

The nation's programs to combat salinity

Introduction

2.1 This chapter provides an overview of the:

- national programs that address salinity:

A National Action Plan for Salinity and Water Quality (paragraphs 2.24-2.32); *Natural Heritage Trust* (paragraphs 2.33-2.40); and *National Landcare Program* (paragraphs 2.41-2.47);

- strategies to address salinity in the Murray-Darling Basin, the states and local government initiatives (paragraphs 2.48-2.113);
- responses to the national salinity programs:

A National Action Plan (paragraphs 2.114-2.131); incorporating key research findings into salinity programs (paragraphs 2.132-2.140); the Australian Government's science investments into new salinity management methods and technologies (paragraphs 2.141-2.148; and region-based planning and delivery of NRM programs (paragraphs 2.149-2.183).

*History gives us lessons on the consequences of not addressing problems of salinity. Salinisation of the soil was a major contributor to the downfall of ancient civilizations in Mesopotamia in 4000 BC and again in 500 AD. Salt from sedimentary rocks was deposited in the Tigris-Euphrates Delta by flooding and irrigation. As salinity increased, soil fertility diminished, as did the ability of agricultural systems to respond to natural environmental disturbances. Crop production shifted to more salt-tolerant crops (eg, wheat to barley) and control of water rights became a cause of conflict. We will travel down the same path unless scientists from a variety of backgrounds are encouraged to explore new and innovative ways of managing our land and water resources to control salinity.*¹

- 2.2 Prior to European settlement, much of the Australian landscape was naturally saline.² In 1829 Captain Charles Sturt found the water of the Darling River near Bourke too salty to drink. The start of irrigation in the Murray-Darling Basin during the 1870s was accompanied by significant increases in the areas affected by salinity:

Irrigated land salinisation began to emerge as a problem soon after irrigation commenced. In the Kerang region salt problems were first noticed in the 1890s, less than 20 years after the commencement of irrigation ... By the early 1930s, salinisation had extended over much of the Kerang region. Drains were then constructed to remove saline groundwater and the saline drainage water was carried into the River Murray via Barr Creek.³

- 2.3 The link between land clearing and salinity was identified in the Western Australian Wheat Belt by the turn of the twentieth century.⁴ Two engineers, Mr W.E. Wood and Mr N.C. Reynoldson, are credited with first describing the dryland salinity processes. In 1917, a Royal Commission on the Mallee Belt and Esperance Lands aimed 'to create the case for an extension of the railway so as to facilitate the expansion of the wheat industry'.⁵ However, to the Commissioners' dismay, compelling evidence was presented that 'salinity was a major obstacle to the opening up of this

1 Centre for Salinity Assessment and Management, *Submission no. 19*, p. 3.

2 F. Ghassemi, A.J. Jakeman and H.A. Nix, *Salinisation of Land and Water Resources: human cases, extent, management and case studies*, Centre for Resource and Environmental Studies, Canberra, 2000, p. 181.

3 *ibid.*, pp. 181-182.

4 Q. Beresford, H. Bekle, H. Phillips and J. Mulcock, *The Salinity Crisis: landscapes, communities and politics*, University of Western Australia Press, 2001, pp. 45-50.

5 *ibid.*, p. 46.

region'. The Commissioners rejected the scientific evidence presented as 'prejudice'.⁶

2.4 After the Second World War returned soldiers were supported, through the War Service Land Settlement Scheme and later the New Farm Lands Scheme, to settle and clear the land for agricultural production in Western Australia.⁷ According to Beresford et. al. the authorities were by this time aware that the 'frenzy of land clearing' could be linked to land salinisation:

... government was in receipt of explicit scientific information which it chose to ignore in favour of rapid development.⁸

2.5 During the 1970s there was a shift within the Federal and state governments to acknowledge the importance of protecting the natural environment.⁹ In 1989 Mr Ric Farley (former Director, National Farmers Federation) and Mr Phillip Toyne (former Director, Australian Conservation Foundation) approached the then Prime Minister, the Hon. R.J.C. Hawke, for funds to address land degradation issues.¹⁰ The result was the creation of the *National Landcare Program*.

National programs that address salinity

2.6 The following section provides an overview of the national programs to address salinity. The importance of regional level planning and delivery in the implementation of these initiatives is described.

2.7 The Australian Government's strategies for salinity management are placed within the broader context of managing all of Australia's natural resources. The national natural resource management (NRM) model incorporates:

- policy, institutional and legislative reform;
- regional delivery and action;
- standards and targets;

6 *ibid.*

7 *ibid.*, p. 63.

8 *ibid.*, p. 70.

9 *ibid.*, p. 85.

10 P. Toyne and R. Farley, *The Decade of Landcare: looking backward – looking forward*, 2000, viewed 14 May 2004, <www.tai.org.au/Publications_Files/DP_Files/DP30SUM.PDF>.

- good science and information;
- strategic investment;
- monitoring and evaluation;
- community engagement; and
- focus on causes not symptoms.¹¹

2.8 National NRM is supported by three major initiatives:

- *A National Action Plan for Salinity and Water Quality* (NAP);
- *Natural Heritage Trust* (NHT); and the
- *National Landcare Program* (NLP).¹²

2.9 The development and implementation of these and other initiatives for NRM are overseen by the Natural Resource Management Ministerial Council (NRMMC), which is comprised of all the Australian and state/territory government ministers responsible for NRM matters. The NRMMC is supported by the NRM Standing Committee and its working groups.¹³

2.10 The NAP and NHT programs are administered at the national level by the Australian Government Regional Natural Resource Management Team, which is staffed by the Departments of Agriculture, Fisheries and Forestry (DAFF), and the Environment and Heritage (DEH).

2.11 A significant development in the NRM policy environment over the past 15 years has been the creation of regional NRM groups and regional strategic planning.¹⁴ In 1999, the Agriculture and Resource Management Council of Australia and New Zealand agreed to develop a policy statement on the management of rural resources for the next 10 to 15 years.¹⁵ A national discussion paper was produced and public comment was invited.¹⁶ Five hundred written submissions and over 100 verbal

11 Australian Government Departments of the Environment and Heritage (DEH), and Agriculture, Fisheries and Forestry (DAFF), *Submission no. 72*, p. 2.

12 *ibid.*, p. 7.

13 Information on the Natural Resource Management Ministerial Council and its Standing Committee is available from the Ministerial council's web site, viewed 21 January 2004, <www.mincos.gov.au>.

14 Commonwealth Scientific and Industrial Research Organisation (CSIRO), *Submission no. 42*, p. 3.

15 In 2001, the Council was subsumed by the Natural Resource Management Ministerial Council (NRMMC) and the Primary Industries Ministerial Council (PIMC).

16 Also see *Managing Natural Resources in Rural Australia for a Sustainable Future: a discussion paper for developing a national policy*, 1999, available the National Action Plan for Salinity and Water

comments were submitted. The public submissions were supportive of the seven policy directives outlined in the paper, notably 'devolving authority and empowering regions':

Appropriate institutional arrangements for decision making at the regional level should be established, in the form of regional management bodies with clearly defined responsibilities for natural resource management.¹⁷

- 2.12 The role of region-based planning for NRM and its implications for salinity programs are described in the following section.

Region-based planning and delivery under the national natural resource management framework

- 2.13 Major components of both the NAP and NHT have been designed around regional or catchment level planning and implementation. DAFF stated that effective management of natural resources requires regional level understanding and action, and argued that 'the regional level is the most effective level to engage communities and to effect the necessary landscape-scale changes to manage Australia's natural resources.'¹⁸ This is because sustainable landscape-level change 'needs to be driven from the ground up and must be responsive to regional priorities.'¹⁹
- 2.14 Fifty-six regions, covering Australia, have been identified to address natural resource issues under the national NRM framework. Each region is to have at least one regional NRM body, referred to generically throughout this report as catchment management organisations (CMOs), formed to manage their region's natural resources and to develop a single integrated catchment/regional NRM plan. At present it is difficult to make generalisations about CMOs in Australia.²⁰ This is due to the rapidity and frequency of the changes to CMOs' 'structural arrangements, legislative

Quality website, viewed 13 May 2004, <www.napswq.gov.au/publications/nrm-discussion.html>.

17 Steering Committee's report to Australian governments on the public response to *Managing Natural Resources in Rural Australia for a Sustainable Future: a discussion paper for developing a national policy*, 2000, p. 33, available the National Action Plan for Salinity and Water Quality website, viewed 14 May 2004, <www.napswq.gov.au/publications/steering-committee/index.html>.

18 DAFF and DEH, *loc. cit.*

19 *ibid.*, p. 8.

20 D. Pannell, A. Ridley, P. Regan and G. Gale, *Catchment Management Bodies in Four Australian States: structures, legislation, and relationships to government agencies*, 2004, pp. 1-7, viewed 13 May 2004, <www.general.uwa.edu.au/u/dpannell/cmbs2.pdf>.

basis and relationships to government agencies', and the variations in the organisational arrangements that exist between states and territories.²¹

2.15 These plans are to be:

- based on a 'whole of region' approach, and address significant natural resource management issues incorporating environmental, social and economic aspects;
- developed by an organised catchment or regional body representing the local community and accountable for expenditure of public monies;
- based on meeting agreed targets and outcomes that reflect good science; and
- based on meeting a firm timetable agreed by all parties.²²

2.16 Following the signing of a bilateral agreement between the Australian Government and the particular state or territory, regional plans (or 'regional catchment strategies') are then jointly accredited by the Australian and the respective state or territory government using criteria agreed to through the NRMMC in May 2002. Key elements of the accreditation criteria include:

- addressing all local NRM issues;
 - scientific analysis of natural resource conditions, problems and priorities;
 - involvement of key stakeholders in planning and delivery;
 - focus on the causes of problems rather than symptoms;
 - development of practical strategies to manage issues;
 - consistency with all other planning processes and legislative requirements applicable to the region;
 - targets set at the regional scale which are consistent with the national framework for NRM standards and targets; and
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21 The titles, functions, composition and legislative basis of the catchment management organisations vary across the states. Victoria and New South Wales have established their regional bodies as statutory authorities: Victoria has 10 catchment management authorities (CMAs) and New South Wales has 13 CMAs. Subject to the passage of NRM legislation, the South Australian Government proposes to establish eight NRM regions, each directed by an NRM Board. Western Australia has established six regional NRM groups and Queensland will establish 14 regional bodies. Further information on NRM regions and bodies is available on the Australian Government's NRM website, viewed 17 April 2004, <www.nrm.gov.au/about-regions/index.html#orgs>.

22 DAFF and DEH, *Exhibit no. 64, Overview of the NAP, NHT and NLP*, p. 3.

- continuous development, monitoring, review and improvement of the plan.²³
- 2.17 In addition to accreditation criteria, nationally agreed frameworks have also been developed through the NRMCC to assist CMOs develop and implement plans for standards and targets, monitoring and evaluation, and capacity building.²⁴
- 2.18 Once regional plans have been accredited, CMOs must develop investment strategies with specific actions, costs and timeframes required to implement the plan and achieve regional targets. These strategies form the basis for investment from both the NAP and NHT, which are described below.
- 2.19 Once investment strategies are decided, partnership agreements between the Australian Government, the CMO and the relevant state or territory government are signed, formally releasing investment funds. Partnership agreements define:
- funding amounts for salinity and water quality actions identified in the investment strategy flowing from each accredited regional plan;
 - responsibilities for undertaking the activities and cost-sharing arrangements;
 - agreed outcomes to be achieved; and
 - targets and milestones, performance measures and a comprehensive monitoring and evaluation process.²⁵
- 2.20 Several CMOs provided examples of their catchment blueprints and the salinity plans developed under these catchment strategies.²⁶
- 2.21 The importance of addressing salinity in the wider NRM context was emphasised to the Committee. Salinity is one of a range of natural resource degradation issues that land managers and CMOs must address:

23 *ibid.*, pp. 3-4.

24 *ibid.*, p. 2

25 Natural Resource Management Communications Team, *A natural resource management overview*, DAFF and DEH, Canberra, 2004, viewed 20 January 2004, <www.napswq.gov.au>.

26 Murrumbidgee Catchment Management Board, *Exhibit no. 53, Murrumbidgee Catchment Blueprint*; Glenelg Hopkins Catchment Management Authority (GHCMA), *Exhibit no. 22, Regional Catchment Strategy 2003–2004*; GHCMA, *Exhibit no. 20, Salinity Plan: Final Draft*; Eyre Peninsula Catchment Water Management Board, *Exhibit no. 117, Eyre Peninsula Salinity Strategy*; and Goulburn Broken Catchment Management Authority, *Exhibit no. 56, Goulburn Broken Draft Regional Catchment Strategy*.

