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Land & Water Australia

RIPRaP

RIVER AND RIPARIAN LANDS MANAGEMENT NEWSLETTER
Edition 33, 2008

Community learning

"Everything changes" observed the ancient Greek philosopher Heraclitus. It was he who observed that a man cannot step twice into the same river — for he is not quite the same man, nor is it quite the same river. This principle applies to everything around us, as we, and the environment and communities in which we live, are always changing. One of the ways we change is through our interactions with those around us. We learn from each other by listening, sharing ideas and experiencing situations together. Nowhere is this more important than in natural resource management, where we are learning that by bringing different communities together we can develop joint solutions and approaches to some of the challenges we currently face.

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RIParian lands: WHERE LAND AND WATER MEET

From the Editor

Welcome to another *RipRap*, an edition that is all about the importance of creating environments in which we can learn from each other. I chose this theme of 'community learning' because I have learnt so much during my time at Land & Water Australia about the importance of listening to, learning from, and investing in people. We are all knowledgeable about the world in which we live, and when we provide opportunities to share that knowledge with others we maximise our efforts to achieve the goals we set ourselves and our communities. The articles in this edition all relate to this theme, and show different ways of engaging with, and learning from communities.

This will be the last edition of *RipRap*. I feel fortunate to have been given the opportunity to edit and manage this newsletter for nearly ten years! The popularity of *RipRap* has given me, and all those who have written articles, the satisfaction of knowing that the river-related research and practice we are engaging in has been communicated to people all over Australia. LWA plans to develop a new magazine featuring articles from across the whole portfolio of research, and you will be given the opportunity to subscribe to this publication later on in the year. On a personal note, thank you very much for your support, it has been a pleasure working with you all as we strive to protect and restore our river and riparian environments. ■

Community learning

By Siwan Lovett and Judy Lambert

Community learning and development is about supporting people in communities to identify and understand issues that are important to them, and providing them with opportunities to take action on those issues. In natural resource management (NRM), we have tended to seek solutions to problems by looking for experts outside local communities to provide answers. However, the more we learn about NRM, the more we realise that the inter-connectedness of social, cultural and biophysical factors means that we need to draw not only on 'expert' disciplinary skills, but also on the experience and knowledge held within local communities. We are learning that when science is brought together with 'real life' experience, people are able to develop shared understandings about how this knowledge can have meaning for them and the problems they are trying to address. This is not a one way process, researchers are also finding their work significantly enriched by learning from people's experiential knowledge and gaining alternative perspectives on the work they are undertaking.

Learning communities create environments that are conducive to learning. Learning communities help people grow, by providing access to knowledge and skills, and increasing their confidence and competence to participate actively in their communities. Individuals who engage with their communities to learn and help others learn, and organisations collaborating to facilitate learning, contribute to stronger, more capable, more aware and more sustainable communities.

This edition of *RipRap* features articles from across the Land & Water Australia (LWA) portfolio that support researchers working with a range of different 'communities' to improve NRM outcomes. Many of these researchers are using 'participatory action research' and 'action learning' — the processes of learning by doing, to engage with, and learn from, the people they are working with. What these articles will demonstrate is that community learning has become an integral part of the process, rather than something that happens after the experimental work is done.

While there remains systemic challenges to undertaking collaborative research, much from the social sciences has contributed to these changes. That there are different ways of 'knowing', and that each has its place in NRM, is now widely accepted. Individual knowledge based on personal life experiences, local knowledge derived from shared family or community history, specialist knowledge based on technical learning, and strategic knowledge of the type that underpins policy and program development all contribute to the holistic knowledge that makes for strong and enduring decisions. There is also the 'knowledge' derived through our sensory experiences, with art, drama, song and writing becoming valued as ways we 'know' our world.

Just as profit and proof of the relevance of good science to a particular situation are important to successful community learning, so too are the people, their perspectives and values, and the promise they offer each other and their shared outcomes. Community learning is about sharing information, generating knowledge and developing new skills. It is as much a social science as it is a natural science, and it is the recognition and acceptance of this that underpins many of the more successful community learning projects. ■

The Board and staff of Land & Water Australia are deeply saddened by the passing of Professor Peter Cullen. Professor Cullen was a great Australian who combined his scientific expertise and knowledge with a unique ability to communicate the importance of saving our river systems.

He was a highly valued Director of Land & Water Australia over the last six years. His warmth and good humour, his broad management experience and his unwavering commitment to an improved Australian environment will be greatly missed by the Board, our staff and our many partners.

We extend our deep sympathy to Peter's family.

The Watershed Torbay experience: community, collaboration and celebration

Watershed Torbay was established in 2001 as a national demonstration project to undertake whole of catchment waterways restoration. Funded by LWA through the former National Rivers Consortium, the aim was to further develop and test approaches to waterways management at a whole catchment, rather than river reach scale, and to share the learnings and successes throughout Australia. In particular, Watershed Torbay demonstrated what it takes to achieve the scale of change required — at a community and technical level — to address waterways at a whole catchment scale. After five years of research, planning and community involvement, along with steady but cautious progress with on-ground actions, the Watershed Torbay project is now complete. This new *Technical Guideline* summarises the project's successes and learnings so that other groups across Australia can benefit from the knowledge and experience gained through Watershed Torbay.

For copies go to <www.rivers.gov.au> or order from CanPrint 1800 776 616, product code PN20623.

Summary of key learnings from the project

Managing change

- Have a philosophy of change and use a change framework working on all elements simultaneously — pressure, creating vision, capacity, and first steps.
- Build reflection into projects. Adaptive management is taking feedback that comes from reflecting and monitoring, responding with problem solving, and reporting back on action taken. Dedicate time from the start of the project to building relationships and trust between all involved.
- Anticipate and plan management approaches to dealing with conflict between the interests of different players.
- Use planning processes that integrate research and local knowledge around what will have the 'best' local impact. Make sure targets are achievable, effective and acceptable.
- Use social marketing and social survey techniques to understand the local community and target behaviour change strategies.
- Use a wide range of extension and communication methods to enable a diversity of people and organisations to get involved.

Government agencies

- Be flexible in your style and in the pace of work — slow down, take time to listen and deal with concerns.
- Where possible use local agency representatives as they are best placed to engage in local projects.
- Be explicit about the agenda of different partners in the project and what each can and can't do.
- Develop an understanding of the community, its Indigenous and European history, values, leaders, etc. and the impact of that history on your project.
- Acknowledge community involvement is time-consuming, costly, and involves skill sets not broadly held in government. Resources need to be set aside to build agency capacity in order to accomplish community engagement successfully.

Researchers

- Edit technical/science reports in plain language using local examples.
- Develop science programs using a 'civic-science' approach that values and integrates local values, technical knowledge and research knowledge.
- Have a robust selection criteria and objectives for a research program.
- Fund social science as well as natural science.
- Require researchers to collaborate, share equipment, data and results.
- Foster researcher and community exchange and provide training to scientists on how to communicate their work simply.
- Use local researchers if possible, as they are better connected and more available.

Working with community

- Don't expect too much from community members, they are volunteers.
- Attract new people to groups for continuity. Make involvement fun!
- Give community members time to consider and discuss research and planning.
- Ensure that community expectations from project targets are realistic.
- Try to use one-to-one contact with landholders as it is the most effective extension approach.

Funding agencies

- Be prepared to provide resources so that an aware and active community can be created with knowledge about river systems, and people committed to driving and managing projects to get successful outcomes.
- Acknowledge good catchment management involves community engagement, planning, research and on-ground works, with significant investment required across all these areas.
- Acknowledge that strategic planning for investment is needed to set targets and drive resource condition change. Research information needs to be linked with community aspirational goals and objectives.

For further information

<www.torbay.scric.org>

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Photo courtesy Louise Duxbury.

Rivers legacy products

The National Riparian Lands R&D Program has come to an end, and while a few products are still available as hard copy, all are accessible on the website <www.rivers.gov.au> and... are on the Program's legacy CD.

Contact CanPrint on 1800 776 616 for a copy of the CD quoting product code EC061241.

Another program to have concluded is the National River Contaminants program which, early in 2008, produced a synthesis publication that brings together the key findings from the program. Hard copies of *Salt, Nutrient, Sediment and Interactions* are still available from CanPrint on 1800 776 616 (product code PK071328).

To download copies of the Rivers fact sheets, technical guidelines, earlier copies of *RipRap* and products from the also completed Land, Water & Wool program go to <www.rivers.gov.au> or <www.landwaterwool.gov.au>

Pathways to good practice in regional NRM governance

By Julie Davidson

Governance: what it is and why it's important in NRM

Governance is now a much used, but often misunderstood concept in NRM circles. It is therefore worth exploring its various meanings and its specific relevance to NRM.

The term 'governance' can mean different things in different contexts. In the corporate sphere, governance refers to the system used to direct the operations of corporate boards. It embraces concepts such as accountability and transparency, as well as issues of compliance with external regulations.

In the public sector, now strongly influenced by private sector management methods, governance can be interpreted as an attempt to increase the 'steering' (policy decisions) that governments do and reduce the amount of 'rowing' (service delivery).

In general terms, governance is broader than government and is more than the familiar parliamentary processes. It includes public, private and voluntary sectors, and refers to institutions, processes and instruments used in making policy decisions, planning, and implementing policy. Good governance combines ideas about how political and economic power should be distributed for efficient, open, accountable and audited administration, with liberal democratic political ideals that the legitimacy and authority of a governing body should be democratically derived. Governance can also be understood as coordination of interactions among private, public and voluntary sector enterprises and organisations through partnerships.

In this project we have defined governance as: the interactions among institutions, structures and processes, including input from stakeholders that affect the exercise of NRM powers, responsibilities and decisions.

In a climate of uncertainty, good governance gives systems greater flexibility, adaptability and intelligence — the qualities that they need to respond to risks and unexpected change.

Photo Roger Charlton.

Partner Reference Group and Research Team meeting in Albury.

New governing territory

Governance is especially relevant to environmental management. Many of the issues confronting Australia's natural resource managers — declining water quality and quantity, and adaptation to climate change — are extremely complex and novel. In part, this complexity reflects the high level of uncertainty about causes, impacts and solutions. It is also true that no single government, organisation or individual has the ability to solve many of these issues. Cooperation and collaboration amongst all those affected are required to effectively address many NRM issues. Having a diversity of information, knowledge and ideas improves the chances of identifying solutions. NRM problems are often cross jurisdictional and sometimes new structures and processes are required to coordinate the activities and decisions of different levels of government, sectors, regions, and property owners.

In a climate of uncertainty, good governance gives systems greater flexibility, adaptability and intelligence — the qualities that they need to respond to risks and unexpected change.

The project

The move in 2002 to a regional NRM delivery model led to this project being undertaken to assess the effectiveness of the changes to governance arrangements, and to develop a standard for good practice. A University of Tasmania/ Charles Sturt University research team did this research during 2006–2008.

A literature review was undertaken and an expert panel was used to identify a set of preliminary governance principles. These principles were refined through interviews and workshops with representatives from nine regions. This was done in parallel with an assessment of the operation of the NRM delivery model.

The project team regularly reported on activities to a Partner Reference Group through face-to-face meetings, teleconferences and bulletins. In turn, the partners tested and provided feedback on the research team's activities and outputs such as draft reports, governance principles and the governance standard.

The governance principles

The governance principles that have been developed are: legitimacy, transparency, accountability, inclusiveness, fairness, integration, capability and adaptability. They indicate the values that will make NRM governance "good". The principles provided a framework for assessing the quality of NRM governance, identifying aspects of governance for improvement, and developing the governance standard and assessment tool. The main elements are outlined in Table 1, on the following page.

Table 1: Main elements of NRM governance principles

Principles	Main elements
Legitimacy valid exercise of authority	• an organisation's valid authority to undertake its responsibilities: – conferred by democratically mandated means, and/or – earned through stakeholders' acceptance of that organisation's authority; • devolution of power to the lowest level at which it can be effectively exercised; • authority is exercised with integrity and commitment.
Transparency openness of decision-making processes	• visibility of decision-making processes; • clarity with which the reasoning behind decisions is communicated; • ready availability of, and access to, relevant information about the governance and performance of an organisation.
Accountability responsible organisational conduct	• allocation and acceptance of responsibility for decisions and actions; • the demonstration of how these responsibilities have been met.
Inclusiveness broad engagement of stakeholders	• availability of opportunities for stakeholders to participate in and influence decision-making processes and actions.
Fairness equitable and genuine engagement of stakeholders	• distribution of NRM responsibilities to individuals and organisations commensurate with their potential or obligation to assume them; • respect and attention given to stakeholders' views; • consistency and absence of personal bias in decision making; • consideration given in decision making to cost/benefit distribution.
Integration coordination among decision-making levels, and consistency across policy, planning and management instruments	• connection between, and coordination across, different levels of governance; • connection between, and coordination across, organisations at the same level of governance; • alignment of priorities, plans and activities across governance bodies.
Capability ability to effectively implement allocated responsibilities	• skills, leadership, experience, resources, knowledge, plans and systems that enable organisations and the individuals who work for them, to deliver on their responsibilities.
Adaptability ability to adapt to changing conditions, knowledge and performance	• incorporation of learning into decision making and implementation; • anticipation and management of threats, opportunities and associated risks; • systematic self-reflection on individual, organisational and system performance.

Key project outputs

Five outputs have been produced by this research, they are:

1. a standard for good NRM governance;
2. a governance assessment tool;
3. an assessment of the quality of NRM governance in nine NRM regions in south eastern Australia and of related state and national government agencies;
4. recommendations on aspects of regional NRM governance to target for improvement; and
5. a set of good practice guidelines.

These are elaborated in a series of reports available on the project website at <www.geol.utas.edu.au/geography/NRMGovernance/index.htm>

What is the status of NRM governance?

An overwhelming conclusion from interviews with project partners is that the regional model of NRM is generally sound and should be allowed time to fulfil its potential. As would be expected of a system that is in its infancy, some aspects of NRM governance are strong, while others require improvement. Some strengths of the regional organisations include high levels of personal integrity and commitment to regional delivery, effective management of probity matters, generally good communication, widespread and strong commitment to inclusive governance and fairness, and the high calibre of boards and staff.

Aspects where performance could be improved involve the mismatch between the responsibilities and powers devolved to regional organisations by governments; onerous reporting requirements; lack of clarity in roles, responsibilities and accountabilities among NRM bodies; inability to engage some stakeholder groups (such as Indigenous groups and urban constituencies); poor alignment of policies and sectors, and integration of strategic planning instruments; poorly developed knowledge management systems; and generally immature monitoring, evaluation and review systems.

Photo Roger Charlton.

Management implications

NRM governance will be strengthened when:

- NRM regions have greater autonomy to undertake their allocated responsibilities;
- regional organisations respect governments' legitimate roles in a multi-layer system;
- governments rationalise reporting requirements (some initiatives are already under way);
- there is greater clarity about responsibility for particular NRM activities;
- regional organisations improve engagement of marginalised stake-holders (such as Indigenous and 'care' groups) at the regional level;
- participation of regional representatives in higher-level decision processes is improved;
- NRM governing bodies institute formal procedures to explain investment decisions (for example, providing feedback to unsuccessful proponents);
- regional organisations track the distribution of the costs and benefits of investment decisions;
- governments genuinely embrace 'joined up' governance so that policies, plans and activities are aligned;
- regional organisations have more durable and flexible funding arrange-ments (there is some movement here);
- governments lead development and investment in improved knowledge management systems; and
- governments lead development of adaptive capacity addressing policy and institutional barriers to active adaptive management (intentional learning from management actions).

The project team is Julie Davidson, Allan Curtis, Elaine Stratford and Michael Lockwood. ■

For further information

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POLICY FACT SHEET 2

Managing flows for ephemeral streams

This fact sheet provides a brief summary of the importance of ephemeral streams and the need to ensure that ephemeral streams receive careful management, even during times of drought. While there is a common perception that biota within ephemeral streams are drought hardy, a large number of species require refuge in rock pools and water holes in order to recolonise streams during flow events.

This fact sheet is available from CanPrint on 1800 776 616, quoting product code PN20579 or from the Environmental Water Allocation R&D program website at <www.lwa.gov.au/ewa>

At a greater level of detail to this new fact sheet is Fran Sheldon's guideline on 'Quantifying the health of ephemeral rivers'. This includes a step by step process to assess ephemeral rivers, as well as supporting material and references to enable you to apply the method in your region. We hope to have the guideline available for download by the end of May. We will also have a limited number of hard copies, so if you are interested in getting a copy please send your name and address to carmel.ewing@lwa.gov.au

The engagement of Indigenous Australians in natural resource management — Overview of LWA research activities since 2000

By Tuppy McIntosh

Since 2000, LWA have spearheaded a rich portfolio of over 24 research projects focusing on the relationship between Indigenous Australians and their environment, as well as their current and future involvement with NRM. This research activity has fostered the development of strong relationships between Indigenous groups, scientists and other agencies — a prerequisite for effective NRM in any community. Late last year a synthesis report, authored by Alice Roughley and Susie Williams, captured these outcomes along with the knowledge generated by LWA's projects. The new report is organised around the following themes:

1. Values and methods for engaging Indigenous Australians in NRM and knowledge management.
2. The connection between land, water and the health of Aboriginal peoples.
3. The development of Indigenous livelihoods through NRM.
4. Implications for developing and implementing NRM policy in Indigenous Australia. ■

If you'd like to download a pdf copy of the report, please go to the Land & Water Australia website at <www.lwa.gov.au> and select the image thumbnail of *The Engagement of Indigenous Australians in Natural Resource Management: Key findings and outcomes from Land & Water Australia funded research and the broader literature*.

Key NRM principles supported from research profiled within the report:

- Indigenous Australians understand landscapes are integrally connected.
- NRM is more effective when driven by local people with a local agenda.
- NRM approaches are more appropriate when they build on existing capacities of the group and allow ongoing group learning and adaption.
- NRM investment should be targeted toward long term projects which create opportunities and employment for local people.
- Clear working agreements with communities that protect peoples' rights and interests in the data collected and the future management of knowledge are necessary in establishing confidence.
- An Indigenous traditional knowledge protocol that defines and respects Aboriginal and Torres Strait Islander intellectual property and associated intellectual property rights should be adopted to ensure high ethical standards.
- Intergenerational knowledge should be facilitated for long term impact.
- Resource materials and capacity building strategies are required for future self management.

For further information on Land & Water Australia's Indigenous portfolio of research

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A cultural and conservation economy for northern Australia

By Rosemary Hill

A landmark joint project between the Australian Conservation Foundation and Land & Water Australia investigated approaches for culturally and environmentally appropriate economies throughout communities in northern Australia. This was achieved through the active engagement of partners and stakeholders.

