

## **Part 2: The case studies**

## 2 Pastoral stakeholders and regional NRM planning: Designing better partnerships in savanna regions

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### Introduction

The pastoral industry in Australia's northern savannas operates across the semi-arid and tropical rangelands environments of the Northern Territory, Queensland and Western Australia. Pastoralism is the major land use by area in these jurisdictions. Pastoral tenure accounts for forty-six percent of the Northern Territory with some 217 pastoral leases<sup>1</sup> and seventy percent of the Kimberley region with ninety-three leases for pastoral purposes<sup>2</sup>. In Queensland's Burdekin region, pastoral land use is estimated at some ninety-six percent of that region's land area<sup>3</sup>.

Pastoralism is significant both economically and culturally to savanna communities and regional identities. The industry however is not a single homogenous entity. It consists of diverse enterprise types with equally diverse management aspirations that operate in a range of environmental and institutional settings (Fargher *et al* 2003; Bortolussi *et al.* 2005a). Looking across the northern savannas, a simple example of this diversity is seen in a subset of the industry, such as large-scale commercial beef producers (see Table 1).

Savanna pastoral regions and the values associated with them are changing. In addition to traditional production values there is increasing recognition of biodiversity conservation, cultural, spiritual and customary economic values in these regions (e.g. Holmes 2000; Ash and Stafford-Smith 2003).

These different values influence decisions about regulation, investment and management of pastoral lands, and which stakeholders have a say in those decisions. Because of this these values are often highly contested. Recent reviews of policy, legislative and planning instruments that govern access to and use of pastoral land (e.g. Queensland's Rural Leasehold Land Strategy and the Northern Territory Government's Pastoral Lands Act) reflect some of these changing values. Pastoral industry groups are participating in these reviews, and in some cases are playing a major partnership role in social and economic development agendas for regions through these policy initiatives (e.g. Queensland Government 2005).

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<sup>1</sup> Department of Infrastructure Planning & Environment, 2004

<sup>2</sup> Rangelands NRM Coordinating Group, 2005

<sup>3</sup> BDTB, 2005

<b>Table 1:</b> Variation between average commercial beef property sizes (ha) and herd sizes (head) across four northern Australian regions in 1996/7 (Source: Bortolussi et al 2005a).				
Region	Property size (ha)		Herd size (head)	
	Mean	Median	Mean	Median
Nth Queensland (Burdekin)	68 320	25 950	4881	3500
Nth West Queensland (Gulf)	116 521	36 310	8601	3850
Nth Northern Territory	408 950	304 200	17 835	13690
Nth Western Australia (West Kimberly and Ord-Victoria)	521 785	286 216	17 106	5250

There are growing expectations by governments and the community that industry groups and individual pastoralists will also support and engage in natural resource management agendas at local and regional levels. These expectations stem from the reality of pastoralists as key managers, observers and agents of change of natural resources. For example, nearly half (48%) of northern commercial beef producers surveyed in 1996/7 reported some presence of erosion, salinity, or weed problems. In most regions surveyed, over two-thirds (68%) reported the presence of woody weeds (Bortolussi *et al.* 2005b).

Regional initiatives funded under the Natural Heritage Trust (NHT) and National Action Plan for Salinity and Water Quality (NAP) are presented as an important focal point for ‘industry’, community and government collaboration to address resource management issues on grazing lands. If this regional model is going to be effective, the ability of regional NRM bodies and the pastoral industry to work in partnership is critical. The Draft WA Rangelands Strategy clearly states for example that the pastoral industry is:

“the most geographically significant industry in the rangelands, considered a key stakeholder group for engagement [and] for the implementation of NRM actions.” (RCG 2005, p.11)

A recent evaluation of regional NRM planning arrangements in northern Australia (McDonald *et al.* 2005) indicates however that the regional model was achieving only ‘mixed success’ with pastoral industry engagement. Findings also suggest that cooperation between regional NRM activities and pastoral industry initiatives is underdeveloped and possibly poorly targeted in several regions. Given this, there is then a need to ask: i) how are these partnerships progressing at the regional level; ii) what are the experiences and views of industry players on regional NRM; and, iii) how might these inform more effective partnerships in the future?

## **Objectives**

The objectives of this case study are to:

1. Explore the involvement of the pastoral industry in NHT and NAP planning and investment activity (and in NRM more broadly), and;
2. Contribute to identifying strategies to improve partnerships between the pastoral industry and regional NRM bodies in savanna regions.

This case study explores some of the experiences and perceived barriers to industry involvement during the establishment of regional NRM bodies, their planning and early investment phases.

## **Approach**

Thirteen (13) semi-structured interviews were conducted with interviewees from Northern Territory, Kimberley and Queensland NRM regions between September 2005 and early 2006. Individuals from the following organisations or networks participated in the interviews:

- Northern Territory Cattleman’s Association, Pastoralists & Graziers Association (WA), and Agforce (QLD);
- Landcare coordinator and facilitator networks;

- Staff of Regional NRM Bodies in the Burdekin Dry Tropics, the Landcare Council of the Northern Territory<sup>4</sup>, the Kimberley sub-region of the Western Australian Rangelands and the Ord Catchment Reference Group;
- State and Territory government science, policy and extension officers of the Department of Agriculture (WA), Water and Rivers Commission (WA), Natural Resources Environment and the Arts (NT), and, Department of Primary Industries (QLD).

The analysis of the interview data was structured around the main themes of the interview questions and sub-themes emerging within those data sets. The core interview questions sought perceptions and experiences on:

- The status of pastoral industry involvement in natural resource management planning and investment in regions or jurisdictions;
- How this involvement was occurring;
- What they believed to be some of the costs and benefits to date from industry involvement; and,
- Perceived level of alignment between current industry directions and NRM planning and investment.

## **Key findings**

The findings are presented under the following three major headings: 1) experiences and perceived barriers in the planning phase; 2) the role of pastoral and subregional land management networks; and, 3) emerging partnerships in regions.

### **Experiences and perceived barriers during the planning phase**

Peak industry representatives raised several issues in interviews they believed influenced producers', or the industries' involvement in regional NRM to date. They stressed that at whole of industry level, NRM is "one of many" issues on the industry's crowded agenda that includes other important issues such as improving market access and reducing export costs, "Indigenous issues", and anticipated transition of pastoral leases or changes to lease conditions.

One industry representative stated that even individual land managers "who are genuinely interested don't have the time and resources to allocate to NRM compared to other areas" and that often "only larger properties with managers" could allot that time. It was also reported that involvement is unpalatable to many landholders because of perceived accountability burdens:

"land managers feel thwarted by the overspill of people wanting to monitor and check on everything happening on their properties, some accountability is OK but [they are] currently being monitored up the hilt".

During plan development and consultation phases the benefits of involvement at the regional level was often reported as unclear to the industry or individual producers. In particular several interviewees reported that it was difficult to see where local aspirations were addressed through regional level priorities in plans, evident for example in one comment on the Northern Territory INRM plan:

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<sup>4</sup> At the time of interviews the nominated regional body for the NT investment region was in transition from the *Landcare Council of the Northern Territory* to the *Natural Resource Management Board (NT) Inc.* These new arrangements were announced in December 2005

“...the [regional plan] tries to connect but there is little integration between land managers’ aspirations and directions in the plan”

Also in the Territory interviews were concerns that the regional planning process had not effectively engaged pastoralists and had marginalized the pastoral networks in place. This was despite one interviewee believing the industry had a “strong voice” through representation on the regional NRM board. Concerns were also voiced in the Landcare sector that the planning process had been a “top down, information provision exercise” that had disenfranchised local groups resulting in “no one on-ground to deliver outcomes” and fears that funding would be diverted from the local level<sup>5</sup>.

An industry representative from a different jurisdiction raised similar concerns stating they were seeing “more and more facilitators, advisers and administration people rather than good on-ground environmental outcomes”. At the time of interviews, main funding programs and projects were being drafted in several regions. One criticism expressed:

“...the community cant see how the priority setting process addressed their issues...how it divided up the spoils? ...how it will fund staff at the local level?”

One interviewee also identified potential risks associated with “getting too close” to the regional process until the ambiguity of government commitment and on-going funding was resolved. In the Queensland context it was stated that experiences with earlier regulatory planning processes in the State has ‘burnt out the more forward thinkers’ in the grazing sector, thereby reducing their desire or interest to get involved in the regional NRM process. Another barrier to engagement identified by state-wide industry groups was the different cultures or approaches of regional NRM bodies in dealing with producer groups.

Therefore, it appears that the experiences of pastoral industry stakeholders in NRM plan development and early engagement efforts – in particular representative or peak industry groups - are largely reported as unsatisfactory with benefits and outcomes unclear and seen as potentially threatening to existing industry efforts or a distraction from their main priorities. These ‘industry’ views agree with regional NRM body and state agency perspectives on industry engagement during the same period as reported in McDonald et al (2005).

### **Land management networks in regions**

The majority of interviewees, particularly in the Northern Territory and Western Australia highlighted the importance of existing regional and sub-regional networks of pastoral land managers to achieve NRM outcomes. In the NT these networks largely consist of Pastoral Landcare groups and, in the Kimberley and broader Rangelands NRM region, Land and Conservation District Committee’s (LCDCs).

Northern Territory interviewees reported that since the early 1990s pastoral Landcare groups have provided support for awareness raising and on-ground practice improvement. Industry estimates are that some 85% of pastoral landholders in the Territory actively participate in these networks, which historically have been funded through the National Landcare Program and more recently the Natural Heritage Trust. These networks include organisations such as the Barkly Landcare & Conservation Association (BLCA); Victoria River District Conservation Association (VRDCA); and Centralian Land Management Association (CLMA) and are aligned with major pastoral production regions. One of the benefits of pastoral groups reported by government agency staff was that it:

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<sup>5</sup> The timing of the interviews may also have influenced these concerns. As it were the Northern Territory and Western Australian interviews were conducted in the period between NRM plan development and notification of funding outcomes for implementation in those jurisdictions.

“plays a key contact point for projects, research providers such as CRCs, establishing Environmental Management Systems and other partnerships”.

More importantly these networks were seen by interviewees as providing a “true regionalisation” of the Northern Territory planning area, as active and as having in many cases a proven track record in supporting cultural change in sustainable land management amongst pastoralists<sup>6</sup>.

Interviewees from the Kimberley highlighted the role of the four LCDCs in the region including the East Kimberley, North Kimberley, West Kimberley and Ord Irrigation Area. The last of these evolved into Ord Land and Water. These committees established under the statutory Land and Conservation Commission, have historically relied on administrative support from government agencies through providing a commissioner's nominee. Interviewees believe this provides a vital link between government ‘rangelands business’, extension efforts and the activities of the LCDC. However, interviewees suggested that these committees have had a “mixed history” with some committee’s more effective than others over time.

LCDCs are also reported to be shifting from a “traditional land conservation role” and that their scope is moving beyond NRM issues to include a broader focus on pastoral industry business viability. An example of a LCDC workshop provided by one interviewee included a session on cattle conformation as well as rangelands monitoring skills. Several Western Australian interviewees saw LCDCs as “completely different from pastoral Landcare” yet benefits were described quite similarly, for example, as providing:

“a good opportunity to build on and bounce ideas off people. [They] provide a good point of contact for government. [Government] is looking to expand the role [of LCDCs] to include best management practice and enterprise viability aspects and provide staff to support broader involvement from the grass roots “

In response to NAP investment in the Ord region, the Ord Catchment Reference Group has expanded its scope to include stakeholders from the upper, rangelands areas of the catchment including the Halls Creek (East Kimberley) LCDC. Interviewees stated this has contributed to a re-invigoration of the LCDC and subsequently the development of rangelands focused projects and two LCDC representatives on the Ord Catchment Reference Group.

Interviews indicate that Queensland is somewhat different again from the other jurisdictions. There is no single pastoral land management network across the state, but instead a range of approaches exists. These vary from established Landcare and catchment (ICM) groups to new networks of landholders being formed in priority sub-catchments as part of regional NRM body investment. Interviewees from large regions, such as the Burdekin Dry Tropics, believe they will rely heavily on contracting ‘sub-regional’ organisations to deliver pastoral land management programs or host projects. In the case of the Burdekin Dry Tropics, these sub-regional groups include the Dalrymple Landcare Committee, Desert Uplands Build-Up Strategy Committee and Central Highlands Regional Resource Use Planning Cooperative. These groups are recognised by the regional NRM body as having well-established local networks necessary to engage pastoralists in projects.

