

REALIZING THE CAPACITIES OF RURAL COMMUNITY INSTITUTIONS TO MANAGE ECOLOGICALLY STRATEGIC LANDSCAPES ON BEHALF OF AUSTRALIAN SOCIETY

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Submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

of the Australian National University

January 2010



CANDIDATE'S DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of the author's knowledge, it contains no material previously published or written by another person, except where due reference is made in the text.

David Eastburn

Date:

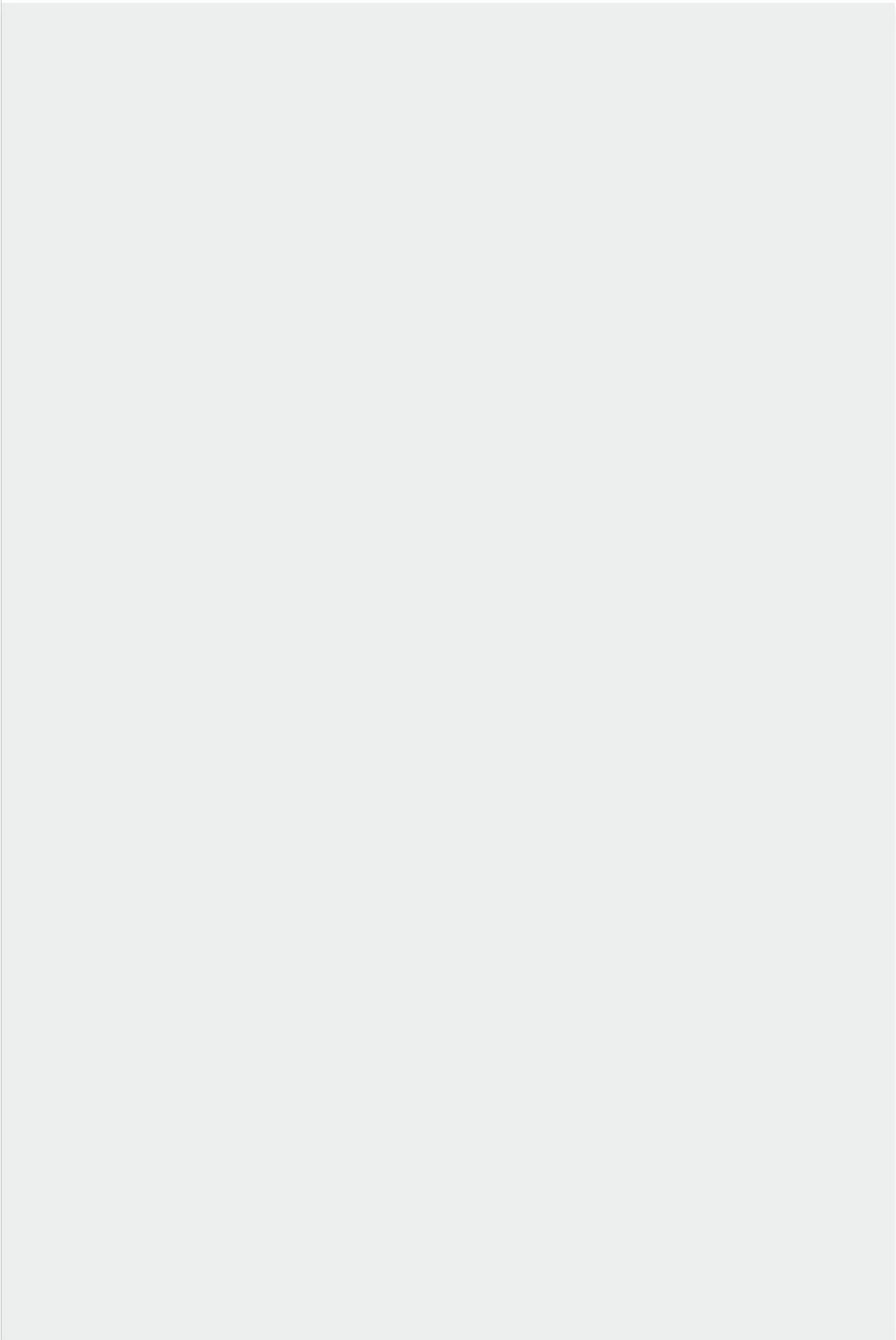
ACKNOWLEDGEMENTS

I thank my wife Bernadette and son Jimmy for their patience and inspiration to support my efforts. I thank my supervisor Richard Baker for providing the opportunity to write the thesis and for his generous contribution of time, wisdom, guidance and patience to see it to fruition. I thank Adrian Gorman for highlighting the unique political history of the lower Murrumbidgee floodplain and for providing direction and the opportunity to look at in detail. I thank Ralph Jacobi for 'sowing the seed' for the project, for the insightful contents of his parliamentary debates in the early 1980s and for his explanations of the 'politics' of natural resources management. I thank Alan Ives for the generous access to his extensive archives and his generous contribution of time, knowledge and valuable leads. I thank Tom Davy for his generous contribution of time and local knowledge to map and assemble statistics on the lower Murrumbidgee floodplain. Thanks also to John Harris for his moral support and encouragement; to my Advisory Panel members Jenny Andrew and Val Brown for their wisdom and guidance; and to Brett Russell for producing maps, diagrams and design of the document. I thank the members of the Lowbidgee floodplain community, Sven-Erik Magnusson, members of the 'Special forever' network, and the members of the Southern Fishermen's Association for their inspiration, hospitality, enjoyable company, perseverance, and resilience.

I also thank the following people without whom this thesis would not have been possible: Greg Amaral, Lindsay Beck, Marion Benjamin, Meg Bishop, Graeme Black, Steve Blore, Leith Bouilly, Stephen Boyden, Amanda Bradford, Mark Brettschneider, Sue Briggs, Moss Cass, Graeme Campbell, Andrew and Ann-Marie Connellan, Paul Connellan, Hamish Cullenward, David Dole, Vic Eddy, Graeme Gibson, Tom Griffith, Nerissa Guest, Mike Hayes, Garry Hera-Singh, Terry Hillman, Barry Hodgson, Henry Jones, Richard Kingsford, John Koehn, Esta Knudsen, Bob and Errolly McFarland, Brett and Lisa McNiven, Michael Murphy, Besley Murray, Fred Nelson, Joe Powell, Ben Pratt, David Reid, Warwick and Elaine Robertson, Brett Russell, Renee Shepherd, Michael and Helen Spinks, Wayne and Jane Sullivan, Ken Thorne, Deb Wangmann, Lyn and Ned Wells, Ian Woods, Gabrielle Williams, Marcus Wright, and Rosemarie Zalec.



Plate A.1 Some members of the Lowbidgee floodplain community.



ABSTRACT

This is a reflective thesis, the empirical basis of which is four decades experience of working with rural communities in Australia and Papua New Guinea. It examines the rhetoric and reality of real world natural resources management (NRM). The key word in the title is *realizing*. As highlighted by McDermott (2001: 58), “Capacity” means nothing if there is no means or discretion with which to exercise it. I use Dovers (2005: 12) definition of institutions as:

(P)ersistent, predictable arrangements, laws, processes or customs serving to structure political, social, cultural or economic transactions and relationships in a society. They may be informal or formal, and allow organised, collective efforts around common concerns. Although persistent, institutions constantly evolve.

The realization of capacity within rural community institutions to manage ecologically strategic landscapes, to maintain or improve their resilience and productivity, on behalf of Australian society, introduces the issue of overcoming multiple barriers to its achievement, at multiple scales. In addition, it involves identifying generally under-utilized assets within communities, such as social memory (McIntosh 2000: 143). Dore et al. (2003: 156), acknowledge that regional governance ‘is now well and truly on the agenda of Australia’s governments and civil society’. This thesis examines the processes and ‘politics’ involved in moving authentic decentralised governance from the agenda onto the ground.

The key concept and underlying assumption that shapes the thesis is realizing the capacities of community institutions to manage for social-ecological systems *resilience*, which ‘shifts our perspective from an aspiration to control change to one that sustains and enhances the capacity to cope with, adapt to, and shape change’ (Moberg and Galaz 2005: 12). In order to achieve social-ecological systems resilience it is sometimes necessary to enhance certain desirable aspects, and at others, to erode undesirable aspects to achieve transformation (Lebel et al. 2006: 20). Not everything that is resilient is desirable. I discuss some resilient impediments to progress towards an ecologically sustainable and humanly desirable future for the Murray-Darling Basin.

Effective NRM, from a social-ecological perspective, requires a broader skill-set than is currently the norm. As Folke et al. (2005: 443-444) explain; addressing only the social dimension without an understanding of resource and ecosystem dynamics will not be sufficient to guide society towards sustainable outcomes. Similarly, ‘focusing only on the ecological side as a basis for decision making for sustainability may lead to too narrow conclusions’. They use the example of an observed shift from a desired to a less desired state in a lake as indicating a loss of ecological resilience, but if there is capacity in the social system to respond and restore the lake, then the social-ecological system remains resilient.

The thesis demonstrates that while there is recognition that change from a mechanistic worldview is necessary to progress towards a more ecologically sustainable and humanly desirable future for rural Australia, there remains considerable resistance within many NRM bureaucracies and rural industry groups that are structured on an industrial model. Light et al. (1995: 153) summarize the reason for the dilemma as follows:

Resource matters were thought to be basically technical, so it was argued that foresters and engineers, not politicians, should make the key decisions. This style of management by a technocratic elite has dominated resource management during this [twentieth] century. Technological (a.k.a. “scientific”) management is highly centralized. It assumes strict values, sets rigid goals and the means for achieving these goals, and is decidedly resistant to feedback. Technological management has glorified large public works, and it has nurtured excessive regulation and policy fragmentation that accelerated conflicts and thwarted learning among sectors of government and society. The large amount of capital (money and people) invested in these projects and programs, and the associated high cost of change have been a barrier to renewal.

As a result of this legacy, I demonstrate that there is ever-present potential for technocratic subversion in programs designed to progress towards greater social-ecological resilience, resulting in the maintenance of a ‘poverty of process’ (Woodhill 1999: 109) that has led to a crisis in the resilience of Australia’s Murray-Darling Basin social-ecological system. The following quotation encapsulates for me the current dilemma of sustainability:

At the dawn of a new century, we have the ability to change the vital ecosystems of this planet, for better or worse. To change them for the better, we must recognize that the well-being of people and ecosystems is interwoven and that the fabric is fraying. We need to repair it, and we have the tools at hand to do so.

Brown et al. 2000: ix

My experience indicates that recognizing and understanding problems, and having the tools and abilities to address them, does not guarantee success. It also requires a culture of creative leadership and experimentation, political will, commitment to a collegial partnership between government and community, trust, improved communication, new perspectives and management structures, interdisciplinary respect and cooperation, an independent arbitration process, and downward as well as upward accountability.

I use historical perspectives to help to make sense of apparent anomalies, to identify social memory as a resource within communities to help deal with crises (Hahn et al. 2008: 139-140; Folke et al. 2005: 453), and to emphasise that change is possible. Ife (2001: 145) suggests that without a sense of history ‘it is easy to think that the existing order is somehow “natural” and immutable’. He adds that while the dominant worldview has tended to lack historical perspective, ‘holistic analysis requires that the past be seen as important as a framework for understanding the present, and the concept of intergenerational equity

forces us to confront both the past and the future, and to consider the future implications of present actions' (2002: 76-77). History also provides a key link between the humanities, and the natural and social sciences necessary for effective NRM (Steffen 2008: 507 and 512).

The thesis uses both synthesis and analysis to explore the social and political aspects of adaptive ecosystem management and to examine social-ecological dynamics. It interrogates the knowledge and risk-spreading strategies of communities apparently living successfully in ecologically dynamic systems and attempts to establish why they appear to be frequently incompatible with current NRM values, structures and institutions. Capacity realization to manage ecologically strategic landscapes on behalf of Australian society, involves addressing politics, inequality and injustice, which are embedded in the operating structures and institutions of western industrial and post-industrial societies. As Adger (2002: 1716) argues; 'inequality in its economic, environmental, and geographical manifestations is among the most significant barriers to sustainable development'. Agyeman points out that 'sustainability is at least as much about politics, injustice, and inequality as it is about science or the environment' (2005: 43).

BOX 1. LINE OF ARGUMENT AND THESIS STRUCTURE

Thesis title:

Realizing the Capacities of Rural Community Institutions to Manage Ecologically Strategic Landscapes on behalf of Australian Society.

Chapter	Argument
Part One: Introduction, Methodology and Scene Setting	
<i>One</i> Sustainability: A Contested Process	Introduction to the research theme and main line of argument. The current sustainability debate is as much about power as problem-solving, which has resulted in a mismatch of expectation in bureaucracy-community partnerships, and in physical-social sciences partnerships.
<i>Two</i> Barriers to Social-Ecological Systems Management	Current technocratic dominance of the natural resources management (NRM) agenda in the Murray-Darling Basin is a barrier to transformation to social-ecological systems management.
<i>Three</i> Research Methodology	Overview of the theoretical scope, research methodology, epistemological assumptions, and research projects. Critical Geography theory helps to interrogate existing assumptions and knowledge claims in relation to NRM and sustainability, and facilitates the consideration of possible alternatives that may be more effective, rational, cost effective, sustainable, just and equitable. Case study methodology is designed to 'make sense' of some of the impediments to sustainability and capacity realization, and to identify enabling conditions and processes through both synthesis and analysis.
<i>Four</i> Fish and the Future	This chapter is an advance organizer for the thesis. I look at four key themes that have lessons for terrestrial NRM, and improved social-ecological resilience. Firstly, an examination of the global fisheries collapse as an ecological and management crisis reveals valuable lessons for terrestrial models. Secondly, fish are indicators of the health of aquatic systems and catchments, and therefore the effectiveness of NRM initiatives. Thirdly, discussions about native fish provide a valuable introductory vehicle for facilitating community interest and participation in NRM. Finally, I examine an artisanal fishery effectively governed as a common pool resource, as a possible model for greater resilience through landscape-scale management in Australia's Murray-Darling Basin.

Chapter	Argument
Part Two: A Critique of the government-community partnership model for NRM	
<i>Five</i> Capacity Realization: Releasing the ‘god within’	I demonstrate that rural communities and their institutions have a huge amount of expertise and energy to contribute to progress towards an ecologically sustainable and humanly desirable future, which can be realized through a suite of processes, policies and structures. However, the government-community partnership deemed as necessary to progress towards the aspiration of a sustainable Murray-Darling Basin appears to have created a dilemma of ‘fear and need’ (Pretty 1995) within NRM bureaucracies and some industry groups. Currently, the fear of greater democratisation of natural resources governance or other changes from ‘business-as-usual’ appears to outweigh the perceived need for the realization of community capacity to help address the crisis of resources degradation. <i>Key individuals emerge as being central to the realization of community capacity and problem solving:</i>
<i>Six</i> Celebrating Change Agents	I reveal that in our current risk-averse society, individual change agents tend to take risks on our behalf, often at great personal cost. Many valuable initiatives and new perspectives in NRM over the last century and a half have been presented or promoted by individuals and their community networks, often against inertia, ridicule, or direct opposition from bureaucracy, industry and the general public. I demonstrate that the nurture of community change agents should be a key principle of any initiative attempting to progress towards a more ecologically sustainable and humanly desirable Murray-Darling Basin. <i>A common dysfunctional reaction to change agents who may have answers to a current problem, thus threatening the status quo, is to attack them, highlighting the ‘politics’ of sustainability:</i>

Chapter	Argument
Part Three: A Critique of Institutional Responses to Sustainability	
<i>Seven</i> ‘The kind of nonsense that only a bureaucracy can sustain’: The Politics of Sustainability	Many NRM technocrats appear to suffer a ‘crisis of perception’ (Capra 1997) as a result of awareness and resentment of necessary transformation from a mechanistic to a social- ecological management approach in order to progress towards a more ecologically sustainable and humanly desirable future. I demonstrate that denial of the inadequacy of the current technocratic structure and skill-set, a wish to maintain ‘business-as-usual’, and the dilemma of a partnership with the community to address the issue, has resulted in ‘the kind of nonsense that only a bureaucracy can sustain’ over the past quarter century. <i>Denial of current structural inadequacies to address the NRM crisis has led to a decentralisation of responsibility without the structural change or support necessary for success:</i>
<i>Eight</i> Decentralised natural resources management: ‘Potential for pernicious outcomes’	Decentralised, community-based NRM intuitively appears to be more efficient, effective and democratic than ‘top-down’ approaches. However, I reveal that while it has great potential, it must be handled with care to ensure social inclusiveness and accountability, and to avoid a ‘tyranny of localism’ (Lane and Corbett 2005: 141). The assumption that a particular scale or structure will automatically result in progress towards greater social-ecological resilience is flawed. I examine the assertion that the ‘incremental shift’ in regional NRM arrangements ‘from participatory and inclusive processes and towards closed policy-making processes’ (Wallington et al. 2008: 23) based on neo-corporatist models is vulnerable to ‘capture’ by local elites and subversion by technocratic bureaucracy wishing to maintain pre-ecological ‘business-as-usual’. <i>The privileging of simplistic technocratic structures and processes in NRM represents a ‘poverty of process’:</i>
<i>Nine</i> ‘Poverty of Process’: Mechanistic maladaptations	The maintenance of attempts to achieve sustainable resources governance primarily through an industrial model and corporate management practises, which have repeatedly proven inadequate, appears to represent a situation of denial. I examine John Ralston Saul’s assertion that the ‘mania for denial ... constitutes that expertise and the corporatist structure are more important than reality’ (1995: 95), as an explanation for major investments in NRM to date going to the quest for technical ‘solutions’ to biophysical symptoms, rather than to addressing socio-cultural causes. <i>I use a case study of the lower Murrumbidgee floodplain landscape to bridge the natural and human sciences (Tress et al. 2001) and the humanities, necessary for effective NRM, to ground the research.</i>

Chapter	Argument
Part Four: Discussion using the primary case study as a frame of reference	
<i>Ten</i> ‘The Flooded Country below Hay’: A Critical Analysis of the lower Murrumbidgee bioregion	Landscapes represent an interface between the biophysical and socio-cultural aspects of sustainability. I use the lower Murrumbidgee floodplain bioregion as a microcosm of the Murray-Darling Basin to provide a frame of reference to facilitate synthesis and analysis of the issues that enable or obstruct the realization of the capacities of rural community institutions to manage ecologically strategic landscapes on behalf of Australian society. <i>Using the lower Murrumbidgee floodplain as a frame of reference, I explore vernacular land-use and landscape-scale governance alternatives as possible contributors to social-ecological resilience.</i>
<i>Eleven</i> Land-use and Governance for Social-ecological Resilience	Current NRM programs operating in the Murray-Darling Basin reflect a hierarchical-mechanistic worldview and require transformation to a social-ecological worldview in order to facilitate progress towards greater resilience for the region. I examine Hilborn’s (2007: 303) claim that without effective governance ‘any attempt at sustainability will fail’ and Pahl-Wostl’s (2002:409) suggestion that effective governance ‘is more important to deal with water resource management problems than technical solutions’. <i>Politics and inequality emerge as being as important for effective NRM as science and the environment.</i>
<i>Twelve</i> Environmental Justice	In this chapter I examine proposals that sustainability is at least as much about politics, injustice, and inequality as it is about science or the environment (Agyeman 2005: 43) and that frequently: Only by excavating the hopes of the past can we begin to appraise the depth of community unease and the prospects for sustainability. For sustainability is not only an economic, demographic and environmental concept; it is also a historical concept. It links future expectations and present policies with past experience. Davison 2005: 39 <i>I further test the above proposal with the study of more than a century of marginalization of a landscape and its residents.</i>

Chapter	Argument
Part Four (continued): Discussion using the primary case study as a frame of reference	
<i>Thirteen</i> An Excluded Landscape and Contested Livelihoods	Pellow et al. (2001: 429) suggest that the ‘historical origins of environmental inequity are key to understanding these conflicts and promoting solutions.’ To test that proposal, I use Leymann’s (1996) five phases of mobbing to provide a framework to help ‘make sense’ of the marginalisation of the lower Murrumbidgee floodplain landscape and its residents, over the past century. As the pernicious aspect of mobbing is the cumulative effects of its frequency and duration, a temporal scale is required to expose the process, its consequences, and to examine community responses. <i>I conclude that the strategies developed to maintain social-ecological resilience on the floodplain within a hostile epistemic and deteriorating biophysical environment demonstrate the possibility, and necessity, of the realization of the capacities of rural community institutions to manage ecologically strategic landscapes on behalf of Australian Society.</i>
Part Five: Conclusions	
<i>Fourteen</i> A Fundamental Rethinking of the Role of Rural Community Institutions in the Sustainable Futures of Australia’s Ecologically Strategic Landscapes	I demonstrate that there are models that can meet the following challenge, if there is the political will to allow them to come to fruition: The transformation of agricultural production from one of the greatest threats to global biodiversity and ecosystem services to a major contributor to ecosystem integrity is unquestionably a key challenge of the 21st century. McNeely and Scherr 2007: 415 I reveal the inadequacy of automatically engaging technical experts with narrow skill-sets to address the symptoms to what are frequently socio-cultural issues (‘people problems’) in NRM. I demonstrate that many ‘answers’ to greater social-ecological resilience exist within the social memories of rural communities and can be accessed by people with broad social-ecological expertise for effective use by local institutions. For example that: Looking to history for the principles of sustainable land management relevant to the future can sometimes be a more efficient and reliable approach than seeking scientific and technical solutions. Williamson et al. 2003: 34 I conclude that rural community institutions have the potential to make major contributions to the social-ecological resilience of rural Australia and help rural residents to regain greater control of their futures.

