57 The primary output of the CEF project will be a spatially based Scenario Planning and Investment Framework that will demonstrate the profitability of plantations at the property scale across regions.<sup>82</sup>
- 6.58 In the 2004 Budget, the Australian Government also announced two assistance programs for the Western Australian forest industry and dependent communities—a \$12.5 million Forestry Assistance Program for Western Australia and a \$2.5 million Grants for Forest Communities Program. These programs, which are to be funded over the next two financial years, will provide grants to businesses and community groups proposing developments in the forestry and forest products industries in Western Australia.<sup>83</sup>
- 6.59 The Committee notes the evidence that to arrest salinity requires substantial land use change and that this will only be achieved through the development of commercial crops and new industries. The Committee is pleased to note the considerable investment of growers in Western Australia, committed to the commercial development of mallee eucalypts. The Committee notes the calls for the Australian Government to encourage commercially-driven tree production systems, including the development of environmental markets, and to ensure that CMOs introduce industry development planning into their NRM planning and R&D funding prioritisation processes.

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81 DAFF and DEH, *loc. cit.*

82 Information obtained from the Commercial Environmental Forestry Brochure, viewed 26 April 2004, <[www.ffp.csiro.au/cef/CEF\\_Brochure.pdf](http://www.ffp.csiro.au/cef/CEF_Brochure.pdf)>.

83 The Hon. Warren Truss MP (Australian Government Minister for Agriculture, Fisheries and Forestry), Senator the Hon. Ian Macdonald (Australian Government Minister for Fisheries, Forestry and Conservation) and Senator the Hon. Judith Troeth (Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry), *Rural and Regional Australia—Sustaining the Nation*, 2004-05 Budget Statement, pp. 12-13, viewed 12 May 2004, <[www.budget.gov.au/2004-05/ministerial/download/agriculture\\_fisheries\\_forestry\\_mod.pdf](http://www.budget.gov.au/2004-05/ministerial/download/agriculture_fisheries_forestry_mod.pdf)>.

## Recommendation 5

- 6.60 **The Committee recommends that the Australian Government encourage catchment management organisations to introduce industry development planning into their natural resource management planning and funding prioritisation process.**

### Urban salinity

- 6.61 The effects of urban salinity are of particular concern to the Committee. As noted in chapter three, the Committee observed first-hand the destructive effects of urban salinity in Wagga Wagga and in the Western Australian Wheat Belt town of Katanning.
- 6.62 The Committee notes that the report, *Dryland Salinity and its Impacts on Rural Industries and the Landscape*, to the Prime Minister's Science, Engineering and Innovation Council, found that:
- while salinity is widely recognised as causing problems for agriculture it is less appreciated that dryland salinity causes serious damage ... to regional and urban infrastructure due to damage to foundations from shallow, saline groundwater.<sup>84</sup>
- 6.63 Several submitters suggested that the need for research into the effects of urban salinity is not adequately recognised in national priorities.<sup>85</sup> The particular issues associated with urban salinity include: the interaction between urban development and salinity, potential impacts on major infrastructure, maintenance and threats to high value assets, and the potential impacts on agriculture located on the urban fringe.<sup>86</sup>
- 6.64 A range of R&D priorities to address urban salinity were outlined in the submissions. For example, the NSW Government suggested that the following matters be addressed at the national level:
- requesting the Australian Transport Council to consider a national roads project by Austroad to identify best practice in maintaining roads in saline conditions;

84 Cited in Australian Government Department of Education, Science and Training, *Submission no. 69*, p. 4.

85 See for example: WSROC, *op. cit.*, p 4; HNCMB, *op. cit.*, p. 2; NSW Government, *op. cit.*, pp. 9-10; ACF, *op. cit.*, p. 4.

86 WSROC, *op. cit.*, pp. 6-7.

- expediting the work of the technical working party on salinity established by the Australian Building Code Board at its 2001 National Technical Summit, including enhancing the level of research and investigation into urban salinity;
  - improving the technical and scientific input into the development of Australian standards, the Australian Building Code and construction specifications; and
  - developing agreed national competencies and training packages to improve education in urban salinity, and developing National Guidelines on urban salinity.<sup>87</sup>
- 6.65 In addition, submitters advocated research into improved urban salinity assessment and risk evaluation, and options for treatment and management, including:
- measurement, mapping and modelling of salt stores and water flows in urban landscapes;<sup>88</sup>
  - addressing the effects of salinity on building materials, roads and pavement, and implications for council asset management;<sup>89</sup>
  - identifying the link between urban land use, planning and salinity;<sup>90</sup>
  - identifying the relationship between stormwater and wastewater management and urban salinity;<sup>91</sup> and
  - developing options for protecting infrastructure, conservation and cultural heritage assets.<sup>92</sup>
- 6.66 The Committee notes that for several years, the Wagga Wagga Council has implemented strategies to address urban salinity and carried out remediation work.<sup>93</sup>
- 6.67 During its inspections, the Committee was informed of proposals to develop and apply desalination technologies in Katanning (to use the groundwater currently pumped out from under the town) and a number
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87 NSW Government, *op. cit.*, p. 9.

