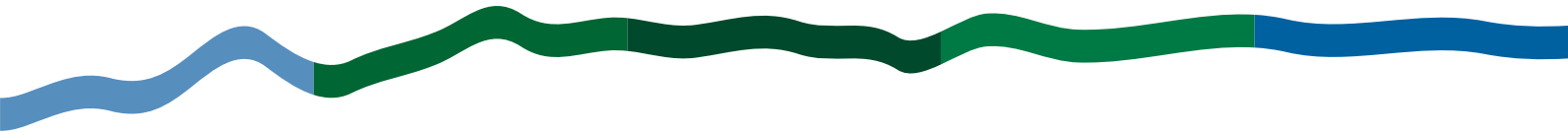Australian Government

Land & Water Australia

knowledge for managing Australian landscapes

Native Vegetation and Biodiversity

R&D Program Plan
2005 – 2010

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Executive Summary

The management of native vegetation and biodiversity has been highlighted as a priority issue by Land & Water Australia for future R&D investment because of its critical role in providing ecosystem services (eg fresh water), in improving landscape function (eg in controlling salinity and erosion), in enhancing production (eg through provision of shelter) and in mitigating climate change (eg through carbon sequestration).

Extensive national scoping of the R&D needs and opportunities led to the development of an investment prospectus which has been discussed with a wide range of potential program partners. These discussions have led to this program plan which aims to address vegetation and biodiversity issues in both the intensive and extensive landscapes of Australia. The plan is organised around six themes which have a strong focus on improved knowledge generation, application and adoption.

The program will be a collaborative partnership between a wide range of agencies with interest in native vegetation and biodiversity. Funding partners will form the Management Committee for the new program, while other interested parties and client groups will form a network for ongoing engagement.

This R&D investment is directed at informing governments at all levels and in all jurisdictions, and providing tools, technologies and practices to resource managers and landowners to substantially enhance landscape health and productivity.

The goal of the program is:

To undertake focused research and development to improve the management and use of Australia's native vegetation and biodiversity resources to enhance the delivery of ecosystem goods and services.

The six R&D themes are:

1. Understanding and valuing landscape processes, including the role and function of biodiversity in the delivery of ecosystem services

2. Understanding risks and threatening processes in order to develop effective responses

3. Understanding ecosystem processes, condition and dynamics

4. Informing policy and management - developing Australia's capacity to effectively manage vegetation and biodiversity

5. Enhancing national R&D capacity in native vegetation, ecosystem services and biodiversity

6. Effective communication and adoption

1. Introduction

In December 2003 following an extensive investment planning process, the Land & Water Australia Board identified native vegetation and biodiversity as a priority for future R&D investment. To establish detailed research priorities, a series of national workshops were conducted with key stakeholders. In addition, several recent studies were consulted including the reports of the National Land and Water Resources Audit (2002), the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) Report on Sustaining our Natural Systems and Biodiversity (2002) and the review of Land & Water Australia's Native Vegetation R&D Program (unpublished) which included scoping new R&D priorities.

The outputs from these processes were carefully synthesised and a strong alignment of R&D priorities surrounding ecosystem services, native vegetation and biodiversity emerged. These were subsequently developed into the six core R&D themes. An investment prospectus was prepared and, following approval by the Land & Water Australia Board, used for consultation with prospective funding partners. These consultations have indicated strong support for the emergent themes and their subsidiary research questions.

Central Australia (Photo: Neil Owens)

2. Context for Native Vegetation and Biodiversity Research

"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. 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."

Land & Water Australia Strategic R&D Plan (2005-2010)

National needs

The Australian Government has identified progress towards 'an environmentally sustainable Australia' as one of its four national research priorities (2002). The 'sustainable use of Australia's biodiversity' sub-priority seeks to manage and protect Australia's biodiversity to develop long term use of ecosystem goods and services.

