

# **DRAFT FINAL REPORT**

The relationships between community vitality, viability and health and natural resources and their management

*Prepared for*

## **National Land and Water Resources Audit**

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# Contents

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<b>Executive Summary</b> .....	<b>ES-1</b>
<b>1 Introduction</b> .....	<b>1-1</b>
1.1 About the Project – background	1-1
1.2 Project objectives	1-1
1.3 About the Final Report	1-2
<b>2 Community VVH and natural resource management</b> .....	<b>2-1</b>
<b>3 Headline indicators of community VVH</b> .....	<b>3-1</b>
<b>4 Testing the indicators - suggested prospectuses</b> .....	<b>4-2</b>
<b>5 Testing the indicators - an implementation schedule</b> .....	<b>5-2</b>
<b>6 Acknowledgements and references</b> .....	<b>6-2</b>
6.1 References	6-2
<b>7 Limitations</b> .....	<b>7-2</b>
<b>8 Annex</b> .....	Error! Bookmark not defined.

## Tables

Table 2: Socio-economic indicators for assessing changing resource condition and community vitality, viability & health.....	<b>Error! Bookmark not defined.</b>
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## Figures

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# Executive Summary

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To be added after the Workshop planned for the 27 April

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This Draft Final Report presents:

- (i) key findings from a Literature Review that explores the nature of people's interactions with natural resources, viewed from individual and community perspectives, with special attention given to the concept of community vitality, viability and health (VVH);
- (ii) suggested headline indicators to be used in assessing community VVH that is relevant to natural resource management delivery and outcomes;
- (iii) a prospectus for how the indicators might be tested in one or more regions across Australia, and
- (iv) a schedule for implementing the prospectus.

This is the final report that will be delivered to the National Land and Water Resources Audit, as part of URS's commitments to the *Socio-economic indicators to assess community vitality, viability and health for natural resource management project*.

## 1.1 About the Project – background

Socio-economic indicators are required for land managers, regional organizations, and the broader community to assess the:

- (a) capacity of land managers to change and to adopt sustainable land management practices;
- (b) capacity of regional organisations to make NRM decisions, and
- (c) capacity of regional communities to respond to and manage NRM issues.

## 1.2 Project objectives

The objectives listed in the Consultancy Terms of Reference (ToR) are to:

1. produce an evidence based Conceptual Framework that clarifies concepts and terminology on the relationship between community vitality, viability and health (VVH) and natural resource management (NRM) outcomes, in consultation with key stakeholders;
2. propose initial indicators of VVH relevant to NRM, and identify appropriate measures and information sources, highlighting major data gaps, and
3. develop a prospectus for future co-investment in trials of the indicators, data collection and reporting on VVH.

The project's Terms of Reference identify four key policy questions that need to be answered.

- The relationship between community VVH and natural resources outcomes?

- The importance of community VVH in NRM programs?
- The most useful measures of community VVH?
- Measuring, analysing and reporting on community VVH?

### 1.3 About the Final Report

**Section 1** introduces the objectives of the project.

**Section 2** presents the conclusions about the relationships between Community VVH and NRM based on a literature review completed in an earlier phase of the project.

**Section 3** presents suggested headline indicators for testing.

**Section 4** sets out approaches (prospectuses) that can be used in testing the headline indicators in regional Australia.

**Section 5** presents a schedule for refining the indicator list and implementing a selected prospectus.

**Section 6** lists acknowledgements and references.

**Section 7** presents that standard limitations associated with the Report.

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This Literature Review explores the nature of people's interactions with natural resources, viewed from individual and community perspectives, with special attention given to the concept of community vitality, viability and health (VVH).

This is the first of four reports that will be delivered to the National Land and Water Resources Audit, as part of URS's commitments to the *Socio-economic indicators to assess community vitality, viability and health for natural resource management project*.

### ***Findings from a review of the literature***

#### **Communities and natural resources – the policy context**

- Australian governments (Commonwealth, State and Local) are investing in regional economic and social development, in research and development for natural resource management (NRM), and in changed land use and management.
- It appears that the investments in regional economic and social development and regional NRM are occurring in parallel at all levels of government, with limited linkages between the two streams. The exception will be where investments in human and social capacity are being made to meet the needs for NRM.
- Capacity building, including information and knowledge generation and management for NRM is occurring in a plethora of organisations and programs. While some of these programs have been designed to operate with the regional delivery model, most have not, and instead are linked to industry R&D corporations, and industry organisations. A focus on developing and measuring capacity in NRM needs to include this very large and complex array of organisations and programs.
- The regional delivery model for NRM has received endorsement by two recent authoritative reviews, which have recommended continuation of the model with minor adjustments only. It is concerning to note though that on eof these reviews found low engagement with primary industry and local government, which are important contributors to NRM and community viability, vitality and health.

#### **The nature of community viability, vitality and health (VVH)**

- There is no one definition of community that is sufficient for all purposes. People living together in a location in space may comprise one community, or in the case of people with widely differing 'stories' and economic and social supports, they may comprise more than one community. However, many of the factors that contribute to overall community VVH require contributions from these separate sectors. For example, competent and well-resourced governance and access to a wide range of skills and experience are more likely to be achieved in a heterogenous larger local or regional population than in a more homogenous and smaller population.

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- The characteristics of what make communities ‘tick’ have received abundant attention in the community development literature and there seems to be a high degree of commonality that human and social capital in a number of dimensions are what matters. However, there is less attention to how this capital is built and the role of some of the underlying economic drivers in creating the environment where human and social capital can flourish.
  - Although there is a much theoretical literature in the area, not all of which seems to be grounded in observation, there is sufficient empirical support for these human and social capital factors being instrumental in the development of innovative, healthy and viable communities. This provides a basis for choosing indicators for use in measuring community VVH.
  - The research into community VVH has not given much consideration to the role of the environment in which a community is located as a contributor to community well-being, nor has it considered the value that community VVH can provide for sound NRM. There appears to be no obvious or necessary relationship. This may in part be because the research into human factors in community development and NRM has rarely been closely linked.