The natural resource system is complex. Diverse linkages occur between soil, water, plant and animal communities. It is not possible to change one aspect without expecting resultant change in linked areas. As such, salinity planning and implementation cannot occur in isolation. Regional, state and national frameworks provide the mechanism through which due consideration of these other elements are taken into account.²⁷

- 2.22 Murrumbidgee Irrigation noted that ‘salinity should not be considered in isolation, so knowledge transfer mechanisms need to be able to integrate all natural resource management issues for the landholder.’²⁸
- 2.23 These perspectives accord with the Prime Minister’s Science, Engineering and Innovation Council (PMSEIC), which observed in its *Moving Forward in NRM* report that factors causing natural resource degradation are interrelated and degradation problems should not be viewed in isolation, but from a ‘whole-of-landscape’ perspective.²⁹ The PMSEIC also concluded that the causes of dryland salinity can be most effectively addressed at the catchment or regional scale, rather than the farm level.³⁰

National Action Plan for Salinity and Water Quality

- 2.24 Agreed to by the Australian, state and territory governments at the Council of Australian Governments (COAG) meeting in November 2000, the NAP:

identifies high priority, immediate actions to address salinity ... and deteriorating water quality in key catchments and regions across Australia.

It is a plan for decisive salinity and water quality related action to ensure that our land and water management practices will sustain

27 GHCMA, *Exhibit no. 20, Salinity Plan: Final Draft*, p. 21. See also: Dr Baden Williams, *Submission no. 1*, p. 1; Mr John Ive, *Submission no. 74.1*, p. 2; Land and Water Australia, *Submission no. 59*, p. 4; Murrumbidgee Irrigation, *Submission no. 52*, p. 4; CSIRO, *Submission no. 42*, p. 4; Mr Warwick McDonald (Murray-Darling Basin Commission), *Transcript of Evidence*, 7 November 2003, p. 27. Other forms of natural resource degradation include: waterlogging; sodicity; soil nutrient decline and acidification; acid sulphate soils; water and wind erosion; soil structure decline; declining river, wetland and estuary health; land and water contamination; loss of ecosystem function and biodiversity; weeds; and pests.

28 Murrumbidgee Irrigation, *Submission no. 52*, p. 4.

29 PMSEIC, *Moving Forward in Natural Resource Management: The contribution that science, engineering and innovation can make*, Australian Government Department of Education, Science and Training (DEST), Canberra, 1999, p. 34, viewed 29 January 2004, <www.dest.gov.au/science/pmseic/documents/nrm2.pdf>.

30 *ibid.*, p. 21.

productive and profitable land and water uses as well as our natural environments.³¹

2.25 The NAP aims to enable regional communities and landholders to use coordinated and targeted action to:

- prevent, stabilise and reverse trends in dryland salinity affecting the sustainability of production, the conservation of biological diversity and the viability of infrastructure; and
- improve water quality and secure reliable allocations for human uses, industry and the environment.³²

2.26 The NAP proposes that 21 highly affected catchments and regions be addressed. These 'priority regions' were determined by the Australian Government following consultation with the states and territories, and were based on data from the National Land and Water Resources Audit (NLWRA).³³

2.27 The NAP comprises six key components:

- setting standards and regional targets for salinity, water quality and stream and terrestrial biodiversity. These are to be based on good science and economics, established bilaterally or multilaterally with the states;
- integrated catchment/regional NRM plans developed by the local community in all highly affected catchments/regions, which will be jointly accredited by the Australian and relevant state and territory governments, and include proposed targets and outcomes, accountability and performance monitoring and reporting measures;
- capacity building activities to assist communities and landholders to develop and implement integrated regional plans, together with technical and scientific support and engineering innovations;
- an improved governance framework, covering property rights, pricing and regulatory reforms for water and land use;
- clearly articulated roles for each level of government and the community to replace current frameworks for natural resource management; and

31 COAG, *A National Action Plan for Salinity and Water Quality*, DAFF and DEH, Canberra, 2000, p. 5.

32 DAFF and DEH, *Exhibit no. 64, op. cit.*, p. 1.

33 The locations of the priority regions are available on the web site of the National Action Plan, viewed 20 January 2004, <www.napswq.gov.au/publications/priority_regions>.

- a public communication program to support understanding of the NAP.³⁴

2.28 The capacity building component is intended to assist communities and landholders by:

- reorienting the facilitator and coordinator support network to support integrated catchment/region management planning and implementation;
- developing the management and technical skills of land managers and other stakeholders to ensure wider adoption of sustainable land and water use, and to enhance the capacity of communities to prepare, evaluate and monitor the progress of integrated catchment/region management plans;
- extending information to communities, including NLWRA data, so that they can effectively develop and implement their plans; and
- developing (where they do not exist) appropriate catchment/regional delivery bodies/arrangements to implement the plans.³⁵

2.29 The NAP notes that ‘new scientific developments allow localised salt to be identified and investment to be targeted’.³⁶ The application of new scientific, technical and engineering knowledge is said to require:

- ‘ultrasound’ (that is, airborne geophysics, incorporating electromagnetic, airborne magnetic, radiometric and digital elevation techniques) salinity mapping and related technologies in priority catchments/regions to identify salinity deposits and flows as a basis for focused regional management action;
- salinity response teams to provide specific technical expertise to assist communities to develop integrated regional plans;
- development of production systems attuned to Australian conditions that facilitate sustainable production in rural and regional Australia; and
- salt interception/engineering schemes in areas that are exporting salt into waterways and where resulting downstream impacts are positive.³⁷

34 COAG, *op. cit.*, p. 6. See also: National Capacity Building Team for the National Action Plan for Salinity and Water Quality, *Natural Resource Management Capacity Building Framework*, DAFF, Canberra, 2002, pp. 2-6, viewed 20 January 2004, <www.affa.gov.au>.

35 *ibid.*, p. 8.

36 *ibid.*

37 *ibid.*

- 2.30 The Australian Government will contribute \$700 million to the NAP over the seven years to 2007–08. CMOs will be funded to implement accredited regional plans on a matching basis with the states and territories. State allocations for the NAP are listed in Table 2.1.
- 2.31 Funding under the NAP is to be delivered primarily by:
- foundation funding to assist CMOs in priority regions to develop accredited regional plans to support future investment, which can include activities such as a research and development (R&D) needs analysis and preparing a strategy for monitoring and evaluation;
 - priority funding is for actions, agreed between the Australian Government, state and CMO, prior to accreditation of the regional plan and include high priority works; and
 - capacity building funding to provide the information, tools or skills to support the NAP.

Table 2.1: Indicative allocations for the \$700 million *National Action Plan for Salinity and Water Quality* matching funding to be contributed by state and territory governments— agreed at the Council of Australian Governments meeting, November 2000

State	\$ Million
New South Wales	198
Victoria	152
Queensland	81
Western Australia	158
South Australia	93
Tasmania	12
Northern Territory	6
Total	700

Source Natural Resource Management Communications Team, *A natural resource management overview*, Australian Government Departments of Agriculture, Fisheries and Forestry and the Environment and Heritage, Canberra, 2004, viewed 20 January 2004, <www.napswq.gov.au/publications/index>.

- 2.32 Following adoption of the initial in-principle intergovernmental agreement, each state and territory government has now entered into bilateral agreements with the Australian Government. The bilateral agreements established state/territory-specific arrangements for the CMOs, the process for accrediting regional plans within that jurisdiction and other administrative arrangements.

Natural Heritage Trust

- 2.33 The NHT was established by the Australian Government in 1997 to fund environmental protection, sustainable agriculture and natural resource management directed towards:
- biodiversity conservation;
 - sustainable use of natural resources; and
 - community capacity building and institutional change.³⁸
- 2.34 Trust funding totalling \$1.4 billion supported over 12 000 projects and related programs over the six years to 2001–02. More than 400 000 volunteers were involved in these projects, which included erecting more than 36 000 kilometres of fencing to protect areas of remnant vegetation, and planting some 27 million seedlings.³⁹
- 2.35 During its first phase, the Trust funded key research programs that produced valuable information to aid understanding of the salinity problem, notably the NLWRA, which was established in 1997 and allocated \$30 million of Trust funds.
- 2.36 In the 2001 Budget, the Trust was allocated an additional \$1 billion to extend the program for a further five years to 2006–07. Of the extension budget, an estimated \$350 million has been allocated for measures to improve water quality.⁴⁰ The 2004 Budget provided an additional \$300 million for the NHT to 2007-08, bringing total investment in the Trust to \$3.0 billion.⁴¹
- 2.37 Trust funds are delivered at three levels:
- national investments, which may be funded solely by the Australian Government or matched by the relevant states and territories;
 - regional investments, for which the states and territories have agreed to match the Australian Government’s investments in delivering the NHT extension; and

38 DAFF and DEH, *Exhibit no. 64, op. cit.*, p. 2.

39 *ibid.*

40 Information on the NHT obtained from the Trust web site, viewed 21 January 2004, <www.nht.gov.au/overview.html>.

41 The Hon. Dr David Kemp MP (Australian Government Minister for the Environment and Heritage), *A Sustainability Strategy for the Australian Continent: Environment Budget Statement 2004-05*, p. 23, viewed 12 May 2004, <www.budget.gov.au/2004-05/ministerial/download/environment.pdf>.

- local investments, which are funded solely by the Commonwealth through the Australian Government Envirofund.⁴²
- 2.38 During the first phase of the NHT, approximately 60 per cent of approved funding was allocated to community organisations and local governments, with numerous grants provided directly for salinity projects. In phase two, regional investments will become the principal delivery mechanism for Trust funds and will follow the model developed under the NAP. That is, investments are to be made on the basis of accredited, integrated catchment or regional NRM plans, incorporating the major natural resource management issues in the particular region or catchment.⁴³
- 2.39 As with the NAP, regional plans accredited under the NHT are to be 'based on rigorous scientific and technical information' and 'set achievable natural resource condition targets'. This requires investment in research.⁴⁴
- 2.40 With the second phase of the Trust, programs have been consolidated and funding for projects is now delivered under four programs:
- Landcare invests in contributions to reverse land degradation and promote sustainable agriculture;
 - Bushcare invests in contributions to conserve and restore habitat for Australia's native flora and fauna;
 - Rivercare invests in contributions to improve water quality and environmental conditions in river systems and wetlands; and
 - Coastcare invests in contributions to protecting coastal catchments, ecosystems and the marine environment.⁴⁵

National Landcare Program

- 2.41 Australian Government efforts to address salinity began with the NLP in 1989.⁴⁶ The NLP aims to 'increase engagement by industry and resource

42 DAFF and DEH, *Exhibit no. 64, op. cit.*, pp. 2-3.

43 DAFF and DEH, *Framework for the Extension of the Natural Heritage Trust*, Canberra, 2002, p. 4, viewed 21 January 2004, <www.nht.gov.au/extension/framework/index.html#framework>.

44 *ibid.*

45 *ibid.*, p. 2.

46 D. J. Pannell, 'Dryland salinity: economic, scientific, social and policy dimensions,' *Australian Journal of Agricultural and Resource Economics*, vol. 45, no. 2, December 2001, pp. 536-537.

users in landcare and NRM activities, with a focus on developing partnerships in sustainable primary industries.⁴⁷

- 2.42 The NLP primarily provides facilitators and organisers for Landcare groups (comprised of volunteers), and partial funding of relatively small on-ground works. There are currently 4 000 Landcare groups nationally, which operate largely in rural Australia, and some 40 per cent of Australian farmers belong to Landcare groups.⁴⁸
- 2.43 Activities of the Program have included: raising awareness and improving information flows, with a focus on the communication of information on improved management practices; facilitating engagement of industry and the wider community in NRM at regional and national levels; and assisting on-ground implementation of projects that contribute to NLP outcomes.
- 2.44 In 2003 the NLP received additional funding of \$122 million for the three years to 2005–06. Investment in Landcare is also provided by the NHT to complement investment in sustainable NRM practices.
- 2.45 The NLP Investment Framework for 2003–04 states that the Program will consist of community support and a national component:
- Community support will fund Landcare investments principally identified in accredited regional NRM plans and investment strategies. In this regard, the NLP complements the NHT and NAP programs. Investment under the Community Support component will fund community and industry on-ground works where they increase uptake of sustainable NRM practices, enhance the skills of NRM managers, promote the implementation of best management practice and improve integration of NRM into business and property management plans at the enterprise level.
 - The national component will fund projects that have a broad scale national outcome rather than regional or local outcomes, and are therefore most effectively addressed at the national level. The National Component has the following elements:
 - ⇒ Landcare Support funds the Australian Landcare Council (which advises the Federal Ministers for the Environment and Heritage and Agriculture, Fisheries and Forestry), Landcare Australia Limited (which promotes the landcare ethic and raises corporate
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47 Landcare and Sustainable Industries, Natural Resource Management Business Unit, *National Landcare Program – Investment Framework for 2003–04*, DAFF, Canberra, 2003, p. 1, viewed 21 January 2004, <www.affa.gov.au>.

