Sustainable Primary Industries

More than 60 per cent of the Australian continent is managed by farming and grazing industries. Land & Water Australia is working with primary industries, through the research and development programs in the Sustainable Primary Industries group, to find ways of ensuring that natural resources are used sustainably while also supporting profitable farm business and viable rural communities.

Sustainable Primary Industries programs target environmental and production outcomes. They also provide a link between Australia's primary industries and the other environmental and social research in Land & Water Australia's broad portfolio. Land & Water Australia annually manages approximately $25 million of research investments across five 'arenas' - Rivers, Native Vegetation, Future Landscapes, Cross-cutting and Sustainable Primary Industries. Research includes investigations into the management of rivers, riparian areas and native vegetation, the social and institutional drivers of change and potential future agricultural systems for improved resource sustainability.

The Sustainable Primary Industries programs, projects and activities take a variety of forms and are targeted to the specific needs of partner organisations and industries. They range from multi-partner programs across a number of industries to those working with a specific partner and a single industry. Research programs involve various mixes of pure and applied science. They usually involve Land & Water Australia as a driver of partnerships but also include investments by Land & Water Australia into programs run through other agencies. The Sustainable Primary Industries programs even provide advice and assistance to rural industries wanting to initiate more environmental research of their own. The programs can involve major expenditure over an extended period or be small short-term projects and studies.

The five research and development programs currently within the Sustainable Primary Industries group are:

- Grain & Graze
- Land, Water & Wool
- Managing Climate Variability
- National Dryland Salinity Program
- National Program for Sustainable Irrigation
Land and Water Australia is an Australian Government authority responsible for research and development aimed at the productive and sustainable management of the land, water and vegetation resources underpinning Australia’s primary industries and regional communities. One of our goals is to help build the capacity of industry to manage natural resources sustainably. A key theme is to promote production and environmental gains for viable regional communities. Our research explores the relationships between farmers, their production systems and the catchments in which they operate.

Part of the charter of Land and Water is to foster national collaboration to improve the efficiency and effectiveness of research efforts among research and development corporations. Sustainable Primary Industries is an “arena” of research within Land & Water Australia. It strives to build partnerships with rural industries; bringing access to the best environmental research and looking for information on production systems and the drivers of on-farm change.

For more information go to www.lwa.gov.au.

Australia’s farming and grazing industries managed more than 60 per cent of the continent. Through the Sustainable Primary Industries group of programs, Land & Water Australia is working with primary industries to improve the management of natural resources.

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Sustainable Primary Industries

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Enhancing the capacity of Australia's primary industries to sustainably manage natural resources.

Grain & Graze

Mixed farming is at the core of the newest Program in the Sustainable Primary Industry group, Grain & Graze. Local farmer groups will be working with researchers and catchment planners to design and implement on-farm trial and demonstration sites in 10 catchment-based areas across Australia. The program aims to develop new tools for farmers to improve productivity across mixed farming systems while maintaining or enhancing biodiversity and catchment resources.

The key objectives of the Program include:

- More profit for mixed farmers (especially from the pasture phase of rotations)
- Better water quality (e.g., reduced recharge via incorporation of deep-rooted pastures)
- Enhanced condition and diversity of plants and wildlife (on farms and across catchments)

Through Grain & Graze farmers will substantially participate with researchers and catchment planners to design and implement on-farm trial and demonstration sites, as well as training and communication activities. The trial and demonstration sites may also showcase incentive programs run via catchment groups.

A key series of regionally based research sites will be linked nationally via ongoing communication and will be run with the support of local farmer groups. The sites will follow the same protocols for data gathering, analysis, and modelling. They may also link with catchment modelling programs and investigations to map environmental risks at the regional level.

These activities will be supported by a network of regional facilitators and by a suite of extension and communication tools. These tools, which draw upon knowledge from prior research and new findings from the program, will be developed by Grain & Graze to enable farmers to quickly apply the latest “whole farm” knowledge for mixed farming systems.
There are 25,000 to 30,000 mixed enterprise dryland farmers in Australia, nearly half of the nation's 66,000 broadacre farmers. These farmers and their communities are the primary stakeholders for the Grain & Graze program. Their interests are represented by the three core funding partners:

- Grains Research & Development Corporation
- Land & Water Australia, and
- Meat & Livestock Australia

Much of Grain & Graze will build upon existing or previous farming system research projects including those in the GRDC Farming Systems Groups and MLA’s Sustainable Grazing Systems. Those interests (farmers and researchers) will be important contributors.

Across Australia regional groups (often based on catchments) are developing integrated natural resource management plans and strategies to invest in achieving agreed natural resource targets. These initiatives are driven, and supported, by governments at all levels, and especially the Australian Government. These networks are important stakeholders in Grain & Graze.