### **Community VVH as a driver of natural resource management (NRM)**

- The literature overwhelmingly states that behavioural change occurs as a function of the extent to which the change being considered is perceived to be in the individual’s self-interest. In summary, change will occur when the individual’s motivation, the nature of the change, and the information supports are aligned. Personality and human traits are important in deciding how an individual decides what is in his or her best interest.
- While affecting individual behaviour may be beyond the easy reach of community influence, human and social capital will be important in determining how well a community makes decisions, the trust it has in decisions made by its own and others, and how it allocates resources to address problems. Thus, human and social capital that is fostered within communities with high VVH is likely to contribute to better management of natural resources but at the planning and implementation of programs.
- Developing organisational capacity is likely to occur more readily in communities that are rich in human and social capital.

### **Natural resources and their management as a contributor to community VVH**

- The use of natural resources for broad-acre, capital intensive agriculture and agro-forestry is likely to be having a depressing impact on community VVH in those areas where this is the main primary driver of economic activity. This depressing impact will result from declining local populations required to support this land use, and centralising of services in fewer larger regional centres.
- The paradox evident in this analysis is that the very trends required to improve the ability of agriculture to address declining terms of trade, and to generate sufficient resources for NRM –

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such as farm amalgamations, increased use of technology, and increased sourcing of specialist advice – are also the factors that will impact hardest on local community VVH.

- Where local and regional populations are increasing their dependency on alternative sources of natural resource use, such as mining, oil and gas extraction (as in the rangelands) and tourism (as in areas of high scenic value), these trends are likely to be enhancing community VVH.
- Trends in migration to coastal and per-urban areas is altering the rural and community fabric of these areas in a way that is likely to be beneficial to community VVH.
- The aspirations and needs of Aboriginal people in their relationships between land access, land use and management and community development are not always being addressed adequately within existing institutional and organisational arrangements for land use and management in the rangelands. Specialist programs funded through the regional NRM deliver model are now addressing some of these inadequacies.
- Based on the evidence reviewed for this report, we suggest that the impact of the decline in the condition of the natural resources on local and regional community VVH has been overstated. While there are clearly some local and regional extreme examples, at large scale, some of the major natural resource problems are contributing less to declining regional fortunes than factors such as declining terms of trade, and changing land uses.

### Measuring community capacity

- There is abundant experience in the design and use of indicators to measure the accepted elements that comprise community VVH.
- The development of means of measuring and reporting on regional NRM organisational performance is well advanced, although these methodologies may not connect closely with some of the fundamental drivers of that performance which are community-based.
- The task will be to consider the components of community VVH that are likely to contribute most to NRM performance and match these with appropriate social and economic indicators used in existing national and state frameworks.

### Conclusions

#### The nature of community VVH

There is reasonable consistency within the literature about what makes communities viable, vital and healthy. Factors such as growing populations, availability of skills and experience, willingness to use external information, the quality of leadership and networks are identified in many authors' work. Further, Australian, State and local governments are all involved in measuring most of these elements as part of a commitment to triple-bottom line progress. This provides a solid grounding to the consideration of community VVH in the use and management of natural resources.

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### **Linkages between community development and NRM**

The community development and NRM professions have had limited cross-fertilisation. While the information on community functioning is rich in the area of how human and social capital contribute to healthy communities, there is much less attention given to the economic supports for the communities and the resultant impacts on NRM.

### **Dependency of community VVH on natural resources**

The available evidence would suggest that the economic gains from the use of nature resources have varying impacts on natural resources. Where the use is confined to broad-acre agriculture, the market forces operating on that land use are resulting in adjustments that are likely to inhibit local and sometimes regional community VVH. Conversely, where there is a move towards uses of natural resources for tourism and amenity/ lifestyle supports, as in coastal and peri-urban areas, the evidence is for trends that are enhancing community VVH. Finally, the costs of natural resource decline are likely to be having a marginal depressing impact on community VVH in most areas of Australia.

### **Dependency of NRM on community VVH**

Individual land use and management behaviour is only indirectly affected by community VVH, which can operate to affect individual values that they use in considering decisions made in their own interest. However, there is evidence that communities with strong VVH are better at setting regional directions and plans for how they want their landscapes to look and to be used. This will be particularly so in the management of NRM strategies, programs and investments are regional and local scale, where a depth of community strength will be able to support better performance in all these areas.

### ***Recommendations***

At this stage of the project, only three recommendations are presented.

1. There is sufficient evidence of linkages between community VVH and NRM to proceed to development of indicators that can highlight nature of the linkages.
2. This project and subsequent work can be used to define and foster the linkages between those people and organisations working the community VVH and NRM domains.
3. Link indicators for the NLWRA measurement of community VVH to existing National, State and locally developed indicators.

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There is a growing body of literature and experience in the development of reporting frameworks to report the state of human and social well-being, the progress towards sustainability or ‘triple-bottom line’ objectives, and objectives for community development and social goals. These recent developments have added to long-standing reporting behaviour that has occurred through publication of national accounts and statistics for dimensions such as demographics, economic, employment, education, health and community safety. However, it is within these wider reporting frameworks that existing indicators are likely to be found that can contribute to an appreciation of the state and trends in a community’s overall viability, vitality and health (VVH).

### 3.1 National reporting experience

Commonwealth Government agencies, such as the Australian Bureau of Agricultural and Resource Economics (ABARE), the Australian Bureau of Statistics (ABS), the Bureau of Rural Sciences (BRS), the Department of Environment and Heritage (DEH) and the Productivity Commission are building their capacity to report on the economic, environmental and social trends in Australia.