In summary, industry and government interviewees both in the Northern Territory and Western Australia, strongly associate with existing pastoral land management networks as the main vehicle for engaging pastoralists and delivering NRM outcomes on pastoral land. In Queensland, it is within regional NRM bodies that the value of sub-regional organisations and sub-catchment networks to deliver outcomes on pastoral land is widely recognised and

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<sup>6</sup> Gill (2004) in a recent study in the Australian rangelands also discusses the contribution of land management networks to long-term cultural change amongst pastoralists

reported. The strength and effectiveness of relationships between regional and subregional players however is highly variable between regions and at different stages of maturity across regions. The focus of industry-driven programs in Queensland however is currently positioned more to deliver discrete property management tools and data to individual landholders. As such there is considerable scope to explore how these discrete tools might interface with broader landscape focused planning approaches promoted by regional NRM bodies.

### **Emerging partnerships and activities**

Interviews indicate there are several different types of partnerships emerging in regions between the pastoral industry and regional NRM bodies. The term partnership is used here to refer to any agreed cooperation between parties to achieve defined and mutually beneficial outcomes.

Five general types of emerging partnerships were evident from the interviews. These are listed below with some examples of activities to give a sense of what was occurring during the interview period of September 2005 to April 2006 and are not intended to be comprehensive or complete by any means. The five types of partnerships are:

1. **Engagement and communication networks in regions** e.g. government, regional body and industry support for land management networks such as LCDCs and pastoral Landcare groups. Peak industry organisations in WA and NT also continue to host pastoral NRM / Landcare coordinator positions. These positions also seek to align regional program funds with industry business and policy agendas.
2. Regional bodies contracting pastoral industry **service providers to support NRM plan implementation**. For example, in the Burdekin region, the regional NRM body has a major program of investment in rangelands management and is negotiating with state government agencies to help deliver those outcomes on their behalf through programs such as Grazing Land Management.
3. **Joint investment and/or cooperation in property level planning initiatives**. For example, in response to concerns about the proliferation of property level planning packages there have been increased efforts to improve links or provide steps for producers between industry-driven Agforward<sup>7</sup> workshops and regional body incentives or sub-catchment planning programs.
4. **Co-developing and co-funding strategic programs of research** (e.g. on cost-effectiveness of different management practices or alternative extension models);
5. **Information gathering and resource condition monitoring** (e.g. including broad scale resource assessment via remote sensed data or using landholder knowledge and observations of change in resource condition)

It is important to note that many examples of grazing industry related activity provided in interviews often served two or more partnership functions. That is, cooperation between stakeholders on a given activity is multi layered and often reported to have several benefits to both parties. Interviewees emphasised however that in many cases these activities and partnerships were still “in development” or the early stages of implementation. Industry

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<sup>7</sup> The Queensland Government has funded AgForce Qld to deliver a four year, AgForward program, formally launched on May 19 2005. The initial phase of the program focuses on providing producers with tools and information to improve vegetation management. The program developers acknowledge it “will not deliver all of the solutions and hence must link into complementary programs and other planning processes such as the regional NRM groups”.

representatives also identified several effective partnerships they were involved in that did not involve regional NRM bodies. The development and roll-out of Beef Plan, was one such partnership between Pastoralists & Graziers Association, Meat & Livestock Australia and the Indigenous Land Corporation identified by a Kimberley region interviewee.

## **Strategies for more effective partnerships**

The interview process raised a number of issues that currently influence relationships and hence the development of more effective partnerships between regional bodies and the grazing industry. Some of these issues were directly raised by a number of interviewees whilst others have emerged from the analysis of key themes in interviews. They are presented here as general ‘strategies’ for the consideration of regional bodies, agencies and industry players in designing and developing partnerships.

### ***1. Industry groups as interface agents***

Industry groups in all jurisdictions stated a clear desire to operate as an “interface”, “intermediary”, “translator” or “buffer” between producers, government, researchers, and, in some cases regional body programs. For example, one industry representative expressed their organisation’s involvement as “important to opening the door to the regional process for producers”. This indicates industry organisations are looking to define a clear role and function for themselves within regional arrangements. In Queensland, other industry sectors such as horticulture, cotton and sugar cane have developed a similar role. In doing so, that role has matured over time from an “intermediary” to a more productive partnership focus.

This is a role, however, which regional bodies in the rangelands also consider as a key responsibility and role for themselves. In the Kimberley, for example, a regional body interviewee stated that ‘managing’ the overlap between pastoral and traditional owner interests in land management as an important future role for NRM board. If these roles are coordinated rather than contested, benefits may arise. Anecdotal evidence suggests, for example, that industry groups have ‘access’ to producers that regional bodies may not, for political, historical or other reasons, and vice versa. In this sense, partnerships may assist considerably in more effective exposure of NRM programs to a wider range of pastoral land managers. One Queensland interviewee also recognised the potential for industry groups to be an “advocate or voice for [regional body] efforts with their constituents”.

Industry managed or co-funded NRM investments may also help regional bodies address legitimate privacy and accountability concerns related to property access, monitoring on-ground works or managing landholder records. Both industry group and regional body interviewees in Queensland recognised a significant role in accessing, managing, sharing or reporting landholder-collected monitoring data – particularly around uptake and effectiveness of more sustainable management practices. Indications are however that in most jurisdictions ‘partnership’ discussions between industry groups and regional bodies are still at a preliminary stage.

An area where regional bodies may begin working more closely with industry groups, in an interface capacity, is to identify and respond to new government policies and initiatives that impact on pastoral land management. For example there are major reviews of existing legislation, tenure or regulatory mechanisms in all three jurisdictions that affect grazing land. Regional NRM body led investment may provide attractive alternative (non-regulatory) pathways to assist achieve ‘compliance’ with emerging policies and government requirements.

## ***2. Building on subregional delivery networks***

In investment regions such as the NT, industry organisations also have a long history of involvement and support for pastoral land management networks (e.g. the regional pastoral Landcare network). As discussed above there is considerable scope to address the perceived neglect of local and regional pastoral networks during the NRM plan development process.

Particularly in the NT context these pastoral Landcare groups are valuable vehicles for engagement and implementation, and to a degree, have an identity not dependant on the NRM process. The value of subregional LCDC networks in the Kimberley region, were also stressed by a regional NRM body representative who saw these as:

“the best link to regional planning for grazing industry – not as reactive as the peak industry group...if the LCDC was dysfunctional then would be difficult to engage pastoralists”

An important aspect of this strategy, stressed by industry groups, is to recognise existing contributions by pastoralists and the industry more broadly to NRM outcomes. There is a strong desire within the Northern Territory Cattlemen’s Association in particular, over the next three years to support a transition of Pastoral Landcare towards a greater focus on sustainable production models. Part of this is re-assessing the role and contribution of those networks to natural resource management outcomes, including the economic benefit of self-funded contributions by the industry at property and industry scales. The goal of this would be to “bed-down” the existing learning to date generated through the Pastoral Landcare process to identify options for “future proofing” management of the pastoral estate and in the short term “securing financial and human resources to help maintain those networks”.

Two issues however need to be addressed, particularly in QLD and NT contexts. Firstly, regional bodies believe industry and other potential partners often see them simply as a source of funding, which according to a number of regional body interviewees “is not really what partnerships look like”. Secondly, regional bodies acknowledge they need to improve their visibility, relevance and demonstrate their “ability to make a difference” in order to be viable partners. Providing an incentive to pastoralists for involvement, which is based on clear, practical benefit, was a major theme throughout the interviews.

## ***3. Think broader than NRM at enterprise & regional levels***

The interviews underlined that the natural resource management agenda is only one of a suite of issues and priorities the ‘industry’ is dealing with at present. The other critical issues revolve mainly around industry level viability and development involving the impacts of regulation and tenure systems, improving access to markets and improved infrastructure and industry positioning. There is an equally strong emphasis on the well being of pastoralists, on professionalisation of enterprises and viability of their local communities. A number of interviewees highlighted the considerable effort going into industry wide corporate planning, and government lead initiatives on regional economic development planning.

As such, at present at the regional scale there is currently a perceived ‘split’ between industry development and sustainable resource management agendas. Repositioning NRM as part of good business practice and considering whole-of-enterprise management needs in the design of NRM incentives is a much needed approach here. At the regional level there is considerable opportunity for regional NRM bodies to work with industry and economic development organisations to embed and mainstream NRM outcomes into those initiatives. In the Territory for example this may mean assessing opportunities to align NRM investment with aspects of the Building Stronger Regions-Stronger Futures initiative or Blue print for the Bush initiative in Queensland.

#### ***4. Working with a diverse industry***

Interviewees highlighted the considerable diversity within and between pastoral enterprises and land managers in the north. This diversity is evident both within and between NRM regions. One interviewee in the Northern Territory described some of this diversity as:

“The Alice area consists mostly of family operators; the Barkley is ninety percent corporate; the VRD is a mix of family and corporate; and, the Top End with smaller to medium sized owner-operators”.

The lack of recognition of diversity within the northern pastoral industry is a theme also noted by authors such as Fargher who highlight the “wide structural and productivity diversity in what is erroneously lumped as a single pastoral industry” stating there are “in fact many pastoral industry ‘sectors’ with very different aspirations and operating contexts” (2003:149).

One regional body representative in the Ord catchment, for example, commented that as one-third of that catchment area (and one third of pastoral leases) are Indigenous owned:

“We need some different engagement strategies for [working with] the Indigenous pastoralists – there are some shared management practices and some different ones. Differences tend to occur when the land is equally or more predominantly used for cultural purposes such as burning to protect cultural values... fire management practices can run askew in certain contexts”

To design effective targets, engagement and implementation strategies it is essential that regional bodies incorporate an improved understanding of this diversity in values and enterprises. Interviewees’ comments are also consistent with earlier evaluation findings from a review of NRM plans in Queensland (Taylor 2005) suggesting that poor recognition of pastoral industry diversity may impact on the effectiveness and appropriateness of incentives and property planning tools, on which NRM planners, governments and industry organisations are relying increasingly heavily. A broad framework that may support a structured assessment of industry diversity in regions is presented in Attachment 1.

### **Conclusion**

Engagement with the pastoral sector and its peak industry organisations during the development of regional plans has been less than effective in a number of key pastoral regions. There are, however, encouraging signs that sub-regional land management networks are re-building, being re-invigorated or are positioning themselves to access resources through the regional NRM investment phase.

Three important challenges however require further discussion amongst industry, agency and regional body ‘sustainability’ service providers:

1. Given the diversity in operations, aspirations and affiliations of pastoral land managers in regions, what suite of ‘entry points’ are required to provide the range of land holders with suitable access to sustainability programs, funds and services?
2. Given the range of current service providers for pastoral land managers, where, and how, do investors such as State, Territory or Australian governments decide on allocation of limited funds?
3. And, given points one and two above, how negotiation might be supported between service providers at both the regional and State/Territory levels on these issues.

Currently in most jurisdictions ‘partnership’ discussions between industry groups and regional bodies are still at a preliminary stage.

There are however a number of examples of promising fledgling partnerships emerging between industry organisations and regional bodies for grazing land outcomes. Strengthening of these partnerships will require on-going dialogue between parties that focuses on practical solutions and benefits from cooperation, or alternatively, respective contributions to common objectives. The strategies presented above may provide a broad framework for these focused discussions. An affirmation of a clear 'place' or role for industry groups within the regional NRM delivery model would also assist.