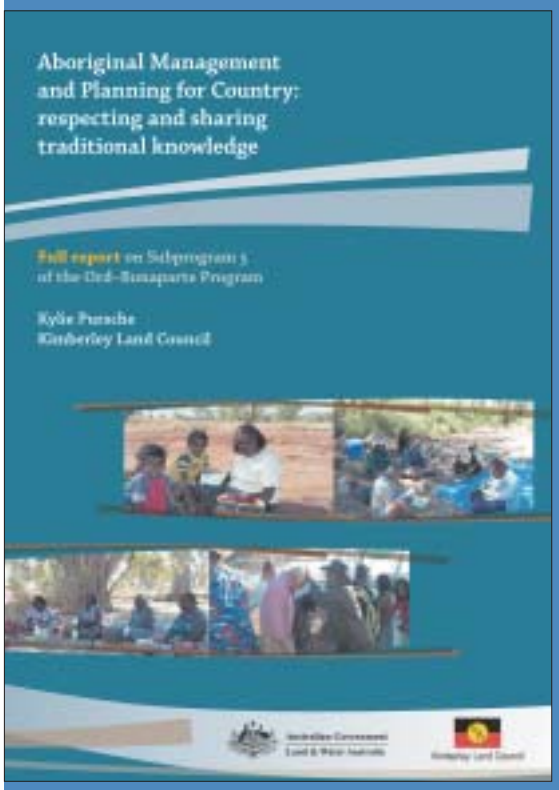
After witnessing the success of the Ecotrust model of a 'conservation economy' in the communities of the coastal temperate rainforest of North America, Ecotrust representatives were invited to discuss their model's contribution to improving economic, ecological, and social conditions for Indigenous communities. The next logical step was to assess the potential of this model to uplift rural and Indigenous communities in Australia.

As a result of the Ecotrust meeting, a new report has been prepared called *A Cultural and Conservation Economy for Northern Australia*. This report assesses the components and principles of the 'conservation economy' model in relation to the institutional and natural landscape of northern Australia.

With rural and remote communities in northern Australia, unacceptably high socio-economic disadvantage presents a unique challenge for sustainability. NRM opportunities for Indigenous people are available, yet inappropriate development may limit the extent to which the community engages in long-term, sustainable economic activities. Existing institutions may

Phyllis Ningamara painting at Waringarri Aboriginal Arts in Kununurra — development of community-based commercial arts and crafts centres are an important aspiration of Miriuwung-Gajerrong peoples.

Aboriginal Management and Planning for Country



Land & Water Australia have been doing a stocktake of our products and discovered some extra copies of this excellent report (and booklet) on Aboriginal Management and Planning for Country, experience and knowledge gained through our work in the Ord-Bonaparte region. If you would like a copy of either, or both sent to you please contact CanPrint on 1800 776 616.

Product code for the full report: PR040788
Product code for the booklet: PK040789

The booklet includes a CD-ROM with a pdf version of the full report.

This fish shop and processing plant at Tofino, British Columbia, Canada was catalysed through the initiatives developed by Ecotrust Canada.

provide some services for capacity-building, including support for entrepreneurial initiatives, but the promotion of sustainability is weak and largely unconnected to economic outcomes. As a result, the research team recommend that the newly formed Ecotrust Australia, embrace the concept of a 'quadruple bottom line', with the fourth goal of 'aboriginal justice', augmenting the traditional three goals of social, economic and environmental capital. The report also recommends a restructuring of Australian tax and business laws, rewarding philanthropic giving and setting up a loan-guarantee fund, for example, to help Ecotrust Australia get off the ground.

"We really need to think outside the box on this issue and it needs to become a mainstream concern for all Australians. Northern Australia is a globally important region, both environmentally and culturally. Economic development is critical for people in the region, but needs to be driven by Indigenous people so that it is socially and culturally acceptable." (Rosemary Hill)

The report *A Cultural and Conservation Economy for Northern Australia* is available in hard copy and pdf from <www.lwa.gov.au>. Product code PR071437.

Ecotrust Australia will be launched in the Kimberley region in 2008. The development of the group as an independent entity will be the responsibility of a Steering Committee including the Poola Foundation, the Australian Conservation Foundation, the Kimberley Land Council, and Community Sector Banking. This establishment process is likely to take one to two years, including the establishment of an independent Board. Advice on the building of Ecotrust Australia will be taken broadly from key stakeholders and experts as identified by the Steering Committee. ■

For further information

For further information on the Ecotrust model for a cultural and conservation economy see <www.ecotrustcan.org>

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Making successful investments in NRM practice change

By Sue Salvin and Ingrid Roth

Given that many of the nation's natural resources are found on private land, the ability of regional NRM bodies to effectively communicate with landholders and other community members, and to positively influence the way they manage their resources, is essential. This depends on a sound approach to engagement, a genuine understanding and appreciation of the internal and external motivators of personal change, a good knowledge of the wide variety of available tools to create change, as well as an understanding of the logical dependencies between the investment activities, the shorter term practice change targets, and long-term resource condition targets.

Regions must also be in a position to monitor, analyse and assess the impact of their investments on practice change. This knowledge can then be applied to inform future investment decisions as well as to support adaptive management processes. It should also result in more realistic targets and continuous improvement of investment decision making by regions.

Photo Roger Charlton.

At this stage in the implementation of regional delivery, not all regional NRM bodies are fully equipped to plan for, drive and monitor changes in NRM practice in their communities. Supporting regional bodies to enhance their skills in these areas has, therefore, been the key focus of a four-year project *Making Successful Investments in NRM Practice Change* that commenced in 2006. The project is being managed by a team from Hassall & Associates, led by Ingrid Roth and Sue Salvin. It is funded by LWA and the Commonwealth Department of the Environment, Water, Heritage and the Arts.

The project has been set up using participatory action research. There was considerable interest from regional bodies wishing to participate as co-researchers in the project and 35 regional NRM bodies submitted an expression of interest. The resulting nine regions selected cover arid, tropical and temperate areas, and all states are represented.

Progress to date

The project has been designed to enable an annual cycle of planning, implementation, data gathering, review and learning. This method is based on the concept of the action learning cycle of plan-do-check-act. The aim has been to assist the regions to 'learn by doing'. It is based around independent application by the co-researchers (with assistance from the core team), complemented by joint learning, review and action planning by all of the regions together.

The first annual cycle is now complete. An initial workshop was held in each region to identify the regional NRM body's current approach to practice change and their key challenges and needs. The first annual forum was held in April 2007 and this provided an opportunity for the project participants to start to develop a community of practice.

The forum also enabled the regions to more clearly identify specific areas where they were interested in working with the project team to develop new tools or approaches. As a result, work with the regions for 2007 concentrated on five key themes.

The five themes are:

1. **Implementation models** — comparing approaches for supporting regional NRM implementation groups and identifying suitable mechanisms for fostering change.
2. **Planning** — developing and testing a process for planning a program, including better understanding of the 'customers' in order to engage with people who haven't engaged in the past.
3. **Profiling and engagement** — identifying key considerations in developing a community engagement plan to ensure that: all obligations are met; the plan is used within the organisation; and it is effective in engaging with the community.
4. **Strategic review** — providing regions with a process to investigate their current approaches to investing in practice change and the success of these approaches in achieving targets identified in regional catchment strategies.
5. **Business planning** — considering ways to incorporate practice change into standard business practice/planning.

Key findings

The participatory research approach adopted by the project team has been well received by the regions. This approach, combined with the development and testing of tools and processes to meet their specific needs, is equipping regions not only with those tools and processes but also with the skills and confidence to plan, manage and review their investments in practice change.

Simple tools and processes seem to be effective in assisting the regions to plan for, or to review their past approaches to NRM practice change. For example, a step-wise planning process serves as a checklist, as well as presenting a process that can give key staff in the regions greater confidence. These simple tools provide the framework and confidence for regions to then use more detailed tools. Key outputs of the project to date include:

- A Practice Change Planning Framework (see Figure 1). This was developed in close collaboration with the participating regions and it continues to be tested and refined. It helps regional NRM bodies to identify **how** they will achieve their local vision for NRM, and is proving a useful tool for prompting consideration of the people aspects of change.
- A Practice Change Planning Process that presents a step-wise approach for program planning by a regional NRM body, using program logic and the practice change planning framework.
- A modified NRM Program Logic.
- An explanation of how Program Logic and the Practice Change Planning Framework fit together as program planning tools. In short, program logic helps to identify **what** you aim to achieve, while the practice change planning framework then helps to identify **how** this will be achieved.
- A Strategic Review Process for taking a rear-vision look at past investments and how these have considered and fostered practice change.
- A guide to strategies for Supporting Regional NRM Implementation Groups.
- Case studies of how four different regions support regional NRM implementation groups and foster change.
- An outline of 'Key Considerations' for Community Engagement Planning.

Policy implications

There are some emerging observations from the project that would be of value to those considering the design of Natural Heritage Trust Phase 3 (NHT3) and the policy settings for future NRM investments. There is a need for the Australian Government to adopt a clear and very simple program logic to guide investment through NHT3 and to ensure that this is embedded in all planning, reporting and evaluation requirements, and is widely communicated.

The basic program logic of Phase 2 of the NHT seems to have been lost. Investors have focused on Management Action Targets (MATs) and Resource Condition Targets (RCTs), but the critical intermediate outcomes (such as practice change) that link MATs to RCTs appear to be missing from the formal system. This gives the impression that investors are looking for 'activity', rather than actual outcomes such as practice change, that will lead to improved natural resource condition.

Figure 1: NRM practice change planning framework

PLANNING FOR NATURAL RESOURCE MANAGEMENT	**Vision**	What do we want to achieve in the region? (from existing plans)
	Stocktake	Where are we at? What is the condition of assets across our region? Which assets are highest priorities to improve/protect? What information is available to assist our decisions? What practices are currently in place?
	What to change?	Is change needed, and if so, what? What practice changes are highest priorities for the vision? Where in the region is this change most needed? What changes will give the greatest return for the investment required? What are the 'givens' or investor preferences? What scale of change is needed and how quickly?
UNDERSTANDING, MOTIVATING AND ENGAGING PEOPLE	**Whose practices to change?**	Whose practices need change? What is the relative importance of each market segment in relation to this change? What are the attributes/demographics of these people/segments?
	People and change	Why would people change? What drives or prevents the change? How willing are they to engage? Who influences them? Where are they at in the change cycle? What is their capacity to change? Who is able/willing to change in the required timeframe? What is the 'fit' of the change with these audiences?
	Mechanisms to foster change	What is required for change to happen? Which *mechanisms* are most effective and efficient for fostering change for each practice change and each market segment? How will mechanisms interact? Is there a best sequence? How will we build confidence and knowledge?
	Consider implications	What are the risks and benefits? What other impacts (positive and negative) may result? What are the trade-offs? What assumptions are made?
	Implementation	What *resources* are required? — staff, funds, other Who could we *partner* with to help achieve the change? *Timeliness* — what is the best time to suit the target sectors? What time is needed for people to *consider* the change?
REVIEW AND ADAPT	**Review**	How will we monitor, evaluate and reflect on what has been achieved?
	Learn, adapt and celebrate	What did we learn? What will we do differently? Do we need to adapt the program/project? How can we celebrate and promote achievements?

This framework is designed to prompt thought and discussion about how regional NRM bodies can plan, implement and review their investments in NRM practice change. It is a tool to guide the "Making Successful Investments in NRM Practice Change" project.

Photo Roger Charlton.

This framework can be used independently or in combination with program logic — for more details on the linkages, refer to "Program logic and Practice change framework — linkages", also at <www.hassall.com.au/australian_division>

For many regions this is not a problem; they have figured out their own logic and assumptions and can fit this to the reporting requirements. Some regions have now recognised the gap between MATs and RCTs — in the past they may simply have assumed that practice change would happen but they now recognise that this is not a 'given' and are addressing it. However, there is considerable risk that the current system doesn't necessarily require clear planning of the link from outputs to resource condition change, and regions who haven't figured this out won't necessarily be prompted to do so.

There is also a need to clearly identify the role of people and capacity building in enhancing natural resource condition (e.g. it may be a key intermediate outcome). Some regions felt that people were not always seen as integral to NRM change. Discussions around the draft practice change planning framework identified that most regions tend to jump from 'stocktake' to 'implementation' and the people parts are left to the implementation staff to plan out. The assumption is also often made that changing attitudes will lead to changes in practice, but this assumption is not necessarily tested. The desired changes in practice are not always 'top of mind'.

Some regions felt that people were not always seen as integral to NRM change.

A key observation from the project to date is that regions are very thirsty for knowledge of how other regions are approaching similar challenges. The participating regions, for example, have each developed their own business models, often in isolation or in dialogue with other regions within their own state. However, in so doing, they have all had to address similar issues. There would therefore be value in investing in processes that would facilitate increased dialogue between regions, particularly across states, at the level of focussed, operational issues.

Keeping in touch with the project

A dedicated website has been developed for the project <www.hassall.com.au/australian_ division>. The home page provides a description of the project and contains links to sections that contain: information about the participating regions; tools and resources; and additional information. Links and fact sheets about existing tools and information sources are being added to the website as the need or interest arises from the various research themes. The aim is for the project not to duplicate past work but rather to provide ready links to suitable tools and information to assist regions in making successful investments in practice change.

The 'additional information' page on the website contains project-specific information, including 'works in progress' which are the tools currently under development, testing and refinement through the project activities. Both of these sections will continue to evolve throughout the life of the project. ■

For further information

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Freshwater ecosystems in major droughts: a summary of existing research

Professor Sam Lake of Monash University was selected by LWA for a Senior Research Fellowship to read and digest available literature on drought and aquatic ecosystems. In undertaking this project, Sam found that some information exists on the impact of drought on flowing waters, but little work has been done on the long-term impacts of drought in standing water, lakes and wetlands. Sam's review of research and literature on drought and aquatic ecosystems is now complete and published in two important publications in 2007:

- Lake, S., Bond, N., Reich, P. 2007, 'Floods Down Rivers: From damaging to replenishing forces', *Advances in Ecological Research*, vol 39, pp. 41–62.
- Lake, P.S., Bond, N., Reich, P. 2007, 'Linking ecological theory with stream restoration', *Freshwater Biology*, vol. 52, pp. 597–615.

Sam has gone on to contribute to a global view in the 2008 article titled 'Climate change and the world's river basins: anticipation management options', *Frontiers in Ecology and Environment*, vol. 6, pp. 81–89. A discussion paper prepared by Professor Lake is also available on the <www.lwa.gov.au> website.

Photo Roger Charlton.

Bringing capacity building research and practice together: learning, networking and mentoring

By Ruth Nettle

A key issue for many people working in rural industries and in land management is to ensure results of research are used by, and benefit, target audiences. This "research into practice" dilemma was one faced by the members of the Cooperative Venture for Capacity Building (CVCB) that, over six years since 2001, has invested in research into capacity building in rural Australia[1].

One of the CVCB's capacity building initiatives was a 12-month project called "On the fast track". Over 60 people, representing a variety of rural industries from all over Australia, participated in the project. At its core was "translating" CVCB research outputs into meaningful learning tools, and supporting capacity building practitioners in applying their learning in their day-to-day work.

1 The Cooperative Venture for Capacity Building (CVCB) was established in 2001 by research and development corporations to enhance capacity building in rural industries in Australia.

The "On the fast track" approach: learning, networking, mentoring

Learning. CVCB research outputs were organised into a workbook for practitioners that linked practitioner questions and experiences to the relevant research outputs of the CVCB. The research was organised around what became known as "the capacity building wheel" (see figure) that provided a framework for thinking about, and working through, the meaning and practice of "capacity building".

The capacity building wheel (integrating the elements of capacity building) was the framework for thinking about the elements of capacity building used in the 'On the fast track' project. Diagram © 2007 Cooperative Venture for Capacity Building.

Workshops were designed using action learning principles, where research findings were applied to participants own issues or projects. Topics covered included:

- What are we trying to achieve from our efforts in capacity building?
- How do we engage stakeholders, organisations, farmers and communities in our efforts?
- What is best practice design and delivery for capacity building? How can we improve what we do and how we do it?
- How do we better evaluate what we do?

Case studies, exercises, "expert panels" and participant presentations were used to help consolidate learning. Over the two-day workshop, participants built action plans. These formed the basis of a mentoring relationship that supported plans into action over the next eight months.

Networking. The project philosophy was based on the idea that "fast tracking" capacity of practitioners required more than exposure to research. In addition, it needed to capitalise on the different experience of industries and people in different roles, e.g. project managers as well as field workers. This networking dimension meant people from industries such as dairy, wool, meat, cotton and sugar, as well as from NRM and community groups, got to know each other and were exposed to new ways of looking at capacity building. It also meant participants could work with people that had similar issues but worked in different contexts. A project BLOG was established for participants to share progress.

The project ended with a final workshop in Sydney that involved all participants coming together to share their results with each other. This not only consolidated and reinforced learning, but also turned networking opportunities into more established relationships that would endure beyond the project.

Mentoring. Building people's confidence and skills in the principles and elements of capacity building is not an overnight process. Mentoring was built into the project to support participants in using the learning from the workshops in an ongoing way in their own projects or work.

At the workshops participants formed action planning groups — where participants were able to develop their action plan with specific input from a mentor and another participant. Photos courtesy of the project team.

Eighteen mentors with experience and an interest in capacity building were invited to participate. Mentors were identified through the CVCB members' networks and were briefed on the vision of the project and their role prior to the workshops. A mentor developer was also part of the project team. Her role was to support the mentors in their role through regular telephone hook-ups.

The mentors attended the workshops and participants were able to nominate their preferred mentor. Mentoring agreements were then established between each participant and their mentor to help build the relationship and set out the aim of the mentoring experience. Mentors also appreciated being exposed to the CVCB research materials and interaction with other mentors as well as participants. This meant that participants, mentors and the project team were "co-learning" throughout the whole project.

Participants identify benefits

A final report on the outcomes and results of the full project is now available. Sixty three participants (including the 18 mentors) were involved in the project. Participant projects were very diverse including: developing mentoring systems in the dairy industry; improving women's involvement in industry decision making; improving group processes; designing effective farm business management groups in the sugar industry; building stronger young farmers networks; developing a better extension project proposal with a greater focus on capacity building; creating extension leverage from NRM networks; building Indigenous employment strategies in the cotton industry; building capacity of commercial irrigation services in the cotton industry; and more effective reporting of capacity building efforts to stakeholders.