Environment Australia<sup>1</sup> published *Are we sustaining Australia? Report against headline indicators* in 2002 (Environment Australia 2002). The framework was developed to measure national performance against the core objectives of the *National Strategy for Ecologically Sustainable Development* (Council of Australian Governments 1992).

The ABS is increasing its capacity to report on specific aspects of sustainable development such as (i) Indigenous health and welfare, (ii) how the nation is housed, and (iii) what Australians think about the environment, and (iv) how regions are functioning across economic, social and environmental domains. It has also begun reporting general progress through the *Reporting Australia’s Progress 2004* document (Australian Bureau of Statistics 2004). This report can be considered as the first ‘triple-bottom line’ report on Australia as a whole and as such the development of indicators for reporting community VVH and NRM at local and regional scale would benefit from being consistent with this national approach. More specific socio-economic indicators that have been developed by the National Land and Water Resources Audit and ABARE (2005) to measure landholder economic and social capacity. Some of these indicators are shown in **Error! Reference source not found.**

Intellectual development in measuring change in community and environmental conditions is being led by the Commonwealth and State Governments (e.g. see DLGRD 2003), and some NGOs such as the Australia Institute (Hamilton and Denniss 2000). The work being done by the Australia Institute is highlighting problems with conventional measures such as gross domestic or regional product (GDP) per capita, and is focusing on indicators that provide insights into how ‘we’ live as a community and individuals. Commissioned reports have been completed for the Department of Family and Community Services (Black and Hughes 2001), the Department of Transport and Regional Services (Regional

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<sup>1</sup> Now the Department of Environment and Heritage

Women’s Advisory Council 2001), and the Australian Local Government Association (National Economics 2002).

Across Australia, State and Territory Governments such as Tasmania (Tasmania Together Progress Board 2003), Victoria (Government of Victoria 2001) and the Australian Capital Territory (ACT 2003); and local governments such as Newcastle and Onkaparinga have developed reporting frameworks (Australia Institute and City of Newcastle 2000, City of Onkaparinga 2000).

These reports follow a similar framework being based on aspirational goals or desired states, with a range of measures that are able to detect change in respect of the goal or the general area of interest. Victoria’s approach is a little different, in that it reports an array of selected activities (e.g. number of new teachers employed) undertaken by Government in pursuit of the goals. The approach is less objective than that taken by Tasmania or the ACT. The Government of South Australia’s State Strategy lists 6 objectives and 79 targets across these objectives (Government of South Australia (2004). Again the approach is mainly about being able to track what government does to drive change in desired directions.

**3.2 Existing NRM ‘capacity reporting’ frameworks**

**3.2.1 Regional NRM organisations**

Mark Fenton has developed an approach for measuring the natural resource management capacity, using indicators shown in Table 1. The focus is clearly on the measurement of regional NRM organisational status and performance, and they do not consider background community VVH factors that may be contributing to the NRM performance.

**Table 1: Measuring capacity for NRM**

<b>Headline indicator) (from Fenton 2004)</b>	<b>Fenton 2004</b>
NRM management capacity	Organisational structure and composition
	Decision making
	Skills and abilities
	Quality of leadership
	Organisational cohesion
NRM Management outcomes	Financial capability
	Personnel management
Program capacity	Planning and management knowledge
	Scientific knowledge
	Technical and expert advice
	Funding submissions and investment strategies
	Program specific staff

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Environmental controls	Interaction with government and semi-government organisations, (ii) local governments and (iii) community
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Fenton and Rickert (2006) continued the development of this indicator set in publishing a quantitative survey instrument to capture the data from stakeholders involved directly in regional NRM delivery. They have since published an initial use of the instrument to assess the performance of the regional NRM organisations in Queensland (Fenton and Rickert 2006b). The instrument enables individual regional NRM organisations to benchmark their indices of performance

### 3.2.2 Landholders

At landholder level, ABARE (2005) has recently put forward a framework for developing economic and social indicators for Australian agriculture. This is being done within the *Signposts* project which 'is aimed at developing a framework for reporting on the contribution of agriculture to ecologically sustainable development in Australia.' (p.3). Indicators are suggested across:

- economic outcomes – total factor productivity, farm business profit, farmland value;
- human capital – number of farm accidents, level of education and training, and
- social capital outcomes – employment.

A recent test of these indicators is that

### 3.3 Indicators for the relationship between community VVH and NRM

# Headline indicators of community VVH

## SECTION 3

Table 2: Suggested headline indicators for the relationship between community VVH and NRM