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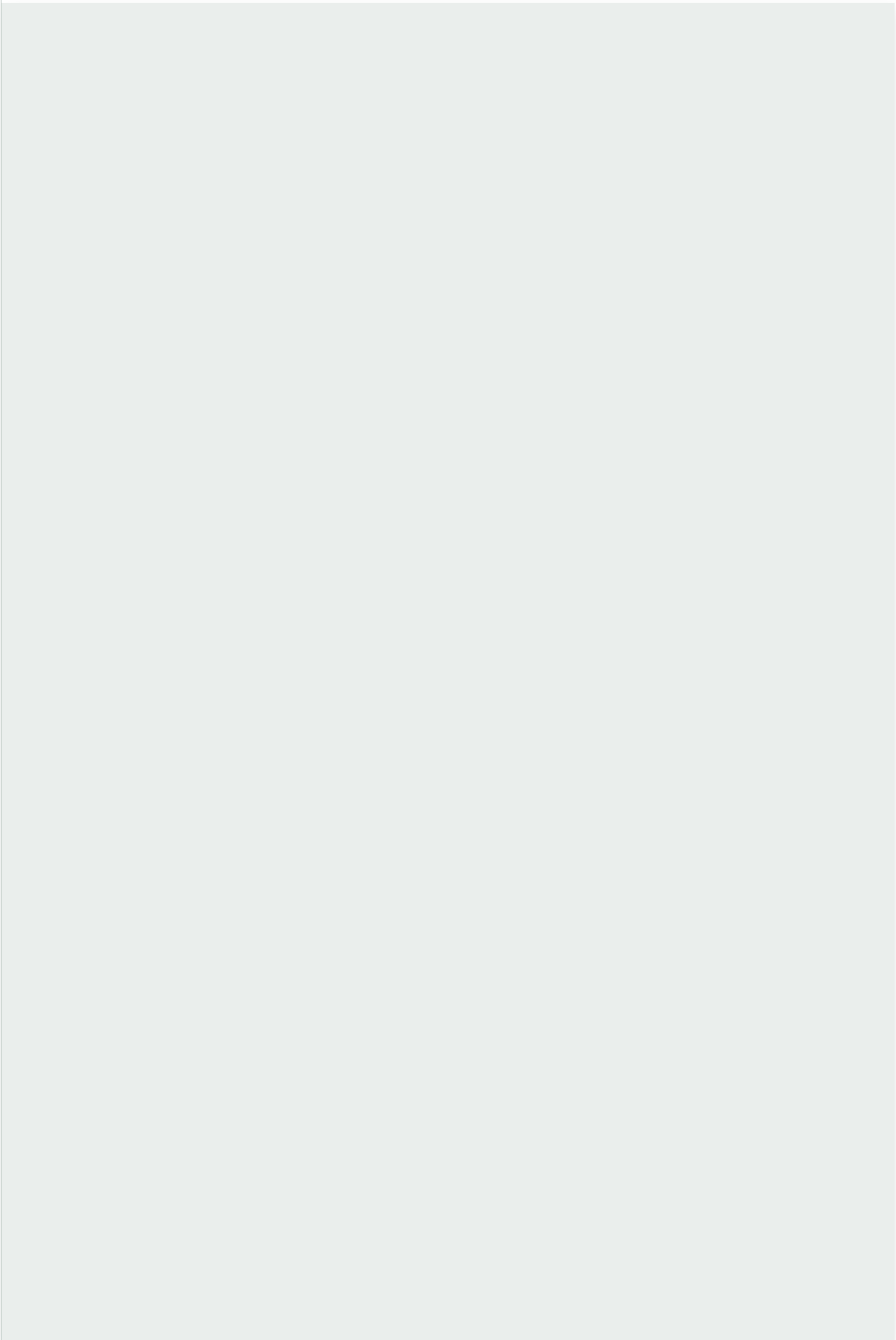
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LIST OF ACRONYMS AND ABBREVIATIONS

ABC	Australian Broadcasting Corporation
CAC	(Murray-Darling Basin Ministerial Council) Community Advisory Committee
CMA	Catchment Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
MCMA	Murrumbidgee Catchment Management Authority
MDB	Murray-Darling Basin
MDBC	Murray-Darling Basin Commission
MDBMC	Murray-Darling Basin Ministerial Council
NGO	non-government organisation
NRC	Natural Resources Commission of New South Wales
NRM	natural resources management
NSW	New South Wales
NSWLA	New South Wales Legislative Assembly
PWD	New South Wales Public Works Department
SES	social-ecological systems
W.C & I.C	New South Wales Water Conservation and Irrigation Commission



PART 1: Introduction, Methodology and Scene Setting



STATEMENT OF THE PROBLEM

An authentic government-community partnership was identified as a key element in the foundation on which to build the Murray-Darling Basin Initiative:

To promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the land, water and environmental resources of the Murray Darling Basin.

In the official joint communiqué from the Murray-Darling Basin Ministerial Meeting of 15-16 November 1985, containing the above statement announcing the decision to cooperatively tackle the Basin's problems, Ministers 'stressed the importance of community participation in the resolution of the water, land and environmental management' issues (page 5) of the vast region. Later statements called for community and government to 'cooperate in their efforts' and that community involvement was 'fundamental' to the success of the Initiative (Murray-Darling Basin Ministerial Council 1990: iv; see 1.1.1). Government acknowledged that it did not have the human or financial resources, or in many cases the authority, to carry out the task alone. It recognised, for example, that improved water quality and biodiversity protection depended on the active cooperation of catchment residents, which would require a long-term (25 year) program of relationship-building and information-sharing to achieve (Connolly 1983: 153). It also acknowledged that there was never going to be a sufficient number of national parks to adequately conserve biodiversity and that the cooperation of private landholders was required to complement public conservation areas. It recognised the enormous value of harnessing the 'eyes, ears and hands' of community partners, informed by their local knowledge, social memory, and experience in adaptive management, to be iteratively involved in the management of all parts of the vast social-ecological system. Finally, intergenerational equity was acknowledged as being at the heart of the initiative.

However, only a fraction of the capacity of rural community institutions available to contribute to progress towards greater resilience for the Murray-Darling Basin social-ecological system has been realized since the signing of the Murray-Darling Basin Agreement in 1987. That is despite the formal agreement brokered by Australia's most powerful natural resources Ministers at the time, and strong public support for a comprehensive plan of cooperation. It has occurred despite rhetoric, and the fact that private landholders are responsible for the stewardship of most of the land in the Murray-Darling Basin (Figgis 2003: 209; Williamson et al. 2003: 10), and are a large available pool of expert adaptive managers who appear willing to work with government (see 8.2; Phillips 2008: 105).

The focus of this thesis is on what impedes or facilitates the realization of available or potential capacity within rural community institutions to contribute to the resilience of the Murray-Darling Basin social-ecological system. As highlighted by McDermott (2001: 58), “Capacity” means nothing if there is no means or discretion with which to exercise it’. Throughout the thesis I use community institutions to refer to the partners of government agencies in natural resources management (NRM) because ‘community’ alone is far too broad a concept to be useful. By rural institutions I mean agreed formal and informal mechanisms that groups of people within rural communities have developed to inform and control how a given resource or ecosystem should be used, and to inform their behaviour towards each other during its use (Folke et al. 2007: 31). Rural community institutions generally have continuity and therefore hold social memory but are also flexible, which enables them to evolve (Dovers 2005: 12).

There has certainly been increased awareness of natural resources issues since the 1980s but there has been little opportunity for the community to firstly become an *authentic* partner with government in the process to address them, and secondly to *remain* a partner: a situation that has been expressed as both frustrating and disempowering (McFarland interviews 1/4/05 and 23/6/05; Murrumbidgee Landcare Inc. 2006: 10). By an authentic or collegiate partnership, I mean a transparent, respectful, generative partnership of equals, or colleagues, in a common quest.

The essence of the problem is structural and can be traced to the foundation of modern western industrial culture. The European Enlightenment and scientific revolution of the seventeenth and eighteenth centuries promoted a decontextualised mechanistic worldview with reductionist principles and emphasis on control, predictability, simplicity and mechanistic efficiency to deal with a world of ‘surplus’ resources and untapped markets. As such, until the late twentieth century, resource matters were thought to be basically technical and therefore to be left to technical experts to address. A technocratic elite emerged with power and influence that provided it with access to considerable public funds for ‘heroic’ public projects but without ultimate political responsibility (Light et al. 1995: 153). The powerful combination of an ‘industrial’ culture reinforced by self-interest is a great impediment to change from primarily technocentric ‘business-as-usual’ in NRM, to social-ecological systems thinking and action, even by very senior executives. Bouilly (interview 15/3/05) recounted the concerns of a Murray-Darling Basin Commissioner that leadership programs for the improvement of leadership within community ‘partners’ could in effect result in ‘letting the genii out of the bottle’ which he appeared to consider threatening to technocratic dominance of the natural resources management (NRM) agenda. In contrast, Agyeman and Evans (2004: 162) argue that democracy is ‘vital for sustainability in that it facilitates involvement, but through this it also nurtures understanding and education ... [necessary] to combat the alienation and civic disengagement which will undermine the drive toward more just and sustainable societies’.

This thesis explores complexities in the implementation of current NRM models for the Murray-Darling Basin. In particular, it examines the problem of continued compartmentalisation and poorly developed relationships between policy, program management, and implementation; between the biophysical sciences and the social sciences/ humanities; between the socio-cultural causes of problems and biophysical symptoms; and especially between government agencies and community institutions. It is largely an examination of the structural weaknesses of current NRM models that allow human weaknesses such as subversion, exclusion, or privilege to readily flourish with apparent impunity, and for redundant management priorities and models to prevail, to the potential peril of current and future generations of Australians. The depth of the issue is encapsulated by Woodhill below.

Box 2. The Essence of the Natural Resources Management Dilemma in Australia.

There is little doubt that Australia's recent approaches to natural resources management (NRM) are in many ways world leading... However, the harsh reality is that these approaches are not leading to the scale of on-ground change necessary to overcome land degradation and achieve widespread ecologically sustainable land use. Farmers have been furnished neither with the resources nor the incentives to make the changes or to take the risks, that achieving sustainable agriculture demands.

The problem of unsustainable land use continues largely unabated ... because of a lack of attention to the deeper structural causes of the problem ... which are embedded in the dominant scientific, political, economic and normative institutions of modern industrial society ... Everywhere in the world, environment and development work that focuses on local level participation and empowerment eventually runs up against constraints that have to do with broader scale institutional arrangements.

Woodhill 2002: 318

The thesis demonstrates that important insights for effective NRM can only be revealed by synthesis and contextualisation, later combined with analysis. Part of its purpose is to take advantage of my four decades of experience of working with rural communities and bureaucracies in NRM, in order to 'make-sense' of frequent dysfunctional outcomes from apparently sound vision, policy and enthusiasm, and to identify strategies that may make future government-community partnerships more constructive. I primarily examine *relationships* in social-ecological systems rather than deeply analysing specific *parts*, in order to minimise the apparent vestigial mechanistic hegemony in NRM research that privileges analysis over synthesis.

Research Questions

This thesis is driven by the following research questions:

- What enables or obstructs the realization of the existing and potential capacities of rural community institutions to manage ecologically strategic landscapes and to maintain or improve their social-ecological resilience and productivity on behalf of Australian society?
- What has been wrong with the sustainability process in the Murray-Darling Basin that only a fraction of the potential capacity of rural community institutions and members available

to contribute has been realized, since they were identified as critical partners by the first Murray-Darling Basin Ministerial Meeting in 1985?

- Can the apparent incompatibility between current NRM structures and the expressed necessity for the creation of authentic (collegiate) community partnerships be bridged?
- What institutional, land-use, and landscape governance alternatives could be put in place to enable rural communities to realize their capacities to sustain strategic local landscapes for resource production and ecosystem services provision on behalf of Australian society? How can they be implemented?

Research Vehicles

The research is conducted through the interlinked lenses of environmental history, environmental justice, vernacular innovation, interpretive biography, and communication. The thesis attempts to ‘make sense’ of apparent adjustment trauma (Burton-Bradley 1975) responses that continue from within traditional NRM bureaucracies and industrial-model rural industries; triggered by calls in the 1980s for progress towards more ecologically sustainable and humanly desirable futures for the Murray-Darling Basin:

(S)ense making is integral to crisis management – from the earliest pre-crisis stage to the final efforts to extract as much meaningful learning from the experience. The less adequate the sense making process directed at the crisis, the more likely the crisis will get out of control, and the less likely significant learning in the wake of the crisis will have occurred.

Nathan 2004: 185

Original Contribution to Research

This research demonstrates that the capacities of community institutions can be realized to manage ecologically strategic social-ecological landscape systems for greater resilience on behalf of society. It helps expose some of the current inadequacies of the dominant mechanistic NRM paradigm. It identifies and examines some of the strategies designed to obstruct the necessary transformation to a social-ecological systemic worldview, and discusses ways to address them. It presents:

- A fundamental rethinking of the roles of primary producers and rural community institutions in the sustainability of the Murray-Darling Basin;
- A critical assessment of current NRM systems and their effectiveness in creating sustainable futures for the Murray-Darling Basin. It is informed by Havens’ (1975: 106-107) suggestion that often obsolete ‘models and their concepts become ends rather than means and become “infused with value”’; a situation that makes change threatening to the *status quo*; and
- Bioregional-scale complementary agricultural and ecological land-use governance models to complement and assist in the transition of industrial models for greater productivity and social-ecological resilience

CHAPTER 1: SUSTAINABILITY - A CONTESTED PROCESS

Sustainability is about the terms and conditions of human survival.

Orr 1992: 83

My use of the word 'sustainability' in this thesis accords with the interpretation in Land and Water Australia's 'Strategic Research and Development Plan for 2001-2006': A journey towards sustainability (2001:10). Dovers (2005: 33), suggests that moving towards sustainability involves 'addressing complex tensions and incompatibilities between the three component social goals of ecological integrity, social equity and economic efficiency'. This thesis focuses primarily on the social equity goals of sustainability. Agyeman (2005: 6) argues that if sustainability is to become a process with the 'power to transform as opposed to its current environmental, stewardship, or reform focus, justice and equity issues need to be incorporated into its very core'. Agyeman's Just Sustainability Paradigm (JSP) arises from the definition of sustainability as 'the need to ensure a better quality of life for all, now and into the future, in a just and equitable manner, whilst living within the limits of supporting ecosystems' (Agyeman et al. 2003: 5). Walker and Salt (2006: 9) argue that the key to sustainability lies in 'enhancing the resilience of social-ecological systems, not in optimizing isolated components of the system'.

In this thesis, I integrate the concepts of 'just sustainability' and 'resilience' within social-ecological systems, in order to identify some of the current barriers to progress towards more sustainable resource-use, sustained ecosystem goods and services production, and an improved quality of life for members of rural communities in the Murray-Darling Basin. Walker et al. (2004: 6) define resilience as 'the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks'. Resilience focuses on the on-going capacity of social-ecological systems to provide social and ecosystem goods and services as the key indicator of sustainability, rather than the current state of the system.

I argue in this thesis that the natural resources management model for the Murray-Darling Basin would be more effective if it was reconceptualised within the systemic Just Sustainability Paradigm (JSP) (Agyeman 2005: 6). JSP is able to incorporate the social-ecological aspects of natural resources management by accommodating both current societal values and current scientific understanding. JSP acknowledges the fundamental importance of the environment as our 'life-support system' and also highlights justice and equity as key elements of sustainability. The current primarily technocentric

NRM arrangements are inadequate within the context of current scientific understanding of healthy ecosystems, agri-ecological land-use, climate change, and the significance of social capacity in social-ecological systems' resilience. They also fail to adequately consider human rights aspects of natural resources management.

A social-ecological system consists of an ecosystem, its management by actors and organizations, and the formal and informal institutions (rules, social norms, and conventions) underlying the management (Hahn et al. 2008: 120). The resilience of the system depends on ecological dynamics as well as the organizational and institutional capacity to adapt to ecosystems dynamics. This requires a learning environment and links between key persons across organizational levels. To be resilient, the social-ecological system also needs capacity for dealing with external change.

1.1 INTRODUCTION

In 1970, biohistorian Stephen Boyden argued for a focus on the dynamic interplay of ecological and social systems, known today as social-ecological systems, in order to address environmental degradation and progress towards greater ecological, social and economic resilience:

The suggestion that all our problems will be solved through further scientific research is not only foolish, but in fact dangerous – for it implies that... anyone who is not a scientist, has no role to play, nor any special responsibility in these matters... the environmental changes of our time have arisen out of the tremendous intensification of the interaction between cultural and natural processes. They can neither be considered as problems to be left to the natural scientists, nor as problems to be left to those concerned professionally with the phenomena of culture. They depend for their solution on our understanding of both sets of processes, cultural and natural, and especially on the way they interact together... and on long-range and intelligent planning based on this understanding.

The question of where in society lies the responsibility for doing something about this situation is one that is receiving far too little attention... while all sections of the community have a role to play, certain key groups have, at the present time, a special responsibility.

Boyden 1970: 18

I argue in this thesis that institutions within rural communities that have a history of effective governance to sustain ecologically strategic landscapes and waterscapes, in addition to primary production, have a 'special responsibility' at the current time. The Lowbidgee League, the Southern Fishermen's Association, and Ecomuseum Kristianstads Vattenrike (Sweden) are three such locally crafted institutions involved in the management of local natural resources and ecosystems that I will examine in this thesis. They can provide practical models of multifunctional regional land-use to progress towards a more ecologically, socially and economically resilient, and humanly desirable, future. The thesis demonstrates that the human dimension of ecological issues (Meyer

and Helfman 1993: 570) can be embraced to help solve problems rather than being excluded or exploited. The ultimate test of the 'sustainable development' paradigm will be determined by the extent to which it facilitates the creation of ecologically sustainable landscapes (Linehan and Gross 1998: 209) that incorporate a diversity of land-uses.

1.1.1 People – the Murray-Darling Basin's underutilized resource

I argue that progress towards greater resilience for the Murray-Darling Basin social-ecological system will not emerge until an authentic (collegiate) partnership is established between government and the Australian people, and between the technical and socio-cultural aspects of NRM. The active involvement of the Australian people is required to provide additional leadership, creativity, access to social memory, ownership, and continuity necessary to achieve transformation. As Beck et al. (1994: 19) explain:

The themes of the future, which are now on every-one's lips, have not originated from the foresightedness of the rulers or from the struggle in parliament – and certainly not from the cathedrals of power in business, science and the state. They have been put on the social agenda against the concentrated resistance of this institutionalised ignorance by entangled, moralising groups and splinter groups.

Australians have a tradition of taking the initiative when delegated authority wavers. It is the essence of the Anzac myth, expressed in the ability of ordinary Australian soldiers to self-organise in the absence of directions from officers in France and Belgium during World War I. Midgley (2004: 1) suggests that myths are not lies or detached stories but 'imaginative patterns, networks of powerful symbols that suggest particular ways of interpreting the world'. On two occasions, for example, community-initiated conferences held in the small New South Wales River Murray town of Corowa, contributed significantly to Australian history (Federation 1893 and the River Murray Waters Agreement 1902); the latter following decades of unsuccessful negotiations by colonial politicians and bureaucrats (*Sydney Morning Herald*, 3 April 1902; Eaton 1945: 10; Pumpa 1982: 25-26).