Some of the research questions addressed by Grain & Graze are also being addressed by other researchers and organisations including the CRC for Catchment Hydrology and the CRC for Plant Based Management of Dryland Salinity. Linkages will be established with these organisations.

Almost half of Australia's 66,000 broadacre farmers are involved in mixed-enterprise cropping and livestock production systems.
Land, Water & Wool

Land, Water & Wool is the most comprehensive natural resource management research and development program ever undertaken for the Australian wool industry. It is an initiative between the wool industry’s peak research and development body, Australian Wool Innovation Limited and the nation’s premier broker of natural resource management resources research and development, Land & Water Australia.

Within the Land, Water & Wool program, there are seven key research and development areas focusing on key natural resource management issues for wool growers. These are:

- Sustainable Grazing on Saline Land (SGSL)
- Rivers and Water Quality
- Native Vegetation and Biodiversity
- Managing Climate Variability
- Managing Pastoral Country
- Future Woolscapes
- Benchmarking

The Land, Water & Wool program offers exciting opportunities to change the way Australian wool growers think about natural resource management on-farm and how they manage their business into the future. On a broader scale, the program has the potential to position the nation’s wool industry as more sustainable and competitive in the global marketplace, providing the connection between science and experience to influence change.

Land, Water & Wool aims to encourage grower-to-grower interaction in relation to improved management of natural resources on farm, and support growers to identify and work on their NRM issues. In its first two years, Land, Water & Wool has already attracted over 2000 wool growers.

Through Land, Water & Wool, wool growers across Australia are reaping the rewards from improved management of natural resources on their farms - they have healthier rivers, richer native bushland and more productive soils and pastures.
Case Study – Sustainable Grazing on Saline Lands

Woolgrowers Michael and Margaret Lloyd are demonstrating that significant productivity gains can be achieved by implementing new ideas and management systems on salt-affected sections of their cropping and grazing property. Targeted on-farm research and development has demonstrated endless possibilities that might soon be realised through a major supportive R&D effort such as Sustainable Grazing from Saline Lands.

"Twenty years ago, the penny finally dropped. I was in serious trouble and so was my 2160 hectare cropping and grazing property, 'Bundilla' in the Western Australian wheatbelt.

I started farming in the late 1950s, contract clearing scrub and woodland with two bulldozers and a heavy anchor chain. In the mid 1970s, the script started to go wrong. There was the odd patch of bare pasture, a declining crop yield. At first, it was easy to come up with an excuse. Perhaps the season had been too wet – more likely too dry.

Within 15 years, salinity had reduced the arable area on our farm from 1800 hectares to less than 1000 ha. The clearing of native vegetation which developed our farm and made us prosperous was having unexpected consequences.

I realised that if I was going to stay farming, I had to do something with this saltland. I couldn't afford to buy a neighbour's property or more arable land elsewhere, so I made the commitment to have a go, to make 'Bundilla' productive and sustainable again.

Today, 'Bundilla' has more than one million saltbush shrubs growing on nearly 600 ha of revegetated saltland. The sheep graze happily. In fact, if it weren't for the saltbush, 'Bundilla' would only be able to carry half the current number of sheep.

What of the economics? Is it worth it? From the work done on 'Bundilla' and data from other saltland farmers, the answer is undoubtedly YES! In fact, our costs and returns are so good that some visitors and even my neighbours think I must be cooking the books!

We collected our own seed and direct drilled it. Our spray and vermiculite costs are $24/ha. For this we get 2000 plants per hectare. So much for it being too expensive! Where else could we more than treble production from an area of land with such a small additional cost?

Establishment cost is one thing. What about the economic returns from saltland? Our experience shows that costs can be recouped in a short time frame. We've quadrupled our stocking rate to more than eight dry sheep equivalents per hectare (DSE/ha) without additional clovers.

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When we assume a cost of $6.00 per head to run the eight sheep, cut six kilograms of wool per head at, say $3.00/kg and the fertiliser cost is $20.00/ha, the total cost is $68/ha for a return of $144/ha. That's a gross margin of $76/ha – a very powerful incentive for action.

Many of the proposed solutions to salinity have been environmentally driven. My feeling is that if economics was part of the problem, its must be part of the solution – we've got to find more productive and sustainable ways to use saltland.

To successfully manage salinity, we will have to 'think outside the box'. Sheep and wool are in a good position to exploit this new thinking. This is because animal production from saline land will always be the 'main game in town'. Most of what I have learned about productively using saltland has been learned the hard way – by trial and error. And I am still learning. I can only imagine how much further and faster I can progress now that we have access to the support of a strategic research and development program such as Land, Water & Wool Sustainable Grazing from Saline Lands."
Managing Climate Variability

This Program focuses on research and development aimed at improving climate prediction, providing access to climate information, developing tools for tactical decision making, and adapting agricultural and natural resource management practices to Australia’s unique circumstances. The Managing Climate Variability Program builds on more than a decade of climate research by the Climate Variability in Agriculture Program, and is focusing on delivering more accurate seasonal forecasts with longer lead times.

