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Knowledge and adoption

When we think about the term 'knowledge' we tend to think about the range of information presented to us in publications and workshops that outline how particular parts of our environment functions, for example: in-stream temperature and its importance for river health. The knowledge contained in these publications can be described as 'cognitive', that is, knowledge based on what we define as 'rational' or 'logical'. We assert that people will be able to make informed decisions when they have a sound technical base upon which they can weigh various options and select the one that is appropriate to their needs. However, this 'cognitive' approach to knowledge goes against the reality that most people make decisions on emotional rather than rational grounds.

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RIP^arian lands:

WHERE LAND AND WATER MEET

From the Editor



The last six months have been a bit of a whirlwind as I, and some of the researchers who have worked on our Program, have travelled around the country running National Riparian Lands R&D Program workshops with catchment management, state and territory department, research institution and non-government representatives. What has struck me most about this experience has been the fantastic group of people working in river and riparian management across Australia. The welcome we were given everywhere we went was genuine, and people seemed to really enjoy meeting and talking with the research team. For the researchers, it was also a terrific experience, as they could see the results of their research being communicated directly to those people most likely to implement findings in their day to day work. It was also a lot of fun, so thank you to all those who were involved.

The workshops are one method of knowledge and adoption, and inspired me to do an edition of *RipRap* on this topic. When I asked people for contributions the pages rapidly filled up, so here again is a bumper edition. I hope you enjoy looking through the many different knowledge and adoption techniques discussed in the articles. All of us working in river and riparian management are involved in sharing our knowledge and learning from each other, I hope this edition of *RipRap* provides you with ideas, support and encouragement and we welcome your feedback on how we can continue to make *RipRap* meet your needs.

Front cover:

Photo Nadeem Samnakay.

Managing knowledge for natural resources management outcomes

By Siwan Lovett

1 James Raffan is a writer who is passionate about rivers and our relationship to them. More information can be found at the website www.writersunion.ca/r/raffan.htm

Our modern world supports and favours cognitive ways of knowing, and we are more likely to be successful in gaining funding when we can present arguments based on fact rather than feeling. Yet, James Raffan¹ argues that we should explicitly recognise the fact that feeling and emotion tend to govern decision making and, as a result, we need to move to thinking about natural resources management (NRM) and people's experiences of it, through the range of senses (sight, smell, touch, feel, hear) and 'intellectuals' (visual, dance, musical, artistic) that we use to interact with our world. He argues that until we do this, we will fail to engage people in NRM because cognitive 'knowing' is not personal enough to motivate someone into action. It is only through personal experience that public knowledge becomes meaningful. Once a person can attach meaning to knowledge, it is more likely to be adopted.

Raffan's ideas are borne out by the definition of 'knowledge' that clearly refers to:

'Knowing, familiarity gained by experience (of person, thing or fact)'

Source: Concise Oxford Dictionary

This definition provides a much broader conception of knowledge as being something gained through experience. This enables us to consider the range of experiences that motivate people to behave, think and act the way they do. For example, how someone experiences the natural world can be expressed through paintings, poetry, dance and song. Cultures across the world provide insights into their relationship to their world in writings, ritual and ceremony — all

of these are ways of experiencing our natural environment and our place in it. An example of the depth of feeling and connection people have with their natural environment is provided in the following quote from Chief Seattle, a First Nations representative, who was explaining the importance of his people's connection to their rivers to the President of the United States.

The shining water that moves in the streams is not just water, but the blood of our ancestors. Each ghostly reflection in the clear waters of the lakes tells us of events and memories of the life of my people. The water's murmur is the voice of my father's father. The rivers are our brothers. They quench our thirst. They carry our canoes and feed our children. So you must give to the rivers the kindness you would give to any brother... Man did not weave the web of life, he is merely standing in it. Whatever he does to the web, he does to himself.

These words convey the passion, connection and love Chief Seattle and his people feel about their rivers. In Australia, we have writers such as Banjo Patterson, Dorothea McKellar and the painter Clifford Possum to provide us with similar insights into their connection with country. A purely 'cognitive' experience fails to tap into the emotion that drives people to do particular things and, as a result, does not enable a complete understanding about how that person relates to their environment. Without that understanding it is often difficult to gain trust and acceptance from those you might wish to work with to improve NRM outcomes.

We are all knowledgeable because knowledge comes from experience of our world, by combining science with experience we can optimise natural resources management outcomes. Images: Currie Communications, except for second right, provided by Lindsay and Biz Nicolson.



So where does this leave us? Given that we know emotion is what largely governs decision making it means that to maximise beneficial NRM outcomes we need to include the range of experiences people have in the work that we do. By using a framework called the 'Five Ps' it is possible to incorporate the many different factors and experiences that impact upon a person working in NRM². The Five Ps stand for: Profit, Proof, People, Place and Promise and were developed to highlight the full range of factors that impact on NRM decision making. It is a framework that can be applied at a number of different levels by people working in catchment management and with rural industries. An overview of each of the Five Ps is provided below with an example provided to show how the framework can be applied to a program of research, in this case, the National Riparian Lands R&D Program.



Profit

When we use the term profit, it tends to be given a very narrow interpretation that, in general, relates to how much money is being made from a particular activity. When you go to the dictionary, however, it is defined as 'advantage', 'benefit' or 'gain', a much broader way of thinking about the term.

In 1991, the Land & Water Australia (LWA) Board commissioned a study into the state of knowledge about riparian areas in Australia, and this identified a major gap in basic understanding about the processes and functions of riparian areas. The scoping study provided the basis upon which the LWA Board could decide whether to invest in a program of research. A template of

questions was used to determine whether the research issue was of national significance, whether there were other organisations better suited to undertake the work, and who could benefit from the outcomes of the research. Central to the template of questions was the idea of profit, the potential environmental, social and economic gains that could be derived from a research investment. By using 'profit' in this broader sense, we can think more laterally about the range of benefits that can be gained from a project, program of activity or decision.



Proof

High quality, technically rigorous science that is able to be applied, has been the signature of the National Riparian Lands R&D. Without good science underpinning management recommendations, there can be little confidence for the end-user that the required outcomes will be achieved. Over the 13 years of its operation, the National Riparian Lands R&D Program has sought out the 'best' researchers to undertake projects into how riparian areas function and how they can be managed to maximise environmental, economic and social outcomes. The independent reviews of the Program have all found the science undertaken to be of world class standard, and this reflects the long-term commitment of funds, as well as the freedom given to scientists working on the Program to explore new ways of thinking about, and understanding, riparian areas. Importantly, scientists working on the Program know that their work has to have practical application, so 'proof' when used in this context, is to provide certainty to natural resource managers

2 The 'Five Ps' framework was developed in the Land, Water & Wool — Rivers and Water Quality Sub-program also managed by Siwan Lovett. For further information visit the www.landwaterwool.gov.au website.

Images on these pages from left to right: Guy Roth, Gary Caitcheon, James Morris, Currie Communications.

that the tools, techniques and guidelines that are developed are done so on the basis of excellent science. However, it is important to note that proof is only important when it is presented in ways that people can relate to and understand how it can be used in their daily life. Ultimately proof is about providing people with the confidence to act.



People

When it comes down to it, managing our natural resources is all about people and how we interact with our environment. However, we don't tend to spend a lot of time on this topic as we are all too busy managing the day to day issues that capture our attention. By mixing social scientists with biophysical scientists, the National Riparian Lands R&D Program has been fortunate in developing a team of people with different skills, but who work well together and who are committed to getting the best outcome possible for end-users. Considerable effort has been made by those managing the Program to 'look after' the researchers, on-ground people working on demonstration sites, and the general catchment management audience, so that relationships are maintained and recognised as being fundamental to meeting the objectives the Program has set out to achieve. A range of communication techniques has been used to develop networks throughout the research, industry, government and non-government sectors. *RipRap* is probably the most well-known example of how the Program has tried to keep people working in river and riparian manage-

ment across Australia 'connected'. Overall, the Program has tried to highlight the need to value and pay attention to the social aspects of catchment management, as without this understanding there is little likelihood of science being applied.



Place

When you ask someone what motivates them to change their behaviour, it generally comes down to a feeling, for example, wanting to leave their 'place' in good condition for future generations, or wanting to preserve the special 'place' where they went fishing with their Dad. Emotion is what drives us to do most things, yet it is often not talked about and few resources are allocated to taking the time to understand the socio-cultural context within which someone is located. Without this understanding it is difficult to develop guidelines, management recommendations or tools that will be used. Trust and confidence take a long time to build, and asking someone to change their behaviour overnight is difficult when there may be no immediate benefit to them. The National Riparian Lands R&D Program has tried to create a 'place' for people to turn to for advice and assistance by providing a consistent look and feel through images such as the River Landscapes poster, terminology, and by having the same people delivering messages about how best to manage riparian areas. The Program has tried to have 'places' for interaction, be they workshops, the website, *RipRap* or catching up with people at conferences.

Ultimately proof is about providing people with the confidence to act.



Photo Roger Charlton.

Promise

This final 'P' is the most difficult to describe, yet it is about valuing the relationships between people that generate trust, confidence and a desire to work together. The LWA Board are currently considering how they can continue to maintain the relationships that the National Riparian Lands R&D Program has established, and are endeavouring to ensure that when the Program ends something is offered in its place that will meet end-user needs.

By examining the National Riparian Lands R&D Program through the Five P framework it is clear that each 'P' is equally important. In NRM there is a tendency to focus on the first two (Profit and Proof) with much talk, but few resources allocated to the other three. By considering the

Five Ps, the experience of the National Riparian Lands R&D program is better understood as being the result of a range of different factors and experiences, and not dominated by one 'P' over another. The 'Five Ps' is an attempt to explicitly recognise the importance of considering the biophysical, economic, social and environmental together, rather than as separate parts of a puzzle. To date, the National Riparian Lands R&D Program and the Land, Water & Wool — Rivers Sub-program has found that people relate well to the 'Five Ps' as the framework demystifies a lot of the jargon used in NRM, and places the individual at the centre of the issue, rather than on the periphery.

Conclusion

Ideally, our work in NRM needs to be inclusive, celebratory, and able to incorporate the range of experiences, and hence knowledge, people have of their environment. We may need to combine some of the technically based demands we are placing on community groups, with ways to celebrate and encourage involvement at a range of different levels, not just in formal committee structures or meetings. It would also be valuable to start exploring and validating the importance of ideas around different ways of 'knowing' our rivers and land and to try and place an equal value on the range of 'experiential' knowledge we use in our decision making processes. ■

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Photo Mike Wagg.

The NRM knowledge system in Australia

By Andrew
Campbell

In June and July 2005 Andrew undertook a writing sabbatical to analyse the knowledge system for natural resource management (NRM) in Australia, and how we as a nation might 'learn' our way to more sustainable systems of land and water use and management. The following article contains the key findings from Andrew's work, with the full paper available in hard copy or on the web from Land & Water Australia (LWA).

Three key ingredients are needed for more sustainable management of natural resources. People need to know what to do and how to do it; they must want to do it; and they need to be able to do it. Knowledge, commitment and capacity are essential to underpin changes towards more sustainable systems of land, water and vegetation management at all scales. This analysis of Australia's progress on the knowledge component of the sustainability equation has found that many areas of genuine innovation and pockets of excellence exist, but that overall, we are not putting it all together as well as we might. As a result, we need to invest in new knowledge and make better use of what we know already:

1. to help people, businesses, industries and governments make better decisions at all levels of management and policy,
2. to energise the innovation process so that we can develop more sustainable land use and management systems and technologies, and
3. to help communities and the nation as a whole to learn as we go along, so that we make best use of existing knowledge and past experience.

Discussion

Australia currently invests several billion dollars of public funds per year on national NRM programs and agricultural science. Notwithstanding these large public investments, most NRM knowledge exists in the experience, skills and know how of the tens of thousands of people actively involved in managing natural resources every day. Our challenge is to get the best performance we can from this overall knowledge 'system' — formal and informal, public and private, at all scales — so that Australia is doing the best job it can on the knowledge component of the sustainability equation. This analysis proposes three key analytical lenses for the NRM knowledge system — purpose,

cohesion and function — and it works through current issues and potential system improvements for each.

Several measures would make the system more **purposeful**:

- Establish a high level capacity to set priorities and review progress, without implying a centralised, command and control model or an overarching NRM knowledge agency.
- Develop an overall NRM knowledge strategy, preferably consistent with a new national framework for agricultural and NRM research, development and extension — but not constrained to only those activities within the NRM knowledge system, nor to just the formal scientific knowledge domain.
- Strategic direction requires the ability to comprehend the whole system, which means developing at least core elements of a common reporting framework. Incentives would need to be built-in so that there is a sound business case for agencies to meet national reporting requirements.

Complementary measures would make the system more **cohesive**:

- The most important need is to ensure that knowledge assets and knowledge-rich activities are transparent and accessible across the whole system, so that people in any part of the system can more easily find out what has happened and been learned in the past and/or in other places.
- Thinking of a typical system or organisational diagram represented by boxes connected by arrows, it is critical for overall system cohesion to allocate resources explicitly and specifically to the arrows — the linkage and communication mechanisms — not just the boxes. For the NRM knowledge system, this means looking at the boundaries between knowledge sectors such as management, research, extension, policy and evaluation.

It also requires attention to the boundaries between knowledge domains such as local, indigenous, organisational and scientific knowledge.

- From a funders' perspective, we need to think about extending ways to reward collaborative behaviour, so that we better reward knowledge sharing, particularly between different knowledge sectors and knowledge domains.

There are two key dimensions to system **function**: the decision-making dimension (point 1 above) and the learning and innovation dimension (points 2 and 3). Further measures would improve the **learning** dimension of system function:

- When we have made knowledge assets easier to find and access, it is then important to build in memory aids so that wheels are not reinvented unnecessarily. Monitoring and evaluation tools should pull out and underline the lessons learned from both successes and failures. There are hundreds of potential case studies happening every day in NRM, but few are known beyond their immediate participants.
- We need to do better in honouring, retaining and tapping into elders — people with rich experience and deep knowledge — and helping them to make their insights more accessible and enduring. Currently, amnesia is systemic, exacerbated by de-skilling of state agencies, high levels of staff turnover, short-term contracts and insufficient attention to career paths, induction or long term skills development.
- To foster innovation in our capacity to manage resources more sustainably, we could improve the linkages between the 'public' knowledge system of formal research-driven science and the private knowledge system of the leading edge farmers, their consultants and suppliers. We could shift the balance in NRM research to directly fund more basic science and pay more attention to the development and marketing of practical technologies that are able to be adopted on a widespread scale by resource managers.
- Monitoring and evaluation is perhaps the biggest weakness in the NRM knowledge system at present. As well as reinvesting (using latest technology) in the collection and analysis of primary data on resource condition and management practices, we should

be looking at the value other countries are deriving from long term research and monitoring sites, with a view to expanding on and enriching the few we have already.

A specific subset of the overall NRM knowledge system that needs urgent attention is the 'regional model' of NRM program delivery for the National Action Plan for Salinity and Water Quality (NAP) and the Natural Heritage Trust (NHT). The regional model is a world-leading effort to implement sustainable NRM at a landscape scale. It has huge potential through its capacity to devolve decision making and resource allocation to appropriate scales; to tap into and build on deep local knowledge and connection to place; and to work across issues and industries in an integrated way. It is also a grand experiment, so the need to learn as we go and apply the lessons learned is critical.

