Australian Government
Land & Water Australia

2005–2010
Strategic R&D Plan

knowledge for managing Australian landscapes

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GLOSSARY OF ACRONYMS

ARC	Australian Research Council
CRC	Co-operative Research Centre
LWA	Land & Water Australia
NAP	National Action Plan for Salinity and Water Quality
NHT	Natural Heritage Trust
NLP	National Landcare Program
NRM	Natural Resource Management
NWC	National Water Commission
NWI	National Water Initiative
PIERD	Primary Industries and Energy Research & Development
R&D	Research and Development
RDC	Research & Development Corporation

Contents

FOREWORD

This Strategic Research and Development (R&D) Plan outlines the key research investment priorities for Land & Water Australia over the next five years. It shows how the Corporation intends to organise itself to deliver on those priorities with and for its key stakeholders. The plan focuses on improving the knowledge base for sustainably managing Australia's natural resources for the benefit of primary industries and the wider community. It also relates the Corporation's core business as a research investor, to its complementary and supporting activities as a leading research broker, coordinator and collaborator in natural resource management (NRM).

Land & Water Australia is required to submit a Strategic R&D Plan to the Minister for Agriculture, Fisheries and Forestry every five years. This plan came into effect on 1 July 2005. The previous plan commenced on 1 July 2001, but changes in the external operating environment and the timing of major investment decisions within Land & Water Australia led the Board to submit a new plan to the Minister one year early. The National Research Priorities developed by the Australian Government set out an overarching framework for public investment in research. Land & Water Australia is extremely well positioned and equipped to invest in the first of these priorities "An Environmentally Sustainable Australia".

All Rural Research and Development Corporations (RDCs) have been asked to demonstrate that they are maximising the R&D benefits to their industries, maximising adoption of R&D outputs, working closely with other RDCs, and communicating effectively to government and industry. Land & Water Australia has also been directed to 'promote, integrate, and coordinate' R&D in natural resource management across the rural R&D corporations.

This Strategic Plan positions Land & Water Australia to take up these challenges.

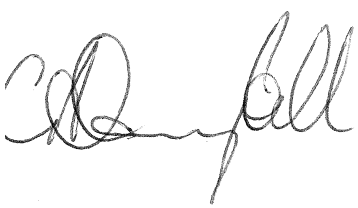
We will be building on our already extensive partnerships with industry and through our related RDCs to ensure that our research is timely, relevant and adoptable by primary producers. Farmers and pastoralists own or manage over sixty percent of the Australian continent and irrigators use more than seventy percent of harnessed water resources. Improved farming practices offer the single biggest opportunity for conservation and sustainable use of natural resources. Our industry partnerships aim to develop and implement new and improved production systems that more effectively improve farm profitability and productivity, while integrating more efficient use of water, better management of climate risk, and the conservation of native vegetation and biodiversity.

Our new Knowledge and Adoption Strategy complements this Strategic R&D Plan. It places particular emphasis on the regional bodies that are playing such a crucial role in delivering major national initiatives such as the Natural Heritage Trust (NHT) and the National Action Plan for Salinity and Water Quality (NAP). We will also be working to improve linkages between our research investments and the new policy and institutional frameworks being developed by the Australian Government, including the National Water Initiative (NWI), to govern the management of Australia's priceless natural resources.

Land & Water Australia has a critical contribution to make in delivering the major natural resource management priorities of the next decade. This Strategic R&D Plan will guide that contribution.

ROBERTA BRAZIL
CHAIRMAN

ANDREW CAMPBELL
EXECUTIVE DIRECTOR



The National Research Priorities developed by the Australian Government set out an overarching framework for public investment in research. Land & Water Australia is extremely well positioned and equipped to invest in the first of these priorities – "An Environmentally Sustainable Australia".

MANDATE

The need for knowledge

The management of Australia's rich and unique endowment of natural resources has never been higher on the national agenda. Water resources – both surface water and groundwater – are under extreme pressure, the majority of the Australian population experiences water restrictions and irrigators face severely reduced allocations. Australia has long had to deal with extreme climate variability, but it is now becoming clear that each drought is hotter than the last, and we seem to be in a more profound drying cycle, especially in south-western and south-eastern Australia.

Climate is a fundamental driver of ecological processes in Australia, and a major shaper of production possibilities for Australia's primary producers. Australia is one of the most biologically diverse countries on the planet, and most of our native species exist in no other country, which means that responsibility for their management and future prospects rests with us. The management of vegetation, both pastures and trees, is critical in achieving an appropriate hydrological balance, in managing carbon emissions, in minimising further losses of biodiversity and in sustaining many of our grazing systems. Invasive introduced species, both plants and animals, continue to impose significant costs on agricultural production, and fierce competition and predation pressures on native species. Australian soils are the engine room of agricultural productivity. Soil management remains an important development opportunity for more sustainable production systems.

The uniqueness of Australia's landscapes, climates, soils and biota means that in the main we cannot import knowledge about management of our natural resources. We have to develop our own solutions for our own problems. Our agricultural production systems have to be smarter and more sophisticated to achieve comparable levels of profitability with our international competitors who enjoy younger, richer, more forgiving soils with more reliable climates.

Community expectations of agricultural and pastoral landscapes continue to change. Consumers demand healthy rivers and estuaries and viable populations of native animals and plants, in addition to cheap and clean food, fibre and water. Increasingly, the community wants a wider range of services from the countryside, which is becoming a place of consumption (of vistas, tourist, cultural and heritage experiences and lifestyle opportunities) alongside the traditional processes of food and fibre production. Demographic change, especially along the eastern seaboard, will intensify competition for rural land and place pressure on the resource base, while opening up new opportunities through the influx of new capital and a wider range of people.

In response to the challenge of balancing the often competing demands on rural landscapes, governments across Australia have fostered the development of new organisations at catchment and regional scales. These new catchment bodies and regional committees are charged with important planning responsibilities, and often with the demanding task of prioritising and allocating public funding through large national funding programs such as the Natural Heritage Trust (NHT), the National Action Plan for Salinity and Water Quality (NAP) and complementary programs at State and Territory level. These organisations are becoming important players in the natural resource management knowledge system, and critical clients for NRM research outputs.

Against this background, there is a greater need than ever for carefully targeted and well-managed research: to generate the uniquely Australian knowledge needed to improve Australian farming systems and consequent profitability; to manage our natural resources more sustainably; to inform large public investments in natural capital; and to help governments balance competing demands on natural resources and rural landscapes.

MANDATE (continued)

The legislative base

Land & Water Australia was established to provide an independent expert mechanism, at arms length from the everyday business of government and for strategic investment in research and development to underpin better management of the nation's land, water and vegetation resources. It is a statutory corporation established under the Primary Industries and Energy Research and Development (PIERD) Act 1989, within the Australian Government's Agriculture, Fisheries and Forestry portfolio. The Corporation remains focused on the four objects of the PIERD Act:

- Achieving the sustainable use and sustainable management of natural resources;
- Increasing the environmental, social and economic benefits to primary industries and the community;
- Making more effective use of the resources and skills of the scientific and general community; and
- Improving accountability for R&D expenditure.

Of the many agencies involved in NRM R&D at the national level, Land & Water Australia is distinctive in several ways. Our interests are not constrained by any particular commodity, region, discipline or research provider(s). Our research investments range across the biophysical and social sciences. As the host agency for the National Land & Water Resources Audit, the Corporation is well placed to link the best available data and information to its research funding and management.

We have a very broad mandate, with a modest appropriation which has been stable at $11-12 million per annum over the last decade. This demands a strategic approach to target our investments and to attract partnership funding to the most critical issues, in ways that will maximise the influence and return on investment of our core funding. The key activities that comprise our strategic approach include:

- Brokering partnerships between research providers and customers by converting research needs into research questions, linking to appropriate research providers, managing research efficiently, evaluating impact and establishing effective adoption pathways;
- Funding innovative, inter-disciplinary and integrated research that meets Australia's primary NRM knowledge needs and creates new opportunities for future generations;
- Scanning and scoping future research priorities and opportunities, informed by analyses of trends and drivers of future change and the business environment; and
- Communicating the national NRM R&D agenda to research providers, governments, primary industries and the general community.