## References

- Ash, A. and Stafford-Smith, M. 2003, Pastoralism in Tropical Rangelands: Seizing the opportunity to change, *The Rangeland Journal*, 25(2), 113-127.
- BDTB 2005, *Burdekin Dry Tropics Natural Resource Management Plan (2005-2010)*, Burdekin Dry Tropics Board, Townsville.
- Bortolussi, G. McIvor, J.G., Hodgkinson, J.J., Coffey, S.G. Holmes, C.R. 2005a, The northern Australian beef industry, a snapshot. 1. Regional enterprise activity and structure, *Australian Journal of Experimental Agriculture*, 45,1057-1073.
- Bortolussi, G. McIvor, J.G., Hodgkinson, J.J., Coffey, S.G. Holmes, C.R. 2005b, The northern Australian beef industry, a snapshot. 4. Condition and management of natural resources, *Australian Journal of Experimental Agriculture*, 45,1109-1120.
- DIPE 2004, *Discussion paper: Review of the Pastoral Land Act, 1992*, July 1994, NTG.
- Fargher, J.D., Howard B.M., Burnside, D.G. and Andrew M.H. 2003, The economy of Australian Rangelands – Myth or Mystery?, *The Rangeland Journal*, 25(2), 140-156.
- Gill, N. 2004, Politics within and without – The origins and development of a rangelands Landcare group, *Australian Geographical Studies*, 42(2), 135-151.
- Holmes, J. 2000, Land tenure and administration in northern Australia: needed future directions, In *Land Administration and Land Management in the Tropical Savannas: A better way*, Proceedings of the TS-CRC Forum 21-22 February 2000, Darwin.
- McCullough, M 2004, Snapshot of the upper Burdekin Rangelands, In M. McCullough and B. Musso (eds) *Healthy Rangelands: Principles for sustainable systems*, Tropical Savannas CRC.
- McDonald et al 2005, *Benchmarking regional planning arrangements for natural resource management 2004-5: progress, constraints and opportunities*. TSMCRC Project 3.3.5, Milestone Report no.3, Brisbane.
- Queensland Government 2005, *Blueprint for the Bush – Discussion Paper*, Queensland Government and Agforce Queensland, Brisbane.
- Rangelands NRM Coordinating Group 2005, *A strategy for managing the natural resources of Western Australia's rangelands – Draft for public comment and review*, Rangelands NRM Coordinating Group.
- Taylor, B 2005, Industries and economies for sustainable regions, In G. McDonald, B. Taylor and C. Robinson (eds.), *Desktop review of regional NRM plans: Findings and lessons*, Tropical Savannas CRC project 3.3.5 technical report.

**Attachment 1:** Proposed analytical framework using diversity in pastoral land aspirations and operating contexts in savanna regions (after Fargher et al 2003; Tapsall pers comm. 2005)

Pastoral industry sectors	Enterprise characteristics and location	Operating environment	Management aspirations	Existing 'incentives' and programs	Potential partnership strategies
Large corporate entities					
Land held and managed by non-pastoral businesses (e.g. mining companies)					
Land held by indigenous communities <sup>1</sup>					
Private and family-based grazing businesses <sup>2</sup>					

Notes: <sup>1</sup> May include operations run as primarily commercial enterprises, mixed commercial / subsistence, or primarily subsistence; <sup>2</sup> Including land as base for non-grazing economic activity and family-based grazing operations.

# 3 Community Engagement in Remote Regions

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## Introduction

Community engagement has been cited as a critical component for the effective functioning of NRM to achieve sustainable management practices and improvements in on-ground asset condition (eg. Lee 1993; Berkes *et al.* 1994; Reynoso 2000; Berkes *et al.* 2001). In fact, a key facet of the current regional governance arrangements throughout Australia is the notion of community-based management (Lane, McDonald and Morrison 2004), where communities are included in meaningful decision-making activities, from participation on some regional body Boards, to influencing the prioritisation of investment decisions through regional body initiated community engagement. The first Benchmark Report (McDonald *et al.* 2005) highlighted that the practice community engagement remains a key challenge for many regional bodies in northern Australia.

Another challenge exists in the monitoring and evaluation of “enabling mechanisms” – such as community engagement – for the achievement of sustained asset condition change. This challenge becomes more evident when considering that only bio-physical asset condition change has been systematically integrated within the reporting frameworks of the respective regional bodies, and that there is a current trend of reduced resourcing of capacity-building type activities in favour of increased funds for on-ground works.

## Objectives

The primary objective of the case study was to describe the various approaches to community engagement among a selection of regional bodies and critically analyse the implications of those approaches in terms of engagement rationale, engagement tools, disenfranchised stakeholders, and critical success factors and strategies. A secondary objective was to consider those findings in terms of opportunities to include monitoring and evaluation of community engagement to engender the development of a reflective practitioner culture among regional body staff in relation to engagement.

The key research questions for the case study included the following:

- Why do the regional bodies engage with communities?
- Who is targeted? Who is engaged? Who has dis-engaged? Who hasn't been engaged?
- How are communities engaged? What tools are used to do this?
- What works and what doesn't work? How do the regional bodies know if the approach is working? How does the regional context affect this?
- Are there examples of innovative approaches to engagement in Australia's tropical savanna regions?

## **Approach**

The case study included three regions across the northern Australian States/Territory. The cases were chosen upon meeting three criteria: (i) cases located in one of the three northern Australian jurisdictions; (ii) cases being remote in their location to a major urban centre; and (iii) cases being located in the tropical savannas region of Australia. As well as meeting the three criteria, the cases were also selected upon discussion and agreement with the respective regional bodies. The regions included for investigation were the Northern Gulf (Queensland), the Top End and Savannas sub-regions of the Northern Territory, and the Kimberly sub-region (Western Australia). While the Top-End sub-region of the Northern Territory includes Darwin, the sub-region was included due to the large coverage of non-urban areas and results were combined with the Savanna sub-region of the Northern Territory. Each of the regions were sent a flier on the case study aim and objectives and contacted by phone and email to request their participation in the study.

Focus groups were conducted with in two of the three regions and interviews with key practitioners were conducted in the other region. The reason for interviews in one of the regions, rather than a focus group, was due to the lack of availability of key practitioners. The interviews included both face to face and telephone interviews. The focus groups consisted of one researcher facilitating the discussion, while the other researcher captured the key points of the discussion. The discussion followed a standardised template for all regions. The discussion points were captured either on computer (using a data projector) or butchers paper so that participants could modify or clarify the researchers' interpretation of the dialogue. Each focus group ran for about 3 hours, while the interviews lasted about 40 minutes. All face to face interview and focus groups were conducted in the respective regions in November and December 2005. A total of 15 practitioners from the three regions were included in the case study.

Data analysis consisted of content analysis of the focus group responses to determine: (i) themes or areas of convergence; and (ii) areas of divergence, emerging in response to each of the research questions.

## **Key findings**

### ***Why engage?***

Several reasons for engaging were proposed by case study participants. The dominant reasons included: (i) transferring information or technologies (eg. disseminating information or encouraging adoption of new technologies); (ii) responding to a formal requirement for community engagement (eg. to gain government funding); (iii) building communities and social capital (eg. resolving conflict between sectors and transferring ownership of issues to communities); and (iv) facilitating improvements in asset condition (eg. supporting on-ground changes and attracting volunteers – also contributing to improved social capital).

Case study participants stated that they often had multiple objectives for community engagement (such as technology adoption and supporting on-ground change). It was apparent to the researchers that some of these multiple objectives may be in conflict, such as encouraging the adoption of new technologies for increased productivity, combined with encouraging conservation of biodiversity. Similarly, various case study participants stated reasons for engagement that inferred a disparity of worldviews (O'Riordan 1981) within each of the regions. For example, some practitioners exhibited ecocentric worldviews through promoting biodiversity conservation through the support of on-ground changes, while others exhibited anthropocentric worldviews through a focus on reduction of conflict and consensus-

building among stakeholders (eg. “We are here for the community” – respondent from focus group 1). Other practitioners also inferred technocentric worldviews through a focus on the promotion of new technologies to achieve sustainable land management (eg. “To inform them [stakeholders] of ... new NRM technologies” – respondent from focus group 2). Many practitioners also recognised the link between building community capacity and realising on-ground change. For example, one focus group participant stated that they undertook community engagement to “support people on the ground who will be the ones achieving NRM outcomes” (respondent from focus group 3).

### ***Who is targeted and engaged?***

Case study participants highlighted two groups who were targeted for engagement activities – those who were primary targets and those who were secondary targets.

Four primary target groups were identified by focus group participants and included: (i) land managers – through peak sector groups; (ii) existing NRM community groups; (iii) traditional owners; and (iv) NRM-related State Government Agencies.

Two secondary target groups were also identified by focus group participants and included: (i) local government; and (ii) the general community.

Case study participants stated that the groups who were primary targets were the most heavily engaged and acknowledged that there was a focus on targeting those groups who are already currently engaged for future engagement activities.

### ***Who has disengaged?***

Case study participants identified that two sectors who were previously engaged in NRM had disengaged from the new regional arrangements (eg. NHT and NAP) and consisted of: (i) AgForce / Pastoral Lobby Groups; and (ii) some local community groups.

A number of reasons for the disengagement were discussed by the case study participants and included both State / national issues; as well as, local issues affecting the levels of disengagement. For example, some local groups who previously had higher levels of power and direct access to government funding, relative to other local groups, had disengaged from the regional arrangements when they now had to conform to the new regional arrangements for issue prioritisation and funding. While some case study participants noted that peak pastoral groups had disengaged, another Healthy Regional Planning Systems case study on pastoral partnerships has identified that those groups are currently re-engaging with the regional arrangements.

### ***Who is not engaged?***

Case study participants acknowledged that many stakeholders remain unengaged. These stakeholders can be grouped into five categories, including: (i) some State government agencies (mainly with a non-NRM mandate); (ii) indigenous communities who are not traditional owners; (iii) the general community; (iv) visitors / tourists; and an emerging stakeholder group (v) hobby farmers (eg. tree or sea changers).

Case study participants acknowledged difficulties in engaging many sectors in NRM (eg. “NRM is not their core focus and they think NRM is for greenies” – respondent from focus group 2), even though they perceived that some of these sectors (eg. tourism) had the potential to have significant impacts on NRM.

### ***How are people engaged?***

Six tools for engagement activities were cited by case study participants. These tools included: (i) media – including radio and television; (ii) email / fax / mail-outs of information (eg. using existing organisational and other networks); (iii) web-based information dissemination; (iv) public meetings and workshops; (v) site visits; and (vi) one-on-one dialogue.

All tools mentioned by case study participants were traditional engagement tools. No engagement tools developed in the last few decades (eg. citizen juries, round tables, consensus conferences, etc.), apart from the use of internet technology, were used. However, all case study participants acknowledged one-on-one dialogue as the most valuable form of community engagement.

### ***What hasn't worked?***

A combination of events, tools and processes were blamed by case study participants as having an adverse impact on the success of engagement activities, these included: (i) poorly timed events; (ii) tokenistic events; (iii) multi-criteria analyses; (iv) written materials (eg. where literacy levels are low); (v) mail-out surveys; (vi) using “outsiders” to do the engagement (ie. people who do not reside in the region); and (vii) use of overly technical language.

A key finding in relation to the lack of success of engagement tools was that tools fail when not matched to stakeholder preferences. Smith et al. (2005) have also highlighted that community engagement activities need to be matched to practitioner capacities and the local context of engagement; as well as, stakeholder preferences, in order to be effective.

### ***What are the challenges?***

Engagement activities were complicated by a number of challenges faced by northern Australian regional bodies, including: (i) distances (eg. to attend meetings); (ii) seasons (eg. inaccessibility during the wet season and work commitments during the dry season); (iii) cultural barriers; (iv) diversity of stakeholders (eg. differences in goals and worldviews); (v) lack of interest by many stakeholders (eg. due to lack of time to be involved and not recognising NRM as a core concern); (vi) unrealistic deadlines for NRM planning; (vii) limited funding for on-ground works and community engagement; and (viii) difficulty in achieving meaningful inclusion of engagement outcomes (eg. into NRM prioritisation processes and management plans).

A combination of both specific and generic challenges was complicating the effectiveness of engagement strategies and activities. While some of these challenges were specific to northern Australia, such as large distances to participate in meetings and isolation caused by the wet season, many challenges were generic and likely to be also challenging the effectiveness of community engagement in other Australian regions, such as limited funding and unrealistic deadlines for the conduct of engagement and building of community trust. In fact, a respondent from focus group 2 expressed surprise that more stakeholders had not disengaged from the NRM planning processes and regional arrangements because of the unrealistic deadlines.