Research funded jointly by LWA and the NHT has found that although the knowledge needs of the 54 regional bodies are varied, there is lots of scope for learning across regional and state boundaries. Land & Water Australia is currently managing an NHT-funded project called Knowledge for Regional NRM (see page 11) that is exploring ways of improving knowledge management and knowledge exchange among regional bodies, and improving the way the overall system serves those regional bodies from a knowledge perspective.

In conclusion

This analysis concludes that in many aspects of NRM, Australia is at the leading edge of international efforts to develop and implement more sustainable ways of managing land, water and biodiversity resources. However, at present we are not pulling all of this together as well as we could or should. It is too hard for people in any part of the system to find out what is happening and what is being learned elsewhere — or has been learned already. Consequently, decisions may not always be based on the best available information, past mistakes may be being repeated, and we are probably not getting the best possible return on investment of public and private funds and effort.

Renovating the NRM knowledge system would be a great investment for Australia. ■

Copies of the report can be obtained from CanPrint Communications 1800 776 616 or via the website www.lwa.gov.au



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Getting science into practice and practice into science

By Kate Andrews

What is natural resource management (NRM) research actually for? Why are we investing in it?

I think we all believe that the reason we invest money into research on natural resource management and sustainable agriculture is to make a positive difference — for people and the environment. But this is trickier than it sounds. How do we know what research to invest in and that it is relevant? How do we ensure that people can practically apply the results of the research? If only it was as simple as a new piece of technology like the mobile phone — Australians love new gadgets, how can we make some of our science as appealing and easy to use?

When working in a research organisation it is easy to be absorbed into the world of data, information and knowledge and to believe that it is knowledge that changes people's behaviour and the world. Information and knowledge, however, are only some of the factors that contribute to, or inhibit, practice change in NRM. They sit within a much bigger picture of social, political and economic factors which all influence behaviour and practice change. A whole suite of factors including incentives, regulation and culture, contribute to changing behaviour in individuals and organisations. For example, a water use efficiency measure may be adopted for lifestyle reasons, it saves time and effort, perhaps saving the irrigator from getting up in the night to check the water levels, and this is more important than any economic or environmental benefits.

Photo provided by Tim Haeusler from NSW Department of Natural Resources (South Coast Region).



As an R&D organisation Land & Water Australia (LWA) plays a crucial, yet limited role, in the process of achieving practice change. When investing in applied research we try to ask strategic questions such as “Is this NRM issue constrained by a lack of knowledge?” “What impact or outcome do we seek to have, and how can we achieve it?” “Who do we need to work with to help make this happen?”

Studies of why certain information, ideas, technologies or knowledge may be taken up by some people, and not others, have shown that numerous characteristics of the knowledge or technology itself influence why we might choose to use or apply it. These characteristics include credibility of the source, relevance, timing, appropriateness of scale, accessibility, level of complexity and whether the change can be trialled, compatibility to existing practices and values, level of additional learning and capital outlay required, and the level of risk and uncertainty. There may be very good reasons as to why non-adoption occurs and it is important to understand them if our research is to be adopted (see Knowledge for Regional NRM Article page 11).

For this reason, we try to invest in a range of different forms of engagement and information provision so that we can slot into where a person or organisation sits in the practice change cycle — be it awareness, trialling, implementation or evaluation. This doesn't just apply to natural resource management. For example, if you are raising someone's awareness about the health hazards of smoking then a shocking advertisement is appropriate. When they take the step of trying to quit then advice tailored to their needs in a face to face discussion, perhaps from their doctor, becomes crucial. The knowledge people need and the way they need to be engaged is different and changing.

The complexity and variability of the research methods and topics funded and managed by LWA and our wide range of participants and users, means that there is no one or right way to encourage adoption of our research and development outcomes. We use a broad spectrum of methods to encourage adoption, from direct engagement or collaborative research, through to

Copies of the Knowledge and Adoption Strategy for Land & Water Australia can be obtained from CanPrint Communications 1800 776 616 or via the website www.lwa.gov.au



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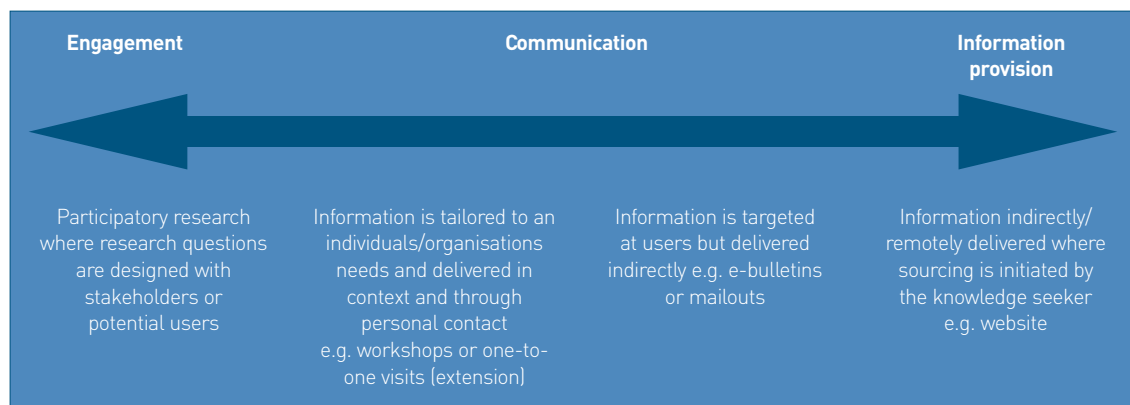


Figure 1: Spectrum of methods to encourage adoption. Figure from Land & Water Australia's "Knowledge and Adoption Strategy".

tailored communication products and, finally, to indirect information provision. This reflects the enormous diversity of our work. Communication is just one method for achieving adoption (see Figure 1).

When initiating research, we need to identify our **target participants or audience**, such as Australia's leading woolgrowers (see page 21), or the Australian Government facilitator network, or other researchers, and most frequently a combination of several. We then need to identify the **method** that we use to engage with or communicate with them. And thirdly we must identify how we will **measure** the outputs and outcomes of that method.

Crucial to this model is the **two-way feedback**. Just as we are improving our methods or pathways for encouraging adoption of our research we are working to improve how we learn about the needs of those we are working with and for. One example is the extensive stakeholder workshops and consultations that are held at the scoping stage of a program.

It has also become clear that we need to better manage what happens with the outcomes of research once a project or program has finished. What we now call the **legacy**. It is illogical to bring everything to a halt when the

research ends. That may be when it is time to analyse results and tailor them for people, or when we can draw them together with work from elsewhere to synthesise key messages (see page 11). Adoption is a long slow process that is unlikely to happen in the timeframe of three, even five, year research projects.

The maturing regional framework for NRM presents a challenge to national knowledge providers. Engaging effectively with the regional framework to ensure that we are contributing the best possible information and knowledge to regional planning and implementation requires that we realign some of our efforts. We need to establish further collaborative pathways, between the national level with the state, regional and local levels (as appropriate to the research and work that we are undertaking). Examples of programs attempting to do this are Land, Water & Wool (see page 21), Grain and Graze and the National Program for Sustainable Irrigation (see page 16).

It is the responsibility of LWA to manage our existing and new research outcomes for greater adoption, and for us to show how increased adoption links to improvements in the management and condition of Australia's natural resources. ■

We need to systematically plan and budget for the 'legacy' of projects and programs and to synthesise research outcomes and materials for people. An example of this is the National Riparian Lands R&D Program harvest year products.

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See next edition of *RipRap* for details.

Knowledge for regional NRM — connecting researchers and regions

**By Melissa Morley
and Alice
Thompson**

Trying to find the information and knowledge that you need can be a challenge. How do you know where to find it? Who is the best person to talk to? How do you know what you need? These are questions that regional bodies find themselves asking as they seek to access, use and share the best available knowledge and information for natural resource management (NRM).

Knowledge for Regional NRM is a national Land & Water Australia (LWA) project funded through the Natural Heritage Trust (NHT). The project is building stronger connections between national research and development (R&D) organisations and the 56 NRM regional bodies who cover Australia.

In working with regional bodies, national R&D organisations, NRM facilitators and knowledge brokers, the *Knowledge for Regional NRM* project has identified barriers to regional information exchange and some possible solutions.

What are the knowledge exchange challenges for regional bodies?

Regions have identified that they would like more opportunities to share their knowledge and experience with each other, but they have little opportunity to do so. It is hard to find out what other regions are currently working on or 'who is about to do what', a lack of appropriate resources also contributes to this problem.

Regions would like to share their knowledge and experiences with policy and R&D organisations but are not always sure of the best way to engage with them. Similarly, there is a need for policy and R&D to more effectively communicate their activities and outputs in a format that is useful to regional bodies. For information to become useful, it needs to be interpreted with the time, cultural and political context relevant to the region. Information generated by national providers is perceived as useful in terms of general principles, but it is not always apparent how it can be used at a regional level.

Regional staff feel that their knowledge and information needs are not known at a national level, often resulting in a research agenda that is not relevant to their circumstances. Regions have identified that they need more support in defining and communicating their knowledge needs to policy and R&D.

Support is also needed for regional practitioners to further develop information seeking practices, as individual regional staff have varying levels of skill to seek and select information from the vast amount that is available. There are different preferences when it comes to accessing information such as face-to-face contact, online discussion forums or hardcopy publications. Technological limitations like no access to broadband infrastructure also impacts on the capacity of regional bodies to access information. Information providers need to consider this diversity of needs when communicating with regional bodies.

Staff turnover and the associated loss of established contacts and data sources due to information being 'held in people's heads', adds to the importance of establishing and maintaining

Australia's 'regional model' is a world-leading effort to implement sustainable NRM at a landscape scale. Regional bodies are responsible for developing, implementing and evaluating regional strategic plans, to deliver environmental, social and economic outcomes for the region. Regional bodies operate under a variety of situations and organisational structures often with a mix of paid staff, volunteers and representatives from government and non-government organisations.

Boyne Tanuum Coastcare monitoring marine water quality.



Photo provided by Glenda George, Burnett Mary Queensland.

systems that manage the large amounts of NRM information and knowledge held within regional bodies. To do this, regions need increased support to develop systematic approaches to information and knowledge management. Support for regions to develop greater capacity to manage and evaluate the credibility and relevance of information is also part of this solution.

- a directory of R&D organisations,
- a database of regional knowledge needs,
- face-to-face expos, workshops and forums,
- regional research funding pools,
- a librarian service,
- evergreen synthesis documents,
- training and support for people that undertake knowledge brokering activities.

What are some of the solutions?

The project has focused on solutions that have the ability to connect people, deal with the enormous amount of information available, and to capture and store dispersed data and information. Technology can provide useful tools but should never be seen as the silver bullet. It is something to be used to support and enhance people-based solutions, such as:

- support for regions in developing knowledge strategies,
- region to region mentoring via a sister region program,
- a first stop knowledge shop including a search engine allowing users to search across multiple knowledge repositories from a single search point. This does not act as a central database,

Current projects

While there are many things that knowledge providers can be doing to improve knowledge exchange, there are also things that regional bodies can work towards. *Knowledge for Regional NRM* is working with three regions to pilot projects that are investigating their knowledge sources and future knowledge needs.

The *Knowledge for Regional NRM* project is also learning and documenting how training could be delivered to other regions about developing their own knowledge management strategy. There will be many regional benefits to this pilot including the transfer of skills to access, manage and improve the use of relevant knowledge. The pilot will also enhance organisational practices that manage the loss of corporate memory.

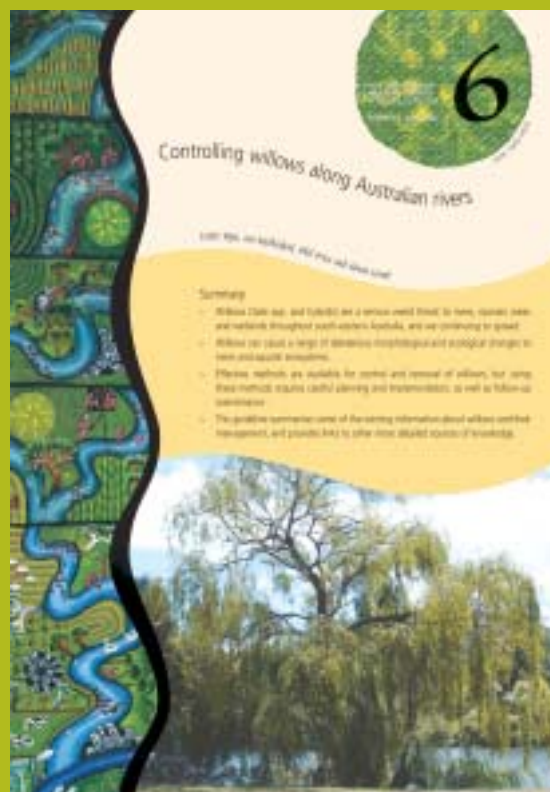


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Left: Riverside Lake School Planting Day. **Right:** Cuckoo Falls Scottsdale. Photos on these pages provided by James McKee, NRM North Tasmania.

Controlling willows along Australian rivers



Knowledge for Regional NRM is also collecting regional knowledge needs to be accessed through an online database. The project has reviewed regional plans, investment strategies and other relevant documents as a starting point, in order to identify current knowledge needs and communicate them to researchers, facilitators, policy and other regional bodies. The aim of this is to increase interest by R&D organisations into regional issues and to increase research collaboration across regional bodies.

Regional bodies will be able to update the database and lodge new needs as they occur. This will assist with the identification of cases where multiple regions require the same knowledge and can potentially cost share to obtain it.

Region to region mentoring via a sister region program is another opportunity that the project is supporting. At the recent North Australian NRM Forum in May, many regions were enthusiastic about a more formal process of sharing their lessons and four regions have expressed interest in being part of a trial. ■

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Willow management guides have been produced for several regions in southern Australia, and by different agencies. There is a lot of information available, but not all of the guides have all the information required to set priorities and plan an effective control program. In general, there is plenty of information about why willows are a problem, and how to control them, but there is much less on how to identify the main species or varieties, how they are spreading and how to prioritise actions and engage communities in long-term and effective programs for their removal or management.

This Guideline has been produced to provide an introduction to all the information that is available about willows and their control, and to outline some of the key issues to be considered.

It is available from CanPrint
Communications 1800 776 616
and the www.rivers.gov.au website

The Mosaic Map project

By Heather Turk

The Australian Government is working closely with regional communities to protect and manage our land, water and coasts. One of the ongoing priorities is to find ways to showcase the hard work of the 56 natural resource management (NRM) regions and help communities share their experiences. With many people keen to see how their activities fit into a 'bigger picture', the Joint Natural Resource Management Team is developing an exciting new product to provide just that.

The *Mosaic Map* is an interactive web-based mapping search tool that will, for the first time, allow users to find project information at a national, state or regional level. Users will be able to do this by accessing a map of Australia located on the Australian Government's NRM website.

Mosaic will contain a variety of current and past projects by region with descriptions and beautiful images. Users will be able to do complete project searches by funding source or by using key words. In addition, they will have access to contacts and further information. Where available, reports can be downloaded or users can link to other environmental and agricultural databases. Moving footage will complement still photographs, and as the product



develops we will also include handy information for schools and other students.