88 CSAM, *op. cit.*, p. 2.

89 Mr Colin Kandan-Smith (WSROC), *Transcript of Evidence*, 29 October 2003, p. 17; Mr Bryan Short (Wagga Wagga City Council), *Transcript of Evidence*, 30 October 2003, p. 28.

90 HNCMB, *op. cit.*, p. 4; WSROC, *op. cit.*, p. 7.

91 *ibid.*

92 ACF, *op. cit.*, p. 4; NDSP, *Exhibit no. 134*, p. 25.

93 Wagga Wagga City Council, *Submission no. 5*, p. 1.

of other Wheat Belt towns. This project is anticipated to have a range of benefits including saving the cost of piping freshwater from Perth to Katanning, promoting new industries, and establishing technologies with export potential.

- 6.68 The Committee is concerned at claims that the Western Australian Rural Towns Program, which addresses salinity in some 32 Wheat Belt towns, no longer receives Australian Government support.<sup>94</sup> However, the Committee is pleased to note the announcement by Western Australian and Federal Government Ministers in April 2004 of a \$500 000 commitment under the NAP for a 'Rural Towns—Liquid Assets' initiative, to develop integrated town water management schemes for the Avon region of Western Australia.<sup>95</sup>

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### **Recommendation 6**

- 6.69 **The Committee recommends that the Australian Government emphasise, through its investments in salinity science, the development of technologies to address urban salinity, including:**
- (a) salinity assessment and risk evaluation methods; and**
  - (b) options for treatment and management.**

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94 Mr Rex Edmondson (WA SRDTC), *Transcript of Evidence*, 12 November 2003, p. 45.

95 Joint media release by the Australian Government Minister for Agriculture, Fisheries and Forestry, The Hon. Warren Truss MP, Australian Government Minister for the Environment, The Hon. Dr David Kemp MP, Western Australian Minister for Agriculture, Kim Chance, and Western Australian Minister for Environment, Dr Judy Edwards, and Mr Don Randall MP, Member for Canning, issued 7 April 2004. Media release available online, DEH, Canberra, viewed 4 May 2004, <[www.deh.gov.au/minister/env/2004/mr07apr04.html](http://www.deh.gov.au/minister/env/2004/mr07apr04.html)>.



## The need for multidisciplinary and interdisciplinary research

- 6.70 A range of submissions emphasised the importance of multidisciplinary salinity research activities:
- [t]he greatest hope for the future is being able to undertake multi-disciplinary research to provide integrated solutions to salinity as a multi-faceted problem.<sup>96</sup>
- 6.71 The complexity of agricultural systems is said to require multidisciplinary research, or the support of multidisciplinary teams:
- Many specialist discipline-based scientists have trouble understanding the complexity of agricultural systems. The interaction of the economic, social, environmental, political and cultural context of agricultural systems is complex and unless scientists work in multi-disciplinary teams, many pieces of technology are unlikely to deliver useful results.<sup>97</sup>
- 6.72 Similarly, Dr John Ive argued that land managers and scientists have strongly contrasting approaches to resource management issues. Traditionally, scientific research has been undertaken in single theme oriented groups or agencies which tend to form silos, thereby inhibiting the exchange of ideas between disciplines. In addition, scientists are generally rewarded on the basis of peer reviewed work, 'a process that engenders a need to specialise to meet the demanding standards of one's peers.'<sup>98</sup> It was argued that this specialisation clashes with the needs of landholders, who must manage a multitude of themes simultaneously and integrate knowledge across a range of disciplines. Consequently, Dr Ive argued that scientific input that has a single issue focus tends to miss the landholders' need for 'knowledge and tools to address the important interactions' between resource degradation issues.<sup>99</sup>
- 6.73 In this respect, CSIRO stated that it 'is in a unique position among research providers to assemble the multidisciplinary teams needed to address the complex NRM issues like salinity ... CSIRO has in recent years developed extensive skill in those areas and can provide tailored advice to

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96 Murdoch University, *op. cit.*, p. 3. See also: Dr Ben Kefford, *op. cit.*, p. 1; Murray Catchment Management Board, *Submission no. 10*, p. 2; CRC LEME, *op. cit.*, p. 4; NSW Government, *op. cit.*, p. 7.

97 CRC PBMDs, *op. cit.*, p. 7.

98 Dr John Ive, *Submission no. 74.1*, p. 1.

99 *ibid.*, pp. 2-3.

regions'.<sup>100</sup> The NSW Government also noted that links among the disciplines involved in salinity research are fostered by CRCs, the NDSP and state salinity R&D coordinating committees.<sup>101</sup>

6.74 Several submitters also emphasised that solutions to salinity require the input of the social sciences, in addition to the biological and physical sciences.<sup>102</sup> Five reasons were advanced for this:

- to meet Australia's obligations under international conventions for sustainability requires consideration of the triple bottom line—physical/biological, economic and social—each requiring and supported by a body of scientific research;