48 *ibid.*

sponsorship for landcare activities), and the National Landcare Facilitator.

- ⇒ Natural Resource Innovation Grants: one-off grants to groups or individuals to adopt, implement and deliver innovations that will contribute to improved NRM in primary production or processing. Such innovations might include, for example, testing of cultivars of salt-tolerant plants in a region.
- ⇒ Industry Partnerships: investments in projects to assist industry in identifying the NRM issues facing them nationally and to assist in addressing these issues.
- ⇒ Priority National Projects: funds projects in areas of high priority identified by the Australian Government.
- ⇒ Monitoring and evaluation: funds program evaluations and assessments.⁴⁹

2.46 A review of the Program's effectiveness and appropriateness, which was submitted to the relevant Ministers in October 2003, concluded that the NLP:

has been highly effective in increasing awareness of natural resource management issues, in generating and transferring knowledge among participants on sustainable farming and natural resource management practices, and in building skills, capacity and social cohesion.⁵⁰

2.47 The 2004 Budget extended the Program for two years, providing an additional \$80 million (\$40 million in both 2006-07 and 2007-08).⁵¹

Multilateral, state and local government initiatives to address salinity

2.48 In addition to the three national programs described in the preceding section, salinity is also being addressed through strategies developed by

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

50 Australian Government Department of Agriculture, Fisheries and Forestry, *Review of the National Landcare Program*, DAFF, Canberra, October 2003, p. 9, viewed 19 April 2004, <www.daff.gov.au/corporate_docs/publications/pdf/nrm/landcare/nlp_review_report_final.pdf>.

51 The Hon. Dr David Kemp MP (Australian Government Minister for the Environment and Heritage), *A Sustainability Strategy for the Australian Continent: Environment Budget Statement 2004-05*, p. 27, viewed 12 May 2004, <www.budget.gov.au/2004-05/ministerial/download/environment.pdf>.

the states and the Murray-Darling Basin Commission (MDBC). Recognising the threat posed by salinity to rural towns and urban areas, some local governments have also taken action to address salinity. The following section surveys the salinity strategies adopted by the MDBC and those state and local governments that submitted to the inquiry, and describes the place of science in these initiatives.

The Murray-Darling Basin Initiative and salinity strategies

2.49 The *Murray-Darling Basin Initiative*, which was established to give effect to the Murray-Darling Basin Agreement, is:

the largest integrated catchment management program in the world, covering the watersheds of the Murray and Darling rivers, an area of over one million square kilometres.⁵²

2.50 The Murray-Darling Basin Agreement was adopted in 1992 and followed the establishment in 1985 of the Murray-Darling Basin Ministerial Council. The Council is comprised of ministers from the Australian Government, New South Wales, Victoria, South Australia and Queensland governments holding land, water and environment portfolios. It aims:

to promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin.⁵³

2.51 The key institutional elements specified in the Agreement are the:

- Murray-Darling Basin Ministerial Council (MDBMC), the decision-making forum;
- MDBC, the executive arm of the Ministerial Council which advises the Council and implements its decisions; and the
- Community Advisory Committee, which provides the Ministerial Council with advice and provides a means of communication between the Council and the community.⁵⁴

52 MDBC, *The Murray-Darling Basin Initiative – Overview*, Canberra, 2004, viewed 22 January 2004, <www.mdbc.gov.au/about/governance/overview.htm>.

53 Murray-Darling Basin Ministerial Council, *Murray-Darling Basin Agreement*, MDBC, Canberra, 1992, p. 8, viewed 22 January 2003, <www.mdbc.gov.au/about/governance/agreement.htm>. Queensland became a signatory to the Agreement in 1996 and the ACT Government formalised its involvement through a memorandum of understanding in 1998.

54 MDBC, *The Murray-Darling Basin Initiative–Overview*, *loc. cit.*

The role of the Murray-Darling Basin Commission

- 2.52 The MDBC, comprising an independent President, two Commissioners from each contracting government and a representative of the ACT Government, is responsible for:
- managing the River Murray and the Menindee Lakes system of the lower Darling River; and
 - advising the Ministerial Council in relation to the use of the water, land and other environmental resources of the Basin.⁵⁵
- 2.53 In performing its functions, which are specified in the Agreement, the Commission has a role in coordinating the efforts of government partners to the Initiative and has a 'mandate to initiate, support and evaluate integrated NRM across the Murray-Darling Basin.'⁵⁶ In this way the Commission:
- works cooperatively with the partner governments, committees and community groups to develop and implement policies and programs aimed at the integrated management of the Murray-Darling catchment and managing and distributing the water of the River Murray in accordance with the Murray-Darling Basin Agreement.⁵⁷
- 2.54 The Commission is an autonomous organisation equally responsible to the governments represented on the Ministerial Council. The Commission is not a government department, nor a statutory body of any individual government.⁵⁸

Salinity strategies for the Murray-Darling Basin

- 2.55 In response to the threat posed by salinity to the irrigation industry, the residents of Adelaide and many regional towns in the Basin, in 1988 the MDBMC adopted a *Salinity and Drainage Strategy (S&DS)*. From 1988 until it was superseded in 2001, the Strategy provided a framework for New South Wales, Victoria, South Australia and the Commonwealth to manage salinisation in the shared rivers of the Basin.
- 2.56 A key element of the Strategy was the commitment by governments to undertake a program of works to achieve a specific salinity reduction target of lowering average salinity in the Murray River at Morgan by 80

55 MDBC, *Submission no. 51*, p. 4.

56 *ibid.* p. 5.

57 *ibid.*

58 *ibid.*, p. 4

Electrical Conductivity Units (EC).⁵⁹ The Strategy also aimed to ensure that salinity levels at Morgan were less than 800 EC, 95 per cent of the time. A system of salinity credits and debits was adopted to manage the state accountabilities. Each state needed to ensure that it remained in credit by undertaking works which reduced average salinity levels at Morgan.⁶⁰

- 2.57 The S&DS sought to balance the competing needs of land management and river protection through the use of a combination of engineering options, involving construction of salt interception and drainage schemes (for example, groundwater pumping), and non-engineering solutions, including the development of land and water management plans in irrigation regions.⁶¹
- 2.58 In the decade to 1998, approximately \$70 million was invested in the on-ground works and plans, which now exist for most irrigation areas in the Basin.⁶² Combined with state interception and drainage diversion schemes, the Strategy intercepted more than 400 000 tonnes of salt per year that would have otherwise entered the Murray. The S&DS successfully achieved its objectives.⁶³
- 2.59 The MDBC estimated that over the period 1980 to 2003 salinity management in the Basin lowered average salinity levels in the river Murray at Morgan by 200 EC, relative to the levels that would have occurred without intervention.⁶⁴
- 2.60 Under the S&DS the Commission's key roles, through inter-jurisdictional working groups, were to:

59 Electrical Conductivity Units (EC) is the standard measure of water salinity levels—the higher the EC value, the more saline the water. One EC equals one micro-Siemen per centimetre measured at 25 degrees Celsius, or approximately 0.6 milligrams of salt per litre. Morgan is located a short distance upstream of the pipeline off-takes for Adelaide's water supply and is used as an indicator site for impacts on the whole Murray-Darling Basin system.

60 MDBC, *Salinity and Drainage Strategy – Ten Years On*, Canberra, 1999, p. 3. 800 EC units is the World Health Organization's recommended desirable upper limit for salinity in drinking water.

61 MDBC, *Submission no. 51*, p. 5.

62 PMSEIC, *Dryland Salinity and its Impacts on Rural Industries and the Landscape*, DEST, Canberra, 1998, p. 28, viewed 22 January 2004, <www.dest.gov.au/science/pmseic/documents/salinity.pdf>.

63 MDBC, *Submission no. 51*, p. 5; MDBC, *Salinity and Drainage Strategy – Ten Years On*, *op. cit.*, p. 9.

64 MDBC, *Exhibit no. 72, The Effect of Salinity Management in the Murray-Darling Basin – Average Salinity Levels in the River Murray at Morgan (South Australia)*.

- coordinate the investigation, construction and ongoing operation of jointly funded salt interception schemes (Salt Interception Working Group);
- administer the accountability arrangements for the system of salinity credits and debits that operated under the Murray-Darling Basin Agreement (Salinity and Drainage Strategy Assessment Working Group);
- coordinate strategic investigations and education activities to develop and disseminate new knowledge in salinity related issues (Irrigation and Dryland Issues Working Groups); and
- participate in broader forums for salinity research and development, including the *National Dryland Salinity Program* (NDSP), Cooperative Research Centres (CRC) for Catchment Hydrology and Freshwater Ecology, and the NLWRA.⁶⁵

2.61 In 1997 a process to review the Strategy was begun and a *Basin Salinity Audit* was issued in 1999.⁶⁶ The Audit concluded that under the then existing management systems and in the absence of major interventions:

- over five million tonnes of salt are mobilised to the land surface every year in the Basin and by 2050 that figure will increase to 8.4 million tonnes and more than 10.3 million tonnes in 2100;
- three to five million hectares of land will become salinised during the coming 100 years to the extent that there will be substantial effects on water quality, productivity, the environment and built infrastructure;
- salinity in the lower Murray will increase by approximately 50 per cent during the coming 50 years;
- damage to agricultural productivity and infrastructure in the Basin caused by salt will increase to an estimated \$600 to \$1 000 million a year during the next century; and
- there will be serious effects on major wetlands such as the Macquarie marshes, the Avoca marshes and the Chowilla wetlands.⁶⁷

2.62 With these dire predictions the Audit concluded that the nation's efforts to combat salinity in the Basin needed to be significantly expanded.

65 MDBC, *Submission no. 51*, p. 5.

66 MDBMC, *The Salinity Audit of the Murray-Darling Basin: A 100-year perspective*, MDBC, Canberra, 1999, p. vii, viewed 21 January 2004, <www.mdbc.gov.au/naturalresources/pdf/Final_Salt_Audit.pdf>.

67 MDBMC, *Salinity Audit: Community Summary*, MDBC, Canberra, 1999.

- 2.63 It was concluded that if no additional salinity management measures were undertaken, the gains in river quality made under the Strategy would be overwhelmed by large increases in salinity contributions from the dryland farming areas and from drainage systems built prior to the Strategy. The Audit estimated that the reduction in lower River Murray salinity would be cancelled out in 20 to 30 years, and salinity levels would exceed the Australian Drinking Water Guidelines for good quality water within 50 to 100 years.⁶⁸ The Audit pointed to the need for a new Basin salinity strategy.
- 2.64 The new *Basin Salinity Management Strategy 2001—2015* (BSMS) was released in August 2001. The BSMS extends the life of the targets set under the Salinity and Drainage Strategy for the Murray River at Morgan until 2015. It also extends the accountability arrangements to South Australia and Queensland and introduces the use of end-of-valley salinity and salt-load targets in each state to help maintain the Morgan (Basin-wide) target.
- 2.65 The BSMS has four objectives:
- to maintain the water quality of the shared water resources of the Murray and Darling Rivers for all beneficial uses—river salinity at Morgan will be maintained at less than 800 EC for 95 per cent of the time;
 - to control the rise in salt loads in all tributary rivers of the Basin and, through that control, protect their water resources and aquatic ecosystems at agreed levels—meeting the end-of-valley salinity and salt load targets;
 - to control land degradation and protect important terrestrial ecosystems, productive farm land, cultural heritage and built infrastructure at agreed levels Basin-wide—expressed as within-valley targets; and
 - to maximise net benefits from salinity control across the Basin.⁶⁹
- 2.66 Under the BSMS partner governments committed to nine elements of strategic action which are to be implemented over the next 15 years:
- capacity building initiatives to implement the Strategy, including improving access to and use of the knowledge and decision tools generated by salinity research and development;

68 MDBC, *Exhibit no. 34, Salinity Update 2003*, p. 3.

69 MDBC, *Submission no. 51*, p. 6.

- identifying important values and assets throughout the Basin at risk of salinity, and the nature and timeframe of risk. This explicitly recognises the 'triple bottom line' approach, requiring a balance between economic, environmental and social values. It also recognises that living with salinity will be the only choice in some situations;
- setting salinity targets. The Council will adopt end-of-valley targets. States will empower CMOs to advise on end-of-valley targets and determine within-valley targets and monitoring arrangements, under salinity and catchment management plans;
- managing trade-offs with the available within-valley options. While meeting other catchment health targets and social and economic needs, states are to analyse the best mix of land management, engineering, river flow, and 'living with salt' options to achieve salinity targets;
- implementing salinity and catchment management plans;
- redesigning farm systems. The state governments are to coordinate and enhance research and development into new farming and forestry systems that deliver improved control of groundwater recharge. The Commission will enhance R&D into new industries, such as broadacre saltland agronomy, saline aquaculture, and salt harvesting;
- targeting reforestation and vegetation management;
- constructing new salt interception works to protect Basin-wide assets and values; and
- ensuring Basin-wide accountability through monitoring, evaluating and reporting. The states are to demonstrate accountability by reporting to the Commission and Council through state end-of-valley Report Cards and Commission Salinity Registers that record the salinity effects of actions, including salt interception schemes and catchment management plans.⁷⁰

2.67 The BSMS was the first strategy to be developed under the over-arching *Integrated Catchment Management Policy* (ICM Policy) statement. Released by the MDBMC and the Community Advisory Committee in 2001, the ICM Policy provides the framework for NRM in the Basin over the decade 2001 until 2010 and sets out a program for the development of a package of issue-specific strategies, of which the BSMS is the first.⁷¹

⁷⁰ MDBC, *Exhibit no. 37, Basin Salinity Management Strategy 2001-2015*, pp. iii, 3.

