

LandWater & Wool

Shaping the future



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A snapshot of the Australian wool industry's *Land, Water & Wool* natural resource management research and development programme.

SHAPING THE FUTURE: LAND, WATER & WOOL

A healthier environment for profit

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The Australian wool industry's long-term future depends to a large extent on balancing profitable wool production with sustainable management of land and water resources. Achieving this balance is both a challenge and opportunity facing woolgrowers.

Wool continues to be one of Australia's major export industries, supplying 27 per cent of the world's greasy wool (2004-05) valued at \$2.5 billion and the majority of the world's fine apparel wool. Australian wool is recognised worldwide as a quality product with some 35,000 woolgrowers producing 475 million kilograms of wool from about one quarter of the Australian continent.

Tackling environmental issues is a matter of securing the long-term viability of wool production. It can also improve short- and medium-term profitability on-farm, and is critical to securing the 'clean-green' reputation of the wool industry in the international marketplace.

Land, Water & Wool is the most comprehensive natural resource management research and development programme ever undertaken for the Australian Wool industry. It is a five-year collaboration between Australian Wool Innovation Limited, Land & Water Australia and numerous other investors and comprises \$20 million of AWI Limited funding with \$18 million from contributing partners, underpinned by Land & Water Australia's significant research investment over the last 10 years into natural resource management.

The research results now emerging – the focus of this summary report – offer valuable pathways forward for woolgrowers to cost-effectively improve the balance, resilience and productivity of their businesses through better management of the natural assets that are so important to the future of the industry.

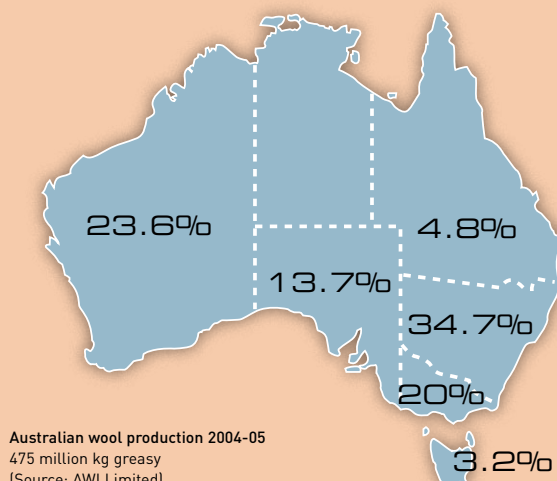
Combined with AWI Limited's new *Natural Resource Management for Wool Production Programme (2005-2009)*, which will draw significantly from the Land, Water & Wool research investment, the industry will continue to find practical ways of integrating the research findings into whole-farm management for woolgrowers.

It's not just logical – it's ecological

The world's largest suppliers of fine apparel wool, Australia's 35,000 sheep and wool producers currently manage 107 million sheep across 85 million hectares of the landscape, from the high rainfall areas on the coastal fringe to the medium rainfall sheep-wheat belt and inland to the saltbush and mulga lands of the pastoral zone.

Woolgrowers are conscious of the fact that they are in the natural resource management business and the environment in which they operate in is tough and often unforgiving. Australia's climate is one of the most variable on earth and our soils are mostly old and deficient in nutrients. Much of our wool-growing therefore relies on native vegetation to support production.

The recent National Land & Water Resources Audit found that Australian farmers generally have a positive but pragmatic attitude towards environmental issues. The *Land, Water & Wool 'Best Practice'* survey (2002) further found that Australian woolgrowers believe that they are custodians of the land, with 90 per cent considering that natural resource management is a key component of their whole farm enterprise.



Shaping the future profitability of our land

Mike Wagg,

Programme Manager
Land, Water & Wool

Following nearly four years of collaborative research into improved natural resource management, the *Land, Water & Wool* programme is now entering an important final phase of consolidating its research findings into practical management and information tools for the wool industry.

A fundamental objective for all *Land, Water & Wool* investments is to have a positive impact on the profitability and sustainability of woolgrowers. Additionally, experience with *Land, Water & Wool* has reinforced that commercial outcomes remain a key driver of woolgrower change.