- to understand and develop economic and social conditions that will support adoption of findings from the biophysical sciences, for example:

no amount of research into new salt-tolerant agricultural crops is going to result in adoption if the economic drivers likely to support or impede such adoption are unknown and cannot be managed.<sup>103</sup>

- to determine the best way of designing institutional arrangements for NRM, such as the relationship between governments, regional bodies and non-government organisations;

- to develop and analyse policy options to encourage or require uptake of salinity measures; and

- to examine sustainable futures.<sup>104</sup>

6.75 Murdoch University noted that some effort has been made to integrate social and economic research in NRM, for example through the Social and Institutional Research Program of Land and Water Australia (LWA). However, it was recommended that the NDSP, or a successor agency, be adequately funded to conduct economic and social research as part of salinity management research activities.<sup>105</sup> The CRC PBMDs also

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100 CSIRO, *op. cit.*, p. 12.

101 NSW Government, *op. cit.*, p. 7.

102 CSAM, *op. cit.*, p. 2; Murdoch University, *op. cit.*, pp. 2, 4; HNCMB, *op. cit.*, p. 2; Australian Nuclear Science and Technology Organisation (ANSTO), *Submission no. 22*, p. 5.

103 Murdoch University, *op. cit.*, p. 3.

104 Dr Susan Moore (Murdoch University), *Transcript of Evidence*, 13 November 2003, pp. 28-29.

105 Murdoch University, *op. cit.*, pp. 3, 4.

recommended that NAP funds be used to increase understanding of the socio-economic constraints to adoption of relevant technologies.<sup>106</sup>

- 6.76 Proposals to foster greater cooperation amongst salinity scientists included an annual multidisciplinary salinity conference, research showcase or roundtable, and a dedicated salinity journal that brings together research findings from across the range of disciplines.<sup>107</sup> CSIRO also noted that, with the exception of the biennial Productive Use and Rehabilitation of Saline Land Conference, there are no regular national conferences that address salinity.<sup>108</sup>
- 6.77 Murdoch University recommended that the Australian Research Council (ARC) should be 'encouraged to support and preferentially fund multidisciplinary projects in the natural resource management area.'<sup>109</sup>

## Recommendation 7

- 6.78 **The Committee recommends that the Australian Government:**
- (a) foster greater cooperation amongst scientists addressing salinity and, specifically, sponsor an annual multidisciplinary salinity conference, research showcase or science roundtable; and**
  - (b) examine ways to foster interdisciplinary research in natural resource management more generally.**

## The importance of adaptive management

- 6.79 Notwithstanding the need for further salinity research, the Committee was told that 'we cannot wait until we get the science perfectly right' and 'action should not be delayed until scientific proof is determined.'<sup>110</sup> Similarly, the Murray-Darling Basin Commission (MDBC) argued that:

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106 CRC PBMDS, *op. cit.*, p. 6.

107 Dr Jerzy Jankowski, *Transcript of Evidence*, 29 October 2003, p. 37; Professor Les Copeland (CSAM), *Transcript of Evidence*, 29 October 2003, p. 63.

108 CSIRO, *op. cit.*, p. 13.

109 Murdoch University, *op. cit.*, p. 4.

110 Dr Michael Curll (Deputy Director-General, New South Wales Agriculture), *Transcript of Evidence*, 29 October 2003, p. 85; Lower Murray Darling Catchment Management Board, *Submission no. 2*, pp. 2-3.

it is not realistic to wait for “perfect knowledge” ... it is essential to act based on best available, “best bet” knowledge, managing risks and continually learning from the results.<sup>111</sup>

- 6.80 The importance of combining an adaptive management approach to addressing salinity, in which ‘you review, you evaluate, you decide and you move forward’, with traditional scientific research was emphasised.<sup>112</sup> For example, the FPCWA stated:

The experience we have had, as an agency, in the last 10 or 15 years would suggest that both approaches are necessary. Trial and error—adaptive management—is necessary on an operational scale, but to back that up you need some good quality science and an understanding of the processes.<sup>113</sup>

- 6.81 Similarly, the Hawkesbury-Nepean Catchment Management Board suggested:

Current knowledge and technical capacity is not perfect. Existing knowledge and skills need to be applied in an adaptive management context so that program monitoring and emerging knowledge gaps can be used to identify new research and technical needs.<sup>114</sup>

- 6.82 Moreover, the NSW Government observed that salinity solutions ‘must be developed in a partnership/learning process with farmers, so that they know these new systems meet their needs, they are profitable, and that the new systems can be managed ... without excessive risk.’<sup>115</sup>

## Funding salinity research

- 6.83 In order to address the knowledge gaps identified in the evidence, several submitters made recommendations in relation to the funding of salinity research:
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111 MDBC, *Submission no. 51*, p. 7.

112 Mr Kevin Goss (MDBC), *Transcript of Evidence*, 7 November 2003, p. 36. See also: Dr Ben Kefford, *Submission no. 33*, p. 1; Cooperative Research Centre for Freshwater Ecology, *op. cit.*, p. 2; Mr Michael Watts (ACF), *Transcript of Evidence*, 31 October 2003, p. 23; Phil Dyson and Associates, *Submission no. 46*, p. 3; NDSP, *op. cit.*, p. 15.