⁷¹ *ibid.*, p. 27.

- 2.68 The ICM Policy sets standards to be met by all new Basin strategies and seeks to ensure:
- various natural resources management issues affecting a river catchment or region, and the environmental, economic and social dimensions of the issues, are addressed in a coordinated way by everyone with an interest in the issues.⁷²
- 2.69 Consequently, the MDBC is now supporting research activities that will contribute to an understanding of how to manage multiple issues at once, in addition to supporting the implementation of the BSMS. These investigations include targeting reforestation and vegetation management, and redesigning farming systems.⁷³
- 2.70 The BSMS has been designed to be compatible with the NAP, state salinity strategies and regional plans. The Intergovernmental Agreement for the NAP requires that the implementation of the NAP will be consistent with the multilateral approach of the BSMS and regional plans accredited under the NAP are expected to meet the requirements of the BSMS.⁷⁴

The use of science in the Murray-Darling Basin salinity strategies

- 2.71 The MDBC stated that its salinity strategies have been developed with the use of rigorous science and research, including:
- the use of objective targets and strong accountabilities based on monitoring and assessment of proposed actions. The end-of-valley salinity target approach emphasised in the BSMS gives a reference point for decisions about the most appropriate and effective management actions, and the science needed to achieve them;
 - the effects of all management actions are assessed in terms of their downstream salinity impacts by using a biophysical reference point of salinity levels in the River Murray at Morgan in South Australia, combined with an economic assessment framework;
 - actions are based on the best available, 'best bet' knowledge, managing risks and continually learning from the results;

72 MDBC, *Exhibit no. 41, Managing Dryland Salinity – Draft Report*, p. 20.

73 *ibid.*, pp. 20-21.

74 COAG, *Intergovernmental Agreement on a National Action Plan for Salinity and Water Quality*, Canberra, 2000, p. 3, viewed 21 January 2004, <www.napsqw.gov.au/publications/intergovernmental.html>.

- a coordinated multi-jurisdictional approach, because bilateral approaches will not provide sufficient coordination for Basin-wide salinity management. Accordingly, the Commission has developed multi-jurisdictional working groups. Of particular relevance to salinity management is the Basin Salinity Management Strategy Implementation Working Group which implements the BSMS and develops and extends knowledge in relation to the Strategy; and
 - the MDBC provides funds for investment in knowledge generation and dissemination of information related to salinity and other NRM issues. The Commission also draws on and partners with national science and research agencies, including CSIRO, NDSP, NLWRA, and the CRC Program.⁷⁵
- 2.72 The MDBC has contributed to knowledge generation for salinity management through investigations funded under its Irrigation and Rivers, and Dryland Programs.
- 2.73 Since 1990, the Dryland Program has contributed to knowledge about the causes of land, water and vegetation issues in dryland landscapes, the impacts of the issues and management options to address them:
- The extensive body of knowledge generated by salinity investigation during the 1990s was brought together (and supplemented by additional investigations) in developing the *Basin Salinity Management Strategy 2001 – 2015* in 2000.⁷⁶
- 2.74 Knowledge generated by the Dryland Program has been synthesised into booklets to promote the sharing of information among Basin stakeholders. Of these, the *Managing Dryland* salinity booklet describes the key salinity management tools and understanding developed by 27 key projects within the Dryland Program from 1990 to 2000, across the following themes: the quantification of salinity impacts; understanding salinity processes; assessing management options; and implementing on-ground works.⁷⁷
- 2.75 The tools developed from the research are primarily aimed at supporting regional to Basin scale salinity management, rather than farm scale activities. The latter are considered to be ‘primarily the preserve of State natural resources and agricultural agencies and rural industry R&D corporations.’⁷⁸
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75 MDBC, *Submission no. 51*, pp. 7-8.

76 MDBC, *Exhibit no. 41, op cit.*, p. 19.

77 *ibid.*, p. 3.

78 *ibid.*, pp. 4-5.

- 2.76 The Commission also stressed that knowledge is required across all geographic scales (national, Basin, state, catchment, local and property scales). It was argued that there must be strong links between the knowledge generated at each scale and, in particular, how cumulative action at the property scale will change the health of the catchment and the Basin as a whole. Knowledge about the biophysical processes causing salinity and management options needs to be expanded and integrated with knowledge about the economic and social needs of communities affected by salinity.⁷⁹
- 2.77 The MDBC noted that primary responsibility for NRM lies with the state and territory governments, but that the Australian Government has now taken a greater role through its contribution of funding for the NAP. The MDBC argued it is therefore essential that the Commonwealth ‘work in partnerships across the State, Territory, catchment and local government boundaries to take action to protect the health of the Basin.’⁸⁰ It urged that roles and responsibilities in relation to NRM be clearly defined.
- 2.78 The MDBC stated that, under the ICM Policy, the Australian Government’s responsibilities include the following:
- provide leadership on matters of national interest, including international obligations;
 - coordinate policies across portfolios of the Australian Government;
 - generate, coordinate and share knowledge;
 - be involved in setting targets for priority national outcomes;
 - act to achieve these outcomes using a range of government mechanisms, including providing information and investment;
 - be accountable for investments and outcomes;
 - ensure that Basin, State and catchment frameworks are adequate to deliver these outcomes;
 - monitor progress toward achieving these outcomes;
 - engage key partners; and
 - review and evaluate Australian Government policies, legislation and mechanisms.⁸¹

79 MDBC, *Submission no. 51*, pp. 7-8.

80 *ibid.*, p. 9.

81 *ibid.*, pp. 9-10.

- 2.79 In the 2004 Budget, the Australian Government announced funding of \$67 million for the MDBC over four years to 2007-08, to fund capital works, education activities and salinity mitigation works.⁸² Total Australian Government investment in the Basin now approaches \$1 billion across the NHT, NAP and financial support for the MDBC.⁸³

State strategies

- 2.80 While the Australian Government's role in natural resource management is significant—through leadership, national coordination and financial assistance to the states/territories and regions—the division of Constitutional powers grants states and territories the power to legislate with respect to most NRM matters, including rural industries, land tenure, land use and water supply.⁸⁴
- 2.81 Salinity strategies have been developed by most states, including all the Murray-Darling Basin states. Of those states with salinity programs, the Committee received submissions from the Governments of New South Wales, Western Australia and South Australia.

New South Wales

- 2.82 Developed following the State's Salinity Summit in March 2000, the New South Wales salinity strategy, *Taking on the Challenge: NSW Salinity Strategy*, was released in August 2000 and involved an initial State Government commitment of \$52 million over four years. The Strategy's objective is to slow down the rate of increase in salinity in the State and it has eight components:

82 Australian Government, *2004-05 Budget Overview*, p. 22, viewed 12 May 2004, <www.budget.gov.au/2004-05/overview/download/budget_overview.pdf>.

83 The Hon. Dr David Kemp MP (Australian Government Minister for the Environment and Heritage), *A Sustainability Strategy for the Australian Continent: Environment Budget Statement 2004-05*, p. 9, viewed 12 May 2004, <www.budget.gov.au/2004-05/ministerial/download/environment.pdf>.

84 Information obtained from the web site of the Natural Resource Management Ministerial Council and the Primary Industries Ministerial Council, viewed 27 January 2004, <www.mincos.gov.au/background.htm>. See also: s. 100 and s. 96 of the Constitution; DAFF submission to the House of Representatives Standing Committee on Agriculture, Fisheries and Forestry *Inquiry into Future Water Supplies for Australia's Rural Industries and Communities*, p. 4, viewed 10 April 2004, <www.aph.gov.au/house/committee/primind/waterinq/sub160.pdf>; The Hon. John Anderson MP (Deputy Prime Minister, Minister for Transport and Regional Services), *National Salinity and Water Quality Action Plan is a Watershed for Farmers' Rights - Anderson*, media release, Canberra, 2 November 2000, viewed 5 April 2004, <www.ministers.dotars.gov.au/ja/releases/2000/november/a159_2000.htm>.

- development of end-of-valley salinity targets that the State can live with and afford;
- establishment of market-based mechanisms to provide land managers with incentives to reduce salinity;
- development of business opportunities for productive use of saline land and water resources;
- improved regulation;
- provision of salinity advice to land managers through extension staff and Salt Action Teams;
- provision of information, including data, analytical tools, decision support and dissemination;
- in collaboration with other agencies, conduct scientific research into the biophysical processes of salinity, land use systems that minimise recharge or allow for the use of saline land and water, the impact of salinity on natural ecosystems and the social and economic impacts of salinity management; and
- planning at the appropriate geographic scale, including the development of catchment management plans.⁸⁵

2.83 As part of an NRM package announced by the New South Wales Government in October 2003, the State established a Natural Resources Commission and a Natural Resources Advisory Council. Among its responsibilities, the Commission will:

- set environmental targets and standards for New South Wales and report on progress towards their achievement;
- recommend to Government the approval of catchment plans developed by the State's 13 Catchment Management Authorities (CMAs); and
- audit the performance of CMAs and carry out inquiries.⁸⁶

2.84 The New South Wales Government explained that management actions for salinity mitigation at the regional level, which flow from the catchment blueprints and their associated regional investment strategies, are based on the best available scientific knowledge.⁸⁷

85 New South Wales Department of Land and Water Conservation, *Taking on the Challenge: NSW Salinity Strategy*, Government of New South Wales, Sydney, 2000, viewed 27 January 2004, <www.dlwc.nsw.gov.au/care/salinity/index.html>.

86 *Land and Water News*, 2 December 2003, p. 14.

87 Government of New South Wales, *Submission no. 61*, p. 1.

2.85 It was submitted that detailed salinity assessment across the whole landscape is both impractical and financially prohibitive. However, the State argued that it is well advanced in developing techniques for salt and water balance modelling from a paddock to whole-of-catchment scale. These models also measure the impacts of various management actions.⁸⁸

2.86 The New South Wales Government stated that it uses science to develop solutions for commercial agriculture and to support salinity management at three levels:

- At the Basin level, the key questions which require the use of science are:
 - ⇒ What is the current and expected future size and extent of the salt problem?
 - ⇒ How does salt generated in one catchment impact on downstream catchments and states?

Audits have been undertaken to identify the magnitude of the salinity problem and its driving factors. These were peer reviewed by the CSIRO and used data on groundwater levels and river salinity as the basis for estimating future dryland salinity trends. The State's regional bodies used the audits as the primary source of information when setting end-of-valley salinity targets in their regional plans. At this level, the State utilises the river basin Integrated Water Quantity and Quality Model (IQQM) which is able to analyse how daily flows and salt loads from contributing tributaries travel through the main river systems of New South Wales. Combined with a sub-catchment scale salt and water balance model, referred to as CATSALT, land use change scenarios can be analysed at a Basin scale to evaluate contributions to achieving salinity targets.⁸⁹

- At a sub-catchment level, New South Wales is undertaking new salinity hazard and risk assessments in order to answer four key questions:
 - ⇒ Where is the salt?
 - ⇒ Is it being mobilised?
 - ⇒ Where are management options best located to achieve required outcomes?
 - ⇒ What undesirable consequences, such as impacts on water yields, might there be?

88 *ibid.*

89 *ibid.*, pp. 1-2.

The Government is currently rolling out CATSALT in 150 sub-catchments across the State. The model provides a daily time series analysis of land use change impacts on groundwater and surface wash-off of salt from priority tributaries identified in the Murray-Darling Basin, Hunter and coastal audits.⁹⁰

- At the property scale, science is being used to answer questions that include:
 - ⇒ Is salt a problem due to current or future land use and management?
 - ⇒ What options are available to mitigate it?
 - ⇒ Where are the options best located?
 - ⇒ How effective are the options?