NRM program logics		Community VVH and NRM		
NAP Program logic area*	NHT Program logic area**	VVH components	Desirable contribution to NRM	Indicators (and suggested sources)
Enabling regional communities	Achievement ( <b>outcomes</b> ) – capacity building and institutional change.	Administrative capacity Infrastructure and services	Local and regional governance has NRM as core activity, and it is delivered according to sound plans (lagging indicators)	<ul style="list-style-type: none"> <li>Inclusion of NRM requirements in statutory local and regional land use plans (ALGA? Planning agencies?)</li> <li>Investment (monetary and non-monetary) leveraged by local and regional communities from other sources – state and Australian governments, corporate (Regional NRM Group records?)</li> <li>Local and regional government investment in NRM as proportion of total investment (LGA records?)</li> </ul>
	Change ( <b>intermediate outcomes</b> ) – improved decision-making capability, institutional responsiveness.	Managerial capacity, leadership Economic strength and resilience Organisational supports	The local and regional community has sufficient managerial and leadership capacity to commit to sound decision-making in NRM, and is sufficiently strong and resilient to be able to act on those decisions. (Lagging and leading indicators)	<ul style="list-style-type: none"> <li>Inclusion of NRM in local and regional government strategic plans (ALGA? BTRE?)</li> <li>Levels of local and regional employment in NRM (Regional NRM groups? LGA records?)</li> <li>MOUs established for NRM delivery by third parties – universities, state agencies, corporates (Regional NRM Groups, LGAs)</li> <li>Local and regional governance resources (ALGA?)</li> <li>Index of economic diversity (BTRE, ABS)</li> </ul>
	Actions ( <b>outputs</b> ) – on-ground actions and reforms, development of institutions.	‘Spare’ resources Internal and external networks inclusiveness	The community is able and willing to commit a diversity of social and community resources to NRM and can use its networks to build capacity. (Mainly leading indicators)	<ul style="list-style-type: none"> <li>Per-capita income (BTRE)</li> <li>Income distribution (ABS)</li> <li>Indicators of financial pressures (BTRE)</li> <li>Effectiveness of information networks (ABS)</li> <li>Volunteer activity in NRM (BTRE?)</li> <li>Social capital indices (ABS, BTRE)</li> </ul>

# Headline indicators of community VVH

## SECTION 3

NRM program logics		Community VVH and NRM		
				<ul style="list-style-type: none"> <li>• Internal and external promotion of environmental values and issues (Regional NRM Groups)</li> <li>• Index of telecommunications availability (BTRE)</li> <li>• Indigenous participation in wider community life – e.g. employment, government (ABS, BTRE)</li> </ul>
Motivating regional communities (leading indicators)	Foundations ( <b>activities</b> ) – generation of knowledge, infrastructure development, enhancement of skills and awareness, engaging communities and stakeholders	Diversity and availability of skills, knowledge and experience  Attitudes and values, commitment to place  Inclusiveness  Population mobility	The community is committed to sound NRM, has access to and is able to use available skills, knowledge and experience in NRM planning, and welcomes new people and perspectives.  (Leading indicators)	<ul style="list-style-type: none"> <li>• Remoteness index (BTRE)</li> <li>• Local and regional demographic trends (ABS)</li> <li>• Net migration of youth (NLWRA)</li> <li>• Employment type – as in professional vv manual (ABS)</li> <li>• Type of residence – as in owner-occupied vv rental (ABS)</li> <li>• Quality of physical environment (BTRE)</li> <li>• Environmental attitudes and values (ABS)</li> <li>• Organisations represented locally that have an NRM focus (Regional NRM Groups)</li> </ul>

\* from: NAP M&E core documents (2003)

\*\* from: Webb *et al.* (2004)

### 4.1 Selection of regions

Suggest four regions for testing indicators.

#### 4.1.1 A metropolitan region

Swan Catchment, Port Phillip and Western Port Bay, Sydney Metro, South East Queensland

#### 4.1.2 A 'seachange' region

Corangamite, Southern Rivers, Northern Rivers, Wet Tropics, South West WA

#### 4.1.3 A well populated rural region

Namoi, Central West NSW, Goulburn-Broken, Burnett-Mary

#### 4.1.4 A sparsely populated rural region.

Desert Channels, South Australian Rangelands, Aboriginal Lands, Western NSW, Eyre Peninsula.

**Testing the indicators - an  
implementation schedule**

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- Members of the Project Advisory Committee (PAC) for their input to the conceptual framework and their assistance with locating relevant literature.

### 6.1 References

Agriculture and Food Policy Reference Group (2006). *Creating our future: Agriculture and food policy for the next generation*. Report to the Minister for Agriculture, Fisheries and Forestry, Canberra.

ABARE (2005). *Signposts for Australian Agriculture: A Framework for developing economic and social indicators*, October, Canberra.

Australian Bureau of Statistics (2004). *Measures of Australia's Progress 2004*. Australian Government, Canberra.

Australian Bureau of Statistics (2003). *Australian Social Trends*. Australian Bureau of Statistics, Canberra.

Australian Bureau of Statistics (2002). *Census of Population and Housing 2001*. Australian Government.

Australian Bureau of Statistics (2001). *Agriculture, Australia 1999-2000*. Australian Government, Canberra.

Australian Capital Territory (2003). *People, Place, Prosperity*. Publication 03/0063. Office of Sustainability, Chief Minister's Department

Australian Government (2003). *National natural resource management monitoring and evaluation framework*. Report prepared by DAFF/ DEH.

Australia Institute and City of Newcastle (2000). *Indicators of a sustainable community*. The Australia Institute Discussion Paper 28. May 2000.

Barr, N. (2005). *The changing social landscape of rural Victoria*. Department of Primary Industries, Bendigo, Victoria

Barr, N., Karunaratne, K., and Wilkinson, W. (2005). *Australia's farmers: past, present and future*. Land & Water Australia

Barr N. and Cary, J. (2000). *Influencing improved natural resource management on farms*. Bureau of Rural Sciences. ACT.