### ***What are the innovations?***

While case study participants identified a number of flaws and challenges to community engagement, they also identified several innovations, including: (i) piggybacking meetings with each other in remote locations so that they become two-day events that include social

get-togethers (in order to build social cohesion and trust); (ii) using previous funding initiatives to show the “runs on the board” (respondent from focus group 1) that have been achieved and to generate and increase interest in current initiatives; (iii) creation of a regional identity and language (eg. the “Gulf Croaker” newsletter); and (iv) going to communities – rather than expecting stakeholders to travel long distances to participate in workshops or meetings (eg. travelling “road shows” in the Northern Territory).

Examples of innovations, such as social activities, were identified as key elements to building trust among stakeholders for long-term commitment to engagement activities. Furthermore, publications such as the “Gulf Croaker” were perceived by the case study participants to engender a sense of regional identity among regional communities, where bureaucratic or scientific language could be contextualised for Northern Gulf communities. Lastly, case study participants were aware of northern Australian challenges to community engagement, such as distance, and in some regions a specific effort was made to overcome this obstacle by going to communities, rather than expecting communities to come to them.

### ***How is success measured?***

Case study participants stated that most evaluation of community engagement was largely informal and anecdotal. However, some examples of measuring engagement success included: (i) evidence of environmental improvements / on-ground actions following an engagement activity; (ii) people turning up at meetings and workshops; (iii) an increase in the number of funding applications; (iv) an increase in phone calls and enquiries received; and (v) results of a telephone survey to get feedback on community perceptions of the regional body and thus assess the regional body’s community profile.

However, all attempts at measuring success were based on quantitative assessments with no formal use of qualitative assessments. Furthermore, while there are systematic assessments of natural asset condition change that have been incorporated into formal reporting frameworks, there were few systematic assessments of engagement success.

### **Recommendations**

In order to improve community engagement in remote regions, a number of recommendations have been developed by the researchers and include:

- Increased dialogue between engagement practitioners to maintain consistency in messages to relevant target audiences (eg. by understanding how the discourse is framed in terms of prevailing worldviews)
- Greater focus on communities and sectors who are not currently engaged (eg. by showing how NRM relates to a number of other issues such as employment, tourism, and health)
- Greater focus on addressing the underlying reasons why some sectors have disengaged in order to better facilitate their re-engagement
- Greater matching of engagement tools to stakeholder preferences and the trial of non-traditional tools to facilitate increased levels of engagement (both in terms of numbers of people and their commitment)
- More systematic inclusion of evaluation of engagement activities, both for practitioner reflection and formal reporting to justify resource allocation to engagement and capacity-building

- Greater emphasis on qualitative measures for monitoring and evaluation of “enabling outcomes”
- Continued support of innovations in community engagement in remote regions

## Conclusions

NRM is a social process and effective engagement is both complex and critical. Sharing lessons among practitioners can help to both benchmark processes as well as engender a reflective practitioner culture. Processes such as engagement need rigorous assessment – similar to assessment of on-ground change – in order to allow critical practitioner reflection; as well as, justifying the maintenance of resourcing for enabling activities such as engagement and capacity-building.

## References

- Berkes, F., Folke, C. and Gadgil, M. 1994, Traditional Ecological Knowledge, Biodiversity, Resilience, and Sustainability, In C.A. Perrings, K.G. Maler, C. Folke, C.S. Holling and B.O. Jansson (eds.), *Biodiversity Conservation*, Kluwer, Dordrecht, pp. 281–299.
- Berkes, F., Mathias, J., Kislalioglu, M. and Fast, H. 2001, The Canadian Arctic and the Oceans Act: the development of participatory environmental research and management, *Ocean and Coastal Management*, 44, 451–469.
- Lane, M. B., McDonald, G. T. and Morrison, T. H. 2004, Decentralisation and environmental management in Australia: a comment on the prescriptions of the Wentworth Group, *Australian Geographical Studies*, 24(1), 103-15.
- Lee, K. N. 1993, *Compass and Gyroscope: Integrating Science and Politics for the Environment*, Island Press, Washington.
- McDonald, G., Taylor, B., Bellamy, J., Robinson, C., Walker, M., Smith, T., Hoverman, S., McAlpine, C., Peterson, A. and Dawson, S. 2005, *Benchmarking Regional Planning Arrangements for Natural Resource Management 2004-05: Progress, constraints and future directions for regions*, Healthy Savanna Planning Systems Project, Tropical Savannas Management CRC.
- O’Riordan, T. 1981, *Environmentalism*, Pion, London.
- Reynoso, L. 2000, Towards a new water management practice: experiences and proposals from Guanajuato state for a participatory and decentralized water management structure in Mexico, *International Journal of Water Resources Development*, 16(4), 571–588.
- Smith T. F., Darbas T, Hall C, Bellamy J, Fisher J, Gambley, C, and Leitch, A, 2005, *Development of a Typology of Engagement in Natural Resource Management for the Western Catchments of South East Queensland*, Proceedings of the International Conference on Community Engagement, August 2005, Brisbane.

## 4 Biodiversity in action

Clive McAlpine, Sonja Heyenga and Fiachra Kearney

### Introduction

Woinarski and Fisher (2003) described Australia's rangelands (both arid and semi-arid) as a critical reservoir of Australia's biodiversity, where the 'pulse of the continent still beats'. The rangelands harbour a large component of Australia's most distinctive flora and fauna, including centres of endemism and refugia (Morton *et al.* 1995). However, the impact of European settlement has been particularly profound on arid zone biota (Dickman *et al.* 1993; Lunney 2001; Morton 1990; Woinarski and Fisher 2003). Grazing by domestic stock (especially sheep and cattle,) and feral animals (especially rabbits), are recognised as the main cause of the historical decline of arid zone fauna. Other factors such as altered fire regimes, predation by foxes and cats, and clearing and structural modification of native woody vegetation, especially in Queensland's Brigalow Belt, also have had profound impacts on rangeland landscapes and their biota (James *et al.* 1995; McAlpine *et al.* 2002). Terrestrial mammal fauna have suffered the highest level of attrition, especially in the central, southern and western rangelands (Woinarski 2001; National Land and Water Resources Audit 2002). The bird fauna has also suffered declines, although the proportion of species in decline is less than for mammals (Woinarski 2001). Less is known about trends in reptile, frog and invertebrate fauna while a number of plant species have become extinct or are recognised as endangered.

The fauna of Queensland's rangelands (both extensive and intensive), according to the National Land and Water Resources Audit terrestrial biodiversity assessment report (National Land and Water Resources Audit (2002), have suffered lower levels of attrition and range contraction. However, it is likely that many species are undergoing a long period of relaxation due to the extensive clearing of native vegetation that occurred of the past 50 years (McAlpine *et al.* 2002; Seabrook *et al.* In Press), estimated at 74,500 km<sup>2</sup> (remnant and non-remnant) between 1989 and 2003 (Queensland Department of Natural Resources and Mines 2006). Clearing, combined with excessive grazing pressure and altered fire regimes, has left many ecosystems threatened or of concern, and in need of recovery. Since the cessation of broad-scale clearing in 2004, the management of regrowth and thickening and thinning are now an important native vegetation and biodiversity issues in regions such as the Brigalow Belt, Desert Uplands and Einasleigh Uplands. The predicted but uncertain impacts of climate change (Walsh *et al.* 2001) pose an added threat to the legacy of clearing on native biodiversity.

Regional NRM plans developed under the National Action Plan for Salinity and Water Quality (NAP) and the Natural Heritage Trust Extension (NHT2) are the starting point for addressing biodiversity conservation concerns in Queensland's rangelands. Regional planning is in its early stages of development, and is based on the premise that regional communities are more likely to take ownership of their responsibilities for solving natural resource problems where they share goals and norms, a sense of mutual identity and belonging, and a level of dependence on the natural resources. Queensland's extensive rangelands account for six NRM regions, extending from Cape York and the Northern and Southern Gulf to the Queensland Murray Darling Basin in the south, while a further five regions form part of the more intensive land use zone which has a mixture of grazing and cropping land use.

It is imperative that regional NRM bodies, through the implementation of their plans, develop and implement effective strategies for conservation the biodiversity of Queensland's rangelands, as well as a range of other issues related to water, soil, pasture pressure and socio-economic issues. The challenge for regional bodies is that biodiversity conservation is technically a complex issue, and that the sustainable management of soil, pasture and water resources does not automatically deliver sound biodiversity outcomes. Regional NRM bodies are currently funded until June 2007, funding beyond this date still to be secured. There also is considerable inequity of funding between the NAP regions and the NHT2 regions. The four Queensland priority catchments for funding under the received earlier and larger total funding from both Australian and State Governments, while all regions received funding under the NHT extension program.

## **Objectives**

The aim of this case study was to identify issues and strategies to better integrate biodiversity science into regional NRM planning in Queensland's extensive rangelands. The geographic focus was on the extensive rangelands but also included the sub-humid intensive regions (mixed cropping-grazing land use) such as the Burnett Mary and western catchments of South East Queensland Catchments and the Mackay Whitsunday NRM regions. The specific objectives of the case study were to identify practical strategies and future directions for improving the use of biodiversity science in regional NRM planning and implementation

## **Approach**

The case study focused on a workshop held in Brisbane December 5 - December 6 2005. The workshop involved 17 participants from Regional NRM bodies and the research community. Regional NRM technical staff came from Cape York, Burdekin Dry Tropics, Fitzroy Basin, Desert Channels, South West NRM, Queensland Murray Darling Committee and SEQ Western Catchments. The workshop also involved research scientists from Queensland EPA, Queensland DPIF, CSIRO, Tropical Savanna CRC and The University of Queensland with a background in biodiversity conservation, native vegetation management and grazing land management. Additional information was gained from a national rangelands monitoring workshop held in Adelaide in April 2006, and interviews with Dr Alan House CSIRO sustainable ecosystems, regarding his experience in collaborating with regional bodies. Personal observations of Dr Clive McAlpine are also included and referenced where cited.

## **Key Findings**

The workshop identified a number of key issues in integrating biodiversity science into regional NRM planning in Queensland's rangelands.

### ***Perception of biodiversity (For regional NRM bodies, State and Commonwealth Government Agencies and Industry Peak Bodies)***

The word 'biodiversity' has a negative image to many landholders in Queensland's rangelands, a legacy of recent legislative controls on broad scale clearing of native vegetation. Biodiversity conservation and woody native vegetation are often viewed as competing with production, and represent an economic cost to landholders. The emphasis on production values represents conflicts with achieving biodiversity outcomes in rangeland regions.

Landholders are usually aware of legislative requirements under the *Native Vegetation and Other Legislation Act 2004* (2004). However, they are less aware of how land management practices impact on biodiversity. The emphasis on production values is reflected in the planning priorities and resources allocated to biodiversity conservation and native vegetation management in the regional plans. Biodiversity is often secondary to soil, water and socio-economic planning objectives. For many landholders, the fear of further government regulation of native vegetation management through controls on the clearing of regrowth represents another threat to their livelihood and independence (C. McAlpine pers. observations). This is one possible reason why biodiversity conservation and native vegetation have received a relatively low investment through the regional investment strategies. Some workshop participants questioned whether it is possible to balance the competing demands of production and biodiversity conservation at a property-level, and that the continued use of potentially unachievable frameworks may be detrimental to progress. Finally, there is a need to recognise that NRM does not specifically cater for biodiversity. It is about managing natural resources for the sustainability of that resource – this does not automatically infer biodiversity benefit, although it is often used in this way. Species richness is not necessarily synonymous with maintaining ecological function or sustainable production. Compensatory mechanisms such as density dependence, functional compensation, predators and relaxation periods can often occur, meaning some species can still become locally or totally extinct but the system will continue to function.

#### ***Inadequate Biodiversity Information and Exchange (For State Government Agencies and Regional NRM bodies)***

The workshop highlighted the need for better information that is accessible and relevant to biodiversity condition and species' distribution and ecology. While the situation is improving, spatial information held by Queensland Government agencies is not always readily available in a suitable format and resolution required by regional bodies. The delivery of web-based biodiversity information in Queensland appears to be lagging behind the Northern Territory, which has developed a web system to provide high-resolution information on the distribution of native fauna, flora and pest animal and plant species. As a consequence, planning has to operate in a data poor environment. Biodiversity data and information will always be a limiting factor. The challenge is to make best use of available data and information, particularly the knowledge of both the scientific and broader community, including the Indigenous community.