Participants have reported a range of impacts and outcomes from their involvement in the project including:

- improved team work in projects;
- more engagement with stakeholders in projects leading to better participation and greater results;
- greater confidence in capacity building efforts;
- better quality projects from well executed engagement strategies and design, delivery and evaluation of projects;
- using their experience to train others in capacity building;
- more motivated extension teams;
- greater use of CVCB research after workshops.

In the box opposite there is some feedback from participants when asked about their experience of being involved in the project.

Some lessons learned

During the project we learned some important lessons about what did and didn't work. Some mentoring relationships were less successful than they could have been. To improve this, the project team believes more effort could go into helping participants in how to use their mentors effectively and giving more guidance to both mentor and mentorees in how to work together.

"I have learnt how to do an evaluation plan that does a better job of demonstrating impacts on people's capacity from involvement in our NRM programs."

"Through my involvement with the 'On the fast track' project I led an exercise with our main stakeholders to work on a strategic direction, planning, mentoring and support for extension practitioners within the group".

This extension manager used the capacity building wheel and lessons from the workshop to work with his team to plan more effective extension for the extensive beef industry — which is now being put into practice.

"In designing and delivering an industry mentoring program I found myself jumping in and out of the spokes of the 'capacity building wheel' — integrating the elements of capacity building — it helped me focus each decision I make or action to be delivered. My mentor was amazing and contributed so much to my personal development and the project. I am inspired..."

"My mentor emphasised the importance of building celebration into the end of projects, and the workshops taught me that involving key contacts in organising workshops and inviting workshop participants is a very successful strategy. I am currently applying these learnings to the development of an e-network."

At the workshops participants evaluated the first day by forming a line rating their satisfaction with the content and processes of the day. They then discussed some of the reasons for their rating and this was recorded by the project team to improve the next day.

Some participant's projects changed over the time, or were too broad to enable effective action over a short period. The project team believes more effort in defining and tightening participants projects and aims for involvement would have improved the outcomes for some participants.

It is clear that the process and methods used in this project were well accepted by practitioners, and the feedback from participants is that there is a strong demand for further learning in capacity building. The way theory and practice were combined in the delivery of this project was seen as a very important feature and one that should be incorporated in future capacity building training.

Some evaluation of the project suggests that the critical success factors for the "On the fast track" approach include:

- the mentor matching and mentoring process;
- meeting and learning from other industries and other organisations working in the field;
- working in small groups to focus on each others' issues;
- having a balanced mix of learning, pondering and doing;
- the importance of follow-up process (mentoring and reporting) to get the action plan "on the ground". ■

For further information

To find out more about the CVCB and its research: <www.rirdc.gov.au/capacitybuilding/reports.html>
To find out more about this project: you can look at the project BLOG <www.onthefastrack.blogspot.com> or contact
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Exploring quality assured business process improvement for regional NRM

By Rod Griffith

Natural resource management in Australia is a form of 'new governance', emerging from the bringing together of ideas underpinning big societal change agendas such a neo-liberalism and sustainable development. There has been an increasing recognition by governments over the past decade or so, that traditional top-down approaches do not work in some circumstances. This is particularly so where complex social, economic and ecological interactions are involved, and where problems derive from uncertainty, long time horizons and cross-scale issues. These problems are characteristic of those we deal with in NRM.

These new governance models demand power sharing, as well as new and often diverse institutional arrangements and behaviours. In Australia, there are differences in investor relationships and agreements between Commonwealth, state and territory governments, and different relationships with regional NRM bodies within each jurisdiction. In Western Australia and Queensland for example, the NRM bodies are based in the civil society, whereas those in New South Wales, Victoria and South Australia are mandated through legislation and, therefore, under tighter control. One of the big challenges in NRM is getting these diverse arrangements and organisational types working together in a cohesive national system.

Mid term evaluations of the Natural Heritage Trust, while generally reinforcing the regional service delivery model, had identified a number of areas in which improvements could be made. One of these was less complex delivery and accountability processes. Our research team (see box on this page) was commissioned in July 2006 to provide a package of ideas around business process improvement and quality assurance that might assist policy makers in the framing of post-2008 NRM in Australia. We set out to explore:

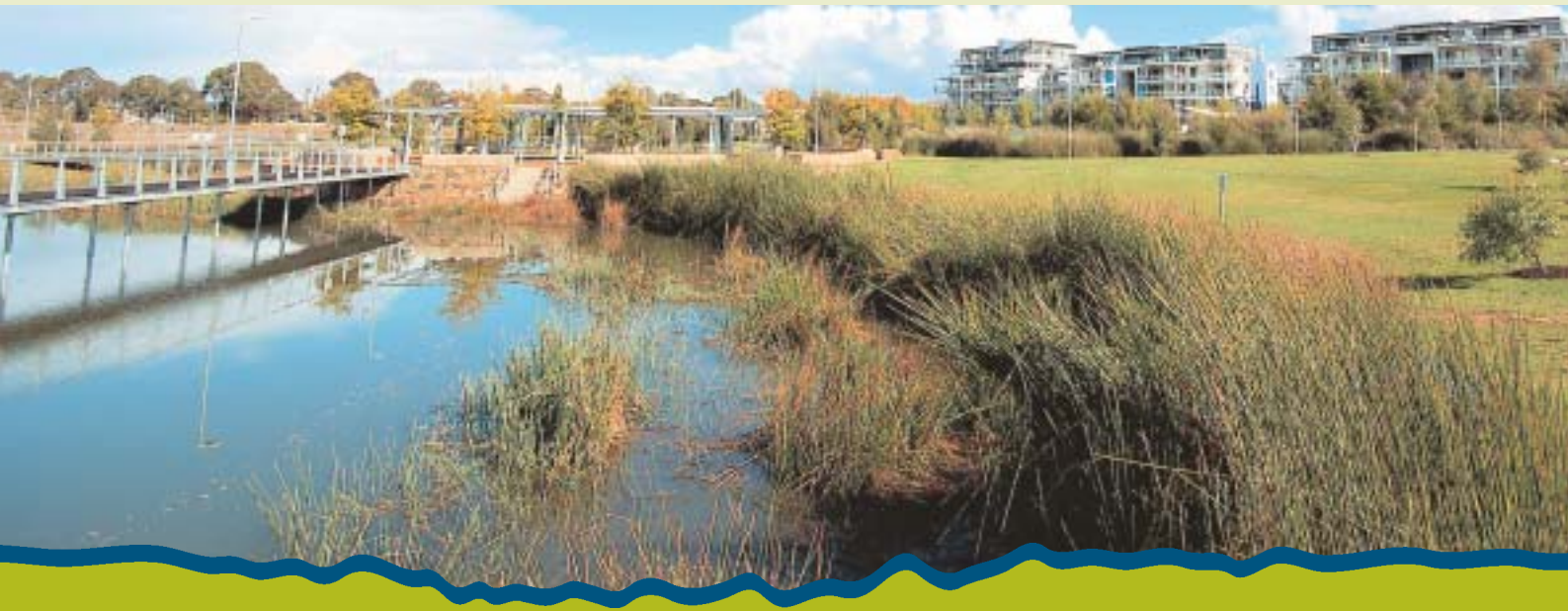
1. Whether current levels of confidence were adequate for the regional NRM delivery model to run effectively and efficiently?
2. If not, whether some form of business process improvement or quality assurance might build investor confidence levels in NRM without the need to disrupt existing diverse institutional frameworks in the states and territories?
3. If so, what standards and attributes might be useful in developing a business process improvement or quality assurance approach in NRM?

Our first task was to unpack the notion of 'investor confidence'. After consultations around Australia we found that government investor confidence in the regional NRM context is primarily related to:

- NRM performance including:
  - planning competence,
  - management of investment throughput,
  - delivery and documentation of agreed outputs and outcomes.
- good governance; and
- financial probity (often seen as part of good governance but separated here for emphasis).

The research team is: Rod Griffiths, John Dean, Allan Curtis, Gavin Hanlon, Kevin Parton and Andrew Green.

Photo Roger Charlton.



Key findings

From interviews with key people at all three levels of government, it became apparent that government investor confidence was patchy, with the perception of big gaps in performance and governance between regions, even within particular state frameworks. Only a small number of regional bodies were perceived to perform well across all aspects, while a few were perceived as 'struggling'. Similarly, regional confidence in government agencies was quite low in some cases, and centred mainly on overly cumbersome controls and unreasonable reporting expectations, but more generally on a failure to understand field conditions and pressures.

From the literature and case study examples, including those from the private sector, NRM and other public investment programs, we were able to put a case that business process improvement and quality assurance can, under the right conditions, contribute to improved outcomes and enhance investor confidence. Quality assurance systems are generally comprised of a:

- standard (sometimes a set of standards or components — these can be prescriptive or non-prescriptive and either generic or targeted to particular applications);
- means of assessing performance against the standard (ranging from self assessment, through second party assessment to complex three party arrangements and often including formal auditing);
- model for improving performance if the standard is not met;
- set of clear understandings between parties about implications, disputes etc relating to the assessment and performance.

While there are a number of generic and purpose designed quality assurance and business process improvement models available, none of these 'off the shelf' products were considered fully suitable for a national NRM approach in their current form.

Recommendations

If a national approach were to be implemented, our consultations suggested that the following 11 non-prescriptive components would cover the key issues affecting investor confidence.

1. **Program logic** — generates confidence that assets, targets, investment and business processes are logically and consistently linked.
2. **Collection and use of knowledge** — generates confidence that best available knowledge is used to guide investment decisions.
3. **Community engagement** — generates confidence that regional communities are actively and meaningfully involved.
4. **Determination of scale** — generates confidence that the full spatial, temporal, sectoral and institutional implications and lags of decisions are understood.
5. **Opportunities for collaboration** — generates confidence that responsibility and costs of NRM are fairly and effectively shared.
6. **Risk management** — generates confidence that the likelihood, severity and frequency of ecological and organisational risks are taken into account in decision making.
7. **Monitoring and evaluation** — generates confidence that feedback mechanisms are in place to enable adaptation to changing conditions.
8. **Information management** — generates confidence that information is consistent with agreed protocols, ethically safeguarded and accessible.
9. **Board and staff decision making** — generates confidence that good corporate governance arrangement are in place and practiced.
10. **Financial probity** — generates confidence that investment funds are securely and transparently managed and accounted for.
11. **Management environment** — generates confidence that day to day procedures are systematic, legal and ethical.

Seven of the above components were taken from the NSW Standard for quality NRM. While these were accepted by our study participants as necessary and relevant in other jurisdictions, they were not deemed to be sufficient for a national NRM standard. Additional components relating to corporate governance and financial probity have been drawn from sources such as the Walter Turnbull governance assessment tool and the Victorian Regional Catchment Investment Plan

guidelines. The components of the example standard reflect the objectives of the National Action Plan for Salinity and Water Quality and Natural Heritage Trust programs, yet seek to challenge NRM groups to think deeply about what they do, why they do it and how they do it.

The perceived gap between more mature regional bodies and newer organisations, and concerns over governance and performance in some regions, suggests the need for two different types of improvement to be considered. For those organisations assessed as having relatively small gaps between actual performance and standard, a form of improvement known as continual improvement would be appropriate. Under this scenario, changes are slow and incremental, and associated with experiential learning. Most tried and true of the shelf models (e.g. ISO 14001 relating to environmental management systems, and the Business Excellence Framework) are based around continual improvement.

For those organisations where the gaps are very large, or those at the other end of the scale that have reached a plateau and are seeking innovation, what is often called discontinuous or step improvement (commonly business process improvement or re-engineering in the academic literature) would be an option. Here the change is radical and rapid, often casting aside existing systems. In the case of organisations with big gaps the standard can be used as a set of design criteria.

While the need to raise and maintain investor confidence was accepted universally, assessment against such a standard (or any set of agreed criteria or principles) was also generally perceived as an opportunity by many of the regional leaders we spoke to, both as a showcase for sound management, as well as for its guidance on performance and governance improvement. However, the common message was that regions would need active support and assistance to undertake the improvement process.

Most stakeholders included in the study expressed comfort with either self assessment or second party assessment (where the government investors organise and manage the assessment), provided the latter was transparent. Support for a complex third party system of assessment was proposed by a few, on the basis of its independence, however, it would require some new infrastructure for national implementation. In practice, the choice of assessment approach comes down to why the assessment is being undertaken and what it will be used for.

In NSW, the Natural Resources Commission uses a second party approach based on a less formal form of audit called a systems review. The Walter Turnbull approach is a risk based audit, while the Performance Excellence Guide is implemented in Queensland by self assessment and peer assessment, but has the option for more formal independent auditing. The main factor in success is that all parties have a say in the content of the standard and are comfortable with the assessment arrangements. Obviously, if trust is missing entirely from the relationship then self assessment is unlikely to raise investor confidence.

Management implications

While no decision to adopt a national quality assurance approach has been taken, some significant announcements about post 2008 NRM have already been made. Some of the second level findings of this project about complexity of processes and more flexibility with funding have been addressed already. There is also a new way of monitoring, evaluation and reporting in place with renewed emphasis on improvement and our suggestion of more attention to program logic seems to have been accepted.

At the regional scale, interest in business process improvement and quality assurance continues to grow, with interest in benchmarking also being expressed. The NSW Standard and improvement system is continuing its cutting edge development. In Queensland, the Performance Excellence approach is consolidating, and other interstate regions are assessing its potential, while in Western Australia, a quality assurance system has been raised as a possible aid to the relationship between community based regional bodies and the WA Government agencies.

While the project was limited to business process improvement for NRM regional bodies, the approach could have wider applicability. Any organisation involved in NRM could benefit from assessment against such a standard, particularly those acting as suppliers of services to NRM bodies. Managing new institutional arrangements in water reform with a diversity of implementation organisations is another potential application. ■

Obviously, if trust is missing entirely from the relationship then self assessment is unlikely to raise investor confidence.

For further information

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Regional bodies: communities learning about managing information and knowledge

By Claire Harris

'Sometimes I feel like I'm falling down a well, panicking as I try to grab for handholds to stop my fall. I feel as if I am not in control of the work I do.'

— Staff member, pilot Regional Body.

Staff members in regional bodies such as catchment management authorities and regional NRM boards, have an important job to do. From protecting their region's natural resources; managing scientific, social and economic research and policies; representing the broader regional community; to liaising with state agencies and the Federal Government, there is a lot to be aware of. An interesting fact to consider is that the amount of technical information we are dealing with in the world is doubling every two years (Karl Fisch, 2007).

Some regional body staff members are feeling the strain of 'information overload', trying to understand complex material and data flows, and meeting the need for better collaboration and relationships within their regional body and with external stakeholders.

The Knowledge for Regional NRM Program at LWA has developed a process with regional bodies that enables them to explore a range of topics about managing their information and knowledge, and to develop a strategy for moving forward. This five-stage Regional Knowledge Strategy process (described at right) has been developed with five pilot regional bodies. It focuses on empowering staff to create, share and use information and knowledge more effectively.

Regional Knowledge Strategy process

Stage 1: engage region and information mapping

Bring stakeholders together to workshop potential objectives from the process, as well as mapping regional information and data flows.

Stage 2: conduct internal and external stakeholder surveys

Surveys are designed and distributed to stakeholders to determine their needs and potential challenges to be addressed.

Stage 3: anecdote circles

Anecdote circles are used to hear about how people experience a range of issues around a topic. These experiences are then used as the basis for better understanding about what can be done to improve the sharing and use of information and knowledge.

Stage 4: sensemaking and action planning

This stage involves looking at what is working and what is not. It asks the 'where to from here?' questions. The focus is on engaging with as many people as possible for action — not on getting everything exactly right.

Stage 5: implementation

The final stage is when initiatives and smaller interventions that could make a difference are defined, and a continuous improvement process is designed. Actions are prioritised and next steps determined. This is then documented in a knowledge strategy.

Further information

on the process can be found at the Regional Knowledge Resource Kit, at the following website <www.rkrk.net.au/index.php/Knowledge_strategy_process>

RKRK

Note

The Knowledge for Regional NRM Program, run through LWA is funded by the Australian Government through the Natural Heritage Trust. Further information about the Program can be found at <www.lwa.gov.au/regionalknowledge>

Workshop participants starting their story spine about a topic highlighted through the clustering of post-it notes (Stage 4: Sense-making). Photo Melanie Randall.

The process focuses staff on making small, easy changes as a way to act, rather than plan. This focus on action takes a 'ready, aim, fire' approach, to learn from what happens and progressively adapt, rather than the commonly-used and wasteful 'ready, aim, aim, aim, aim...' approach.

For groups that have been through the Regional Knowledge Strategy process, outcomes have been positive. Following are some examples of outcomes/learnings provided by participants:

- *Recognising face-to-face contact is important to external stakeholders, we changed the way we deliver information, with less publications and more face-to-face discussions.*
- *Staffing structures have been modified to a flatter model, to enable better transfer of information within and between units, and to use the knowledge staff have within the regional body.*
- *Understanding and explaining the differences between 'data', 'information' and 'knowledge' has led to more emphasis being placed on translating and interpreting facts and figures so that they are relevant and meaningful for people.*
- *Identifying technological problems has enabled staff who are not co-located to share information, and use the same systems and processes for storing and retrieving data.*
- *By developing more strategic processes to emerging regional issues and meeting the needs of stakeholders, we are able to respond to identified knowledge gaps.*

(Source: interviews with people involved in the stakeholder surveys and pilot regional groups.)

To build on the positive outcomes of the pilot trial, the team at LWA is also training a National Core Team of Knowledge Leaders. The team, who were identified through seeking expressions of interest from state and territory based government NRM facilitators, state agency officers, and state regional NRM support organisations, will go on to train Regional Knowledge Leaders. This Core Team is supported by LWA through training material, the Regional Knowledge Resource Kit <www.rkrk.net.au>, mentoring, and the *Friends of the Regional Knowledge Resource Kit* online community (which anyone can apply to join).

For information on becoming a Regional Knowledge Leader to run a knowledge strategy in your region go to <www.rkrk.net.au/index.php/Regional_Knowledge_Leaders_training_program>

Additional information about the knowledge strategy process, including the learning, facilitation, and discussion techniques can be found in the How to... guides available from the website <www.rkrk.net.au/index.php/How_to>

Another product from the Knowledge for Regional NRM program is the NRM toolbar. This is an Australian first featuring an NRM-specific search engine. You can also access and contribute to NRM-specific databases of professional bodies, events, e-networks and more. Visit the website at <www.nrmtoolbar.net.au> ■

NRMtoolbar

Reference

Karl Fisch, 2007: *Did you know* presentation. Available from <www.thefischbowl.blogspot.com>

A national baseline of the social and institutional foundations of natural resource management programs

By Mark Fenton and Arwen Rickert

The National Land & Water Resources Audit (the Audit) coordinates the development of national data standards and collation of data to support reporting under the National Natural Resource Management Monitoring and Evaluation Framework (National M&E Framework).