Over the next 12 months we aim to have over 2300 featured projects covering the National Action Plan for Salinity and Water Quality, Phase 2 of the Natural Heritage Trust (NHT) and the best of NHT1. The project is in the software development stage, and regions will shortly send in a selection of their favourite projects. The writing and photography will then begin in earnest. We hope to launch the map later this year.

We want to make sure *Mosaic* isn't just another web link, but a tool that inspires, encourages and informs people about the great work happening across the country.

Stay tuned! ■

For further information

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The *Mosaic Map* will feature a range of natural resource management activities from around Australia. All photos © Department of the Environment and Heritage and Georgia Curry.

People, Practice and Policy

People, Practice and Policy is a new publication recently released by Land & Water Australia (LWA). *People, Practice and Policy* provides you with a snapshot of innovative and exciting social sciences research that helps us to better understand and inform sustainable natural resources management (NRM) in Australia. *People, Practice and Policy* showcases a series of short articles by researchers working in NRM. The articles are written by the researchers who did the work, and highlight the key findings and implications of their NRM research. Three integrating themes group the articles:

1. Institutions and governance arrangements — what are the 'best' organisational arrangements to enable the regional delivery of NRM to be effective? How can we build our regional capacity to take on the challenges of regional NRM?
2. Policy instrument choice — can we use market based instruments to assist in the allocation of water? What role does regulation play in NRM. What are other countries doing in this area?
3. Landscapes, lifestyles and livelihoods — how can we learn from other cultures to better inform our relationship with our natural environment. What are the social and economic drivers behind land-use change?

These themes guide LWA's investments in social and institutional research and are elaborated in the Social and Institutional Research Program's Strategic Plan 2005–2010 called '*Making the connections that build sustainability in natural resources management*'. The objective of the Program is to integrate social and institutional considerations into biophysical and industries based approaches to NRM, and thereby to inform policy and enhance adoption of sustainable practice change by land managers.

People, Practice and Policy provides you with the opportunity to access social science research in an easy to read and attractive publication that links finding to action on the ground. It will bring you up to speed on the latest developments in social science thinking, and provide you with links to a range of resources and supporting materials.

You can also sign on to the e-mail service "SIRP'S UP" that keeps subscribers informed of new SIRP research reports. To subscribe simply

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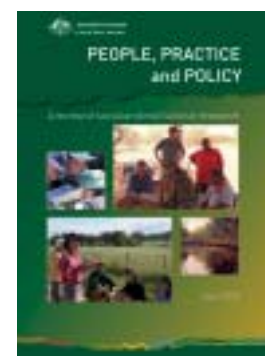
send an e-mail to sirp@lwa.gov.au with the words "subscribe SIRP's UP" in the subject line, and include your full name. ■

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To order your free copy of *People, Practice and Policy* contact CanPrint Communications on 1800 776 616 or via the website www.lwa.gov.au/sirp



Western Australian irrigation research project

This story is about a catalytic research project that has helped achieve substantial environmental and productivity gains in Western Australia — a research project that was founded on the very best practices for knowledge and adoption. Due to great joint-inquiry processes, the project has been integrated into something much bigger involving a range of stakeholders including the Department of Agriculture, Harvey Water, South West Catchments Council and Western Dairy. The program of change in the region has resulted in securing water and energy efficiencies from storage to paddock, trade of water savings to the Western Australian Integrated Water Supply System, improvement of water quality, and reduced environmental impacts from irrigation.

Funding a science project where the research team consists of three local blokes spanning commerce, dairying and consulting may seem a little unusual. The proposal to the National Program for Sustainable Irrigation (NPSI) was compelling, as it was an excellent demonstration of joint-inquiry processes and partnerships at the local level. The WA Department of Agriculture, Harvey Water, and NPSI were all actively involved in the research project — called “Changing Irrigation Systems and Management in the Harvey Irrigation Area”.

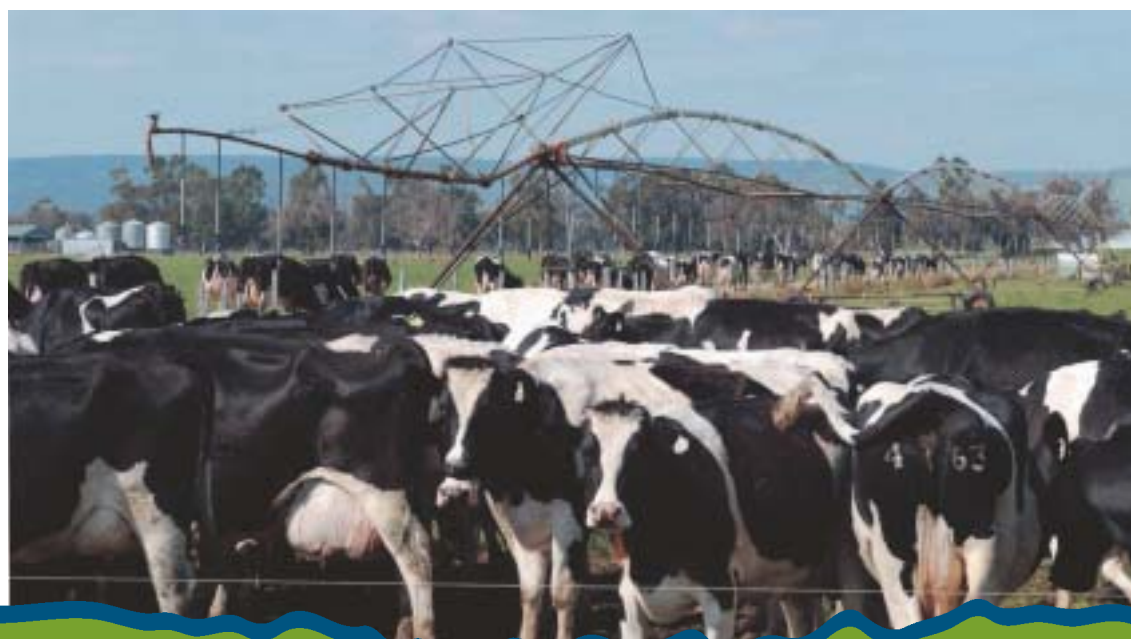
The NPSI project was conducted over the 2003–04 and 2004–05 irrigation seasons and demonstrated that centre pivot irrigation can be successfully integrated into a dairy system, with production gains and water savings likely with appropriate management.

NPSI funded experts from Queensland and Victoria worked with the Harvey team. They were invited in as outside specialists, not as know-it-alls, but to enable a combination of local knowledge and expertise to occur. In the on-farm demonstration, the centre pivot irrigation system used 29% less water in the first year and 31% less in the second year. The demonstration also saw an increase in pasture yields. In 2003–04 the centre pivot site grew 54% more pasture per hectare than the surface bay and in 2004–05, pasture production on the centre pivot was double that of the surface bay.

Farm field days were popular with local dairy farmers. The project showed that a ‘learn and grow’ approach that moved the farmer through critical learning steps to give measurable results on-farm is the most effective approach in achieving changed practices. This combines the irrigator’s developed experience, overall intuition and growing confidence in the use of data.

The project demonstrated on-farm innovation through:

- adoption of centre pivot irrigation for dairy pasture,
- adaptive water management through soil moisture monitoring, pasture sampling and management, and water and nutrient sampling, and
- whole-farm planning that improves decision making for investment in changes to irrigation systems to improve water management.



Left: A dairy farm in the Harvey Water Irrigation Area showing a centre pivot in the background.

Right: Centre pivot irrigation has proved successful in terms of gains in production and water savings.

Far right: Harvey Water is replacing open channels with HDPE pipe to cut down delivery losses.

All photos Department of Agriculture, Fisheries and Forestry.

sparks water savings... and wins the 2006 WA Premiers Environment Award

The project also highlighted issues that require further investigation or action.

1. **Overcoming farmer risk aversion and incentives required to make decisions to invest.**

Even with positive rates of return and payback periods for investing in improved irrigation systems, farmers remain reluctant to invest. This risk aversion stems from non-economic factors such as industry uncertainties, life-stage, desired lifestyle and family business structures. For example, farmers with young families facing market and price uncertainty tend to be highly risk averse to large investments based on borrowing. The role of incentives to reduce risk and encourage investment in innovation needs further investigation.

2. **Improving plants' water use efficiency and the potential impacts from soil structure change.**

Expert advice provided to the NPSI Harvey project, was that it is the improvement in the rooting depth of plants and the uptake of water and nutrients allowed by soil amelioration and irrigation practice that will enable further productivity gains with advanced irrigation systems.

3. **Using new approaches to extension and learning that results in change.**

The "learn and grow" approach referred to above is practical and built on sound adult learning principles. Also, being so well connected through joint-inquiry processes with other organisations creates an environment conducive to change.

The issues at a regional and state level at the time of the project were:

- the need to enhance the productive capacity and sustainability of the Harvey Water Irrigation Area as the prime area for Western Australian irrigated agriculture,
- the need to provide more diverse opportunities for irrigators,
- the imperative to improve the state water supply, and
- the drive to achieve harmonious environmental management.

Planning, design and preliminary funding has taken place for a project to fully pipe the Harvey Water Irrigation Area. The proposal is to stage the development in five steps over about 10 years which is estimated to cost about \$200 million. It involves a new pipe network that will replace the open irrigation channels and deliver water to the farm gate in both the Harvey and Collie Irrigation Districts.

Providing infrastructure that can deliver water under gravity pressure in pipes to farms also increases the options for farmers to innovate and change systems and practices. The gravity pressure pipe system is capable of delivering 12 megalitres per day to the property involved in the NPSI research, with an estimated energy saving to the farmer of between \$6000 and \$13,000 in comparison with having to pump from a dam or bore over say 1 kilometre.

The NPSI funded study that started with three local blokes has shown that substantial change is possible. Through the efforts of public and private sector individuals and organisations, small research projects such as the one described here, can link in with, inform, and reap the benefits from, something much bigger.

The project won the 2005 WA Environment Awards in the category of Water Conservation and Management. ■

For further information

Murray & Liz Chapman

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visit the NPSI website www.npsi.gov.au



Exchanging dry feet for wet feet at 'Veg Futures'



Interest in better management of Australian waterways is alive and well if participation at the riparian workshop sessions at the 'Veg Futures 06' conference is anything to go by. 'Veg Futures 06' was one of the largest conferences addressing native vegetation management issues to be held in Australia in the last decade. Over 500 people attended the four day conference in Albury-Wodonga NSW. The second day featured 'paddock sessions' where delegates were taken away from the confines of the conference room into the field to see first hand what was being trialled and tested to improve native vegetation throughout the region.

The action packed third day saw 16 concurrent workshop sessions about diverse topics from improved management of native pastures, TransGrid's environmental achievements, seed collection, Canberra bushfire recovery, livestock management and two workshops about riparian management that had waiting lists of people wishing to attend.

Land & Water Australia's National Riparian Land's R&D Program's workshop was held at the remarkable Wonga Wetlands near Albury (see page 39). The Wetlands reuse water from the city of Albury to naturally filter pollutants and provide habitat for many unique birds and vegetation. The new growth of river red gums along some of the stretches of river was impressive with young trees reaching 2 metres tall in five years since grazing was removed.

The Riparian Land's R&D workshops showcase the results from over 10 years of leading edge research into riparian management issues. These workshops have been held throughout Australia over the last six months and have been highly valued (see article, page 30). The workshop for 'Veg Futures' had four components:

- an overview of Wonga Wetlands,
- the Rapid Appraisal of Riparian Condition (RARC) tool,



Photos on these pages
(until credited otherwise)
Nadeem Samnakay.



Australian Government
Land & Water Australia



Wonga Wetlands. Photo
Greening Australia.

- key learnings about the role of riparian vegetation for in-stream health, and
- revegetating and regenerating riparian vegetation.

Overwhelmingly, the participants found the workshop content extremely useful and it aided their understanding of riparian management. As a model for knowledge and adoption these workshops have received strong support from participants.

Earthtech's riparian workshop in the afternoon demonstrated how the Goulburn-Broken Catchment Management Authority (GBCMA) was taking the lead in establishing monitoring and evaluation program to measure the impact of different types of riparian environmental works in the upper Goulburn Catchment. Thirty sites were selected and a range of riparian assessment tools including the 2004 Index of Stream Condition (ISC), the RARC (described earlier) and the Vegetation Quality Assessment (VQA), were used to establish benchmarks so changes in vegetation and habitat condition following rehabilitation works, could be measured. The data will also show the types and timing of the works that have been more effective. Many Catchment Management Authorities are keen to see the results from the monitoring program.

Where can I find more information?

The key learnings, speaker's papers, summaries of workshops and discussions from 'Veg Futures' will be available electronically on Greening Australia's website www.greeningaustralia.org.au from September 2006. The proceedings are being sponsored by the Exchange — the National Vegetation Knowledge Service which provides links between information, resources and the latest knowledge about native vegetation to the people and organisations that need it. The service is managed by Greening Australia and funded by the Australian Government through the Natural Heritage Trust. ■

You are able to e-mail or telephone your questions about native vegetation management to Exchange on:
Tel: 1300 886 589
(local call from anywhere in Australia)
E-mail: exchange@greeningaustralia.org.au



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National Vegetation Information Service

The Australian Government has just released new native vegetation mapping products based on a recent update to the National Vegetation Information System (NVIS). The NVIS is the most detailed, up-to-date and accurate information source on Australia's native vegetation, and has been collated through the active participation of all Australian state and territory governments. There have been a number of new information products developed for use by researchers, educators and natural resource managers. Key information products the NVIS can generate include:

- General descriptions of vegetation types across the continent, including coloured maps, tables and graphs (available free on the web).
- Downloadable geographic information system (GIS) datasets of estimated pre-1750 and present Major Vegetation Groups (MVGs) covering Australia.
- Web maps available through the Australian Natural Resources Atlas Map Maker.
- Identification of data gaps and quality issues across Australia.
- More detailed information in regions where mapping is complete.
- NVIS also provides guidelines for surveying, classifying and mapping new vegetation datasets.

Details of these products can be accessed online at www.deh.gov.au/erin/nvis. They include finer scale datasets applicable to GIS such as regional planning.

Free copies of the 2006 NVIS **map** of Major Vegetation Groups in Australia and **brochure** are available by post. Simply e-mail your request to ciu@deh.gov.au or call 1800 803 772.

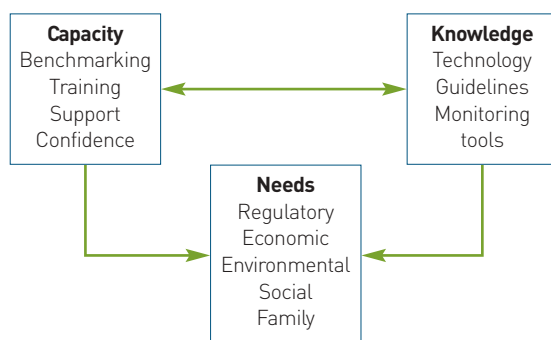
Land, Water & Wool:

Using new extension techniques to achieve lasting change in NRM on wool properties

By Michael Wagg
and Andrew
Lawson

Land, Water & Wool (LWW) is a joint Australian Wool Innovation Ltd and Land & Water Australia program. It aims to provide the wool industry with the knowledge, tools and enthusiasm to minimise its environmental impact while enhancing productivity.

Knowledge and adoption is the key reason for LWW's existence, and we felt that in order to achieve management changes on farms, the manager must identify a need or motivating factor for change. This must be supported by the required knowledge or technology being available, along with a capacity to implement.