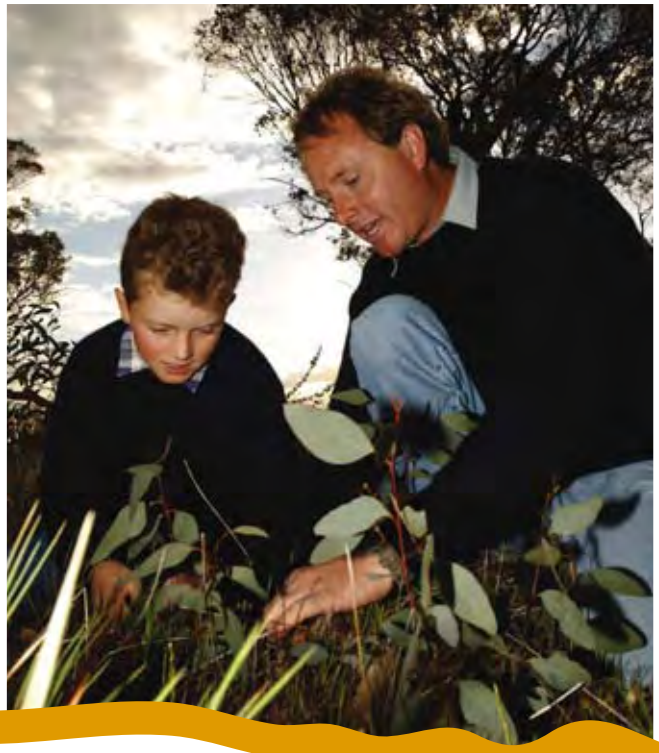
MANDATE (continued)

National Research Priorities

Land & Water Australia is well positioned to deliver the Australian Government's National Research Priorities, the first of which is "An Environmentally Sustainable Australia", which has as its sub-themes:

- Water – a critical resource – ways of using less water in agriculture and related industries, providing increased protection of rivers and groundwater and the re-use of urban and industrial waste waters;
- Transforming existing industries – new technologies for resource-based industries to deliver substantial increases in national wealth by reducing environmental impacts on land and sea;
- Overcoming soil loss, salinity and acidity – identifying causes and solutions to land degradation using a multidisciplinary approach to restore land surfaces;
- Sustainable use of Australia's biodiversity – managing and protecting Australia's terrestrial and marine biodiversity to develop long-term use of ecosystem goods and services ranging from fisheries to ecotourism; and
- Responding to climate change and variability – increasing our understanding of the impact of climate change and variability at the regional level across Australia, and addressing the consequences of these factors on the environment and on communities.

Our comprehensive implementation plan for the National Research Priorities provides further detail that will inform the implementation of this Strategic R&D Plan.



Rural Research Priorities for Agriculture, Fisheries and Forestry

In December 1999, the Minister wrote to all RDCs outlining the Government's priorities for rural research to increase the competitiveness of Australia's rural industries. Those priorities were re-affirmed in a letter of 11 May 2001 and updated in a letter from Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry Senator the Hon. Judith Troeth on 12 March 2003. This strategic plan focuses primarily on the first priority but also contributes directly and indirectly to the other six priorities. In particular, strategies involving collaboration with the commodity-based RDCs such as fundamental research on fertilisers and pesticides, interpreting the potential applications of frontier technologies, and explicitly supporting high innovation will ensure strong delivery on all the rural research priorities:

- Sustainable natural resource management;
- Improving competitiveness through a whole-of-industry approach;
- Maintaining and improving confidence in the integrity of Australian agricultural food, fish and forestry products;
- Improved trade and market access;
- Use of frontier technologies;
- Protecting Australia from invasive diseases and pests; and
- Creating an innovative culture.

The Australian Government, in collaboration with State and Territory Governments, has initiated major public investments in natural resource management exceeding $3 billion over the next five years. Chief among these are the National Action Plan for Salinity and Water Quality (NAP), the Natural Heritage Trust (NHT) and more recently the National Water Initiative (NWI). These major government programs have drawn in part on research funded by Land & Water Australia to understand the nature, extent and significance of resource degradation problems.

However, the regional implementation of these programs is generating new questions related to prioritising investments, working out appropriate interventions and monitoring and evaluating progress. The challenge for Land & Water Australia is to develop effective means of engaging with the NAP and NHT initiatives, and in particular with the regional and catchment bodies through which most investment flows. We need to ensure that these major public programs are informed to the optimum degree by our research portfolio and that our research investments are informed by the questions they are generating. As a leading national investor in water resources research, we are also keen to develop direct linkages with the National Water Initiative, through the National Water Commission in the first instance.

VISION, OUTCOME AND MISSION

Vision

The sustainable use and management of natural resources for the benefit of primary industries and the Australian community.

Outcome

The overall outcome we are working towards, in line with the Australian Government Department of Agriculture Fisheries and Forestry and other key stakeholders, is:

Knowledge, understanding and informed debate to inspire innovation and action in sustainable natural resource management.

Outcome Performance Indicator

Improvements in the understanding, management and condition of Australia's natural resources that can be linked demonstrably with the adoption of the outputs of our research investments.

Mission

To invest in knowledge, partnerships, innovation and adoption to underpin sustainable natural resource management.

For fourteen years, since the creation of the then LWRRDC[1] as part of the Decade of Landcare, incorporating the research elements of the National Soil Conservation Program and the Australian Water Research Advisory Council, the core business of Land & Water Australia has been clear. First and foremost, we are a research purchaser. The Corporation was set up as a strategic mechanism for the investment of taxpayers' money into research and development in the national interest. We invest in R&D activities to improve the knowledge base for sustainable natural resource management.

In order to both extend the reach of the Corporation's budget, and to improve linkages between research and the delivery context, the Corporation's investments have mostly involved brokering partnerships with others, both purchasers and end users. We now have around thirty partners at the program level and many more at a project level. This adds an extra layer of management at the collaborative commissioned program level, as opposed to just investing at the project level through an annual call.

The need to communicate research outputs in ways that are relevant, useful and timely for the intended end-users has long been recognised, and now there is increasing pressure on RDCs to emphasise and report on the adoption of our knowledge outputs into practice.

[1] Land and Water Resources Research and Development Corporation, the legal name of Land & Water Australia.

OBJECTIVES

Land & Water Australia's objectives for 2005–2010 are:

1. **Generate new knowledge useful to the sustainable management and use of Australia's natural resources**

Knowledge generation will be focussed at three scales, as well as linkages and feedbacks across scales. At the farm scale new knowledge will be applied on-farm to develop more sustainable and productive primary industries. At the landscape scale new knowledge will be used to inform the on-ground implementation of policies and programs (including NAP, NHT and NWI) at that scale, while enhancing links between landscape-scale goals and farm-scale practice. At the national scale new understanding will inform the development of better governance, policies and programs to accelerate the adoption of sustainable management practices.

2. **Develop productive partnerships and undertake strategic analyses to support improved R&D investment in natural resource management**

Partnerships and collaborations will ensure greater efficiencies in research investment, reduced duplication of effort, more effective application of Australia's NRM research capability against national priorities, and more integrated solutions. Strategic analyses will enhance reporting to government and the community on Australia's NRM R&D priorities, the costs of sustainability issues to the community, national NRM research capacity, research activities and funding needs.