Individual perseverance rather than bureaucratic initiative has also been responsible for the development or adoption of many fundamental natural resources management (NRM) institutions in Australia that today are taken for granted (see Chapter 6). These include Integrated Catchment Management (Jackson 1982; Lindsay *Border Mail*, 8 August 1985; McGoverne *Border Mail*, 16 October 1990; Appendix 1 and 2), Landcare (Roberts 1992: 20), and the establishment of the Murray-Darling Freshwater Research Centre to look at the health and water quality of inland rivers (Jacobi 4 June 1981; Institute of Freshwater Studies Interim Council 1984: vi; Appendix 1). Woodhill and Roling (1998: 47) suggest that there is a need to:

[F]ocus on integrating the creative capacities of people, whether they be land users, lay people, natural scientists, policy makers or politicians ... To address environmental issues effectively from an integration of biophysical and social dimensions requires understanding, decision making and action at and across all levels of society ... It is to this task that the social sciences need to make a more relevant contribution and to which biophysical science needs to be more open.

There has been awareness for some time that 'our current environmental dilemmas are beyond the scope of technological solutions and the resources of government', and that community 'ownership, involvement, and action are essential' (Martin 1991: 773, Boyden 1970: 18; Murray-Darling Basin Ministerial meeting 1985: 2, 5; Murray-Darling Basin Ministerial Council (MDBMC) 1990: iv, 11, 13). According to the MDBMC, the 'community' is expected to be an active and equal partner with government because, to a large degree, the success of the Murray-Darling Basin Initiative:

Relies on the Community to lead and participate in the planning and implementation of on-ground works and measures and to adopt natural resources management practices consistent with sustainable use.

MDBMC 1990: iv

In addition, the 'sheer size of the Basin and its problems' was highlighted as a significant reason for community involvement (MDBMC 1990: iv). It was recognised that centralised 'control' of the huge and diverse area was impractical and impossible to 'police'.

Members of many rural communities have a rich base for interpreting the past; are highly sensitive to current climatic, environmental, market and policy changes; and have a strong interest in a sustainable future for their children and the landscapes in which they live and work. Pretty (2005: 174) acknowledges that 'theoretical developments on both governance of the commons and on social capital' have resulted in the emergence of local groups as an effective 'third' option for managing ecologically strategic landscapes 'instead of strict regulation or enclosure'.

Sue Briggs, Principal Research Scientist of the Biodiversity Research and Management Division of New South Wales National Parks and Wildlife Service (interview 18/7/05), argues that primary producers should be provided with support to encourage their management for biodiversity, on behalf of Australian society. She proposes that this is 'no different from paying a park worker or ranger to manage a National Park for biodiversity. There may be different mechanisms but there is no difference in principle'. Nabhan suggests that 'ultimately, the most potent way of conserving biological diversity may be to protect the diversity of cultures that have stewarded the plant and animal communities' (1998: 223).

1.1.2 New land-use Perspectives

John Williams, Commissioner of the NSW Natural Resources Commission and Commissioner to the Australian Centre for International Agricultural Research, and Fiona McKenzie, senior policy analyst with the Wentworth Group of Concerned Scientists, propose that resilient agricultural systems cannot be achieved with current processes and structures:

It is possible to create resilient agricultural systems, to have healthy productive landscapes. It isn't easy, but it is essential. The present path of agricultural science is unlikely to achieve development goals for global food production and security whilst improving or maintaining the condition of the natural resource base and global environment.

Canberra Times, 28 July 2008

Our 'environmental problems' cannot be authentically addressed until they are acknowledged as socio-cultural problems caused by the demands of our western industrial and post-industrial society, and the mismatch of an 'off the shelf' industrial agricultural model being imposed onto Murray-Darling Basin landscapes. Current agricultural systems in the Basin have been partially sustained at great cost to ecological resilience by farmer innovation, technology, public funding, and inputs of cheap energy, water and fertilizer. Symptoms of some of the flaws of industrial agricultural practices that urban populations can relate to, such as the outbreak of 'mad cow' disease at the close of the twentieth century, are also increasingly being revealed, and are coming under considerable social and scientific pressure to transform:

A crucial element in marketing is, increasingly, being able to certify that products are safe, meet agreed quality criteria, and have been produced within a recognised environmental management plan.

Macadam et al. 2004: 11

1.1.2.1 Social utility Property

Williams and McKenzie (above) appear to be advocating a departure from the traditional strict private-public property divide, and expert-practitioner divide, for a mixture of agricultural and ecological land-uses on private property. 'Social utility property' combines 'features of public and private ownership in landscape-level conservation' (Geisler 2000: 51, 58). It enables landholders to receive public support to sustainably manage or rehabilitate areas on private property that produce significant ecological or societal benefits, beyond their boundaries. As suggested by the presenter of the Australian Broadcasting Corporation (ABC) current affairs television program, the *7.30 Report*:

It's a novel idea – if Australians want the rural and regional environment preserved, pay the farmers to do it.

O'Brien 26/4/04

Such a paradigm shift would also enable other primary producers, such as fishers or apiarists, to formally assist in the management of similarly significant areas on public land or waterways. The concept of 'public good' property is by no means a new idea; a similar device was the *trust doctrine* of the ancient Romans and Germans which 'evolved from the belief that certain physical resources were of such fundamental importance to society as a whole that they should never be subject to exclusive control; rather they should be held by a group or individual in trust for the rest of society' (Wright 1989: 7).

As well as strengthening social and natural capital, this approach would increase the resilience of rural communities by establishing a more multifunctional economic base, beyond the production of food, fibre and fuel. In the future, managing land, water or wetlands to produce 'ecosystem services', on behalf of Australian society, may become just another part of the business of primary production and Australian rural communities. Handmer et al. (2001: 295) argue for a higher priority for off-reserve protection because 'most ecosystem functions and biota are outside reserves' but acknowledge that it poses considerable challenges for 'public commitment and support – and therefore for policy design and implementation'.

1.1.2.2 *A connected agri-ecological future*

Figgis (2003: 200) states that there is scientific consensus that isolated, 'island', national parks and protected areas alone will not achieve a necessary level of biodiversity conservation. She suggests that the problem may be reduced if links can be established to ecosystems protected on private property throughout the landscape to form networks beyond park boundaries that connect to national park hubs. That can be achieved by encouraging private landholders to actively manage ecologically significant areas and processes on their properties, and especially if wildlife corridors linking distant ecosystems can be maintained or established through agricultural land. She suggests that the catalyst for greater flexibility in conservation may be provided by global warming, which accords with Gunderson et al's. (2006: 22) observations that change generally only occurs 'when forced by social or ecological crises'.

The current fragmented, reductionist approach of protecting ecologically significant 'sites' rather than 'systems' (Kingsford and Thomas 2001: 74), primarily by excluding people and establishing national parks, is no longer adequate or viable. That model is based broadly on Yellowstone National Park, established in 1872 primarily in western Wyoming in the United States of America. A number of flaws have emerged in the 'Yellowstone model' over the years, including the promotion of the concept of wilderness over indigenous heritage and the reduction of top predators. The importance of sympathetic buffer zones around core areas protecting biodiversity and ecosystem services is also emerging from Yellowstone National Park, which is beginning to have its integrity threatened by

increasing human population densities and development on surrounding private land (Jackson et al. 2007: 310). Increasingly, the physical isolation and limited area of land protected in national park 'islands' is also being recognised as a major issue. Biologists argue that even if all of the ecological sites currently formally protected in the world remain intact, it would 'still be woefully insufficient for humanity's future needs' (Wells and McShane 2004: 513).

1.1.2.3 *Bioregional management unit*

Sale (2000: 55) argues a bioregion is the scale at which 'human potential can match ecological reality'; and defines a bioregion as:

[A]ny part of the earth's surface whose rough boundaries are determined by natural characteristics rather than human dictates, distinguishable from other areas by attributes of flora, fauna, water, climate, soils and landforms, and the human settlements and cultures those attributes have given rise to.

He adds that it is an ideal scale because it is too large to be ignored, but small enough for residents to be responsive to the environment, enable effective communication, and to provide opportunities for input from individuals and groups to find locally appropriate solutions. Aberley (1999: 13) explains that bioregionalism evolved in response to the challenge of 'reconnecting socially-just human cultures in a sustainable manner to the regional-scale ecosystems in which they are irrevocably embedded'. Gray (2007: 792) argues that the 'primary cause of environmental and social problems' is the "disembedding" of people from the natural world, and also highlights that 'social and ecological justice principles underlie bioregional governance' (*Ibid*: 796). Bioregions vary in size because they are shaped by the interaction of biophysical and cultural factors.

I argue that a series of linked ecologically strategic bioregions based on agri-ecological land-use will contribute significantly to ecological, social and economic resilience, in highly modified twenty-first century catchments of the Murray-Darling Basin. I acknowledge that the use of a bioregional-scale management unit alone with an assumption that effective governance will automatically follow is flawed (Jennings and Moore 2000: 189; see 1.2.1 and Chapter 8). However, I argue that both the sustainability agenda and rural Australia would benefit if members of rural community institutions had greater involvement in the active adaptive management of ecological processes that contribute to the social-ecological resilience of their landscapes or bioregions. Abel and Stepp (2003: 13) explain that effective ecosystems management requires active management of both the human and non-human components because there is incomplete understanding of ecosystems, and as they are parts of larger complex systems there are multi-scaled influences with potential for surprise.

The formal involvement of rural community institutions in management to facilitate the increased production of ecosystem services has the advantage of protecting and linking ecologically significant areas that may be too small to be viable parks, and creating buffer zones to protect the integrity of formally protected areas, as discussed above. It would also develop the ecological management capacities of members of rural communities throughout the Murray-Darling Basin and utilise their local knowledge and social memories, thus adding value to existing human resources and diversifying employment opportunities.

In addition to landholders and other primary producers, many groups in rural communities would benefit from having access to a greater range of satisfying rural based occupations. Such opportunities are important for fifteen to thirty year-olds and females needed to rejuvenate and energize rural communities. Members of these groups frequently leave their communities for study or work and many will not return unless there are interesting employment opportunities (Curtis et al. 2005: 551). It is particularly important for Indigenous members, generally the fastest growing group in rural Australia, who would again have opportunities to have valuable input to NRM.



Plate 1.1 Modified ecosystems increasingly require active human management to maximize services production.

Landholders managed the successful completion of the breeding cycle of a number of waterbird species in this rookery on the lower Murrumbidgee floodplain in south-western New South Wales during a drought period in 2005. In conjunction with the water superintendent, they attracted the birds to this small deep site in order to manage the process with a limited quantity of water. They maintained water at an appropriate level by daily monitoring, and ordering supplementary environmental water or diverting commercial water as required. They also developed a strategy to reduce pollution in the rookery by trickling water through the site.

1.2 DILEMMAS

Bowen (1994: 36) bluntly asks the question ‘what has been wrong with our environmental efforts ... [since 1970] that they have not worked?’ His reflection points to a lack of authentic community engagement, which he rationalizes with the statement that ‘participation in decision making has never been encouraged by industry or government; in many cases ... the public has been seen as an obstacle to be pushed aside by coercive force if necessary’ (1994: 12). Williamson et al. suggest that the commonly held view that community groups cannot care for their resources is due to ‘inappropriate social institutions rather than any inherent disability in people’ (2003: 13). Bumacas et al. (2007: 289) suggest that local communities are not sufficiently valued to be ‘equitable partners in decision-making processes’. Woodhill and Roling (1998: 67) add that because ‘politicians and policy makers have a dismal view of the public sphere... they do not take seriously processes which actually occur and which could be used to great advantage in moving towards more sustainable futures’. Magnusson (interview 26/11/07) encountered a similar situation in Sweden.

Pretty explains the relationship between bureaucracy and community in NRM in terms of fear and need. While a sustainable future is impossible without the authentic involvement and empowerment of diverse groups of people, this in turn, will upset the traditional ‘balance of power’ that strongly favours the current bureaucratic structure:

The dilemma for many authorities is they both need and fear people’s participation. They need people’s agreement and support, but they fear that this wider involvement is less controllable, less precise and so likely to slow down planning processes. But if this fear permits only stage-managed forms of participation, then distrust and greater alienation are the most likely outcomes.

Pretty, 1995: 1251-2

Bavington (2002: 3) presents an argument for resentment at the erosion of technocratic power and increased accountability, as possible reasons for NRM bureaucracies resisting community partnerships. Nietzsche describes resentment as ‘a bitter emotion based on a sense of inferiority and frustrated vindictiveness’ (Solomon 1994: 95). Solomon adds that it is ‘an emotion that is distinguished, first of all, by its concern and involvement with *power*’ (*Ibid* 103). Bavington (*Ibid*) points out that the institutions and processes of NRM traditionally enabled ‘a select few’ to side-step ‘democratic politics and environmental ethics in favour of top-down anthropocentric administration’.

Esta Knudsen, who was Community Participation Coordinator (CPC) with the Murray-Darling Basin Commission between 1994 and 2000 (interview 23/11/05), also found that resentment and

professional self interest 'dictated that the CPC role would never fulfil its potential' (see 2.1.2). She found a short time after the commencement of her work with the Commission that the 'stated intent didn't match the reality of working in the organisation' and posits two reasons for the disparity. Firstly, the Community Participation Coordinator position had been 'imposed' on the Chief Executive by Commissioners, and he did not appear to appreciate the socio-cultural aspects of NRM; suggesting that the Commission was not a 'welfare agency'. Secondly the CPC role and position description had been developed by an external expert working group and there was little interest, understanding or involvement by Commission office management who would be required to implement it. She said that over the six years of her employment she 'saw this "mismatch" time and time again' (see 2.4.2).

Bavington (2002: 3) also suggests that technocratic insecurity has increased with the shift away from the 'balance of nature' paradigm, which 'permitted certainty, command and control' of biophysical systems, towards a 'flux of nature paradigm focused on coping with uncertainty' in dynamic and interconnected social-ecological systems. Inertia, apparently created by a 'crisis of perception' (Capra 1997: 3-5, see 2.3.3), is the cumulative result of the government-community 'stand-off' as bureaucracies attempt to maintain their traditional privileged position in the government-community relationship through an inadequate mechanistic model:

(S)cholars and policymakers have discovered the potential of local level actors for governing and conserving natural resources. What remains, however, is determining how to unleash this potential appropriately for building a results-based sense of common purpose. This task, in turn, requires a fundamental choice involving how public managers and elected officials conceptualize the means and ends of environmental governance.

Schlager 2004: 167

Bob MacFarland, grazier of 'Oxley' Station on the lower Lachlan River, former Chair of the Lachlan Catchment Management Committee, and former member of the Murray-Darling Basin Ministerial Council Community Advisory Committee suggests that the 'rules of engagement' between community and government need to be revisited to overcome misconceptions from both sides (interview 23/6/05). Kweit and Kweit (1981: 37) described the common mismatch of expectations in bureaucracy-community 'partnerships' as citizens expecting a 'redistribution of power' but officials simply seeking administrative convenience by 'searching for increased citizen trust and acquiescence as well as for improvements in the resources and knowledge necessary to deliver satisfactory services to the citizen'. Those sentiments also accord with Knudsen's (23/11/05) experience of the Murray-Darling Basin Commission. She proposed that the:

MDBC at present is an environment where the expectations of government and community are not clarified, and mostly very different. Hence the need for a joint effort on a philosophical base ... the development of a philosophy entails moving people from an individualistic to a collective approach ... But this is not an easy ask - my experience of MDBC and other agencies, indicates that this is where they lose the plot, because it means they have to change their behaviour and let go of existing power bases.

She suggests that community-government partnerships ‘need to be underpinned by both sides working through (together) an agreed philosophical base’ because many organisational structures are not conducive to partnerships. Organisational structures and processes ‘dictate cultures and ways of behaving’, so they must be tailored to fit a partnership philosophy, which requires government to have a clear idea ‘about WHY it wants the partnership, as does community’. Another counter-intuitive dilemma related to the government-community partnership debate is the potential ‘trap’ of decentralised, community-based environmental management.

1.2.1 The ‘local trap’

While decentralised, community-based NRM intuitively appears to be more efficient, effective and democratic than ‘top-down’ approaches, it must be handled with care for success. It is vulnerable to subversion by interest groups and bureaucracy (Curtis 2003: 449; Curtis and Lockwood 2000: 70) determined to maintain the *status quo* or to frustrate reform efforts that may result in greater transparency or democracy. This situation has been described as the ‘paradox of decentralisation’ (Tendler, 1997 cited in Wallington et al. 2008: 23; see 8.1), the ‘local trap’ (Brown and Purcell 2005: 607-608) or the ‘tyranny of localism’ (Lane and Corbett 2005: 141). It is also suspected by some, that decentralisation is a risk and responsibility avoidance strategy by government (Shortall 2004: 109; Hillman 2002: 356; Vanclay 1994).

1.2.2 The perpetuation of business-as-usual disguised beneath new vocabularies, technologies and administrative structures

A related dilemma is the perpetuation of business-as-usual (see 2.4 and 4.1) disguised beneath new vocabularies, technologies and administrative structures ‘at the expense of challenging, reformulating, and implementing social goals and planning strategies that address and correct the aberrations our development paradigm has on the ecological, economic, cultural, and political dimensions of our landscapes’ (Linehan and Gross 1998: 209). That situation appears to have occurred in the Goulburn-Broken Catchment in northern Victoria where community industry leaders proposed the establishment of a regional natural resources governance model based on community decision-making (Curtis and Lockwood 2000: 69).

The state government subsequently devolved responsibility for the management of the catchment via the establishment of a Catchment Management Authority (CMA). The Goulburn-Broken Catchment Management Authority was one of the first CMAs to be established in Australia and in many ways has

served as a prototype for the widespread adoption of the institutional model. However, it also serves as a lesson about the vulnerability of the model to ‘capture’ by vested interests (Lane and Corbett 2005, see 1.2.1) who then have the capacity to perpetuate unsustainable business-as-usual by a form of denial involving the masking of symptoms and limiting access to, or excluding relevant information, thus lulling the community that they represent into a false sense of security. Future options for the Goulburn-Broken Catchment social-ecological system are diminished through the continued erosion of resilience masked by short-term engineering ‘solutions’ dealing with symptoms of ecosystem change (Olsson et al. 2006: 27), which removes incentive for necessary transformation:

The Goulburn-Broken Catchment (GBC) is one of the nation’s most productive agricultural heartlands. It’s also among the most intensively studied catchments. More is known about its biophysical function than just about anywhere. Knowing more hasn’t helped because the underlying expectation of the people in the region is that they want to continue doing things the way they’ve always done things.

Walker and Salt 2006: 40-41

The adoption of an ‘engineering solutions’ approach to maintain production and social business-as-usual in the Goulburn-Broken Catchment is perversely appealing because individuals benefit from not changing their unsustainable practices at considerable direct and indirect public expense, and they do not have to concern themselves directly with the issues. It appears to be a continuation of the culture of the state-sponsored socialism (Rutherford 1968: 137) of the historical irrigation developments in south-east Australia. The convergence of strong vested interests and community support, without apparently viable alternative proposals, has resulted in a subversion of the process. The strategy appears to be an attempt to ‘buy time’ by improving the mechanistic efficiency of the existing unsustainable industrial production system, instead of more radical transformation to improve social-ecological resilience and open up options for the future.

Moss Cass, the Australian Government’s first Environment Minister (1972-1975) explained (interview 21/7/05) that on some occasions, funding that is rightly provided on compassionate grounds to restore the *status quo*, such as re-building homes on flood-prone land (see 2.3.1), on closer examination may in fact be perpetuating human misery. The money, in some circumstances, he suggested is better spent solving the problem by transforming the situation rather than repeatedly dealing with a symptom that will never be satisfactorily addressed. However, most public money continues to go towards dealing with symptoms that encourage the perpetuation of the unsustainable *status quo*, reward industry inertia (and their lobbyists), discourage transformation, privilege technical ‘fixes’, and encourage ever-increasing community dependency, as illustrated by the following:

When the Council of Australian Governments met in Sydney last week, there were high expectations it would announce an emergency rescue package for the Coorong. Instead, it announced \$3.7 billion for “significant water projects”, which Prime Minister Kevin Rudd described as “all designed to improve the efficiency of irrigators”.

Beeby, *Canberra Times*, 9 July 2008

Efficiency does not equate to sustainability; simplicity is the key principal of efficiency while diversity is a key principle of resilience. Next, I examine why there appears to continue to be confusion, at the highest levels of government, between mechanistic ‘efficiency’, and social-ecological ‘resilience’ necessary to progress towards sustainability.