Modified from Zammit, C., pers. comm., 2005.

Without all three factors in place, the desired objective won't be achieved. LWW extension activities are now designed to support one or more of these factors within defined target audiences that are either direct (woolgrowers) or indirect (e.g. extension staff, policy makers, regional natural resource management (NRM) bodies).

The Program has around one year left to run. The size of the Program and the breadth of subject matter have enabled the team to target various audiences and trial a range of extension techniques from the traditional to the quirky. All the techniques discussed in this article are aimed at nurturing knowledge, skills, solutions, confidence, pride and a sense of fun.

Farmer-initiated demonstration sites

In the SGSL Sub-program, we have combined five formal, scientifically rigorous research sites with 120 woolgrower-initiated demonstration sites (involving about 1200 farmers) in which local landholder groups (such as landcare groups and farming systems groups) tackle a salt-land issue relevant to them. This recognises that as research

Land, Water & Wool project activities mainly take place within seven sub-programs, they are:

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

Further information go to www.landwaterwool.gov.au



SGSL photo competition category winner. Photographer Ed Barrett-Lennard. See over for more details about the competition.

managers, we don't always know what the need is that sparks a woolgrower to change practices. The result is a tremendous feedback process between the scientists on the formal research sites and the growers with their demonstration sites. Feedback from woolgrowers and researchers is positive, with both groups enjoying the opportunity to develop joint solutions to saltland management.

Publications

All of the LWW sub-programs have relied heavily on the use of publications to get messages across, with particular thought being given to specific target audiences for each publication. For example, in the Rivers & Water Quality Sub-program, a suite of publications on river management were launched early in the year. The flagship products were two comprehensive rivers guides — one each for the high rainfall and wheat/sheep zones. These were targeted at technical staff in regional NRM bodies (who had the opportunity to input to the product) who are in a position to influence woolgrowers and provided considerable detail, supported by research, on river management activities that can impact at the catchment scale. The aim was to align the interests of LWW with the objectives of the regional NRM bodies (e.g. better water quality) so that their staff would find the guides a useful resource when dealing with farmers. (See page 26 for more information about these publications.)

Websites

For pastoralists in Queensland, the Climate Sub-program has chosen the Internet as its primary delivery tool. While convenient, the use of the internet has posed some challenges for our climate projects in successful knowledge transfer (slow connection time a major problem). For

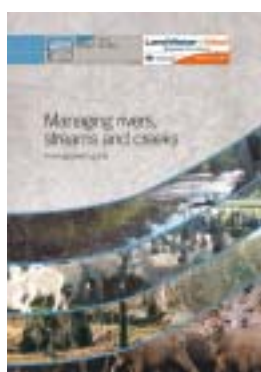
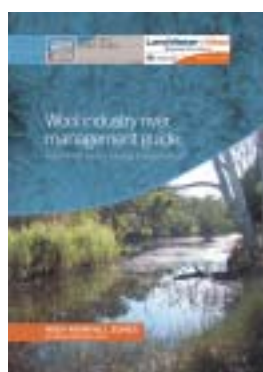


woolgrowers, many management decisions are bound up in the question of whether it's going to rain, and this is especially important in the range-lands where bad stocking rate decisions have impacts that can sometimes last for decades. However, the science of climate variability is highly technical with a language of its own and a refined discourse on the issue of uncertainty. Woolgrowers and on-ground extension staff have found the discourse mind-boggling — all they want to know is: Is it going to rain? As a result, the website has been supported by introductory workshops, hardcopy materials and telephone support. A more general website is the whole of program website. This operates more as an introductory portal to the program, although a large amount of specific information can be downloaded. We have averaged around 500 users per month since the site went live.

Photo competition

With the huge amount of on farm activity occurring among the 1200 woolgrowers involved in the SGSL producer networks, an opportunity was identified to both allow interested people to show what salt-land management meant to them, as well as to collate a valuable library of salt-land management images. Hence, the *SGSL Pride in Salt-Land Management* photo competition was born. *Pride* has been identified as a key motivating factor from within SGSL as a reason for people to become involved in salt-land management activities such as saline agronomy. This activity had terrific momentum right from the start.

www.landwaterwool.gov.au



Over 400 entries were received from across the country in a range of categories all around the theme of *pride*. As well as increasing awareness about SGSL, the competition also reinforced among the entrants the importance of what they are achieving. The impact of the competition continues through two travelling exhibitions of the 30 photos that were the finalists.

Photovoice — telling stories with pictures

How people think and feel about something relates to how they behave in relation to it. The Native Vegetation & Biodiversity project in the Traprock region of south-east Queensland used an innovative method called 'Photovoice' to understand some of the psychological and social factors that influence landholders' decisions. It is always easier to tell a story with pictures, and this method is also useful in capturing the thoughts of people who may not normally be verbally expressive but have important things to say.

Participants used a disposable camera to take pictures on their properties and were given 'framing' questions to provide focus for the subjects of photos. Researchers had a taped conversation with participants to discuss particularly meaningful photos that communicated a significant theme or story. Participants then attended a focus group to share photos and perspectives related to each framing question, and put together a collection of photos that best represented the issues from a regional perspective. Analyses of the dialogue and pictures shed light on place characteristics related to the land that were implied in participants' land management, for example, history, belonging, value, identity and commitment. Responses were clustered around the themes of 'Biodiversity', 'Sustainable Production' and 'Sense of place', as well as the relationships between people and places.

Field days and workshops

A lot of our extension effort goes into the traditional activities of field days and workshops. Field days are generally based around on-farm research activities and are often tied in with major events such as conferences. In the Pastoral Sub-program, workshops have been used to deter-



Overall winner, and category winner in the SGSL photo competition. Photographer Peter Garside.

mine the extent to which new technologies can add value to the woolgrower's decision-making ability. Our *Remote Controls for Woolgrowers* project is investigating the use of satellite imagery for in-season stocking rate decisions in the pastoral zone. To the researchers, the technology is exciting and full of possibilities. However, we can't presume that pastoralists find it similarly exciting. A series of workshops with participating pastoralists in South Australia has enabled the researchers to ask woolgrowers about the sort of information they would find useful from such technology and how they would like that information presented and packaged.



Category winner in the SGSL photo competition.
Photographer Barb Woolford.

With these groups in mind, we created an opportunity for national and regional print, radio and television media to visit woolgrowing properties where environmental management is a priority, and enable them to speak directly with woolgrowers and research scientists on the steps they are taking together to achieve an improved environment. The media tour was a great success with many stories appearing in newspapers, local radio and other media outlets as a result of the experience the reporters had over the two days they spent with us.

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Future woollscapes — scenario testing

What might the world and the wool industry look like in the year 2030? And in what way may governments and consumers be requiring farmers to be managing their natural resources at that time? The Future Woollscapes Sub-Program brought together 20 representatives from the wool and other industries to begin an 18 month long process of examining a range of key issues that may impact on the world and wool industry over the next 25 years. While recognising that the future cannot be predicted, the group used a scenario planning process to analyse trends and patterns evident today, and looked at how they may shape the wool industry's future. By examining key issues in detail, the project has sought to stimulate debate in order to provide insight into the challenges, threats and opportunities that lie ahead. In doing so, the wool industry (and Australian agriculture in general) might be better prepared for what may happen in the longer term.

Media tour

Land, Water & Wool needs to positively influence two key stakeholder groups:

- firstly, there are woolgrowers and people who assist and advise woolgrowers at the coal-face of land management. Woolgrowers, farm consultants, state agency agronomists, Catchment Management Authorities (CMA), and
- secondly, there are wool consumers and the general community who have an indirect but vital influence on the way woolgrowers manage land.

Advocates

Tangible, hard-copy documents, reports and materials are valuable in LWW extension. They form a permanent 'repository' of information, lessons, learnings and experiences that will endure long after the LWW program finishes. However, these aids to extension don't sell themselves. They are sold by *people* and the relationships of trust people have with each other. As research projects reach their conclusion and generate research findings that can be packaged in documents, websites and other tools, LWW has commissioned four 'Advocates' to promote the work of the Program. Our Advocates are already well-connected with key contacts in the state agencies, CMAs and farm consultancy circles, and will take on a face-to-face communications role in delivering LWW products. Our hope is that this will get our information out of our program and into the hands, hearts and minds of users.

Dog-collars

Communications experts tell us that a truly effective communications product must balance concepts that come from — and appeal to — both sides of the brain. The left side is analytical, 'scientific', rational, logical, whereas the right-side of the brain is the hemisphere of "curiosity, synergy, experimentation, metaphoric thinking, playfulness, solution finding, artistry, flexibility, synthesising and in general, risk taking" (Sheldrick, 2005). One of the most novel examples of right-brain thinking in the development of extension products came out of our Native Vegetation & Biodiversity project in Victoria, where researcher Jim Moll conceived and developed the idea of adding a land management

slogan and the LWW website address to a dog collar. The dog collars are inserted around a photo of a sheepdog that appears on the front of a brochure and talks about the benefits of better management of native grasses on hill country in Victoria. The dog-collar bears the slogan:

BARK UP THE RIGHT TREE

and is being distributed for free (with brochure attached!) through Elders and Landmark outlets in areas of Victoria relevant to the research. Look out for it in at an Elders or Landmark agricultural supply store near you!

Discussion

Land, Water & Wool comes to an end in December 2006. An evaluation strategy is in place and results that have been collected during LWW will be analysed over the next six months. In managing some 80 projects, we have gained a fair bit of experience in what has worked, what hasn't worked, and in some cases we have learned to understand why. Hopefully these "understandings" will be supported (or modified) by evidence at the conclusion of our formal evaluation activities. In the meantime we have gained a fair amount of confidence in the following "insights", many of which support findings in the extension literature.

1. Make it locally relevant

With a national program such as LWW there is often a tension between maintaining a national profile and being locally relevant. For information to be taken seriously it needs to be presented with the relevant local context in mind.

2. Provide plenty of hooks

A lot of agricultural extension has been underpinned by a belief that practice change is mainly motivated by profit now and into the future. While profit should never be discounted as a motivator, we have seen many examples in LWW where people have changed practices without improving profit. Adoption can be improved if the technology can be linked to a range of possible motivating factors. Ease of management, "doing the right thing", being seen as an innovator, or protecting a favourite spot on the farm may all be more important than profit to some people in some circumstances.



Photo Currie Communications.

3. Have plenty of entry points

Experience has shown us that while some people are prepared to adopt major management changes in one hit on the basis of a field day or research report, others prefer to 'try before they buy' and like to test out new technology on a small scale first. Enabling people to do this with low risk has improved involvement.

4. Understand who can help you

Land, Water & Wool is mainly an industry funded program aiming to provide woolgrowers with the knowledge tools and enthusiasm to improve NRM. By working with other groups with similar objectives, such as CMAs, we have been able to leverage assistance. Agribusiness is also a key contact point with farmers, as well as a highly respected source of credible information.

5. On-farm research gets people involved

On-farm research has been a strong component of LWW. While it often has limitations in terms of scientific method, and conclusions may need to be treated with caution, on-farm research is hugely influential and achieves high levels of engagement.

Conclusion

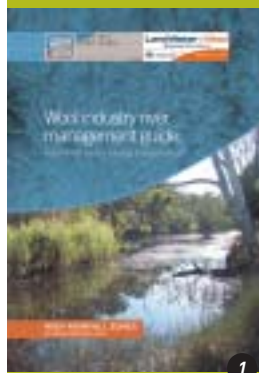
New knowledge and its adoption is essential for industry to stay ahead of community, government and consumer expectations, and to demonstrate to these groups that steps are being taken towards a more sustainable future. Through this range of knowledge and adoption techniques, LWW is striving to connect with woolgrowers and the communities they live in to ensure that this can occur. ■

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5

'Wool industry river management guides', 'Managing rivers, streams and creeks', 'Woolgrower checklist' and 'Rivers insights'

The **Wool industry river management guides** bring together the latest science and recommended management practices for riparian areas within the context of a commercial wool growing property. The Guides are available for the high rainfall regions (above 600 mm) and sheep/wheat regions (300–600 mm) of Australia. Each book has over 200 full-colour pages.

1. High rainfall zone: product code PX050951

2. Sheep/wheat zone: product code PX050952

Managing rivers, streams and creeks:

A woolgrowers guide — a summary of the key recommendations from the 'Wool industry river management guides' and provides a friendly introduction to the river and riparian management issues on farm.

3. Product code PX051003

Are my waterways in good condition? This checklist provides colour coded pictures that you can use to quickly assess the condition of your stream or creek. It is quick and easy to use and will help you to work out the health of the streams or creeks running through your property and suggests management actions to improve or maintain these vital parts of your farm.

4. Product code PB061114

River insights — a publication featuring the stories of ten woolgrowers and what has motivated them to manage their rivers, creeks and streams in ways that make both economic and environmental sense.

5. Product code PK050950

These products are available from CanPrint Communications on freecall 1800 776 616 in hard copy or can be downloaded from — www.landwaterwool.gov.au or www.rivers.gov.au

Yet another new publication from the Rivers Arena (and yes, sheep are included!)

 Australian Government
Land & Water Australia

Stock and waterways:

A MANAGER'S GUIDE

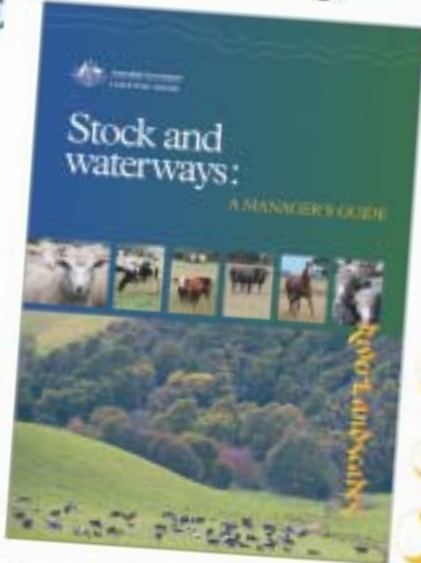
Mention "riparian land" to most people and they'll think you're talking about another planet. In fact, "riparian land" is land that is connected to a waterway, such as a river, creek, dam or lake.

The purpose of Land & Water Australia's new book, "Stock and waterways: a manager's guide" is to help farmers identify their riparian land and understand the role it plays in maintaining a healthy waterway.

The Guide offers practical advice on how to manage riparian land both productively and sustainably, and includes a number of case studies from farmers throughout Australia who have seen the benefits of changing their management practices. The Guide also gives a summary of funding and resources available for improving riparian management.