The national significance of effective strategies for biodiversity and natural resource management is emphasised in the Prime Minister's Science Engineering and Innovation Council (PMSEIC) report 'Sustaining our Natural Systems and Biodiversity' (2002) which states that:

- Australians receive great value from natural systems and their capacity to deliver ecosystem services, but this capacity is jeopardised due to the declining health of natural systems

- Healthy, biodiverse systems underpin much economic activity, including tourism and agriculture

- Many important ecosystem services are unvalued or undervalued

- The cost of landscape repair is large, land degradation is estimated to cost $1.15 billion per annum (pa) in lost production and that $2 to $6 billion pa would be required for full environmental repair

- Maintenance of natural systems is cheaper than repair, and

- Enhanced R&D efforts and national coordination is required.

It is cheaper to maintain and protect our ecosystems than it is to repair them. The National Land & Water Resources Audit's Terrestrial Biodiversity Assessment (2002) reported that a modest investment could achieve significant recovery of species and ecosystems across about one-third of the continent. This research initiative will explore better techniques to cost-effectively restore, as well as prevent, further damage to our natural landscapes, and better ways of targeting and prioritising such efforts using existing datasets.

Regional NRM needs

The nationwide regional framework for integrated natural resource management, supported through the Natural Heritage Trust (NHT) and the National Action Plan for Salinity and Water Quality (NAP), provides new delivery institutions for landscape-scale research on management of Australia's native vegetation and biodiversity. However, the challenges of effective collaboration, influence and knowledge delivery remain.

Vegetation plays a central role in NRM. The kinds of NRM outcomes being sought in many different parts of Australia include: ensuring more resilient and productive landscapes; maintaining culturally and ecologically significant landscapes; maintaining regional species diversity; the protection of threatened and endangered species; addressing dryland salinity; improving river and coastal water quality and restoring riparian zones etc. These aspirations are being laid out in numerous regional NRM plans and other planning and policy documents.

3. Program Goal

Vegetation and biodiversity management are linked directly and/or indirectly to the achievement of these NRM outcomes via:

- The nature of the causal relationships (biophysical)

- The institutional relationships

- Society's need to sustain the health and productivity of natural resources and the inter-linked socio-economic systems (eg rivers, pastoral resources, agricultural industries)

- Continuing impacts in space and time of clearing and vegetation modification

- The primacy of vegetation/revegetation in both habitat management and natural resource management

- Well recognised needs to sustain species, habitats and ecosystem processes

- Anticipated declines in functional health, productivity and biodiversity in many regions

- The significant opportunities to enhance policy and management capacity

- Opportunities for knowledge to enhance prevention, restoration and integrated management, and

- Incorporation of biodiversity targets into regional NRM processes.

There are significant opportunities for improving the effectiveness of regional natural resource management programs and in particular for integrating biodiversity issues and outcomes. However, there are currently serious limitations in capacity for delivering integrated approaches.

> This program will undertake focused research and development to improve the management and use of Australia's native vegetation and biodiversity resources to enhance the delivery of ecosystem goods and services.

Callistemon flower (Photo: Sam Highley)

4. Program Outcomes and Activities

There is no doubt that improved management of native vegetation and biodiversity is one of the nation's major natural resource management challenges. The need for increased investment, cooperation and coordination of R&D in this area has been widely recognised.

Themes

The core themes this program will focus on are:

1. Understanding and valuing landscape processes, including the role and function of biodiversity in the delivery of ecosystem services

2. Understanding risks and threatening processes in order to develop effective responses

3. Understanding ecosystem processes, condition and dynamics

4. Informing policy and management - developing Australia's capacity to effectively manage vegetation and biodiversity

5. Enhancing national R&D capacity in native vegetation, ecosystem services and biodiversity

6. Effective communication and adoption

Outputs

The key outputs from the program will be:

- Improved knowledge of landscape processes and how the delivery of ecosystem services are influenced by the management of native vegetation and biodiversity

- Improved capacity to understand, predict and respond to risks posed by factors such as land degradation and salinity, changes in water and fire regimes, feral plant and animal invasions, species decline and extinction, climate change and inappropriate management of natural resources