Long term improvements in the condition of land, water and biological resources are reliant upon the establishment of social and institutional foundations underpinning NRM programs because natural resources are managed by people, organisations and institutions. This project assessed the level of capacity, engagement, partnerships and recognition underpinning current regional NRM delivery arrangements.

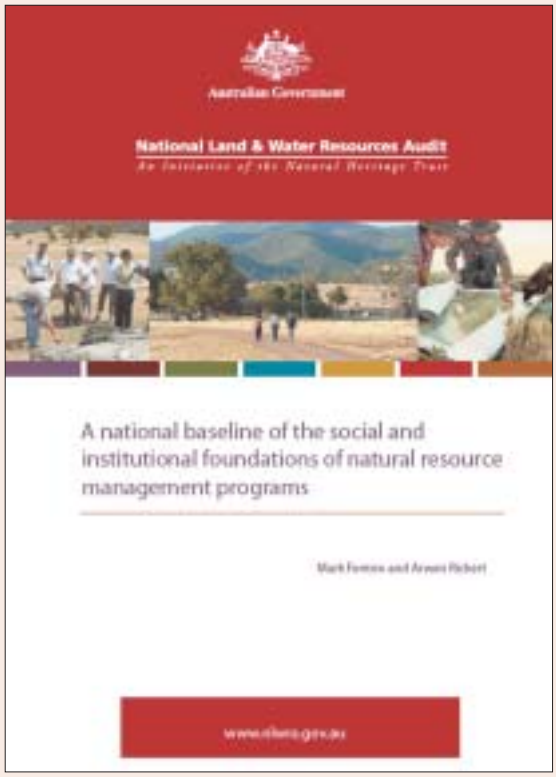
The objectives of the project were to:

- refine and implement the National NRM M&E indicators and protocols for assessing the social and institutional foundations of NRM;
- establish a national baseline for reporting on the intermediate outcomes of NRM programs; and
- contribute to an informed discussion by the NRM community on progress to date.

The project focused specifically on the assessment of four core indicators which included:

1. **Capacity of regional NRM bodies**
   The capacity of regional bodies to make NRM decisions as defined on the basis of their management, NRM program capacity and their external engagement.
2. **Engagement in NRM**
   Engagement is defined as the purposeful and meaningful involvement of stakeholders, including community, landholders, industry and others in NRM decision making, with the intent of achieving a shared NRM vision, ownership and NRM outcomes at the regional level.
3. **Partnerships in NRM**
   Partnerships is defined as the strength of the relationships amongst regional NRM bodies and Australian and state governments in the delivery of NRM programs. Partnerships are underpinned by attributes such as trust and confidence in relationships.
4. **Recognition of the social foundations of NRM**
   Recognition is defined as the extent to which the social foundations (engagement, partnerships and capacity building) have been incorporated and recognised in Australian and state government policies, frameworks, guidelines and regional body activities. ■

If you would like to know more about the results from this interesting piece of work, the final report is available from <www.nlwra.gov.au>



For further information

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New weeds maps and data now available

Weeds have a major effect on Australia's natural ecosystems and biodiversity, as well as on agricultural and forestry production, community health and safety, tourism, economic well-being and quality of life. The Audit, in collaboration with state and territory governments, has generated a National Weeds Data Collation — *Assessing the extent and distribution of weeds in Australia 2008*. The report provides a national overview of the extent and density of significant invasive vegetation species, the first in Australia since 1999. The information will assist national, state and regional resource managers to make effective policy and management decisions for weed control.

Uniform monitoring activities across Australia, and consistent, reliable reporting processes are essential to effectively control weeds. Information on the occurrence, abundance, distribution, trend and quality of weed related data can be used to support the development of various management activities. This includes activities such as establishing the scale of management required for any on-ground control measures, identifying priority areas for control, determining the appropriateness and feasibility of various management options, and assessing the success of any control actions undertaken.

The dataset for 98 weed species includes 20 weeds of national significance (WONS), 51 potential weeds of national significance, plus sleepers and alert species. It was compiled using a methodology that records information at varying scales and sources, including scientific surveys, state and territory level databases, herbarium records, local government datasets, plus expert and anecdotal/local knowledge. Information on extent (present or absent), density (occasional, common or abundant) and distribution (localised or widespread) for each species was recorded. Information on data quality and trend was also collected. This information was collated using an online web update tool. The data quality is good for the 20 weeds of national significance but is highly variable for the other species assessed.

While the national collations are not at a scale to allow direct assessment of management action, the process of mapping allows for a continuous national picture of invasive species extent to be able to be updated and presented at various scales depending on the availability of data. ■

Where can you obtain the data and information?

The data is owned by individual states and territories but the data collations are available on the Australian Natural Resources Data Library.

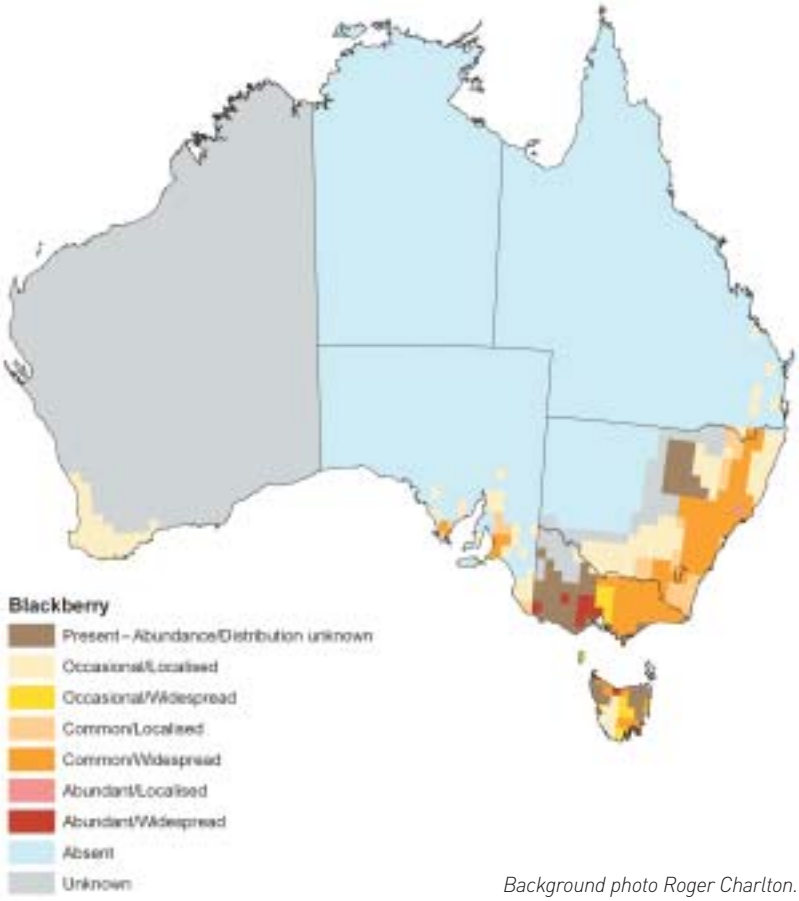
Overview: The data library provides a range of datasets, lookup tables and images associated with the national project for mapping Australian weeds: their abundance and distribution. <http://adl.brs.gov.au/anrdl/php/full.php?fileidentifier=metadata_files/iswnso9a___01611a00.xml>

Dataset: This dataset provides both spatial and attribute information on the occurrence, abundance, distribution, trend and quality of weed related data. <http://adl.brs.gov.au/anrdl/php/full.php?fileidentifier=metadata_files/isw06d9a___01611a01.xml>

Look up tables
<http://adl.brs.gov.au/anrdl/php/full.php?fileidentifier=metadata_files/isw06d9a___01611a03.xml>

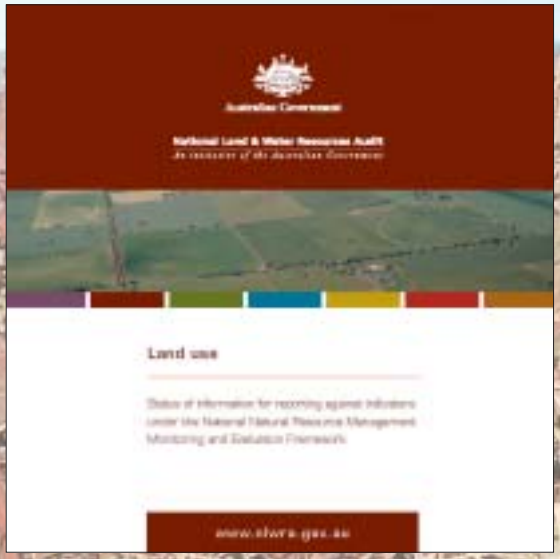
All state and territory governments contributed detailed information and data to support the production of the national dataset. The Australian Weeds Committee and Bureau of Rural Sciences provided significant guidance, specialist advice and leadership.

An example of the maps which can be generated, i.e. extent and distribution of blackberry (*Rubus fruticosus agg*) is shown below.



Background photo Roger Charlton.

Upcoming Audit publications



Keeping an eye on our rivers

Resource managers need access to reliable, consistent information if they are to achieve sustainable land management and improve their ability to manage biodiversity and other environmental values.

In 2002, the Audit published the *Australian catchment, river and estuary assessment* which was Australia's first comprehensive assessment of catchments, rivers and estuaries. The river assessment collated and interpreted data for about 14,000 reaches across the more intensively used catchments.

The Audit continues to work with partners such as the River Health Contact Group which comprises representatives from all states and territories. One task of this group is to develop the national river health indicators, which include critical indicators such as benthic macroinvertebrates, fish assemblages and riverine vegetation, as well as recommended indicators such as water quality, hydrology and catchment disturbance.

By allowing rivers to be compared through common indicators, a better idea can be gained of their *relative* health. This in turn will ensure government policies, funding and community efforts are targeted to the areas where they are most needed. ■

For further information or to request copies of our free publications go to <www.nlwra.gov.au> and follow the links.

Still to come —
Inland aquatic ecosystems; Estuarine, coastal and marine; Invasive species; Soil condition; and Social and economic information.
Keep an eye on the Audit website.

www.nlwra.gov.au

Join the water debate... with droplets!

If we started with a blank slate and environmental outcomes firmly in mind, what system would be the most effective and efficient way to allocate water licences? Questions to prompt debate on this matter are posed in a series of brief discussion pieces called *droplets*, as part of a LWA funded research project being undertaken by Mike Young, of Adelaide University, and Jim McColl, of CSIRO.

The research project is seeking, among other things, to identify ways that an agreement for water-sharing in the Murray-Darling Basin can be drafted with environmental outcomes as the primary goal. The project will also go on to search for essential ingredients of environmental and other policy reforms that build on the National Water Initiative. The *droplets* are published to encourage debate about water management issues and to provide ideas to stimulate discussion. Readers are encouraged to provide their feedback on the options proposed through a website monitored by the research team. A total of 12 droplets have been produced under the following titles:

1. Stormwater: Expensive nuisance or an opportunity?
2. Thinking like an accountant about rivers and aquifers
3. Undermining water — accounting for flow reducing activities
4. Governance of large water bodies
5. Urban water pricing: How might an urban water trading scheme work?
6. Irrigation water: Use it or lose it because you can't save it!
7. Murray-Darling Basin Authority: Keeping the devil out of the detail
8. The unmentionable option: Is there a place for an across-the-board purchase?
9. New water for old: Speeding up the reform process
10. Pricing your water: Is there a smart way to do it?
11. Cullenisms: Thinking about water
12. A future-proofed basin ■

To subscribe to *droplets* and to enter into upcoming discussion topics, log on to <www.myoung.net.au/water> or e-mail droplets@adelaide.edu.au

Photo above Roger Charlton.

RiverWays

Shortcuts to River Management Information in Australia

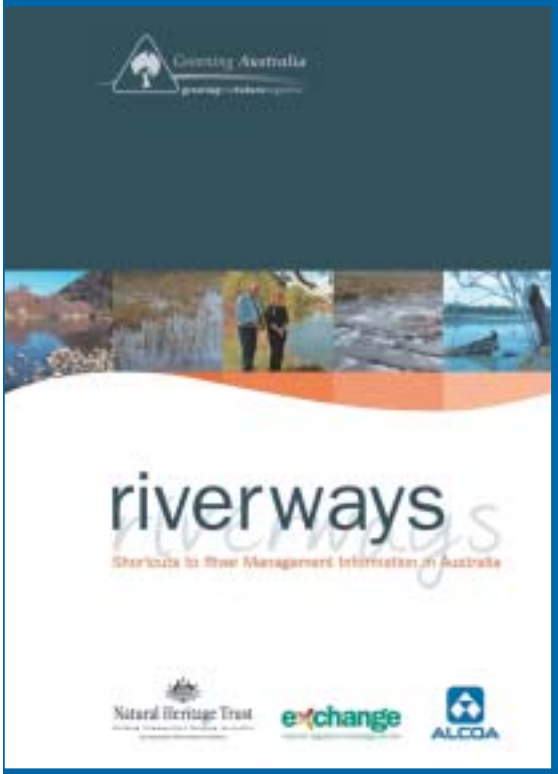
RiverWays is a national guide featuring information on the organisations and resources that deal with river management in Australia. The publication, compiled by Greening Australia in conjunction with other natural resource management organisations around the country, features more than 100 publications (drawn from over 500 recommendations) including cover images, descriptions and evaluations.

RiverWays is a FREE, practical, user friendly guide for anyone involved in river management, from students through to professionals.

For copies, contact Lori Gould at Greening Australia on 0439 030 058 or (02) 6253 3035.

Alternatively e-mail lgould@act.greeningaustralia.org.au

Multiple copies are available (28 per box).



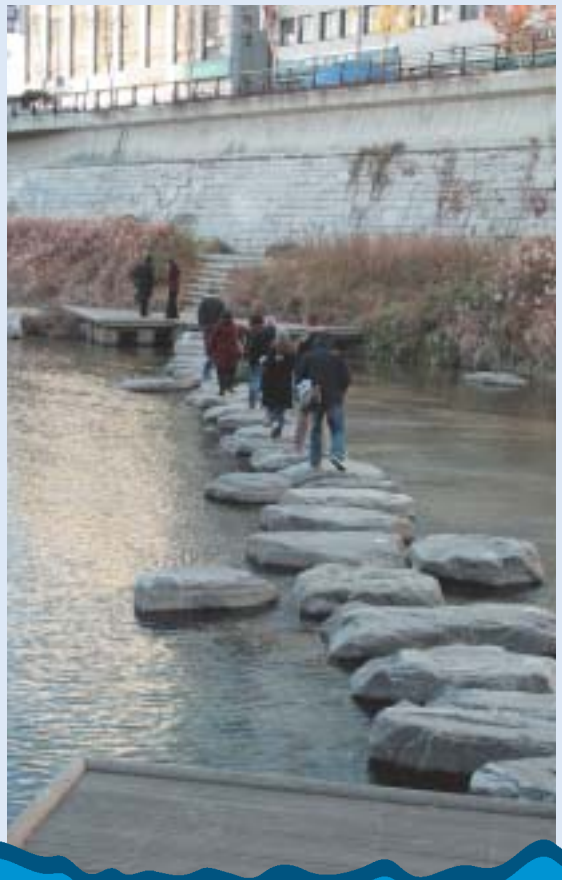
Community learning from Korea: technology, the art of tea and questions for grasshopper!

By Jim Donaldson and Michelle Walker

Sometimes we gain our best insights when placed in an alien context and given the opportunity to learn how other people do things.

In November 2007, ten Australians embarked on a journey to South Korea that became a fascinating introduction to environmental management and culture in a country that has undergone much change over the past century. The ten Australians were delegates chosen as part of the Australia-Korea Young Leaders Exchange Program, an initiative of the Australia-Korea Foundation, managed in partnership with the Korea Foundation and Sydney University's Research Institute for Asia and the Pacific.

The program aims to develop the skills of emerging leaders from both Australia and Korea, with the 2007 program focusing on the environment, and drawing delegates from industry and government across the country. An impressive schedule of site visits, seminars, meetings and cultural activities enabled the group to become familiar with the dynamic country and its friendly people.



Photos throughout this article by Jim Donaldson.

The exchange program also allowed time to reflect on what we learn from others by stepping outside the daily work routine to observe a new place and gain a new perspective. First, some context for those who don't know Korea, as we didn't!

Korea has been in a headlong rush of modernisation and industrialisation over the past 40 years. As one of the so-called 'Asian tigers', it has risen from being one of the poorest countries to the 10th largest economy in the world. However, 'the times they are a changing' and the Korean people are starting to question some of the costs of this frenetic pace of engineering-led development to consider more seriously the environmental, cultural and social dimensions of sustainable development.

Cheonggyecheon Stream in Seoul

No more does this seem to be reflected better than with the Cheonggyecheon Stream project, right in the heart of Seoul. Championed in 2002 by the then Mayor of Seoul, and now the newly elected President of South Korea, Lee Myung-bak, this project sought to restore the Cheonggyecheon from a stream buried like a drain beneath a huge elevated expressway, back to something approaching its original condition. In the process, an ecological and recreational oasis in the middle of the huge grey city has been created.

While the local environmental and social benefits of this change may seem obvious, the district surrounding the Cheonggye Road had over the years become a vital part of Seoul's local commerce, supporting over 200,000 merchants. The financial impact on businesses and individuals was, therefore, an issue of primary concern. We were impressed to learn that over 400 meetings and 4000 interviews were held to consult the merchants and devise ways to reduce the inconvenience and economic impacts on local businesses, as well as stimulate new commercial activities.

But that wasn't all. Almost everywhere we visited in Korea we were met by an amazing array

of interpretative facilities, such as scale models, artifacts, videos, publications and hands-on interactive exhibits to educate us about what we were seeing. We in Australia have much to learn from Korea about the art of engaging the public.

For the Cheonggyecheon, Seoul's citizens were invited to be part of the project and reflect, through art, on what the restoration meant to them. A four-story museum has also been established to convey the story of the stream's restoration and its environmental, economic and cultural history, which spans over 600 years.