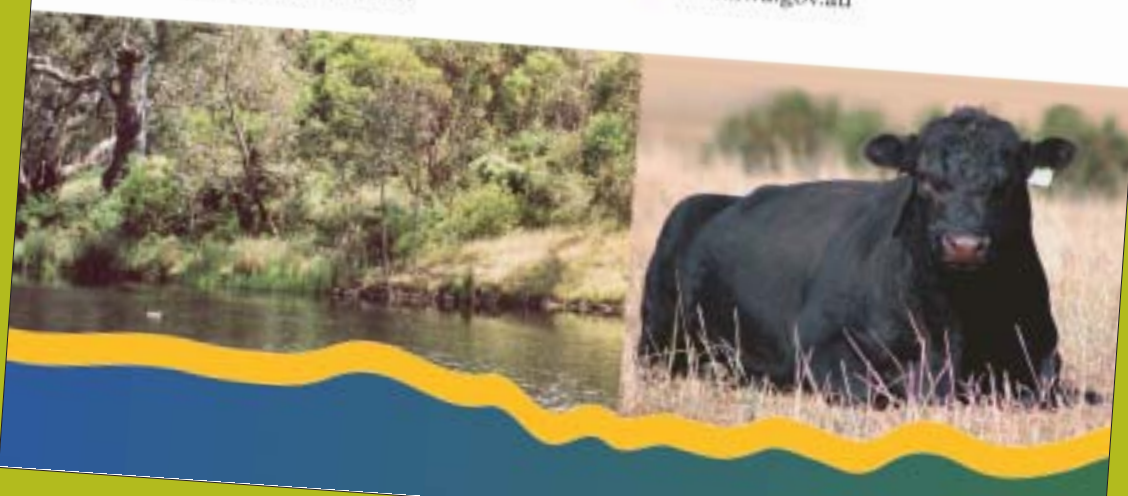
The Guide has more than 100 pages of user-friendly information, contains hundreds of colour photographs and diagrams, and is freely available from —

CanPrint Communications
on freecall 1800 776 616.

 **River Landscapes**

It can also be ordered through:

- www.rivers.gov.au
- www.lwa.gov.au



Product code PR061132

RAPt in rivers

NEW FACES

Welcome Jim Donaldson



HELLO

Jim is the new Manager of Landscapes R&D in Land & Water Australia (LWA) where he is responsible for managing LWA's research investments in tropical rivers, environmental water allocation, riparian lands, native vegetation and biodiversity, river contaminants, and weeds.

Jim comes to the job with over 15 years of experience working in the natural resource management field at the interface of science, policy and program delivery. This includes stints in the Australian Government's Department of Agriculture, Fisheries and Forestry, Department of the Environment and Heritage, and Bureau of Rural Sciences. In these roles, he has helped shape national policies and administered projects in the areas of natural resources data and information, science, knowledge exchange, vegetation information, biodiversity conservation, forestry and greenhouse science.

Jim is keen to ensure that research and knowledge exchange activities undertaken by LWA are highly valued by natural resource management stakeholders, including regional groups and those working in policy, industry and the community.

Welcome Nadeem Samnakay



HI THERE

Nadeem has recently joined the Knowledge and Adoption (K&A) team at LWA. With responsibilities to the landscapes arena, Nadeem's role is to extend the knowledge gained from LWA's research primarily in water and vegetation related programs. Individual research projects funded by LWA enhance our knowledge of natural resources and K&A officers have a responsibility to collate and synthesise information across several projects and programs. This knowledge can assist in the development of better policy or planning, or assist in managing on-ground changes that contribute to sustainable production practices.

Nadeem recently spent a year working for IUCN based in the Pakistan country office assisting in the development of a variety of conservation projects. Prior to this he spent several years as an extension officer with the Queensland Parks and Wildlife Service based in southern Queensland. His other experiences include working as a landcare coordinator in the Western Australian wheatbelt town of Kellerberrin, as well as working with the Agriculture Protection Board with responsibilities for managing declared plant and animal control programs in Dalwallinu. His interests revolve primarily around food and exercising so he can continue to enjoy more food.

Welcome Judy Lambert



GIDDAY

Judy has recently joined the Landscapes team as Research and Development Coordinator for the Defeating the Weed Menace program. Since 1993, Judy and her business partner Jane Elix have together operated their consultancy business Community Solutions, which specialises in bringing together the diversity of people needed to achieve sustainable living. In much of their work there is a strong emphasis on natural resource management. Originally trained in medical sciences, Judy has over the years, retrained in both Environmental Management and Business Administration. Having grown up on a farm in north-eastern Victoria, Judy remains a 'country girl' at heart and has a strong preference for work that takes her to country areas.

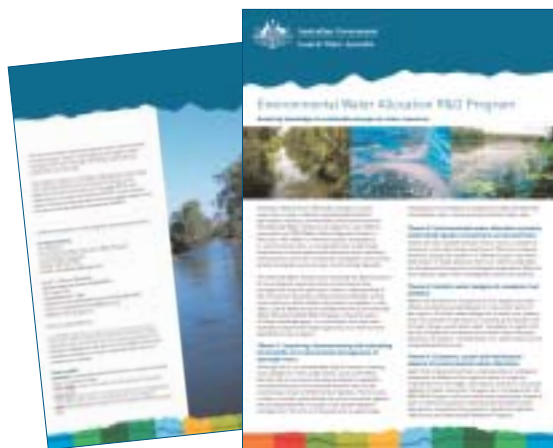
NEW PROGRAMS

Environmental Water Allocation Program

The demand for fresh water in Australia continues to increase, complicated by prolonged droughts across the nation. Many regional towns and major cities like Brisbane, Sydney and Perth are contemplating new infrastructure projects to supply the water needs of our urban population. Similarly, the irrigation industry continues to expand and compete for increasingly scarce water resources. Meeting the needs for our growing population means that the needs of the environment can sometimes be overlooked. To ensure that water regulators and managers have the knowledge to appropriately manage water for competing needs, LWA has commenced a research and development program focussing on the water needs required to maintain aquatic ecosystems. The Environmental Water Allocation R&D program is funding a number of projects to generate knowledge to sustainably manage our water resources. A brochure outlining the program objectives and research projects is now available. The brochure can be ordered from CanPrint by calling 1800 776 616 or downloaded from the website at www.rivers.gov.au

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Defeating the Weed Menace — new LWA Program



From June 2006, Land & Water Australia (LWA) will be responsible for the R&D which forms part of the Australian Government's Defeating the Weed Menace program. Weeds are currently estimated to cost Australian agriculture around \$4 billion each year through their effects on production, operating costs and access to markets. Then there are all the other effects of weeds on water quality, biodiversity and the integrity of our natural systems.

Commissioned jointly by the Department of Agriculture, Fisheries and Forestry and the Department of the Environment and Heritage, LWA has just over \$5 million to invest during the next two years in projects that generate knowledge to prevent the development of new weed problems, to reduce the impacts of existing weeds of national priority, and to build capacity to better manage weeds of major significance. Given the scale of the weed problem across many areas of Australia, recently appointed R&D Coordinator, Dr Judy Lambert will be contacting organisations with an interest in research into weed management, seeking partnerships to implement and expand this program.

For further information

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Taking researchers into the regions

By Siwan Lovett

The National Riparian Lands R&D Program has undertaken 11 years of research into how riparian areas function, how they can be better managed, and how to engage local communities in protecting, maintaining and rehabilitating these important parts of the landscape. The research that has been undertaken is world class, and the Program has always had a strong focus on knowledge and adoption activities. Publications aimed for audiences at a range of levels have been a feature of the Program, as well as innovative CD-ROMs, web-based products and newsletters like *RipRap*. However, the knowledge and adoption

activity that really creates a stir is the Program workshops, that enable people to interact directly with the researchers who did the work.

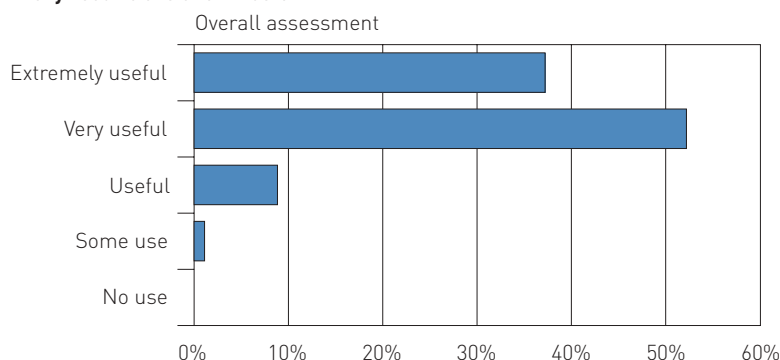
Between November 2005 and March 2006 the National Riparian Lands R&D Program has been 'on the road', running workshops in each state and territory, plus tailored made ones for organisations like Greening Australia. Researchers of the calibre of Ian Rutherford, Peter M. Davies, Amy Jansen, Andrew Brooks, Don Thomson, Phil Price and Stuart Bunn have been presenting their research findings to staff, invited by the hosts of the workshop to attend on the basis that they are best able to translate the science into practical management outcomes.

Demand for these workshops has been very high, with all states and territories visited requesting more be organised, as the mix of science and practice is very popular with participants. Each workshop has had between 25–35 participants, drawn from government NRM departments or Catchment Management Authorities and equivalents. Each of the workshops had workbooks and a CD-ROM that had all the presentations on it so that people could refresh their memories when they returned back to their offices.

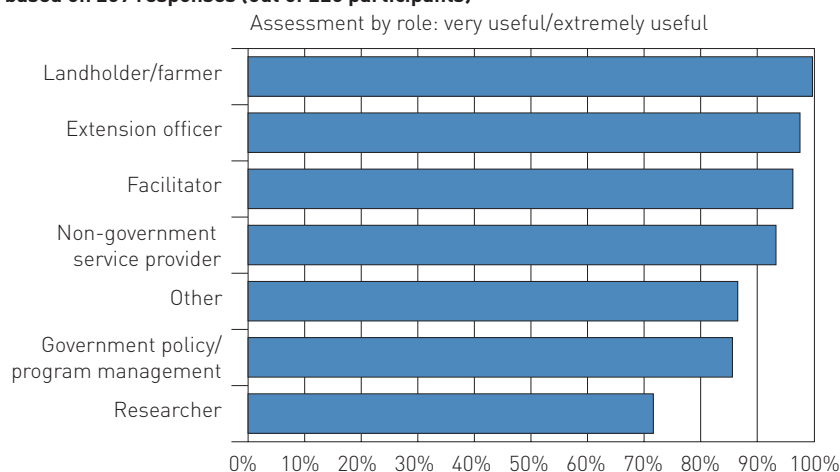
The results shown (at left) are very pleasing as our key target audience of facilitator/extension officer found the workshops met their needs.

Qualitative responses highlight the value participants place on being able to talk directly to the researchers who did the work, as well as the professionalism and organisation of the workshops being excellent. As a model of knowledge and adoption, taking researchers out to the regions is clearly a good approach as people feel they can access science but have it placed within their local context. We are now exploring the use of this approach across Land & Water Australia

Preliminary results are shown below:



based on 209 responses (out of 220 participants)





Nadeem (see page 28) bribed us with food to pose for this photo.

(LWA) as we try and develop packages of information for organisations like Greening Australia and other industry groups who are interested in cross portfolio research. It is an excellent way of ensuring that the science that is being undertaken is directly relevant to our key stakeholders.

Potential impact

When the researchers are asked why they enjoy doing these workshops they say that it is because they can see their research being understood and taken up by participants. As an example, the in-stream temperature modelling (*Technical Guideline no. 5*) presented by Dr Peter M. Davies has been adopted by the Department of Primary Industries, Water and Environment who are applying the approach to every stream in Tasmania, providing a useful tool for prioritising restoration works. This is directly applying the research presented in the workshop and is a great outcome for all involved. In summary, people have more confidence in the science when it is explained by the researcher who did the work, and this is supported by materials that clearly guide them into applying it to their region.

One issue that has arisen from running this series of workshops is that participants are concerned about the National Riparian Lands R&D Program finishing — what will fill the gap that will open up when the Program is no longer there? Well, don't despair, as a new project has been approved by the LWA Board that will bring together all of the research from the National Riparian Lands Research & Development Program onto one CD-ROM, with introductory sections on key riparian management issues supported by all the publications and tools the Program has developed over the years. It is likely that this CD-ROM will be supported by another National Riparian Lands Research & Development Program Workshop that is open to everyone, so stay tuned to *RipRap* for more information! ■

For further information

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All photos in this article are from the Bendigo Workshop, taken by Nadeem Samnakay.

Achieving successful partnerships between business, the community and government

By Rebecca Gordon

Where there are common interests, partnerships between business, community and government can offer a viable approach to share knowledge, adopt new approaches and develop solutions. Obviously, for this to work there needs to be an agreed shared interest, and while the emphasis will differ significantly for each party, their interdependence provides the basis for a productive relationship. It is also the way in which each of the parties approach and address the issue, whether for land access and use, improving water efficiency or community and/or business sustainability, that determines the success or failure of the partnership.

In a partnership of business, community and government, each has a different focus. For industry, the emphasis is on the business case: the bottom line. The purpose here is to create and build a viable, sustainable operation whether in mining, agriculture, health or education. For the community, the interest is both personal and professional, built on a shared identity, history and attachment to the area. It combines the very personal experiences of individuals and their families with the professional expertise of residents both living and/or working in the region. For government, it is the duty of care to society, to both current and future generations, combined with the various legislative and regulatory responsibilities that define its focus.

Orica from Stockton Fullerton Road. Photos on these pages Rebecca Gordon.



While these distinctions are useful to help understand some of the motivations, they only represent part of the story. Particularly in regional and rural areas, it is often the case that individuals, whether their primary interest is to represent government or business, are also residents of the local community. This duality brings opportunities, obligations and self-regulation in how the groups interact. This is evident in many areas, particularly those outside professional responsibilities. At sporting events, for example, especially where young people are involved, in school committees and social events, individuals work together in their personal lives. These efforts of goodwill, sponsorships and volunteering help the community 'rub along together'. If managed carefully, these relationships can be used to strengthen the partnership, drawing together necessary resources (both people and finance) and bringing parity among the representative groups.

One recent example is a project initiated by a corporation operating adjacent to the north arm of the Hunter River. Orica Mining Services on Kooragang Island produces the feedstock for commercial mining explosives. It needed to engage with the community because of its sensitive location and its proximity to the community of Stockton. Orica inherited the site, used previously by other industrial groups, and because of this had current and historical issues to address. Kooragang Island also has an important wetland and nature reserve recognised under the RAMSAR convention. Consultations were held with primary schools, the health care sector, industry, business services, sport and recreational groups, river users, environmental projects and groups, Indigenous people, residents groups, the local council together with policy advocates and government.

For the company, an engagement strategy offered a number of immediate and long-term benefits. In the short term, it helped manage risk, both to its operations and reputation. In the longer term, building closer relationships with various stakeholders and representatives makes commercial sense, delivering improved environmental and shareholder benefits. For the

Achieving successful partnerships

community there is now a stronger basis to share and develop knowledge, and adopt new approaches to address social and environmental issues. For government, closer interaction and monitoring have proved beneficial, particularly in the trialling of new technologies to address environmental issues, both on and off the site.

While the motivations and interests often differ between business, government and the community, the benefits of collaboration offer the potential to bring about significant change in knowledge, policy and practice. There are often many areas of common interest where partnerships can provide a useful and enabling model. To be successful, the relationship and motivations of each of the parties needs to be carefully managed. Agreeing on a structure where the purpose, responsibilities and timeline is clearly defined and recognised by all can help in the initial negotiations and operation.