- Techniques for managing vegetation to improve landscape health through ameliorating degradation processes, enhancing habitat and restoring ecosystem function

- Improved capacity to predict outcomes of vegetation management at a range of scales, and enhanced understanding of regional scale processes

- Tested techniques and tools for prioritising, targeting and allocating public investment in vegetation and biodiversity management at a landscape scale across a range of land tenures

- Cost-effective and innovative methods for landscape restoration and protection including large scale revegetation and regeneration techniques and to achieve biodiversity enhancement and other NRM objectives

- Collaborative working relationships with natural resource managers developed through designing and implementing large scale adaptive management experiments

- Improved policy development and application to protect and restore native vegetation and biodiversity and utilisation and management of ecosystem services, and

- Adoption of new and existing knowledge on native vegetation, biodiversity and ecosystem services and capacity to apply this knowledge to protecting and restoring healthy landscapes.

Outcomes

The program aims to achieve the following outcomes:

- More sustainable use and management of Australia's native vegetation and biodiversity resources leading to improved quality and quantity of ecosystem services and landscape health

- Improved understanding of the role and importance of native vegetation and biodiversity management in the protection and restoration of landscapes and in the delivery of ecosystem goods and services

- Practical, cost-effective responses to threats to the health of native vegetation, biodiversity and the delivery of ecosystem services developed

- National and regional capacity in vegetation and biodiversity science and management enhanced

- Enhanced adoption of new and existing knowledge

- Improved research capacity in native vegetation and biodiversity capable of improving landscape health and productivity, and

- Greater confidence in metrics for ecosystem services.

5.   Research Questions

The research and development plan has been organised into six themes. The research questions (themes 1-4) and proposed activities (themes 5-6) within each theme are:

Theme 1

Understanding and valuing landscape processes, including the role and function of biodiversity in the delivery of ecosystem services:

- How do landscapes work and how do they generate value?
- How can we manage landscapes to maintain and/or improve their capacity to deliver ecosystem services?

Theme 2

Understanding risks and threatening processes in order to develop effective responses:

- What are the risks to the long-term capacity to deliver ecosystem services, achieve sustainable landscapes and protect biodiversity?
- How significant are these risks and what are their likely impacts?
- What actions should be taken to address these risks?
- How do we increase cost-effectiveness and likelihood of success in addressing risks and threatening processes?
- How do we predict the interactions and impacts of multiple risks that exert compounding influences on landscape composition, structure and function?

Theme 3

Understanding ecosystem processes, condition and dynamics:

- What are the key processes that drive landscape change?
- How can we improve capacity for condition and trend assessments?
- What are the critical landscape thresholds and how can these be identified?

- What are the underlying processes that determine landscape condition, resilience and capacity to deliver ecosystem services?
- How can the most effective tools and techniques for determining condition and trends in landscape health be developed?
- How can the critical landscape processes and thresholds (and their interactions) be identified so that preventative management can be implemented?

Theme 4

Informing policy and management - developing Australia's capacity to effectively manage landscape processes:

- How to inform policy and institutional responses using improved knowledge and understanding of ecological systems and the natural, social and economic drivers that shape landscapes?
- How to develop intelligent landscape management principles that guide competent regional planning?
- How to build knowledge and improve methods to integrate biodiversity conservation with agriculture and other industry and production systems to deliver improved understanding of the trade offs and cost benefits of different land-use systems, policy choices and management practices?
- How to efficiently allocate scarce public funding for landscape-scale biodiversity conservation and management across a range of tenures?
- How to improve the efficiency and effectiveness of landscape restoration by improving the understanding and practice?

Theme 4 will include a close collaboration with Land & Water Australia's Social and Institutional Research Program.