1.2.3 Technocratic hegemony of natural resources management

The notion of hegemony emerged from the work of Antonio Gramsci (1891-1937) to explain the ‘hidden’ oppression suffered by the working classes in Italy in the early twentieth century. Hegemony is a process of intellectual control in a society which guides us to uncritically accept and reproduce certain beliefs, values and ways of doing things, even when they may not be in our best interest (Crehan 2002: 99 -105).

Falkenmark and Rockstrom (2004: 76) suggest that the dominating roles played by economics and engineering in industrial and post-industrial societies have a direct bearing on the professional disciplines dealing with NRM, specifically water management, and how it is approached. That can result in approaches that privilege the management of only those natural resources areas that can most easily be ‘engineered’, such as ‘blue water’ (water in streams and lakes), and frame a view of NRM that is too narrow and exclusive to progress towards greater social-ecological systems resilience.

They point out that the tendency among policy-makers and the general public to see water as mainly a technical issue is a ‘barrier to sustainable development, but it is a natural consequence of past experiences in human history’ (2004: xvii). As Carpenter et al. (2009: 13-14) explain, the positivist-mechanistic hegemony of privileging the computable (things able to be counted/quantified), and ignoring information that does not ‘fit’ dominant models, continues to be a weakness in NRM (see 4.1.1). There also remains a tendency to link ‘best practice’ to mechanistic efficiency rather than social-ecological resilience.

For Woodhill, the technocratic hegemony of NRM constitutes a ‘poverty of process’, which he suggests occurs ‘when a limited range of problem-solving methodologies are used, when there is little critical

reflection on the questions of process, and as a consequence the process followed is inappropriate for the task at hand' (1999: 109). A significant example of a 'poverty of process' as a result of technocratic hegemony is the privileging of technical innovation over human resource development. Effective NRM requires technical innovation and human resource development to be mutually reinforcing. However, NRM bureaucracies are overwhelmingly dominated by technocrats, and generally 'in practice technically trained government staff does not feel comfortable with human resource development activities', which have been 'sadly neglected' as a result (Roling 1995: 149).

The pervasiveness of the technocratic hegemony may be reflected in the tendency in western industrial societies generally to seek the right or best answer and then attempt to impose it universally (Ife 2002: 43-44), which excludes opportunities for discussion and interpretation, and may stifle creativity. Local distinctiveness, solutions, and ways of doing things should be celebrated as a part of the process of working towards a sustainable future because diversity is one of the main principles of ecology and sustainability:

The principle of diversity maintains that there is not necessarily just one answer, or one right way of doing things, and so encourages a range of responses.

Ife 2002: 43

Diversity and flexibility contribute to resilience, which enables ecosystems and primary production systems to survive disturbances and adapt to changing conditions (Capra 1997: 293; Sorbo 2003: 113; Lobe and Berkes 2004: 280). Diversity also gives communities 'alternative ways to grow' but 'the price of diversity is periodic disagreement and contention' (Broomfield 1997: 224).

In the next chapter I explore the increasing contestation of the adequacy of technical-rational epistemology in NRM and the assumed 'right' of technocrats to be the final arbiters and therefore to control NRM activities. Epistemology is a knowledge model, or the assumptions used to claim validity for a particular form of knowledge or inquiry. It deals with the theory, nature, scope and basis of knowledge (Macey 2000: 114). One of the main problems of epistemology is to ascertain which procedures for obtaining knowledge can have the most confidence placed in them.

CHAPTER 2: BARRIERS TO SOCIAL-ECOLOGICAL SYSTEMS MANAGEMENT

The shift in thinking about natural resources management (NRM) priorities from mechanistic efficiency, based on simplification and stability, to ecological resilience that benefits from diversity and variability, began in 1973 with Hollings' paper on 'Resilience and stability of ecological systems'. Increasing recognition that ecological management must explicitly consider human dimensions, and the linkages between the social and ecological aspects of NRM, has shifted the focus to resilience of social-ecological systems (Schluter and Pahl-Wostl 2007: 5). Social-ecological systems (SES) are complex adaptive systems where anthropogenic and biophysical agents interact at multiple temporal and spatial scales. The current challenge for NRM in the Murray-Darling Basin is its consideration as a SES, and the constructive negotiation of a transition from a mechanistic to a social-ecological management model. Such a paradigm shift is complicated by a natural human reluctance to change and a culture of technocratic 'right' to direct NRM, built on a century of precedence.

2.1 WHO IS TO BE IN-CHARGE?

Power-tensions between bureaucracy, government, dominant industry groups, and community institutions; and between the technical and socio-cultural aspects of NRM, appear to be major obstacles to progress towards greater resilience in the Murray-Darling Basin social-ecological system. Power play takes resources, time and focus away from cooperatively addressing issues. A fundamental dilemma for industrial societies appears to be a difficulty to accept that sustainability is a 'deeply cultural' (Sterling 1996: 210) and emotional issue, as well as a technical challenge. As Barham (2001: 190) proposes:

[T]he ultimate answers to our environmental problems do not lie in how we meet the technical challenges before us, as important as these challenges are. The answers lie in the social and political response that we are capable of, and the attention we give to making that response together. Watershed thinking can be an opportunity to strengthen our ability to work together, or it can represent the imposition of new authority that ultimately undermines collective decision making.

I will explore the issue of power tensions through discussions and observations of the issue mainly during the period of transformation from the River Murray Commission to the Murray-Darling Basin Commission; the decade from early 1980s to the early 1990s.

2.1.1 Technocratic self-interest

During a debate as part of the second reading of the River Murray Waters Amendment Bill in August 1983, Ralph Jacobi, Federal Member for Hawker in South Australia, identified the tendency for NRM bureaucracies to privilege their existing technocratic human resources and technical-rational epistemology. Such self-interest was sometimes in defiance of political direction and public interest:

What we can learn from the Maunsell report [*Murray Valley Salinity and Drainage*, 1979] is, firstly, that the State water authorities and the previous Federal Government did not spend a cent on the on-farm measures which were given top priority in the report. That is beyond dispute. On the other hand, millions of dollars have been spent on engineering structures surveyed in that report, including some projects which were given a very low priority.

Jacobi 1983: 193

The majority of Murray-Darling Ministerial Council members, during the period being discussed, had portfolios for NRM areas that privileged technical 'solutions'. However, the bureaucratic favouring of technical processes and frequent diminution of the socio-cultural aspects in the management of Murray-Darling Basin natural resources did not go entirely unnoticed by all members of the Council. I observed, on at least one occasion, a senior technocrat indulging in self-celebratory monologue (Sampson 1993: 13) and trivialising the role of community input to the success of the Murray-Darling Basin Initiative, being abruptly brought to account with a blunt accusation of 'intellectual dishonesty' (New South Wales Minister for the Environment, Tim Moore, Murray-Darling Basin Ministerial Council Meeting Number 10, Sydney, 30 August 1991).

The possibility of government bureaucracies becoming so powerful that they have 'a life of their own' is of concern for both politicians and members of the public. Politicians may attempt to address the situation by breaking up large powerful bureaucracies over time and also attempting to ensure that bureaucrats are 'government servants' first and 'public servants' second, which may create further dilemmas. Bureaucracies may then focus too much on fulfilling upward accountability requirements and ignore their downward responsibilities to the 'public', which can be counter-productive by alienating the community, eroding social capital and undoing decades of good will. That situation appears to have occurred in some catchments with the restructuring of Catchment Management Authorities in New South Wales in 2004 (Hillman and Howitt 2008: 60).

2.1.2 Professional Self-interest

Jacobi also raised the issue of professional self-interest as a potential impediment to progress towards an ecologically sustainable future, during the River Murray Waters Agreement Amendment Bill debates. He commented that:

[S]ome State water authorities may not be happy about another body putting its nose into areas which may challenge or reflect upon their administrations. It is not so much a threat to States' rights which stands in the way of better research or better management of the Murray–Darling basin. It is the threat to departmental rights. The State authorities are suspicious of interdisciplinary and basin-wide planning and research because their importance in the River Murray management hierarchy is involved and could be threatened.

Jacobi 1983: 193

This statement referred to the possible opposition to the introduction of a Murray-Darling Basin Commission with changed priorities and status. However, I suggest that the introduction of professionals in areas of the socio-cultural aspects of NRM, and especially their having an integral role and equivalent status to engineers, equally disturbed the strong technocratic cultures of water-based NRM organisations in the Murray-Darling Basin (Roughley 2005: 9-11, 21-22, 24-25; Knudsen 23/11/05).

Jacobi, along with a number of other 'parents' of the Murray-Darling Basin Initiative, such as Ernest 'Watershed' Jackson, retained a keen interest in its progress. After I commenced work with the River Murray Commission in 1984, which became the Murray-Darling Basin Commission in 1998, I met with these change agents to discuss their visions for the Initiative. They also acted as quality assurance 'sounding boards' during the development of the communication strategy to support the Initiative. Jackson influenced and supported the development of the video/ television program, and contact with Jacobi resulted in almost a decade of dialogue about NRM 'power and politics' (Appendices 1, 2 and 5).

A casual comment about the apparent irrationality of a senior technocrat opposing the publication of a major book on the River Murray (Mackay and Eastburn 1990), which included input from more than thirty natural resources experts from different fields, had Jacobi directing me to his discussions of self-interest (above) in the House of Representatives Hansard. He suggested that the action may not have been irrational from the perspective of the self-interest of engineers wishing to maintain their traditional uncontested status in water management. It was an example of 'conditional' commitment to progress towards sustainability. Jacobi's understanding of the power politics of NRM was similar to Flyvbjerg's (1998: 36) proposal that in modern societies 'the ability to facilitate or suppress knowledge is in large part what makes one party more powerful than another'. He identified 'conditional' progress towards sustainability by technocrats and industry groups and 'lowest common denominator' Ministerial negotiations between governments as potential impediments to MDB Initiative success.

2.1.3 The dilemma of conditional progress towards a sustainable future

An example of 'conditional' progress towards ecological sustainability is irrigation industry demand for public funding to improve irrigation infrastructure efficiency to maintain 'business-as-usual' before water is allowed to 'trickle down' to the environment (Beeby 2009: 6). According to Halpin (2004: 201-203) industry groups prefer 'bargaining' for pre-existing interests rather than a collaborative quest for solutions through informed decision-making and transparent debate (deliberation), which may 'risk' a contrary outcome. In small hybrid government-community executive structures consisting of appointed members, such as catchment management boards, there is potential for industry self-interest to emerge through unofficial 'representation' on a board, in addition to technocratic and professional self-interest, which may eclipse community representation (Curtis and Lockwood 2000: 70; Kelly 2005: 42).

Personal experiences of professional and technocratic self-interests included the erosion and eventual disbanding of the large-scale integrated communication program designed to build relationships with the community and encourage public deliberation on NRM issues in the Murray-Darling Basin (see 7.5.3). I experienced a similar pattern of strong opposition to suggestions to include 'outside' expert input and public information-sharing for quality assurance, from the executives of a New South Wales Catchment Management Authority (NSW CMA), in relation to the production of a landscape-scale NRM plan in 2006-2007. Niemeyer and Spash (2001: 575) explain that such proposals can trigger apparently perverse behaviour because they 'challenge the power brokered by vested interest groups who may therefore oppose the introduction of deliberative forums or their findings'.

2.2 THREE RESPONSES TO CALLS FOR PROGRESS TOWARDS A MORE ECOLOGICALLY SUSTAINABLE AND HUMANLY DESIRABLE FUTURE

I will briefly outline three different broad responses taken by technocratic NRM institutions to address necessary changes in roles and status in order to progress towards a more ecologically sustainable and humanly desirable future, which I have encountered during my career. I have categorised them as creative leadership; self-celebratory technocratic monologue; and desperate denial.

2.2.1 Creative leadership

According to Knowles (1983: 26-30), creative leadership facilitates 'releasing the energy of people' and institutions to enable them to realize their capacities to generate further constructive development of a

project. I experienced creative leadership from the Curriculum Branch of the Department of Education in Papua New Guinea and it was particularly strong in the Commonwealth Schools Commission Country Areas Program (see Appendix 3). Creative leadership also appears to have been part of the culture of the Snowy Mountains Hydro-Electric Authority during its construction phase (see 7.3.1), as demonstrated by the Chief Executive and President of the River Murray Commission at the time of the transition to the Murray-Darling Basin Commission (1984-1988), both of whom had worked with the Authority. Knowles suggests that creative leaders share the following behavioural characteristics:

- They make essentially positive assumptions about human nature;
- They accept as a law of nature that people feel a commitment to a decision in proportion to the extent that they feel they have participated in making it;
- They believe in and use the power of self-fulfilling prophecy;
- They value individuality highly;
- They stimulate and reward creativity;
- They are committed to a process of continuous change and are skilful in managing change;
- They emphasise internal motivators over external motivators; and
- They encourage people to be self directing.

2.2.2 Technocratic monologue

The second response, which I have encountered in NRM bureaucracies, is self-celebratory monologue (Sampson 1993: 13). It involves the dominant technocrats constructing non-technocrats (socio-cultural staff, community members, and frequently research scientists) as 'serviceable' others to support and celebrate technical-rational epistemology and its 'heroic' achievements. The key word in this strategy is monologue, which ensures that technocratic pre-conceptions are not contradicted by feedback providing new perspectives or correcting weaknesses, thus ensuring that inadequacies of the technical-rational epistemology are not exposed.

My observations indicate that the above situation is at the core of the common contestation by technocrats of the roles and status of social scientists and representatives of the humanities in NRM bureaucracies. The contextual, interpretive, and critical nature of the social sciences and humanities often results in a questioning of the assumptions, values and processes of the technocratic agencies, which is frequently not accepted in the spirit of constructive criticism by the generally physical science-trained executives (Knudsen 23/11/05):

Social sciences frame the context in which other knowledge can be applied; questioning the fit between that knowledge and its context and evaluating its purpose; and providing a critique of science and technology which is valuable as an input to technological decision-making from the beginning.

Australian Science and Technology Council 1993: 13

2.2.3 Desperate denial

The third response to necessary transformation in order to progress towards greater resilience for the Murray-Darling Basin social-ecological system, which I have encountered, is what I describe as desperate denial. It involves the apparent ‘capture’ of an NRM institution, or its agendas, by members of interest groups, to maintain ‘business-as-usual’ in their areas of interest. This strategy appears to be facilitated by:

The incremental shift in NRM arrangements from participatory and inclusive processes towards closed policy-making processes, which more closely resemble corporatist arrangements than renewed democracy ... This ‘paradox of decentralisation’ (Tendler, 1997) prompts us to be mindful that the power relations between civil society and the state, may work to reproduce existing practices and institutions – a timely warning for regional NRM governance in Australia, where the legacy of neo-corporatism is sustaining exclusionary practices and inequitable resource distribution. This, in turn, is undermining the potential for mutuality gains.

Wallington et al. 2008: 23

NRM organisations based on neo-corporatist models with little downward accountability and a small number of non-elected board members appear most vulnerable to ‘capture’ by local elites. Through the control of decentralised NRM organisations, local elites can consolidate their power (Wallington et al. 2008: 20) and may indulge in privilege and exclusion.

2.2.3.1 Gate-keeping

As Roling (1998: 46) explains, capacity is ‘often determined by access to resources and tangible opportunities’. In addition to privileging the *status quo*, local elites may also maintain their power by ‘reducing others’ access to resources’ (Birkeland 2008: 221; Ribot and Peluso 2003: 153-156); or the

diminution of resources that others possess. The process of privilege or exclusion by the denial of anything that does not fulfil preconceptions of the dominant group conforms to Flyvbjerg's concept of 'will to ignorance' (1998: 31). He maintains that too much concentration of power can result in more concern with 'defining a specific reality than with understanding what reality is' and may very well 'see knowledge as an obstacle' (1998: 36). He proposes that any change, including progress towards a more ecologically sustainable and humanly desirable future must address 'rationality and power', and not rationality alone, because:

Power determines what counts as knowledge, what kind of interpretation attains authority as the dominant interpretation. Power procures the knowledge which supports its purposes, while it ignores or suppresses that knowledge which does not serve it.

Flyvbjerg 1998: 226

One of the more extreme 'will to ignorance' strategies, which I have experienced and observed, is the intensive passive aggressive process of 'mobbing'. That process is used to exclude or diminish the success of legitimate 'competing' projects, perspectives, or people where there are no legal avenues for obstruction. Mobbing involves ongoing harassment, delays, and 'minor' insults, which cumulatively distract, isolate and demoralise the 'target' with the ultimate aim of exclusion by 'voluntary' withdrawal. The term mobbing was first used by German psychologist Heinz Leymann (1990 and 1996) in the early 1980s, to describe psychological violence in workplaces involving group harassment of an individual usually perceived to be threatening. The term was originally used by animal behaviourist Konrad Lorenz to describe the harassing actions of a group, commonly birds, to distract and drive off a threatening individual (Kirkwood and Dickie 2005: 336).

2.3 INAPPROPRIATE 'TOOLS' TO ADDRESS THE PROBLEM

Sustainability is quite a different issue from those for which the current political and policy system in Australia has evolved to cope (Dovers, 1996: 308-314) i.e. a capitalist society based broadly on the values and institutions of the European Enlightenment, which uses economic competition to efficiently exploit and promote the consumption of the resources of a mechanistic world. As Woodhill and Roling (1998: 46) propose:

[T]here is a very real 'environmental crisis', but, the crisis is not 'out there' in the 'environment', it is within. It is a crisis that needs to be understood in terms of competing values, beliefs, perceptions and political positions. It has to do with our 'way of life' and how we understand, explain and create our existence.

Physicist, Fritjof Capra (1997: 3-4) suggests that the 'environmental crisis' is in fact a 'crisis of perception' (see 2.3.3) that derives from the fact that 'most of us, and especially our large social

institutions, subscribe to the concepts of an outdated [mechanistic] worldview', which he suggests is inadequate for dealing with systemic NRM: Woodhill's (1999: 109) 'poverty of process' (see Chapter 9). Robottom and Hart (1993: 33) support Capra and Woodhill's interpretations by stating that environmental crises arise because 'we have constructed a deficient code for reading nature, leading to a deficiency in interacting with nature' and that the root cause 'lies in the foundations of our thinking about how the world works', which the following example illustrates.

2.3.1 'Floodplains are for floods'!

In an 'emperor has no clothes' revelatory observation, Moss Cass, the first Environment Minister in the Australian Government (1972-1975) made the perception-changing announcement that 'floodplains are for floods'. The statement was made in relation to frequent requests for Commonwealth assistance for flood victims living on floodplains. While assistance to the flood victims on compassionate grounds was supported by both government and opposition, Cass also saw it as dealing with symptoms and perpetuating a problem, along with human misery, by repeated injections of public funding, rather than solving it (interview 21/7/05). He explained that at the time, his statement caused 'uproar ... but I persisted and said that we shouldn't be putting money into continually rebuilding on floodplains where we knew the consequences ... It was just a shock that someone was prepared to acknowledge that nature has a hand in what goes on and we have to live by the rules of nature and not against them'.

On the other side of the same coin, floods have continued to be excluded from floodplains, where they 'belong', at great economic, ecological, and social cost to Australian society, despite what has been learned over the past four decades about their biodiversity and strategic roles in the health and productivity of our river systems. That situation is no less irrational than repeatedly re-building houses on flood-prone land. As Mussared (1997: 4) explains, floodplain waters contain 'at least 100 times more species than do river channels', and wetlands are 'nature's water treatment works, removing vast quantities of pollutants from inland river waters'. He adds that for the past 150 years floodplains have been progressively alienated from their parent rivers in inland Australia, and uses the analogy of ring-barking a tree to highlight the ultimate outcome of the practice of isolating a river from its floodplain. Folke et al. (2002: 437) point to two fundamental flaws underpinning past policies for addressing natural resources issues and the need for worldwide change in thinking and practice:

The first error has been an implicit assumption that ecosystem responses to human use are linear, predictable and controllable. The second has been an assumption that human and natural systems can be treated independently.

2.3.2 Denial of Structural Inadequacy

John Ralston Saul (1995: 95) has suggested that the denial by a number of western governments in relation to HIV contaminated blood scandals of the late 1980s and early 1990s, indicated that the ‘desperation to be seen to be right in all cases was more important than the lives of patients’. He added that the ‘mania for denial ... constitutes that expertise and the corporatist structure are more important than reality’, a view vindicated by the global economic collapse of 2008-2009. Saul’s view was reinforced by the British Government’s response to public concerns about the bovine spongiform encephalopathy (BSE) crisis. The strategy of denial and dismissal of any link between BSE in cattle and a variant of the brain disease Creutzfeldt-Jakob syndrome in humans, despite being furnished with information to the contrary, because of a fear of a loss of consumer confidence in beef consumption, is an example of ‘organised irresponsibility’ (Beck 1995: 61, Mythen 2004: 60-61). Mythen explains that organised irresponsibility ‘refers to the way in which institutions are forced to recognise catastrophic risks whilst simultaneously refuting and deflecting public concerns’.