At this scale, the State has developed a Land Use Options Simulator (LUOS) to extrapolate CATSALT results to calculate the effectiveness or impacts of a land use option, down to the paddock scale, on the average annual river salinity.⁹¹

Western Australia

- 2.87 With more than 70 per cent of the nation's salinity affected land area, Western Australia has a major dryland salinity problem:

Land, water, infrastructure and biodiversity assets are either affected, or at imminent risk. In this State, salinity is obvious, its consequences immediately apparent and the time to develop cost effective interventions is running out, both in terms of community expectations and the rate of salinity encroachment.⁹²

- 2.88 A Western Australian *Salinity Strategy* was issued in 2000, following an earlier State Salinity Action Plan released in 1996.⁹³

- 2.89 The Strategy aims to reduce the impact of salinity in the south-western agricultural region of the State and has five goals:

- to reduce the rate of degradation of agricultural and public land, and where practical recover, rehabilitate or manage salt-affected land;

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

91 *ibid.*, p. 3.

92 Western Australian Salinity Research and Development Technical Committee (WA SRDTC), *Submission no. 54*, p. 3.

93 Western Australian State Salinity Council, *The Salinity Strategy*, Government of Western Australia, Perth, 2000, viewed 28 January 2004, <www.salinity.org.au/management/pdfs/salinity-strategy.pdf>.

- to protect and restore key water resources to ensure salinity levels are kept to a level that permits safe, potable water supplies in perpetuity;
- to protect and restore high value wetlands and natural vegetation, and maintain natural diversity within the south-west region of Western Australia;
- to provide communities with the capacity to address salinity issues and to manage the changes brought about by salinity; and
- to protect infrastructure affected by salinity.⁹⁴

2.90 The proposed actions to achieve these goals are based on three principles: salinity needs to be addressed by treating the causes of the problem; developing practical and environmentally sound methods that mitigate the impact of salinity; and the strategy needs to be implemented in a partnership with stakeholders at the regional and catchment level. The strategy contains nine elements:

- working in partnerships that involve all stakeholders;
- analysing risk in different areas over time to allow appropriate priorities to be set;
- retaining native vegetation and protecting remaining biodiversity values;
- adopting an appropriate mix of the tools available to manage salinity;
- helping the farming community to make the transition to more sustainable production systems and building their capacity to do so;
- addressing the equity concerns that arise;
- promoting research and development to improve salinity management;
- planning to address shortfalls in actions where priority biodiversity and other public assets remain at an unacceptable risk, or are significantly affected; and
- developing continuous monitoring and evaluation of salinity management actions.⁹⁵

2.91 A major investment in salinity management in Western Australia has been the Land Monitor Project, funded by the NHT and the State Government, 'to map and monitor the extent of salinity through satellite imagery at the

94 *ibid.*, p. 10.

95 *ibid.*, p. 11.

farm and catchment scale', particularly in the south-western agricultural region of the State.⁹⁶

- 2.92 In May 2001 the Minister with Special Responsibility for Salinity formed a Salinity Taskforce to review the State's Salinity Strategy and Salinity Action Plan, and to recommend future strategies which would provide a more targeted and cohesive response to the State's salinity threat.
- 2.93 In September 2001 the Taskforce issued its report, *Salinity: A New Balance*, which encouraged a more focused approach to salinity management and recommended that governments conduct three main actions:
- protect outstanding public assets (for example, rural towns and threatened high-value conservation areas) from the consequences of salinity and other resource degradation;
 - invest in and support major actions on private land by developing new technologies and industries (for example, new perennial plants, commercial farm forestry and engineering solutions); and
 - support and provide incentives for planning, coordination and implementation of smaller on-ground works on private land (for example, for water management and protection of biodiversity).⁹⁷
- 2.94 Specifically, the Taskforce recommended a 'new balance' of Government activity in favour of protecting high-value public assets and investment in major actions on private land by developing new technologies and industries.⁹⁸
- 2.95 Among its responses to the Taskforce report, the Western Australian Government established a Natural Resource Management Council to provide a broader context for the integrated management of salinity and other natural resource issues in the State.⁹⁹
- 2.96 The State's Salinity Council, the predecessor of the NRM Council, also initiated the development of a Salinity Investment Framework in 2002, to

96 Land and Water Australia (LWA), *Exhibit no. 71, Australian Dryland Salinity Assessment 2000*, p. 39; Mr Tim Sparks (Western Australian Department of Environment), *Exhibit no. 89, Land Monitor Salinity Mapping*.

97 Mr Tim Sparks (Western Australian Department of the Environment), *Exhibit no. 111, Salinity: A New Balance*, p. 15.

98 *ibid.*, pp. 15-17.

99 The Hon. Dr J. Edwards MLA (Western Australian Minister for the Environment and Heritage), *State Government outlines new initiatives to tackle salinity problem*, media release, Perth, 10 July 2002, viewed 27 January 2004, <www.salinity.org.au/news/latestnews.cfm>.

guide targeted public investment in salinity management initiatives at state and catchment levels.¹⁰⁰

South Australia

- 2.97 In 1989 the Government of South Australia established a State Dryland Salinity Committee, which developed a 'Technical strategy to address Dryland Salinity in South Australia', issued in 1990.¹⁰¹
- 2.98 In 1999 the Soil Conservation Council of South Australia instigated the development of a new Strategy, the overarching objective of which is to reverse the trend of rising salinity and, where possible, reduce the impacts on resources and assets. The Strategy aims to protect:
- the quality of River Murray water, keeping salinity below the guideline level of 800 EC for drinking water at Morgan 95 per cent of the time;
 - land resources from salinisation, minimising the area of land affected by dryland salinity beyond the currently affected (326 000 hectares) area;
 - natural environment and biodiversity resources, keeping salinity impacts to current levels or where possible reducing them; and
 - the State's economic resource base, developing productive uses for irreversibly saline land and water.¹⁰²
- 2.99 The Strategy outlines support for its implementation under four themes: on-ground works; developing partnerships between various agencies and groups; improving knowledge; and arrangements for effective implementation.
- 2.100 The on-ground works to manage salinity under the Strategy include:
- reducing recharge, usually with the aid of deep-rooted perennial vegetation;
 - utilising discharge with salt-tolerant plants or in other industries that can use saline water; and

100 Mr Tim Sparks (Western Australian Department of the Environment), *Exhibit no. 104, Salinity Investment Framework Interim Report – Phase I*, p. 6.

101 South Australian Department of Water, Land and Biodiversity Conservation, *Salt Control SA*, 'Salinity in SA: Overview', viewed 23 February 2004, <www.saltcontrolsa.com/overviewsa.html#01>.

102 Primary Industries and Resources SA and the Soil Conservation Council of South Australia, *South Australian Dryland Salinity Strategy*, Government of South Australia, Adelaide, 2001, p. 2, viewed 23 February 2004, <www.saltcontrolsa.com/pdfs/sadss_72.pdf>.

- disposing of surplus water, usually by drainage.¹⁰³
- 2.101 The Strategy identifies several imperatives in relation to research and development for salinity management, including the need to provide farmers with profitable solutions, particularly perennial crops, and new ways to productively use saline land and water resources, including development of new industries.¹⁰⁴
- 2.102 The Dryland Salinity Strategy is linked with the South Australian River Murray Salinity Strategy, released in 2001, which established actions to protect the River Murray and its floodplain from salinity impacts due to dryland farming practices.¹⁰⁵
- 2.103 A new South Australian Dryland Salinity Committee (SADSC) has been established to:
- provide a broad community and technical forum to prioritise actions under the Strategy, to coordinate the activities of partners, to conduct special cross-agency projects and to measure progress.¹⁰⁶
- 2.104 The SADSC aims to identify salinity research and development priorities for the State and facilitate communication between stakeholders.
- 2.105 Natural resource management programs in South Australia, including salinity, are delivered through a 'regional Integrated Natural Resource Management (INRM) framework.'¹⁰⁷ Eight regional INRM groups are in the process of being established and it is intended that these will operate on a statutory basis.
- 2.106 The existing regional groups are currently developing integrated NRM plans and investment strategies. The groups are being guided by the SADSC in the development, implementation and evaluation of salinity management plans. The regional groups will be responsible to a Ministerial Integrated Natural Resource Management Board, which will have ultimate responsibility for salinity management in South Australia.¹⁰⁸
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103 *ibid.*, p. 17.

104 *ibid.*, pp. 30-32.

105 South Australian Department of Water, Land and Biodiversity Conservation, *Salt Control SA*, *loc. cit.*

106 Primary Industries and Resources SA and the Soil Conservation Council of South Australia, *South Australian Dryland Salinity Strategy*, *op. cit.*, p. 3.

107 Government of South Australia, *Submission no. 81*, p. 4.

108 Primary Industries and Resources SA and the Soil Conservation Council of South Australia, *South Australian Dryland Salinity Strategy*, *op. cit.*, p. 34.

Local government initiatives

2.107 The Committee received evidence from local governments that have implemented programs to address the issue of urban salinity. There are some 50 towns in the Murray-Darling Basin (28 in New South Wales and 22 in Victoria) and at least 34 towns in Western Australia affected by urban salinity. Parts of Western Sydney and areas of the Hunter Valley have also been affected.¹⁰⁹ Two examples of the impacts of urban salinity and measures to address it follow.

Wagga Wagga

2.108 The Wagga Wagga City Council first identified signs of rising saline groundwater in Wagga Wagga in 1993. This was apparent from damage to residences, sporting grounds, dying vegetation and premature deterioration of road surfaces.

2.109 Economic analysis estimated that if nothing were done, the costs to the town would be approximately \$180 million over 30 years.¹¹⁰ Costs to individual residents are substantial, with some people 'finding that they have to spend \$10 000 to \$20 000 on repair work for some of these houses.'¹¹¹

2.110 In conjunction with CSIRO and state agencies, the Council undertook a four year investigation phase. This was followed by a further four year period trialling various initiatives to address the urban salinity threat. These were in large part supported by funding from the NHT program. The Council's programs include:

- education and demonstration to change water usage habits and to show residents how to live with salt—this has included the production of a number of brochures and booklets, including education packages for school and university groups, and provision of information through the Council's web site;¹¹²
- revegetation requirements in the Council's planning instruments to ensure more vegetation in future urban development;

109 Wagga Wagga City Council, *Exhibit no. 7, The One Stop Shop for Managing Urban Salinity*, p. 2.

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

111 Mr Bryan Short (Wagga Wagga City Council), *Transcript of Evidence*, 30 October 2003, p. 23.

112 See for example: Wagga Wagga City Council, *Exhibit no. 49, Halt the salt in our homes, buildings and farms*, and *Exhibit no. 51, Water Wise and Salt Tolerant Plants*.

- leakage reduction initiatives to reduce the volume of water entering the watertable; and
- installation of nine bores to lower the watertable under the worst affected area of the town, and the Council has installed a network of over 100 piezometers to monitor watertable levels.¹¹³

Western Sydney Regional Organisation of Councils

- 2.111 The Western Sydney Regional Organisation of Councils (WSROC) has recognised that urban salinity is an emerging issue for the residents in western Sydney.¹¹⁴ A map of salinity potential in western Sydney, published by the New South Wales Government, has indicated that ‘a vast area of Western Sydney is affected by or is susceptible to salinity.’¹¹⁵
- 2.112 Among its initiatives, and with Australian Government support, WSROC has published a *Western Sydney Salinity Code of Practice*, which attempts to:
- link National, State and local initiatives within a regional management framework to provide a coordinated response to urban salinity in Western Sydney.¹¹⁶
- Combined, the Councils spent in excess of \$197 000 and \$205 000 on salinity projects in 2001–02 and 2002–03 respectively.¹¹⁷
- 2.113 As part of its broader State Salinity Strategy, the New South Wales Government has also initiated a *Local Government Salinity Initiative*. The Initiative has involved publication of a series of booklets on urban salinity.¹¹⁸

Responses to the national programs that address salinity

- 2.114 The preceding sections provided an overview of the three major national NRM programs which address salinity. Major components of the national NRM initiatives have been designed around catchment/regional level planning and implementation. The salinity strategies developed by three

113 Wagga Wagga City Council, *Exhibit no. 7, op cit.*, pp. 5-8.

114 Mr Colin Kandan-Smith (WSROC), *Transcript of Evidence*, 29 October 2003, p. 15.

115 *ibid.*

116 WSROC, *Submission no. 20*, p. 5.

117 WSROC, *Exhibit no. 133, Salinity Projects in Western Sydney*.

118 Hawkesbury-Nepean Catchment Management Board, *Exhibit no. 42, Salinity Potential in Western Sydney* (publications by the New South Wales Department of Infrastructure, Planning and Natural Resources).

states and for the Murray-Darling Basin were described. Initiatives of some local governments to address urban salinity were also outlined. The following section gathers evidence presented to the Committee in response to the national programs that address salinity.