This report provides a brief summary of some of the results from research projects currently underway. Supported by some of Australia's leading research, advisory and educational institutions, the scope of experience and depth of knowledge from the *Land, Water & Wool* investment promises significant and credible management tools to improve the natural resource base on wool-growing properties and more broadly.

In the programme's final year (2006-07), *Land, Water & Wool* will be synthesising its science into a series of focussed research reports. Our research teams are now finalising results and examining in detail the data, grower experience and other information that will help provide us with a clearer understanding of the interaction between grazing sheep and the bigger natural resource management picture.

Together with existing knowledge from previous work undertaken by programme co-investors and others, the *Land, Water & Wool* programme aims to develop and extend to woolgrowers clear management recommendations and knowledge that will have implications at the farm and catchment management level.

Land, Water & Wool – at a glance:

- The wool industry's most significant investment in natural resource management research and development
- Established in 2001, *Land, Water & Wool* is a five-year, science-based research collaboration between AWI Limited and Land & Water Australia.
- More than 1380 woolgrowers and their families are directly involved in the research on 230 properties across Australia.
- A further 7600 growers have received information directly from *Land, Water & Wool* or participated in programme activities.
- *Land, Water & Wool* has joined with some of the country's leading research and development, resource management and educational organisations, including: Meat & Livestock Australia; CRC for Plant-based Management of Dryland Salinity; CSIRO; River Murray Catchment Water Management Board; Mid North Grasslands Working Group; Southern New England Landcare Limited; Agriculture and/or conservation management agencies in NSW, Victoria, WA, Tasmania and Queensland; the Queensland Murray-Darling Basin Committee; the University of New England, University of Tasmania and University of Southern Queensland.

Land, Water & Wool has identified five important natural resource management issues being tackled by the wool industry, which form the core Sub-programmes for research activity. These are:

- Sustainable Grazing on Saline Lands;
- Native Vegetation and Biodiversity;
- Rivers and Water Quality;
- Managing Pastoral Country; and
- Managing Climate Variability.

'Future Woolscape' and 'Benchmarking' supporting Sub-programmes also form part of the research portfolio.

On the money salinity solutions

Dryland salinity affects some 2.5 million hectares of land, is a visual affront and often poses severe environmental threats to remnant vegetation, wetlands and waterways. Nearly 8000 woolgrowers are already reporting salinity as an issue on their properties.

This huge area of land has lost, or is in the process of losing, its productivity and much of its commercial value. Grazing is one of the few activities that can make productive and profitable use of saline land, and therefore potentially reduce the negative impacts on the environment.

The ***Sustainable Grazing on Saline Lands (SGSL)*** Sub-programme is helping livestock producers (both sheep and cattle) better understand and manage their saline land and is the largest Land, Water & Wool Sub-programme. SGSL aims to utilise already salinised land to its productive/profit potential for livestock production; reduce the negative environmental impacts associated with saline land; and restore livestock producers' personal pride in their property, their management and their product, through increased productivity, visual amenity and financial value of their salinised land.

“We are certainly not afraid of buying saltland, because well managed it can be a valuable asset...it makes the sheep enterprise more robust, with more options for grazing.”

**WA woolgrower
Tony York, 'Anameka Farms', Tammin.**

Land, Water & Wool has shown to date:

- Salt-affected land is highly variable across Australia because of the interaction of the amount of salt and extent of waterlogging and soil type, with highly salty and waterlogged clay soils being the most difficult to manage. Within this huge variation, SGSL has now identified productive options for approximately half of the salt-affected land in Australia.
- SGSL has found that 'mid-range' salinity sites are the best place for farmers to make a start on saltland management. Less salty or waterlogged sites are 'easier' to manage, but have a higher opportunity cost as farmers can still grow profitable barley crops – the most salt-tolerant of the cereal crops – on such land. Sites at the other end of the scale - the most salty and/or waterlogged sites - have no opportunity cost, but the risk of failure is higher. Even if successfully established, saltland pastures in these more hostile environments are not very productive.
- The 'cost' of establishing productive saltland pastures varies greatly, ranging from \$73 per hectare to more than \$700/ha across a selection of the SGSL sites (average \$277/ha). The number of years to 'break even' at these sites from livestock production ranges from three to more than 20 years. SGSL is focussing on finding the best balance between the high cost but often most reliable methods, such as sowing of nursery-raised seedlings and the lower cost but less reliable methods, such as direct seeding.
- A major barrier to adoption of many existing and effective saltland management systems is poor pasture establishment and associated costs. SGSL research is identifying new ways of reducing failure rates for saltland pasture establishment. This involves developing novel establishment techniques including the use of seed coatings to deter seed predators such as ants; the use of smoke/butenolide to enhance germination; seed priming to dramatically shorten the

Making saltland pay

Michael and Margaret Lloyd, from Lake Grace in Western Australia, began to notice the effects of salinity on 'Bundilla' in the mid-1970s. Within 15 years, the arable area on the property had been reduced from 1800 ha to just 1000 ha. Michael and Margaret realised that if they were going to continue farming, something had to be done.

Now some 13 years later, nearly 600 ha has been planted to salt-tolerant pastures such as saltbush and complimented by valuable understorey pasture species (pictured right). The annual benefit from treating the saline area has been an extra \$52/ha – easily covering the cost of establishing the saltbush and delivering a 300 per cent increase in gross margin from the treated saline land compared to untreated saline land.

'Bundilla' now hosts one of the SGSL National Experiment research sites, looking at the environmental and economic benefits of improved saltland management. Michael further shares his experience with the wool industry as a member of AWI Limited's Sustainable Wool Advisory Group.

“Salinity will remain part of the landscape – we've got to find more productive and sustainable ways to use saltland,” said Michael.

germination process and the use of salicylic acid to improve plant-tolerance to stresses such as salinity. SGSL is also exploring the potential of more robust native and introduced plant species.

- The returns or benefits from saltland pastures vary greatly from farm to farm, but usually comprise a mixture of:
 - The direct value of the additional feed produced;
 - The fact that the additional feed is often out of season can give it a much greater value – salty sites stay wetter, longer;
 - Resting land not affected by salinity from grazing after the break of season allows more autumn/winter production from non-saline pastures;
 - The efficiency of wool production (kilograms of wool produced per kilogram of feed eaten) is increased by salt in the sheep's diet;
 - Saline pastures have high levels of vitamin E, reducing the need for feed supplementation;
 - Farmers are greatly pleased with the amenity value of saltland pastures compared to bare and eroding saline areas.
- SGSL has identified pride as an important motivation factor behind farmers' decisions to invest in saltland management.
- Two clear target markets have emerged for the SGSL research findings and different strategies for motivating livestock producers to adopt improved management practices. Different products will be needed for these two markets.

- The biggest market in terms of hectares is farmers with large amounts of saline land on their properties – the majority of these are in Western Australia and South Australia. For these farmers, the productivity and profitability of saltland pastures is the major consideration as there is considerable potential for saltland pastures to make a significant contribution to whole farm income. Amenity and environmental improvements are important to this market, but are not the major drivers for adoption.
- The biggest market in terms of sheer numbers is farmers with small patches of saline land. Nationally, 54 per cent of farmers with saline land have less than 20 ha, while in NSW and Victoria, 51 per cent have less than 10 ha. For these farmers with small areas, there is less potential for saltland pastures to make a major impact on farm profit. Therefore, amenity value, personal pride in their management and potential for environmental improvements tend to be the major drivers of adoption, with costs and profit as important but secondary considerations.



Photo courtesy: Michael Lloyd



Biodiversity boosts the bottom line

Woolgrowers in the high rainfall and sheep-cereal zones manage a significant area of Australia's native vegetation and its associated biodiversity – encompassing native pastures, native bush, wetlands and waterways.