- 
- Bauen, R. Baker, B. and Johnson, K. (1996) *Sustainable community checklist*. Seattle: Northwest Policy Center, University of Washington. Available: [http://72.14.235.104/search?q=cache:FU537G8VVh0J:www.cityofangels.org/Departments/Plannin/g/GeneralPlan/FINAL\\_DraftGeneralPlan2006/C11%2520CommunityID%25200806.pdf+Bauen+et+al+\(1996\)&hl=en&gl=au&ct=clnk&cd=3](http://72.14.235.104/search?q=cache:FU537G8VVh0J:www.cityofangels.org/Departments/Plannin/g/GeneralPlan/FINAL_DraftGeneralPlan2006/C11%2520CommunityID%25200806.pdf+Bauen+et+al+(1996)&hl=en&gl=au&ct=clnk&cd=3)
- Barron, L. and Gauntlett, E. (2002). *Model of social sustainability. Stage 1 Report of the Indicators Project*. Western Australian Council of Social Services.
- Baum, S. (2006). A Typology of Socio-Economic Advantage and Disadvantage in Australia's Large Non-Metropolitan Cities, Towns and Regions. *Australian Geographer*, Vol 37, No 2, 233-258.
- Becker, G. 1993. *Human Capital*, 3<sup>rd</sup> ed. New York: Columbia University Press.
- Beresford, Q., Bekle, H., Phillips, H. and Mulcock, J. (2001). *The salinity crisis: landscapes, communities and politics*. University of WA Press, Perth.
- Black, A. and Hughes, P. (2001). *The identification and analysis of indicators of community strength and outcomes*. Occasional paper No. 3, Department of Family and Community Services, June 2001, Commonwealth of Australia.
- Blackadder Communication and Naturally Resourceful (2001). *Natural Resources Management. People and Policy. Research projects commissioned by the Social and Institutional Research Program of Land & Water Australia*. Land & Water Australia, Canberra.
- Brunckhorst, D. (2000b). *Bioregional Planning: Resource Management Beyond the New Millennium*, Harwood Academic Publishers.
- Bultena, G. and Hoiberg, E. (1983). Factors affecting farmer's adoption of conservation tillage, *Journal of Soil and Water Conservation*, Vol.38: 281-284.
- Bureau of Transport and Regional Economics (2006b). *About Australia's Regions*. Working Paper No 68. Department of Transport and Regional Services.
- Bureau of Transport and Regional Economics. *Working paper 55. Government interventions in pursuit of regional development: learning from experience*.
- Byron, I. and Curtis, A. (2001). Landcare in Australia: burned out and browned off, *Local Environment*, 6(3), 311-326.
- Canadian Policy Research Networks (2001) *Indicators of Quality of Life in Canada: A Citizens' Prototype*. Canadian Policy Research Networks.
- Cary, J., Webb, T., and Barr, N. (2002). *Understanding landholders capacity to change to sustainable practices: Insights about practice adoption and social capacity for change*. Bureau of Rural Sciences, Commonwealth Department of Agriculture, Fisheries and Forestry – Australia.
-

- 
- Cavaye, J.M. (2004). *Social capital: a commentary on issues, understanding and measurement*. Paper for the Pascal Observatory, RMIT, Melbourne.
- Christaller, W. (1933). *Central Places in Southern Germany* (Translated by C.W.Baskin, 1966), Englewood Cliffs, NJ: Prentice-Hall.
- Christensen and Norris (1983)
- City of Greater Geelong (<http://geelong.vic.gov.au>).
- City of Ballarat (<http://www.ballarat.vic.gov.au>).
- City of Onkaparinga (2000). *Monitoring outcomes: achieving goals* City of Onkaparinga, Noarlunga.
- Cleary, J., Raymond, C.M. and Cosgrove, K. (undated). Community engagement in natural resource management – capacity auditing in the SA arid lands. Rural Solutions, South Australia.
- Commonwealth of Australia (1999). *National Principles and Guidelines for Rangeland Management*. Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).
- Commonwealth of Australia (2003). *National Action Plan for salinity and Water Quality. Schedule 4. National Framework for Natural Resource Management Standards and Targets*. NRM Ministerial Council.
- Corangamite Catchment Management Authority (2003). *Corangamite Regional Catchment Strategy 2003-2008*. Corangamite Catchment Management Authority, Colac: Victoria
- Council of Australian Governments (1992). *National Strategy for Ecologically Sustainable Development*. AGPS, Canberra.
- CSIRO and URS Australia (2001). *Data compilation and analysis for Theme 6 of NLWR Audit*. Report for National Land and Water Resources Audit, Canberra. CSIRO Land and Water and URS Australia Pty Limited, Adelaide.
- Curtis, A. (2003). The Landcare Experience, in Dovers, S. and Wild River, S. (eds) *Managing Australia's Environment*, Federation Press, Annandale, NSW.**
- Curtis, A., and Byron, I. (2002). Understanding the social drivers of catchment in the Wimmera region. Victoria Department of Natural Resources and Environment.
- Curtis, A. and De Lacy, T. (1996). Landcare in Australia: Does it make a difference? *Journal of Environmental Management*, Vol.46: 119-137.
- Curtis, A. and Van Nouhuys, M. (1999). Landcare participation in Australia: The volunteer perspective, *Sustainable Development*, Vo.7: 98-111.

- 
- Curtis, A. and Van Nouhuys, M. (1999). Landcare participation in Australia: The volunteer perspective, *Sustainable Development*, Vo.7: 98-111.
- Department of Education, Science and Training (2004). *Cooperative Research Centre Directory 2004*. Australian Government, Canberra.
- Department of Environment (2003). *Salinity Investment Framework Interim Report – Phase I*. Department of Environment, Salinity and Land Use Impacts Series No. SLUI 32.
- Department of the Environment and Heritage (DoEH) (2001). *Australia State of the Environment Report 2001 (Land Theme Report)*, Prepared by: Ann Hamblin, Bureau of Rural Sciences.
- Department of Local Government and Regional Development (2003a). *Indicators of Regional Development in Western Australia*. Government of Western Australia.
- Department of Local Government and Regional Development (2003b). *Wheatbelt Economic Perspective. An update on the economy of Western Australia's Wheatbelt Region*. Government of Western Australia.
- Department of Natural Resources and Environment (2001). *Agricultural Production across the Corangamite Region*. Government of Victoria.
- Diamond, J. (2006). *Collapse. How societies choose to fail or survive*. Penguin, London.
- Dore, J. & Woodhill, J. (1999). *Sustainable Regional Development. Final report*. An Australia-wide study of regionalism highlighting efforts to improve the community, economy and environment. Greening Australia.
- Dunlap, Van Liere, Mertig and Jones (2000). Measuring endorsement of the new ecological paradigm scale: a revised NEP scale. *Journal of Social Issues*. Vol 56, No 3. pp 425-442.
- Ellis, F. (2000). *Rural livelihoods and diversity in developing countries*. Oxford University Press, UK.
- Environment Australia (2002). *Are we sustaining Australia? Report against headline indicators*. Government of Australia.
- European Communities (2001). *Measuring progress towards a more sustainable Europe. Proposed indicators for sustainable development*. Office for Official Publications of the European Communities, European Union.
- Fargher, J.D., Howard, B.M., Burnside, D.G. and Andrew, M.H (2003). The economy of the rangelands: myth or mystery. *The Rangeland Journal* 25(2) 140 – 156.
- Fenton, M. (2004). *Socio-economic indicators for NRM (project A1.1). Indicators of Capacity, Performance and Change in Regional NRM bodies*. National Land and Water Resources Audit, Canberra.
-