#### ***Technical Staff and Science Resources (For State and Commonwealth Agencies).***

Maintaining technical staff responsible for implementing all planning themes, not just biodiversity, is a major issue for regional bodies. The short funding cycle means that technical staff working for regional bodies lack security of tenure and are often on short-term contracts. In fact, it is hard to attract staff to some regions (e.g. Southern Gulf NRM region). The problem of attracting suitable staff to regions is exacerbated because of the short funding cycle. High staffing turnover rates of regional bodies make the successful implementation of biodiversity targets even more difficult. Due to poor handover procedures and continual vacancies, information capacity is lost. Furthermore, it has proven difficult to attract researchers to do research in rangeland regions, with remote regions, in particular, having poor access to science providers. As a consequence, an eastern bias in research projects currently exists. While some ecosystem types and biota have been well researched, others are still largely unexplored. Access to properties to do research is also an important issue. In the past, there has also been an over concentration of research and innovation efforts on only a few champion landholders who welcome research on their properties.

In some cases, this has led to a burnout and withdrawal from the science planning process. New community leaders and champions need to be identified who can be leaders in initiating attitudinal and on-ground change as part of the regional NRM process. For example, landholders, whose children have been to university, are often more receptive to new ideas.

***Poor prioritisation of Science towards Planning and Management (For scientists and research providers).***

Currently, there is a current gap between the biodiversity science and the research needs of regional planning and biodiversity conservation. In general, biodiversity science currently does not have strong connections with regional planning (sensu Opdam *et al.* 2002). Science questions and traditional null hypothesis testing often have little relevance to planning and management. A related problem is that much of current research knowledge is fragmented and lacks integration across project and institutions. While CSIRO and state government researchers, in general, have a more applied focus, academic researchers are increasingly required to publish in peer-reviewed journals, preferably in highly ranked international journals, with little reward for application to planning and management. However, application of research is just as important as publication. Science language also can be very technical. Most regional body technical staff does not have a research background and consequently have problems interpreting and understanding research outcomes, and question the relevance of research to the management of natural resources in their regions. From a landholder perspective, there is often too much information to absorb. Surveys undertaken by the Queensland Department of Primary Industries and Fisheries show that graziers want access to educational information in a useful and interesting form. However, they are often overwhelmed by too much information from a plethora of sources and do not know how to prioritise. Conversely, there is a substantial amount of useful research that does not get implemented by landholders or agencies, despite the fact it has been made available. This infers that perhaps it is the prioritisation of research questions rather than the models of science communication that need to be revisited.

***Challenges in Target Setting and Implementation (For regional NRM bodies and Queensland Government)***

Target setting and prioritisation are cornerstones of the planning process. In Queensland, biodiversity targets are often set for endangered ecosystems while other, lower priority ecosystems are excluded, while many biodiversity targets are often not easily quantifiable. Some regions now recognise they have too many biodiversity targets and are reviewing management action targets stated in the original NRM plans. This means that it is very difficult to convert targets into meaningful actions. Some scientists argue that it is impossible to measure biodiversity and to set adequate targets and priorities for biodiversity outcomes. Nevertheless, it remains an important issue to develop a suitable framework for deciding where and how to spend investment on biodiversity in regions at appropriate spatial scales. Incentives are an important instrument for achieving biodiversity outcomes. However, this involves considering how to prioritise incentives and frameworks for evaluating the costs and benefits of planning investments in biodiversity. At present there is no consistent and objective framework for deciding how incentives are allocated. The workshop discussed approaches to this problem, including 'habitat hectares', which has been developed for Victoria (Parkes *et al.* 2003). The BioCondition field assessment manual developed by Queensland EPA (Eyre *et al.* 2006) was considered as useful priority for assessing site-scale vegetation condition and ecosystem function, while the Biodiversity Assessment and Mapping Methodology (2002) was more suited to regional-scale assessment.

### ***Broader Institutional Constraints (For State and Commonwealth Government Agencies)***

Lack of security of long-term funding currently limits the ability of regional bodies to commit funds to large (3-4 year) research projects as well as for ongoing support to landholders for on-ground works. Institutional constraints also exist within State Government agencies, with EPA researchers restricted in their ability to collaborate with regional NRM bodies. Queensland's rangelands also "fall through the cracks" in the current Commonwealth Environmental Research Facility (CERF) research program. The Commonwealth CERF arrangements involve \$40 million investment by the Commonwealth Department of Environment and Heritage Marine and Tropical Science Research Facility, making access to CERF funds for non-reef and rainforest Queensland difficult to secure. Land and Water Australia is investing more R&D funds under the native vegetation and biodiversity program in northern Australia, but the amount of total funds available is limited. One important limitation of the current regional NRM process is the inability of regions to deal effectively with cross-regional issues such as climate change. This requires a coordinated research program involving all regions and state government agencies. While there was no consensus at the workshop on the potential consequences of climate change, it was recognised that predicted increased temperatures and climate variability could have important consequences for regional ecosystems and biota, and may override current conservation programs focussed at the property or landscape-level. The workshop highlighted that probably the best strategy for dealing with the biodiversity impacts of climate change is to apply sound management actions now so that ecosystems and biota are better able to cope with the increased variability expected under a future climate.

### **Strategies and Future Directions**

The following points highlight some of the possible strategies and future directions for addressing the above issues. This is broken into two core areas: 1) making better use of existing research knowledge; 2) and building new research knowledge.

#### **1) Making Better Use of Research Knowledge**

##### ***Funding cycles (For State and Commonwealth Government Agencies)***

Biodiversity conservation requires long-term funding for regional NRM bodies. Commonwealth and State governments need to commit to long term funding of regional planning process to ensure certainty of resources to implement planning initiatives, including biodiversity conservation. If we want to conserve biodiversity in rangeland regions, then the current funding arrangements need to continue in the long-term to provide regional NRM bodies the resources to effectively address issues and implement management action targets. Inequities in funding between NAP and NHT2 regions also need to be addressed in future funding programs.

##### ***Biodiversity science communication and tools. (For researchers and Regional NRM bodies).***

Biodiversity scientists need to better communicate research outcomes back to regional bodies in a form that can be easily understood and implemented. Workshops that engage researchers, regional bodies and staff and regional communities provide a very useful mechanism for building collaborative links and research projects. Possible strategies to develop stronger communication among scientists, regional bodies and communities include:

- Succinct reviews of particular biodiversity issues;
- Joint workshops and field days involving researchers, regional bodies and landholders;
- Regional forums and workshops on specific issues;
- Extend the work on BioCondition indicators to specific ecosystems (e.g., Mitchell Grasslands) and test links between these indicators and the persistence of particular biota; and
- Development of biodiversity toolkits, planning guidelines and interactive computer-based tools such as currently being used for grazing land management (GLM+, MegaMachine, Bayesian Belief Networks).

A second, more structured, option is investigating the utility of a dedicated knowledge brokering systems such as advocated by Campbell (2006), firstly as a prototype. Such a system is not confined to biodiversity, but needs to include other natural resource assets such as soil, water and weeds. This is a recognised priority of regional NRM in Australia where Land and Water Australia have a knowledge brokering program (Campbell 2006). Areas of information concern identified by Land and Water Australia include knowledge fragmentation, volume, relevance, accessibility, the need for two-way exchange of knowledge, and the need for sharing across regions and up to the Commonwealth level and back. Campbell advocates a ‘First Stop Knowledge Shop’ (face to face and web-based) for regional knowledge building that would guide regional bodies in working out how to meet their knowledge needs.

***Spatial prioritisation of biodiversity investments (Researchers and regional NRM bodies).***

Regional bodies need to recognise they are in the business of biodiversity conservation, and not just instruments for delivering targets. Biodiversity outcomes needs to be dealt with in a business-like way, using decision-making tools to determine actions and performance evaluation and monitoring to measure the success of outcomes (Possingham 2001). This requires that regional NRM bodies and biodiversity managers are more accountable for their actions and funding allocations by clearly enunciating conservation objectives and measuring and reporting on performance towards achieving these objectives. It also requires moving beyond short-term investment horizon to a long-term horizon and from small reporting on allocation and spending of NHT2 and NAP funds for short-term targets as is the current practice, to the strategic planning and allocation of resources through objective decision-making criteria within a truly adaptive management framework. Science-based decision tools can help meet this challenge. Collaborative projects between research community and regional NRM bodies can help to develop maximise the biodiversity outcomes of the investment in biodiversity. Regional NRM bodies have access to considerable amounts of money for biodiversity and native vegetation management incentive schemes, albeit not enough to ameliorate all the problems. Five years ago, this money was not available. However, in bioregions such as the Brigalow Belt, where ecosystems and biodiversity are under serious threat, there are perhaps ways to allocate funds in more creative ways. This requires using a landscape triage frameworks to spatially-prioritise biodiversity funding allocation (Hobbs and Kristjansson 2003). Triage frameworks can be allied in conjunction with understanding how populations work, money could be directed to where it is most needed, and be directed to landholders who retain land in good condition and who may be prepared to accept payment to manage land for biodiversity outcomes.

Research and monitoring underpin progress towards achieving biodiversity objectives, and must be integrated into regional planning and management actions. We can only measure success when we have some idea of what success looks like (Hobbs 2003). Programs for monitoring biodiversity by regional NRM bodies are currently in their infancy, and lack a sound scientific basis. Biological science has the knowledge and tools for assessing condition, understanding causes and monitoring trends.

## **2. Building new research knowledge**

### ***Develop integrative, cross-regional research projects (For Commonwealth and state governments, and regional NRM bodies).***

It is imperative that research questions be framed so they have a planning/management as well as theoretical focus. Theory and application are not necessarily mutually exclusive, with careful research design able to address both theoretical and applied questions (C. McAlpine pers. observations). This requires a move away from traditional null hypothesis testing towards more integrative science testing competing alternative hypotheses or predictions (Holling 1998). This requires developing and testing a priori predictions for conserving biodiversity in rangelands that have applicability beyond a single case study. If management principles or rules can be established, then they can be applied more broadly. This will save duplication of resources and help improve outcomes. Further, cross-regional and cross-institution research programs which deal with large-scale problems such as the impacts of climate change on biodiversity need to be developed. These issues need to be addressed at a national, state and regional level through structured long-term research programs that address core research issues in rangelands. State and Commonwealth need to support this. There is a trade off between the current competitive grants scheme which focuses on individual projects and the need for integrated research programs that look at whole systems and processes. One way of addressing this problem is to develop research programs along particular themes similar to the CSIRO model.

### ***Building collaborative research with regional NRM bodies (For researchers and Regional NRM bodies).***

Researchers and research providers need to build collaborative research with regional NRM bodies. However, this process can be slow and time-consuming, and requires persistence and perseverance on the part of researchers, and building trust between researchers and regional body staff. There are many different types of collaborative relationships, and there is no one right way to build collaborative relationships (Wondolleck and Yaffe 2000). Collaborative research can lead to better decisions that are more likely to deliver stronger outcomes and at the same time prepare regional NRM bodies for future challenges. As Wondolleck and Yaffe (2000: p249) highlight, many useful skills are required in collaboration, but the key skills of humility, honesty, sincerity, creativity, listening and understanding are not rocket science. Many regional NRM technical staff have limited experience of research and developing sound research projects. For researchers, building collaborative relationships may require starting with a small-short term project which can deliver tangible outcomes in the short-term (Alan House, Personal Communication, March 2006). Larger and longer projects such as Australian Research Council and Land and Water Australia grants take longer to develop, and can evolve out of smaller projects. Conversely, regional bodies need to recognise that developing successful research projects requires cash contribution towards the project costs, and that in-kind support is not enough. This requires regional bodies work with researchers to set the research goals and provide expertise, especially in ensuring the practical application of the research outcomes.

The benefit for regional bodies is building technical capacity of staff and value-adding to new knowledge, tools and guidelines for more effective plan implementation and incentive schemes.