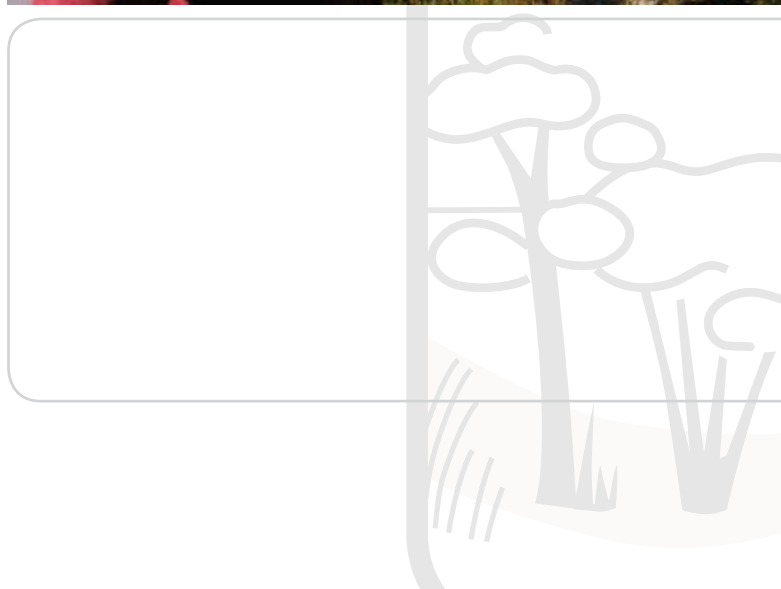
In the NSW Northern Tablelands, for example, woolgrowers manage an area of native vegetation equivalent to one-third of the national park estate in NSW. Some 500,000 hectares of native pastures are grazed in the South Australian Mid-North, while as much of half of the sheep flock in Tasmania (around two million sheep) graze on native country.

Sustainable management of native vegetation on-farm is essential as many ecological communities and species in southern and eastern Australia are now very restricted in extent and often highly dependent on private land managers such as woolgrowers for their existence. Managing native vegetation as part of a whole farm system will help address one of Australia's most serious environmental issues – the decline and loss of biodiversity – as well as having the potential to boost the farm's bottom line.

The **Native Vegetation and Biodiversity** Sub-programme is exploring ways of managing landscapes so as to maintain enterprise profitability while meeting natural resource management objectives. The Sub-programme focuses on the high-rainfall and sheep-cereal zones and specifically aims to improve knowledge of the impact of grazing systems on native vegetation (including native pastures and bushland) and its associated biodiversity; develop best practice management guidelines for managing native pastures and bushland in wool production landscapes; have input into criteria that could be used in the development of accreditation schemes for specific environments and provide authoritative data to support the environmental credentials of the wool industry.

Land, Water & Wool has shown to date:

- That both conservation and production goals can be achieved as part of profitable farming enterprises, especially where grazing management is undertaken in the context of whole farm planning. Importantly, a diversity of management approaches can be used to meet these goals.
- Monitoring of grazing trials in the Mid-North of South Australia has found that strategic, rotational grazing according to plant growth rates promotes healthier perennial plants, reduces bare ground and improves water infiltration while at the same time allowing stocking rates to double from 2.5 dry sheep equivalents per hectare to 5 DSE/ha on some sites.
- In the Traprock region of south-eastern Queensland, many of the ground-feeding birds that have declined or disappeared from similar woodlands further south currently co-exist with sheep in the Traprock landscape.