- 
- Fenton, M. and Rickert, A. (2006a). *Refining indicators for monitoring and evaluating the social and institutional foundations of regional NRM programs*. Report prepared for the Departments of Environment and Heritage, and Agriculture, Fisheries and Forestry, Canberra.
- Fenton, M. and Rickert, A. (2006b). *Monitoring and Evaluating the Performance of NAPSWQ Regional Bodies in Queensland (EBC2)*. Canberra, ACT: National Land and Water Resources Audit.
- Frost, F. and Burnside, D. (2001). Appreciating and creating history. In Viv Read and Associates (Ed.). *Wheatbelt Valley Floors Conference, 30 July – 1 August 2001*, Merredin, Australia: Water and Rivers Commission.
- Government Statistical Office (2001). *Quality of life counts. Indicators for a strategy for sustainable development for the United Kingdom*. HMSO.
- Government of Victoria (2001). *Growing Victoria together*.
- Griffin-NRM and URS (2005). *Case studies for sustainable land management - Overview report*. Unpublished report prepared for the Department of Agriculture, Fisheries and Forestry, Canberra.
- Hamilton, C and Denniss, R (2000) *Tracking well being in Australia - The Genuine Progress Indicator 2000*. The Australia Institute Ltd.
- Head, L. (1994). Perspectives on multiple use of the rangelands. *The Rangeland Journal* 16(2) 167 - 183
- Indigenous Land Corporation (2001). *National Indigenous Land Strategy 2001-2006*. Indigenous Land Corporation, Adelaide.
- Indigenous Land Corporation (2002). *Land Acquisition and Land Management Programs Guide 2002-2006*. Indigenous Land Corporation, Adelaide.
- Jiggins, J., Syme, G.J. and Butterworth, J.E. (1998). Community participation in CSIRO's Dryland Farming Systems program. In: *Farming Action – Catchment Reaction: the effect of dryland farming on the natural environment*. (Eds. J. Williams, R.A. Hook, and H.L. Gascoigne). Collingwood: CSIRO.
- Hugo, G., Smailes, P., Macgregor, C., Fenton, M. and Brunckhorst, D. Defining Social Catchments in Non-metropolitan Australia. Canberra, ACT: Bureau of Rural Sciences.
- Jardine, A., Speldewinde, P. and Carver, S. (In press). Dryland Salinity and Ecosystem Distress Syndrome: Human Health Implications. *EcoHealth*.
- Joint RDCs NRM Working Group (2005). *Natural Resource Management Research & Development Report 2005*. Department of Agriculture, Fisheries and Forestry, Canberra.
- Kenyon, P. and Black, A. (Editors). (2001). *Small Town Renewal*. Rural Industries Research and Development Corporation.
-

- 
- Kenyon, P., Black, A., Cavaye, J., Duff, J., O'Meara, M. and Palmer, P. (2001). *A kit for Small Town Renewal*. Canberra, ACT: Rural Industries Research and Development Corporation.
- Keogh, K., Chant, D. and Frazer, B. (2006). *Review of Arrangements for Regional Delivery of Natural Resource Management Programmes*. Final Report to the Ministerial Reference Group for Future NRM Programmes Delivery, Australian Government, Canberra.
- Korsching, P., Stofferahn, C., Nowak, P. and Wagener, D. (1983). Adopter characteristics and adoption patterns of minimum tillage: Implications for soil conservation programs, *Journal of Soil and Water Conservation*, Vol.38: 428-431.
- Lennon, J. and Mathews, S. (1996). *Cultural Landscape Management: guidelines for identifying, assessing and managing cultural landscapes in the Australian Alp National Parks*. Cultural Heritage Working Group, Australian Alps National Parks.
- Lindner, R.K. (1987). *Adoption and Diffusion of Technology: An Overview*, in 'Technological Change in Postharvest Handling and Transportation of Grains in the Humid Tropics', B.R. Champ, E. Highley and J.V. Remenyi (eds.), ACIAR Proceedings No. 19.
- Macgregor, C. (1996). *Researching Sustainability in the Australian Tropical Savanna: A Review of Methodological Issues*. Paper presented to the Federated PhD Scheme, ANU, Canberra, July 1996.
- Macgregor, C. (2003). Working towards sustainability in small towns: a perspective from northern Australia. *International Journal of Environment and Sustainable Development*, Vol 2, No 4 pp 342-363.
- Macgregor, C.J. and Cary, J. (2002). Social/Human Capital Rapid Appraisal Model (SCRAM): a method of remotely assessing social and human capacity in Australian rural communities. *Rural Society*, 12(2): 105-122.
- Mackay, H. (1998). *The good listener*. Macmillan, Sydney.
- McFarlane, D.J., George, R.J. and Caccetta, P.A. (2004). 'The extent and potential area of salt-affected land in Western Australia estimated using remote sensing and digital terrain models', in S. Dogramaci and A. Waterhouse (eds.), *Proceedings of Engineering Salinity Solutions, 1<sup>st</sup> National Salinity Engineering Conference*, 9-12 November 2004, Perth, Engineers Australia. 2004, pp. 55-60.
- McIntyre-Tamwoy, S. (2004). Social value, the cultural component in natural resource management. *Australasian Journal of Environmental Management*, Dec 2004)
- McPherson, S. (2003). Keynote address to the VIIth International Rangeland Congress, Durban, South Africa, July 2003.
- Mealy, L. and Theis, P. (1995). The relationship between mood and preferences among natural landscapes: an evolutionary perspective. *Ethology and Sociobiology* 16: 247-256.
-