Moving minds — a perspective from the red centre

The Cheonggyecheon Stream and the Todd River in the heart of Alice Springs are worlds apart in location and nature. In 2005, the Cheonggyecheon resurfaced as a natural waterway after a massive rehabilitation project; however, its flows are artificially maintained by pumping, and its banks are highly modified for human traffic. In contrast, the Todd River is perpetually dry except for flood events that reshape banks and channel morphology. Despite their obvious physical differences, both waterways symbolise the value communities can attribute to their natural surroundings.

Community members enjoy many benefits from these river corridors. River red gums line the Todd River with tree hollows providing a home for birds, bats and other secretive creatures. The Cheonggyecheon rehabilitation created instream and riparian habitats for birds and aquatic life — we saw sleek ducks and fish happily navigating the stream. Uncovering the Cheonggyecheon had the effect of moderating ambient temperature in the urban surroundings; the sandy banks and shady gums of the Todd River also provide a cool oasis in the hot red centre. Whether dry or flowing, the rivers remind us of our distant past when life and survival was more closely linked to our natural surroundings.

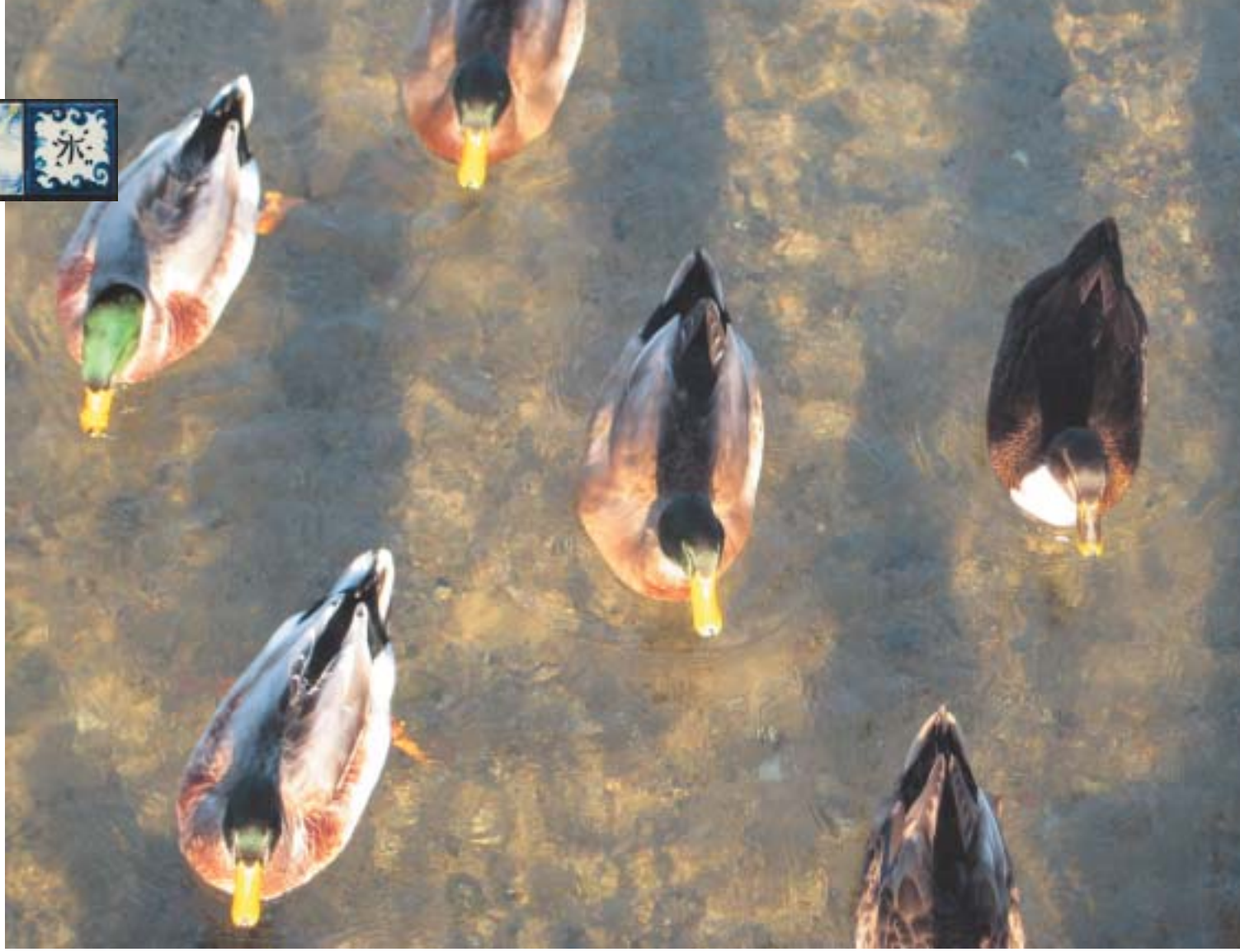
According to outdoor educator James Raffan, natural areas may engage the senses and provide a personal experience that is enough to motivate engagement or action. Knowledge in itself is insufficient to promote action; meaning and emotion are required to inspire motivation. Iconic river systems like the Cheonggyecheon and the Todd River clearly evoke emotional responses from the community and often inspire action or activity through art, community events or ecological field trips.

Central Australian towns like Alice Springs depend on limited groundwater resources and the community, government and service providers are charged with the responsibility of reducing water use. We know that 'cognitive', 'rational' or 'logical' based information is often not enough to inspire action. How then can a sense of urgency be evoked to reduce pressure on water resources that are buried deep beneath the ground, unseen and undetected by the senses? What are the implications of the personal motivation theory for natural resources that do not inspire the imagination or evoke the senses, as do rivers like the Cheonggyecheon and Todd?

Meeting the Master — questions for grasshopper over tea

For Koreans and Australians alike, the Cheonggyecheon story raises many questions about sustainability and what we value: was it mainly a symbolic national project and more about beautification and recreation than ecology? Is pumping a huge volume of water into a stream everyday to maintain its flows really restoring it? Is it sustainable? What do we want to sustain?

Knowledge in itself is insufficient to promote action; meaning and emotion are required to inspire motivation.



Later on in the trip, we faced some interesting questions ourselves. On a visit to a Buddhist temple in the mountains, the group had an audience with a Master Zen monk over a tea ceremony. On hearing that we were all environmental 'experts' he asked us: 'What is the environment?' After receiving an earnest reply, along the lines most of us would give, he then asked: 'Is there anything that is not the environment?' That puzzled us! When we struggled to answer, he asked further: 'Do you think people care about their environment?' It was hard to answer 'no'. Through a series of simple yet profound questions, the monk challenged us to think through what it was we were all working on and how we communicated with each other and the public about the environment and natural resource management. Amongst the elders of our group, the audience with the monk brought back fond memories of the old 'Kung Fu' TV series where the young pupil who has much to learn from the Master is called 'Grasshopper'. For those not old enough to remember, you may have to google that one!

In relation to the theme of this issue of *RipRap*, recalling this story begs some questions about our purpose in NRM: 'What is community?' 'What is community learning?' Who needs to learn about what and why? Aren't we all part of the community in one way or another? So what does it mean? At what scale is community important: the family, the local community, the region, the state, the nation, the earth? Does it include industry, NGOs and governments as actors in the game?

In Korea, we were reminded of the great importance of a sense of place and that with attachment to place comes identity, history, belonging and responsibility to care for what is around you. At the same time, the visit highlighted the inter-connectedness of our two countries; the inter-dependency of our economies and the consequent global nature of our environmental challenges, not just climate change. Both Australia and Korea will find it difficult to deal with many environmental issues in isolation: there is just as much need for the global community to continue to share experiences and learn together, as there is for local communities. ■

For further information about Cheonggyecheon you could google or visit: <www.english.seoul.go.kr/gover/initiatives/inti_02cheon.htm>

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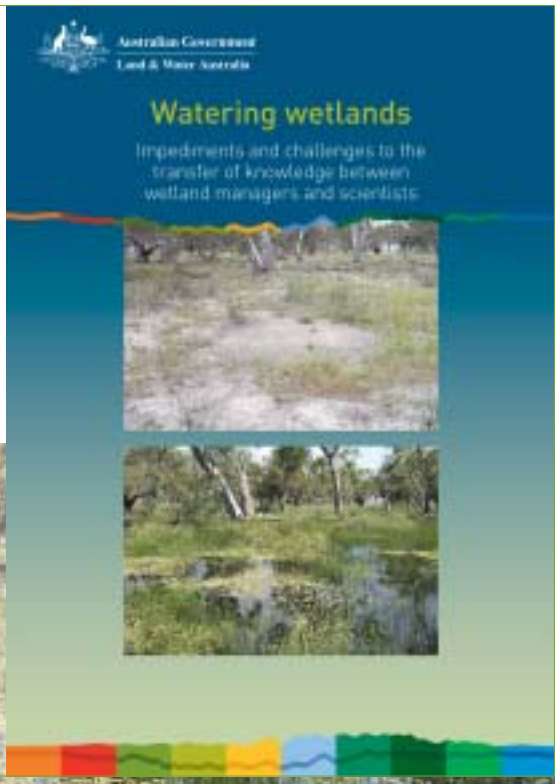
By Nadeem Samnakay

Does research appropriately inform management decisions?

Exchanging knowledge between wetland managers and wetland scientists, and putting knowledge into practice, is an essential part of managing our wetlands and aquatic assets. As an investor in research and a generator of knowledge, LWA's Environmental Water Allocation program undertook a study to examine the impediments of knowledge exchange between wetland scientists and wetland managers.

In preparation for the study, 32 wetland managers and 19 wetland scientists were surveyed about the use of scientific knowledge in wetland watering. The study blended traditional concepts of knowledge exchange, with a model of consumer behaviour and marketing techniques.

To access a copy of the report, visit <www.lwa.gov.au/ewa> or order a copy from CanPrint 1800 776 616 quoting product code PR071378.



The study assessed:

- factors that influence attitude;
- knowledge seeking strategies;
- barriers to knowledge exchange;
- the context for management decisions; and
- the decision making process.

The study provided the content for a discussion paper that was presented and debated by a panel session at River*Symposium* 2007. Discussions from the panel session were then incorporated into a final discussion paper which is now published, titled *Watering Wetlands: Impediments and challenges to the transfer of knowledge between wetland managers and scientists*.

The paper starts by providing a brief review of the current scientific knowledge with respect to watering wetlands. This is followed by an assessment of the extent to which water resource and wetland managers have access to this information, and the impediments they face in putting it into practice. The paper then concludes with a series of recommendations about how to improve the way that scientific information can be used to inform wetland watering decisions.

While the report provides a number of key findings about the impediments to knowledge exchange, it also highlights the importance of providing adequate time to build relationships. Long term relationships build trust, and mean that knowledge can be transmitted over a long period of time, feeding into multiple stages of planning and operational cycles. ■

For further information on this article and the groundwater article on the following page contact

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IMPROVING OUR KNOWLEDGE OF GROUNDWATER DEPENDENT ECOSYSTEMS

As Australia's surface water resources become increasingly scarce as a result of prolonged droughts, increased consumption and changing climate, the demands on our groundwater reserves continues to rise. The environmental impact of lowering groundwater tables is, however, poorly known, particularly for ecosystems that are either partially or wholly reliant on groundwater. These ecosystems are more generally referred to as groundwater dependent ecosystems (GDEs).

GDEs include a variety of ecosystem types including wetlands, rivers that are fed through groundwater (baseflow), terrestrial vegetation communities which could include, though not limited to, some red gum or coolibah forests, near shore marine systems, and ecosystems that survive underground, either within cave systems or within the groundwater aquifer itself (stygofauna).

The extraction of groundwater for consumptive use can have severe implications for the health of these ecosystems — particularly those that are predominantly reliant on groundwater. This makes it necessary to understand which ecosystems are groundwater dependent, and the extent of that dependency.

To help in our understanding of such systems, LWA, through the Environmental Water Allocation program has managed several GDE related research projects. One project that recently concluded was *A framework to provide for the assessment of environmental water requirements of groundwater dependent ecosystems*. This project reviewed and tested a number of assessment tools that would assist water managers and ecologists in determining which systems are groundwater dependent. The *final reports* from this study are available at <www.lwa.gov.au/ewa>.

More recently, LWA in partnership with the National Water Commission hosted a workshop to identify the institutional and biophysical research needs relating to GDEs. The outcomes from this workshop have helped to identify critical research needs which will assist in better identification and management of GDEs. Broadly, the workshop identified the need to:

- raise awareness of GDEs through education and extension activities;
- develop and refine groundwater management and assessment tools or methodologies;
- invest in technologies that assist in better understanding and identifying GDEs; and
- ensure continued professional development amongst the hydrological and ecological sciences for participatory research and development.

The focus on groundwater and GDEs is highlighting the need to understand entire water cycles, rather than components of the water cycle such as surface flows or underground aquifers. An enhanced understanding of GDEs will assist in this endeavour, as GDEs highlight the connectedness of natural systems. ■

Great Artesian Basin bore near Thargomindah, western Queensland. Photo Rob Ashdown.

DEFEATING THE WEED MENACE

Aquatic weed detection and control a big hit at recent knowledge assimilation workshop

Land & Water Australia recently brought together representatives of each of the 25 research projects within the research program of Defeating the Weed Menace (DWM). With the DWM program wrapping up in June 2008, it was important to have each of the project teams identify what knowledge products they will generate. One of the greatest values of the workshop was in having the projects come together to share their research, inform each other of planned outputs, and look for synergies between individual projects.

Riparian zone at Healeys Lagoon with Para grass, Brachiaria mutica, *and the aquatic weed Water hyacinth,* Eichhornia crassipes. *Photo John Dowe.*

Working with the Principal Investigators and other project team members from each project, DWM R&D Coordinator Dr Judy Lambert and the Sustainable Landscapes staff at LWA identified several opportunities for creating knowledge products that assimilate individual project findings. Some of the themes emerging were:

- The issues surrounding management of what workshop participants labelled "conflict of interest" plant species — those plants that have important commercial benefits but that are also invasive environmental weeds (including the pasture grasses such as Buffel grass, Gamba grass and Para grass, and ponded pastures such as *Hymenachne*, and species such as introduced pines).
- The importance of tackling weeds with the whole landscape in mind by understanding the ecological processes at work and using them to ensure that when one weed species is removed the space created is not simply invaded by another, perhaps more vigorous species.
- The need for greater recognition that biological control agents are just one tool in the mix of weed control options, and that there are challenges faced by researchers seeking to develop these agents — described by one participant as making sure that land managers appreciate that biological control agents are rarely 'silver bullets'.
- The need to target new knowledge, not just to the landholders and land managers whose job it is to keep weeds under control, but also to shape what is learned so that it assists policy and program development.

One of the big 'hits' in the workshop was a project from the University of Sydney's Australian Centre for Field Robotics. Dr Salah Sukkarieh and his colleagues are adapting a robotic helicopter to fly over hard-to-access waterways with visible and/or infrared spectral cameras on board, creating photographs and appropriate analytical algorithms, to identify and pinpoint the presence and location of aquatic weeds.

WILLOWS

Photo Salah Sukkarieh, ACFR University of Sydney.

The tiny unmanned helicopter is no more than 2 metres long, and the results being generated in the trial phase of this project are creating a lot of interest, not just among weeds researchers, but also among commercial weed managers and others who need to be able to detect and accurately 'finger-print' weeds in relatively inaccessible places. This work, along with some of the other projects relating to weed detection and management, generated cross-group discussion on the role of new imaging technologies — an area that appears ripe for further investigation.

Along with the development of new approaches to weed detection in aquatic areas, the project team is also modifying the helicopter to accept a payload which would enable very localised herbicide application of the invasions detected.

Both the field robotics team, who learned a whole lot more about the problems of weed detection and control, and weeds researchers previously unfamiliar with the potential of new field robotics tools and techniques, were very positive about the coming together of the new research they are completing within the DWM program. ■

For further information

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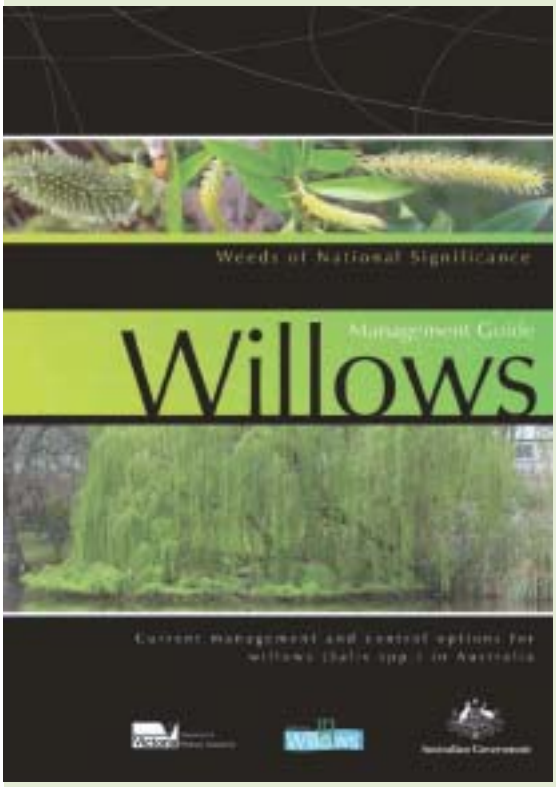
Defeating the Weed Menace R&D <www.lwa.gov.au>
For more general information about control and management of weeds visit <www.weeds.org.au>

Good news willows managers!

The National Willows Management Guide is now printed and ready for distribution! If you have previously ordered a copy you can expect to receive it over the coming weeks.

The guide has been a huge collaborative effort by over 50 willow managers from different organisations and areas all over Australia to provide information on effective willow management programs. It includes comprehensive information on:

- understanding willows impacts and biology,
- broadscale and site specific planning for your management program,
- controlling and removing willows (including considerations for site rehabilitation and waste management),
- rehabilitation of sites where willows are removed, and
- a number of real life case studies that highlight successful willow management programs. ■



It is now available for download and viewing on the willows webpage, <www.weeds.org.au/WoNS/willows>

Haven't ordered your copy? Know someone that wants one?

Orders can be made at <www.weeds.org.au/WoNS/willows>

NATIVE VEGETATION AND BIODIVERSITY

Keeping up to date with native vegetation in riparian landscapes

Managing riparian landscapes, as is evident from many publications produced by the National Riparian Lands R&D Program, is equally about managing vegetation condition, extent and pattern, as it is about water. Vegetation can narrowly, and sometimes incorrectly, be viewed as managing native trees only. While riparian vegetation is critical for providing the food and habitat needs of numerous fauna, the matrix of vegetation in the landscape plays an important role in managing erosion, nutrients and connectivity with riparian zones, thus impacting on water quality and water quantity.