113 Dr John McGrath (FPCWA), *Transcript of Evidence*, 12 November 2003, p. 3.

114 Mrs Mary Howard (HNCMB), *Transcript of Evidence*, 29 October 2003, p. 68.

115 NSW Government, *op. cit.*, p. 4.

- at the state and national levels;
  - at the regional level; and
  - for basic salinity science.
- 6.84 The Committee also received evidence in relation to the need for long-term funding of research, on-ground works and data collection, and measures to foster private sector investment in salinity R&D activities. These matters are addressed in the sections which follow.

### Funding for nationally coordinated salinity research

- 6.85 The CRC PBMDs summarised a research funding dilemma for the Australian Government:
- There is a problem there ... that the Commonwealth really needs to address if it firstly accepts that there is a need for research and then if it wants that research to be conducted without allocation of additional funds, other than the National Action Plan.<sup>116</sup>
- 6.86 To address this issue, the South Australian Government recommended that the NAP provide ‘for a salinity research and development fund to finance research that is of statewide importance or of a size or scale that is beyond the scope of attention of an individual region’.<sup>117</sup> The CSIRO also supported a nationally coordinated research effort.<sup>118</sup>
- 6.87 Similarly, the FPCWA recommended a ‘significant change in the quantum of science funding’ and suggested that the increase in funding ‘can be achieved by allocating a proportion (5%) of the funding already allocated to the NAP.’<sup>119</sup>
- 6.88 LWA suggested that the aggregate level of investment in salinity research is probably sufficient, but informed the Committee that in January 2003 it developed a proposal for pooled-funding to support a coordinated national approach to R&D under the NAP.<sup>120</sup> This proposal was developed for the Science and Information Working Group of the NRM Standing Committee, but it was not submitted to the Standing Committee ‘because several jurisdictions argued that all NAP funds have already been

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116 Professor Philip Cocks (CRC PBMDs), *Transcript of Evidence*, 13 November 2003, p. 19.

117 Government of South Australia, *op. cit.*, p. 7.

118 Dr John Williams (CSIRO), *Transcript of Evidence*, 7 November 2003, pp. 86-87.

119 FPCWA, *Submission no. 63*, p. 7.

120 LWA, *Submission no. 59*, pp. 5, 2.

allocated through bilateral relationships between the Australian Government and each jurisdiction.<sup>121</sup> LWA concluded:

Extracting any funds from the “glass jar” of pooled funding for multilateral investment such as coordinated national approach to R&D has proven to be too difficult at this stage in the process.<sup>122</sup>

- 6.89 The CRC PBMDs also recommended that the Australian Government allocate significant levels of NAP funding to R&D priorities at the state level. Individual CMOs would be consulted but would not have the power to veto the allocation of research funds.<sup>123</sup>
- 6.90 The Committee notes that there has been an overall increase in salinity funding due to the NAP.<sup>124</sup> However, the Committee is concerned that the NAP does not have a charter to fund salinity R&D, at least not beyond that required for regional level implementation. Adequate funding should be available to support on-going salinity R&D, particularly into generic issues that are of nationwide significance or for research that is beyond the scope of individual CMOs. Research of this type was described in the first section of this chapter and includes the development of profitable land and water use systems.
- 6.91 The Committee also encourages state governments to continue to support a coordinated national approach to generic salinity R&D, particularly through contributions to initiatives such as the NDSP.

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121 *ibid.*

122 *ibid.*, pp. 2-3.

123 CRC PBMDs, *op. cit.*, p. 5.

124 CSIRO, *op. cit.*, p. 1; LWA, *op. cit.*, p. 2.

## Recommendation 8

- 6.92 (a) **The Committee recommends that the Australian and state governments make provision within the *National Action Plan for Salinity and Water Quality* for the establishment of a salinity research and development fund, to finance research that:**
- (i) **is of national or statewide significance, and beyond the scope of individual catchment management organisations (CMOs);**
  - (ii) **pertains to the development of new technologies and industries for salinity management; and**
  - (iii) **is otherwise of a long-term, strategic or generic nature.**
- (b) **The Committee further recommends that the allocation of the pooled research funds:**
- (i) **be as agreed between the Australian and state governments, but that CMOs be consulted for research needs; and**
  - (ii) **have regard for the research priorities identified in this report.**

## The role of Research and Development Corporations

- 6.93 The research investments of RDCs on behalf of rural industries was argued to be profoundly significant:

These investments are as significant as those made by government; perhaps even more so, for they are closely tied to industry extension programs that engage a wider spectrum of producers than government programs, and are based on explicit levy-paying relationships that ensure more direct ownership by producers of these programs.<sup>125</sup>

- 6.94 The CRC PBMDs urged that RDCs, including Australian Wool Innovation (AWI), GRDC and Meat and Livestock Australia, be encouraged to take a leading role in supporting research for new technology development, such as those identified in the first section of this chapter.<sup>126</sup>

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125 LWA, *Submission no. 59*, p. 4.