Theme 5

Enhancing national R&D capacity:

- Coordinating R&D investment in native vegetation, biodiversity and ecosystem services and developing strong and robust R&D processes to deliver improved links to adoption in both practical and policy dimensions. There will be a strong focus on delivering natural resource management outcomes including via large scale integrated and 'adaptive management experiments' working with regional communities to improve both the science and practice of managing landscapes, and
- Identifying areas where Australia lacks appropriate expertise and research capacity, and instituting measures to build such capacity.

Theme 6

Effective communication and adoption:

- The initiative will be judged by the extent to which it delivers improved understanding and more effective methodologies to defined target audiences, and by the extent of their use. This means much more than simply communicating R&D outputs. It will be based around interactive relationships with defined end-users throughout the research and innovation process, to inform research activities and to equip institutions and land managers with the knowledge and capacity to create more sustainable Australian landscapes.

Theme 6 is described in more detail under knowledge management and adoption.

Geographic focus

As an ambitious program with broad scope and a continental scale, it is clear that not all of the above research questions can be tackled throughout Australia. The extent to which the program addresses each theme and their relative weighting will be determined by the aggregate level of investment in the program and the priorities of the respective partners. It is envisaged that many projects will span several themes while focusing on specific issues or bioregions.

The geographic scope of the program will be based on:

- The remote areas of Australia's arid and semi-arid rangelands,
- The tropical savannahs – the wet and dry tropics predominantly used for extensive grazing in the north of the continent, and
- The drier margin of the wheat-sheep belt.

6. Knowledge Management & Adoption

"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."

Land & Water Australia Strategic R&D Plan (2005-2010)

Knowledge management and adoption is critical to the program achieving its aims of improving capacity in overcoming basic gaps in understanding; increasing national R&D capacity and coordination; and supporting improved policy, planning and management at a regional scale. While the R&D themes attempt to order this into logical groupings, having effective adoption pathways is critical to delivering the programs outcomes across all themes.

In developing the program it has become clear that there are five target audiences for the program. They and the proposed adoption pathways are outlined in the table on the next page.

The Program will apply a range of methods to enhance knowledge management and adoption:

- **Designing research** in collaboration with rural industries, catchment and other natural resource management managers 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 knowledge** at a national level and communicating to government and the wider community on substantive R&D issues

- **Targeting** facilitator networks and regional bodies to include good science in planning and implementation

- **Facilitating** knowledge exchange processes across all levels of government, communities and rural industries, and

- **Building capacity** to access and interpret NRM information for specific regions situation or needs.

Knowledge and adoption activities in this plan will align closely with Land & Water Australia's Knowledge & Adoption Strategy. Full details are given in the Implementation Plan.

Program target audiences and proposed adoption pathways

Program target audience	Adoption pathways
Policy and management agencies	• Joint projects that target agency priorities • Policy briefings (with Social & Institutional Research Program) • Newsletters and summary documents synthesising program outputs • Policy and R&D workshops
Regional NRM groups, NRM coordinators etc	• Joint projects that target regional NRM priorities • Regional forums • Newsletters and summary documents synthesising program • Training, workshops, field days • Professional development courses
Primary industries and RDCs	• Joint projects that target industry priorities or bioregions • Industry specific publications – eg Cotton riparian guidelines • Training, workshops, field days • Newsletters and summary documents synthesising program
Landcare and vegetation practitioners	• Joint projects that target multi-regional priorities • Industry specific publications – technical publications • Resources directories • Innovation networks • Conferences, training, workshops, field days • Newsletters and summary documents synthesising program outputs
Researchers	• Program documents including program calls and tenders • Joint projects that link researchers with larger scale NRM activities • Support for networks • Annual coordination meeting • Scoping and research workshops • Publications, project reports, summaries • Synthesis products • PhD scholarships

7. Monitoring & Evaluation Strategy

Monitoring and evaluation of this program is aligned with the Land & Water Australia Evaluation Strategy 2004. The monitoring and evaluation aims to measure progress of the plan in achieving its outputs and outcomes, using project level milestone reporting and review, and program level independent reviews at mid-term and on completion. The evaluation processes will include assessment of:

- Science quality

- Timeliness of delivery of outputs

- Effectiveness of knowledge management and adoption processes

- Effectiveness of the program's management, and

- Assessment of the impact of the program in achieving the nominated outcomes

The performance indicators for this plan are:

Outcomes	Performance Indicators
Improved understanding of the role and importance of native vegetation and biodiversity management in the protection and restoration of landscapes and in the delivery of ecosystem goods and services	• Knowledge of landscape processes and how the delivery of ecosystem services are influenced by the management of native vegetation and biodiversity
Practical, cost-effective responses to threats to the health of native vegetation, biodiversity and the delivery of ecosystem services developed	• Improved capacity to understand, predict and respond to risks posed by factors such as land degradation and salinity, changes in water and fire regimes, feral plant and animal invasions, species decline and extinction, climate change and inappropriate management of natural resources • Improved techniques for managing vegetation to improve landscape health through ameliorating degradation processes, enhancing habitat and restoring ecosystem function

Outcomes	Performance Indicators
National and regional capacity in vegetation and biodiversity science and management enhanced	• Improved capacity to predict outcomes of vegetation management at a range of scales, and enhanced understanding of regional scale processes • Improving the available 'toolkit' for prioritising, targeting and allocating public investment in vegetation and biodiversity management at a landscape scale across a range of land tenures • Cost-effective and innovative methods for landscape restoration and protection including large scale revegetation and regeneration techniques and biodiversity enhancement
Improved research capacity in native vegetation and biodiversity capable of improving landscape health and productivity	• National research capacity directed to areas of greatest need • Collaborative working relationships with natural resource managers in order to design and implement large scale adaptive management experiments/projects
More sustainable use and management of Australia's native vegetation and biodiversity resources leading to improved quality and quantity of ecosystem services and landscape health	• Assessment of the quality and quantity of ecosystem services supplied by native vegetation and biodiversity
Enhanced adoption of new and existing knowledge	• Enhanced adoption of new and existing knowledge on native vegetation, biodiversity and ecosystem services and capacity to apply this knowledge to protecting and restoring healthy landscapes

8.   Governance

The governance structure aims to address the following key challenges:

- The need for a formal program management agreement and a Program Management Committee (PMC) which is accountable to the program partners

- The need for national coordination and possibly sub-national coordination beyond the R&D projects funded, due to the large number of agencies involved

- The scope and scale of the new program with its wide range of potential project types and/or location of project activities, and

- The capacity to effectively address the communication and adoption needs across many regions and agencies.

The Program Management Committee will consist of all investors willing to contribute cash to be invested in agreed program priorities, plus additional skills as required. The PMC would be supported by an advisory committee/s that is established to address the needs for national coordination, communication, liaison and linkages to policy and management agencies.

The Program Management Committee will operate under clear guidelines of best practice governance. It will have delegated responsibilities to allocate funds and manage projects as specified within a legal program management agreement.

In commissioning R&D the Program Management Committee will judiciously utilise a mix of open calls, limited tenders and direct commissioning of research projects. Large projects that entail partnerships of research providers are likely to be commissioned from consortia that have the capacity to scope and undertake the multi-disciplinary research required. Where precise priorities are not well known and where there are many possible providers, proposals will be sought through a tendering or open call process. Calls will emphasise the need for stakeholder support and third party funding. Proposals will be assessed by the Program Management Committee, specialist panels and/or expert referees.

Daly River, Northern Territory (Photo: Andrew Campbell)

9. Program Budget

The Land & Water Australia Board has made an in principle commitment of $5 million over the five years of the program. This is a modest investment relative to the aims of the program, but there are several other stakeholders with significant interests in the research who should be able to contribute resources to better achieve the goals. Significant partner funds from third parties are being sought and there should be strong co-funding of individual projects.

10. Further Information

For further information on the Native Vegetation and Biodiversity Program please contact:

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Macleay River, New South Wales (Photo: Samuel Clarke)

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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.