Those views complement Havens’ (1975: 106-107) suggestion that ‘models and their concepts become ends rather than means and become “infused with value”’; a situation that makes change threatening to the *status quo* and therefore it becomes an emotional rather than a rational process. Havens also suggests that existing models are generally hegemonic in that they are ‘conceptualized so as to indicate the success or failure of the individual or project within the system rather than indications of success or failure of the system’ itself.

2.3.2.1 *The Maintenance of obsolete systems*

This concept can be illustrated by comparing the dilemma of attempting to sustain the Murray-Darling Basin by primarily using an inadequate mechanistic management model, with the English-speaking world’s retention of the QWERTY, or Sholes, typewriter keyboard. QWERTY takes its name from the first six letters on the keyboard’s top row, a layout patented by Christopher Sholes in 1868 and first appeared on typewriters in 1873. Over the past 135 years, vast amounts of money and time have been expended to improve individual typing speed on a system designed specifically to resist speed maximisation.

The QWERTY layout was designed to prevent the jamming of mechanical arms on early typewriters by physically separating letters that commonly occur together, so that there was time for one arm to return before the next was launched. While the problem was solved before the end of the 1870s, by the use of

springs, the layout persists as a vestigial anomaly on modern computer keyboards. It is estimated that a transformation of the system, in this case changing the keyboard layout, to for example the Dvorak design, would result in a typing efficiency improvement of 30% (Lidwell et al. 2003: 150-151).

The process of being locked into a particular structure, *modus operandi* or skills-base for historical reasons, even though changed situations may have rendered it inappropriate, inefficient or redundant, is described as 'path dependence' (Martin and Sunley 2006: 399-403). As I demonstrate in this thesis, we have in place a range of QWERTY-like systems deeply embedded in approaches to NRM in Australia, the transformation of which, I posit would produce at least an equivalent percentage improvement as the adoption of the Dvorak keyboard.

2.3.3 A 'crisis of perception'

Capra (1997: 3-5) explains that the paradigm shift from a mechanistic to a social-ecological worldview is a difficult and 'intensely emotional' process that requires an expansion of perceptions, ways of thinking, and values, which creates a 'crisis of perception' within people whose identity is closely linked with the former worldview. Woster (2001:213) identified an additional dilemma for technocrats, the traditional decision-makers for NRM, by suggesting that they are 'in reality only subordinate members of the ruling elite' so they are under considerable pressure to continue to be 'useful' to the latter.

Apparent insecurity among technocrats caused by the transition is frequently manifested in inertia, denial or backlash against perceived threats. These conditions are caused by a combination of inadequate skills to deal effectively with social-ecological systems, or to perform systemically in response to a large-scale multi-faceted crisis situation, and a fear of loss of traditional power, status and identity. As Robottom and Hart (1993: 51) caution:

(T)he scientific/technocratic/managerial paradigm informed by an empiricist, objectivist epistemology, is not a neutral, detached, objective process but is highly political. Its politics are those of preservation of the *status quo* ... of reproduction and of 'dynamic stability in the face of change'.

2.4 THE INCREMENTAL ADAPTATION TRAP

The temptation, especially by industry leaders and advocates, to attempt to maintain increasingly obsolete production systems, ultimately erodes resilience and increases the vulnerability of their communities. The latter situation appears to apply especially to irrigation communities established in the first half of the twentieth century that are heavily dependent on publicly-funded engineering

infrastructure and the production of a narrow range of crops, products and associated processing industries (Anderies et al. 2006: 871; Walker et al. 2009: 15, 29).

Anderies et al. (2006: 877) describe the vicious cycle of the pursuit of efficiency dictated by past investment (Walker et al. 2009: 15), leading increasingly to reduced options for change, as an 'incremental adaptation trap'. It is also described as the 'stranded infrastructure' dilemma (Roper et al. 2006), the 'infrastructure trap' (Worster 2001: 214), or the 'lock-in trap' (Allison and Hobbs 2004: 17). In economics, the 'lock-in trap' describes the pathological situation where 'an industry that has so much "sunk-costs" that it may continue to degrade the resource it relies upon until the capital is totally removed' (Allison and Hobbs *ibid*). Adaptation to improve the efficiency of existing mechanistic irrigation systems based on nineteenth century models, demands 'ever-increasing investment in physical and social infrastructure' (Anderies *Ibid*), which may ultimately be counter-productive (Walker *et al.* 2009: 30-32).

Curtis and Lockwood (2000: 69) revealed that in 1997-1998 the Goulburn-Broken region of northern Victoria accessed 60.7% of the 2001 Murray-Darling program budget for that State 'largely based on historical precedent, and in part reflected the spurious justification that work in the Goulburn Valley would be used as a model for other areas – spurious because there simply were not resources available to fund work elsewhere'. I have discussed elsewhere the process of powerful interest groups accessing external public resources to maintain unsustainable land-use activities and obstructing transformation, possibly ultimately to the detriment to the industries or communities that they are trying to protect (see 1.2.2; 2.4.1; 5.3.4).

Despite past investment, transformation involving the 'capacity to reorganize around a fundamentally different set of principles and escape the incremental adaptation trap' appears to be frequently necessary for the long-term viability of social-ecological systems (Anderies et al. 2006: 877). The Goulburn-Broken Catchment (see 5.3.4) is given as an example of a community that missed a critical opportunity for transformation and opted instead to invest in adaptability primarily through engineering strategies to maintain the current production and social systems ('business-as-usual') while attempting to minimise their impacts on local ecosystems (Olsson et al. 2006: 20).

2.4.1 Barriers to transformation

In reference to the Goulburn-Broken Catchment in Victoria, Olsson et al. (2006: 31) observed that new organizations such as catchment management authorities 'do not always facilitate transformation';

on the contrary, they can 'become the barriers for such change'. My observations and experience of the New South Wales Catchment Management Authority (NSW CMA) structure, between May 2006 and December 2007, accords with those observations. I would suggest that the current management structure of NSW CMA is vulnerable to, and possibly represents, 'recourse to technocracy' (UNESCO 1980: 26; Hillman and Howitt 2008: 60). 'Recourse to technocracy' frequently emerges as a political response to circumstances, which ironically appear to arise as a result of a technocratic hegemony attempting to manage natural resources in social-ecological systems as a simplistic 'industrial' process:

The problems of the environment are indeed complex ones. They involve numerous parameters and interrelations. Lacking the necessary knowledge and approaches, individuals admit defeat and hand the problems over to the specialists. It is in terms such as these that recourse to technocracy is frequently justified.

UNESCO 1980: 26

The following justification for restructuring catchment management in New South Wales (*Catchment Management Authorities Act 2003*) given by Environment Minister Knowles, in the New South Legislative Assembly on 12 November 2003, appears to conform to 'recourse to technocracy':

This [new CMA] system will move us away from the "argy bargy" style conflict that has historically accompanied the natural resource debate to a professional, outcomes-based approach to natural resource management.

My observation is that the new CMA system in New South Wales has certainly reduced debate on NRM issues, which I suggest is a regressive step. I also posit that what is interpreted as 'argy bargy' is part of the democratic process and the inability to address it is a structural problem, which appears to have been exacerbated by the new system. It represents the inadequacy of a predominantly technocratic 'culture' and staff to manage social-ecological systems through an inappropriate industrial process. I also posit that the new CMA structure increases the potential for other forms of 'argy bargy' by concentrating power and privilege, and reducing transparency.

The new structure has shifted from a semi-democratic process of partial community representation and deliberation towards a closed institutional system (Wallington et al. 2008: 23), which presents a danger of reduced communication, innovation, democracy, transparency, dynamism and flexibility. Lockwood et al. (2009: 175-176) suggest that academics and participants 'diverge in relation to the adequacy of democratic representation' with the participants that they interviewed being satisfied with CMA boards consisting of a small number of appointed experts. My observations indicated that there is considerable potential to subvert the current process by the appointment of 'experts' who are in fact thinly veiled industry or geographical representatives. My experience indicates that there is considerable

dissatisfaction with the current model, particularly from Landcare members. By concentrating power and privilege and severely reducing representation, there is potential to erode community trust and ownership, with long-term negative consequences. Once established, such a closed institutional system with its potential to develop a culture of privilege and exclusion may be difficult to correct without radical action. Gunderson et al. (2006: 22) caution that closed institutional systems 'appear to change only when forced by social or ecological crises because their primary focus is on insulating themselves, filtering information, and maintaining existing theories and paradigms'.

I demonstrate throughout this thesis that a major barrier to progress towards an ecologically sustainable and humanly desirable future in the Murray-Darling Basin is the technocratic hegemony of the natural resources agenda and powerful industry groups attempting to maintain 'business-as-usual'. Inadequate downward accountability through a lack of community representation in the current NSW CMA structure risks the development of a 'principal-agent problem' and with it the maintenance of unsustainable 'business-as-usual'. The principal-agent problem is a mismatch of priorities and incentives between agents; bureaucrats, appointed board members, and politicians, and their principals; the people whom they are serving or representing (Willis 2006: 115). Intellectual stagnation may also result from what I describe as 'big frogs in a small pond' syndrome where executives and board members are able to sustain redundant management methods and resist relevant new information or feedback because of insulation resulting from their undemocratic appointments.

2.4.1.1 Potential for CMA-Landcare conflict: business-as-usual or transformation?

I suggest that it is significant that the Goulburn-Broken Catchment Management Authority, as one of the first CMAs to be created (Walker and Salt 2006: 48), appears to be locked into the pathological cycle of resource degradation and a progressive erosion of social-ecological resilience by attempting to maintain 'business-as-usual' through the process of incremental adaptation (Anderies et al. 2006: 877). It reflects a potentially serious flaw in such devolution of responsibility for NRM. The current NSW CMA structure also appears vulnerable to the creation of a situation where the power of vested interests could eclipse rationality and capability, and institute of a culture of 'will to ignorance' (Flyvbjerg 1998: 31), effectively obstructing the possibility of transformation. Small Ministerially-appointed boards and the use of closed corporate procedures can be questioned in terms of democracy, legitimacy, transparency, stakeholder representation, and accountability to local populations (Wallington et al. 2008; Kelly 2005: 42; Curtis and Lockwood 2000: 70). They can also be questioned in terms of conflicts of interest, limiting diversity, and safeguards to protect the public interest (Fidelman 2006:7; Howard and Seth 2005).

The apparent widespread alienation of Landcare groups in the Murrumbidgee Catchment since the introduction of Catchment Management Authorities in 2004 is presented as evidence of erosion of social capital brought about by the new corporate-industrial structure (Personal observation; Murrumbidgee Landcare Incorporated 2006; Benjamin, Murrumbidgee Landcare *pers. comm.* 28/5/08; Thomas *Border Mail* 18 July 2008; Walker correspondence 23/11/09). Warren et al. (2008: 188) suggest that such a 'loss in social and human capital will impact the capacity and willingness of farmers to address environmental concerns'. Social capital, which includes, trust, reciprocity, and effective communication to promote group cohesiveness, has been demonstrated to be 'important to facilitate coordination and cooperation for mutual benefit, in essence lowering the cost of working together'. The CMA structure in NSW is sufficiently flexible to allow different cultures to develop in different Authorities, so relationships with Landcare varies in different parts of the State (Walker 23/11/09).

Without increased transparency, and downward accountability in particular, there is potential for CMAs to lose community support (Lockwood et al. 2009: 183). There is also potential to subconsciously privilege particular interest groups (perversely, possibly to the long-term detriment of those groups and associated communities through a reduction of resilience); and to retard, or even reverse, progress towards an ecologically sustainable and human desirable future for the majority.

2.4.2 Vision – Implementation Gap

My observations of both the Murray-Darling Basin Commission (MDBC) and a NSW CMA revealed a significant gap between the vision, principles and policies of those who conceived and developed the initiatives and the managers who implement them, particularly in relation to the socio-cultural aspects of NRM (Natural Resources Commission 2005 and 2007). Cullen's (1997) explanation for that situation was that 'the leaders who developed the initiative have now been replaced by a new breed of manager who have yet to demonstrate the vision or commitment to land management demonstrated by their predecessors'.

Knudsen (23/11/05) commented that in a 'multi-level organisation like the MDBC it is interesting to see how decisions signed off by the Commissioners can become subverted internally by the organisation's managers'. She provided a possible explanation as resentment by managers of having a philosophy that they do not appreciate, and therefore do not believe in, 'imposed' on them. The prominent proclamation of vision, mission, values and principles in the publications of the above bureaucracies (Murray-Darling Basin Ministerial Council 2004: ii; Murray-Darling Basin Commission 2000: 12; Murrumbidgee Catchment Management Authority 2007: 6-8), while

apparently developed with the best of intentions (Bouilly 15/3/05), appear to be frequently cynically subverted by management as the fulfilment of obligations in those areas.

The compartmentalization of responsibilities between policy-makers and implementers is a structural problem. It is a vestige of an era when NRM was assumed to be a simple mechanistic process (Light et al. 1995: 153) involving a transfer of technology such that once the 'facts' and structure were established by 'experts' it was chauvinistically assumed that adoption would automatically follow. From my observations over a quarter of a century, the separation of policy and planning from implementation is a major impediment to progress towards an ecologically sustainable future in the Murray-Darling Basin, and to the realization of the capacities of community institutions to manage ecologically significant ecosystems.

It is naive to assume that the prescription of a particular passive structure, scale, set of policies and principles, or expertise will necessarily result in a desired outcome (Hillman and Howitt 2008: 62; Jennings and Moore 2000: 180-189), without also educating the implementers, and active interaction between them and policy-makers, to address the current technocratic hegemony of NRM. The CMA structure introduced in New South Wales in 2004 illustrates the risk in NRM programs if a high level of vigilance is not maintained to ensure that there is not a mismatch between vision and implementation, and between government and community expectations.

Pinto-Correia et al. (2006: 339) suggest that centrally defined policies, and especially those relating to the socio-cultural aspects of NRM, may be resisted by local managers and technical staff because 'they feel safer in their own speciality domain, do not have enough information about other concerns, and do not have the tradition of collaboration and negotiation'. That position accords with Knudsen's conclusion in relation to the Murray-Darling Basin Commission (see 1.2). My observations suggest that technocratic managers who are insecure with the socio-cultural aspects of NRM will also often discourage staff members who are comfortable with community collaboration.

Communication between the principles established by policy-makers and the priorities of implementers, and lack of authentic community-government dialogue, appear to be the weakest links in the NRM process in the Murray-Darling Basin. In addition, while presented as a 'public interest' institution, the current NSW CMA structure, which is run by a small board of appointed members, is vulnerable to 'the hidden exercise of power and the protection of special interests' (Flyvbjerg 1998: 225). The perception of such a situation is resulting in a crisis of confidence for many voluntary community NRM institutions, such as Landcare groups (see 2.4.1.1) that are

the heart of progress towards social-ecological resilience for rural Australia. Such groups must be valued and actively supported, rather than alienated, as they provide necessary social capital, continuity, local knowledge, (Sobels et al. 2001), and access to social memory essential to address the crisis in the Murray-Darling Basin:

Social memory here is used to mark the bridge between the deepest values and symbolic truths of a society and the social or physical environment on which members of that society have to act. Social memory is the arena in which metaphors, symbols, legends, and attitudes crystallize social action. Social memory is the arena in which captured experience ... and successful adaptations, as structured by a yet deeper level of values, is actualized through community debate and decision-making processes into appropriate strategies.

McIntosh 2000: 143

Primary reliance on external incentives and controls through the current catchment management process appears to demonstrate short-term vision. At the very beginning of discussions that led to the development of the Murray-Darling Basin Initiative in the early 1980s, the Chairman of the bipartisan River Murray Parliamentary Committee (Connolly 1983: 155) highlighted the socio-cultural causes and consequences of natural resources degradation and the fundamental flaw in the tendency for governments to believe that natural resources problems could be overcome by regulations, controls and technical processes alone. He advocated the facilitation of processes that would enable informed community input as partners with government. That approach was proposed for the practical reason that private individuals control most of the natural resources that require management, and governments do not have the capacity to progress towards a resilient future for the Murray-Darling Basin social-ecological system without active community cooperation and participation.

2.5 BUREAUCRATIC CAPACITY FOR DEPOLITICISATION

Bureaucracies maintain their power by taking issues out of their social contexts and examining them within preordained designs thereby abstracting the issues and presenting them as problems to be solved by specialists. Pakulski provides one explanation for this response by suggesting that 'ethically guided politics are displaced by bureaucratic politics which translates questions of values into problems appropriate to administrative procedures' (1991:163). It results in choices being made and priorities formed within a prescribed institutional context which avoids broader social dilemmas (Misgeld 1987: 80). As a result, the socio-cultural aspects of NRM can be deemed 'out-of-scope' by managers within technocratic bureaucracies. Di Chiro (1992: 25) explains this highly political process in terms of depoliticisation:

The depoliticising of environmental problems may result in the oversimplification of the problem by framing it as a technical issue, the resolution of which simply requires new and more sophisticated technology, and the removal of the issue from the 'realms of possibility' in terms of ordinary people being able to do something to change the problem, i.e. it is left to the 'experts' and power-holders.

The capacity for internal transformation also enables technocratic bureaucracies to absorb resources allocated for socio-cultural purposes and transform them into assets to support technical activities. Staff involved in the socio-cultural aspects of sustainability, within NRM bureaucracies, are also not immune to transformation and absorption. They are vulnerable to processes of 'deskilling', and then 'reskilling' (Apple 1982: 250-253) in order to become integrated with the technical 'machine'. Technical control and deskilling are linked through the process of division of labour that gradually reduces people with socio-cultural expertise to technicians who can carry out prescribed tasks mechanistically efficiently, and most importantly, without question. People are discouraged from having non-technological visions for the future, which brings to mind Freire's (1970: 80) concern that:

Efficiency ceases to be identified with the power that men (sic) have to think, to imagine, to risk themselves in creation, and rather comes to mean carrying out orders from above precisely and punctually.

The 'deskilling-reskilling' process is designed to maintain the technocratic *status quo*. If the process is contested by individuals who wish to continue the socio-cultural activities for which they were employed, another manifestation of the current knowledge-identity-power adjustment crisis within NRM bureaucracies can come into play. It involves isolation, frequently by pronouncing socio-cultural activities as 'out-of-scope', the appropriation of socio-cultural resources to support technical tasks, and the use of attrition as a management tool (personal observation; Knudsen 23/11/05). If a satisfactory level of 'reskilling' is not achieved, there are options of redundancy and in extreme cases, exclusion by mobbing where frequent and ongoing passive-aggressive violence is applied to achieve 'voluntary' withdrawal.

2.5.1 Dealing with an intensification of interaction between cultural and natural processes

More than a decade ago, Woodhill and Roling (1998: 46) argued for a 'balance and interconnection between the biophysical and social dimensions' in order to progress towards an ecologically sustainable future, and suggested that not only 'the consequences of human activity, but human activity itself' should be dealt with. They acknowledged that this view 'challenges traditional and often unquestioned beliefs about science, the "natural world", knowledge and political power'. An

assumption that was supported by their search of Australian advertisements for environmental management positions in the late 1990s, which revealed an almost exclusive demand for environmental professionals from the biophysical sciences.

They (1998: 46) concluded that environmental management 'has been perceived primarily as a technical task' with the major investment going into 'understanding the biophysical dimensions of change in the "natural environment" and the quest for technical solutions'. They considered it remarkable that the response of society centred on 'ecological consequences rather than on the social causes' because 'most people would readily agree that the causal agents are indeed people'. Midgley (2004: 2) expresses this perverse but dominant approach to problem-solving as being equivalent to 'offering each citizen more and better Prozac rather than asking what made them unhappy in the first place'. She attributes the response, and the apparent public acceptance of it, to a western 'myth of omniscient science' (*Ibid*: 6) that was maintained by 'scientistic prophets' repeatedly telling a bewildered public throughout the twentieth century that 'policies that in fact had little to do with science must be accepted because experts had shown that they were scientific and objective' (*Ibid*: 18). Midgley (2004: 120) acknowledges that 'technology is an important part of our life' and that 'trouble only comes with the obsession with a particular model that drives out other necessary ways of thinking'.