126 CRC PBMDs, *op. cit.*, p. 4.

6.95 The WA SRDTC strongly supported the work of those RDCs engaged in public good research to improve the sustainability of agriculture, but expressed concern that while 'some [RDCs] are beginning to accept their responsibilities in this area, others clearly are not.'<sup>127</sup> The Land, Water and Wool Program, managed by AWI, was held up as:

an excellent model to follow. This Program funds nine sustainability initiatives including the Sustainable Grazing on Saline Lands (SGSL) initiative. SGSL is sponsoring Commonwealth-State Agency based research, the development of producer networks and major communication programs focused on the development of profitable uses for saline soils.<sup>128</sup>

6.96 The WA SRDTC recommended that the Australian Government insist that RDCs invest more substantially in researching sustainable land use systems.<sup>129</sup>

6.97 The CRC PBMDs also argued that the commodity based funding model, which has been dominant in research investment (for example, GRDC, Meat and Livestock Australia, Cotton RDC), has led to an emphasis on productivity at the expense of sustainability. It was argued that research funders struggle to put together research projects which recognise that 'farming systems in, for example, the Wheat Belt include several commodities.'<sup>130</sup> CRC PBMDs argued that the need to forge links between productivity and sustainability is a challenge for researchers and technologists.

6.98 While supporting the research activities of the RDCs, the MDBC and ACF also expressed concern that RDCs are not adequately supporting changed land use practice:

We question whether they are sufficiently introducing the more challenging messages here. Just to emphasise a point, the R&D corporations have demonstrated their credentials by aligning increased productivity with marginal improvement in water use, and those two are moving on. Our issue is that increased marginal improvement in water use, in the absence of land use change, is not sufficient. Therefore, there is another line of work to be done,

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127 WA SRDTC, *op. cit.*, p. 8.

128 *ibid.*

129 *ibid.*

130 CRC PBMDs, *op. cit.*, p. 7.



and I do not think the relationship between what they are doing and farmers is good enough.<sup>131</sup>

6.99 The Committee concurs with these views.

## Recommendation 9

6.100 **The Committee recommends that the Australian Government encourage Research and Development Corporations to:**

- (a) invest more substantially in research for sustainable land use systems and in the development of new salinity technologies; and**
- (b) conduct projects that forge links across commodities in farming systems.**

## Funding research at the regional level

6.101 The South Australian Government noted that, at the regional level, a 'strong science base and a sound understanding of the biophysical processes is critical to develop management actions that will be successful, effective and provide value for money.' The South Australian Government recommended that CMOs be encouraged to continue to 'include research and development as part of their investment mix in their regional investment strategies'.<sup>132</sup>

6.102 The CRC PBMDs recommended that the Australian Government remove perceived or actual impediments to funding of R&D by individual CMOs under the NAP.<sup>133</sup> Similarly, the ACF argued that:

[G]reater effort needs to be applied to ensure all catchment and regional bodies develop the wherewithal to do good R&D of most relevance to their needs. The Commonwealth should ensure that impediments to R&D investments by catchment and regional bodies are minimised, allocate significant NAP funds to R&D at

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131 Mr Kevin Goss (MDBC), *Transcript of Evidence*, 7 November 2003, p. 40; ACF, *Submission no. 62*, p. 4; Mr Michael Watts (ACF), *Transcript of Evidence*, 31 October 2003, p. 25.

132 Government of South Australia, *loc. cit.*

133 CRC PBMDs, *op. cit.*, p. 5.

the catchment level and ensure that regional/catchment R&D investment meet both national and local priorities.<sup>134</sup>

6.103 CSIRO also argued that ‘research below a generic level so as to be regionally-specific requires significantly more funding.’<sup>135</sup>

6.104 However, CRC LEME expressed concern with tendering processes at the regional level:

There is a lack of separation between science advisors to CMAs from those benefiting directly or indirectly from the award of contracts. Often the same research groups or consultants are giving advice and benefiting from the contracts awarded.<sup>136</sup>

6.105 CRC LEME argued that research work contracted by CMOs is not peer reviewed and that there is a need for an independent body to:

impartially assess science needs within a catchment, gaps in data, evaluation of tenders and contracts, and interpretation of results. All this needs to happen both at CMA level, and also at a more strategic level between Commonwealth and State organisations.<sup>137</sup>

6.106 Despite the need for generic research activities to be supported directly at state and national levels, the Committee concludes that individual CMOs ought to be encouraged and appropriately resourced to undertake salinity research, where this is relevant. The Committee also notes the difficulties presented by regional devolution for coordinated research activities and recommends that cooperation between regions to undertake strategic research and industry development be fostered.

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134 ACF, *Submission no. 62*, p. 5.

135 CSIRO, *op. cit.*, p. 13; Murrumbidgee Irrigation, *op. cit.*, p. 1.

136 CRC LEME, *op. cit.*, p. 3.

137 *ibid.*, p. 4.