3. **Improve adoption of the outputs of R&D**

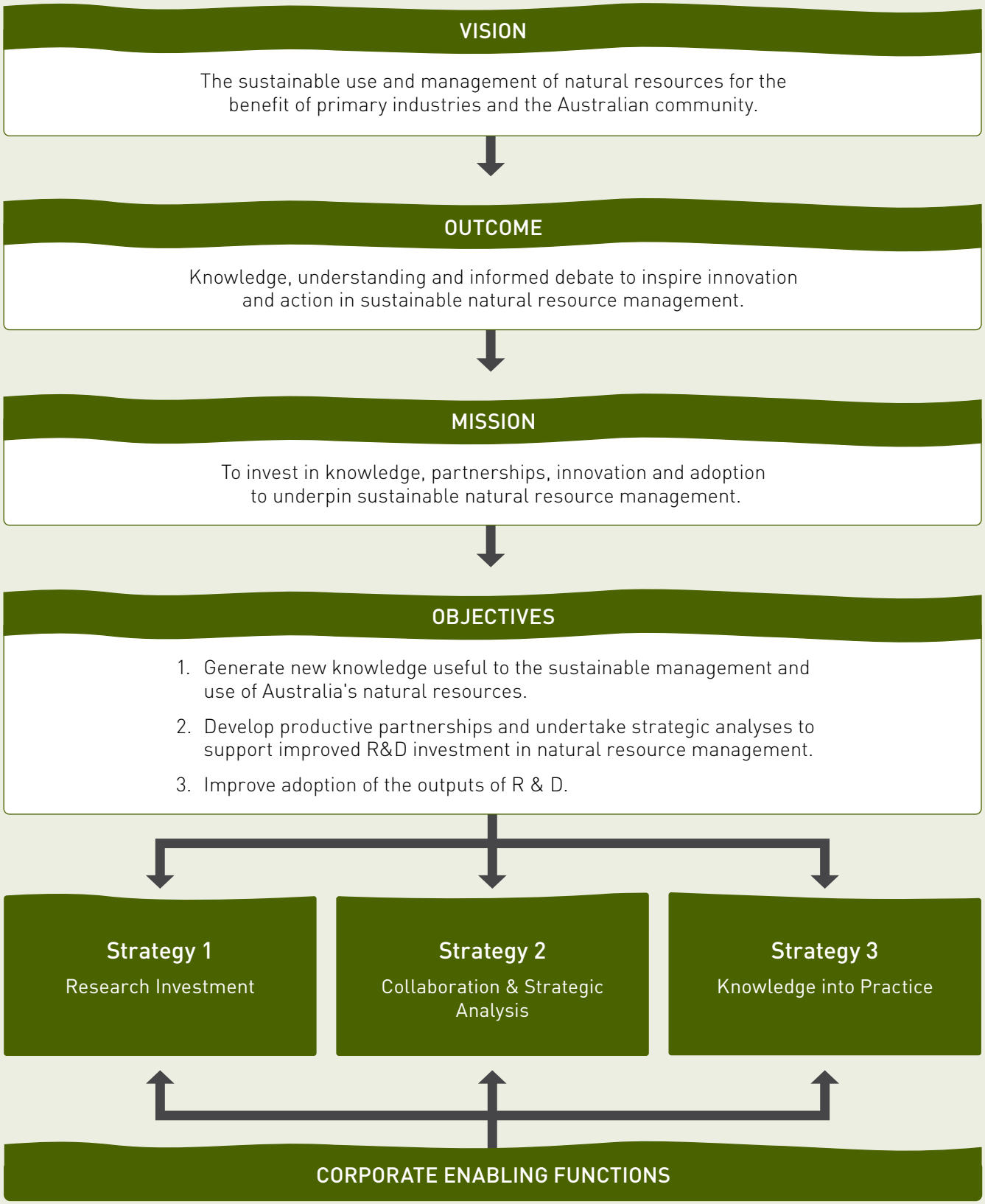
Improvements will be sought in the accessibility, synthesis and uptake of knowledge generated through Land & Water Australia and related investments. A special focus will be given to enhancing adoption processes and knowledge delivery.

KEY STRATEGIES

We will achieve our objectives through three key strategies:

1. Investing in strategic R&D targeted to Australia's major NRM issues, improving the knowledge base, supporting innovation and delivering strong return on investments;
2. Building on existing partnerships and brokering new partnerships to make best use of the overall Australian Government investment in NRM research through minimising duplication of effort, maximising investment on key priorities, and increasing adoption; and
3. Translating existing and new knowledge into practice to achieve our outcome.

R&D PLAN OVERVIEW



STRATEGY 1: RESEARCH INVESTMENT

Research Investment Performance Indicator

Generation of new knowledge useful to the sustainable management and use of Australia's natural resources.

Investing in R&D for sustainable natural resource management remains our core business and our highest priority. Our R&D management processes are focussed on: the identification of national priorities; selection of topics where we can add most value; development of the most effective interventions; design and implementation of the research and adoption process; and evaluation of the results. We have developed robust methods for each of these steps. The investment planning process and the proposed architecture of our research portfolio is described below. Our monitoring and evaluation framework is outlined later.

Research Investment Planning

A biennial investment planning process underpins the broader Strategic R&D Plan. This assessment of R&D priorities enables the Corporation to respond in a timely way to emerging R&D needs. The key steps are:

1. Scanning: an ongoing process of scanning the business environment by nominated staff and Board members and external agencies, with particular emphasis on emerging issues and opportunities. Potential R&D investments are collated, assessed and short-listed by the Board.

2. Scoring: a process in which the Board evaluates the short-listed issues/opportunities against attractiveness and feasibility criteria and selects several for more detailed scoping.

3. Scoping: this is the detailed investigation of the issue/opportunity. The scoping process entails a detailed analysis of the investment opportunity and design of the investment strategy. In considering proposed R&D programs, the Land & Water Australia Board requires an assessment against a Template of Questions:

    - What is the national or generic significance of the natural resource management issue or opportunity and alignment with the National and Rural Research Priorities?
    - What are the key factors or innovations that are believed to contribute to the natural resource management issue or opportunity? What are the relationships and interactions amongst these factors?
    - What mechanisms are available for improving action to address the issue or opportunity? What are the relative strengths and weaknesses of alternative mechanisms?
    - What are the specific outcomes being sought? What R&D will help achieve these outcomes? Who are the clients for this R&D and what is their adoption capacity?
    - What role, if any, should Land & Water Australia play? What partnerships, if any, would be necessary to achieve the anticipated benefits of intervention?
    - What is the potential for the R&D investment to provide benefits to the Australian community?

4. Program planning: this phase focuses on the assessment and negotiation of potential partnerships and the construction of a detailed program plan in a specified format. The plan is submitted to the Land & Water Australia Board for funding approval.

Programs developed in this way are allocated for management through one of four broad R&D arenas described below. The knowledge generated within projects and programs will be managed corporately as well as within arenas. Uniform monitoring and evaluation methods will be applied across the Corporation.

STRATEGY 1: RESEARCH INVESTMENT (continued)

INDUSTRIES

- Designing sustainable production systems
- Improving irrigation efficiency
- Managing for climate variability
- Improving biodiversity conservation on farmland
- Enhancing adoption of sustainable practices
- Improving soil health

LANDSCAPES

- Protecting and managing northern rivers
- Managing environmental water allocations
- Building resilient landscapes through vegetation and biodiversity management
- Investing in knowledge and human capacity for regional management
- Linking farm-scale objectives to regional outcomes

OUR OUTCOME

Knowledge, understanding and informed debate to inspire innovation and action in sustainable natural resource management.

PEOPLE

- Improving NRM institutional arrangements
- Policy instrument choice and design
- Socio-economic values and aspirations for landscapes, lifestyles and livelihoods

INNOVATION

- Identifying new and emerging issues
- Stimulating new ideas, concepts and technologies
- Encouraging blue-sky, breakthrough research
- Building science capacity in identified gaps
- PhD candidates, travelling & visiting fellows and LWA senior research fellows

STRATEGY 1: RESEARCH INVESTMENT (continued)

Our research portfolio will be structured around four arenas: Industries, Landscapes, People and Innovation. We do not intend that these arenas become separate 'silos', and we are determined to continue to strengthen our capacity to look across arenas and manage our whole portfolio of current and previous R&D in a comprehensive and integrated way. Nevertheless, we do need to divide our portfolio into manageable chunks of activity with a degree of internal coherence. While no arena will focus on a single type of research, target audience or scale of activity, there are broad differences across these arenas that serve to characterise them.