In the following chapter, I outline the methodology that I have adopted to interrogate the contradiction and dilemmas outlined above, and to consider possible alternatives that may be more effective, rational, cost effective, sustainable, just and equitable.

CHAPTER 3: RESEARCH METHODOLOGY

This is a reflective thesis. The design of the methodology draws on four decades of experience of working with rural communities in Australia and Papua New Guinea, in the areas of communication, education, and natural resources management (NRM). Papua New Guinea is a culturally and geographically diverse Melanesian country consisting of the eastern half of the island of New Guinea immediately north of Australia. This chapter is devoted to discussing the research methodology for inquiring into the realization of the capacities of rural community institutions to manage ecologically strategic ecosystems, to maintain their resilience and productivity on behalf of Australian society.

It is a transdisciplinary study grounded in critical human geography. I look at the characteristics of qualitative research design, case study, interpretive biography, and environmental history in seeking appropriate structures in which to research the subject of the thesis. I also discuss the influences of my background, cultural origins and specific experiences, on my approach. My research approach is well expressed by Flyvbjerg (2006: 240) who explains that good social science ‘is opposed to an either/or [approach] and stands for a both/and [perspective] on the question of qualitative versus quantitative methods’.

My research is informed by critical theory, through examinations of rhetoric-reality gaps, and societal structures that have resulted in an apparent institutionalized ‘poverty of process’ (Woodhill 1999: 109) and perversity in approaches designed to progress towards an ecologically sustainable and humanly desirable future for Australia’s Murray-Darling Basin. I use critical geography theory to examine the assertion that politics, inequality and environmental injustice are factors that are as significant for social-ecological systems resilience as science and the environment (Agyeman and Evans 2004: 160-161; Agyeman 2005: 43); and to ‘challenge the image of resource management as a technical task, in which places can be reduced to dispassionate, and to some extent interchangeable grid references in Cartesian space’ (Howitt 2001a: 173).

3.1 CRITICAL GEOGRAPHY THEORY

Critical geography is unified by an ideology of emancipation and justice. It is the study of ‘social, cultural, economic or political relations that create unequal, uneven, unjust and exploitative geographies’ with the aim of change and bridging the ‘divide between research and praxis’ (Hubbard et al. 2002: 62-63). Painter describes critical geography as:

A diverse and rapidly changing set of ideas and practices within human geography linked by a shared commitment to emancipatory politics within and beyond the discipline, to the promotion of progressive social change and to the development of a broad range of critical theories and their application in geographical research and political practice.

2000: 126

Critical geography lacks a distinctive theoretical identity because it can involve a range of different approaches (Marxist, feminist, postcolonial, post-structural). It interrogates the socio-spatial processes that (re)produce inequalities between people and places. It sensitises local experience to separate rhetoric from reality in order to assist in capacity realization. It elevates issues of social-ecological systems resilience and capacity realization, 'from the technical domain to the realm of power and social relations', which renders them amenable to 'social critique, not simply a technological fix' (Di Chiro 1992: 44). Critical geographers are reflective and sometimes incorporate their own voices for context in the writing of geography (Painter 2000:126; Hubbard et al. 2004:245). Harvey (1984: 7) proposes that geographers 'cannot remain neutral. But they can strive towards scientific rigor, integrity and honesty'.

Critical theory interrogates existing assumptions and knowledge claims. It helps to interpret everyday realities and facilitates the consideration of possible alternatives that may be more effective, rational, cost effective, sustainable, just and equitable. It is used to critique the predominantly technocratic organisations that currently dominate the NRM agenda in Australia. It helps to examine community understanding of 'fairness' in resources use (Syme et al. 1999); and the socio-cultural aspects of sustainability. It can be used to raise the profile of the importance of social justice, deliberative democracy, and intergenerational equity in natural resources management:

[O]ne of the central aims of critical theory is to enable people to be empowered through equipping them with the tools to analyse their own experiences by relating them to social and political structures (the personal is political) and thus take action.

Ife 1997: 129

Critical geography highlights the important roles of history, biography and communication as tools to contribute to ecologically sustainable and socially just futures. For example, mechanistic 'efficiency' and 'difference' from the *status quo* in land-use or landscape has been used through history as justification for decisions that may be unjust (genocide in extreme cases) or erode ecological resilience by discouraging diversity (Kiernan 2007: 29, 31, 177-179, 436-437; Turner 2004: 883-885; Pretty 2002: 64-65). Early studies of the environmental justice movement that emerged in the USA in the early 1980s concentrated on the impacts of the apparent unwritten 'policy' in some states of locating of toxic waste dumps near poor urban, generally African-American or Latino, communities (Bullard 1990; Agyeman 2005). These have now been expanded to include the impacts of inequitable natural resources distribution on ecosystems and human communities in rural areas (Pulido 1996; Hooks and Smith 2004).

Critical Geography theory provides a broad frame-of-reference that enables me to examine insights from systems theory, critical theory, agroecology (Powell 1996: 257-260; Woster 1990), biography, environmental history, and environmental justice. It is able to accommodate politically emancipatory aspects of geography labelled 'applied peoples' geography' by Harvey (1984:9) and discussed by Howitt (1993: 127-140). I use the broad term anthropologists to refer to applied peoples' geographers, or cooperative sense-makers. This is based on Johnston's (2001: 134) description of the roles already being performed by applied anthropologists in the areas of NRM and environmental justice (see 14.1.2.2). In an age of research from a distance and 'set and forget' relationships, the umbrella term emphasises the necessity for field work involving in-depth and on-going contact with members of rural communities (McIntosh et al. 2000: 32, see 14.1.2.1), in a generative 'advisor acting as an insider' role (Pinto-Correia et al. 2006: 341). In addition to highlighting the process, the term also attempts to avoid having to differentiate between the roles of a range of possible social science and humanities practitioners who may take the lead in performing the task in different situations. Finally, it acknowledges a Norwegian model termed 'anthropology at home' (Lien and Melhuus 2009) where anthropologists work with farmers and fishers within that country to help maintain or improve social-ecological resilience.

My experience accords with Flyvbjerg's (2006: 239) proposal that knowledge at the beginner's level 'consists precisely in the reduced formulas that characterize theories, whereas true expertise is based on intimate experience with thousands of individual cases and on the ability to discriminate between situations, with all their nuances of difference, without distilling them into formulas or standard cases'.

3.1.1 Sense-making

I use sense-making as a conceptual framework to understand the impediments to progress towards ecologically sustainable development in the Murray-Darling Basin between 1982 and 2007 and in particular, barriers to the realization of the capacities of rural community institutions to manage ecologically strategic local landscapes on behalf of Australian society. The sense-making process was originally developed to understand the circumstances that led to the Columbine school shooting tragedy of 1999. It is an interpretive process to make retrospective sense of what has occurred to extract as much meaningful learning from the experience as possible to better inform future decision-making:

Sensemaking derives from efforts to create order and make retrospective sense of what has occurred.

Nathan 2004:183

The outcomes of sense making enable community institutions to be better prepared to address issues in the future through the identification key indicators and the development of survival strategies:

The best way to suppose what may come is to remember what is past and then use it with foresight. Past is prologue, potentially prologue to a better, safer future as we seek to learn and grow from our (and others') experiences of crisis such as Columbine.

Nathan 2004: 197

Andrew (1997: 99) posits that environmental issues are 'affected by the biographical and intergenerational histories that shape and imbue settings with meanings for individuals and communities'. I have used the contextualising tools of interpretive biography and environmental history, to attempt to understand the historic circumstances, political context, and reasons for the specific case of the marginalization of the lower Murrumbidgee floodplain and its residents by many government officers, industrial agricultural industry groups, conservationists, and politicians since the beginning of the twentieth century. History and interpretive biography revealed an extraordinary set of circumstances that resulted in the alienation of the landscape and its residents, and that the current situation is anything but 'the natural order'. They also identified mobbing (Westhues 2004: 1) as an explanation of the pattern of steps involved in the marginalization (see Chapter 13).

3.1.1.1 Interpretive biography

I have used interpretive biographical studies as contextual snapshots to attempt to provide insights to the reasons for different responses by individuals to various (and especially similar) NRM situations. I have achieved this by briefly examining their life experiences, family backgrounds, personality, and the political environment of the time. As posited by Smith (1994: 294):

The roots of political actions lie in the motives, personalities, and characters of key individual actors in any set of important historical events. Private events and papers relate a different facet of politics than do public events and speeches. And it is not only the great men and women who are important, but also the other people who surround them in complex social events.

Biography complements environmental history in the explanation of actions, and can assist in bringing into focus relevant issues that are difficult to identify from other sources but which may strongly influence decisions and outcomes. As proposed by Powell (1993b: 2):

There is a natural and very common inclination to feel uncomfortable with the sober analyses of dry concepts and techniques that could so easily dominate the history of environmental appraisal and resource management. Biographers, on the other hand, can uncover the same themes quite efficiently by allowing us to encounter them through the undertakings of individual participants.

It also contributes to a better appreciation of the motivations and resilience of 'change agents' and 'anti-change agents', and to the understanding of the importance of intergenerational knowledge transfer.

3.1.1.2 *Environmental history*

The historical context of environmental issues is also important for ‘sense-making’, capacity realization, and to progress towards an ecologically sustainable and humanly desirable future:

Only by excavating the hopes of the past can we begin to appraise the depth of community unease and the prospects for sustainability. For sustainability is not only an economic, demographic and environmental concept; it is also a historical concept. It links future expectations and present policies with past experience.

Davison 2005: 39

That sentiment accords with Castro’s (2002: 197) suggestion that the ‘historical dimensions of LMS (local management systems) is fundamental to unravelling the connections between new sets of prescriptions and old management systems’.

I have used environmental history to identify the origins and context of redundant or apparently dysfunctional policies, processes, or structures to add to the ‘sense-making’, and also to reveal that ‘major change is not only possible but is normal and inevitable’ (Ife 2002: 290). Environmental history reveals the ahistorical, scientific-technical-managerial view of NRM generally taken by governments, to be hegemonic and inadequate. It presents a considerable impediment to progress towards an ecologically sustainable and humanly desirable future by making ‘obstacles to change seem insurmountable’ (*Ibid*). In a similar vein, Pellow (2000: 588) suggests that in order to fully understand the formation of environmental inequality one must redefine environmental inequality as a multi-dimensional socio-historic process rather than simply viewing it as a discrete event. Di Chiro (1996: 453) adds:

The environmental justice movement proposes a form of environmentalism that recognizes the historical relationships between communities and environments and argues that there are already existing ‘inventions’ of nature that do not take as their starting point the human control of the natural world.

She also argues that our current biodiversity conservation model, which attempts to ‘solve the historical problems of particular capitalist and patriarchal dominations of nature by removing “humans as contaminants” does not move us closer to a sustainable future’. She proposes that more salient issues include ‘how different humans are differently implicated in environmental degradation, how different cultures and environments interact in positive and destructive ways, and how diverse ways of inventing “mixed species communities” might produce a more livable(sic) world’.

3.2 QUALITATIVE RESEARCH DESIGN

My research took a contextual approach, involving participative inquiry and a combination of qualitative processes. Qualitative research cannot be carried out solely 'objectively' as it is an assessment of 'real life' processes which requires in-depth knowledge of the content, process and the people involved to be able to successfully identify and recognise the potential of the emergent properties:

Qualitative research is multimethod in focus, involving an interpretive, naturalistic approach to its subject matter...[It] involves the studied use and collection of a variety of empirical materials — case study, personal experience, introspective life story, interview, observational, historical, interactional and visual texts — that describe routine and problematic moments in individuals' lives.

Denzin and Lincoln 1994: 2

Denzin and Lincoln (1994: 199) suggest that qualitative researchers 'self-consciously draw on their own experiences as a resource in their inquiries. They always think reflectively, historically, and biographically. They seek strategies of empirical inquiry that will allow them to make connections among lived experience, larger social and cultural structures, and the here and now'. Blackstock et al. (2006: 732) add that qualitative methods allow the study of a case 'in depth and detail, capturing the richness of people's perceptions and experiences in their own terms and developing an analytical understanding through the aggregation of these individual accounts'. They also suggest that qualitative approaches involve 'making visible those invisible, taken-for-granted processes (particularly those with regard to perception and judgement), creating a new politics of knowledge'.

3.3 CASE STUDY

The basis of the multi-method approach in this thesis is the case study. Huberman and Miles (1984: 440) define a 'case' as 'a phenomenon of some sort occurring in a bounded context' which normally has a focus of attention and 'a more or less vaguely defined temporal, social, and/or physical boundary'. The foci and boundaries 'can be defined by social unit size (an individual, a role, a small group, an organisation, community, nation), by spatial location, or temporally (an episode, an event, a day)'. Cases may also contain sub-cases or embedded units of analysis (Yin 2003: 40-43).

Case study is an effective vehicle for contributing to one of the central aims of critical theory, which is to empower people by equipping them with the tools and opportunity to analyse their own experiences by relating them to social and political structures (Ife 1997: 129). Case study contributes to the fulfilment of those requirements as it is sufficiently flexible, contextual and

transparent for readers to draw their own conclusions (Stake 1994: 243). Its accessibility invites further input and participation. As proposed by Flyvbjerg (2006: 238):

The goal is not to make the case study be all things to all people. The goal is to allow the study to be different things to different people.

Case Studies facilitate a rich understanding of the history, context and form of the sustainability crisis as it has unfolded in the Murray-Darling Basin. I have used a primary case study area, and several secondary and minor studies to provide frames of reference to enable the interrogation of the issue of the realization of the capacities of community institutions to manage ecologically strategic local landscapes on behalf of Australian society. I have also used an event, the Global Fisheries Collapse, and two temporal periods to frame the research and facilitate interpretation.

3.3.1 Research design

My research design conforms to Stake's 'instrumental case study' (2000: 437), which seeks to provide insight into an issue by using cases as frames of reference for reflection. As a number of instrumental cases are studied jointly, it is described as a collective case study approach. While I have an intrinsic interest in the lower Murrumbidgee floodplain bioregion and some cases are looked at in depth, they themselves are of secondary interest in this research. The cases provide a supporting role to facilitate an understanding of the key theme of the thesis and how it may be addressed.

3.3.1.1 *Bioregional case studies*

I have conducted a primary and three secondary place-based case studies to examine different aspects of my research topic:

The primary study is a community of landholders on the floodplain of the lower Murrumbidgee and lower Lachlan rivers, in south-western New South Wales. The bioregion is used as a microcosm of the Murray-Darling Basin to interrogate issues relating to landscape-scale governance to facilitate generative agri-ecological land-use involving public and private land to improve social-ecological resilience. Embedded within that case is a second temporal unit of synthesis and analysis; a century of marginalisation of the floodplain landscape and its residents;

Secondary case study one is the fishing community operating on the public waters of the lower Murray lakes (Alexandrina and Albert), the Coorong, and the Southern Ocean in south-eastern South

Australia (Lower Murray Lakes and Coorong bioregion). The governance of the fishery has led to Marine Stewardship Council accreditation as a sustainable fishery in 2008, despite the degradation of ecosystems in which it operates largely as a result of catchment-scale developments;

Secondary case study two is the Goulburn-Broken Catchment. A case selected because it presents a revealing example of the 'foreclosure of options in pursuit of efficiency dictated by past investment' (Anderies et al. 2006: 877). An ongoing erosion of social-ecological resilience is occurring through the capacity to maintain an obsolete resource-degrading mechanistic production model by ongoing accession of public funding. Resistance to transformation is achieved by historic institutions, and a technocratic culture within decision-makers for whom transformation from an efficiency-based mechanistic model to a resilience-based social-ecological model would possibly result in 'crises of perception' (Capra 1997: 3-5); and

Secondary study three is Kristianstads Vattenrike Biosphere Reserve in southern Sweden. This case study was selected as it provides an excellent example of the transformation of a social-ecological system for greater resilience. The Kristianstads Vattenrike and the Goulburn-Broken Catchment case studies have also been examined by several researchers in common and are each nationally important centres for agriculture and food processing.

These four cases involve bioregionally-based communities working with local ecosystems. Included in the studies is an investigation of current and historical 'politics', policies and structures that impact on the sustainability of the bioregions and the realization of the capacities of residents to contribute to their social-ecological resilience. They also examine vernacular processes developed by the communities to work in harmony with their environments and maintain resilience.

3.3.1.2 *Temporal case*

This thesis focuses on the 25-year period from 1982 to 2007 in the Murray-Darling Basin. It represents generation-long awareness that integrated natural resources management, initially to improve water quality, requires the active cooperation of catchment residents with government, in order to progress towards an ecologically sustainable and humanly desirable future. The period saw the establishment of the Murray-Darling Freshwater Research Centre, the development of integrated natural resources management, the transformation of the River Murray Commission into the Murray-Darling Basin Commission and Ministerial Council, the rise and recent decline of Landcare (Torbay 2006), the establishment of regional Catchment Management Authorities, and acknowledgement of global warming.

It is also located within the length of time that I have been working with rural communities in the Murray-Darling Basin and Papua New Guinea (1968-2009), which coincides with the approximate period of the development of environmental awareness in Australia. I use public awareness of the 'salinity problem' in the southern Murray-Darling Basin that emerged from the 1967-1968 south-eastern Australian drought, and the conference titled *Education and the Environmental Crisis* hosted by the Australian Academy of Sciences in Canberra on 24-26 April 1970 (Evans and Boyden 1970), to mark the beginning of current environmental awareness in Australia.

3.3.1.3 Global case study

Finally I use the case of the collapse of the world's major marine fisheries at the end of the twentieth century as an 'advance organizer' for the thesis. That series of events is symbolised by the collapse and closure of the Newfoundland cod fishery in 1992, after 500 years of operation (Kurlansky 1999: 186). The global fisheries collapse case provides insights, which may help to avoid a similar situation occurring in the Murray-Darling Basin.

Learning from the experiences of others, in what is a complex global crisis of rapid erosion of ecological, social and economic resilience is an important aspect of the structure of this thesis and the reason for the eclectic approach that I have taken in my examination of cases. As Nathan (2004: 193) suggests:

We are not just learning from our own past experience, but ideally from the past experiences of others. This is a critical way to get around the fact that most crises don't occur often and may not have occurred to the organization previously. The social nature of sense making primes us that we can be adept absorbers of others' hindsight in order to inform our own foresight, particularly when another's crisis is so well documented.

3.3.2 Validity and reliability

Case study methodology is sometimes perceived as an 'easy way' to evaluate, its 'methodological tenets are sometimes poorly understood, and [its] political reactivity in situations is often underestimated' (Kemmis et al. 1983a: 251). Flyvbjerg (2006: 220) suggests that the 'conventional wisdom of case-study research, which if not directly wrong, is so oversimplified as to be grossly misleading'. Yin (2003: 97-98) suggests that a major strength of case study data collection is the opportunity to use far more sources of evidence than other research strategies. He proposes that:

The use of multiple sources of evidence in case studies allows an investigator to address a broader range of historical, attitudinal and behavioural issues. However, the most important advantage presented by using multiple sources of evidence is the development of converging lines of inquiry, a process of triangulation.

Triangulation is the process of using ‘multiple perceptions to clarify meaning’ (Stake 1994: 241), or ‘multiple sources of evidence’ (Yin 2003: 97). It is not a technical process that will guarantee repeatability, but rather ‘a technique which provides more and better evidence from which researchers can construct meaningful propositions about the world’ (Mathison 1988: 15). As the issues researched appear to be common to much of the western industrialised world, triangulation included a comparison of international findings and approaches. I have attempted to maximise the credibility of the research findings through attention to multiple sources of evidence as well as multiple methods of data collection, and the use of both spatial and temporal cases.

Another quality assurance vehicle used in this thesis at the community level, which I have developed during my career, is the professional public presentation of information collected through a participatory action research approach, combined with current scientific findings, for public reflection and feedback (see Appendix 5; Eastburn 1984; Baker and Lane 1993). The information collected on the lower Murrumbidgee floodplain case, for example, was reflected back to members of the community for comment through mini-workshops, presentations at meetings, a video/DVD, and a report. That feedback led to a further level of quality assurance through the co-operative development (government-community) of public signage (see 3.6) for the interpretation of cultural and biophysical aspects of a national park on the lower Murrumbidgee floodplain in 2009.

The process of cooperatively developing public documents and signage was most valuable for revealing the perceived ‘risk’ dilemmas of government NRM departments in their relationship with the public. It also revealed insights such as the reality that government departments are powerful ‘interest groups’ with agendas to promote. My experience (personal observations 2006-2007, 2009) frequently accorded with Flyvbjerg’s (1998: 31) revelation that the ‘documentation not produced is just as interesting as that which is produced’.