2.115 The NAP and NHT have been welcomed:

together these major national initiatives have considerably increased investment in work related to salinity at an Australian Government level.¹¹⁹

The Grains Research and Development Corporation (GRDC) congratulated 'the Commonwealth, State and Territory governments for agreeing to the National Action Plan and its matching funding arrangements', and observed that together with the NHT these programs 'have become the central pillars of Government support for the fight against salinity in Australia.'¹²⁰

2.116 Similarly, the Australian Salinity Action Network (ASAN) stated:

The current Federal and State government programs under the National Action Plan for Salinity and Water Quality to combat salinity are the most comprehensive and forward thinking that have ever been developed on the issue ... The government is congratulated for the creation of the NAP including the provision of significant funds to execute it. It is difficult to fault the system and processes that have been put in place through the NAP in order to combat salinity.¹²¹

2.117 However, some concerns were raised in relation to the nation's salinity programs and the consequences of the regional approach to NRM. The principal concerns relate to the:

- architecture of the NAP, which:¹²²
 - ⇒ inhibits national research coordination;
 - ⇒ does not have a charter to fund salinity research;
 - ⇒ has geographic gaps by focussing on only 21 regions;
 - ⇒ excludes industry participation and marginalises state agency involvement;

119 Land and Water Australia (LWA), *Submission no. 59*, p. 2.

120 GRDC, *Submission no. 29*, p. 3.

121 ASAN, *Submission no. 39*, p. 1.

122 See for example: LWA, *op. cit.*, p. 3.

- ⇒ renders achievement of targets under the Murray-Darling Basin Salinity Management Strategy vulnerable;
- ⇒ lacks a rigorous scientific basis for the allocation of funds to regions;
- failure to incorporate key research findings into salinity programs and the mistaken presumption that economically viable solutions are available;¹²³
- Australian Government science investments neglect research into new salinity management methods and technologies;¹²⁴
- region-based planning and delivery of NRM programs, which:¹²⁵
 - ⇒ risk fragmenting the salinity research effort; and
 - ⇒ make the extension of science and linkages between researchers and CMOs more problematic.

2.118 These four themes are described in the sections which follow.

The architecture of the National Action Plan

Inhibits national research coordination

2.119 LWA argued that the bilateral architecture of the NAP and its use of regional investments does not facilitate a nationally coordinated approach to salinity research.¹²⁶

Does not have a charter to fund salinity research

2.120 The NDSP argued that, while the NAP can fund research and development (R&D) where it is closely related to implementation at the regional level, the NAP:

does not, however, have a charter to fund salinity R&D, nor has it given itself the leverage or buying power to strategically generate knowledge to address the gaps and priorities important to its sound investment in outcomes. As the NDSP has concluded, there

123 See for example: Associate Professor David Pannell, *Submission no. 13*, p. 2.

124 See for example: Cooperative Research Centre for Plant-based Management of Dryland Salinity (CRC PBMS), *Submission no. 8*, p. 4.

125 See for example: Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME), *Submission no. 64*, p. 5.

126 LWA, *loc. cit.*

is a vital need to support further R&D if the problem is to be managed at the scales required.¹²⁷

2.121 Mr Kevin Goss, in his capacity as Chair of the NDSP, stated:

if we look at the central importance of R&D for the long term and we look at how things are unfolding at the moment under ... the national action plan, it does not give us confidence that R&D will be effectively handled ...¹²⁸

Marginalisation of industry and state agency involvement

2.122 Several submitters noted that industry organisations, such as the research and development corporations, have been excluded from the NAP planning, management, monitoring and evaluation process. LWA stated that:

As a result, a significant number of institutions involved in salinity management at a policy, R&D and on-ground level are distanced from the coordination efforts of what has been to date the most significant public investment in managing the salinity problem in Australia.¹²⁹

2.123 The failure to include industry partners in the NAP has meant that the impetus for many primary producers to become involved in works funded by the Program has been absent. The WA SRDTC submitted that 'when industry has been involved', programs have been 'incredibly successful because they also bring in a lot of landholders that are not traditionally brought in under the landcare or conservation banner.'¹³⁰

2.124 Some small to medium sized enterprises (SMEs) also commented critically that, 'as currently structured, the salinity industry does not offer the private sector opportunities that can be turned to account for profit.'¹³¹ GecOz submitted that many SMEs have undertaken R&D 'at great expense and, in many cases, without government funding, yet government too often overlooks their potential contribution.'¹³² Similarly, Orbtek and Natural Resource Intelligence submitted that the role of

127 NDSP, *Submission no. 35*, p. 6.

128 Mr Kevin Goss (NDSP), *Transcript of Evidence*, 3 November 2003, p. 3.

129 LWA, *op. cit.*, p. 4; NDSP, *op. cit.*, p. 6; Dr Don McFarlane (Western Australian Salinity Research and Development Technical Committee), *Transcript of Evidence*, 12 November 2003, p. 42.

130 Dr Don McFarlane (WA SRDTC), *Transcript of Evidence*, 12 November 2003, p. 42.

131 Mr Bill Henty, *Submission no. 4*, p. 3.

132 GecOz, *Submission no. 80*, p. 1.

industry has been stifled.¹³³ Mr Bill Henty argued that ‘what is needed is a private sector attitude that applies business and entrepreneurial skills to develop new opportunities.’¹³⁴

- 2.125 The WA SRDTC argued that, in contrast to other national programs such as the Regional Partnerships Program, the NAP has marginalised state agency involvement. It was suggested that the hallmark of successful national programs is a partnership of four parties: the Australian Government (‘for instance, in new industry development and innovative research’); state agencies (‘because they have been land and water managers for a long period of time’ and have expertise in natural resource management); communities, particularly through regional groups; and industry (‘for example, the rural industry research funds’).¹³⁵ It was asserted that:

we have never been able to renegotiate anything that was signed off at the early stage and, therefore, while it is called a partnership program, we feel [the NAP] was put together at federal level without involving us in perhaps better ways of carrying it out.¹³⁶

- 2.126 Likewise, the NDSP argued that the NAP has ‘not been effective in its role of Commonwealth, state and regional coordination.’¹³⁷ Engineers Australia also urged that links between state and Federal government agencies researching and managing salinity be strengthened.¹³⁸

Geographic gaps by focussing on a limited number of regions

- 2.127 The NAP has also been criticised because it addresses salinity in only 21 priority regions and therefore excludes other areas affected by salinity.¹³⁹ Moreover, the scientific basis for the choice of regions that have been included in the NAP has also been questioned.¹⁴⁰

Renders achievement of targets under the BSMS vulnerable

- 2.128 In contrast to arrangements under the NAP, the MDBI is multilateral. The MDBC expressed concern that the bilateral arrangements of the NAP may

133 Orbtex, *Submission no. 3*, p. 1; NRI, *Submission no. 32*, pp. 8-12.

134 Mr Bill Henty, *op. cit.*, p. 2.

135 Dr Don McFarlane (WA SRDTC), *Transcript of Evidence*, 12 November 2003, p. 42.

136 *ibid.*

137 NDSP, *op. cit.*, p. 20.

138 Engineers Australia, *Submission no. 73*, p. 1.

139 NDSP, *op. cit.*, pp. 6-7.

140 Associate Professor David Pannell, *op. cit.*, p. 4.

place achievement of the targets under the Basin Salinity Management Strategy at risk:

It is vulnerable because we do not yet see the momentum under the [NAP] and its regional delivery so that it is moving from planning to investment and works happening with sufficient speed and precision to be able to deal with the rising need so that these catchment management actions will start to choke salt moving into the river.¹⁴¹

- 2.129 The MDBC is concerned that catchment plans developed by regional bodies do in fact maximise contributions to salinity credits for the Basin as a whole: 'This requires pretty tight coordination, and it is difficult when the investments go through bilateral arrangements.'¹⁴²

Scientific basis for regional funding

- 2.130 The MDBC argued that regional investments need to be directed to specific catchments to achieve Basin salinity targets and funds ought not be spread evenly across regions:

It is not about a popular notion of equity—that is, that everybody gets funds to do things ... It is not necessarily equally or evenly spread across catchments and, in fact, there are some areas where you would hardly contemplate that investment at all in terms of living with salinity or managing it in certain ways.¹⁴³

- 2.131 Similarly, Associate Professor David Pannell submitted that:

a rigorous science-based allocation process would result in considerable diversity in funding levels between regions, but there is no sign that this will occur in practice, or if it does it will not be on the basis of scientific analysis of needs and opportunities.¹⁴⁴

Murray Irrigation strongly concurred with this view and argued that there has been a distinct lack of science in prioritising funding for actions in the Murray Catchment Blueprint.¹⁴⁵

141 Mr Kevin Goss (MDBC), *Transcript of Evidence*, 7 November 2003, p. 34.

142 *ibid.*, p. 39.

143 *ibid.*, p. 34.

144 Associate Professor David Pannell, *op. cit.*, p. 4.

145 Murray Irrigation Ltd, *Submission no. 27*, p. 3; Mr Alex Marshall (Murray Irrigation Ltd), *Transcript of Evidence*, 31 October 2003, p. 14.

Failure to incorporate key research findings into salinity programs and the mistaken presumption that economically viable solutions are available

*Science needs to be dealt with in a much more serious and sophisticated way in the design of national salinity policy.*¹⁴⁶

2.132 Evidence suggested that key scientific insights and recent salinity research from several disciplines have not been reflected in the design of the NAP.

2.133 Hydrological research has concluded that to effectively manage watertables and contain salinity in most locations throughout Australia requires the establishment of perennial vegetation on at least 50 per cent (and perhaps more) of the landscape.¹⁴⁷ Corroborating this view, the WA SRDTC argued that:

If our research has shown anything, it is that you have to apply a solution over a large part of the landscape. Applying it to five, 10 or even 20 per cent of the landscape does not have much of an impact. It might buy you a little bit more time, but it does not solve the problem. It just delays the onset of the problem.¹⁴⁸

That is, the extent of land use change (adoption of perennial plants) needed to contain dryland salinity is much greater than previously believed.

2.134 Social research has determined that large-scale adoption by landholders of new land management systems depends substantially on the financial attractiveness of the proposed farming system—that is, ‘farmers require new farming systems to be profitable if they are to be adopted on a large scale.’¹⁴⁹ This point was repeatedly made to the Committee during its inspections.

2.135 Research has also shown that some currently available perennials are economically attractive in some locations, ‘but very rarely on a scale that

146 Associate Professor David Pannell, *loc. cit.*

147 *ibid.*, p. 2. Research cited includes: NLWRA, *Australian Dryland Salinity Assessment 2000*, NLWRA, Canberra, 2001; R. George, et. al., ‘The effect of recharge management on the extent of dryland salinity, flood risk and biodiversity in Western Australia. Preliminary computer modelling, assessment and financial analysis, unpublished report to State Salinity Council of Western Australia, 1999; T. J. Hatton and R. A. Nulsen, ‘Towards achieving functional ecosystem mimicry with respect to water cycling in southern Australian agriculture’, *Agroforestry Systems*, vol. 45, 1999, pp. 203-14; M. Stauffacher et. al., ‘Assessment of Salinity Management Options for Wanilla, Eyre Peninsula: Groundwater and Crop Water Balance Modelling’, Technical Report 1/00, CSIRO Land and Water, BRS, Canberra, 2000.

148 Dr Don McFarlane (WA SRDTC), *Transcript of Evidence*, 12 November 2003, p. 37.

149 CRC PBMDs, *op. cit.*, p. 3.

would be sufficient to fully manage rising watertables.¹⁵⁰ This partly explains why landholders are not adopting plant-based systems on the required scale to effectively contain salinity.¹⁵¹

2.136 With the amount of funding currently available, Professor Pannell concluded that 'comprehensive establishment of perennials on a large scale will not be achieved by the NAP'.¹⁵² The CRC for Plant-Based Management of Dryland Salinity (CRC PBMDS) also concluded that 'NAP funding alone is sufficient to achieve salinity containment in only a small minority of threatened locations.'¹⁵³

2.137 The WA SRDTC stated that:

We need to make major land use changes over that part of the land where the farmer's income is coming from. To do that you must have a very good farming system, you will have to be credible with those farmers and you have to show that it is an economic solution. Under the National Action Plan, I do not see that we have the ability to develop those broadacre solutions to make a real impact on salinity.¹⁵⁴

2.138 It was argued that national salinity programs mistakenly presume that economically viable solutions to salinity are already available and that 'it is just a matter of widespread education of landholders and detailed planning of where these "solutions" need to be placed in the landscape.'¹⁵⁵ Similarly, the GRDC argued that '[c]ertainly in the NAPSWQ there seems to be the mistaken assumption that the solutions are known and simply need to be rolled out into the key catchments.'¹⁵⁶

2.139 DAFF and DEH did indeed express this view, submitting that salinity solutions are generally well researched and that, with the use of salinity mapping technologies, effective interventions to address salinity can now be highly targeted—obviating the need for large scale land use change, at least in eastern Australia. DAFF argued that the key issue remains *where* to make targeted interventions in the landscape:

150 Associate Professor David Pannell, *op. cit.*, p. 2; GRDC, *Exhibit no. 79, Economic Evaluation of Salinity Management Options in Cropping Regions of Australia*.