Overall the Program looks to increase profitability and sustainability. A major indicator of success will be an increase in the number of farmers who factor seasonal climate forecasts into their management decisions.

The 2002-03 drought has had a devastating impact on Australian farmers and on land and water resources. Extensive consultations with key partners in the new Managing Climate Variability Program clearly show that more accurate and longer-lead seasonal forecasts are key research priorities.

A gradual trend of rising temperatures has now been evident for several decades and will increasingly impact on Australia’s agricultural and natural resources. There is a growing recognition that research on managing for climate variability needs to take into account the climate changes that have already occurred, as well as likely changes in the next few decades.

While continuing to focus on climate change, the Managing Climate Variability program also recognises that improved climate risk management can prepare communities and industries to adapt to climate change as it happens. A well-coordinated approach to climate research is required, and this is delivered by the cross-industry, national viewpoint of Managing Climate Variability.

Tools and concepts developed by the Climate Variability in Agriculture Program for climate variability studies have been invaluable in studies on the likely future impacts of climate change. The Managing Climate Variability program has access to tools and capacities developed by its predecessors which allow a rapid assessment of climate variability and climate change impacts for any location and industry.

The Program also recognises that the impacts of climate variability are social, economic and physical by nature and the portfolio of research and development activities required should address social and policy considerations as well as specific climate, farming system and agribusiness issues.
Objectives

1. Increased adoption (Regions and Industries): Development of generic products and approaches to improve communication to users, including some projects which integrate climate change perspectives in regions/industries where there is potential for significant exposure to climate change.

2. Increased adoption (Natural resources management): Development of generic products and approaches to improve communication to users in natural and water resources management, including some projects which integrate climate change perspectives in catchments and regions where there is potential for significant exposure to climate change.

3. Improved seasonal climate forecasts: Projects will be funded which have the potential to rapidly improve the skill or applicability of statistical forecasts, for example the ease with which they can be used to show value of forecasts. Further projects will be funded which have the potential to significantly improve the skill and value of seasonal climate forecasts at longer lead times of 6 to 12 months by the end of the project.

Stakeholders

There are many different stakeholders with an interest in the Program's products and outcomes. These include the Program's founders, participating organisations, catchment authorities, as well as potential partners in agribusiness where there is scope to better manage business risk associated with climate variability.

The stakeholders include program clients. Of these, farmers are a major focus, either directly or more effectively through relevant agencies, farmer groups and farm organisations. Others include managers of natural resources particularly land and water; education, training and extension organisations, farm advisers and consultants; rural policy agencies; environment groups; the media and a wide range of other agribusiness enterprises.

Partners

As at August 2003, program partners include:

- Land & Water Australia
- Department of Agriculture, Fisheries and Forestry
- Grains Research & Development Corporation
- Sugar Research & Development Corporation
- Dairy Research & Development Corporation
- Rural Industries Research & Development Corporation
- Australian Wool Innovation Ltd (through the Land, Water & Wool Program)

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National Dryland Salinity Program

The National Dryland Salinity Program was established in July 1993 to improve the coordination of Australia's research, development and extension effort for better management of dryland salinity across rural Australia. The first phase of the program was completed in June 1998.

The second phase of the Program recognised that dryland salinity represents an enormous challenge to a diverse range of stakeholders, including:

- Farmers, graziers and other rural producers;
- Resource managers at local, catchment, regional, State and national scales;
- Local government officials, engineers and other public works professionals;
- State and Commonwealth officers involved in policy development, program implementation, regulatory determination and advisory service provision;
- Rural and metropolitan businesses tied to the financial and social health of rural Australia; and
- Residents of rural and metropolitan townships directly affected by rising water tables and salinity.

Between 1998 and 2003 research and development activities generated knowledge relevant to each of these stakeholders to manage the impacts of dryland salinity. The Program also embarked on a major communication effort in support of this research, and established a national network of communication coordinators.

With a decade of research and development completed and an effective communication platform established, the National Dryland Salinity Program is intensifying its knowledge exchange effort for the next twelve months. The aim is to wring as much benefit out of the research investment as possible. This is particularly timely given the enhanced capacity of communities across Australia to learn, absorb and adapt ideas about preventing, rehabilitating or living sensibly with dryland salinity.