With common interests and a willingness to commit to a true partnership significant opportunities can be created to address shared issues and develop alternate solutions in areas of vital importance to the future of Australia. ■

For further information

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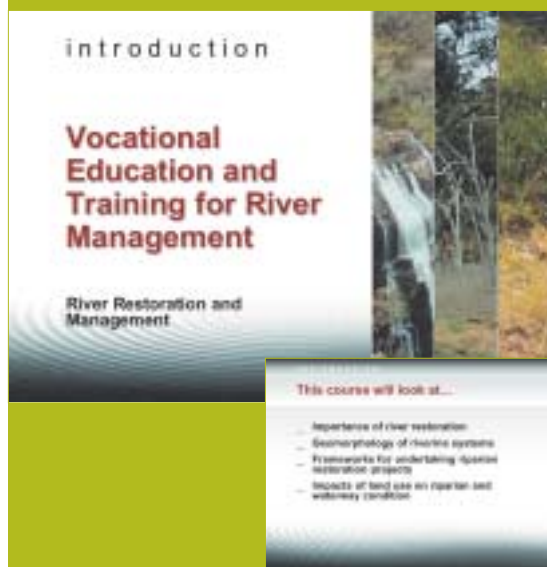
Above: Entrance to Kooragang Wetlands.

Left: Egrets at the western end of Kooragang Island.

NATIONAL RIVERS CONSORTIUM

New training course on the web for river restoration and management

Land & Water Australia have worked with Riverina TAFE to put together an introductory course that enables individuals or groups to take a self-paced learning tour through river restoration and management in Australia. The project, funded by the National Rivers Consortium, is available on the website www.rivers.gov.au in the training and education section. There are 16 PowerPoint sessions covering a range of topics relating to river restoration and management, including, why riparian areas are important, the impact of stock in waterways, channel morphology, and many many more. All the PowerPoint sessions can be downloaded on to your computer so that you can go through the course yourself, or facilitate a group to think through the range of issues that characterise river restoration and management in Australia. Notes are provided with the PowerPoint presentations, as well as links to other publications and supporting materials. The course is free and we encourage you to modify it to suit your situation.



www.rivers.gov.au

Lessons from Watershed Torbay — values, integrating knowledge and managing change

By Louise Duxbury

The Torbay catchment, 26 kilometres west of Albany on the south coast of Western Australia, looks green and productive most of the year round. Contrary to appearances, Lake Powell, Marbellup Brook and the Torbay Inlet experience the worst algal blooms in the state fed by nutrients lost from the catchment. This is despite the fact that the catchment maintains one third of its 330 km² area as remnant vegetation and has relatively little intensive farming or urban land use with 51% of the catchment land use being grazing. The 650 landholdings have an average size between 100–150 hectares and 50% of landholders derive no income from their properties.

The Watershed Torbay project 2001–05, funded by Land & Water Australia's National Rivers Consortium and the Western Australia Department of Environment, with support from the community and other state agencies, set out to:

- show benefits of stream restoration at a catchment scale underpinned by research,
- demonstrate community participation as an essential component,
- incorporate monitoring and evaluation within ongoing adaptive management, and
- achieve action learning through collective work of agencies and community groups, supported by researchers.

The three year project has successfully brought together the community and key agencies to agree on a restoration plan to tackle catchment wide issues. Considerable resources were allocated to change management by:

- working on the quality of long term partnerships between the community and participating agencies,
- bringing together all forms of knowledge — the values and interest of the local community, the technical skills residing in landholders and staff within local agencies, and the scientific knowledge from the research community, and
- recognising that change needs to be managed. A clear framework for change that took account of individual needs (for example, anxiety about change and how to support people through this) was adopted and used through good communication and project work.

Raising high levels of awareness about land and water degradation does not necessarily lead to widespread changes in land and water management. Projects such as Watershed Torbay must go well beyond raising levels of awareness to actively manage change for behaviour to alter. Change is about going from here to there!

Photos throughout show different activities underway as part of Watershed Torbay. Photos Louise Duxbury.



The challenge is to identify why change is necessary, what needs to change, who needs to change, and how much change is the community and agencies concerned willing to undertake and to achieve desired end results. The Watershed Torbay restoration plan rests on community values expressed through workshops, a catchment survey and the project steering committee. The project also worked on expressing these core values to generate new ways of seeing the landscape and landholders' relationship with it.

The project used several processes to incorporate values, local technical knowledge and research into decision making (see Figure 1).

The researchers provided input on how effective different actions would most likely be against the targets for catchment restoration. The community then assessed the acceptability and cost effectiveness of the same proposed actions (Table 1).

The research work undertaken required researchers to use a civic science approach to their work which led to some excellent information supporting decision making. The following criteria were inserted into the research tender documents:

- What is the capacity of the research to answer community questions?
- Will research provide information that will help select and implement actions?

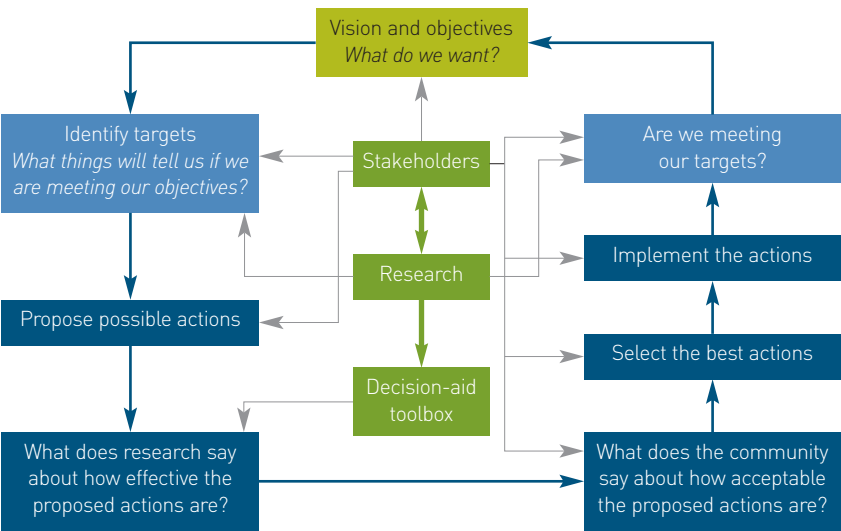


Figure 1: Watershed Torbay restoration plan framework.

RESEARCHER INPUT						
Possible actions farming systems	Best guess effectiveness			Best guess uncertainty levels		
Farming systems	Hi	M	Lo	Hi	M	Lo
Mixed production systems			✓		✓	
Professional fertiliser advice	✓				✓	
Perennial pasture support	✓				✓	
COMMUNITY INPUT						
Possible actions farming systems	How acceptable			How cost effective		
Farming systems	Hi	M	Lo	Hi	M	Lo
Mixed production systems		✓			✓	
Professional fertiliser advice	✓			✓		
Perennial pasture support	✓				✓	

Table 1: Example — Farming Systems subset of possible actions showing difference between researcher and community input into action selection.



Lessons from Watershed Torbay — values, integrating knowledge and managing change

- How urgent is research in terms of influencing action?
- What is the research proposal's potential to give results that lead to low cost land-use management change (behavioural change)?

As part of the restoration plan, focus groups are being run using a social marketing framework to identify the barriers and benefits of key actions in the plan so money spent decreases the barriers and increases the benefits to landholders. This should lead to an uptake of support because it will be targeted at the needs of landholders.

The Watershed Torbay project and the restoration plan currently being implemented, continue to build motivation and commitment to behaviour change. Investment in long term partnerships and a sound framework has set up the Torbay catchment for positive change into the future. The proof of the project and its approach will be seen in the willingness of landholders to continue to be involved in significant works and long term improvements in water quality.

Key learnings from Watershed Torbay

- Invest in long term partnerships with the community.
- Use a framework for change and work on all elements:
 1. create pressure for change
 2. agree on a future vision
 3. develop capacity — skills, markets, infrastructure
 4. get on with practical actions.
- Integrate all forms of knowledge: community values, landholder and agency technical knowledge, and research information for decision making.
- Acknowledge and build on work done to date.
- Fund communications and social science as well as natural science research.
- Base work on core values — help people to connect with them — to see the landscape differently and determine their desired future.
- Actively manage change. ■

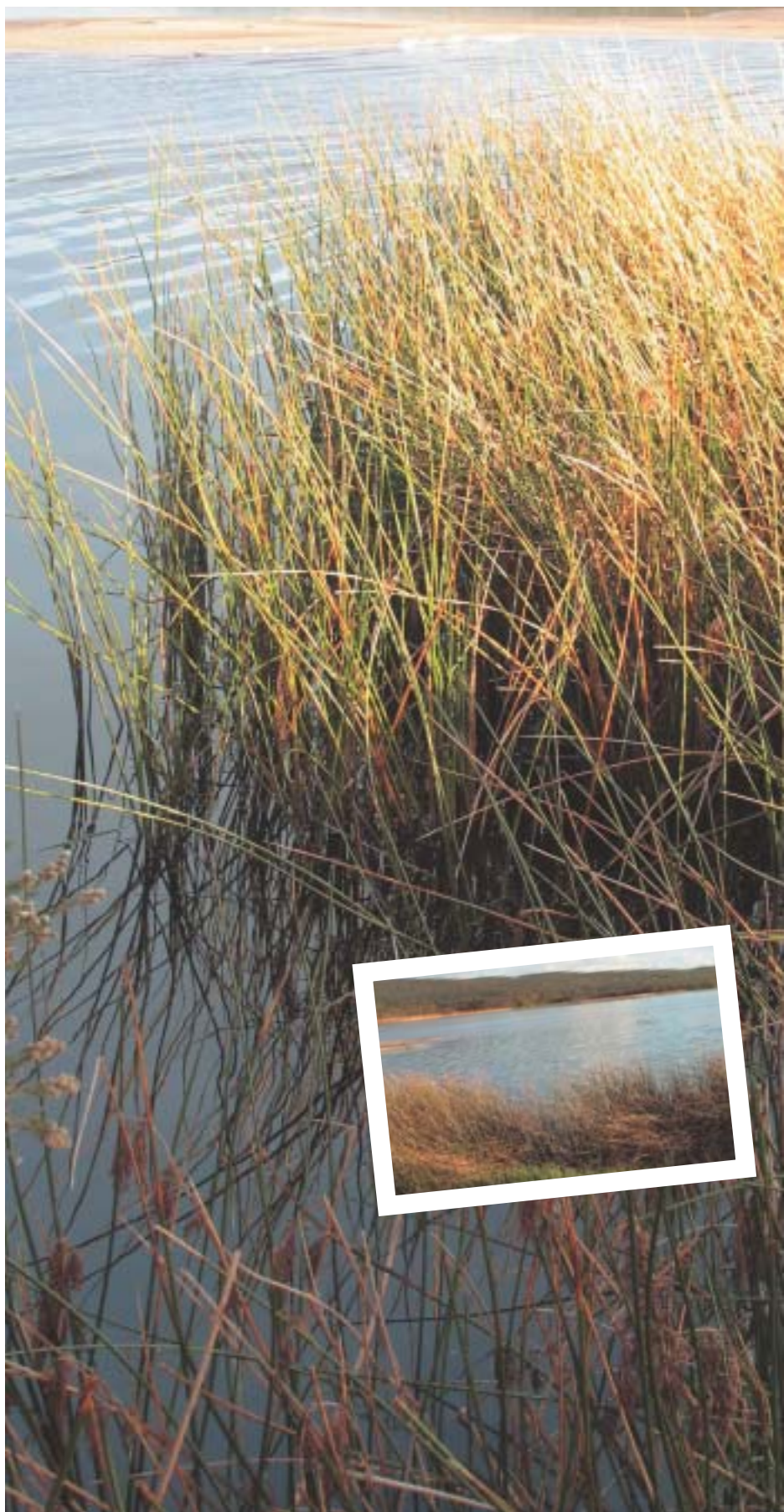
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Australian Capital Territory

'Along the Molonglo', the connection between art and catchment management

The Molonglo Catchment Group, based on the catchment of the Molonglo River system in the Australian Capital Territory and nearby New South Wales, has co-opted art as a key element of its strategy to take natural resource issues to the general community.

RipRap 27 featured 'Along the Molonglo' in its early days, along with several other examples of visual and performing arts both here and abroad, which are increasingly recognised as a tool for inspiring community capacity for environmental sustainability. Since the *RipRap* article, inaugural 'Along the Molonglo' art exhibitions have been held in Queanbeyan and Canberra. As a result of the success of these exhibitions, the Catchment Group will now work with the Queanbeyan Art Society, the Artists Society of Canberra and generous sponsors to hold 'Along the Molonglo' exhibitions and competitions in 2006 and beyond. The aim of the exhibition and competition, is to use art to express and promote the cultural, heritage and natural features and essential character of the greater Molonglo River catchment. This is seen as a means to increase community awareness, identity with and celebrate the rich landscape which encompasses urban, rural residential, agricultural and natural landscapes, cultural activities and environmental assets, on both sides of the border.

The exhibitions attract significant prizes for those paintings and drawings judged best overall on the theme. Current sponsors, Readymix Quarry, Canberra International Airport, the ANZ Bank and the National Capital Authority



are likely to support future competitions and other sponsors are being sought.

The Catchment Group is exploring other innovative avenues for building community capacity in natural resources management, for example, establishing partnerships with the media and creative arts to project images of the catchment to a wider audience. Radio Landcare has now been operating in the catchment for five years on Canberra's 2XX FM 98.3 Community Radio and Queanbeyan FM 96.7 Community Radio, and is a valuable source of natural resource management information as well as inspiring stories.

If you would like to see these lovely exhibitions go to:

- Queanbeyan, during July at O'Neills Cottage, 6 Trinculo Place
- Queanbeyan, during August at Ron Coffey Art Studio/Gallery, 2/24 Chapman Street
- Canberra, 27 September to 1 October, Fitzroy Pavilion, Exhibition Park. ■

The Molonglo Catchment Group is an umbrella landcare support group established in December 2003. Its main aim is to implement a natural resources strategy developed in 2005 to assist land managers in the Molonglo catchment to help to achieve the targets set out in the Murrumbidgee Catchment Action Plan and the ACT Natural Resource Management Plan.



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Return to traditional harvesting — Arrawarra fish traps — harvesting traditional knowledge



Arrawarra Headland fish traps. Photo Roger Dwyer, NSW.



Above: Stone fish traps. Photo Libby Sterling, NSW. **Right:** Michael McDougal (Elder), Brownie Junior (Elder) and Dee Murphy (Yarrawarra Aboriginal Corporation). Photo Libby Sterling.

Aboriginal stone fish traps around Arrawarra Headland on the North Coast of NSW, are coming back into use for traditional harvesting. This is the culmination of long-standing plans of the areas traditional owners, particularly the Garby Elders from the Gumbaynggirr Nation.

Arrawarra headland is situated within the Solitary Island Marine Park and recent changes to the marine reserve zoning has provided for traditional use and research at the site. Traditional collection methods, including the fish trap, hand collection, hand spear and line fishing will be used, coinciding with tidal and moon phases. Members of the Garby Elders and Yarrawarra Aboriginal Corporation will supervise the use of the stone traps to catch fish, whilst molluscs like turban shells (googoombul), will be harvested from around the headland. The traps are baited at particular times of the year to coincide with fish movements up and down the coast, and in concert with particular natural events such as the flowering of local plant species. Woven nets are used to capture fish as the tide recedes.

The reopening of the fish traps has become the focus of a sustainable resource use project between the traditional owners, the University of New England, the Marine Park Authority with input and support from the Northern Rivers Catchment Management Authority, and Coffs Harbour City Council. This project, to be carried out over three years, will combine traditional harvesting, scientific research and cross-cultural education of both Aboriginal and non-Aboriginal people, from primary school to university level and include the general community. The sustainability of harvesting practices will be assessed with local Aboriginal trainees learning to use modern scientific monitoring methods. This research will be used to produce educational fact





'Being there' at Wonga Wetlands — educating through experience



sheets as well as a website and film documentaries for general distribution of the information gathered. The Project is being coordinated by Associate Professor Stephan Smith (UNE) who is based at the National Marine Science Centre in Coffs Harbour.