A participatory action research approach aims to produce knowledge and action that is directly useful to the residents of the case study area. It also seeks to empower people to a deeper level ‘through the process of constructing and using their own knowledge’ (Reason 1994, in Denzin and Lincoln eds.: 328). Plumwood (1996: 81) suggests that the articulation of personal experience is a significant learning and emancipatory process.

3.4 LIMITATIONS OF METHODOLOGY

This type of research cannot be carried out ‘objectively’ as it assesses ‘real life’ situations which require in-depth knowledge of the content, process and the people involved to be able to successfully identify and

recognise the potential of the emergent properties. Interviews are necessarily the personal responses of individuals at a particular time. Different insights will often emerge under different physical or emotional conditions, from different age groups, sexes, and if males and females are interviewed together. However, it is necessary to extract patterns and information from a limited sample. As the writing is situated in the life experiences of the author as well as the individuals being studied, it is incomplete and from my own perspective and time.

My research also took a contextual rather than in-depth approach, which creates limitations to the methodology due to the enormity and diversity of data collected and the time required to code and analyse them (Carr 1994: 90). The qualitative research of the case studies identified themes and established their relative importance but did not provide a detailed quantitative assessment. However, it has provided a foundation for quantitative assessment. The greatest limitation of case study research appears to be that it is possible to portray an inaccurate and misleading situation if insufficient context is provided.

3.5 DATA COLLECTION

My research included archival searches; a literature review; and interviews with community members, bureaucrats, natural resources scientists, a former politician, and opinion leaders. The research was designed to identify impediments and to establish alternatives to improve the governance of regional landscapes by local community institutions on behalf of Australian society.

3.5.1 Interviews

Semi-structured face-to-face interviews were conducted with questions designed to elicit intuitive responses to effective landscape management for a sustainable future; to collect factual information about the human, biophysical, and cultural assets of bioregions; to obtain professional opinions and; assemble community history and memory. Interviews were spread over several years to ensure the coverage of different community activities and experiences, which may trigger different responses.

Interviews (see Appendix 4) were recorded with 27 landholders, primary producers, and community members within the lower Murrumbidgee-Lachlan and Lower Murray lakes and Coorong bioregions. Twenty interviews were recorded with government NRM officers, academics, scientists, community representatives on government panels, teachers, a politician (the first

Australian Government Environment Minister), community facilitators, a social scientist, and a produce buyer. One interview was conducted in Sweden and the rest in Australia. Informal personal communication was also conducted with a range of professionals and community members and key points and concepts noted.

Questioning in many cases was from the perspective of what people have done or would do about various issues in order to sustain landscapes, and what type of support, facilitation or freedom is needed to realize their capacities. It was designed to establish the context, which would allow communities to effectively manage their local landscape for a sustainable future on behalf of Australian society.

3.5.2 Archival search

Archival search was a fundamental component of this thesis. It helped address the ahistorical technocratic hegemony of NRM by synthesising fragmented information from a range of sources to create a contextualising historic and biographical narrative to facilitate critique. It helped to 'make sense' of the current situation and identify alternatives. It helped to reveal group identity and to establish 'difference', which contributes to diversity, as a something that is positive (Howitt 2001b: 237) for social-ecological resilience. It also helped to establish whether the *status quo* was the 'natural' order.

Importantly the narrative produced from archival sources has the potential to provide marginalized groups with a 'voice'. A feature of the technocratic hegemony is that the 'other' is denied the opportunity to 'talk back on its own terms' (Rose 1999: 176-177; Sampson 1993: 4-5; Di Chiro 1992: 25). Archival searches provide foundation information to create an emancipatory 'story' because it is outside of the hegemonic technocratic framework.

A rich source of archival evidence came from reports of Royal Commissions and Parliamentary Committees on water sharing and use in the Murray-Darling Basin. These included the New South Wales Royal Commission on the Conservation of Water 1885-1887; the Interstate Royal Commission on the River Murray 1902 and various related papers; and Parliamentary Committee papers and conference proceedings debating issues relating to the construction of Burrinjuck Dam and the establishment of the Murrumbidgee Irrigation Areas between 1903 and 1906. Of greatest value were the detailed minutes of witness evidence, which record answers from a range of witnesses, including landholders, engineers, public servants, and businessmen; to questions from a panel of politicians and senior bureaucrats. Complementing, and frequently commenting on, the government documents were the Balranald newspaper, *The Riverina Recorder* (1877-

1965) and the Hay newspaper *The Riverine Grazier* (1873-present), which present community perspectives. Material was sourced from public and private archives. Property archives, such as that of 'Nap Nap' pastoral station with records reaching back to the 1870s helped reveal what was of importance, interest or concern to landholders over more than a century.

3.5.3 Participant observation

Participant observation has two-way value in rural communities: 'seeing' and 'being seen'. The technique provides an opportunity to perceive reality from the viewpoint of someone 'inside' the case study rather than external to it but as such there is potential for bias (Yin 2003: 94). My day-to-day activities with the Commonwealth Schools Commission Country Areas Program, the River Murray Commission, and the Murray–Darling Basin Commission between 1982 and 1998, and work this century as a private consultant and with a catchment management authority, have provided opportunities for almost continuous observation of the land and people of the Murray–Darling Basin over more than a quarter of a century. In particular, video production between 1991 and 1998 enabled me to gain a first-hand impression of the overall landscape, to observe people in their community environments throughout the million square kilometre region, and to discuss issues relating to natural resources management with a broad range of individuals and groups (see Appendix 5).

As video production is time consuming, it provided opportunities to spend 'quality time' with the subjects of stories and to establish relationships with them, which could be reinforced through subsequent visits to establish a valuable Basin-wide network. My observations were also focused by my role to contribute to the construction of an image of the vast region, and 'team-building' (Hahn et al. 2008: 123, 138; Westley 1995: 409; Gunderson et al. 1995) with Basin residents.

I also had frequent opportunities to observe the decision-making process at Murray-Darling Basin Commission and Ministerial Council meetings. I had access to, and established constructive relationships with some of the visionaries of the Murray-Darling Basin Initiative, including rural lobbyist Ernest 'Watershed' Jackson and former politician Ralph Jacobi who acted as 'sounding boards' and provided informal quality assurance for the communication program that I was developing (see Appendix 1).

Most recently, I had the opportunity to observe the operations of NRM in New South Wales through work within the catchment management structure over a nineteen-month period in 2006-2007. The process, provided insights that would not have been available through traditional 'external' research (Yin 2003: 94-96) where bureaucracies can control information (Knudsen 23/11/05) through a process described by Knowles (1983: 31) as 'constipated' communication. In addition, it provided enough time for complex community 'politics' to be revealed. Being an 'inside observer' adds depth and rigor to the research process:

The methodology of participant observation is exceptional for studying processes, relationships among people and events, the organisation of people and events, continuities over time, and patterns, as well as the immediate sociocultural contexts in which human existence unfolds.

Jorgensen 1989: 12-13

3.6 DATA ANALYSIS

Data were first synthesised through critical narrative with the recognition that 'most naturalistic, holistic, ethnographic, phenomenological case studies need accurate description and subjective, yet disciplined interpretation' (Stake 2000: 444). The participatory process of collecting information was extended to analysis by reflecting the narrative back to members of the community through a report, a DVD and exhibitions (See 3.3.2). That action fulfils one of the key aims of critical theory, which is to empower people by enabling them to analyse their own experiences in relation to social and political structures and to possibly develop new visions for the future (Ife 1997: 129).

Interviews were transcribed and themes highlighted immediately. Other relevant information relating to the interview was noted. Later, a checklist of themes which emerged was used as the basis for the analysis of interviews. New themes were added as they emerged.

Unobtrusive research was generally used to build up a personal, holistic and roughly generalizable image of the Murray–Darling Basin, its bio-cultural regions and its people. An appreciation of culture is a sign of respect which is fundamental to relationship building, change, participatory learning and problem solving with any group of people. As Freire points out, many errors and miscalculations are made by:

(N)ot taking into account something as real as the people's view of the world: a view which explicitly and implicitly contains their concerns, their doubts, their hopes, their way of seeing the leaders, their perceptions of themselves and of the oppressors, their religious beliefs (almost always syncretic), their fatalism, their rebellious reactions. None of these elements can be seen separately, for in interaction all of them compose a totality.

1972: 149



Plate 3.1 Interpretive signage developed with community members and government officers was presented for public reflection and discussion.

The process of cooperatively developing material for public exhibition is a useful quality assurance exercise. It revealed ‘cultural’ assumptions and facilitated critical thinking and debate. The completed signage provided a contextual framework for discussion and comment, and triggered both individual and shared responses.



3.7 EXPERIENCES THAT INFORMED METHOD DESIGN AND DATA INTERPRETATION

My background, experiences and cultural origins influenced the research and the responses of those interviewed as part of the research. I have a rural background, which provides an appreciation of primary production and rural issues. I spent more than a decade working with non-western cultures where the practice of participatory democracy is common but western science is not. I am familiar with government structures, natural resources policy, and bureaucratic cultures. I have a particular interest in inland water management and have worked in four different water-related government authorities during my careers. I have qualifications and experience in natural resources communication (Andrew and Eastburn 1997: 12), natural resources management, social-ecological systems interpretation, education, and anthropology.

The Murray-Darling Basin is an important part of my cultural heritage and I have lived at various times in centres within different bio-cultural areas and a range of population sizes; including Balranald, Bourke, Canberra, Dubbo, Gwabegar, Hay, Narromine, Wagga Wagga and Wellington NSW (see Figures 1.1 and 10.1). I have worked closely with rural communities to facilitate community-initiated projects, such a perceived 'identity crisis' within rural children, which have involved whole of community asset assessments. I have travelled extensively throughout the region, especially as part of my work recording NRM stories for television and community deliberation with the Murray-Darling Basin Commission.

My methodology and data interpretation in relation to the subject of this thesis are informed by three significant personal experiences. The first involved the observation of the rapid release of enormous individual and group energy, creativity and realization of capacity at the dismantling of a prescriptive, hierarchical, mechanistic management model (see Appendix 3). The second was the identification of social memory as an important tool for crisis management and social-ecological resilience. The third was the recognition of the value of deliberation on vernacular agricultural methods for perspectives that may trigger new approaches to help address issues relating to the erosion of social-ecological systems resilience.

3.7.1 Prescription as a major capacity inhibitor

Prescription is the imposition of specific sets of rules, processes and activities, to the exclusion of alternatives, to achieve a task. Prescription has a role in certain situations, such as the performance

of a specific technical task. However, it can easily be over-used, inappropriately used, or abused by insecure managers. Freire expresses the view that one of the 'basic elements of the relationship between oppressor and oppressed is *prescription*' (1972: 23 emphasis original), which stifles creativity and results in the uncritical acceptance of the *status quo*, or what he terms 'domestication' (1973: 28). In his discussion of Freire's work, O'Neill (1987: 70) explained that the 'evil of our time is the domestication of men and women's intellect, will and imagination'.

As Apple (1993: 123) expressed, borrowing the ideology and techniques of industrial management for reasons of control or administrative convenience 'may have consequences exactly the opposite of what many authorities intend'. Instead of having professionals 'who care greatly about what they do and why they do it' there are likely to be 'alienated executors of someone else's plans'. Ironically, in many industries today, management techniques have become less prescriptive. Horizontal decisions are made 'on the shop floor' to fine-tune processes because with increased customization it is not possible to prescribe every variation that may be requested (Liker 2004:143-148). As suggested in an interview with Andrew in 1996, I believe that expertise and knowledge held in communities is greatly under-utilised. I expressed a strong belief that it is not in the best interest of education, or progress towards greater social-ecological resilience, to 'deskill' (Apple 1982: 250) teachers or farmers, and force them to assume dependent roles:

Teachers are professionals. They have their own interests and they can take advantage of local resources and make education much more relevant by having a program that's flexible rather than prescriptive ... we provide guidelines, we provide a framework, we provide support but we don't prescribe how it is to be done [!].

Andrew and Eastburn 1997: 9

Far from avoiding risk, prescription can be a major risk in itself by excluding powerful community resources from contributing to progress towards ecologically sustainable and humanly desirable futures. As Broomfield (1997: 217) cautions:

You must not prescribe to people, for that puts them in an inferior and dependent position ... People learn best when they are encouraged to see how much they already know and to build on it. From this comes self trust.

3.7.2 Accessing social memory and traditional agricultural knowledge

New Guinea is one of the world's four major centres where agriculture independently emerged (Mazoyer and Roudart 2006: 75, 85; Diamond 2005: 280-286; Denham et al. 2003: 192). As agriculture has been sustained there for between 10 000 and 7 000 years, I realised the



Plate 3.2 Local farmers were actively involved in discussing, demonstrating and analysing vernacular agricultural methods with students at Koroba Provincial High School.

Local farmers demonstrated the subtleties of ancient swamp gardening that dominated agriculture in the region when taro (*Colocasia esculenta*) was the main food crop, before the introduction of the sweet potato (*Ipomoea batatas*). They explained why certain crops were grown in certain places, and how issues of disease, and variations in weather and soils were addressed. They also explained traditional food preservation methods, and identified emergency foods and strategies that could be used during periods of famine ('*taim hungri*').

ethnocentric folly of teaching simplistic western agricultural practices, without also examining rich Melanesian traditions. The deliberative-analytic method used to examine traditional practices made for enjoyable participative learning for both students and local farmers. The analysis of taken-for-granted vernacular methods ('our ancestors have always done it that way') informed by western science, generated pride in their ancestors' insights, as innovations were revealed.

The process of bringing local knowledge into the school and going into the surrounding landscape to observe vernacular solutions to a range of agricultural issues revealed social memory to be a key to social-ecological resilience. It held information for untangling land disputes and for utilizing microhabitats in the landscape; it provided frames of reference for dealing with crises such as disease (anthrax and blight) and famine (caused by drought and frost); and even supplied instructions for surviving the rare event of volcanic ash fall-out (Glasse 1965: 45-46; Blong 1982: 5, 86-87, 197) calculated to have last occurred in the mid-seventeenth century (Blong 1982: 194). As proposed by McIntosh et al. (2000: 24), social memory is dynamic as well as long-term:

Far from being a stagnant pool of knowledge, social memory often involves innovation in the form of experimental recycling or reinvention of ... economic and sociopolitical strategies that previously provided solutions. Social memory in our context is the long-term (greater than three generation) communal understanding of landscape and biocultural dynamics that provides for the curation of pertinent experience and its intergenerational transmission.

3.7.3 Conclusion

The essence of the methodology that I have chosen to interrogate the contradictions and dilemmas involved in the realization of the capacities of rural community institutions to manage ecologically strategic landscapes on behalf of Australian society, and to consider alternatives, is expressed by Freire (1972: 79-80) as follows:

Thematic investigation, which occurs in the realm of the human, cannot be reduced to a mechanical act. As a process of search, of knowledge, and thus of creation, it requires the investigators to discover the interpenetration of problems, in the linking of meaningful themes. The investigation will be most educational when it is most critical, and most critical when it avoids the narrow outlines of partial or 'focalized' views of reality, and sticks to the comprehension of *total* reality. Thus, the process of searching for the meaningful thematics should include a concern for the links between themes, a concern to pose these themes as problems, and a concern for their historical-cultural context.

In the next chapter, I identify some relevant lessons for terrestrial NRM to be learned from the 'global collapse' of major marine fisheries (Watson and Pauly 2001: 534). It continues the theme of examining the socio-cultural causes of resources degradation in an attempt to identify potential solutions. As explained by Milich (1999: 627), 'Canada prided itself on applying the world's most-sophisticated, "best" fisheries science to its harvesting regimes' but that did not prevent the collapse of the Canadian Grand Banks off Newfoundland, which was closed in 1992 after nearly 500 years of operation (Kurlansky 1997: 50-51). It appears that by similarly attempting to stick to technocentric 'business-as-usual' in terrestrial NRM, we are repeating the mistakes that resulted in the collapse of some of the world's great fisheries.

In contrast, I will examine the Lower Lakes and Coorong Fishery in south-eastern South Australia, which received Marine Stewardship Council accreditation as one of the world's sustainable fisheries in 2008. At a time when many fishing communities are in decline, and the lower Murray lakes (Lake Alexandrina and Lake Albert) and Coorong bioregion around the mouth of the River Murray is under extreme ecological stress (Beeby 2008; Eccleston 2008: 100-113), there are positive lessons in resilience, governance, and initiative to be learned that community group.

CHAPTER 4: FISH AND THE FUTURE

I have four reasons for discussing fish and fisheries as an advance organizer chapter for this thesis. Firstly, fish are indicators of the health of river systems and their catchments, and therefore of the effectiveness of natural resources management (NRM) initiatives. Secondly, I have found the discussion of native fish to be a valuable vehicle for facilitating community interest in NRM. Thirdly, an examination of the global fisheries collapse as a social-ecological and management crisis reveals insights for terrestrial NRM. Finally, an examination of the effective governance of a fishery as a common pool resource (St Martin 2005: 79; Ostrom 1990: 30) has applications for terrestrial landscape-scale management.

The decline of native fish was one of the first observed indicators of the negative impacts of European settlement on the inland Australian landscape. Author Mary Gilmore (1969 [1948]: 117-118), writing about growing up in the mid-Murrumbidgee Valley during the nineteenth century, stated that in the 1870s she had asked her father why native fish were no longer common on the dining table. His reply was:

‘When the blacks went the fish went’: meaning that the habit of preserving the wild was destitute in the ordinary white settler. Yet at the time the white population on the rivers was only a fraction of what the blacks had been.

In more recent times, the European carp has been one of the key messengers about the need to reform land and water-use, and approaches to NRM in the Murray-Darling Basin. The European carp invasion since the mid-1960s has been the indicator of inappropriate river regulation, a mismatch of land and water-use aspirations with the geomorphology and climate, and past fragmented NRM (Suzuki 1993: 163); all of which tend to favour exotic species. The issue is not that these mistakes were made but the perverse ‘politics’ that obstruct their rectification.

I have found discussions about ‘fish’ with Murray-Darling Basin residents to be inclusive, with participants able to draw from their own experiences and those of community or family members to constructively respond to issues being discussed. They are not limited to simply reacting to scientific ‘facts’ or protecting vested interests. Stevenson (2009: 249) revealed the Mary River cod ‘that was dear to the hearts of many’ had been the shared vision used to unite a catchment community with diverse interests in south-east Queensland. Similarly, I have found the topic of fish to be a valuable vehicle for initiating discussion of concepts such as resilience, integrated natural resources management, and community participation. As I explained (Eastburn 1996: 7), at a fisheries communicators’ conference:

One of our native fish posters handed to a bar tender in any hotel in the Murray–Darling Basin will quickly break the ice with the locals.

Conversations about fish tend to be fairly relaxed; a mixture of fact and folklore. Some of our best projects have grown out of casual comments made during these conversations; campaigns such as *Give Murray Cray a fair go!* and the children's booklet *Ponde the Murray cod*, are two examples.

The topic of 'fish' also appears to be an excellent (neutral?) vehicle for introducing the concepts of sustainability and integrated catchment management ... Discussing 'fish' also helps us to realise that our 'environmental problems' are really people problems.

I have also found from more than two decades of working with fisheries biologists that, contrary to the North American experience (Milich 1999; Johannes et al. 2000; St. Martin 2001), they are the most willing of all natural resources managers to embrace community participation. They acknowledge that 'the best outcomes will be achieved through a mix of good management, science, and community support and ownership' (Koehn 2004: 213). They were the first natural resources managers to take a holistic approach to NRM, including the management of native fish communities and habitat restoration. They are willing to embrace adaptive management and many match the definition of adaptive manager as decision-maker:

The adaptive manager must have aptitudes for being a scientist, collaborator, politician, and agency manager simultaneously.

Westley 2002: 353

4.1 LESSONS FROM THE 'GLOBAL FISHERIES COLLAPSE': BEWARE OF DECONTEXTUALIZED 'BUSINESS-AS-USUAL'

Milich (1999: 627 and 630) describes the collapse of the Newfoundland cod fishery in Canada as a crisis caused by the maintenance of business-as-usual through an amalgam of 'tyrannies of small decisions' (Mackay 1990: xvi), self-interest, and inertia:

Neither chaos nor complexity accounts for the collapse of the fishery; the crisis is better interpreted by considering the volatile mix of politics, economics and faulty science that promoted institutional paralysis. In particular, the evolution of technological precision embodied in modern trawler fleets destabilized the system. Subsequently, nearly all parties involved in the fishery operated under a business-as-usual maxim.