- 
- National Economics (2002). *Towards a national regional benchmarking system*. Report prepared for Australian Local Government Association and Department of Transport and Regional Services.
- National Institute of Economic and Industry Research (1999a). *The Western Division of New South Wales: its human geography and economic prospects*. A report for the Western Lands Review and the CSIRO/DLWC/LWRRDC Project – Sustainable use of rangelands in the 21<sup>st</sup> Century.
- National Institute of Economic and Industry Research (1999b). *Prospects for socio-economic advancement in the Western Catchment area of NSW*. Unpublished Report for the Western Catchment Management Committee.
- National Land and Water Resources Audit (2001). *Rangelands – Tracking Changes: Australian Collaborative Rangeland Information System*. National Land and Water Resources Audit, Canberra.
- National Land and Water Resources Audit (2002). *Australians and Natural Resource Management 2002*. National Land and Water Resources Audit, Canberra.
- National Land and Water Resources Audit (undated). *Indicators with a decision framework. Social, economic and institutional indicators for sustainable management of rangelands*. Report prepared by the Centre for International Economics, BRS, CSIRO, and Resource Planning and Management. Canberra and Sydney.
- Nichol, G.E., MacEwan, R.J., Pettit, C., Dorrough, J., Hossain, H., Suter, H., Cherry, D., Beverly, C. Cheng, X., Sposito, V., McNeill, J., Melland, A., and Shanks, A. (undated). A review of models applicable to ‘Our Rural landscape’. Department of Primary Industries, Victoria.
- Norris, P. and Batie, S. (1989). Virginia farmers’ soil conservation decisions: An application of Tobit analysis, *Southern Journal of Agricultural Economics*, Vol.19: 79-90.
- NSW Farmers Association (2005). *Building Rural Communities Project*.
- Office of Economic and Statistical Research (2001). *Regional Profiles - North West Central West and South West*. Office of Economic and Statistical Research, Queensland Treasury.
- Office of Economic and Statistical Research (2002). *The contribution of international and domestic visitor expenditure to the Queensland regional economies 1998-1999*. Office of Economic and Statistical Research, Queensland Treasury.
- Orians, G.H. and Heerwagen, J.H. (1992). Evolved responses to landscapes. In J.H. Barkow, Cosmides, L., & Tooby, J. (1992) *The Adapted Mind*. Oxford University Press, New York.
- Pahl, R. (1965). Class and Commuting in English Commuter Villages. *Sociologia Ruralis*, 5(1): 5-23.
- Pannell, D.J. (1999). *Uncertainty and Adoption of Sustainable Farming Systems*, Sustainability and Economics in Agriculture Working Paper 99/01, University of Western Australia.
-

- 
- Pannell, D.J, Marshall, G.R., Barr, N., Curtis, A., Vanclay, F., and Wilkinson, R. (2005). *Understanding and promoting adoption of conservation technologies by rural landholders*. Unpublished manuscript, submitted to *Australian Journal of Experimental Agriculture*. <http://www.general.uwa.edu.au/u/dpannell/dp0502.html>
- Paton, S., Curtis, A., McDonald, G. and Woods, M. (2004). Regional Natural Resource Management: Is it Sustainable? *Australasian Journal of Environmental Management*, 11(4), 259-267.
- Plowman, I., Coutts, J., & Botha, C. (2004). *Report on the 'Cultural Imprint Project': mapping the social culture of the sugar industry in the Herbert*. A SRDC-funded project.
- Plowman, I, Ashkanasy, N. M., Gardner, J. and Letts, M. (2003). *Innovation in Rural Queensland: Why some towns thrive while others languish*. An ARC-funded joint venture between University of Queensland Business School and the Queensland Department of Primary Industries.
- Plowman, I, Ashkanasy, N. M., Gardner, J. and Letts, M. (2004). *Innovation in Rural Queensland: Why some primary industries and their associations thrive while others languish*. An ARC-funded joint venture between University of Queensland Business School and the Queensland Department of Primary Industries.
- Plowman, I. (2005). *The personalities of primary producers and the consequences for agriculture and government*. Australia & Pacific Extension Network NRM Forum, Toowoomba, 2005.
- Plowman, I. (2006). *Achieving Australia: An Inclusive Learning Society; Why we can't and therefore how we can*. commissioned by Adult Learning Australia.
- Plowman (2006). The four determinants of behaviour. © 2006 *Practice change for sustainable communities: Exploring footprints, pathways and possibilities*. Proceedings of APEN International Conference, 6-8 March 2006 at Beechworth, Victoria, Australia. ISBN 1 920842 31 4
- Pope, J. (2006). *Indicators of Community Strength: a framework and evidence*. Strategic Policy and Research, Department for Victorian Communities.
- Pretty, J. (2003). Social capital and connectedness: Issues and implications for agriculture, rural development and natural resource management in ACP countries. Working Document Number 8032. Technical Centre for Agricultural Rural Cooperation.
- Purcell, G. and Proske, C. (2002). *Triple bottom line reporting in Australia. A practioners guide to reporting against social indicators*. Draft-in-Discussion Report prepared by the Department of Family and Community Services, Canberra
- Richards, C., Lawrence, G., and Kelly, N. (2003). *Is it hard to be green when you are in the red? A sociological account of primary production and environmental sustainability*, paper presented to the 'New times, new worlds, new ideas: sociology today and tomorrow', Conference of the Australian Sociological Association, University of New England, Armidale, December.