The Garby Elders want to be able to pass on their traditional knowledge in a practical way and this project enables them to do this within a framework that brings together traditional harvesting using longstanding local Koori knowledge (times, tides, moon phases), and modern scientific methods to look at monitoring sustainable resource use. It is envisaged that these activities will lead to increased education for both Aboriginal and non-Aboriginal people, and provide future opportunities for younger Aboriginal people. It will also provide a window into how sustainable resource use was carried out by the original inhabitants. ■

For further information

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As a classroom teacher I always believed that you learn and understand best by "being there". Consequently, throughout my teaching career, I have been chided by colleagues for teaching somewhere else, rather than in a classroom. The opportunity to set up and run The Aquatic Environment Education Centre at Wonga Wetlands means that all the school, university, TAFE and community students I see are "there", and so I believe that Wonga Wetlands is the perfect opportunity for students to gain knowledge first hand and be in a position to adopt that knowledge if appropriate.

Albury's "Waterview" Wastewater Treatment Facility was established in 1998 and produces approx 10 megalitres of tertiary treated reclaimed water per day. This water does not go back to the River Murray but is used for 245 hectares of irrigated treelots and pasture. Wonga Wetlands was created at the same time as "Waterview" and involved the resumption of several riverfront properties. Approximately 80 hectares of this land was surrounded by the construction of a 1 in 20 year flood levee bank, and the enclosure was divided by further levees into seven unequal (in both size and topography) lagoons. It is into these lagoons that the reclaimed water flows when it is not needed by the trees and pasture. Surrounding the constructed lagoons are two significant anabranches/billabongs of the River Murray.

*Aerial view of the
Wonga Wetlands.*

Above: Ricki Cain Junior (Elder). Photo Libby Sterling.



Top left: Waterview Water Treatment Works.

Bottom left: Wonga Wetlands Lagoons.

Top right: St John's, Chiltern Kindergarten, bug hunting

Bottom right: Wodonga West Primary, Grade 2, bird watchers.

Photos Mike Copland.

Wonga Wetlands has been operating for eight years and has proved to be a model of form and function! The lagoons fill in winter and spring, and steadily dry out in summer and autumn, thus replicating the natural river regime that existed before downstream irrigation demands. Add to this the presence of river red gums in large numbers, 153 plus species of birds that have turned up to take advantage of the newly-formed lagoons, and the commitment of Albury City Council to the venture, and you have the ideal situation in which to establish an "education/interpretive centre".

With the backing of La Trobe University, Charles Sturt University and the Murray Darling Freshwater Research Centre, the Aquatic Environment Education Centre was established in donated, and completely refurbished buildings. Not only did Albury City restore the buildings, but fully resourced the Centre so that all sectors of the educational and wider community could immediately take advantage of Wonga Wetlands and its offerings. The addition of a Visitors' Centre with displays and audio visual presentations in a restored 1890s farm cottage, and a Working Campsite by the local Wiradjuri people last year, have added to the knowledge-gaining opportunities at Wonga Wetlands.

On virtually every day there are individuals and groups visiting on a casual basis just to see the lagoons, the birds and to go for "a walk" and a picnic. Groups such as the Field Naturalists,

WIRES, Probus, Lions and Rotary often have meetings in the Education Centre. On a daily basis there are groups of students from both Victoria and New South Wales, ranging from kindergarten to Year 12, working/observing in and around the wetlands and using the Aquatic Environment Education Centre and its resources as a base. They might be completing a Higher School Certificate unit on ecosystems, observing birds and bugs, taking photographs or sketching the trees and lagoons. In the first three years of operation (2003–05), more than 11,000 students visited and worked at Wonga Wetlands. Student groups visiting The Aquatic Environment Education Centre are fully resourced ranging from binoculars and laptop computers in the field to microscopes, DVDs and laboratory equipment back in the classroom.

The future for The Aquatic Environment Education Centre at Wonga Wetlands is bright as more and more educational and community groups discover them. Albury City Council can rightfully be proud of its initiatives in building a state-of-the-art water treatment works, an irrigation scheme and a wetlands complex to deal with the reclaimed water and The Aquatic Environment Education Centre and Visitor's Centre to make the community aware of a sustainable way of dealing with urban wastewater and to allow it access to a series of freshwater, floodplain and riparian ecosystems where knowledge and understanding are there for the taking. ■

For further information

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What has art got to do with natural resources governance and planning?

How much would a **poem, play, song, cartoon** or **photograph** really influence the everyday decisions made by people like us in our jobs, or by others sitting in offices throughout Australia, deciding on funding priorities for Natural Heritage Trust investment, or drafting legislation for water resources planning?

Perhaps very little.

We're all rational, realistic, impartial, technical people, nurtured in a scientific tradition of logic and reason. What use is a poem to us in a daily routine? Drama is all very well for the weekend, but there are more important things to spend working hours on. Poems and painting are great for people with sarongs and goatees, but there's **real work to be done**. That long list of never ending tasks!

But should this be so?

And are we all so rational, logical, reasonable and sensible anyway? Or do we suffer our own share of human-kind's foibles, like fear, insecurity and plain not-knowing, without even mentioning greed, jealousy and power-hunger? And do we perhaps paper over these sweaty realities with a rational veneer, using professional language, jargon and weasel-words?

Well I don't know, and who would want to generalise? But what I do think, is that these things need to be 'explored', 'elicited', 'surfaced',

'unpacked' and generally thrown on the table like dead cats for all to see, to smell, to get splattered by, and maybe even to talk about. Only then can there be more truth in our communication with each other, and more hope for real, shared benefit from our collective efforts. And it probably won't be done from within the rules, using the prevailing 'modus operandi'. A *'Committee to Explore, Assess, Evaluate and Report on the Apparent Denial of the Existence of Deep Human Behaviours under a Veneer of Rationality'*, may not be the 'optimum approach', even if it were to be funded in the next budget. It would be like the committee established to investigate the problem of ever-accumulating red tape in bureaucracies.

So how are these things to be brought to our board-rooms for us to address more openly in our discussions and decisions?

Well, we think it can be done with **art**. And not with art that sits outside the power arenas of modern decision-making. Not with art in galleries, exhibitions and anthologies of poetry that speak to a minority. But with art that sits alongside executives at meetings, and that finds its way right in amongst the thickest, dirtiest and most rational of workshops, conferences and steering committees. This art needs to rear its irksome head between PowerPoint presentations, after opening remarks and before reports from

POETRY by Vol Norris

Photo Angus Emmott

Slivers of reality (excerpt)

I cannot know your reality.
But a mere sliver of it,
a chink in the door to your world,
is all I need to know it is there.
Let us layer these slivers upon each other
into a realm of sharing,
reach deep for the darkest,
or burst forth with the brightest;
but dark or light,
let the slivers be real to us each.
Let our hearts have the courage
to bare themselves,
and our shared support
be a moss-bed of growing
to nourish our learning.
Let not the soundproof tangle thicken between us.



the accountant. It needs to find its way into our plans, strategies, minutes and agendas.

This is perhaps an ambitious goal, but a few of us have started on a journey into this interesting territory, and if any of you are of like mind and are keen to join us, in whatever capacity, then we'd be delighted to have your company. Nor do we think it's a new idea, or a lonely crusade. We're sure there are others doing the same thing, and we're certain we'll bump into them along the way and share stories, perhaps even travel together for a while. Maybe you know of a group like this already. If you do, we'd love to hear about it.

We like the idea of this experiment. We think it might bring a smile to your face, but we also hope it might occasionally make you stop and think, where you might otherwise have hurried on to the next important task. The only qualification you may want, to be part of this journey, is a desire to see more openness and honesty in our communication about the things we think about and do for a living, through the use of art in any form whatsoever.

That's a broad brush, so there are many pathways we could explore. We are, so far, a loose e-mail network of interested people, sharing

insights or points of view in the form of poems, photographs, stories or metaphors. There are as yet no cartoonists among us, but there may be some aspiring playwrights, and we are open to all future possibilities. Opera and ballet productions may be some years off, and would anyway be difficult to squeeze into the average annual report or board meeting.

Some of us work in natural resources management and related areas (like Indigenous land management) so our attention strays to those issues, but we don't think it needs to stop there. In a world where we westerners are becoming belatedly aware that all things are connected, there's not a lot that we wouldn't find relevant.

We call ourselves the ART Network. ART stands for many things... so many, in fact, that we haven't been able to choose among them, and we settled instead for a page full of equally applicable acronyms (see below).

If you like this idea too, and would like to participate, contribute or even just listen in, we'd be delighted to have the pleasure of your company. Contact Vol Norris on robynandvol@bigpond.com. All welcome. The more the better. ■

For further information

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*All photos on these pages
Angus Emmott.*

The ART Network

Seeking openness, honesty and shared learning through the use of ART in our working lives by using poetry, story, song, drama, drawing, painting, cartoons, photography, video.

- Discussing the undiscussable.
- Sharing ideas and realities that are not well-served by conventional workplace communication.
- Integrating art as a means of communication in our work places and work lives.

Actual Retail Therapy. About Revealing Truth. Advocating Realism Together. Achieving Real Thinking. Amicably Reflecting for Training. Advocating Real Transitions. Affirmations, Respect and Trust. Aiming for Real Thoughts. Artifacts (the past), Roses (the present) and Tea-leaves (the future).



LEB CAC — getting the attention of your constituents

The Lake Eyre Basin Community Advisory Committee (LEB CAC) advises government ministers, on behalf of the Basin community, about water and other natural resource issues in the Lake Eyre Basin. In order to do this, the CAC regularly seeks feedback from a network of land and water management groups in the Basin, but it can be a challenge attracting the attention of these groups, who are constantly bombarded with all sorts of requests for feedback. Sometimes a Haiku poem can help. They're short and pithy.



Your Basin concerns
We pass on to Ministers:
They think and respond.



Your Basin concerns
We pass on to Ministers:
And some things may change.



These images are about the importance of biodiversity. The natural environment is the controlling influence on everything we do, particularly in my part of the world.

We are embedded in natural systems that provide all our opportunities and resources, as well as some of our constraints.

The flood photo is the main road into town. Water helps to grow grass and beef, but it can also be isolating.



Tailoring the Rapid Appraisal of Riparian Condition to your region

Assessing riparian areas in the Mid North of South Australia will now be much simpler and accurate, thanks to some modifications to the Rapid Appraisal of Riparian Condition (RARC) method. Developed by Jansen et al. (2004), the RARC is designed to assess the ecological health of riparian areas using a range of indicators. The RARC index is made up of five sub-indices, each with several indicators. This includes; Habitat continuity and extent (HABITAT), Vegetation cover and structural complexity (COVER), Dominance of natives versus exotics (NATIVES), Standing dead trees, hollows, fallen logs and leaf litter (DEBRIS), and Indicative features such as native canopy and understorey regeneration and the presence of native tussock grasses and reeds (FEATURES).

As part of a Land, Water & Wool project titled, *Optimising wool production and profitability in Mid North South Australian riparian areas*, the RARC method was trialled on ephemeral creek systems around the Burra region. Many of the wool properties in this area are in a transition zone between sown pastures, cropping land, native grass pastures, and pastoral chenopod

dominated lands. Summers are hot and dry, channels are incised and riparian paddocks or floodplain paddocks are large and potentially productive but also degraded. The average rainfall is about 330 millimetres and many of the creek systems do not have permanent water.

The RARC assessments were aimed at providing a snapshot of the current condition and health of riparian habitats in the Burra region and to test the RARC methodology and its suitability in low rainfall areas. More than 40 sites in the Burra region were surveyed and these varied significantly, including, grazed pastoral land and ungrazed Conservation Park land, on-farm fenced off sites and grazed floodplain country. (A report on the assessments is available on the websites listed opposite.)

However, as the sites were being assessed it soon became clear that modifications to the RARC method were needed to suit this region due to the lack of tree cover. This is because the RARC index is designed for riparian zones that are naturally dominated by trees, with at least 60% of canopy cover. Along many of the assessed



Healthy riparian area with a diversity of vegetation providing habitat for both aquatic and terrestrial animals, Hopkins Creek, South Australia. Photo Kerri Muller.





Photo 1. A site in good condition along the Hopkins Creek near Burra, South Australia (RARC score = 42.25; note continuous canopy of native trees, native shrub understorey, reeds and regeneration of canopy trees). Photo Kerri Muller.

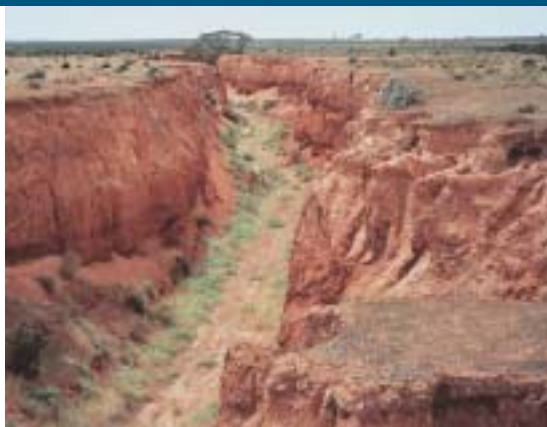


Photo 2. A site in very poor condition in the mid north of South Australia (RARC score = 13.50; note lack of canopy cover, little shrub cover and small amounts of leaf litter). Photo Phil Price.

sites there was little (less than 30%) or no canopy cover, which immediately reduced the potential total condition score. The lack of canopy cover also influenced the potential score for many of the other indicators such as canopy and native canopy, standing dead trees and native canopy species regeneration.

Scientists and historians have long argued as to whether trees were ever a natural feature of the hills and watercourses in the Burra region. Many landholders in the area state that trees have never been a feature along the creek banks due to the low annual average rainfall and the ephemeral nature of the creeks. However it is difficult to know whether there would have been trees present along the riparian areas. The presence of canopy was variable with some sites having 100% cover but generally these sites had some permanent creek water and higher rainfall.

During this study it was necessary to modify several of the indicators, which included reducing the heights of the vegetation cover layers, and expanding the leaf litter indicator to include other plant material (such as grass and shrub litter). After the Burra study was completed, in consultation with the developer, Amy Jansen and other local vegetation experts, further modifications were made to the scoring system for a generalised riparian area in the Mid North of South Australia. Along riparian zones which naturally lack any tree cover, the scoring system will need to be further adjusted. Ways to adapt the method to suit different environments are suggested in the Technical Guideline that is now available from CanPrint Communications on 1800 776 616 or via www.landwaterwool.gov.au or www.rivers.gov.au.

In summary, when using the RARC index in a region it is important to:

- survey a number of relatively pristine sites in the region to provide a benchmark for the scoring system.
- check the scores for each indicator to ensure that all indicators are present, and that the maximum score can be achieved for each indicator, for example, along ephemeral creek systems, reeds may not be a suitable indicator due to a lack of permanent water.
- take a photograph at each site to provide a visual reference and comparison between sites.
- Train local natural resource and land management personnel to use the RARC method. The one-day training involves a formal presentation followed by practical field assessments using the method. It is hoped this training will further extend application of the RARC and highlight the tool as a useful method which can be easily modified for use in specific situations. ■

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Reference

Jansen, A., Robertson, A., Thompson, L. & Wilson, A. 2004, 'Development and application of a method for the rapid appraisal of riparian condition', *River Management Technical Guideline, No. 4 and No. 4A*, Land & Water Australia, Canberra.