LWA's Native Vegetation and Biodiversity Program publishes *Thinking Bush*, an occasional magazine that provides new information on nationally relevant efforts in research, extension and information management.

In its infancy, *Thinking Bush* provided readers with a snapshot of LWA funded research under the Native Vegetation R&D program. Of late, current issues have expanded the depth of information to include activities that are being undertaken by a host of national agencies and organisations with an interest in vegetation management outcomes. These include the Bureau of Rural Sciences; the Department of Agriculture, Fisheries and Forestry; the National Land & Water Resources Audit; Greening Australia; CSIRO; the Department of the Environment, Water, Heritage and the Arts; and the Master TreeGrower Program.

The publication is produced by LWA and is available free of charge. To subscribe to this publication, send an e-mail to Carmel Ewing (carmel.ewing@lwa.gov.au) with your contact details, or telephone Land & Water Australia on (02) 6263 6000. ■

The publication can also be downloaded from <www.lwa.gov.au>

Further information on the Native Vegetation & Biodiversity R&D program is available at <www.lwa.gov.au/nativevegetation>

Photo Louise Duxbury.

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'Tree changers' and 'dust changes' — redefining our 'communities'

By Barry Hancock

Our natural environment embodies "symbolic" meaning ascribed by humans based upon their previous experiences with that environment. In essence, the environment embodies, whether a person is actually conscious of it or not, a reflection of an individual's symbolic sense of "self". How is the symbolic meaning attributed to rural landscapes changing under the pressure of inward migrating urban individuals? What values do urban individuals bring with them into rural areas? Will the arrival of new values result in the erosion of traditional rural values? Does this changing environment result in a redefining of how people view themselves in relation to the natural environment? More broadly, what does all this mean in terms of engaging the community to reach desired natural NRM initiatives?

These challenging questions are being explored in a research project underway in northern Victoria. The project began with an analysis of land transaction data and interviews with real estate agents located throughout the target area of the research project. The focus area is the southern portion of the north central catchment. This geographic region is an area undergoing significant transformation. It is located within a 90-120 minute drive from Melbourne and encompasses parts of the Macedon-Ranges, Mount Alexander, Hepburn, Central Goldfields, Northern Grampians, City of Greater Bendigo and Loddon local government areas. The landscapes within much of this region contain unique environmental amenity values. As such, they are proving highly popular with urban based people seeking a "tree change" rural life style.

The "tree changer"

The motivations for people migrating out of urban centres to take up residence in rural areas are as diverse as the people. Typically, such individuals are believed to hold a strong environmental ethic. However, interviews undertaken with local real estate agents indicate a variety of reasons motivate individuals to relocate to rural areas. While there is a strong desire to own land with "character", this is not always driven by an underlying environmental ethic. Building a home on a small north-west facing acreage (4–20 hectares in size), which is elevated with a view of either a water body or of hills, is often driven by a desire for status. Land with character is much sought after by the wealthy generation of retiring baby boomers. To many of these urban individuals, a small scale rural block provides an opportunity to escape from suburbia and provide them with the solitude they desire. Alternatively, the "sense of community" that exists in many small rural towns is also proving a major attraction. Buying a rural block or a property in a rural town also provides some urban individuals with the opportunity to downsize, that is, to realise the increased wealth in the urban home by selling during the property boom, and using their increased funds to buy a rural property and invest the remaining capital to fund their extended retirement. Housing affordability is also proving to be another important motivator attracting new people into the rural landscape.

Emerging "dust change" phenomena

As the rural landscape within a 90 minute drive from Melbourne is being recolonised by the wealthy generation of baby boomers, rural property prices have increased significantly. This is giving rise to the emergence of pockets of lower socio-economic classes of individuals in the outer reaches of the catchment. Such individuals are being attracted to these outer areas by the relatively affordable property in the smaller towns. The town of Korong Vale (population 170), for example, is experiencing a property boom. This town is proving popular with lower income earning individuals who have lived in Melbourne all their lives, but have been unable to break into the urban property market. Those lower earning income individuals have been able to enter the small scale lifestyle farm market by using vendor term contracts. A local government mayor remarks that people who enter vendor term contracts, that allow them to take possession of their piece of land with minimal deposit, come with big dreams for their block, but generally find they don't have the money to do what they would like.

Redefining the notion of "community"

The changes that are taking place across the rural landscape are giving rise in some areas to an alternative sense of community, as new values and normative processes are being brought in by "city folk". The arrival of new values present challenges to the established normative processes that underpin rural society. In some instances, the arrival of new values is looked upon as broadening the cultural base of a town or area. As one interviewee noted, '...some of the urban people who retire here seek to make the community part of their life.' However, this individual believes the activities they participate in might not be the things that his community is used to.

A declining sense of civic duty?

There is a general acknowledgement of the benefits of having city people bringing new set of skills into a community. The arrival of new skills and higher levels of education is often associated with the establishment of new civic and environmental groups within the community. However, there is a tendency for such groups to be much narrower in their focus, which often reflects a different sense of community.

An important component of rural life and rural communities is its sense of civic duty. This is often displayed through strong participation in civic groups whose charter is to serve the community. Currently, membership of traditional civic groups is in decline. This problem is not specific to rural society — though it is perhaps more prominent. As tree changers migrate into rural areas one could reasonably expect they will seek to integrate into the existing traditional civic groups as a means of integrating themselves into their newly chosen community. What this research is showing is that while some people seek to make themselves part of the community, their presence does not necessarily result in the regeneration of traditional civic groups. Some seek to serve their own narrow community of interest. For example, the rise of single issue focused environmental groups whose involvement in NRM initiatives are outside the more established Landcare, Rivercare and CMA groups.

Other individuals simply seek to use their new residence as a base from which they pursue a "grey nomadic" lifestyle, where they come and go whilst spending their children's inheritance. Such a lifestyle may be an impediment to their integration into their new community. One interviewee offers the following reason why membership of traditional civic groups is not a high priority among people from the city. As this individual understands it, voluntarism was simply not a part of the sense of community they formed while they lived in Melbourne.

Understanding the dynamics of change

As the community around us changes, so must the way we seek to engage the community. Typically, our interaction with the "community" is informed by the assumptions we hold in relation to who is the community and the values they hold. If our assumptions are misguided, we run the risk of reducing the effectiveness of the interventions we undertake to improve our natural environment. To better connect with, and encourage the participation of our communities, we must have an adequate understanding of the values and the motivations which either give rise to, or inhibit, their effective participation in NRM activities. Learning to engage with and understand the motivations of 'tree changers', and the impact of 'dust changes', is one way we can better understand the changing dynamics of our communities and consider ways to most effectively achieve NRM goals within it.

The full outcomes of this research project will be available upon completion of the project in June 2008. ■

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NORTH CENTRAL
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Photo Roger Charlton.

Getting on TRaCK

At a time of increasing awareness of the value of water across Australia, it is vital that public debate, policy and management decisions about our tropical rivers and estuaries are informed by sound science. Around 70% of Australia's fresh water lies in the rivers and groundwater systems of northern Australia, from Cape York to Broome. Supporting grazing, mining, fishing, agriculture and tourism, most of these river's floodplains, wetlands and estuaries are in a healthy state. The region is home to the world's oldest living culture and Indigenous Australians actively manage much of the landscape using traditional knowledge and customs.

There are, however, significant gaps in our current knowledge. To help manage the opportunities and expectations for northern Australia's rivers and water resources, a coordinated research effort that brings together social, economic and environmental disciplines is needed. A consortium led by Charles Darwin University, CSIRO, Griffith University, Land & Water Australia, the North Australia Indigenous Land and Sea Management Alliance and the University of Western Australia has come together under a new $30 million research initiative.

Australian Government

Department of the Environment, Water, Heritage and the Arts

Land & Water Australia

Australian Government Water Fund
Raising National Water Standards

TRaCK receives major funding for its research through the Australian Government's Commonwealth Environment Research Facilities initiative; the Australian Government's Raising National Water Standards Programme; Land & Water Australia and the Queensland Government's Smart State Innovation Funds.

TRaCK brings together leading tropical river researchers and managers from Charles Darwin University, Griffith University, University of Western Australia, CSIRO, James Cook University, Australian National University, Geoscience Australia, Environmental Research Institute of the Supervising Scientist, Australian Institute of Marine Science, North Australia Indigenous Land and Sea Management Alliance, and the Governments of Queensland, Northern Territory and Western Australia.

TRaCK

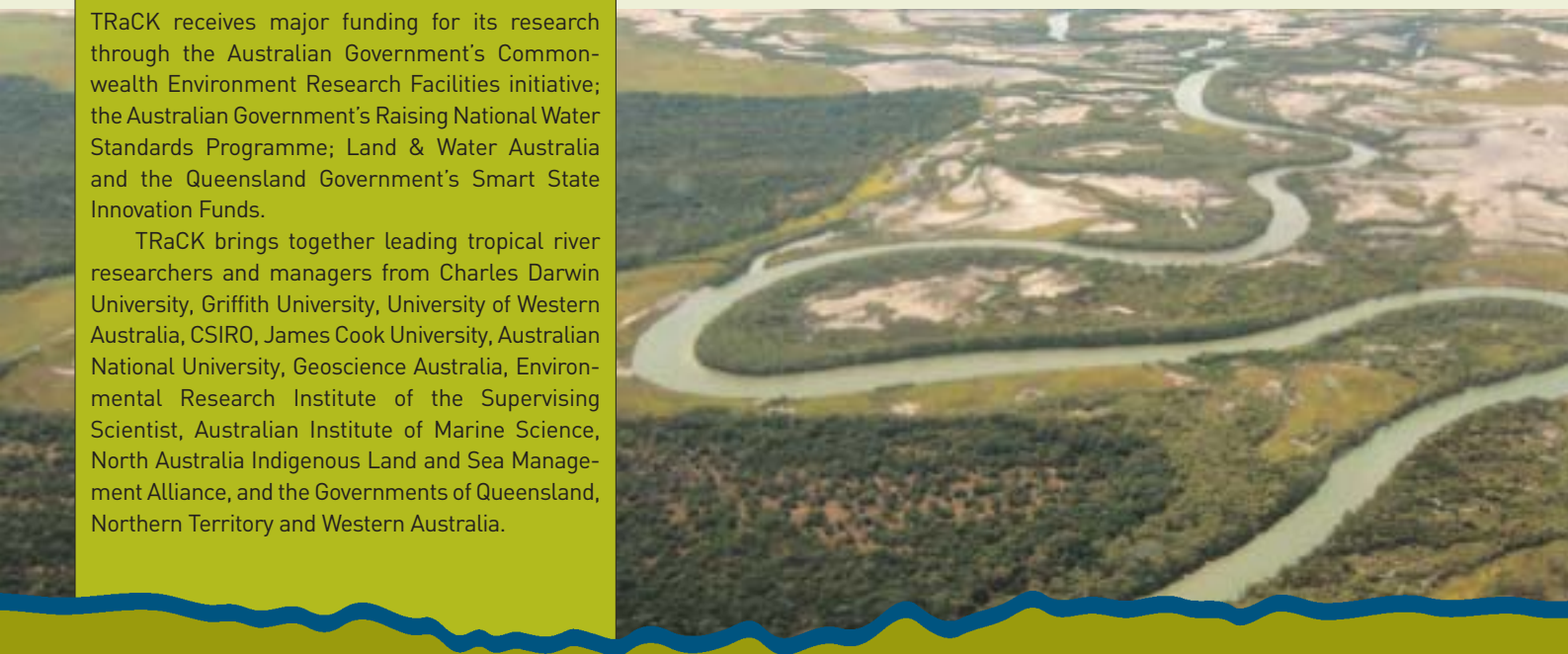
Tropical Rivers and Coastal Knowledge

Drawing together more than 70 of Australia's leading social, cultural, environmental and economic researchers, the Tropical Rivers and Coastal Knowledge (TRaCK) research initiative aims to provide the science and knowledge that governments, communities and industries need for the sustainable use and management of Australia's tropical rivers and estuaries.

More than 20 research projects will be conducted over the next three years, directed towards seven interconnected themes:

- **Values and assets**: Working closely with landowners, land managers, industry and community groups, researchers are examining the full range of values associated with tropical rivers, by for example, assessing the effects of water use decisions on social, cultural, economic and ecological values.

The Mitchell River snakes across the lower wetlands near Kowanyama on the western side of Cape York carrying the nutrient rich waters that feed the highly profitable fisheries of the Gulf of Carpentaria. Photo Anna Straton.



- **Classifying tropical rivers**: Researchers are developing a physical classification system to characterise river landscapes in northern Australia, based on their flow patterns and how they form and evolve. This work will help knowledge gained from research in one catchment to be transferred to other similar catchments in the region.
- **Material budgets**: Researchers are developing models to predict the effects of land use and climate change on the sources, amounts and movement of water, carbon, sediment and nutrients.
- **Foodwebs and biodiversity**: In tropical systems, the sources of organic matter that drive the food webs are largely unknown. Researchers are identifying these sources, developing models that predict the effects of land use and developing tools for determining environmental flows and monitoring biodiversity and ecological condition.
- **Sustainable enterprises**: Researchers are identifying sustainable and culturally appropriate uses of riverine and coastal resources which offer opportunities for innovative enterprise development in remote and regional communities.
- **Evaluating scenarios**: By pulling together information from across the research projects, TRaCK researchers will develop tools that explore the implications of change for our tropical rivers and estuaries. Predictions based on realistic scenarios will help inform public debate, stimulate community action and assist policy makers explore solutions to conflicting community needs.
- **Communicating and integrating**: To ensure that findings are accessible and able to be used, TRaCK is synthesising knowledge from its research and tailoring it to the needs of local communities, natural resource management groups and government policy makers. ■

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The future of tropical rivers: which vision is the most sustainable?

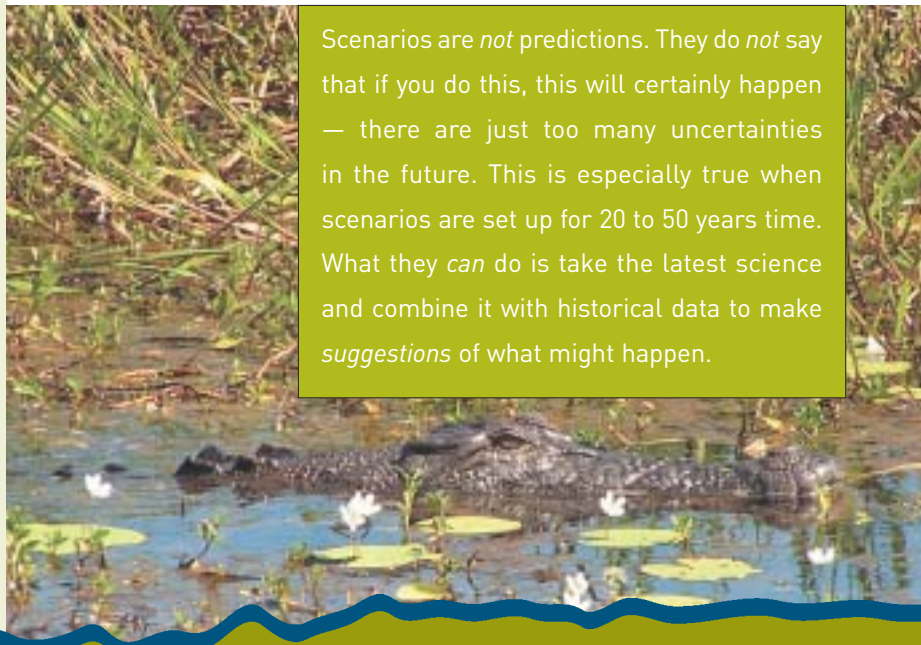
By Stephen Garnett and Neil Collier

People have been dreaming of putting Australia's tropical rivers to commercial use for well over a century. A few, like the Ord and the Burdekin, now have huge dams on them, however, with the south drying out as climate changes, new pressures are being brought to bear to use the annual monsoonal floods for irrigation. The Mitchell and Flinders Rivers of Cape York, the Daly River in the Northern Territory, and the Fitzroy River in the Kimberley are all seen as potential sources of water, or as centres of irrigated agriculture.

Increasingly, however, it is realised that damming a river or drawing down a water table for irrigation has enormous environmental, social and economic consequences, consequences that are effectively irreversible. Not surprisingly, governments are becoming very cautious about making such major decisions.

One tool that can help them is scenario modelling. Scenarios are set up to make you think. Say a decision was made to take out 20% of all the river flow for irrigation each year (such percentages are much higher in some southern rivers), a scenario model might look at what would happen to the fish in the river, the distribution of sandbars, and the income from tourism. You might also want to know what might happen to a site along the river that is culturally important to the river's traditional Indigenous owners.

Scenarios are *not* predictions. They do *not* say that if you do this, this will certainly happen — there are just too many uncertainties in the future. This is especially true when scenarios are set up for 20 to 50 years time. What they *can* do is take the latest science and combine it with historical data to make *suggestions* of what might happen.



Salt water crocodile. Photo Ian Dixon.

Scenarios work best when combining information from lots of sources. It is all very well to know how many turtles will survive in river pools in the dry season, but politicians and natural resource managers also need to know whether there might be effects on tourism income from fewer fish, and match this information against the potential gain in agricultural productivity. Is there a balance that can please most people, if not everyone? Or what happens if the river is left in its natural state? Can there be hidden advantages or costs that have not been foreseen?

It is questions like these that are being asked in one of the major projects in the TRaCK research program. Catchment groups are being asked by researchers from Charles Darwin University, CSIRO and the Department of the Environment, Heritage and the Arts, about what condition they would like to see tropical rivers, and the communities that depend upon them, in another generation. As expected, opinions vary widely, with some people wanting lots of development, others being more cautious, and some that want environmental repair. All of these opinions can be developed into scenarios to see what the likely outcomes might be.

To develop the scenarios, modellers take the results of research from numerous disciplines to help identify the conditions and policies that will be needed to realise each scenario. Some of this research uses knowledge about the biophysical processes occurring in rivers, and combines this with the economic implications of modifying river flow and function. This is then overlaid with stories about how the rivers have changed and individual views about what the future might hold under the different scenarios being modelled.

When the models are finished, the community and government can ask 'what-if questions'. What if there is more rain? What if water is stored in the wet season for use in the long period each year when there is no rain at all? What if we decide to have no further land clearing? The model will provide suggested answers, as well as showing how sensitive potential outcomes are to uncertainty. This process assists with identifying knowledge gaps and directing investment into areas of most need.