- In the NSW Northern Tablelands it has been found that beneficial insect-eating bird species – including a number of woodland species that are declining elsewhere – are returning to areas affected by dieback or overcleared in the past providing a natural pest control service on farms. This follows major tree planting activities and improved native vegetation management by woolgrowers. Remedial actions such as these will be needed as the National Land & Water Resources Audit found that around 50 per cent of temperate woodland bird species will become extinct in the next 50 years if nothing is done.
- Research in Tasmania shows that sheep can graze on native pastures while maintaining a high native plant species diversity on-property, including threatened and declining species. In the Midlands region, threatened native plant species such as *Leucochrysum albicans* (Grassland Paper Daisy) and *Colobanthus curtisiaerelies* (Grassland Cupflower) are commonly found in well-managed sheep grazing habitats.
- Strategic grazing management, that is based on the biology of both the pasture and the stock, is one of the key tools for achieving both production and conservation goals. A *Land, Water & Wool* research site on a 2000-hectare property in the northern Midlands of Tasmania that runs Merino wethers and is 98 per cent native, contains the most moss species ever recorded in the catchment, the highest number of vascular plant species recorded in the surveys undertaken to date and the equivalent of 300,000 soil mites per cubic metre. This figure is comparable to the richest sites in the world, and doesn't include any red-legged earth mites.
- Woolgrowers with hill country in Victoria can simultaneously improve stocking rates and avoid bare hills in summer (a major erosion risk) by adopting deferred grazing, which involves excluding sheep during summer. *Land, Water & Wool* has found that whole farm profits can be conservatively increased by 10-30 per cent using 25-50 per cent higher stocking rates on hill country, achieved within three years of adopting this strategy.

Calculating wool profits from biodiversity

NSW Northern Tablelands woolgrowers Rob and Lucy Adams have two farms, 'Swallowfield' and nearby 'Tulloch', about 25 kilometres north-east of Armidale, which jointly cover 1335 hectares.

The properties are part of 16 Northern Tablelands 'monitor farms' that are being studied by Land, Water & Wool researchers who are looking at how woolgrowers' management decisions affect production and environmental values.

Within their business, the Adams manage a 250-hectare timbered wildlife refuge, as well as another 60 hectares of forest and 1200 hectares of native pastures.

"When we hand it on, we want our country to be in as good or as better shape as when we took it over, and in the meantime we want to have a reasonable lifestyle," said Rob Adams (pictured left).

"In the short-term, we hope to get some answers to some outstanding questions, like which pastures give us the best return and the most sustainability, and what's the best way to graze our stock.

"How do you value a 500-year old red gum? A million things depend on it...they are irreplaceable and we have 300 of them for which we feel a responsibility for their protection."

Victorian woolgrower Peter Waldren, 'Willandra', Melville Forest.

Water quality is at the forefront of community and government concern, particularly given our rivers often have special social significance as well as environmental and economic values. Uncontrolled stock access into rivers and the management of small creeks, streams and gullies – including those located on farms – are primary causes of declining water quality.

Seventy-eight per cent of Australian woolgrowers have properties that adjoin at least one waterway, whether that is a river, stream or creek. *Land, Water & Wool's Rivers and Water Quality* Sub-Programme is showing that better managing stock around waterways improves water quality and stock productivity.

Rivers & Water Quality is helping woolgrowers find profitable, productive management options for land around rivers and streams (riparian lands). To do this, the programme is studying issues such as gully and streambank erosion, water quality, weed management, and riparian zone management within a total grazing system focusing on south-eastern Australia.

Land, Water & Wool has shown to date:

- Riparian lands are most effectively managed with flexibility in mind – fencing programmes to restrict stock access should consider off-stream alternative watering points and strategic, intermittent grazing to improve riparian vegetation and water quality. Riparian lands should be managed as a different, but integrated, part of the property.
- Results from the NSW gully erosion project have revealed that a 50-millimetre rainfall event can send 75 tonnes of suspended sediment, 15 megalitres of discharge (water flow), 20 kilograms of phosphorous and 75 kg of nitrogen through a single farm gully within hours. Three alternate land management strategies to reduce these figures are being investigated:
 - Minimal involvement, which simply involves fencing off the affected area;
 - Moderate involvement, which involves a combination of fencing off and planting; and
 - Major intervention, which involves earthworks.
- Field trials in Tasmania are demonstrating the benefits of revegetation techniques that use special long-stemmed young trees grown in nurseries (tubestock) for use in riparian areas. These long stems are better able to survive grazing pressure from wildlife such as possums, flood events and animal trampling, significantly improving the success-rate of river management work on private land.
- A tool to quickly appraise riparian condition is being trialled with woolgrowers to assess the condition of riparian areas and to monitor changes over time as a result of implementing recommended management practices. Two *Wool Industry River Management Guides* have also been commissioned, one for the high rainfall zone and one for the sheep-cereal zone, to identify on-farm management strategies.