R&D Arenas

Industries

The Industries Arena will target primary producers and involve mainly biophysical and economic research through a range of industry partnerships, mostly with our sister R&D corporations. A key focus will be research that bridges the critical gap between farming practices at paddock and farm scale, and catchment-scale plans and targets for outcomes such as water quality and biodiversity. The R&D priorities for this arena will be:

- Sustainability of production systems at farm and regional scale – understanding opportunities and limitations, and designing novel new systems;
- Water resources management, particularly for irrigated agriculture;
- Managing climate variability and climate change in rural landscapes and farming systems;
- Understanding and demonstrating best practice in improving soil health;
- Managing biodiversity and the delivery of ecosystem services within farming systems;
- Understanding the factors which drive commercial success with environmental and social sustainability; and
- Capacity within rural industries to adopt and implement change-on-farm.

Landscapes

The Landscapes Arena will target catchment and regional bodies, advisors, industries and governments. It will focus strongly on understanding ecological functions and processes at the landscape scale, and the technical and socio-economic challenges of the regional model of natural resource management. Partnerships will be sought to increase the scale and impact of the arena but Land & Water Australia-determined priorities will be the primary focus. The R&D priorities will include:

- Sustainable management of water resources in tropical Australia;
- Demonstrated and improved benefits from environmental water allocation;
- Native vegetation and biodiversity management in production landscapes;
- Strategic research to underpin more effective management of weeds;
- Knowledge assets and capacity to meet the needs of regional management; and
- Linking regional and farm-scale outcomes for land and water management.

People

The People Arena will target the full gamut of NRM stakeholders in both policy and implementation roles, and operate at multiple scales. The research will encompass a wide range of social sciences and economics, integrated with biophysical research in the other arenas where feasible and appropriate. Partnerships will be sought to increase scale, impact and adoption but will not be an essential prerequisite for investment. Land & Water Australia-determined priorities will be the primary focus. R&D priorities will include:

- Improving institutions and governance arrangements for sustainable NRM;
- Informing policy instrument choice;
- Understanding the factors supporting an environment in which change can occur; and
- Exploring values and aspirations for sustainability.

STRATEGY 1: RESEARCH INVESTMENT (continued)

Innovation

The Industries, Landscape and People Arenas above are based primarily around commissioned research on priorities identified by Land & Water Australia and its funding partners. To complement this commissioned research, and recognising the need to allow space for more novel ideas and researchers' own suggestions, Land & Water Australia reserves a portion of its research portfolio for proposals emerging from the scientific community, that don't necessarily overlap with the priorities of other programs. We don't attempt to clump these projects into programs, but rather we manage them at the Arena level in the Innovation Arena. The Innovation Arena also has a key focus on building research capacity in natural resource management through targeted and highly competitive scholarships and fellowships.

An annual Innovation Call has replaced the previous General Call for proposals from the research community. The Innovation Call supports innovative projects that address new issues or develop fundamentally new ideas or technologies. There will be greater opportunity for funding of feasibility or proof-of-concept projects as a precursor to more detailed applications. We will also encourage higher risk proposals and accept potentially increased failure rates in this high risk-high return "blue sky" research domain. Links for supporting innovation through to development will be established with other agencies and industries.

The Innovation Arena funds Masters and PhD Scholarships, and Travelling and Visiting Fellowships to allow Australian scientists to stay up to date with international developments in their fields. Scholarships and Fellowships will target identified key research capacity gaps in Australia. We have also launched a new initiative – Land & Water Australia Senior Research Fellows – which aims to support some of Australia's leading NRM researchers in the conduct of strategic research syntheses and communication activity.

An overarching principle for all arenas will be to ensure that each program and project draws upon the appropriate range of disciplines to address the typically complex NRM problems and opportunities. The four arenas will maximise opportunities to integrate their activities at various levels. This integration will be assisted by ensuring common corporate processes across all arenas, including: knowledge management and adoption; R&D planning and evaluation; financial management and reporting; risk management; and corporate governance.

Modes of Research

The menu of research approaches we will draw upon, according to the nature of the problem or issue and its context, includes:

- The traditional mode of research (rationalist, positivist, reductionist, problem-solving);
- Research approaches that acquire knowledge relevant to both researchers and practising resource managers through experiential learning processes;
- Inter-disciplinary, integrated and participatory processes;
- Systems research that recognises the complexities of social-ecological systems;
- Longer-term adaptive research involving collection and analysis of data from specific sites over many years may be supported, where there is a critical mass of interests and where there is potential to build on existing research sites of high national importance;
- Research utilising futures methods to extend our thinking and time horizons; and
- Research quantifying environmental and social values and benefits, as well as the economic benefits that ecosystems provide.

STRATEGY 2: COLLABORATION AND STRATEGIC ANALYSIS

Collaboration and Strategic Analysis Performance Indicators

Number and financial leverage of program and project partnerships.

Increased research capacity and better coordination of existing capacity in critical areas.

The quality of analysis of strategic issues in NRM.

Land & Water Australia's collaborations bring together researchers and stakeholders from across Australia to reach consensus on R&D priorities, desired outcomes, and to facilitate adoption. We seek to collaborate with other funding bodies, government agencies, rural industries and community-based groups to broker partnerships for R&D programs and to build capacity within the research community to work with industry, rural communities and government. In brokering partnerships we link research providers and customers by converting research needs into research questions, selecting appropriate research providers, leveraging available funding, undertaking efficient R&D management and evaluation and establishing effective adoption pathways. Our collaborations on specific priority issues ensure the optimal application of Government and industry resources across agencies. These partnerships influence research directions, minimise duplication, maximise research investment on key priorities and provide a great platform for increasing adoption.

A key collaboration that we hope to build upon and strengthen in this Strategic Plan is that with the National Land & Water Resources Audit. Land & Water Australia is the host agency for the Audit, which is a program funded by the Natural Heritage Trust and a partnership between the Australian Government and all States and Territories. The Audit's work underpins nationwide assessments of Australia's land, water and biological resources that will enable monitoring and evaluation of natural resource management policies and programs to support sustainable development. Our relationship with the Audit and all the State, Territory and Australian Government agencies represented on the Audit's Advisory Council, enables the Corporation to work across the spectrum from data to information to knowledge. As we seek to work more at a synthesis level, pulling together knowledge packages and services that meet the specific needs of target audiences, we will look to integrate some of our research outputs with the data and information products generated through the Audit and its partners.

In this Strategic Plan, we will seek to build on our existing industry partnerships addressing the nation's foremost NRM issues. Our industry partnerships will focus on the management of water, nutrients, vegetation (including pastures and crops), biodiversity and climate, in two key domains: broadacre (dryland) cropping and grazing, and intensive irrigated agriculture and horticulture. We will expand our role as the leading broker for NRM R&D to achieve greater efficiencies, effective application of Australia's NRM capability, more integrated solutions and improved adoption.

Land & Water Australia also has an active role in promoting, integrating and reporting NRM research across the rural R&D corporations. In this plan, we will conduct strategic analyses and report to government and the wider community (working in partnership with the National Land & Water Resources Audit where appropriate) on:

- priority NRM issues in Australia;
- current and planned NRM R&D activities in Australia;
- assessments of Australia's research capacity across all NRM fields;
- emerging issues likely to be of high future significance;
- cost-benefit analyses on potential interventions; and
- current funding levels and future needs for NRM R&D.