**Recommendation 10**

- 6.107 **The Committee recommends that, in cooperation with the states, the Australian Government:**
- (a) identify and remove impediments for catchment management organisations (CMOs) to undertake or commission research, and encourage CMOs to support research activity as part of their investment strategies;**
  - (b) provide incentives for greater collaboration between CMOs to support research of cross-catchment benefit; and**
  - (c) provide an appropriate degree of support to evaluate tenders and contracts let at the regional level.**

**Funding of basic salinity science and multidisciplinary research**

- 6.108 Some scientists, concerned with a lack of funding for basic salinity research, proposed the establishment of an 'Australian Salinity Research Program'.<sup>138</sup> The Program would act as a granting body, modelled on the competitive granting processes of the Australian Research Council (ARC) or industry based research granting groups such as the Australian Coal Association Research Program. Alternatively, the body could be established on a basis similar to CRCs.<sup>139</sup> It was emphasised that the Program would need to be independent of existing science agencies and should foster multidisciplinary salinity research.
- 6.109 The NSW Farmers' Association observed that 'it would be good to have one body doling out the research funds, as you do with the national research grants system.'<sup>140</sup>
- 6.110 It was also remarked that the ARC programs 'have the potential to look at some of [the] generic issues'.<sup>141</sup> The Committee notes that over the six

138 Associate Professor Robert Creelman, *Submission no. 16*, p. 3.

139 Dr Jerzy Jankowski, *Transcript of Evidence*, 29 October 2003, pp. 29, 32; Associate Professor Robert Creelman, *Transcript of Evidence*, 29 October 2003, p. 32.

140 Mr Jonathan Streat (NSW Farmers Association), *Transcript of Evidence*, 29 October 2003, p. 49.

141 Associate Professor Robert Bell (Murdoch University), *Transcript of Evidence*, 13 November 2003, p. 32.

years to 2003, the ARC invested a total of \$16.5 million in 84 salinity related research projects.<sup>142</sup>

## **Need for long-term funding for research, on-ground works and monitoring**

- 6.111 It was noted that there is a need to ensure long-term funding for some salinity R&D activities:

We are dealing with a problem that has taken many decades to arise. It is not likely to be reversed or even stabilised in the short term ... the funding has to reflect the long-term nature of some of the processes ...<sup>143</sup>

- 6.112 It was also argued that there is a need for long-term funding to monitor the effects of salinity management actions. For instance, the NSW Government observed that 'to identify the effect of farming systems on hydrology, at least six years of data is required to cover variation in climate between seasons and for treatments to take effect.'<sup>144</sup> Furthermore, in the case of catchment studies involving forest management, the 'funding base for research projects' needs to recognise 'the decadal (at least 20-30 years) response times in hydrology and forestry experimentation.'<sup>145</sup>

- 6.113 However, the Committee was told that, in the case of some catchment studies in Western Australia, 'they are not [being] monitored right at the moment. The funding base for that has disappeared because of a lack of funding for the state agency that ran the system.'<sup>146</sup>

- 6.114 Similarly, Dr John Ive argued that funding for research and on-ground activities needs to reflect the realities of the underlying processes at work. The argument was made with reference to the example of a major dryland salinity project in the Yass Valley during the 1980s:

Recharge areas were identified, tree planting undertaken, piezometers installed within the three-year life of the project. Any collection of information ceased early in the project and any

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142 Department of Education, Science and Training, *Exhibit no. 61, Details of ARC funded projects*.

143 Dr John McGrath, (FPCWA), *Transcript of Evidence*, 12 November 2003, p. 4; Mr Paul Wilkes (CRC LEME), *Transcript of Evidence*, 12 November 2003, p. 24.

144 NSW Government, *op. cit.*, p. 11.

145 FPCWA, *op. cit.*, p. 2.

146 Dr John McGrath, (FPCWA), *Transcript of Evidence*, 12 November 2003, p. 4.

analysis was superficial. However, one landholder persisted with the result that there is now clear and substantive evidence of success in managing saline water tables, management of which has provided evidence of both production and environmental benefits. Ironically within the life of the project funding (3 years) no clear evidence was available of the benefits subsequently realised, rather it took a decade of detailed measurement before the evidence became convincing. Such time frames are not unusual for natural resource issues but a common term for project funding and prioritising issues convey an impression that results can be achieved within [three years] ... thereby trivialising the issue and increasing the risk of today's solution becoming tomorrow's problem.<sup>147</sup>

6.115 CMOs also emphasised the importance of on-going monitoring and data collection.<sup>148</sup> The Namoi Catchment Management Board stated that many sub-catchments in the Namoi do not have piezometers and, of those that do, many lack on-going monitoring.<sup>149</sup> The Murray Catchment Management Board urged that governments resource and operate research and data collection programs 'over a longer time frame than the current 1-3 year funding cycles.'<sup>150</sup>

6.116 However, CRC LEME noted that it is possible for some salinity research to be tackled on a modular basis:

with a series of short, sharp projects of a duration of six months or so ... Sure, it has to go on for many years, but we can accommodate a series of short, sharp contractual arrangements. In fact, it is probably a good management mechanism because you then are judged on your deliveries.<sup>151</sup>

6.117 It was also recognised that the provision of funding for research and data collection over longer time frames is a difficult issue for governments to resolve. The FPCWA suggested that:

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147 Dr John Ive, *Submission no. 74.1*, p. 3.