***Funding research (For Commonwealth and state governments, and regional NRM bodies).***

Research also is a business and researchers require funds to undertake successful research projects. While competitive grant schemes are available to researchers, the success of attracting grants is dependent on attracting cash and in-kind support. Supporting and funding research is the responsibility of regional NRM bodies, but also the state government. In Queensland in recent years, there has been a decline in within-agency research and a shift in resources and personnel to policy and planning (C. McAlpine pers. Observation). However, without good research, policy and planning may be misdirected and fail to deliver desired outcomes. Researchers within state agencies find it difficult to achieve promotion and are forced to move into policy or else seek employment elsewhere (e.g., CSIRO) where their talents are recognised. Even when competitive grants are secured, there are often excessive delays in finalising contractual details between industry partners. These delays add unnecessary delays on commencing research projects and delivering project outcomes. The current arrangements through the Joint Steering Committee strategic research funds need to be better administered. Setting of regional research priorities has been slow and reflects a knowledge gap between the research and planning. Processes such as CIRM can help set priorities for issues which span regions. For example, CIRM native vegetation research priorities need to be strongly communicated to regional NRM bodies (Tait 2003). The information and priorities contained in this report are a valuable resource for regional bodies.

**Ideas for Innovation**

Regional NRM bodies need to recognise that NRM is primarily about managing landscapes for sustainable production and as such does not cater well for biodiversity. Achieving biodiversity outcomes requires that the science of biodiversity conservation must be integrated with sustainable land, water and grazing management.

Regional NRM bodies and government agencies (State and Commonwealth) need to recognise that biodiversity and biodiversity conservation is likely to have limited support (i.e. not majority support) for many reasons, and as such reserve or quasi-reserve systems are probably necessary in high intensity landscapes. One option is to consider developing whole or part-property reserve systems with landholder-managers, light stocking rotations and subsequently realistic landholder incentive payments/subsidies;

Use landscape triage frameworks to assist in funding allocation, focusing on ecosystems in good condition and species that are still common. Do not put the bulk of resources into “refloating the Titanic” but rather “try to save ships that are still afloat”);

Design incentive and reward systems for those who actively manage land in an ecologically viable manner – do not reward bad land management (past and present);

Understand but do not focus on symptoms of problems, but rather address the causes of biodiversity management problems. This will help ensure delivery of biodiversity outcomes in the long-term rather than short-term fixes.

## References

- Australian Academy of Science 2002, *Living with climate change*, A national conference on climate change impacts and adaptation, Australian Academy of Science, Canberra.
- Campbell, A. 2006, *The Australian natural resource management knowledge system*, Australian Government Land and Water Australia.
- Dickman, C.R., Pressey, R.L., Lim, L., Parnaby, H.E. 1993, Mammals of particular conservation concern in the Western Division of New South Wales, *Biological Conservation*, 65, 219-248.
- Eyre, T.J., Kelly, A.L., Neldner, J.A. 2006, *BioCondition: A terrestrial vegetation condition assessment tool for Biodiversity in Queensland*, Field assessment manual, Queensland Environmental Protection Agency, Brisbane.
- Hobbs, R., Kristjanson, L.J. 2003, Triage: How do we prioritize health care of landscapes?, *Ecological Management and Restoration*, 4, S39-S45.
- Hobbs, R.J. 2003, Ecological management and restoration: Assessment, setting goals and measuring success, *Ecological Management and Restoration*, 4, S2-S4.
- Holling, C.S. 1998, Two Cultures of Ecology, *Conservation Ecology*, 2, 4-9.
- James, C.D., Landsberg, J., Morton, S.R. 1995, Ecological functioning in arid Australia and research to assist conservation of biodiversity, *Pacific Conservation Biology*, 2, 126-142.
- Lunney, D. 2001, Causes of extinction of native mammals of the Western District of New South Wales: an ecological interpretation of the nineteenth century historical record, *Rangeland Journal*, 23, 44-70.
- McAlpine, C.A., Fensham, R.J., Temple-Smith, D.E. 2002 Biodiversity conservation and vegetation clearance in Queensland: principles and thresholds, *The Rangeland Journal*. 24, 36-55.
- Morton, S.R. 1990, The impact of European settlement on the vertebrate animals of arid Australia: a conceptual model, *Proceedings Royal Society of Australia*, 16, 210-213.
- Morton, S.R., Stafford Smith, D.M., Friedel, M.H., Griffin, G.F., Pickup, G. 1995, The Stewardship of Arid Australia: Ecology and Landscape Management, *Journal of Environmental Management*, 43, 195-217.
- National Land and Water Resources Audit 2002, *Australian terrestrial biodiversity assessment*, National Land and Water Resources Audit, Canberra.
- Opdam, P.F.M., Foppen, R., Vos, C.C. 2002, Bridging the gap between ecology and spatial planning in landscape ecology, *Landscape Ecology*, 16, 767-779.
- Parkes, D., Newell, G., Cheal, D. 2003, Assessing the quality of native vegetation: The 'habitat hectares' approach, *Environmental Management and Restoration*, 4, 29-38.
- Possingham, H.P. 2001, *The Business of Biodiversity: Applying decision theory principles to nature conservation*, Australian Conservation Foundation, Fitzroy, Victoria.
- Queensland Environmental Protection Agency 2002, *Biodiversity assessment and mapping methodology*, Queensland Environmental Protection Agency, Brisbane.
- Queensland, Government 2004, *Vegetation Management and Other Legislation Amendment Act*.
- Queensland Department of Natural Resources and Mines 2006, *Land cover change in Queensland 2001-2003: A statewide landcover and trees study*, Queensland Department of Natural Resources and Mines, Brisbane.
- Seabrook, L.M., McAlpine, C.A., Fensham, R.J. In Press, Cattle, crops and clearing: regional drivers of landscape change in the Brigalow Belt, Queensland Australia, 1840-2004. *Landscape and Urban Planning*.
- Tait, J. 2003, *Priority research and development needs and issues for sustainable native*

- vegetation management in Queensland*, Consortium for Integrated Resource Management, Brisbane.
- Walsh, K., Hennessey, K., Jones, R., McInnes, K., Page, C., Pittock, B., Suppiah, R., Whetton, P. 2001, *Climate change in Queensland under enhanced greenhouse conditions*, CSIRO Atmospheric Research, Canberra.
- Woinarski, J.C.Z. 2001, A review of changes in status and threatening processes., In P. Whitehead, J.C.Z. Woinarski, A. Fisher, R.J. Fensham, K. Beggs (eds), *Developing an analytical framework for monitoring biodiversity in Australia's rangelands*, Tropical Savannas CRC, Darwin, pp. 71-310.
- Woinarski, J.C.Z., Fisher, A. 2003, Conservation and maintenance of biodiversity in the rangelands, *Rangeland Journal*, 25, 157-171.
- Wondolleck, J.M., Yaffe, S.L. 2000, *Making collaboration work*, Island Press, Washington D.C.

## 5 Success Factors for Getting Science on the Ground

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### Introduction

Improved natural resource management requires the ability to access and effectively use relevant information for active adaptive management. The Benchmarking Report identified the need for strong, healthy structures for integrating knowledge, particularly structures that support data and information sharing and which ensure that there are effective arrangements in place to access external expertise, science and science providers. Other reports have identified a similar need (CIRM Reef 2005; Campbell 2006; CSIRO and BoM 2004).

Yet frustration exists over the difficulties in converting existing data into information to support regional planning and implementation. Benchmark I interviewees commented on the high transaction costs involved in 'managing' scientists and researchers and ensuring alignment of that research with local or regional priorities, including its appropriateness to community defined needs. According to state agency respondents, the regional process also presents new challenges, with recent planning activity stimulating a significant learning curve for the scientific community, in some areas initiating a rethink of how traditional science research is conceived and delivered so that it can better support regional NRM delivery.

Science research has traditionally been reductionist, conceived in accordance with research standards appropriate to a particular academic discipline, investigating single issues using a narrow analytical focus. Over the last twenty years the appropriateness of the traditional science research approach as the only valid approach to knowledge-production has increasingly been questioned as alternative claimed knowledge is recognised as legitimate (Gallop *et al.* 2001). For example, scientific peer review as the sole mechanism for quality assurance of research is increasingly challenged by new assessment measures that incorporate social, economic and political aspects into their assessment of the merit and value of the science. Examples of this are juries that are regularly required to apply socially relevant criteria in the assessment of conflicting expert opinion; ethics committees who oversee medical research; communities of interest on issues of pollution or emerging medical conditions who use the internet to review expert opinion against their collective experiences (*ibid.*). In part this democratisation of science has been driven by an appreciation of, and a concern over, the connectedness between science, society's actions and the environment, often at a scale which has global significance. The widespread adoption of the precautionary principle, where environmental prudence overrides the requirement to demonstrate strict scientific causality, is a practical example of this shift.

Gibbons *et al.* (1994) distinguish between conventional science and an emerging significantly different approach to science, which they labelled integrative science, though others have applied the term sustainability science. Integrative science entails a collaborative development and implementation of the research with relevant stakeholders who bring to the dialogue a wide variety of world views and interests. Integrative science takes on board more diverse social, cultural and economic concerns than conventional science, which is generally more tightly focused and motivated. As Kerkhoff (2005) describes it, "the boundaries between science and society become more permeable".

Agricultural extension, the principal mechanism for translating and delivering research findings to land managers, has historically employed a traditional transfer-of-technology (TOT) extension model which used a “teaching” or “information transfer” approach seen to operate almost independently of its recipient (Allen 1998). In recent years, a new vision of extension has arisen, which views successful extension as a system within which land managers, research, extension, education and other interests interact as system elements and through that interaction transform themselves. Notable examples are the agricultural knowledge and information system (AKIS) of Neils Roling (1988) or the integrated systems for knowledge management approach of Allen (Allen *et al* 1998). Such a systems approach recognises, facilitates and celebrates the transformations, applications and creation of (new) knowledge arising from the synergies of multiple players and knowledge systems interacting within the system (Campbell 2006).

One of the insights of applying the systems “frame” to extension and learning is an increased appreciation that through their interactions, all participants including both research scientists and land managers craft new knowledge and advance the development of their understanding within a co-learning experience. The systems “frame” also forces a renewed recognition of the significance of the nature and quality of the relationships and interactions between and amongst the players and the combined knowledge sets they bring to the situation, what Campbell calls, “the arrows” connecting the system elements.

For example, in analysing the “implementation problem” of producer decision support systems, i.e. the reasons behind very low adoption rates of purpose-built decision support tools for land managers, the relationship between the system developer and its eventual users was found to be paramount McCown (2002). Effective new decision support systems transcend mere involvement when they develop a relationship of mutual understanding based on shared recognition of, and respect for, other’s ways of viewing the world. This opens up opportunities for co-creating information systems that utilise the comparative advantages of both practical and scientific knowledge. Intervention emphasis shifts from prescribing action to facilitating learning in actions (McCown 2002:180).

Logically, inclusion of the land manager as an active and reactive component in the knowledge system is particularly important when trying to manage under conditions of uncertainty, rapid change or limited information when active adaptive management is required. Traditional extension methods of conveying received knowledge are of limited use in managing an evolving adaptive system. They also provide little support to land managers who require more integrated information to support their management systems.

In Queensland, significant efforts have been made to produce research needed in particular areas to support the delivery of regional NRM by regional bodies and agency staff. This includes some projects under the various themes of the State-level Investment Program, together with a range of other initiatives which place agency and other science providers in constructive dialogue with land managers and planners. Not all these projects have succeeded in achieving that mandate; this case study inquires into attributes of that variable success by attempting to gain an understanding of the success criteria for developing learning opportunities and environments which support improved understanding and which collaboratively develop, or create, more accessible integrated knowledge.

## Objectives

This case study examines three projects that are generally considered to have successfully integrated scientific research with community requirements, by supporting data and information sharing and developing modelling or risk assessment frameworks to fill defined NRM information and knowledge needs. These projects have been studied in order to analyse what has worked well and what hasn't -- to identify common attributes of successful collaborative efforts so that future research efforts can benefit from good guidance of the key elements of what works well, and avoid those that don't. The following open questions form the basis of this inquiry:

- What are the attributes of successful and unsuccessful collaborative learning approaches?
- What is the context and key processes for success?
- How has success been defined?
- What evidence is there for the durability of this collaborative learning forum/process? What systems put in place?
- What are the pitfalls/lessons learnt from unsuccessful attempts?