STRATEGY 3: KNOWLEDGE INTO PRACTICE

Land & Water Australia defines 'knowledge' broadly – encompassing tacit (in people's heads) and explicit (in research reports, databases and technologies) knowledge. We place a strong emphasis on credible, high quality scientific knowledge which is increasingly demanded in complex political decision-making and policy formulation. At the same time, where appropriate, we embrace other ways of knowing, including the intimate landscape knowledge of farmers and indigenous peoples. We recognise that knowledge can take many forms, including technologies, systems understanding and new insights. Translating knowledge into practice requires highly skilled processes in its own right.

We will increase our efforts to improve the adoption of existing and new knowledge, in particular by farmers, rural industries and catchment managers. In our Industries Arena we will work in partnership with other RDCs and farm advisors targeting key farmers and rural communities. At the catchment level, we will test a range of types of engagement with catchment bodies. At policy levels, we will try to close the gap between research activities and policy formulation so that research is working more closely with policy in an adaptive management sense.

Key strategies include:

- Designing research in collaboration with rural industries and other stakeholders and agreeing on the pathways for delivering research knowledge;
- Synthesising knowledge into forms suitable for uptake by policy, management and practitioner audiences and tailored to its scale of application;
- Managing NRM knowledge at a national level and communicating to government and the wider community on substantive NRM research issues;
- Targeting NRM/Landcare facilitator networks and catchment/regional bodies to include good science in planning and implementation;
- Facilitating knowledge exchange processes across levels of government, communities and rural industries;
- Building capacity in all sectors to access and interpret NRM information for their local situation or specific needs;
- Documenting local knowledge and promoting practical sustainability achievements of community members such as through our Community Fellowships; and
- Assessing research on adoption and taking on and promoting its key messages.

Adoption Performance Indicator

Evidence of increased rates of adoption of Land & Water Australia R&D outputs.

MONITORING AND EVALUATION

Evaluating impact and effectiveness in natural resource management is notoriously difficult. We deal with large scales in space and time, and determining cause and effect is problematic. Attributing a change in resource condition to any particular intervention is often highly fraught. In essence we measure our performance as research investors by evaluating (in order of increasing complexity and expense):

1. the extent to which we are generating relevant and adoptable knowledge;
2. the extent to which our research outputs are being read and adopted;
3. the estimated improvements in resource condition that could reasonably be expected if the research was widely adopted; and
4. measurable changes in resource condition that can be attributed to our research outputs.

Land & Water Australia will introduce an updated and comprehensive corporate evaluation strategy to assess organisational performance annually against the four key performance indicators of this Strategic Plan. The Performance Assessment Framework setting out outputs, performance indicators and measures is tabulated below.

The Corporation will also continue its in-depth ex-post evaluation case studies on major innovations. Each case study examines the outputs, adoption profiles and outcomes within a triple bottom line cost-benefit framework and calculates Return On Investment in terms of net present values, benefit: cost ratios and internal rates of return. The case studies provide detailed information about the innovation and current usage for ongoing communication to stakeholders. A portfolio level Return On Investment for our total past investment is subsequently estimated.

The corporate evaluation strategy also includes evaluations of programs and projects. Programs will be evaluated against their own objectives using standardised methods, at mid-term and on completion, with each evaluation being presented to the relevant program management committee and the Land & Water Australia Board for consideration. The Corporation also has detailed processes for monitoring the progress and achievements of all its individual projects. The corporate evaluation strategy generates an annual performance report against the Strategic R&D Plan for consideration by the Land & Water Australia Board.

EVALUATION FRAMEWORK

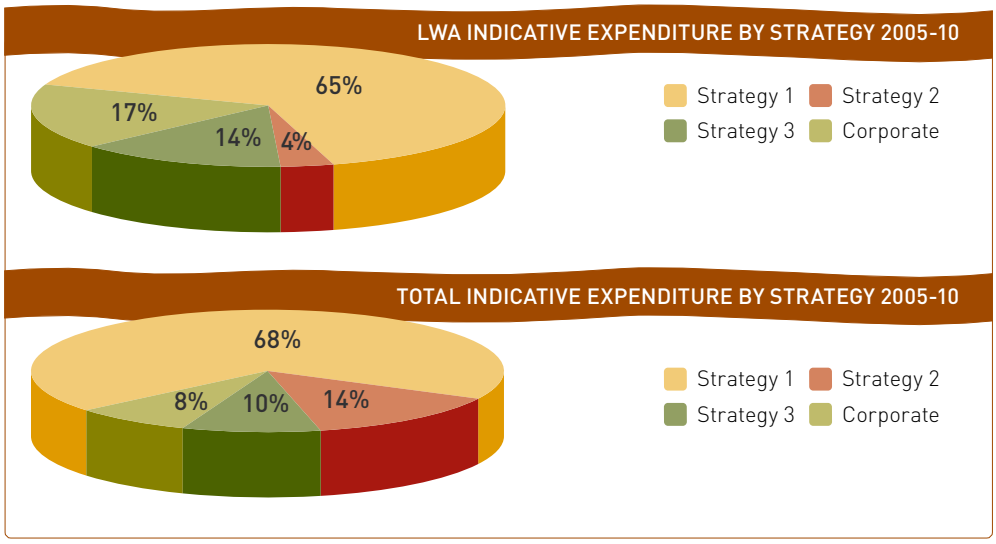
Outcome	Performance indicator	Performance measurement
Corporate Knowledge, understanding and informed debate to inspire innovation and action in sustainable natural resource management.	Improvements in the understanding, management and condition of Australia's natural resources that can be linked demonstrably with the adoption of the outputs of our research investments.	Quantitative measures of knowledge assets generated, adoption of this knowledge, and estimated resulting improvements in condition of Australia's natural resources.
Research Investment Farm scale: Agronomic, social and economic understanding, tools and technologies that can be applied on-farm to develop more sustainable and productive primary industries. Landscape scale: Ecological and socio-cultural understanding of landscape and community function that can be used to inform the on-ground implementation of policies and programs (including NAP, NLP, NHT and NWI) at that scale, while enhancing links between landscape-scale goals and farm-scale practice. National scale: Economic, social and institutional understanding that can inform the development of better governance, policies and programs to accelerate the adoption of sustainable management practices.	Generation of new knowledge useful to the sustainable management and use of Australia's natural resources.	Audit of knowledge assets and technologies produced and disseminated and predictions of their utility.
Collaboration Greater efficiencies in research investment, reduced duplication of effort, effective application of Australia's NRM research capability against national priorities, and more integrated solutions. Enhanced reporting to government and the community on Australia's NRM R&D priorities, the costs of sustainability issues to the community, national NRM research capacity, research activities and funding needs.	Number and financial leverage of program and project partnerships. Increased research capacity and better coordination of existing capacity in critical areas. The quality of analysis of strategic issues in NRM.	Financial leverage of collaborative programs. Change in the distribution and quality of the NRM research base. Government feedback on the quality and utility of Land & Water Australia reports on NRM research issues.
Knowledge into Practice Improvements in the accessibility, synthesis and uptake of knowledge generated through Land & Water Australia investments.	Evidence of increased rates of adoption of Land & Water Australia R&D outputs.	Adoption profiles of Land & Water Australia program and portfolio outputs.