Ultimately, the fate of Australia's tropical rivers will be decided by elected politicians. The scenarios, however, will suggest what the consequences of particular decisions might be. Politicians will make trade-offs, but at least those trade-offs can be made on the basis of good science. ■

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Photos at left and below John Mackenzie. Photo at far right Michael Douglas.

Working together for a change: collaborative planning for water reform

By John Mackenzie

If you live anywhere near a creek or a bore, or if you've been following the debates about water reform in the media, chances are that you've heard about water planning. Water resource plans are meant to restore river health by addressing the overuse of the water in our rivers, recognise and ensure that water users have secure title, and allow trading of water to take place in an open market. These are just some of the important objectives of the national water reform.

Water planning has taken place elsewhere in the world, but the comprehensive and integrated way that it is being done on a mass scale in Australia is unprecedented. Right across the country, plans are being developed and implemented to allocate volumes of surface and groundwater to different purposes and to the environment, typically at a catchment level. Once established, they become binding legislation enacted by state ministers. The mosaic of catchment-based water resource plans across the landscape is linked up to state water legislation, and in turn to the overarching national regulatory framework to comprise the basis of water allocation across Australia. Consequently, achieving the central objective of water reform — a nationally consistent approach to the management of water — depends on how well the planning process occurs the catchment scale.

Under the National Water Initiative (or NWI), water resource plans must use detailed scientific and technical assessments to balance allocations for water users and for the environment. In addition, they must also consider the impacts of changed water allocation scenarios, including the impacts on the lifestyles and livelihoods of people living and working in the catchment. As such, water plans now provide an expanded role for socio-economic assessments and community consultation. These elements are intended to move water planning from the exclusive domain of technical experts, and to introduce wider scope for public involvement in deciding our water futures.

The NWI recognises the need for community engagement in water reform so that plans reflect the needs and aspirations of communities affected by changes in water availability. It also recognises the central role that water plays in the viability, vitality and sustainability of rural and regional communities. Improvements in community engagement are seen to contribute to the capacity of the regions to respond adaptively to the risks and uncertainties of the future of water availability. Introducing greater opportunities for public involvement has required significant institutional restructuring and capacity building in water agencies to accommodate these changes through ongoing learning and improvement.

To assist this effort, the *Collaborative Water Planning* project has been initiated by the TRaCK research hub to pilot and promote innovative approaches to community participation in water planning. In this project, researchers are working across four catchments in northern Australia to

develop guidelines and principles for improving the ways in which Indigenous communities, industry groups and the wider public are included in deliberations about water futures. We are also developing methods to incorporate social, cultural and economic values into planning decisions, with an emphasis on the values held by Indigenous people.

Water allocation planning has been undertaken in only a few northern catchments. In the first phase of the research, we conducted case study evaluations of the previous water planning processes in Northern Australia, focusing on the Gulf of Carpentaria in Queensland and the Ord in Western Australia. This research sought to provide a rich description of the planning process, and to assess how well people were working together to develop water plans. Most of all, we wanted to identify the factors that impede or enhance collaboration between those with an interest in water planning.

To do this, researchers travelled extensively through the catchments, and conducted interviews with a diverse selection of agency, community and industry stakeholders who had participated in the development of the plans. In these conversations, we wanted to review their initial expectations for the water planning process, and to reflect on how well the process and the plan met with those expectations. We also used the interviews to identify what people regarded as the barriers for, and enablers to, a more collaborative approach. Over a three month period, around 60 interviews were conducted across the two catchments.

These conversations revealed some of the factors limiting collaborative planning in northern Australia. The vast areas covered by water plans in the north tend to have under-developed catchment management structures, a low and widely dispersed population, and an Indigenous population facing multiple sources of social and economic disadvantage. Due to the scale of the catchments, even getting people together to meet face-to-face is logistically and practically challenging. Specific individuals are frequently called upon to participate in a range of planning exercises, and the experience of 'planning fatigue' is common. While research is ongoing, there is still insufficient knowledge and understanding about tropical river systems, and water resource science for planning is still in its infancy.

At the same time, there is a strong desire voiced in those communities to be involved in water planning. Our interviewees had an intimate awareness of how the viability of their communities is tied up with water futures. Interviewees understood that water planning plays a decisive role in stimulating economic opportunities for sustainable growth and future development. However, there was a deep scepticism towards government consultation generally. When the community devotes not insubstantial amounts of their time and resources to participate in planning, they want confirmation that they have contributed to the outcomes. People tended to feel disaffected and to lose commitment to the process when they felt like their role was to 'tick the consultation box'. This can have a flow on effect, as scepticism about government consultation contributes to a sense

People tended to feel disaffected and to lose commitment to the process when they felt like their role was to 'tick the consultation box'.

Photos at left and below John Mackenzie. Photo at far right, a Comb-crested jacana by Ian Dixon.

amongst participants that they have little influence on outcomes which have already been decided.

Although most interviewees recognised the importance of technical information and scientific research, they felt that locally-held, community expertise could be better used to supplement and enrich the technical analyses. Interviewees know that they have access to information and knowledge by virtue of their experiences living and working in the region, which may not be available to the technical assessors and scientists. They expected that their own knowledge would be taken seriously and into consideration. The planners knew this too, but integrating technical information, Indigenous cultural values, knowledge, and local experience is complicated.

For more collaborative water planning, the challenge is for planners to find ways to embrace the variety of available knowledge held by different disciplines and social groups, and to work across these distinct types of expertise. To do this, though, there is a need to more clearly specify how different forms of knowledge contribute to an effective water resource plan. At present, there is little shared understanding of what information is required from the community engagement process, and the best way for the community to provide it. In addition, the question of how best to incorporate non-technical information into the decision-making processes remains unresolved. As a result of this finding, our research will directly target this gap in its next phase.

Through our discussions with people involved in water planning, the team now has a foundational understanding of what has and has not worked so far, and where community involvement in water planning may be improved. This is central to the next phase of the project. Working together with water agencies, stakeholder groups, Indigenous communities and industry over the next 12 months, we will be piloting and evaluating new tools and approaches to enhance collaboration. The pilots will be based on participatory action research, where the planning staff and local communities will act as co-researchers by informing project design, methodologies, and even facilitating some of the research activities.

The selected approaches will be negotiated with participants by identifying the specific needs and impediments in each of the catchments. They may include mediation strategies, joint fact-finding, deliberative techniques such as citizen's juries, or the use of multi-criteria analysis. As action research, it will be an example of 'learning-in-motion', where the pilots will ideally contribute to a better understanding of collaboration for the research team, but also to better water planning outcomes for the community.

Through these pilots, we will ensure that our guidelines are based on lessons learned from applying these approaches in practice. This will help to build a shared understanding nationally around questions including when to collaborate, with whom, for what purpose, and how to report back on the usefulness of these collaborative efforts. As the guidelines are developed, they will be made available on the project website, along with progress reports and interim findings, at <www.griffith.edu.au/centre/slrc/water> ■

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Valuing tropical rivers and their ecosystem services through responsive research

By Anna Straton

A responsive, learning approach

What we know about anything in any instance — our knowledge — and how we choose to apply it, are the primary means by which we solve problems. The continual growth in our knowledge is the primary driver of the evolution of our economies and societies (Dopfer & Potts, 2007). We are constantly changing and adapting to our world through what we know and do.

Research, being a process of growing knowledge, can be very powerful in helping to solve problems, especially when it is undertaken in a way that acknowledges that knowledge comes from many different sources. One way to do this is by using approaches that formalise the flow of knowledge between researchers and the communities of interest they interact with, in ways that allow research projects to change in response to this shared knowledge.

The *Valuing tropical rivers and their ecosystem services* project of the TRaCK research hub is using this responsive approach in guiding the objectives of the research. Changes to the objectives of the project have already been made in response to the sharing of knowledge through processes of consultation.

The project

The tropical river systems of northern Australia are of economic, social, cultural and environmental importance. They provide for the activities people value, such as fishing and farming, and offer other benefits, such as enjoyment and relaxation. This project will assess these values and how they have changed through time through three case studies: the Mitchell catchment in Queensland, the Fitzroy catchment in Western Australia and the Daly catchment in the Northern Territory.

The first stage of the project began in mid-2006 and involved contacting the stakeholders and communities of interest for each catchment. These communities included state/territory government department staff, regional NRM body staff, federal government department representatives, catchment group staff and members, landowners, Indigenous groups and organisations, research groups, representative industry organisation staff and members, and non-government organisation staff. Letters and an information flyer were sent out, followed by telephone calls to arrange face-to-face meetings. The meetings were held during two field trips: to the Fitzroy catchment region in November 2006 and to the Mitchell catchment region in April 2007. Meetings were held for the Daly catchment case study at various times throughout the latter part of 2006 and all of 2007.

***Above**: Travellers from around the world come to camp on the sand banks of the Daly River, NT.*
***Photos to the right**: The Mitchell River snakes across the lower wetlands near Kowanyama on the western side of Cape York carrying the nutrient rich waters that feed the highly profitable fisheries of the Gulf of Carpentaria. Photos throughout this article by Anna Straton.*

Participants in the meetings discussed the project, its key concepts ('value' and 'ecosystem services'), objectives, proposed methods and outputs. Also discussed were the values and uses of each river, the issues requiring consideration or solutions, existing research and projects for the river, and how the project could best benefit each community of interest in achieving their goals for the river. These meetings were a significant process of learning, and resulted in three field trip reports available to other members of the TRaCK research hub as 'background' documents.

Shared learning so far

Discussion of the key concept of the project — 'value' — yielded much learning and impetus for the modification of the research project to be more in line with what community members thought was important and would be useful. The term 'value' has different meanings in different contexts. In general, it refers to the worth or desirability of something, and it therefore sits at the basis of many of our decisions about what to do in any given situation: 'which choice will bring about the more desirable outcome?' The way most economists tend to interpret the 'most desirable outcome' is as the one with the greatest 'net present value', and so value is measured in economic (dollar) terms. If the benefits and costs of all options are translated into dollar terms then we can evaluate which will bring us the most benefit. However, some see this calculation as too reductionistic, especially when the value of something involves many costs and benefits that are overly simplified by estimation in dollar terms.

Originally, the project was explicitly about the economic value of tropical river ecosystem services, being the provision of physical resources (such as timber and water) and of supporting processes (such as pollination, the maintenance of healthy river flows and groundwater levels, the maintenance and regeneration of habitat, and the dilution and removal of wastes). While it was acknowledged during discussions that knowing the economic value of some of these services would be useful, it was also felt that there was a need to: (1) understand their value in other terms; and (2) understand the value of other features/uses of tropical rivers.

1. Understanding value in terms other than just economic

In response to discussions about how the value of tropical rivers can be expressed, community members asserted that the values that people hold and the stories they tell are important, as is the history of use. We decided to undertake an additional exercise to identify changes in the features and uses of tropical rivers over time, as well as changes in the values expressed for tropical rivers. This information will be put together as a picture of changes in how the river looks, is valued and is used. This analysis will enable learning about the likely impacts of a set of future development scenarios.

Acknowledgements

I would like to acknowledge the Myer Foundation and Land & Water Australia for funding this research and collaborators on the project, Drs Nick Abel and Sue Jackson from CSIRO Sustainable Ecosystems, and Drs Kerstin Zander and Adam Drucker and Professor Stephen Garnett from Charles Darwin University. I also thank Dan Walker and Jo Savill for their comments on an earlier draft.

2. Understanding the value of other features/uses of tropical rivers

Discussions in several meetings revealed demand for an understanding and estimate of the economic value of some non-market uses of tropical rivers, as well as of ecosystem services. Ecosystem services are one category of use, product or service provided by any natural system, in fact, they underpin most other values of natural systems. People expressed interest in estimations of other categories of use, broadly termed non-market uses. Non-market uses of tropical rivers are those that are unpriced and don't have a market. They include unpriced benefits, such as visual amenity, spiritual benefits and some types of recreation, option values, existence values and bequest values. Examples that arose in the meetings of uses that people were interested in having an economic estimation for, included: customary hunting and fishing activity, sacred sites, and self-guided recreational fishing.

In response to these discussions, and combined with some other needs, such as how to ensure that the results of the project can best add value to the whole TRaCK program of research, it was decided to use the choice modelling method of monetary environmental valuation. The choice modelling method will estimate the economic value of a set of attributes of tropical rivers, some of which will relate directly to ecosystem services, such as river flows and aquatic habitat, while others may relate to other uses of tropical rivers, such as Indigenous customary use and the provision of ponded pasture for cattle.

Boosting impact through more responsive research

Both the economic valuation and the historical analysis will serve to provide input into another TRaCK project that will be developing and evaluating a set of potential development scenarios for the three case study catchments. The economic valuations will provide dollar equivalents of how much benefit will be received (or loss experienced) if we choose one development scenario over another. The historical analyses will provide a longer term systems perspective of the many different features of the values held for tropical rivers and how they have changed through time.

Researchers have learned from the communities of interest for each catchment about how to ensure the project can best provide input into the questions people have about the management of each river system, and how the project's main concepts can be used to best reflect the needs and understanding of the communities. In turn, people in the communities of interest have heard about the concepts that are being used in research, and in support of key decisions about natural systems. The concepts of 'value', 'economic value', and 'ecosystem services' have been (re)introduced to communities and discussed in the form of key concepts guiding policy making about the development of Australia's tropical rivers.

To find out more about this project, including its progress, findings and outcomes, please contact Anna Straton. ■

For further information

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Reference

Dopfer, K. & Potts, J. 2007, *The general theory of economic evolution*, Routledge, Oxford.

Below: The glorious Geike Gorge on the Fitzroy River of WA is a drawcard for tourists and is still the 'larder' for many people of the Fitzroy Valley. Photos Anna Straton.

How do we to tap into recreational fishers' knowledge to help conserve our riverine environments?

By Caitlin Howlett

The Aquatic Habitat Rehabilitation program (AHR), run by the Conservation Action Unit of the NSW Department of Primary Industries, implements on-ground projects with a strong community focus to bring about best management practices on public and private property. Program staff work extensively with local landholders and communities to improve aquatic habitat, from the riverbed to the riparian zone and beyond. However, the AHR program faces a variety of challenges whilst carrying out on-ground works. One challenge currently being focused on is how to tap into the local knowledge of recreational fishers to get them involved in aquatic rehabilitation activities.

It is interesting that in Australia recreational fishers are still slowly adapting to the concept of habitat preservation and rehabilitating degraded waterways. When compared to countries such as Canada, the United States of America and the United Kingdom, Australia is behind in getting recreational fishing communities working effectively on conserving and protecting the aquatic environment. This goes against the reality that recreational fishers spend a lot of their time by the water and are very knowledgeable about the waterways they fish along. Recreational fishers see changes that occur to the river, lake, stream or coastline, and their keen level of observation means that they are often the experts when it comes to explaining whether changes to the waterway are natural seasonal changes, or as a result of human impacts.

The experiential knowledge recreational fishers have is something that the AHR program wants to access, as riparian and waterway restoration efforts could be greatly enhanced through increased cooperation with this group of the community. If you have any ideas about how this can best be achieved, or maybe some examples of where it has been successfully done in your community, contact Caitlin Howlett. ■

David and Dean, members of the Sea Bees Boating Club. Photo Max Castle. Photo below Luke Pearce.

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Many more pamphlets and publications are available from the website, as is further information about the work that AHR program undertakes: <www.fisheries.nsw.gov.au/aquatic_habitats/rehabilitating-habitats/rehabilitation-program>

New report: Endocrine Disrupting Chemicals in the Australian Riverine Environment

By Tuppy McIntosh

Photo *from midground left to right: CSIRO's Dr Anu Kumar and Dr Simon Apte join Dr Fred Leusch of EnTox, University of Queensland, in a discussion with Dr Rai Kookana, CSIRO research team leader on the technical report* Endocrine Disrupting Chemicals in the Australian Riverine Environment. *Photo Tuppy McIntosh.*

Led by Dr Rai Kookana, an Adelaide-based CSIRO team has undertaken research to assess the levels of a pre-selected group of Endocrine Disrupting Chemicals (EDCs) and their potential for endocrine disruption at targeted sites across Australia. To provide a basis for future risk assessment, the project aimed to determine factors that could influence the rate of EDC degradation, and develop a research methodology appropriate for Australian ecosystems. The result of this work is now available in a technical report, *Endocrine Disrupting Chemicals in the Australian Riverine Environment*.

Launched in Canberra during the 'What's in Our Water: The Second Australian Symposium on Ecological Risk Assessment and Management of EDCs, Pharmaceuticals and Personal Care Products in the Australasian Environment', the report was well received by over 170 Australian and international researchers and regulators.

The most cited UK scientist on the topic of environment and ecology, and one of four international keynote speakers at the event, Dr Susan Jobling, commented that levels of aquatic EDCs recorded in the report mean that species living in these waterways would already be affected. To promote the plight of these Australian aquatic ecosystems, Drs Kookana and Jobling were joined at a post-symposium workshop by 19 other Australian and international researchers, policy makers, regulators, water suppliers and research investors. The group drafted *The 2007 Black Mountain Declaration on Endocrine Disrupting Chemicals in Australian Waters* that outlined future research priorities and objectives.

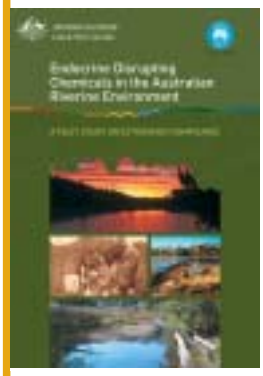
The position paper's objectives support the annually reviewed Prague Declaration on Endocrine Disrupting Chemicals (2005) which states:

> "For the foreseeable future, regulation of endocrine disruptors will have to cope with the tension between the biological plausibility of serious, perhaps irreversible damage and delays in generating data suitable for comprehensive risk assessment. In view of the magnitude of potential risks, we strongly believe that scientific uncertainty should not delay precautionary action for risk reduction."

It is hoped that the Australian public will assist government to steer onto the precautionary path recommended by researchers, as well as its international peers, in regards to both regulatory acknowledgement, and a thorough risk assessment of endocrine disrupting chemicals in our unique environment. ■

If you would like further information on EDCs or a copy of *The 2007 Black Mountain Declaration on EDCs in Australian Waters*, please contact Dr Stuart Pearson on (02) 6263 6007.