A clear understanding of how to integrate research into implementation is particularly relevant to several of the other case studies in this document. In particular it should provide insights into the question of how to get biodiversity issues incorporated into planning, how to set effective water quality targets and could potentially contribute of the issue of regional investment in weeds outcomes

## Approach

Three separate projects were analysed for this case study in order to identify common attributes:

- Integrated Area Wide Management in the Emerald area,
- Short Term Modelling in the Reef catchments, and
- Fitzroy Salinity Risk Assessment.

The choice of these particular projects should not be seen to imply that these are the only, nor indeed definitively the best, examples of "getting science on the ground". Rather, the projects were chosen because there appears to be a general consensus and some evidence that these projects stand out in some way – either because of stated client satisfaction, the level of new knowledge and skills developed or the demonstrated ability to break new ground in developing improved and productive models of collaboration.

A combination of study methods was used. Following discussions with the project leaders or managers, a review of available project documents was undertaken including project proposals, operational plans, reports and newsletters, and one project evaluation of the Short-Term Modelling project (Hoverman 2006).

Semi-directed interviews were then undertaken with a cross section of project participants. A total of 24 face-to-face interviews were undertaken with participants from Emerald, Rockhampton, Canberra and Brisbane. This cross-section approach was structured in order to ensure a variety of perspectives was captured from across the various stakeholders for each project.

Interviewees included science research, modelling and extension personnel from DNRMW, EPA, DPI&F and CSIRO; regional body science and operational staff, managers and Board members, officers from local government, Sunwater, Queensland Farmers Federation, Cotton Growers and Irrigators Association and a collection of irrigators, growers and graziers.

Interviews were taped to allow for subsequent analysis of emerging themes beyond the actual content and focus specific to each project. Additional and follow up telephone interviews were used to further clarify and expand on the original interview material.

## **Context**

The three projects are all quite diverse, engaging different categories of organisations, clients and stakeholders and operating across different, although slightly overlapping, geographical areas. The projects are necessarily complex with multiple components, locations and actors. A brief description of each project including its proponents, clients, focus and objectives is given below in order to provide context from which to make sense of the common themes that emerge.

### ***Integrated Area Wide Management (IAWM)***

Integrated Area Wide Management originally began in 2000 as a coalescence of a series of discrete but complementary initiatives in the Emerald area of Queensland that together served to support the alignment of farm-scale management with regional and broader landscape priorities.

A series of events served to generate the fundamental activities making up IAWM. The cotton industry in the Emerald area had previously formed a series of small grower groups to coordinate area spraying programs with the aim of enhancing the effectiveness of pest management. At the same time the industry was developing its BMP program in the face of increasing social pressures to demonstrate improved and environmentally-responsible management. Increasing pressure for regulatory reform in vegetation and water management set in place consultation processes between the community and the Department of Natural Resources & Mines which were not seen by growers to adequately cater for meaningful input or grower participation in decision making. The end result was a resolve to improve industry information access, information flow and industry participation.

The system which was set in place and the collection of allied activities together were seen as facilitating integration between farming enterprise management and broader area-wide management, hence the name Integrated Area-Wide Management.

Early successes in the Emerald area have lead to subsequent efforts to translate the IAWM concept to other areas and industry partners through State-level Investment Program (SIP) funding, namely to the Condamine Alliance region, the QMDC region and an expansion of the original Emerald project to encompass the Comet and Lower Dawson areas. One spin-off effect of this translation effort has been to formally distil the defining characteristics of IAWM. Briefly, IAWM is now seen as consisting of four main components:

- Biophysical monitoring and practical support programs for growers
- Rural industry information management
- Effective FMS support – both farm and area-wide
- Sustainable mechanisms for collaboration (Wilkinson 2006).

IAWM's greatest successes revolve around establishing mechanisms which promote collaboration and which build the trust of growers in the integrity, confidentiality and value of the systems aggregating individual grower monitoring data. Successful activities under IAWM have included the collection, analysis and use of aggregated grower irrigation water and soils data to successfully negotiate with Sunwater, the water supply company, to line selected major irrigation channels where leakage was causing waterlogging and salinisation of grower fields. Data held by individual growers was insufficient to achieve this purpose; aggregated authenticated data was necessary. Collecting data from individual growers required the development of significant trust and new ways of working together. IAWM was instrumental in achieving successful negotiations with grain growers over chemical spray drift and between state and local governments over relative responsibilities for flood mitigation and planning where historic precedent muddied current responsibilities. Central to delivering IAWM is the coordination role that in addition to providing effective FMS support and access to rural industry information, turns aggregated individual data into informative reports and submissions to support adaptive management.

IAWM's current challenge is trying to determine its most appropriate role vis-a-vis the regional NRM bodies. Similar to an industry group, IAWM currently sees itself as an intermediary between its growers and the regional NRM process, a role also claimed by regional NRM bodies.

#### ***Short Term Modelling in the Reef catchments***

The Short Term Modelling (STM) project in the Reef Catchments was a collaborative package of catchment modelling, communication and extension activity, intended to support regional bodies in the process of setting water quality targets under the Reef Water Quality Protection Plan by providing guidance on whether, and which proposed management actions could be expected to deliver significant reductions in sediment and nutrient delivery.

This cross-regional project centred around the improvement and extension of the catchment model SedNet by science providers across State Agencies, CSIRO, CRC Catchment Hydrology and other research organisations working ultimately with regional NRM bodies to provide the very best advice on the most cost-effective management actions to deliver improvements in resource condition in each locality.

The project consisted of three components: communicating modelling's strengths and weaknesses in catchment and regional NRM planning, improving the model (while adapting it to new areas) and improving the modelling capabilities of regional science staff, in both the agencies and the regional bodies.

Involving participants in all five regions bordering on the Great Barrier Reef, the sheer logistics of coordinating scientific, modelling, communications and extension staff and resources across three NRMW departmental regions, allied research organisations and five regional bodies made this project particularly challenging. The coordination role was therefore significant to the success of the project.

Regional sediment and nutrient modelling used the development of scenarios to assess whether proposed management actions would deliver significant reductions in sediment loss and nutrient transport. The project was supported through a funding combination from the Australian Government's Coastal Catchments Initiative, the Water Quality State-level Investment Program (National Action Plan for Salinity and Water Quality (NAP)) and the Queensland Regional NAP Strategic Reserve.

The project greatly expanded departmental and regional science modellers' capabilities, sometimes from a very low base, through intense, even exhilarating workshop learning experiences bringing together skilled modellers and novices. Initiatives with Board and staff members on five regional bodies significantly improved their understanding of modelling's ability to provide relative information under different management systems.

This benefit however was quite variable, being strongest in the more northern regional bodies where the project was conceived and initiated. However, even where the contributions of modelling to improved management was not taken on board, the project nevertheless delivered significant improvements in general understanding of the effects of various land management and land use impacts on erosion and sediment transport (Hoverman 2006).

The bulk of activities were undertaken between December 2004 and October 2005. The final project report was completed in February 2006.

### ***Fitzroy Salinity Risk Assessment***

The Fitzroy Salinity Risk Assessment project is a collaborative initiative between central and regional science areas at DNRMW and the FBA arising out of concerns surrounding the problematic release of the Fitzroy Salinity hazard map at a time when vegetation clearing issues were at the forefront of public awareness.

Although there is good general understanding of salinity processes, the challenge has been to understand how broad principles link to specific localities. The Salinity Risk Assessment project's purpose is to improve FBA's understanding of salinity risk at both basin-wide and local scales and to provide a basis for making informed investment decisions concerned with salinity prevention and mitigation. In the process it has led to the development of a practical Salinity Risk Assessment Framework (see Figure 1 below) for structuring multiple layers of existing knowledge into a format from which sensible questions about salinity risks can be answered.

This project began in June 2005 after several years of discussions between DNRMW and FBA following a 2002 scoping meeting. It receives funding from the Salinity SIP and FBA's Regional Investment Strategy (RIS).

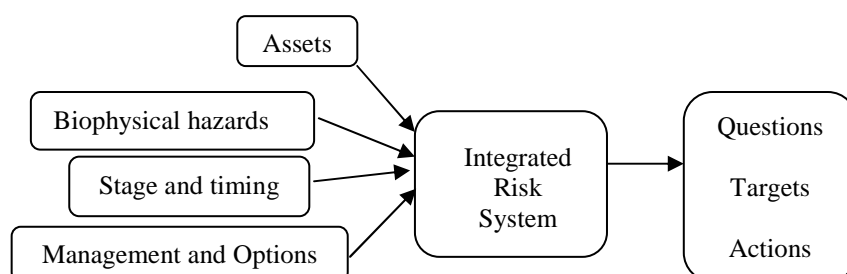
The project involves a range of measurement and modelling activities including:

- selection of a set of focus catchments with particular characteristics covering a range of landscapes, land uses and possible salinity issues,
- development of a range of new and improved data sets including:
- improved digital elevation models of the Fitzroy,
- recent land use mapping,
- new soil attribute layers, rainfall data, groundwater flow systems and vegetation mapping,
- collaborative development of a salinity risk and GIS framework,
- catchment salt balances, rapid stream assessment and refined land use mapping to understand local hydrology and deep drainage patterns.

In a standard project of this nature, much of this work would have been initiated by DNRMW scientists. This project differs in that it has arisen from iteratively defining a regional body need and has carefully built alliances and secured buy-in from a range of regional body officers, land holders and extension staff as well as central and regional science officers.

There has been significant input of local expert knowledge and expertise. The focus catchments have been identified collaboratively using expert advice and forty years of experience and knowledge of local landcare groups and regional scientists. Similar experience and local knowledge has been used in mapping local hydrology and deep drainage patterns.

Consultations surrounding the development of the Salinity Risk Assessment and GIS Framework (see Figure 1) are an excellent example of developing ownership from a wide range of stakeholders. This framework allows regional bodies and land managers to ask sensible questions of the body of information – for example, questions about woodland thickening and thinning, about where to plant trees in the catchment, about deep rooted perennials and the consequences of planting leucana.



**Figure 1. Salinity Risk Framework**

The project has a locally developed extension strategy being implemented by an DNRMW officer and one FBA officer and has already served as an awareness raising/educational experience for landholders and sub-regional coordinators. Due for completion later in 2006, a number of questions about what is happening at the farm level remain to be answered.

**Table 1. Comparison of Participant Types and Regions Affected**

Project Title	Participants		Regions affected	Time frame
	Clients	Organisational Counterparts		
Integrated Area Wide Management (IAWM)	Agency extension officers, agricultural industry consultants, land managers and growers		Emerald Area, Central West Queensland	Well established Long term
	Cotton Growers, mixed enterprise managers	DNRMW and some DPIF (Emerald), 4T Consultants, CHRRUP		
Short-Term Modelling Project	Modellers of sediment and nutrient flows and regional NRM bodies (staff and Board members) bordering the Reef		GBR-catchment regional NRM bodies	Just completed
	FNQNRM, FBA, MWNRM, BDT, Burnett Mary	DNRMW, CSIRO, consultants, EPA		
Fitzroy Salinity Risk Assessment	Salinity and other NRM specialists, FBA as investors, Fitzroy land managers		FBA region	In process
	FBA investors and other land managers	Agency salinity specialists – NRSc, CSIRO, DPI & regional officers		

### Key Findings

Although linked by a central theme of information and science collaboration, these three projects are quite diverse, in different stages of development – from long term well established processes, through just completed to still in process as shown in Table 1 below.

The projects also involve different combinations of stakeholders from the regional arrangements' pool of players – land managers, regional body staff and boards, agency personnel – both regional and centrally-based, and external science researchers.

Yet in the analysis of these projects, which are generally identified as representing functional examples of “getting good science on the ground”, a number of common attributes emerge which may delineate good practice for integrated science. These common attributes are discussed below as themes appearing from the interview and document analysis.