Enhancing the communication effort in 2003-04 will not stem the flow of new salinity-related research knowledge being generated across Australia. Research institutions including Cooperative Research Centres, State and Commonwealth agencies and others will continue to perform important research. Throughout its enhanced communication year the Program will seek to draw upon these efforts and integrate new learning with the results of past research projects.
The National Dryland Salinity Program will enhance the uptake of knowledge generated by the Program and its partners, and lay the foundation for long-term exchange of salinity knowledge between government, community and industry – all in a highly targeted way, focusing at the regional level.

Specific issues to be addressed during the enhanced communication year include:

- Development and delivery of targeted communication tools and tactics to intensify the knowledge exchange effort of the NDSP during 2003-04;
- Management of supply, demand and user support for such tools and tactics;
- Development of a strong collaborative and co-operative culture; and
- Building on and further delivering messages about the impacts of dryland salinity, land management options, infrastructure management and investment options, and implementation support.

Communication Objectives

Four strategies have been developed to deliver to external audiences at the regional level:

1. Driving the exchange of salinity management knowledge nationally by hosting and/or supporting networks of people and their ideas, aspirations and common interest through a range of mediums.
2. Interpreting and translating a range of outcomes from Program projects and other sources for priority target audiences, mainly through communication products and services – ‘do it yourself’, ‘assisted’ and ‘synthesised’, training activities and user-support.
3. Working with the National Land and Water Resources Audit to maximise the capture, integration and availability of data generated by National Dryland Salinity Program projects, and to support the contribution of the Audit and Natural Resource Management Atlas to assist Australians to monitor and manage their dryland salinity situation.
4. Generating new knowledge from carry-over and new Program projects, synthesising this knowledge with that of other sources and incorporating it into appropriate products, networks and data conduits outlined in this strategy. It will also identify priorities for longer-term knowledge generation and exchange.

Australia’s National Dryland Salinity program has demonstrated that no single solution currently exists for salinity – a combination of management options such as strategic revegetation, low leakage catchments and even engineering options are often required to successfully manage the salinity risk in agricultural landscapes.

Sustainable Primary Industries

Land & Water Australia

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www.ndsp.gov.au
National Program for Sustainable Irrigation

The driving force behind the Sustainable Irrigation Program is the development and adoption of sustainable irrigation practices in Australian agricultural industries. Bringing together public and private sector partners, including irrigators, water authorities, research agencies, State and Commonwealth Departments as well as commodity groups, the Program works at a national level to focus irrigation research on critical natural resource management issues.

Earlier this year the Sustainable Irrigation Program called for expressions of interest from research providers to undertake priority research and development work. More than 90 applications were received and a preliminary assessment identified 11 areas of priority investment, at a total investment of approximately $3 million during the next three years and added to by cash and in-kind contributions from various partners.

Research that is now underway through the Program is:

- gaining consensus between regulatory authorities and irrigators to minimise ecological risks downstream of irrigation areas
- developing future options with catchment communities. A project is now underway in the Goulburn-Broken catchment in northern Victoria
- developing a framework for sustainable irrigation in northern Australia
- investigating the potential to sustainably reuse water in horticulture
- analysing the value of irrigation to the Australian economy.

The Sustainable Irrigation Program is about generating new information and ensuring the knowledge is well managed to achieve positive change. Its projects are also being integrated into the new Cooperative Research Centre for Irrigation Futures.
Working With Industry

In conjunction with Horticulture Australia Limited and other partners the Sustainable Irrigation Program is investing in a three-year, $1 million research project to investigate the opportunities and barriers to the use of reclaimed effluent water in horticulture.

The Sustainable Irrigation Program works at a national level to bring a number of researchers into a single project. This project crosses state and regional borders and will provide benefits to all horticultural industries, including viticulture.

Australia currently sends approximately 86 per cent of effluent water to waste. While use of reclaimed water has doubled in the past four years, this remains a small proportion of waste water that could potentially be reused. The concerns of producers and consumers alike must be addressed as this resource is developed to minimise risks and maximise benefits.

The first stage of the two-stage project will gain an understanding of the issues facing horticultural industries for the sustainable use of recycled water and identify gaps and barriers to implementation. This stage will also identify high priority research to be undertaken in stage 2.

Exciting New Technologies

Partial rootzone drying is one of a number of irrigation techniques which deliberately exposes the plant to water deficit. This brings about physiological changes that can improve the efficiency of water use.

Research has demonstrated that by using partial rootzone drying techniques it is possible to grow a commercial crop of pears with no effect on yield or quality on just half of the water usually required. Similar water savings were demonstrated for Valencia and Navel oranges. A project which has just finished (CDH2) has further demonstrated the concept for irrigation of a range of woody horticultural crops and to define more accurately the minimum water requirements for these crops. Other industries, including cotton and sugar, are also investigating this technology.

Irrigation Insights 4 is a compendium of information about partial rootzone drying and regulated deficit irrigation. It includes the theory behind the practice as well as case studies of field applications. The publication is due for release in October 2003.