When the river runs wild...

On any given day at 'Connewarran' in Victoria's Western District, you could find Richard Weatherly in the middle of a paddock on his hands and knees. There is no problem. It's just Richard keeping an eye on the status of the soil and its surrounds, peering into one of his many windows of sustainability. This is how things are done on this remarkable property.

It's a thriving farming ecosystem that includes livestock, trees, shrubs, wetlands, insects, birds and native wildlife with 16 kilometres of Hopkins river frontage that forms an important part of managing 'Connewarran'. It's also one of 18 detailed case studies featured in the *Wool Industry River Management Guides* published by Land, Water & Wool.

"River and waterway management should be a part of the whole farm ecosystem and not a separate issue," Richard, a member of AWI Limited's Sustainable Wool Advisory Group (pictured right), argues. "We have to remember that water quality is a very important factor in livestock productivity and also that the water quality in the river is a result of what happens on the property as a whole."

Proactive pastoral management

Australian pastoralists must manage vast runs in one of the most variable climates in the world. Some 12 million sheep accounting for an eighth of Australia's wool production inhabit the sheep pastoral regions.

There are approximately 2000 woolgrowers in Australia's pastoral zone managing properties ranging from a few thousand to several hundred thousand hectares. **The Managing Pastoral Country** Sub-programme is working with woolgrowers to identify how pastoral country can be better managed to address key environmental issues while maintaining productivity.

It is the newest of the Land, Water & Wool Sub-programmes, featuring projects that seek to provide simple 'best-bet' tools which woolgrowers can readily use for more effective monitoring and management of grazing.

Land, Water & Wool has shown to date:

- Management of existing perennial native species is everything in the pastoral zone – there are limited options for establishing new pastures.
- If the technology being investigated under the programme proves effective, it could have implications for better land management over a fifth of the Australian continent.
- A clear implication for woolgrowers is emerging: better management of the bio-physical resources is possible, particularly via timely manipulation of stocking rates (better management of fragile lands).
- The Sub-programme is also investigating the application of new satellite technology in 'remote' management of stations via satellite and associated automated technologies.
- The Sub-programme research has the potential to reduce wind erosion, loss of rangelands biodiversity and increase drought preparedness.

“Fenced off areas are no longer seen as wasted country. They are a real asset...I can't remember the last time we had any problems with stock during cold snaps and high winds. The benefits of shelter are obvious. It cuts wind velocity and provides a haven for lambing and for shorn sheep; in fact all our shorn sheep now are moved off-shears into sheltered paddocks as part of standard practice.”

Victorian woolgrower Mark Gubbins, 'Coolana', Chatsworth.

The entire length of the Hopkins River on 'Connewarran' has been virtually been all fenced off, forming the foundation of wildlife corridors and a series of wetlands that link various regions of the property (in conjunction with shelter belts and tree plantations). A marked increase has occurred in native fauna species along the river (such as platypus) but also in general with birds, reptiles, mammals and beneficial insects which all play an important role in the whole property ecosystem.



A better climate for wool production

Australia has one of the most variable climates on earth. Recent experiences of severe drought show that planning for seasonal variability is vital to successful farm management. This means that our woolgrowers need to be among the world's best risk managers. Seasonal weather forecasts are vital to good farm management and a recent survey revealed more than half of wool producers are taking notice of these longer term predictions.

The **Managing Climate Variability** Sub-Programme is working with woolgrowers in the pastoral zone to make more effective use of improved seasonal climate forecasts in grazing management decisions for the season ahead. This Sub-programme will improve producer access to seasonal forecasting tools and provide information to assist decision making on stocking rates and other management inputs.