### ***Organic nature of the projects***

These projects arise organically out of prior interactions and are sometimes so closely entangled that their exact origins are difficult to determine. IAWM is strongly rooted in the tradition of Area Wide Management for pest management which had vastly different purposes and which arose from a series of disparate activities only later identified as having common links. The Fitzroy Salinity Risk Assessment arose from discussions following the release of the salinity hazard map for the Fitzroy and resulting conversations about how subsequent salinity information could be made to be more meaningful to the community. At first glance it appeared the Short-term Modelling Project had come into being as a novel idea from the science research area of DNRMW (NRSc), but interviews reveal that a similar project had been undertaken in the Fitzroy Basin in the preceding year using the same modellers.

### ***Cooperative delineation of project and needs***

A key characteristic common to these projects is the time and care taken to ensure there is shared ownership to each project. The issues which IAWM has tackled have arisen from growers issues and needs and were eventually refined through extended and repeated consultation. If there has been direction from the coordinators, it appears to have been mainly to plant a seed of an idea and then wait until the appropriate time when that germ of an idea has taken on meaning amongst the growers. Similarly, several interviewees spoke about FBA not being ready to proceed with a Salinity Risk Framework at the time immediately following release of the salinity hazard maps. The germ of an idea needed to wait until the right time when all parties to the project were ready. The Short-term Modelling project's variable but steadily declining acceptance amongst regional bodies with increasing latitude reflects its history and origins in North Queensland.

The success of co-learning makes the identification of beneficiaries in Table 2 problematic. Beneficiaries from the Fitzroy Salinity Risk project include the FBA who will gain a better understanding of where to target investment for salinity in the Basin, but they also include land managers whose interactions in providing site specific information has enriched their understanding of salinity risk and its management. Equally revealing however is the recounting of modellers' experience from the Short Term Modelling project. One spoke of his respect for the “deep knowledge of their landscape” that regional people brought to the modelling experience; another, when asked what he had gained from the STM experience, vowed never to go back to his previous strictly analytical and theory-based, way of creating and validating models. Both were clear that the challenge of reconciling local experience with universal truths, such as mass balance of materials, resulted in the development of new understanding. The distinction between project providers and project beneficiaries loses its meaning in such circumstances.

### ***Respect for the magnitude of mutual challenges the parties were addressing***

The theme of mutual respect for the capabilities and magnitude of challenges being met by partners surfaced repeatedly in interviews, and was generally closely tied with the issue of mutual trust. It was also closely linked to an appreciation of the significant role of the coordinator(s). Where there were multiple coordinators, appreciation tended to focus on one, which varied, but in all cases indicated considerable respect for the multiple skills for project management and coordination, including decisiveness and inclusiveness, by which the coordinator carried out his responsibilities. Interviewees often stated that the key to the project was the skill and dedication of the coordinator.

### ***Attention to communication and extension***

In all three projects good communication was paramount and received significant attention through the development of an explicit communication strategy which in general began at the beginning of the project and continued throughout. This was also accompanied by an explicit extension strategy to ensure that as developments proceeded, the full range of stakeholders was able to have continuing input. Where circumstances prevented such smooth inclusions in every circumstance, such as the Short Term Modelling project (which was indeed extremely short term), post-project planning included strategies to redress that failing.

### ***Pooling information with a understanding of the exploratory nature of the process***

Throughout the interviews, participants were clear they had all, including their leader/coordinators, been participating in a learning experience which nonetheless did not diminish the respect shown for the coordinators' abilities. Of all parties involved, this engagement in an experimental process was least evident in regional body perspectives of modellers, but the modellers themselves were very candid that the project had provoked and driven a steep learning curve which, particularly for the young modelling staff, had been an exhilarating experience.

New modellers mentioned the open learning atmosphere that encouraged them to "ask any question no matter how stupid" without censure and expressed their appreciation for the skills and experience brought by the more seasoned modellers. Young researchers came away from a coordination meeting with regional bodies assured that they were "on the right track" to a fruitful solution. A passing concern was expressed by a few interviewees of the IAWM project that the project in fact might be too experimental, and responsive to too many stakeholders, to be able to continue to deliver valued services in the future. To date however the general approach of pooling individual property data into informative reports and submissions to support adaptive management appears to have serviced many grower needs.

### ***Coooption of many specialty contributors each for small inputs***

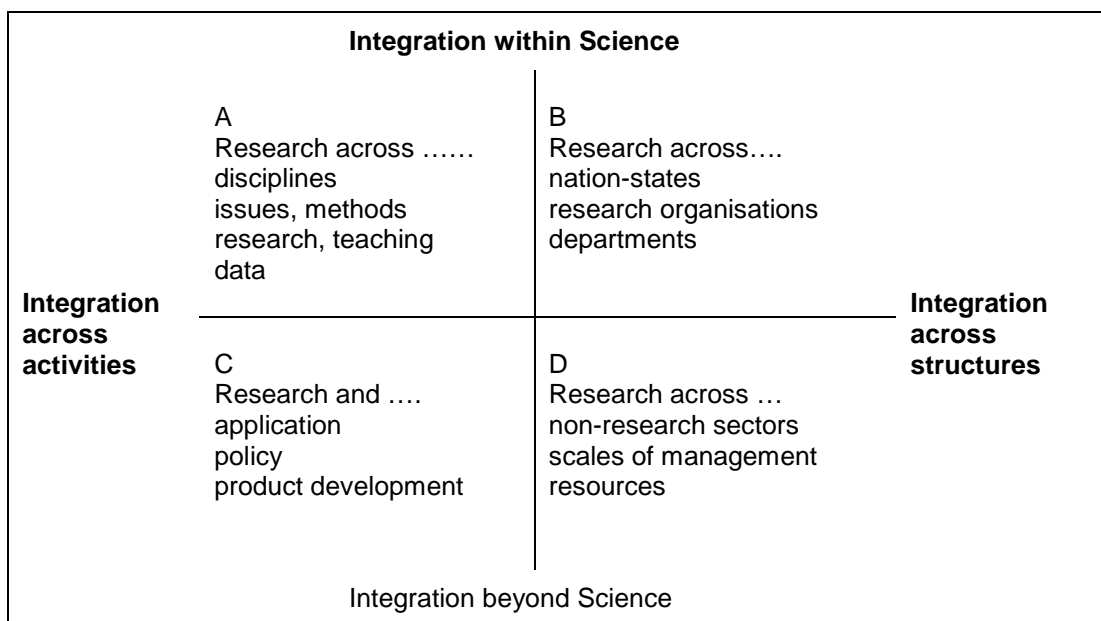
Finally these projects are marked by the cooption of many skilled people to the project, each with their individual responsibilities for some small discrete component of the problem. This tactic fosters buy-in from large numbers of people, across departments and organisations (CSIRO, DPI&F, DNRMW, EPA, Sunwater, local government and regional bodies, etc.), across regions and across disciplines.

In the process it also spreads understanding and develops skills that are later transferable to other locations. Thus sub-regional coordinators and facilitators were co-opted to gather information from landcare groups and land holders in the process honing their communication skills on salinity issues; project officers of projects allied to IAWM contributed time and thinking to the IAWM project, and in the process became what one coordinator labelled "ambassadors for the project".

Hydrographers and soil scientists contribute to small discrete studies related to the development of the Salinity Risk Framework for the Fitzroy region, but take away new skills and knowledge that are transferable to other regions across the State.

**Multiple Forms of Integration**

It is worth noting that within a broader analytical framework, all three projects demonstrate multiple integration types as described by Kerkhoff’s framework for analysing integration, at Figure 2 below. Both the Short Term Modelling project and the Fitzroy Salinity Risk project incorporate research across disciplines (Category A), research across research organisations and departments (Category B), research tied to application and product development (models and frameworks) (Category C) and research across non-research and scales of management (Category D). IAWM fails only to strongly demonstrate Category B “research across departments” but meets Categories A, C, and D for types of integration.



**Figure 2. A framework for analysing integration (Kerkhoff 2005: 460)**

Since each of Kerkhoff’s four types of integration represents a contemporary progressive improvement in scientific research methodology, the fact that the projects under consideration demonstrate aspects of all four types should be seen as a definite indication of innovative approaches to bridging the science research- implementation gap.

**Conclusion**

This research started from the acceptance that research and implementation in NRM have traditionally inhabited different intellectual and philosophical worlds – where the abstract principles resulting from research often did not easily provide the clear practical advice needed for management and implementation in the context of actual landscapes.

These three projects have provided some insights into how it has been possible to bridge that gap, though it is not possible to identify which attributes are the “necessary” ones. It is fair to say however, that a new researcher cannot expect to be welcomed with open arms as the deliverer of a unilaterally-defined research inquiry, no matter how vital he/she believes it to be to the needs of others. Successful projects result from a conjunction of providers’ and beneficiaries’ needs and interests, though that conjunction may be assisted by well-timed dialogues that plant the seed of ideas which later take on greater relevance.

Project scope and objectives need to arise out of a perceived common need, carefully refined through discussions until the time is right for both parties. Successful collaborative situations clearly require mutual respect for the magnitude of the challenges both parties face; mutual trust enables the parties to lower their defences and enter into the vulnerable co-learning situation.

The coordinator's role is central to establishing the co-learning context and smoothly integrating and coordinating the many skills and players required for research which integrates across disciplines, across organisations and across research and non-research spheres. The involvement of multiple actors in these cases may have been guided by a strategy of creating "ambassadors for the project" but the reality is that no single player has the necessary range of skills or authority any more to sort through complex natural resource management problems. The role of the expert coming from one authoritative viewpoint, whether based in science or economics, is no longer adequate for the task. The scale and complexity of interlocking systems demands multiple inputs and a wide range of knowledge to resolve the situation (Edwards 2001).

Working collaboratively offers the possibility that improved decision-making, better resource monitoring, higher quality and less costly information (eg. local knowledge) about the functioning of a particular landscape system can be combined with scientific knowledge to produce a finely tuned set of commonly-owned information on which to base management decisions.

## References

- Allen, W.J., Bosch, O.J.H., Gibson, R.G. & Jopp, A.J. 1998, Co-learning our way to sustainability: An integrated and community-based research approach to support natural resource management decision-making, In S.A. El-Swaify and D.S. Yakowitz (eds), *Multiple Objective Decision Making for Land, Water and Environmental Management*, Lewis Publishers, Boston, pp. 51-59.
- Campbell, A. 2006, *The Australian Natural Resource Management Knowledge System*, Land & Water Australia, Canberra.
- CSIRO and BoM 2004, *Scientific Advice on NRM*, A Report to the Natural Resource Management Ministerial Council by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Bureau of Meteorology (BoM), Canberra.
- Consortium for Integrated Resource Management (CIRM) 2005, *Future research and development needs to improve water quality in the Great Barrier Reef catchments*, A discussion paper prepared for the Reef Catchments Working Group for the Consortium for Integrated Resource Management.
- Edwards, M. 2001, Participatory Governance into the Future: Roles of the Government and Community Sector, IPAA National Conference 2000 paper, *Australian Journal of Public Administration*, 60(3), 78-88.
- Gallop, G.C., Funtowicz, S., O'Connor, M. and Ravetz, J. 2001, Science for the twenty-first century: from social contract to the scientific core, *International Journal Social Science*, 168, 219 – 229.
- Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., Trow, M., 1994, *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*, Sage, London.
- Hoverman S. 2005, *GBR Catchments Short-term Modelling Project (SW NRM01) Project Review* (unpublished).
- Kerkhoff, L. 2005, *Integrated Research: Concepts of Connection in Environmental Science*

- and Policy, *Environmental Science & Policy*, 8, 452-463.
- McCown R.L. 2002, Changing systems for supporting farmers' decisions: problems, paradigms, and prospects, *Agricultural Systems*, 74,179-220.
- McDonald, G., Taylor, B., Bellamy, J., Robinson, C., Walker, M., Smith, T., Hoverman, S., McAlpine, C., Peterson, A. and Dawson, S. 2005, *Benchmarking Regional Planning Arrangements for Natural Resource Management 2004–05: Progress, constraints and future directions for regions*, Tropical Savannas CRC, Darwin.
- Roling, N. 1992, The Emergence of Knowledge Systems Thinking: A Changing Perception of Relationships Among Innovation, Knowledge Process and Configuration, *Knowledge and Policy*, 5(1), 42-64.
- Wilkinson 2006, *Integrated Area Wide Management Operational Plan for Brookstead and Warwick regions in the Upper Condamine Alliance Region (Ag08)*