151 CRC PBMDS, *op. cit.*, pp. 4, 6; CSIRO, *Submission no. 42*, p. 4; NDSP, *Submission no. 35*, p. 9.

152 Associate Professor David Pannell, *loc. cit.*

153 CRC PBMDS, *op. cit.*, p. 4.

154 Dr Don McFarlane (WA SRDTC), *Transcript of Evidence*, 12 November 2003, p. 43.

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

156 GRDC, *op. cit.*, p. 10.

In many cases the next step of tools is well researched. There has been a lot of research on different crop types, trees, deep percolation below crops, changes in land practice and all the rest of it. But it has been done in the absence of knowing where to do it. Now we have a much better picture of where to do it, the other science we can bring to bear in a useful way to intervene in relation to salt stores.¹⁵⁷

2.140 This view was widely disputed. For example, the CRC PBMDs argued that:

[W]e believe that the existing technology ... is not readily available; it is not on the shelf. This is one of the areas where the CRC would probably disagree with the designers of the National Action Plan, who fundamentally believed that the science was in place.¹⁵⁸

National science investments neglect research into new salinity management methods and technologies

2.141 Several submitters argued that the research findings (summarised in the preceding section), which suggested the need for large scale land use change and broadacre solutions to salinity, highlight the 'outstanding importance of R&D' into new salinity management methods and technologies, including:

- development of new types of perennial plants that are profitable (new trees, shrubs, pastures, crops). A range of these are needed to suit different climates and soil types, so that the total area of perennials is enough to make a difference to salinisation rates;
- development of profitable options for making productive use of salinised land and water; and
- testing and design of engineering methods, including assessment of downstream impacts.¹⁵⁹

2.142 However, 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',

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

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

159 Associate Professor David Pannell, *op. cit.*, p. 4. See also: CRC PBMDs, *op. cit.*, pp. 3-4; WA SRDTC, *op. cit.*, pp. 1-2; CSIRO, *op. cit.*, pp. 4, 6; Murray Irrigation Ltd, *op. cit.*, p. 3.

and that this 'reflects poorly on the capacity of certain Commonwealth agencies to assess the real needs for salinity management.'¹⁶⁰

2.143 A similar argument was advanced by the WA SRDTC which asserted:

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.¹⁶¹

2.144 In the priority research areas identified by these submitters, several of the national science agencies, such as the Bureau of Rural Sciences and GeoScience Australia, are said to be inactive.¹⁶² CSIRO also observed that the NAP-related research of these agencies has been poorly coordinated with state and regional activities, and has lacked a strategic framework.¹⁶³ For instance, Australian Government involvement in salinity research in Western Australia is said to be limited to programs outside the core national agencies, and only involves the NLWRA, CSIRO, CRCs, and NDSP.¹⁶⁴

2.145 The WA SRDTC urged a better balance be sought between the capacity building components emphasised in the NAP and NHT, and the development of new land and water use systems as a means of encouraging major actions on private land, and strategic intervention to save high value public and private assets:

Current programs that deliver neither assistance in the management of specific assets, nor research that delivers more effective management options, are not highly valued. This criticism, unfortunately, applies to a number of the core Commonwealth activities for salinity.¹⁶⁵

2.146 The Australian Government was encouraged to adequately resource R&D to develop new land and water use systems. For example, the CRC PBMDS stated that the NAP:

will not succeed in achieving salinity management on a substantial scale unless it is strongly supported by R&D that succeeds in

160 CRC PBMDS, *op. cit.*, p. 4.

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

162 *ibid.*, p. 6.

163 CSIRO, *op. cit.*, p. 9.

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

165 *ibid.*, pp. 3-4.

developing profitable new technologies for salinity management.¹⁶⁶

- 2.147 This key contention raises the issue of the adequacy of the salinity science base and the priorities for further salinity research, which the Committee addresses in chapter six.
- 2.148 Notwithstanding calls from most submitters that further salinity research be undertaken, CSIRO and the NDSP observed that the state of knowledge is sufficient to allow ‘instant action to mitigate some problems’ and that ‘[t]here is a considerable body of knowledge in existence that can already contribute to some positive landscape change.’¹⁶⁷

Implications of region-based planning and delivery of NRM programs

- 2.149 The establishment of CMOs and regional planning is said to have assisted the integrated management of natural resource issues and, prior to their creation, much of the work that had been undertaken at a regional level was considered ‘piecemeal and uncoordinated.’¹⁶⁸

- 2.150 The Australian Spatial Information Business Association (ASIBA), observed:

The catchment is a useful management size that you can work at ... catchment management authorities seem to provide a good balance between focus and breadth ... In their ability to draw different groups together they provide quite a valuable service. The way of dealing with a catchment based on a water catchment, which tends to lump all the processes together, is quite valuable. Where you have catchment authorities ... they are starting to work well in bringing a level of focus and also providing a level of overview.¹⁶⁹

- 2.151 However, devolution of planning and delivery of NRM to the regional level has prompted concern on two grounds relevant to the Committee’s inquiry, as discussed below.

166 CRC PBMDS, *loc. cit.*

167 CSIRO, *op. cit.*, p. 4; NDSP, *op. cit.*, p. 8.

168 Eyre Peninsula Catchment Water Management Board, *Submission no. 75*, p. 4. Also see: Dr Richard Price (NDSP), *Transcript of Evidence*, 3 November 2003, p. 14.

169 Mr Greg Hoxley (ASIBA), *Transcript of Evidence*, 24 November 2003, p. 14.

Increased complexity and fragmentation of the salinity research effort

- 2.152 Devolution of NRM to the regional level is said to have introduced additional complexity into the salinity research effort and will impede research into new salinity management systems and technologies.¹⁷⁰
- 2.153 The South Australian Government submitted that CMOs, by their nature, are likely to be focussed on regional issues and will direct funding towards immediate on-ground works to manage salinity. Accordingly, there will be a tendency to give investment in longer-term R&D a low priority.¹⁷¹ This has serious implications for generic salinity research that would benefit multiple regions, or that should be undertaken at state and national levels.
- 2.154 While the potential exists for CMOs to pool funds for larger scale or more basic research, this will be at the expense of on-ground works and is therefore likely to face local resistance.¹⁷² Coordinating research activities to address the needs of multiple CMOs 'has almost no chance of being funded.'¹⁷³ CSIRO has indeed found that coordinating regional groups to support strategic research is often difficult and costly.¹⁷⁴
- 2.155 In this respect, the CRC PBMDs observed, 'except possibly in South Australia, there appears to be almost no coordination between [CMOs] in terms of research investment priorities.'¹⁷⁵ Again, the reason for this is that:
- The NAP has created community expectations that program funds will be spent exclusively on on-ground works, and [CMOs] are not willing or able to violate these expectations. Even if they were, the NRM regions are not the right scale to determine most funding priorities for salinity science.¹⁷⁶
- 2.156 Furthermore, Associate Professor Richard Bell of Murdoch University noted that CMOs 'do not have sufficient funds to carry out ... generic broad scale ... research'.¹⁷⁷ Some regional bodies themselves have

170 CSIRO, *op. cit.*, p. 1; Natural Resource Intelligence Pty Ltd, *Submission no. 32*, p. 8; Professor Les Copeland (CSAM), *Transcript of Evidence*, 29 October 2003, p. 55; Associate Professor David Pannell, *op. cit.*, p. 4.

171 Government of South Australia, *Submission no. 81*, p. 5.

172 *ibid.*; Professor Philip Cocks (CRC PBMDs), *Transcript of Evidence*, 13 November 2003, p. 18.

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

174 CSIRO, *op. cit.*, p. 4.

175 CRC PBMDs, *loc. cit.*

176 *ibid.*, p. 5.

177 Associate Professor Richard Bell (Murdoch University), *Transcript of Evidence*, 13 November 2003, p. 31.

acknowledged the need for a nationwide approach in coordination and sharing of salinity research.¹⁷⁸

2.157 The CRC for Landscape Environments and Mineral Exploration (CRC LEME) argued ‘the current model of devolution down to the CMAs is not working to best effect. We do not think this is the way to do good science in a timely or cost effective manner’.¹⁷⁹ While devolution to regions has ‘some wonderful benefits in some regards ... it seems to have stifled scientific cooperation, scientific progress, the generation of new science and ... people are doing their own thing in an uncoordinated manner’.¹⁸⁰

2.158 As an example of the consequences of the ‘desire to see more on-ground actions rather than more science’, CRC LEME pointed to:

the profusion of drainage ditch schemes in WA, with the science struggling to keep up with the implications of on-ground actions. Essentially, while the concept of community-driven salinity actions is desirable, the lack of a strategic research capacity is leading to almost no new science at all, and certainly a lack of new science to underpin major public (and private) investments.¹⁸¹

2.159 Similarly, the NDSP argued:

An unintended consequence of the [NAP] has been that it has focussed Australia’s limited research resources into regional contexts, resulting in an increased amount of activity at the regional level whilst causing the focus at the national level to be fragmented.¹⁸²

2.160 Professor Pannell concurred and explained that there are a number of ‘key aspects of the science that would need to be coordinated and conducted on a state-wide or even national scale.’¹⁸³ These include the development of new farming systems that are commercially competitive with existing farming systems, mentioned in the preceding section:

There will be substantial overlap between the regions in their needs for new systems and technologies ... By constraining science to operate in this regional planning environment, we are effectively constraining the NAP investment in science to minimal levels, which is what we are seeing ... It seems quite inappropriate

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

179 Mr Paul Wilkes (CRC LEME), *Transcript of Evidence*, 12 November 2003, p. 15.

180 Dr Dennis Gee (CRC LEME), *Transcript of Evidence*, 12 November 2003, p. 17.

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

182 NDSP, *op. cit.*, p. 4.

183 Associate Professor David Pannell, *op. cit.*, p. 4.

that the setting of the level of investment in R&D in this area is left to chance—the actual level is whatever emerges out of funding sources and processes independent of the national salinity program.¹⁸⁴

- 2.161 The Australian Conservation Foundation (ACF) submitted that while it believes that there is a role for CMOs to undertake R&D, ‘at the moment we do not see that happening at anywhere near the scale at which it needs to happen’.¹⁸⁵
- 2.162 Further discussion of salinity research coordination and the Committee’s views on this matter are presented in chapter five.

Regional capacity and extension of salinity science

- 2.163 DAFF argued that the regional planning process, which is intended to be responsive to regional priorities, moves beyond ‘older models of providing science to regions which had suppliers of science delivering information to unengaged communities.’¹⁸⁶ However, it was conceded that there are ‘some real challenges in equipping regions to be able to manage science and to access science, and in ensuring that the best scientific expertise can work with regions.’¹⁸⁷
- 2.164 In particular, evidence suggested that the shift to regional NRM has presented problems for the link between research providers and CMOs, and the transfer of salinity science.
- 2.165 Due to the large number of CMOs, national science agencies and brokers, CSIRO, LWA and CRC LEME have noted that it is very difficult to maintain a relationship with each CMO, without having research budgets consumed by communications costs. For example, LWA observed that ‘it is very difficult for national science agencies to have a relationship with each of the 60-odd regional bodies in Australia.’¹⁸⁸ There is also potential for creating confusion among the CMOs if they are approached by several research providers.¹⁸⁹

184 *ibid.*

185 Mr Michael Watts (ACF), *Transcript of Evidence*, 31 October 2003, p. 25.

186 Mr Ian Thompson (DAFF), *Transcript of Evidence*, 7 November 2003, p. 53.

187 *ibid.*

188 Mr Andrew Campbell (LWA), *Transcript of Evidence*, 7 November 2003, p. 26. See also: Dr Mirko Stauffacher, (CSIRO), *Transcript of Evidence*, 7 November 2003, p. 88; CRC LEME, *Submission no. 64*, p. 4.

189 CSIRO, *op. cit.*, p. 4.

- 2.166 For science providers to obtain funding under the NAP, it is necessary for them to invest considerable transaction costs in engaging with each individual region and endeavouring to have that science embedded in regional NRM plans. Professor Pannell argued that this is ‘highly inappropriate and inefficient and will result in very patchy application of science across regions.’¹⁹⁰
- 2.167 There is great variation across CMOs in terms of resources and their capacity to use and incorporate science into regional plans. Those CMOs that are well funded and have good management structures have formed effective partnerships with CSIRO, state agencies or consulting firms, but this has been done on a case by case basis and does not include CMOs that are less well advanced in their planning.¹⁹¹ The contrast was drawn between the highly-advanced work of the Goulburn Broken CMA in the Shepparton region of Victoria, which the Committee inspected, and ‘other [CMOs] across Australia that do not even have a single member of staff’ and are poorly advised.¹⁹²
- 2.168 CMOs also expressed frustration with the structures and processes to support dissemination of research findings. One NAP regional body made the following observation:
- The onus is on regional bodies to support their activities with sound scientific findings, but the means of accessing those findings is very much at the mercy of personal relationships developed between staff of regional bodies and individuals within research agencies ... a more structured approach to the dissemination of information to, and communication with regional bodies will be a critically important element of both research programs and implementation programs.¹⁹³
- 2.169 GRDC argued that there is, in many regions, a lack of capacity and skills to identify where land use change needs to take place and, specifically, that there is ‘an enormous skill shortage of people who understand salt movement, water movement, agronomy and land use change to be able to integrate the processes that need to take place.’¹⁹⁴
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190 Associate Professor David Pannell, *op. cit.*, p. 3.