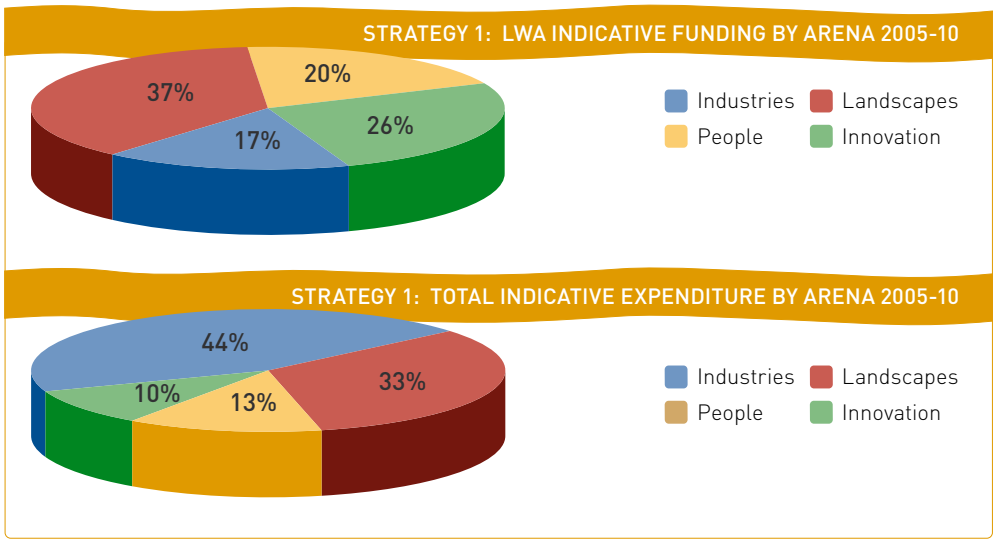
ALLOCATION OF FUNDS 2005-2010

Land & Water Australia's forward funding allocations by Strategy and Arena are shown in the pie charts below for (a) Land & Water Australia funds only and (b) total expenditure inclusive of partner contributions. These figures are indicative only and will depend on future decisions of the Land & Water Australia Board, special funding allocations, adjustments to appropriation and the ongoing development of R&D program partnerships.

Funding allocations to Strategy 1 (research investment) are similar for both Land & Water Australia funds and total expenditure. However a significantly higher allocation of Land & Water Australia funds is made to corporate enabling functions to service the partnership programs. Similarly a higher proportion of Land & Water Australia funds is applied to Strategy 3 (knowledge into practice) to enhance knowledge synthesis and management across the programs. Strategy 2 funding increases substantially under total expenditure due to the inclusion of the National Land & Water Resources Audit, which is funded through the Natural Heritage Trust.

Within Strategy 1, Land & Water Australia attracts co-investment mostly in the Industries Arena and to a lesser extent in the Landscapes Arena. This is reflected below in the differing relative funding proportions from Land & Water Australia funds to total expenditure.





CORPORATE FUNCTIONS

Progress toward the achievement of Land & Water Australia's strategies is underpinned by a strong commitment to business excellence and support from the Corporate Services Team, commitment to attracting and retaining high quality staff, strong leadership, empowering policies and focus on quality. As the Corporation has grown in recent years and entered into many more partnerships with a wider range of collaborators, the demands on our corporate enabling functions have increased. At the outset of this new strategic plan, we are undertaking a comprehensive, integrated renovation of corporate systems and processes including Information Technology, Human Resource Management, Knowledge and Information Systems, Financial Reporting and Budgeting, Procurement (especially R&D contracting processes), Risk Management and Quality Systems. This work will put the Corporation in a very sound position for growth and for continual improvement in our ability to deliver the key strategies outlined in this Strategic Plan.

Financial Management

The Corporation receives a core appropriation from the Australian Government of around $12.5 million each year. Additional funds are sourced from co-investors in external partnerships within collaborative programs and other activities. In the 2004-5 financial year, the Corporation's government appropriation was $12.5m and its total R&D investment was $21.5m. Land & Water Australia aims to increase the level of both appropriation and external funds invested in its R&D programs over the life of this Plan.

Land & Water Australia is improving its financial systems to streamline its business analysis, budgeting, reporting and financial management capabilities. This process commenced in 2003 and will be completed by late 2005.

In light of changes to privacy laws, intellectual property issues, indemnity and insurance issues, and recent climatic extremes, Land & Water Australia is also reviewing its risk management processes. A fully revised Risk Management Plan incorporates new risk management and mitigation strategies. The Risk Management Plan will be supported over the life of this Strategic Plan with a rolling program of review and revision.

The Finance Committee and the Audit Committee (sub-committees of the Land & Water Australia Board) will oversee the review of financial management, and the review of risk management, consistent with their respective roles in providing strategic and policy guidance to the Corporation.

CORPORATE FUNCTIONS (continued)

Corporate Governance

Land & Water Australia is committed to the highest standards of corporate governance in meeting or exceeding the requirements of the Commonwealth Authorities and Companies Act (1997). Processes adopted by Land & Water Australia include: annual internal and external (independent) audits of all financial and accountability operations; a Board Charter and code of conduct for directors including a due-diligence checklist completed at each Board meeting; external evaluations of Board performance; detailed governance and best practice guidelines for program management committees (including procedures for the disclosure and management of conflict of interest); and an organisation-wide risk identification and management framework. Land & Water Australia's management processes and procedures have been accredited under the ISO 9000 quality assurance framework since 1996. Our corporate governance model is illustrated in Appendix 3.

Accountability

The legal requirements for our reporting are:

- Submitting a 5-year Strategic R&D Plan to the Minister for Agriculture, Fisheries and Forestry.
- Submitting an Annual Operational Plan to the Minister for Agriculture, Fisheries and Forestry. This Plan provides a detailed account of the proposed inputs, outputs and outcomes of the Corporation's activities, in line with the 5-year Strategic R&D Plan, for the coming financial year.
- Submitting an Annual Report which records and measures achievements of the organisation against its Annual Operation Plan, as well as covering other statutory reporting requirements.

We are also formally required to report to our Representative Organisations (the National Farmers Federation and the Australian Conservation Foundation) on an annual basis and in preparing the Strategic R&D Plan. In this plan, we formally report to the Australian Government on our contribution to National and Rural Research Priorities, national NRM policy initiatives and their implementation, and specific NRM issues requested by our Minister.

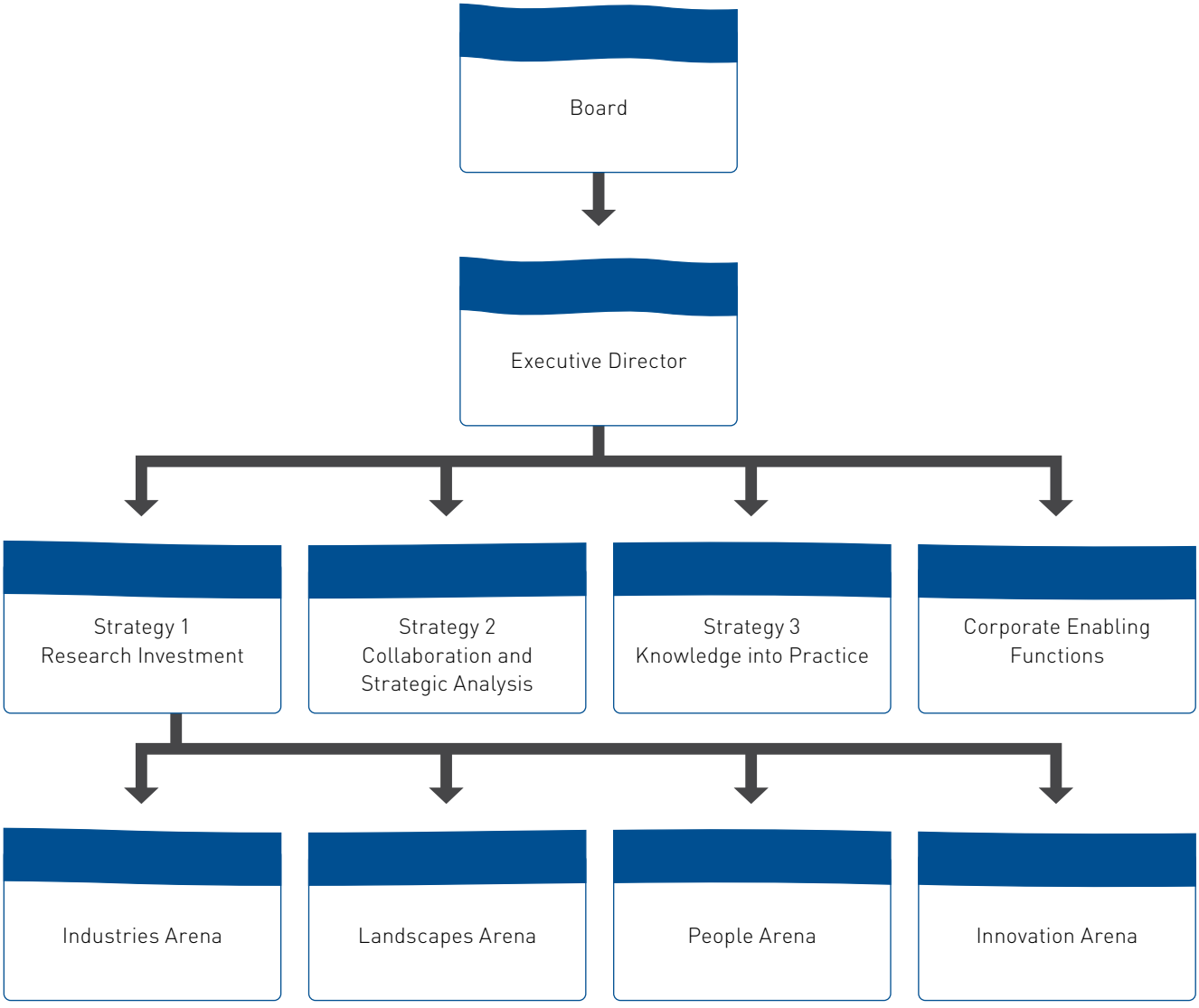
CORPORATE FUNCTIONS (continued)