A significant contribution of this project has been to establish which time of the year Southern Oscillation Index (SOI) - based seasonal forecasts can be relied on in different regions of the pastoral zone.

Land, Water & Wool has shown to date:

- SOI-based seasonal forecasts are only reliable at certain times of the year and this varies from region-to-region across the pastoral zone.
- SOI-based seasonal forecasts were found to be most reliable for:
 - New South Wales in the late winter-spring period, and can contribute to important tactical decisions regarding livestock sales or purchases (and in-crop management).
 - Western Queensland in forecasting rainfall and pasture growth during November to March using a two-stage forecasting system that includes sea surface temperatures.
 - South Australia in three-month forecasts of rainfall and pasture growth between June and November.
- In Western Australia, seasonal forecasts using the SOI are generally unreliable except for summer rainfall when the SOI is strongly positive or negative. The focus in Western Australia is on understanding the changing variability of climate in the pastoral zone with an emphasis on reducing 'false perceptions' of climate to improve the decisiveness of climate risk management.
- The exploration of the reliability of seasonal forecasts with woolgrowers in the (non-WA) pastoral zone has resulted in the creation of a range a new climate-related information products ranging from websites through to reference guides tailored for specific wool-growing regions.



Looking to the future

The wool industry has taken an unprecedented look at what the future might hold through the Future Woolscales Sub-programme. This unique project has used information and research from the world's leading authorities on a range of key "uncertain" factors.

Future Woolscales aims to stimulate debate about the future of the wool industry in order to provide an insight into the challenges, threats and opportunities that lie ahead in 20 to 30 years' time.

Future Woolscales used a scenario planning process to examine factors and the critical issues that may influence industry success and to help foresee risks and opportunities. It is the first time that the wool industry has used this approach, to deliver:

- A set of commissioned 'expert' reports on specific issues that may impact on the world and the wool industry going forward, such as social issues, climate change, competitors, new technologies and consumer preferences.
- Four totally different wool industry scenarios (written as short stories) set in the year 2030.
- Indicators that may be employed via a scanning process to identify if any of these scenarios are emerging.
- Some implications and possible strategies for the wool industry to consider.

Land, Water & Wool has shown to date:

By examining the four scenarios (or different 'worlds') some possible implications emerge in relation to wool industry research, development and policy. This list is not comprehensive, but indicative of how scenario planning can be used:

- Competitive pressure will mean that incremental gains in productivity across the industry may not be sufficient - the development of new technologies and their adoption is needed across all segments.
- Sustainable resource use and animal welfare will become increasingly important - for society, consumers and governments.
- There may well be significant relocation of wool production, especially into the less arable areas.
- A transparent and responsive wool processing supply chain, with full traceability, is likely to be necessary.
- New technologies provide new opportunities to find "paradigm changing" solutions to "industry chestnuts" such as parasites; harvesting; sheep health; bio-security; genetic progress; cost and time of processing; new products.
- Consumer markets will change - new products which focus on responding quickly to changing preferences; value for money; east orientation; health and well being; and individuality will be needed.

photo courtesy Ed Barrett-Lennard



Shaping the future

Further Information

Shaping the Future provides a snapshot of some of the key findings emerging from the Land, Water & Wool initiative. For further information on any of the information contained in this report, or to make contact with the Land, Water & Wool research teams and producer networks, please contact:

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Source material courtesy Land, Water & Wool; Australian Wool Innovation Limited; National Land & Water Resources Audit; The Woolmark Company; Wool Production Forecasting Committee.

Published by: Land & Water Australia
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Land, Water & Wool is a research partnership between Australian Wool Innovation Limited and Land & Water Australia

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Publication data: *Shaping the Future - A Snapshot of the Australian wool industry's Land, Water & Wool natural resource management research and development programme.*

ISBN: 1 920860 83 5
Product code: PR051010
Editorial coordination by: Currie Communications, Melbourne
Designed and Typeset by: Andrew Rankine Design Associates, Canberra
Printed by: Goanna Print, Canberra
December 2005