- 
- Rural Women's Advisory Council (2001). *Success factors – managing change in regional and rural Australia*. Technical Report prepared for the Council and the Department of Transport and Regional Development, Canberra.
- Smith, C. and McDonald, G. (1998). Assessing the Sustainability of Agriculture at the Planning Stage, *Journal of Environmental Management*, 52, 15-37.
- Stanley, J., Clouston, B. and Baker, R. (2005). *Understanding Land Manager Constraints to the Adoption of Changed Practices or Technological Innovations: Literature Review*. Queensland Department of Natural Resources, Mines and Water.
- Stafford Smith D.M, McNee, A., Rose, B., Snowdon, G. and Carter, C.R. (1994). Goals and strategies for Aboriginal cattle enterprises. *The Rangeland Journal*. 16(1): pp 77-93.
- Stephens, U. (2005). *What characteristics make a community strong and resilient?* Strengthening Communities Unit of New South Wales Premier's Department. Available: [http://www.communitybuilders.nsw.gov.au/builder/what/10\\_char\\_sustain.html](http://www.communitybuilders.nsw.gov.au/builder/what/10_char_sustain.html)
- Stocker, L. and Moore, S. (1999). Community Involvement in Ocean Policy: Coastcare and the Establishment of Marine Protected Areas in Australia. *Journal of Policy Studies*, 7, 139-150.
- Tasmania Together Progress Board (2003). *Tasmania Together Progress Report 2003*. Government of Tasmania.
- Thomas, J., Ladewig, H. and McIntosh, A. (1990). The adoption of integrated pest management practices among Texas cotton growers, *Rural Sociology*, 55(3), 395-410.
- Traore, N., Landry, R. and Amara, N. (1998). On-farm adoption of conservation practices: The role of farm and farmer characteristics, perceptions, and health hazards, *Land Economics*, 74(1): 114-127.
- Turrell, G. and McGuffog, I. (1997). Rinsing practices of Australian farmers: The characteristics of farmers who do not rinse chemical residues from empty containers, *Journal of Environmental Management*, Vol.50: 129-146.
- URS and AgInsight (2001). *Demographics and characteristics of the Corangamite people*. Unpublished report prepared for the Corangamite Catchment Management Authority, Colac.
- URS (2003). *Mid-term Review of the Ord Bonaparte Program*. Unpublished Report prepared for the Ord Bonaparte Board and Land and Water Australia by URS Australia Pty Ltd, Perth.
- URS (2004). *Information and knowledge management in regional natural resource management*. Unpublished paper prepared for the Corangamite and Glenelg Hopkins CMAs and Land and Water Australia.
- Vanclay, F., (1992). Barriers to Adoption: a General Overview of the Issues. *Rural Society* 2(2), Centre for Rural Social Research, Charles Sturt University, Wagga Wagga.

---

Vanclay, F. (2004). Social Principles for Agricultural Extension to assist in the Promotion of Natural Resource Management, *Journal of Experimental Agriculture*, 44(3), 213-222.

Watson, W. (1964). 'Social Mobility and Social Class in Industrial Communities', in *Closed Systems and Open Minds*, edited by Devons, E. and Gluckman, M., Edinburgh: Oliver and Boyd.

Webb, T., Cody, K., Harrison, B., Sincock, A. and Mues, C. (2004). *Social and economic information for NRM: An initial discussion paper*. Canberra, ACT: National Land & Water Resources Audit.

Webb, T. and Curtis, A. (2002). *Mapping Regional Capacity*. Final Report to Land and Water Australia. Canberra, ACT: Bureau of Rural Sciences.

Western Australian Local Government Association (2006). *In Your Hands: Shaping the future of Local Government in Western Australia*, Western Australian Local Government Association, August 2006.

Western Australian Planning Commission (2005). *Western Australia Tomorrow. Population predictions for planning regions 2004-2031 and local government areas 2004 to 2021*. Population Report No. 6, Government of Western Australia.

Whelan, J (ed.) (2006). *Partnership-based social research for sustainable natural resource management in Queensland*, Department of Natural Resources, Mines and Water, Brisbane.

Williams, N. and Johnston, R. (1994). 'not Passing Through': Aboriginal Stakeholders in the Rangelands. *The Rangeland Journal* 16(2) 198 – 205.

Wilson, G. (1997). Factors influencing farmer participation in the environmentally sensitive areas scheme, *Journal of Environmental Management*, Vol.50: 67-93.

Witter, S., Robotham, M. and Carrasco, D. (1996). Sustainable adoption of conservation practices by upland farmers in the Dominican Republic, *Journal of Soil and Water Conservation*, 51(3), 249-254.

Young, E. and Ross, H. (1994). Using the Aboriginal rangelands: 'insider' realities and 'outsider' perceptions. *The Rangeland Journal* 16(2) 184 – 197.

Young, M., Young, D., Hamilton, A. and Bright, M. (2002). *A preliminary assessment of the economic and social implications of environmental flow scenarios for the Murray River System*. A Report prepared for the Murray darling Basin Commission. CSIRO Land and Water.

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