Human Resource Management

A new Human Resource Management Plan will be introduced as part of the 2005-2010 Strategic Plan to support all staff in the Corporation and to maintain the Corporation's standing as an employer of choice. It will provide for development in areas such as: talent identification, recruitment, retention, and succession; maintaining and building on our high performance culture; and leadership development at all levels within the Corporation.

A review of our current Terms and Conditions of Employment will consider any changes to the supporting legal employment framework, as well as providing an opportunity to align our training and development strategies with this Strategic R&D Plan. Additionally, systems will be developed to keep our changing workforce fully informed of the requirements of Occupational Health and Safety, Equal Employment Opportunity, Workplace Diversity and other relevant legislative requirements.

ORGANISATION MODEL



APPENDIX 1

The Corporation's Stakeholders and Clients

The Australian Government, in particular:

- the Minister for Agriculture, Fisheries and Forestry
- the Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry
- the Minister for Transport and Regional Services
- the Minister for the Environment and Heritage
- the Minister for Education, Science and Training
- the Department of Agriculture, Fisheries & Forestry
- the Department of Environment and Heritage
- the National Water Commission
- the Department of Transport and Regional Services
- the Department of Education, Science and Training
- the Chief Scientist

Land & Water Australia's Representative Organisations:

- the National Farmers Federation
- the Australian Conservation Foundation

Australian Government NRM Initiatives:

- Natural Heritage Trust
- National Action Plan for Salinity and Water Quality
- National Landcare Program
- National Water Initiative

R&D Program Funding Partners, in particular:

- other Research & Development Corporations
- the Murray Darling Basin Commission
- State Government Departments

Key target audiences for Land & Water Australia's outputs, in particular:

- regional NRM bodies and catchment bodies
- industry organisations, farmers and other land managers, and the people who advise them
- State agencies, local government, NGOs and indigenous organisations
- others involved in the use, management, regulation or conservation of Australia's land, water and vegetation resources.

The research and development community, in particular:

- Universities and CRCs
- CSIRO and other Australian Government research organisations
- State agencies and consultants

The public at large who have an interest in the sustainability of Australia's land, water and vegetation resources.

APPENDIX 2

National Research Priorities & Rural Research and Development Priorities

The National Research Priorities and Rural Research and Development Priorities are central to the development of this Strategic R&D Plan (see pages 3 and 4). Land & Water Australia organises its research, development and adoption principally through R&D strategies, programs and projects. The following table summarises how the two sets of priorities are delivered through this plan.

With respect to the National Research Priorities, Land & Water Australia's focus is predominantly on priority 1 "An Environmentally Sustainable Australia". However many of our activities also support the other three priorities.

National Research Priorities

AN ENVIRONMENTALLY SUSTAINABLE AUSTRALIA

This priority is core business for Land & Water Australia and the following R&D programs represent the focal issues addressed in this plan:

- National Land & Water Resources Audit;
- Environmental Water Allocation Program;
- Grain & Graze Program;
- Innovation arena (including scholarships and fellowships);
- Joint Venture Agroforestry Program (managed by RIRDC);
- Land, Water and Wool Program;
- Managing Climate Variability Program;
- National Program for Sustainable Irrigation;
- National Riparian Lands Program;
- Tropical Rivers Program;
- National River Contaminants Program;
- Native Vegetation and Biodiversity R&D Program; and
- Social and Institutional Research Program.

PROMOTING AND MAINTAINING GOOD HEALTH

Indicative activities

- Improved management of chemicals in the environment;
- Reducing stress in rural communities derived from environmental issues;
- Assisting policy setting through comprehending demographic change;
- Creating visions for future Australian landscapes and industries;
- Building social capital and capacity to meet environmental challenges;
- Helping design more effective institutions to meet community aspirations; and
- Understanding the relationship between healthy landscapes and indigenous health.

FRONTIER TECHNOLOGIES FOR BUILDING AND TRANSFORMING AUSTRALIAN INDUSTRIES

Indicative activities

- Assessing the potential benefits and impacts of emerging meta-technologies;
- Application of new and novel technologies to environmental assessment, research and solutions;
- Matching rural industries to the sustainability constraints of Australian landscapes using new technologies; and
- Developing new technologies to improve the sustainable use and management of natural resources.

SAFEGUARDING AUSTRALIA

Indicative Activities

- Methods of dealing with invasive pests;
- Rapid assessment of the quality and health of waterways; and
- Methods to protect Australia's natural heritage and biodiversity.

APPENDIX 2 (continued)

Rural R&D priorities

SUSTAINABLE NATURAL RESOURCE MANAGEMENT

The Corporation's core business relates to protecting and enhancing the natural resource base that underpins rural Australia (see Land & Water Australia R&D programs above, under "An environmentally sustainable Australia").

IMPROVING COMPETITIVENESS THROUGH A WHOLE OF INDUSTRY APPROACH

The Corporation ensures a whole-of-industry approach in all its collaborative programs and activities, especially with other RDCs. This is essential to achieving industry adoption of best practices to drive sustainability outcomes. Many of our programs involve more than one industry partner (e.g. Grain & Graze partners are Grains Research & Development Corporation, Meat & Livestock Australia and Australian Wool Innovation Limited). Land & Water Australia will increasingly play a lead role in reporting and evaluating NRM R&D across the RDCs.

MAINTAINING AND IMPROVING CONFIDENCE IN THE INTEGRITY OF AUSTRALIAN AGRICULTURAL, FOOD, FISH AND FORESTRY PRODUCTS

Whilst Land & Water Australia has minimal direct R&D responsibility for food safety, we collaborate with the industry-based RDCs to ensure food is sustainably produced through effective management of Australia's natural resources. This is important to ensure domestic and overseas confidence in Australian produce.

IMPROVED TRADE AND MARKET ACCESS

Land & Water Australia's programs, in collaboration with other RDCs, will help landholders to diversify and produce new and improved high-value products in an environmentally sustainable way to satisfy market demand, such as agroforestry products and productive use of saline lands. The need for agri-food exporters to comply with market access requirements makes our collaborative R&D on sustainable production systems a useful tool to assist in meeting these requirements.

USE OF FRONTIER TECHNOLOGIES

Land & Water Australia continues to assess, develop and apply new and innovative technologies for enhancing sustainable production and conservation. A range of technologies from molecular diagnostics to remote sensing will be funded in this plan, primarily through the Innovation Arena.