148 Eyre Peninsula Catchment Water Management Board, *Submission no. 75*, p. 6; Wimmera Catchment Management Authority, *Submission no. 55*, p. 1. See also: Agrilink Holdings Pty Ltd, *Submission no. 25*, p. 5; Australian Society of Soil Science Inc., *Submission no. 68*, p. 4.

149 Namoi Catchment Management Board, *Submission no. 65*, p. 2.

150 Murray Catchment Management Board, *Submission no. 10*, p. 1.

151 Dr Dennis Gee (CRC LEME), *Transcript of Evidence*, 12 November 2003, p. 25.

One of the key questions you have got to address in answering how you achieve this is to identify agencies or entities that have a long-term future or a long-term responsibility for an issue so they have a management role in the medium to long term so that they will exist.<sup>152</sup>

## Encouraging private sector investment in salinity research

6.118 The ACF argued that, in addition to public investment in salinity R&D, the Australian Government should:

augment its efforts by establishing an incentives framework that drives private sector investment in R&D for profitable and sustainable measures to arrest landscape decline, including new perennial land-uses.<sup>153</sup>

6.119 The report, *Repairing the Country: Leveraging Private Investment* (2000), found that in order to reach targets for sustainable natural resource use, an investment of some \$65 billion over ten years would be required.<sup>154</sup> It was realised that funding of this size would be difficult to obtain from public sector budgets alone, but also that many activities could derive a commercial benefit and that these should be financed from private sector investment. The report outlined a framework to facilitate the establishment of investment vehicles capable of attracting such investment funds. The approach involves:

- improved access to private capital through tax-preferred investment vehicles (statutory investment companies);
- a Land Repair Fund to administer a range of programs and tax concessions;
- accreditation for commercial-environmental ventures to ensure project proposals yield public good benefits and are consistent with national and catchment-based policies and objectives;
- taxation measures—an integrated package of offsets and concessions tailored to make environmental investments more attractive; and

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152 Dr John McGrath, (FPCWA), *Transcript of Evidence*, 12 November 2003, p. 8.

153 ACF, *Submission no. 62*, p. 4; Mr Michael Watts (ACF), *Transcript of Evidence*, 31 October 2003, pp. 23-24.

154 ACF, *Exhibit no. 48, Repairing the Country: Leveraging Private Investment*, p. 3. The report was prepared on behalf of ACF, CSIRO and the Business Leaders Roundtable comprising Macquarie Bank, Elders, Berri, ABN AMRO and Southcorp.

- seed funding for innovative commercial ventures that achieve environmental benefits.<sup>155</sup>
- 6.120 The Committee agrees that ways to encourage greater private sector investment in R&D for profitable and sustainable measures to address salinity ought to be examined.

### Recommendation 11

- 6.121 **The Committee recommends that the Australian Government examine ways to encourage private sector investment in research and development for commercial measures to arrest salinity and other forms of natural resource degradation.**

### Developing industry capacity

- 6.122 The Australian Spatial Information Business Association (ASIBA) and Natural Resource Intelligence (NRI) argued that program structures should not limit research funding solely to public science agencies. The Committee was told that '[t]he profit motive does not work as a detriment to good science, but rather adds a level of discipline that is not necessarily expected of government agencies.'<sup>156</sup> Moreover:

Quality R&D is not restricted to government agencies. The private sector has been involved in salinity projects where new methodologies have been tested ... By assuming that only National Science Agencies hold the answer to the salinity problem, government limits creative endeavour, extends the life of the problem and undermines the work of many private sector companies engaged in quality R&D programs.<sup>157</sup>

- 6.123 ASIBA and NRI recommended that steps be taken to develop industry capability and to involve the private sector in R&D. However, it was argued that:

as long as government agencies are encouraged to mimic and compete openly with the private sector—performing work for other federal, state and local government agencies and even for

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155 ACF, *Submission no. 62*, p. 5.

156 ASIBA, *Submission no. 58*, p. 4; NRI, *Submission no. 32*, p. 11.

157 ASIBA, *op. cit.*, p. 6.

that small portion of private sector work placed to open tender—ASIBA and the companies it represents believes they will have a stranglehold on business opportunities and stifle economic growth.<sup>158</sup>

- 6.124 It was recommended that, in general, publicly funded agencies should not act as prime bidder for projects where that bid competes directly with the private sector, ‘unless the work related to the project cannot be effected by an alternative bidder.’<sup>159</sup> ASIBA also recommended that all Australian companies ought to have equal access to the skills and experience of national science agencies as part of their own bids—‘that is, CSIRO should not reserve its services exclusively for any one organisation over another.’<sup>160</sup> ASIBA also called for greater commercial exploitation of government held spatial information.
- 6.125 NRI also argued that that industry often has to compete with publicly funded organisations, such as state agencies, when tendering for contracts let by CMOs. It was argued that the ‘[t]he current situation provides opportunities for breaches of the Trade Practices Act and the Competitive Neutrality Regulations’ and that this often occurs.<sup>161</sup>
- 6.126 To develop industry capacity, NRI recommended that:
- tender specifications provide opportunities for industry to compete for public research funds;
  - existing policy and legislation be applied so that industry can compete effectively against publicly funded organisations;
  - those specifying requirements in tenders be prevented from bidding for work; and
  - all reviews of proposals be signed and made available to the proponent.<sup>162</sup>
- 6.127 The Committee acknowledges the contribution of the private sector to salinity R&D and wishes to see that capacity developed. In particular, the Committee urges that industry be given genuine opportunity to tender for public research funds, especially small to medium sized enterprises at the

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158 *ibid.*

159 *ibid.*, p. 5.