To order a free copy of the technical report



Endocrine Disrupting Chemicals in the Australian Riverine Environment telephone CanPrint 1800 776 616 quoting product code PR071403 or to download a pdf version, go to <www.lwa.gov.au> and follow the links.

Irrigation futures of the Goulburn Broken catchment

By Sarah Leonardi and Leon Soste

Irrigation communities throughout Australia are facing an uncertain future driven by decreasing water security, climate change, global economics and changing community preferences.

Irrigated agriculture is a major industry in the Goulburn Broken region, producing around $1.2 billion at the farm gate from approximately 280,000 hectares of irrigated agricultural land. Investment in on-farm and processing infrastructure is about A$100 million per year.

The Goulburn Broken Irrigation Futures project, through the National Program for Sustainable Irrigation, was established to assist the regional community to plan for the future. The project used scenario planning coupled with extensive stakeholder engagement to develop a vision and strategies for the future of irrigated agriculture in the Goulburn Broken catchment. The project has demonstrated that scenario planning can be used with communities for regional planning. It has developed a methodology for regional scenario planning that can be used by other communities, a step-by-step guide to the processes used, and an overview of the lessons learnt by the project team.

The project developed four scenarios of how the future might unfold over the next 30 years. These scenarios were then developed further to highlight implications for business, the environment, communities and the region. A suite of regional response strategies were developed in response to the scenarios. The assessment process then focussed on the implications for strategic planning and the operational activities of particular agencies dealing with irrigated agriculture, with each agency developing appropriate response strategies.

Changing community views

Many of the issues and concepts dealt with in developing the scenarios and identifying their implications for the region, were complex. As such, participants needed time to understand and come to terms with many of the discussions. The research team found that allowing time, within and between workshops for participants to reflect on the issues and concepts, enabled their thinking to develop and change. For example, at the start of the Technical Working Group process, many participants thought lifestyle residents (treechangers) were a threat to the agricultural productivity of the region. At the conclusion of the process the attitude of many participants had changed, with lifestyle residents seen as valuable contributors to the regional economy and community. These changes in thinking around potentially controversial issues had significant influence on the nature of the regional strategies developed, and improved the quality of the project findings considerably.

Strategies for the future

The scenarios provide a solid foundation for discussions about how the region can prepare for the future. As the project progressed, parts of the scenarios became reality. For example, one of the scenarios suggested that the Federal Government would take over responsibility for water resources, while another suggested a drought would result in water allocations as low as 30%. The fact that these scenarios occurred did not diminish their value. In fact, it helped build the participants confidence in scenario planning.

The four scenarios present four very different possible futures, each with their own significant challenges and opportunities. The implications of the scenarios were assessed by considering the impact of each individual scenario, and all the scenarios collectively, on the major areas of regional competencies — these being features that make the region attractive for investment and living.

The Technical Working Group. Photo courtesy of Department of Primary Industries, Victoria.

Five strategies to respond to these scenarios were identified:

- Land and water for agricultural production including — flexibility in irrigation water supply infrastructure and service level requirements; adaptation of irrigation drainage infrastructure and management; evolution of water management on farms as well as collaboration for integrated land use planning.
- Agribusiness — developing the agricultural workforce; developing new agricultural products and markets; more flexible and robust agribusiness structures and, actively maintaining access to resources.
- Communities — maintaining active community organisations; encouraging development of regional community infrastructure and, lobbying governments.
- Environmental assets — providing vision for the environment and encouraging adaptive environmental management on farms.
- Institutional support — supporting communities during tough times and times of change; establishing regional frameworks for adaptive management; building knowledge management; regional communication, cooperation and decision making.

NATIONAL PROGRAM FOR
Sustainable Irrigation

Rosie Qu drawing showing outcomes of different future scenarios.

An informed future

To ensure that the project results inform future planning in the region, work is underway to build scenario assessments and strategies into forward planning cycles. As a result, the plans of Goulburn Murray Water, Goulburn Broken Catchment Management Authority, the City of Greater Shepparton and Shires of Moira and Campaspe reflect inputs from the Irrigation Futures scenarios.

A series of reports from Irrigation Futures are available to help individuals, businesses and other organisations plan for uncertain futures. These can be accessed at <www.npsi.gov.au>

Next steps

The National Program for Sustainable Irrigation, Goulburn Broken Irrigation Futures project has shown that scenario planning can be used with regional communities to plan for uncertainty. It also highlights that agencies and enterprises will need to build flexibility and adaptability into their processes if they are to successfully manage an uncertain future. The project has provided tools and guidelines to assist this process. Further development of such tools is needed. Through this project a cross section of community and stakeholder organisations contributed their knowledge and ideas, allowing exploration of the future of irrigation in the region and building their capacity to deal with what the future might hold. ■

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If you want to keep up to date on findings from the NPSI, why not subscribe to their *Irrigation update* series — to do so send an e-mail to carmel.ewing@lwa.gov.au

Healthy soils: getting down and dirty

By Frances Hoyle

Australian soils support our industries and communities, and provide many essential services such as water filtration, carbon storage and nutrient recycling. They are therefore an important national asset and we must manage them with care for the future. Australian agriculture and horticulture, and the export income and regional economies that depend on them, face significant challenges from continuing degradation of the soils that underpin all production. Degrading processes are likely to be exacerbated under climate change and increasing variability of rainfall. Modern cropping methods such as controlled traffic, residue retention and direct-drill or no-till can help to slow or reverse these degrading processes, but it is unclear how they can be implemented profitably over the long-term under a changing climate. Working out how best to manage soils for resilient production under climate change is a high-priority for additional research, development, extension and communication to underpin on-farm adoption.

The LWA Healthy Soils Program has been developing national messages around the 'functions of a healthy soil' and the 'habits of healthy soils farmers' putting together technical material on soil constraints, discussing aspects of 'how to do it better' and developing farmer derived case studies across different industries and regions. The Healthy Soils Knowledge Bank will be web enabled and have a number of different entry points for growers and agribusiness, and is expected to be operational in mid to late 2008.

The LWA Healthy Soils Knowledge Bank will strive to integrate existing knowledge and practices on soil, discussing likely benefits to growers and the wider community on the economic, social and environmental impact of practice change on not just the physical and chemical aspects of soil, but also on its biological function and resilience to stress. The web delivery will enable diagnostic approaches for problem soils and provide a filter to access regional and industry specific information ('signposts') on soil health. The need to better understand our soil resource condition is magnified under continued pressure to maintain profitability under a changing climate, reduce energy and input costs, whilst increasing production efficiency and conserving natural resources (i.e. water, carbon). The information developed and delivered through the knowledge bank will be an integral step in educating, informing and supporting practice change to achieve these goals. ■

healthy soils for sustainable farms
a natural heritage trust initiative

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Photo Canegrowers.

The farm sustainability dashboard

By Russell Pattinson

Have you ever thought that running a successful primary production business is a bit like driving a car? Or perhaps more correctly, like flying a plane. You have to keep your eyes on numerous dials and gauges to make sure that everything is running smoothly, that you don't run out of fuel, and that you and your family will get to your destination safely, on time and enjoyed the trip as well.

Well recently, LWA challenged its SAGE Farmer project to consider whether it was possible to design a dashboard of key indicators that could help guide a business along a sustainable flight path — environmentally, financially and from a personal/social perspective! The outcome is the Farm Sustainability Dashboard.

The SAGE Farmer group was formed in 2005 and brought together 12 farmers from a wide variety of agricultural sectors to discuss sustainability issues. In the air traffic control tower were Russell Pattinson (Miracle Dog Pty Ltd), Peter Day (Peter R Day Resource Strategies), and LWA management to help guide the group and to focus on the following questions:

1. Could a "dashboard" of key indicators be developed that made sense to farmers in different commodities and different regions?
2. Would the dashboard, or the process of populating it, be of value to farmers?

Over a period of almost two years, a prototype Dashboard was successfully developed, revised several times and subsequently automated.

The Farm Sustainability Dashboard is an innovative farm-scale, interactive tool that encourages the user to think broadly about a farm business, its relationship with the environment and the owner/manager's personal and social values. It can be used to generate a visual report of key indicators of the condition of a farmer's land and associated business. The visual, like the one on this page, is produced after answering a series of questions about farm and business condition.

The Dashboard is available on LWA's website to trial and provide feedback. It is relevant to farm service providers, agricultural extension officers, NRM facilitators, rural research and development corporations, educators and farmers. Importantly, it does not seek to be an accurate diagnostic or problem solving tool for an individual business in a specific region, as this would require the application of appropriate benchmarks for the 'dials' (which are usually too variable between agricultural sectors or may not be available). Its real value is in making people think about factors that previously may not have been on their radar, and consider how these factors interact (both positively and negatively), rather than focusing on one component in isolation (e.g. water use efficiency). LWA is keen to get views on:

- Does the Dashboard have value as a communication tool?
- Could the Dashboard contribute to influencing farmers to change practices if it was given the necessary support?
- How should the Dashboard be extended?
- Are there existing programs that could use and extend the Dashboard?
- What is the most useful thing the Dashboard could be used for?
- Are all the dials meaningful and necessary?
- Are there better dials/measures that we could use for some items?

The Sustainability Dashboard is recommended to groups or individuals wanting to challenge themselves and to help prompt deeper thinking about the sustainability of their operations. So if you're open to a challenge and interested in 'sustainability', get hold of a copy of the dashboard and have a go at filling it out — <www.lwa.gov.au>

We hope you "enjoy the flight" and we look forward to your feedback. ■

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For a hard copy of *Sustainability Dashboard, How to use it* contact CanPrint on 1800 776 616 and quote product code PB071329

Community science in action: the 'Biodiversity in Grain & Graze' project

The relationship between biodiversity and on-farm production was under the microscope when researchers and farmers gathered at the Biodiversity in Grain & Graze (BiGG) Farmer Forum in Hobart in late January. The BiGG project is investigating the relationship between biodiversity and on-farm production and involves 47 farms across Grain & Graze's nine national regions.

Grain & Graze is a collaborative partnership between Meat & Livestock Australia, Australian Wool Innovation, the Grains Research and Development Corporation, and LWA that aims to boost the profitability of Australia's mixed farms. The Natural Heritage Trust is also a significant investor, specifically in the BiGG project.

With the approval and support of the collaborating farmers, field research officers monitored and collected biological samples each autumn and spring in four paddocks, with different land uses, over two years. The biodiversity information collected by the field officers went hand-in-hand with landholders actively working towards improving natural resources on their farms.

The farmers play a vital role in the project and that is why they were invited to Hobart to meet with the BiGG research team, share the knowledge and experiences of their individual properties and the data collected on-farm. The information collected in the BiGG project is in the process of being been analysed by a research team. The information collected includes soils — nutrients and decomposer activity; vegetation, invertebrates — beetles, spiders and ants; and, birds. So far, the project has collected more than 225,000 "bugs" of which "every single one" has been categorised by the science team.

For the researchers, much of the material collected has been an unexpected bonus. A number of new beetles have been identified, including several rare native weevils not seen for about 100 years. The research has also discovered a rare trap door spider in Western Australia, while in the bird surveys, of the 193 species identified, 33 of the species are listed by either state and/or federal governments as threatened species.

Photos throughout this article courtesy of the Grain & Graze project team.

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Profit through knowledge

The project has revealed that there are substantial amounts of biodiversity alive and well and living on Australian farms. Across the 47 farms the project investigated, there was a large range in the numbers of native invertebrate species. It has also supported the case for undertaking 'community science' projects, as farmers have been part of the research team collecting data and information about biodiversity on their properties and in their regions. This makes sense, as farmers are generally keen observers, and very knowledgeable about the area in which they live.

While the collaborating farmers expect the Biodiversity in Grain and Graze (BiGG) project to deliver meaningful results which better help them to manage their mixed farming systems, the project will have wider consequences in the scientific material it unearths about the state of biodiversity on Australia's mixed farms. One of the outcomes of the Hobart forum was a call by the participating farmers and the industry investment partners to see if this understanding could be turned into guidelines for improved management practice. ■

... supported the case for undertaking 'community science'

For further information

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If you would like more information about Grain & Graze, sign up for the e-newsletter at <http://products.lwa.gov.au/products.asp>, <www.grainandgraze.com.au>

GRDC Grains Research & Development Corporation
Australian Government Land & Water Australia
australian wool innovation limited
mla MEAT & LIVESTOCK AUSTRALIA

Insights into mixed farming in Australia

Grain & Graze recently published *Insights into mixed farming in Australia* — a collection of case studies of Australian families involved in mixed farming. The publication tells the stories of 26 successful farmers and how they are tackling mixed farming in more innovative and efficient ways to improve the profitability of their enterprise. The case studies reveal how farmers consider different information to make appropriate decisions, taking into account financial, social and environmental circumstances. *Insights into mixed farming in Australia* provides great insight into management practices for a whole-farm, sustainable approach to mixed farming. ■

Four Grain & Graze **fact sheets**

Four Grain & Graze fact sheets have just been released around the following topics:

- Biodiversity and productivity
- Feedbase management
- Grazing cereals
- Integrated pest management (IPM)

The fact sheets contain a synthesis of the latest national and regional research projects and findings from the Grain & Graze Program. Biodiversity and the farm feedbase are national research subjects for Grain & Graze and its mixed farmers around the country. The new fact sheets condense a wealth of information into simple, no-frills English. ■

Insights into mixed farming in Australia and the fact sheets are available through Land & Water Australia: To order, contact CanPrint on 1800 776 616 quoting product code PK071331 (Insights into Mixed Farming), PF071391 (Integrated Pest Management), PF071392 (Biodiversity and Productivity), PF071393 (Feedbase Management) and/or PF071394 (Grazing Cereals) or go to <http://products.lwa.gov.au/products.asp> where you can order or download these publications.

Helping landowners better face the challenges of Australia's variable climate

By Mary O'Callaghan and Michelle Riedlinger

As land managers under one of the world's most variable climate regimes, Australian farmers and landowners face the challenge of significant variability in inter-seasonal and inter-annual water availability. The Managing Climate Variability (MCV) Program is helping natural resource managers and producers manage the risks associated with climate variability by improving seasonal forecasts and access to climate knowledge and tools.

Rather than investing in climate change science, MCV aims to provide management-orientated climate knowledge relevant to the timeframes that influence farmer and natural resource manager decision making — that is, on a seasonal or inter-annual scale.

One such MCV project is helping landowners manage a manifestation of climate variability unique to tropical Australia. In the northern reaches of the country, industries such as grazing, grain, sugar and horticulture are heavily influenced by the wet season characteristics. Seasonal variability in rainfall amount and distribution, for example, creates significant uncertainty in predicting the amount and quality of pasture production, while variability in timing of the end of the wet season influences pasture availability and nutrient levels in the dry season.

However, landowners may soon be able to predict the onset and duration of the wet season, thanks to a new forecast coming out of Queensland's Climate Change Centre of Excellence and the Bureau of Meteorology. Lexie Donald, the project's Principal Investigator, hopes to be able to forecast by August each year, when the wet season will arrive, and when the wet and dry spells will occur during the wet season.

"This will be very useful for graziers, who usually have to make their best guess about stocking rates, turn off, what mineral supplements to buy and how much pasture might be available," said Lexie.

The research group has been talking directly with landholders and industry groups to determine how to best deliver a forecast that meets rural management needs. They found that landholders in northern Australia wanted to know the probability of wet season onset by a particular date, rather than the predictions of the three-month mean that they currently rely on. As a result of these discussions, the group has constructed a forecast scheme that predicts the onset, duration and decline of wet season.

The research builds on existing forecast capabilities, using El Niño — Southern Oscillation (ENSO) indicators to predict the onset and strength of the wet season, and the Madden-Julian Oscillation to determine the pulse of the wet season. The impact of ENSO is such that it can result in inter-seasonal differences in rainfall amount of up to 700 mm in some locations.

The predictions will allow better decision making across rural industries, providing important information, for example, for supplementary feeding and stock movements, prediction of degradation events and sowing of pastures. Beyond the rural industries, an effective wet season prediction will have significant ramifications for the construction and tourism industries. The forecast may also be of benefit to community health, with health centres able to better prepare for outbreaks of diseases correlated with heavy rainfall, such as malaria and pneumonia.

Another project running under the banner of the MCV Program is investigating climate variability on a considerably greater timescale, studying global climate systems to determine the impacts of variability on long-term water availability.

Motivated by the string of years with below average rainfall in the southern Basin region, researchers with the South Eastern Australian Climate Initiative (SEACI) have found that rainfall in south east Australia is not only sensitive to the occurrence of El Niño in the eastern equatorial Pacific, but also to patterns of sea surface temperature changes in the central Pacific. Principal Investigator Dr Bryson Bates, says that these findings help explain why some major El Niño events only cause mild droughts, whereas some weak El Niños are associated with severe droughts.

A research team from around the country has found that a combination of factors has led to 2006 being the third driest year in terms of rainfall for the region since 1900.

Inset: The team in western Queensland, from left to right, Matt Wheeler, Fiona Lo, Lexie Donald, Neil White and Sarah Lennox. Photo courtesy of the project team.
Main photo Roger Charlton.

"Even though this isn't the lowest rainfall we've had, there is less water available in Murray-Darling Basin storages. This is because the impacts of below average rainfall have been exacerbated by three factors: a temporal shift in the rainfall pattern, higher air temperatures; and low year-to-year rainfall variability since 1996," said Bryson.

SEACI's mission is to look at future water availability for the southern Murray-Darling Basin. This work is important for decision makers involved in water planning and allocation in the Murray-Darling Basin. Researchers are projecting water availability in 2030 and 2070.

"This past decade has been different from all other decades since 1900. We haven't had a single year with above average rainfall and have experienced record high surface temperatures. Are we looking at a drought or a long-term change in our climate? The answer to this question will be important for ensuring that there is a secure supply of water in the future." (Bryson Bates)

By increasing our understanding and predictability of three large-scale climate drivers — El Niño (the Southern Oscillation), changes in Indian Ocean sea surface temperatures and the Southern Annular mode (hemispheric changes in windiness and storm activity over the Southern Ocean and Antarctica) — researchers now have a better understanding of their influence on rainfall variability in the region.

"While changes in the Southern Annular mode can account for rainfall changes in autumn, sea surface temperature variations in the Indian Ocean and Coral Sea appear to account for a larger part rainfall variability in spring," Bryson said.

The challenge ahead is to better understand how these variations in climate drivers interact to produce changes in rainfall, temperature, wind and evaporation. ■

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If you want to keep up to date on findings from the MCV Program, why not subscribe to *Climag* — a newsletter with the latest on climate research.

To subscribe, send an e-mail to carmel.ewing@lwa.gov.au

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