This project is funded by Australian Wool Innovation Limited and Land & Water Australia through the Rivers and Water Quality Sub-program of the Land, Water & Wool initiative and the South Australian Murray-Darling Basin Natural Resources Management Board.

The RARC Technical Guideline for the Mid North of South Australia is now available, as well as a report on using the RARC survey method in the Burra region. Contact CanPrint Communications for your copy of the Guideline (quote product code PX061155) or visit the website www.landwaterwool.gov.au or www.rivers.gov.au

Sense of Place — Connections to the Land

The Land has Spirit. Indigenous Australians have known this for millennia. Theirs has been a close association with the land, seeing, smelling, hearing, tasting, touching and thinking about it. For me, my every-day existence is entwined with the land and I cannot help but to be powerfully affected by its spirit. It defines my sense of place, my belongings in life. I belong to the land, it doesn't belong to me. I am a steward of this land and I have a fierce passion for, and a sense of responsibility towards it.

This spiritual connection underpins my actions as a farmer and drives my natural resource management (NRM) actions and activities. My passion drives my thirst for knowledge, my desire to intimately know the land. In turn, my knowledge enhances my sense of place and connectedness. Not surprisingly, I have found this passion for the land, this strong sense of place, is shared by other farmers, and they agree that this deeply personal aspect of our lives must be talked about. And it hasn't just been women, but older men, those who have been on the land for years, those guys who have weathered everything nature and society is capable of delivering.

Too often I have heard that "farmer's attitude to the land must change". Why should anyone want to change the connectedness and responsibility felt by farmers? What is needed is for the passion to be shared, for the pooling of skills and resources to enable us to move forward. We need growth together, not enforced change in the form of regulation and social stigmas.

So what does this tell us about NRM?

Social research tells us that for NRM to be successful, farmers need recognition, ongoing support and trust. I would take this notion further and suggest that recognition needs to be not only for the works done on the land, which represents one aspect of our sense of place, but a deeper recognition of the meaning of sense of place. Recognition, support and trust are not one way. They are things that happen between people. They require each person to have respect and an understanding of the other.

We all have our own personal Sense of Place.

Each individual's place, and their sense of place, is different. If we are going to be successful in our cooperative efforts to repair and enhance Australia's natural environment it is imperative that we recognise the importance and the meaning of each person's place to them, and understand and respect differences.

People can have different connections to the same place. This is often the case with an NRM officer and a farmer. For the officer the farm is a **place of interest**, a place where the community's, and more specifically the regional Catchment Management Authority's goals and aspirations can be met. For the farmer the land is very much a **place of identity**, and changes imposed from the outside can be difficult to make, particularly if they do not respect the farmer's sense of place and vision. The implications of this difference in perception of the same place can be very profound.

For further information

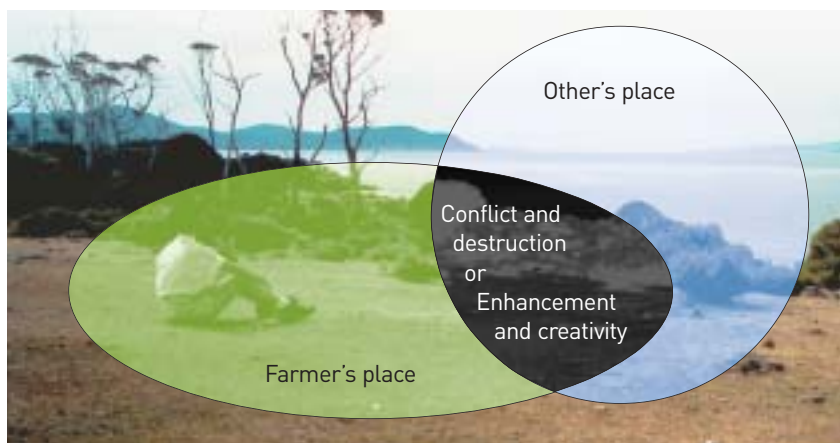
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*All photos are from 'Bangor',
Tom and Cynthia Dunbabin's
beautiful home in Tasmania.*





The diagram above shows that the area of overlap can be a place of conflict and destruction, or it can be a place of enhancement and **creativity**.

- To develop creative solutions to NRM issues it is essential that we have **respect** for each other. Each person is valuable and their “sense of place” is very important.
- **Expect diversity**; not only expect it, but welcome it! **Encourage new players**. The more diverse the group of people the more knowledge, ideas, experience and energy available to harness. All knowledge is important. People on the land have a relationship of knowledge with the land, and this is equally valuable when it comes to managing the environment as is scientific knowledge.
- Be prepared to **learn**, learning can be exciting and **transcending your boundaries** can also be exciting. Remember, there is only a small step between fear and excitement!
- Always **focus on what you want** and not on what you don't want. What you concentrate on is what you will get!
- We must establish **meaningful dialogue** and processes that are **inclusive**. Jargon can be exclusive and creates power hierarchies.
- Processes must be **based on solutions**. It is the goal that is important. Don't get stuck on the steps.
- Processes that make people **feel good** are essential. They nurture **growing involvement** and generate energy.
- Enhance relationships within groups. **Partnerships** based on respect, common interest, support and encouragement can be very creative.
- **Celebrate** successes. Notice what has been achieved, not just what needs to be done.
- **Security** and **economic viability** of all involved is fundamental. Without a sound economic base farmers are unable to carry out the works required, no more than NRM officers are able to work without wages!

In summary, it is my belief that we have to talk about and recognise peoples' sense of place in order to achieve the environmental outcomes we desire and that are so urgently needed. ■

Practices that respect and enhance people's spirit and sense of place produce outcomes that respect and enhance the environment.



Corangamite Knowledge Base — a new knowledge management tool



The Corangamite Catchment Management Authority (CMA) is on the verge of completing a Research, Development and Investigation (R,D&I) Strategy and also launching an on-line knowledge management tool called the "Corangamite Knowledge Base". The strategy is expected to be completed by July 2006 and the knowledge base is expected to be linked to the Corangamite CMA website by May 2006. <http://www.ccma.vic.gov.au/>

The Corangamite CMA region is in south-west Victoria and covers 13,340 square kilometres. The region has a diverse range of landscapes and, accordingly, a diverse range of primary, secondary and service industries. The region also includes substantial urban populations in Ballarat and Geelong and has many coastal townships located along the Great Ocean Road. The Corangamite CMA is committed to working with all members of the community to improve land, river and biodiversity health.

In recent years the Corangamite CMA has recognised that there has been insufficient strategic direction for all natural resource management focused R,D&I projects at the regional scale. Although funding and undertaking R,D&I is not necessarily a core function of the Corangamite CMA, the CMA is in a unique position to coordinate the strategic direction for R,D&I at a regional level. Accordingly an R,D&I Strategy is currently being developed that aims to encourage collaboration, innovation and strategic investment from a range of participants in R,D&I projects that

will contribute to achieving the goals and targets in the Corangamite Regional Catchment Strategy (RCS) and its supporting strategies/plans.

The R,D&I Strategy states key research questions that the Corangamite CMA needs answered over the next five years. The strategy will be implemented through the development of an annual priorities document. The annual priorities document will identify priority project areas that will contribute to answering the key research questions in the strategy. Alongside each priority project area, possible investors and partners will be identified along with the regional catchment goals and targets that the project aims to address.

To identify the key research questions in the R,D&I Strategy and the subsequent priority project areas the Corangamite CMA needs to know what R,D&I has already been done. Having a means to quickly and easily analyse existing knowledge is crucial for ensuring that duplication is avoided and that existing knowledge is actually used to guide future R,D&I projects. As a result the Corangamite CMA decided to develop the "Corangamite Knowledge Base".

The Corangamite Knowledge Base is a web-based interface that currently holds over 2000 entries of R,D&I knowledge related to catchment management in south-west Victoria (see web entry point at left). The Corangamite Knowledge Base allows the user to search by topic, locality or theme from an extensive collection of research project descriptions, research publications and technical reports. The entries include the title, author, date of publication, document types and a brief abstract. Some of the entries also include direct links to the full document.

The potential uses of the Corangamite Knowledge Base are numerous. However, it will only live up to its potential if the breadth and quality of the data is adequately maintained. The Corangamite CMA is committed to the maintenance of the database and encourages the community to contribute new entries on-line. We are keen to hear your comments on the knowledge base and also the development of the strategy. Visit the Corangamite CMA website and follow the links to the Corangamite Knowledge Base to find out more. ■

This is the link to the Corangamite database.
<http://www.aanro.net/ccma/page/search.htm>
or <http://www.aanro.net>
then select custom built products, then select Corangamite.

For further information

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Education and policy — together at last!

Innovation and creative thinking is finding its way into the public service! In Victoria, river health decision makers responsible for ensuring environmental flows have collaborated with Waterwatch Victoria to produce an educational game that they hope will stimulate discussion, disperse popular myths and support the better understanding of flow requirements of Australian rivers.

The 'Run of the River' board game was launched in early 2006 and will encourage students and communities to discover and explore the complexities of balancing the social, economic and environmental values of a river's water flow. Environmental water allocation is the pointy end of policy, where requirements for maintaining river health meet consumptive use realities and the tensions in some communities have got personal. As this area hots up, it presents an important gap for water educators to fill. While there is a range of resources focused on either the integrated nature of river health or the variety of consumptive water use, there is a real lack of educational resources helping learners explore the overlap and potential conflict of the different social, economic and environmental values of rivers.

With complex issues to explore, it became obvious that our target audience was the upper secondary school 15–18 year olds. This filled another gap in water education resources, as this age group tend to be overlooked for the larger reach of the Years 5–9 group with their bigger classes and more flexible curriculum.

To connect with this Internet-raised generation, a web-based game was the obvious choice, but it became clear early that the funding we had available was not going to have the level of sophistication to command their attention. The medium changed to board game which illustrates a catchment from headwaters to estuary/terminal lake and the range of uses and management actions which occur in catchments.

Two types of question cards examine the ecological and hydrological values and needs of river flow, and the different interactions, values and affects (positive and negative) that humans have on flow. The game was developed to motivate students using a range of elements such



as varying the levels of complexity and climate scenarios, the opportunity to experience values interaction, tradeoffs and negotiation and with the flexibility to adapt to different audiences and age groups.

Facilitating the rollout of the game to schools via regional teacher Professional Development opportunities is seen as essential. This way the game's purpose and intent is clearly communicated, but also connects teachers with professionals within local Water Authorities and Catchment Management Authorities to ensure the regional relevance of the game by connecting to as many real life scenarios as possible, and as

New publications

an opportunity for teachers to clarify the roles of these different organisations in water resource management.

While it is early days in terms of evaluating the impact on this resource on community understanding of these complex issues, our anecdotal evidence has found that there is a need across Australia and internationally for educational resources dealing with the social issues surrounding water allocation and maintenance of the values of water assets. Following the roll out of the game, we are including an evaluation on success and learning's from a number of angles, particularly on how the game has filled this educational niche and whether it has prompted further connections between schools/teachers/students and water resource management organisations, so watch this space!

Developing curriculum material in tandem with policy has been a particularly interesting experience which has shown that environmental water education needs to begin evolving on a number of levels to maintain it's relevance and effectiveness. For many years, the water industry has been moving beyond 'taps and toilets' education about water quality, cycles and use, to exploring the connections between environmental, social and economic values and their implications for management. This is essential for programs to develop environmental education experiences that progress toward communities appreciating the values of rivers, understanding their dependency on healthy rivers and being confident and capable of actively participating in decision making. ■

For further information

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Riparian Plants of the Avon Catchment
a field guide

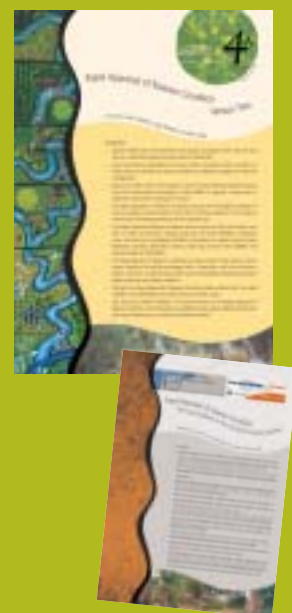
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Department of Environment
Natural Heritage Trust
AVON

RARC guidelines

The Rapid Appraisal of Riparian Condition (RARC) is constantly being modified. The latest, 'Version 4A', has a simplified scoring system and is available in hard copy and on the www.rivers.gov.au website. We are also adapting it for regions, with the new RARC for the mid-north of South Australia demonstrating how the technique can be adapted to take account of local riparian characteristics. The next edition of *RipRap* will feature the new Tropical RARC, so stay in touch for more details!



For a hard copy, contact CanPrint
Communications on freecall 1800 776 616 or
access from the website www.rivers.gov.au

Nyoongar stories of country

Through traditions, Nyoongar creation stories have been passed down through the Nannup family. Noel Nannup first heard the story in 1956 around the campfire from his Uncle Thomas. Noel is now the custodian giving him the right to share these stories. In collaboration with Noel Nannup, the Swan Catchment Council have produced audio CD-ROMs, narrated by Noel that tell Nyoongar stories of country. These stories have never been documented and will endeavour to be a major contributor to a better understanding of Nyoongar people of the past and their intimate relationship with the land.

The Carers of Everything



This story explains the creation of Nyoongar country, which connects Nyoongar people of the south-west of Western Australia to country. It begins at a time when the Earth was flat and featureless, there was nothing on it at all, there was almost total darkness. The sky was a thick dark mass that sat on the ground, there was no wind, and it was freezing cold.

As the spirits wandered they suddenly realised that they were all going to become real, while they did not know where, or when, or how, or why they begun to communicate with each other. They sorted themselves into different groups, there were tree spirits, plant spirits, bird spirits, animal spirits and people spirits.

When the sea level rose



"When the sea level rose" is the story of Nyingarn the echidna and Kaarda the goanna, who were given the special role of representing the spirit of those who passed on and the story of Mamong the whale and Keeler the dolphin and the special role they were given in country.

The main focus of this story centres around when the sea level rose and trapped the spirits of children underneath the sea and the role that Mamong and Keeler played to help bring the children back to the land.

If you would like to order a copy of "The Carers of Everything" or "When the sea level rose" CD-ROMs, please contact the Swan Catchment Council on telephone 08 9374 3333.

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The Swan Catchment Council is a community-led regional group with responsibility for coordinating and delivering natural resource management in the Swan region of Western Australia. As one of 56 groups from around Australia, the Council is helping to achieve a nation-wide approach to management and restoration of our environment. Major activities of the Council are:

- Implementing the *Swan Region Strategy for Natural Resource Management* — A regional strategy guiding environmental activity in the Swan region.
- Managing and administering the distribution of the Australian Government's Natural Heritage Trust funding in the Swan region.
- Administering the Swan Alcoa Landcare Program — funding for community groups involved in on-ground revegetation and rehabilitation projects.
- Coordinating government and corporate investment.

For further information

Swan Catchment Council

Tel: 08 9374 3333

Web: www.wrc.gov.au/swanavon



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