160 *ibid.*

161 NRI, *op. cit.*, p. 8.

162 *ibid.*, pp. 11-12.



regional level, and that tendering processes be transparent. The Committee addresses the private sector's role in the provision of technical and support services in chapter eight.

### **Recommendation 12**

- 6.128 The Committee recommends that the Australian Government, in cooperation with state governments, encourage development of industry capacity in salinity research and development, by adopting measures that include:**
- (a) ensuring tender specifications provide genuine opportunities for industry to compete for public research funds, particularly for small to medium sized enterprises at the regional level; and**
  - (b) ensuring tendering processes are transparent, so that industry can compete effectively against publicly funded organisations.**

## **Conclusions**

### **The need for further salinity research**

- 6.129 Despite the knowledge and management tools developed to date, the Committee is persuaded that governments need to provide on-going support for salinity R&D.
- 6.130 The Committee notes evidence suggesting an imbalance in the Australian Government's salinity science investments towards mapping, at the expense of developing new technologies and systems, engineering systems and new industries for saline resources.
- 6.131 The Committee notes strongly divergent views in the evidence: between national NRM agencies which argued for the efficacy of highly targeted interventions (at least in eastern Australia) aided by mapping technologies, versus a range of submitters who argued that research findings point to the need for large scale land use changes and, hence, the need for profitable land use options that can be widely adopted by landholders.
- 6.132 The Committee notes that differences in geology and landscape characteristics between the east and west of the continent may have

generated diverging perspectives on appropriate management interventions and R&D priorities. Nonetheless, the national NRM agencies conceded that while the prospects for targeted interventions in eastern Australia may be positive, the situation in Western Australia is characterised by much larger, homogenous systems and landscape salt.

- 6.133 The Committee welcomes the potential for targeted salinity management in some locations assisted by mapping technologies, but notes that 70 per cent of the nation's salinity problem occurs in Western Australia. Calls from this state and a range of other submitters are for new land and water use systems and strategic interventions to protect high value assets. Consequently, the Committee recommends that the Australian Government give greater emphasis through its science investments to the development of new land and water use systems.

## Research priorities

- 6.134 Although the Committee's inquiry was concerned with national salinity science coordination and the terms of reference did not seek comment on research priorities, approximately 70 submitters identified specific research needs.
- 6.135 The Committee recognises that prioritising research needs for future R&D investment is properly the responsibility of CMOs and technical committees at state and national levels. However, the Committee recommends that, in addition to new land and water use systems, greater emphasis be given to:
- address urban salinity; and
  - encourage CMOs to introduce industry development planning into their NRM planning and funding prioritisation process.

The Committee also urges that multidisciplinary research be encouraged.

- 6.136 The Committee recognises that the new NRM context has altered the research supply-demand relationship, with CMOs now having greater power to determine research priorities. While this situation is welcomed, the Committee urges that a 'bottom-up' approach to identification of research priorities be effectively combined with a 'top-down' analysis to ensure that national perspectives and new scientific knowledge or techniques are incorporated into regional management practice.
- 6.137 The Committee acknowledges the importance of combining on-going scientific research with an adaptive management approach: using the best available knowledge now and continuing research over the long term.

## Funding for salinity research

- 6.138 Notwithstanding the overall increase in salinity funding, the Committee is concerned that the NAP does not have a charter to fund salinity R&D, at least not beyond that required for regional level implementation. The Committee is persuaded that adequate funding should be available to support salinity R&D, particularly into generic issues that are of nationwide significance or for research that is beyond the scope of individual CMOs. The Committee recommends that provision be made within the NAP for the establishment of a salinity R&D fund to finance research of this nature.
- 6.139 In view of the significance of their research investments and their relationship with primary producers, the role of RDCs is of particular importance. The Committee notes calls for RDCs to invest more substantially in researching sustainable land use systems, and in the development of new salinity technologies.
- 6.140 Although the Committee identifies the need for generic research activities to be supported at state and national levels, the Committee believes that individual CMOs ought to be encouraged to undertake or commission salinity R&D, where this is relevant.
- 6.141 The Committee wishes to encourage greater opportunity for small to medium sized enterprises to tender for research work, particularly at the regional level, and to encourage private sector investment in salinity research activities.
- 6.142 The Committee notes the need for long-term funding for data collection and to monitor the effects of salinity management actions at the regional level. The Committee urges government agencies to provide this on-going support. Other issues associated with the management data and salinity mapping are considered in the following chapter.