PROTECTING AUSTRALIA FROM INVASIVE DISEASES AND PESTS

Our involvement in R&D on invasive diseases and pests to date has primarily been through the National Land & Water Resources Audit (e.g. analysis of threatening processes to biodiversity) and a range of specific projects with program partners. Land & Water Australia anticipates playing a larger role in commissioning R&D on this priority within the life of this plan.

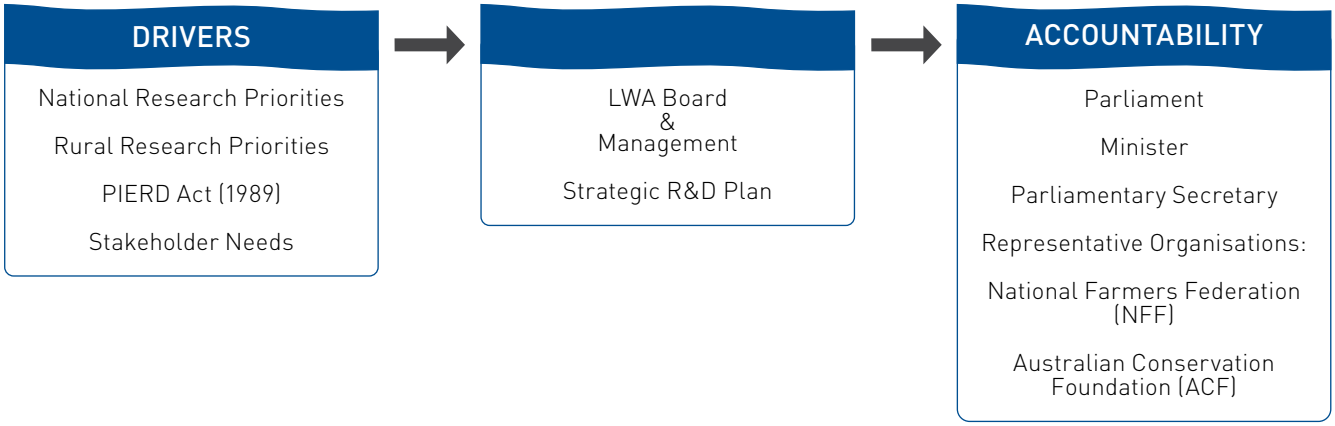
CREATING AN INNOVATIVE CULTURE

Land & Water Australia is highly focussed on innovation and building capacity in the rural communities. Our activities in this plan include:

- Ongoing Australia-wide assessments of water, soil health and biodiversity status made available through an interactive website and The Australian Natural Resources Atlas and Data Library provided via the National Land & Water Resources Audit;
- A wide range of manuals and guidelines on sustainable NRM practices for diverse audiences;
- National databases including the Australian Agriculture and Natural Resources Online (AANRO) embodying Streamline, Australian Rural Research In Progress, Australian Bibliography of Agriculture as well as the Corporation's own website and Innovations Database;
- Thirty postgraduate students, most pursuing PhD degrees in NRM, to provide knowledge to stimulate policy dialogue and trained personnel to assist in designing and implementing future programs;
- Travelling Fellowships allowing young Australian researchers to access knowledge and skills not readily available in Australia. Overseas researchers, with specialist skills not found in Australia, are also invited to Australia to transfer knowledge and skills;
- Training programs for resource managers;
- Continue the partnership in the Cooperative Venture for Capacity Building for Innovation in Rural Industries managed by Rural Industries Research and Development Corporation;
- Close liaison with industries, providing direct knowledge and technology transfer to producers through well-established existing industry mechanisms; and
- Senior Research Fellowships which give leading NRM researchers the opportunity to take 'time out' from management and administrative responsibilities to undertake seminal work in their fields – usually of a reflective or synthesis nature.

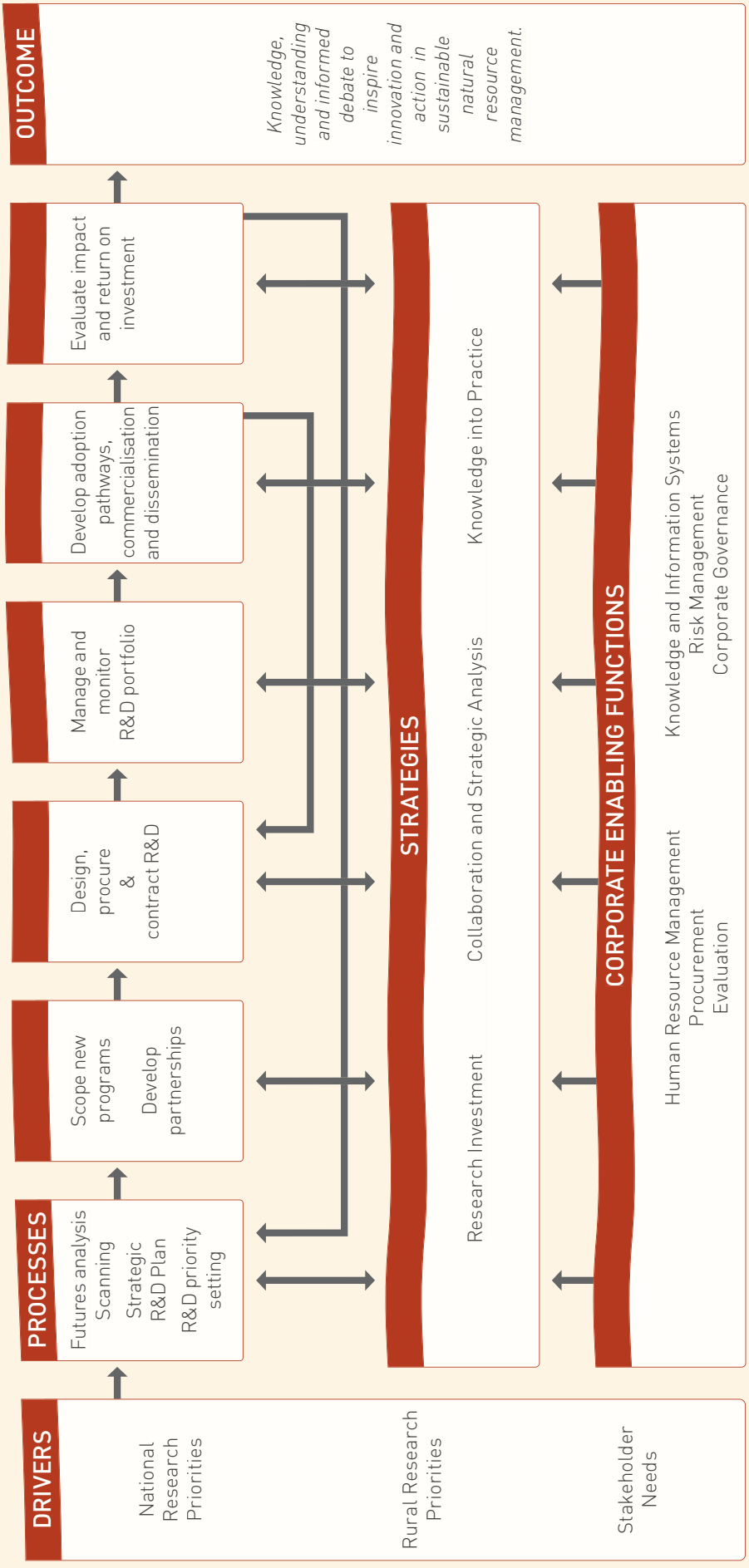
APPENDIX 3

Corporate Governance Model



APPENDIX 4

Land & Water Australia Value Chain



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Land & Water Australia is a statutory corporation of the Australian Government within the Agriculture, Fisheries and Forestry portfolio, established under the Primary Industries and Energy Research and Development (PIERD) Act 1989. Its mission is to invest in knowledge, partnerships, innovation and adoption to underpin sustainable natural resource management in Australia.

cover artwork: Annie Franklin, 2000