191 CRC PBMDs, *op. cit.*, p. 5; Mr Michael Watts (ACF), *Transcript of Evidence*, 31 October 2003, p. 24.

192 Mr Andrew Campbell (LWA), *Transcript of Evidence*, 7 November 2003, p. 7; Mr Paul Wilkes (CRC LEME), *Transcript of Evidence*, 12 November 2003, p. 23.

193 Fitzroy Basin Association, *Submission no. 48*, p. 3.

194 Dr Martin Blumenthal (GRDC), *Transcript of Evidence*, 7 November 2003, p. 71.

- 2.170 The MDBC suggested that the capacity to understand the science of salinity and its interdisciplinary nature may need to be developed in some CMOs.¹⁹⁵ However, it was observed that building the capacity of CMO staff will take both time and resources, and concerns have been raised that structures are not in place to ensure this will occur.¹⁹⁶
- 2.171 Professor Pannell argued that, in developing their regional plans, CMOs are 'constrained from making adequate use of available science and data by the limitations of time and scientific resources that are put at their disposal.'¹⁹⁷ He noted that:
- it is currently easy [for CMOs] to get away with very superficial use of science in the planning process. Given tight timelines, limited resources and limited technical expertise in many cases, such a strategy becomes very attractive to them.¹⁹⁸
- 2.172 Similarly, CSIRO found that 'very often the regions are not really in a position even to ask the right questions about what needs to be done and how it needs to be done.'¹⁹⁹ Murdoch University approved of regional devolution, but stated that 'we have significant concerns that these regional groups do not and will not have access to the best science'.²⁰⁰
- 2.173 Murray Irrigation also expressed concern at the paucity of science used in the development of some catchment blueprints and urged that standards be developed for substantiating science, prior to funds being given to catchment funding organisations.²⁰¹
- 2.174 To address these issues, Professor Pannell recommended that the Australian Government provide:
- guidelines to the NRM bodies making them aware of the scientific realities ... spelling out their implications for the broad types of investments that should and should not be undertaken, and enforcing the guidelines through the accreditation process for regional plans.²⁰²

195 Mr Kevin Goss (MDBC), *Transcript of Evidence*, 7 November 2003, p. 42.

196 See for example: Fitzroy Basin Association, *Submission no. 48*, p. 3; The Murray Catchment Management Board, *Submission no. 10*, p. 1; The Integrated Natural Resource Management Group for the South Australia Murray Darling Basin, *Submission no. 23*, p. 2.

197 Associate Professor David Pannell, *loc. cit.*

198 *ibid.*

199 Dr Mirko Stauffacher (CSIRO), *Transcript of Evidence*, 7 November 2003, p. 84.

200 Associate Professor Richard Bell (Murdoch University), *Transcript of Evidence*, 13 November 2003, p. 28.

201 Murray Irrigation Ltd, *op. cit.*, p. 3.

202 Associate Professor David Pannell, *loc. cit.*

2.175 He also suggested:

any devolution to regional bodies of powers to plan public investments in such a complex and difficult issue as salinity would ideally be accompanied by well resourced systems to make the best science available to the NRM bodies, identify and prioritise knowledge gaps and set about filling them.²⁰³

2.176 Regional planning faces additional complexities in some highly heterogeneous catchments. For example, development of regional plans in Western Australia is made particularly difficult by the distinctiveness of the river systems in that State, as compared to those in the Murray-Darling Basin:

our river systems really are very different ... you can have a surface catchment defining a regional NAP catchment, a very large thing. But they do not flow from one end to the other continuously; they are often disconnected for very long periods of time. The communities in those locales may have very different visions or strategies on how to manage their subcatchment than another part of the same NAP region. In fact some of our NAP regions, including the one that Collie is in, are extremely heterogeneous: there are a number of very distinctive catchments, cultures, groupings of people, industries, within the same one. They do not all flow in and out from one to the other.

This makes regional level decision-making and investment processes a little bit fraught.²⁰⁴

2.177 The Committee is concerned that all CMOs have access to, and the capacity to understand, the science of salinity and to incorporate validated research findings into their regional plans. To this end, the Committee believes that CMOs should be adequately supported to use the best available science, and that structured approaches for the dissemination of research findings should be developed. The Committee also considers that CMOs should be made aware of validated salinity research findings and their implications for appropriate regional investments.

2.178 The matters of regional capacity and support for the implementation of salinity programs are further addressed by the Committee in chapter eight of the report.

203 *ibid.*

204 Dr Tom Hatton (WA SRDTC), *Transcript of Evidence*, 12 November 2003, p. 41.

Recommendation 1

2.179 **The Committee recommends that mechanisms be developed to ensure that validated salinity research findings are considered in regional planning processes, and specifically that Australian Government agencies in cooperation with state and territory governments:**

- (a) develop systems to ensure that the best science is made available to state government agencies, catchment management organisations (CMOs) and land managers on an on-going basis;**
- (b) provide CMOs and land managers with adequate support and resources to use and incorporate science into their regional plans, investment strategies and on-ground works; and**
- (c) provide guidelines for CMOs and land managers, making them aware of pertinent salinity research findings, detailing their implications for the broad types of investments that may be undertaken, and enforcing the guidelines through the accreditation process for regional plans.**

For implementation, this recommendation should be read in conjunction with recommendations 3 and 15.

2.180 The Committee notes that in 2002 the NRMMC agreed to commission annual reviews of the role that science plays in underpinning the NAP and NHT, with particular emphasis on:

- the scientific and technical robustness of NRM program strategies and plans during their implementation; and
- new or emerging scientific advances that may enhance the effectiveness of NRM program implementation.²⁰⁵

2.181 In April 2004, the NRMMC noted the first of these reports, prepared by the CSIRO and the Bureau of Meteorology (BOM). The Council agreed that the report's recommendations be considered by the NRM Standing

205 *Scientific Advice on Natural Resource Management: A Report to the Natural Resource Management Ministerial Council by the Commonwealth Scientific and Industrial Research Organisation and the Commonwealth Bureau of Meteorology*, report presented to the NRMMC, Adelaide, February 2004, p. 7. Also see: DAFF and DEH, *op. cit.*, p. 11; The Hon. Stephen Robertson MP (Minister for Natural Resources and Minister for Mines in the Queensland Government), Committee Correspondence, 27 October 2003; Dr John Williams (CSIRO), *Transcript of Evidence*, 7 November 2003, p. 87.

Committee, which will provide a report to the Ministerial Council in due course.²⁰⁶ The Council noted that the report focuses on ‘strengthening knowledge transfer so that the best available science is applied to improving natural resource management through the regional delivery model.’²⁰⁷

2.182 The Committee notes that the report’s findings mirror many of the issues presented in evidence to the Committee. In particular, the report found that ‘the capacity, capability and understanding of how to use scientific information to its best advantage was extremely variable across the catchment management agencies’, and that this highlights the importance of strengthening ‘knowledge-transfer programs in order to build capacity in the agencies implementing NAP strategies at the regional level.’²⁰⁸ The report also noted issues associated with the:

- processes to monitor progress towards achieving NRM targets established under the NAP;
- importance of farm economics and profitability in natural resource planning and industry development;
- paucity of good data at the local and regional levels; and
- need for long-term investment in research and development for issues that transcend catchment boundaries.²⁰⁹

2.183 Among its other conclusions, the report recommended that the NRMCC task its Science and Information Working Group to review and report on the broader applicability of the recommendations contained in this report.²¹⁰

Conclusions

Salinity programs and strategies

2.184 The Committee welcomes the commitment by the Australian and state governments to address salinity. The NAP involves a funding

206 NRMCC, *NRMCC 6*, Communiqué, Adelaide, 16 April 2004, viewed 17 April 2004, <www.affa.gov.au/ministers/truss/releases/04/nrmcc604.html>.

207 *ibid.*

208 *Scientific Advice on Natural Resource Management, op. cit.*, p. 3.

209 *ibid.*, pp. 3-4.

210 *ibid.*, p. 10.

commitment of \$1.4 billion over seven years, which represents a significant increase in aggregate funding for works to address salinity. Along with the NHT, major components of the NAP have been designed around regional level planning and implementation.

- 2.185 The Committee notes that primary responsibility for NRM rests with the states and several state governments have developed salinity strategies, which are outcome focussed and incorporate salinity research findings. The Committee recognises that urban salinity is an emerging issue for residents in many locations and for local governments.
- 2.186 The Committee is aware that efforts to address salinity in the Murray-Darling Basin commenced in 1988 with the adoption of the Basin *Salinity and Drainage Strategy*. Over the decade following its adoption, the MDBC invested some \$70 million in on-ground works and plans, which were successful in achieving salinity reduction targets. Following dire predictions made in the *Basin Salinity Audit* published in 1999, the Commission released a new *Basin Salinity Management Strategy* for the period to 2015.
- 2.187 Since 1990, the MDBC has generated a body of knowledge and salinity management tools through its Dryland Program and these have been synthesised into booklets to promote the sharing of information among Basin stakeholders. The Committee welcomes the efforts by the MDBC to fund investment in salinity knowledge generation. The MDBC also draws on the research of national science agencies, including CSIRO, NDSP, NLWRA and the CRC Program.
- 2.188 The Committee notes that under the BSMS, partner governments have committed to a range of actions, including research and development into new farming and forestry systems.

Responses to the salinity programs

Industry and state agency involvement

- 2.189 The Committee is concerned at the absence of formal industry involvement in the NAP and regrets tensions that have emerged between some states and national NRM agencies in relation to salinity management. The Committee believes that salinity poses too great a threat for difficulties of this nature to be allowed to persist. The Committee concludes that the NAP-related research activities of national agencies should be better coordinated with state and regional activities.

- 2.190 Given the apparent importance of land use change in addressing salinity, the formal involvement of primary producers would seem to be vital to the successes of salinity initiatives. The Committee urges that primary producer involvement in the NAP, particularly through the rural research and development corporations, be fostered.

Immediate on-ground works and the need for further research

- 2.191 The Committee supports the NAP's focus on immediate on-ground actions to address salinity, noting evidence suggesting there is sufficient knowledge to support some positive landscape change.
- 2.192 However, the Committee is also persuaded that a sufficient number of economically viable solutions to salinity are not yet available. Consequently, the Committee concludes there is a need to support further R&D if salinity is to be addressed at the scales required. 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, and these matters are addressed further in chapters five and six.

Regional delivery of natural resource management programs

- 2.193 The Committee was informed that the establishment of CMOs has assisted the integrated management of natural resource degradation issues, ensuring that salinity is not addressed in isolation. The Committee is also aware that many CMOs are currently being established or have not been operating long. However, arrangements for CMOs (for example, their structure and legislative basis) vary considerably across the states. The Committee concludes that, to facilitate delivery of NRM programs, there may be value in establishing all CMOs on a consistent basis, perhaps through the Council of Australian Governments.
- 2.194 The Committee notes the risks attendant upon the devolution of NRM to regional bodies, particularly for the adequate use of science in regional plans, coordinated research activity and the extension of salinity science.
- 2.195 While the Committee supports regional-level investment, it notes that there is likely to be a focus on funding immediate on-ground works and a tendency to give investment in longer-term and generic research (that transcends regional boundaries) a low priority. Generic research may be beyond the resources, charter and scale of individual CMOs. Consequently, the Committee is concerned that the regional delivery focus under NRM programs not detract from coordinated research of a type that will benefit multiple regions, and that should properly be conducted at the state or national levels.

- 2.196 The Committee is concerned at evidence of considerable variation across regions in the uptake of science. The Committee urges that regional planning, investment strategies and on-ground works be informed by the best available science, and recommends that CMOs and land managers be adequately supported to use and incorporate science into their planning and investment activities. The Committee also urges that adequate scientific and technical support be given to those non-NAP regions that are also threatened by salinity. The matters of regional capacity and support for the implementation of salinity programs are addressed further in chapter eight.
- 2.197 The Committee acknowledges the value of the NRMMC receiving annual external appraisals of the quality of science underpinning the NAP and the status of science in regional planning and delivery.