This explanation is similar to Woster's (1979: 4) interpretation of the causes of the American Dust Bowl of the 1930s. He suggested that:

It cannot be blamed on illiteracy or overpopulation or social disorder. It came about because the culture was operating in precisely the way it was supposed to ... The Dust Bowl ... was the inevitable outcome of a culture that deliberately, self-consciously, set itself [the] task of dominating and exploiting the land for all it was worth.

Cited in Cronon 1992: 1348

It is generally accepted today that western scientific knowledge is essential but inadequate to sustain fish communities, and that western scientific fisheries management methods alone are ineffective for promoting ecological or social resilience (Carpenter et al. 2009; Saenz-Arroyo and Roberts 2008; Garcia-Quijano 2007; Berkes et al. 2006; St. Martin 2005 and 2001; Berkes 2003; Johannes et al. 2000; Milich 1999; Pauly 1997; Acheson and Wilson 1996). Saenz-Arroyo and Roberts (2008: 323) also suggest that decontextualization is problematic in NRM, and that hypotheses must be 'placed in their societal and historical context' to avoid sophisticated mistakes.

Saenz-Arroyo and Roberts (2008: 321) and Murray et al. (2006: 567) highlight the weakness of the ahistoric character of western science, which until recently resulted in fisheries scientists relying on evidence from modern observations without understanding historical baselines or past conditions. Pauly (1995: 430) describes that situation as the 'shifting baseline syndrome':

Essentially, this syndrome has arisen because each generation of fisheries scientists accepts as a base line the stock size and species composition that occurred at the beginning of their careers, and uses this to evaluate changes. When the next generation starts its career ... it is the stocks at that time that serve as a new baseline ... [resulting in a] gradual accommodation of the creeping disappearance of resource species.

Saenz-Arroyo and Roberts (2008: 321) explain that fisheries science was 'conceived in an era of optimism when humans believed they had the power to control nature', so overfishing problems were considered easily reversible. They caution that 'these beliefs are illusory'. They posit that future university marine science programs need to emphasise how little we understand about the impacts of humans on the planet. They suggest that students should be encouraged to 'combine historical information with that coming from experiments or recent social and ecological monitoring', and learn to 'place their hypotheses in a suitable historical context' (*Ibid*: 325).

4.1.1 Technocratic chauvinism – maintaining a costly illusion

Chauvinism involving technocratic self-celebration (Sampson 1993: 4-5) and the continued denial of the importance of socio-cultural and historic aspects of NRM appears to be a manifestation of insecurity created by a 'crisis of perception' (Capra 1997: 3-5), and self-interest, as the illusion of science and technology having all the answers is iteratively eroded. Technocratic chauvinism includes the diminution, obstruction, or outright exclusion of local ecological knowledges or vernacular models of NRM (Johannes et al. 2000: 258). Milich (1999: 632) and Kurlansky (1999: 182-184) revealed that inshore fishers had expressed concern over severe depletion of cod stocks as early as the 1960s, three decades before the final collapse of the Newfoundland fishery, but were dismissed.

Technocratic chauvinism also results in the diminution of 'soft' social sciences and humanities, or the appropriation of their resources within NRM bureaucracies (personal observation; Andrew and Eastburn 1997:15-16). Milich (1999: 632) reveals that there 'were timely warnings of the cod fishery's impending failure issued' but they came from nongovernmental social scientists and not from Department of Fisheries and Oceans (DFO) fisheries biologists. He also considers the encouragement of the widespread use of modern technology in the name of greater efficiency to be 'among the gravest errors of DFO' because improperly managed technology can lead to the demise of a resource 'precisely because of its efficiencies and externalities are unbounded' (*Ibid*: 631).

Carpenter et al. (2009: 13) acknowledge that there is a tendency in western scientific management to privilege computable aspects of environmental problems despite 'awareness of other noncomputable aspects'. In addition, there is a tendency to believe in even incomplete dominant models, which can result in filtering out 'signals that are inconsistent'. They attribute filtering of evidence to the failure of decision makers to perceive the impending collapse of the Newfoundland cod fishery in 1992. They suggest that the solution to this methodological inadequacy is to 'take varied signals from diverse thinkers seriously', and point to the many breakthroughs in complex environmental situations where diverse viewpoints were engaged (*Ibid*: 14; see Chapter 6). In a paper titled 'Ignore fishers' knowledge and miss the boat', Johannes et al. (2000: 261) provide five case studies of serious management and political problems that developed 'as a result of imperfect information being available through a wholly western scientific approach' to NRM.

4.1.2 Beyond mechanistic 'efficiency': managing for resilience

Emphasis on centralized institutions and command and control resource management, based on linear thinking and mechanistic views of nature, often aims to reduce natural variation in an effort to make the ecosystem more productive, predictable, economically efficient and controllable. But the reduction of the range of natural variation is the very process that may lead to a loss of resilience in a system.

Berkes 2003: 10

In exploring 'why conventional managerial approaches to fisheries have not worked well' and seeking a more holistic approach, Berkes suggests two starting points. The first is the necessity of combining natural and social systems as one social-ecological system, because 'ecosystem-based management explicitly includes humans'. The second is the 'need to manage environment and resource systems for resilience, rather than for products and commodities'. He proposes that systems 'need to be nurtured for diversity and flexibility' (2003: 6-7) and not forced to conform to a mechanistic delusion of prediction and control:

Fisheries are integrated social-ecological systems with two-way feedbacks, basically complex adaptive systems characterized by nonlinearity, uncertainty, scale and self-organization. Resilience is one of the emergent properties of such systems, and refers to the ability of complex systems to absorb shocks, self-organize, learn and adapt.

Berkes 2003: 16

A further reality check triggered by the collapse of global marine fisheries relates to ‘poverty of process’ (Woodhill 1999: 109) in attempting to achieve sustainable governance of natural resources through an industrial model and corporate management practices alone:

The fact is that society makes decisions to treat wastes and protect fisheries not only for detached economic reasons, or even documented ecological reasons, but also for ethical, social, cultural and even spiritual reasons ... If we are to achieve sustainable governance of the oceans these values need to be considered as well as ecological and economic ones.

Boesch 1999: 192

4.1.2.1 Quotas and the quantification dilemma

Fishing is regulated by limiting the catch (quantitative or numeric management– how much fish) or limiting the fishing effort (qualitative methods – how to fish). Acheson and Wilson (1996: 582) found that the use of ‘quotas – the single most important concept and tool of scientific management – is conspicuous by its absence’ in the 29 traditional fishing communities that they studied around the world. Traditional communities regulate ‘how’ fishing is done by limiting ‘location, time, stage of life of the target species, or technology. None limit the amount of various species that can be caught’.

The ‘objective of numerical management is to control the tonnage of fish caught. There is no concern for the effects of fishing on the broader environment and indirectly on the sustainability of the fish populations’ (Acheson and Wilson 1996: 580). Wingard (2000: 49-50) provides examples of the externalities generated by the quota system that impact on the environment. Processes such as high grading, which involves ‘discarding lower-valued fish at sea so that they don’t count against the fishers quota’, and price dumping; ‘the practice of discarding fish if, upon reaching shore, prices are unusually low’, may be practiced but are ‘not counted’; giving false statistics. Palsson (1998: 285) proposes that ‘the “rational” quota system has failed to fulfil ecological goals’.

Pauly (1997: 126) sees a need to reverse the current direction of industrialized fishing, where fishers have been forced to become technicians; placeless ‘roving executioners’. He sees the separation of fisheries from ‘place’ as a ‘commons problem’ and proposes that fishing communities need to again become the local guardians of the resources. Berkes et al. (2006: 1557) explain in a

paper titled ‘Globalization, Roving Bandits, and Marine Resources’ that local governance creates a vested interest in the maintenance of local resources, whereas the ability to move around the globe ‘severs local feedback and the incentive to build conserving institutions.’

4.1.3 Community capacity realization

Berkes (2003: 16) suggests that conventional fishery management science does not have ‘the methods in its toolkit’ to deal with dynamism and complexity. He points to examples from resilient small-scale fisheries throughout the world for alternative approaches that support essential ecological processes as well as human needs, which turn the conventional top-down managerial approach on its head:

Instead of fishing-as-business, these alternative approaches focus on sustainable livelihoods; instead of top-down decision-making, there is participatory management; instead of reductionism and positivism, there are complex systems approaches; instead of sole reliance on expert-knows-best science, local and traditional knowledge are also used; instead of control-of-nature utilitarianism, there is emphasis on humans-in-ecosystem management.

Berkes 2003: 16-17

Acheson (1997: 22) highlights that in recent decades there has been a growing sense of stewardship within fishing communities and a belief that their ‘ability to earn a living in the long run is in their own hands.’

4.1.4 Making vernacular and communal processes ‘visible’

The few examples of community managed fisheries in industrialized societies do not have high profiles, so it is assumed that they occur only in distant places or in the past. ‘Invisibility’ means that in western industrial and post-industrial societies:

[C]ommunal forms of resource management are undermined as an option. Overcoming this “peripheralization”, making communities visible and viable in the “centre”, requires a remapping of the centre as a location of processes appropriate for community management of common property resources.

St. Martin 2001: 122

Symes (1996: 147) also revealed that social scientists had raised doubts about the wisdom of ‘overwhelming’ local fisheries management institutions that were ‘sensitive to the particularities of specific stocks and fishing grounds and capable of developing finely tuned, flexible management systems’, by the imposition of ‘blanket technocratic or bureaucratic regulatory regimes’. McIntosh et al. (2000: 5) highlight that, in addition to technology, successful fisheries management relies on

networks of social relations to access a range of essential resources, information and social memory. This fundamental social component is largely invisible to outside observers, which sometimes results in the misplaced imposition of ‘technological problem solving’ that ‘has the potential to disrupt such networks, leaving local populations without a major part of their survival kit’.

St. Martin describes the hegemony of fisheries science informed by bioeconomics in New England as ‘one of statistical and numerical convenience’ (2001: 125). He states that resources management institutions leave ‘no room for alternative conceptions’ and ‘no place for community management’. In addition, they provide a ‘template for individual enterprises to act independent of communities, to treat the commons as open access, and to precipitate a tragedy unavoidable without the transformation of economic relations’. He suggests that breaking out of the hegemony of fisheries science may enable fishers to imagine a positive future:

Alternatively, the diverse and territorial spaces of fishing communities, once made visible, suggest an opportunity for forms of area management that might facilitate community rather than individual prosperity. They might let us imagine other futures where fisheries are the site of potential, rather than always a tableau of tragedy.

St. Martin 2001: 139

In a later paper, St. Martin (2005: 65) suggests that there is a need to free community and commons NRM from their association with the past, and Hardin’s (1968: 1244) parable of the ‘tragedy of the commons’, and to ‘open up the space of the commons to experimentation, negotiation, and multiple economic identities’ (*Ibid*: 75). He acknowledges that the fishing commons is still generally ‘represented by a dominant neoclassical discourse of fisheries as a site of potential tragedy only redeemable through a movement towards enclosure and privatization of access to fisheries resources’ and that the pervasiveness of that representation appears to preclude alternatives. However, he proposes a rereading of the commons ‘as a site of multiple economic/class processes and identities’ (*Ibid*: 79).

4.1.4.1 *A community managed ‘wild fishery with a future’*

(W)e need to document community/commons processes such that they can be freed from their associations with the past; we need to see them as not in retreat but always simultaneously emerging along with other contradictory (even capitalist) identities and spaces.

St. Martin 2005: 65

The commercial fishers of the lower Murray lakes and Coorong in the south-east of South Australia have produced their own vision for a sustainable future for their community and fishery.

They decided in the 1990s to embrace the reality of the social, economic, political and ecological environments of fishing in the twenty-first century in which a predominantly urban society demands that primary production is ecologically sustainable and healthy as well as efficient, but is not in the position to manage the natural resources required to realize those outcomes:

The fishers acknowledge that the Lakes and Coorong region is a community owned natural resource to which we have access rights. Given our continual presence and intimate knowledge of the Lakes and Coorong and the interdependence on the health of the system for our continued survival, the SFA [Southern Fishermen's Association] takes the position that our role is to act as stewards of the resource on behalf of the community.

Southern Fishermen's Association 2003: 4

Rather than the common response of large industry institutions of resisting change and 'bargaining' for pre-existing interests (Halpin 2004: 199-202), the Association put its energy into the production of possibly the world's first integrated management plan for a sustainable fishery (Southern Fishermen's Association et al. 1998), the ongoing cooperative development of codes of conduct, rules and guidelines for members (Southern Fishermen's Association 2002; 2003; 2004), and the commissioning of studies that help quantify activities and plan for the future (Econsearch 2004).

They have also made themselves 'visible' through the production of regular newsletters, participation in, and regular receipt of, environmental and industry awards, a willingness to respond to the media, the establishment of a high quality website (coorongfishery.com) that is regularly updated, and the receipt of Marine Stewardship Council (MSC) accreditation as a sustainable wild fishery.

The members of the Southern Fishermen's Association proudly declare that theirs is a 'wild fishery with a future', which may appear to contradict public assumptions about sustainable fish production. It is frequently assumed that aquaculture relieves pressure on wild fisheries and adds to the world's food supply but that assumption is problematic because the most popular farmed carnivore species, such as salmon, rely on huge amounts of wild caught products and 'deplete rather than augment fisheries resources' (Naylor et al. 1998: 883; Pauly et al. 2002: 693; Tacon and Metian 2009). Intensive 'fish farming' can also result in pollution and increased vulnerability to disease. The following description of a typical community controlled artisanal fishing operation conforms to that of lower Murray lakes and Coorong fishers, and is in marked contrast to industrial aquaculture:

Any particular fishing operation in progress is a simultaneous integration of a large number of discrete thought processes of past experiences with immediate observations aided by all the human senses: the feel of the sea bottom acquired by touching the plumb line; the smell of the sea; the sight of the birds, landmarks, stars, the colour of the sea and the ripples on it; the sound of the shoal movement – to mention a few.

Kurien 1988:476

4.2 LOWER MURRAY LAKES AND COORONG FISHERY – ‘ETHICAL SUSTAINABLE HARVEST HERITAGE FISHERY’

The lower Murray lakes (Lake Alexandrina and Lake Albert) and Coorong region is located around the mouth of the River Murray, in South Australia, the only outlet to the sea for water draining the million-square-kilometre Murray-Darling Basin. The Murray flows into the Southern Ocean, near the town of Goolwa, south-east of the State capital, Adelaide. Lake Alexandrina and Lake Albert form a terminal freshwater lake system covering around 85 000 hectares. The Coorong is a narrow, shallow coastal estuarine lagoon extending about 120 kilometres south-east from the Murray Mouth and is separated from the Southern Ocean by the sand dunes of the equally narrow Younghusband Peninsula.

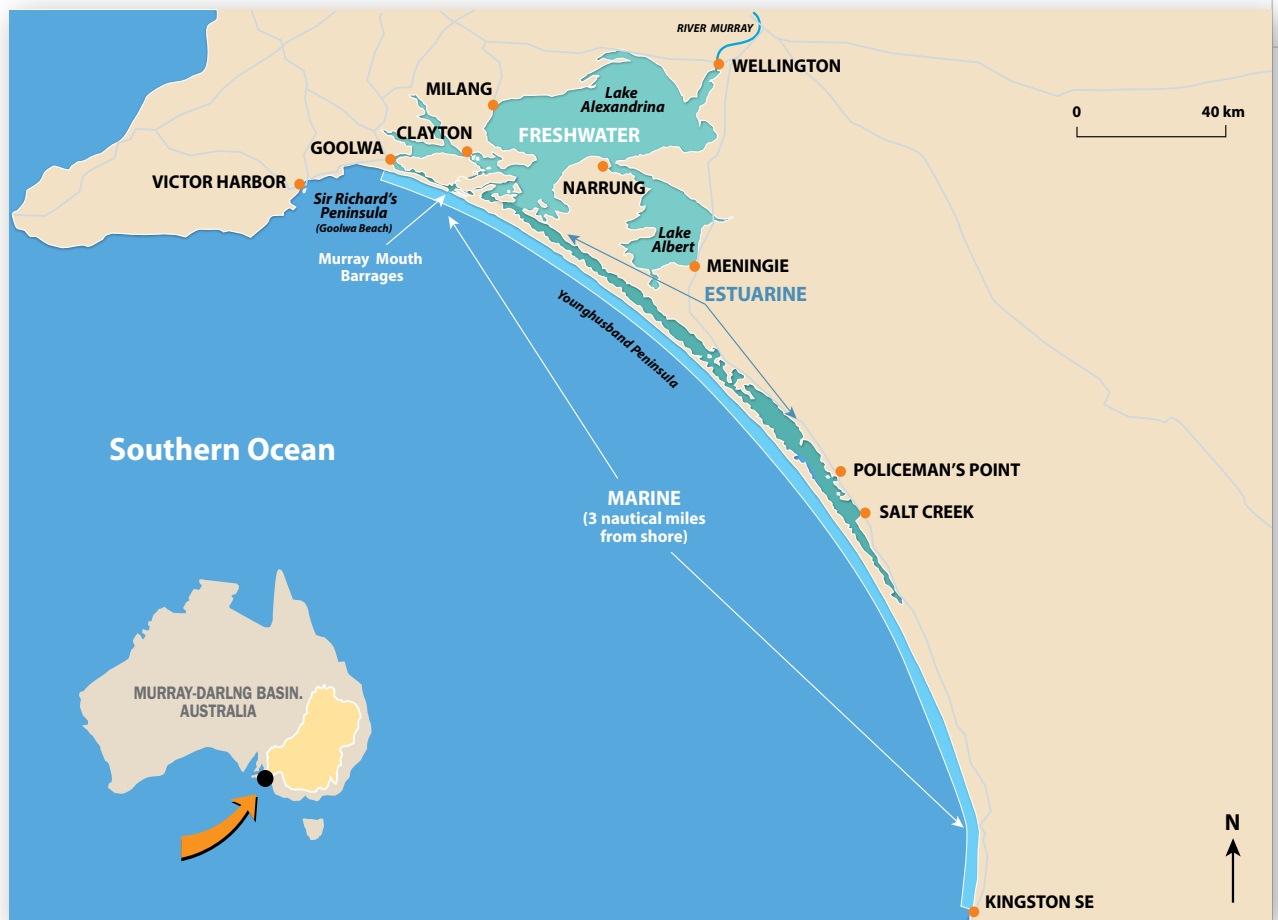


Figure 4.1 Lower Murray Lakes and Coorong Fishery

4.2.1 Lakes and Coorong Fishery

Garry Hera-Singh, commercial fisherman and President of the Southern Fishermen's Association (interview 19/7/04) described the Lakes and Coorong Fishery as an artisanal fishery. That means that fishing is a small-scale family enterprise with the multi-skilled fishers owning and operating their boats, using traditional fishing methods and equipment, and applying local knowledge and adaptive management to their operations. He explained that archaeological evidence suggests that the lower lakes and Coorong has supported a permanent population of 3 000+ Ngarrindjeri people (Pierce 2004: 4) for many thousands of years, and today their descendants still practice traditional fishing in the region. Commercial fishing has taken place in lakes Alexandrina and Albert, and the Coorong since 1846. Today, the Lower Lakes and Coorong commercial fishery is a small-scale, multi-species, multi-method, limited entry artisanal fishery comprising 36 fishers working the waters of three separate but linked ecosystems:

- The freshwater of the lower River Murray lakes (River Murray below the Wellington ferry, Lake Alexandrina, and Lake Albert);
- The estuarine waters of the Coorong lagoons; and
- Coastal marine waters adjacent to the Sir Richard and Younghusband Peninsulas, extending three nautical miles out to sea from the low water mark, from the seaward extension of the Goolwa beach road to the jetty at Kingston.

The fishery is located within an area designated as a wetland of international importance under the Ramsar Convention, which covers 140 500 hectares (Department of the Environment and Heritage 2000), and parts of the fishery are also within the boundaries of the Coorong National Park; recognized primarily for its wetland habitats and importance for a variety of migratory waterbirds. It operates within a dynamic ecosystem, which is influenced by high natural variation in river flooding, winter low pressure and summer high pressure systems that influence winds, and sea conditions, as well as periods of extended drought.

River fluctuations present challenges to management, with respect to matching total harvesting capacity and exploitation rates with annual changes in fish stock abundance, particularly during extended periods of drought. In addition, the natural ecosystems supporting fisheries resources throughout the region have been dramatically modified since European settlement in South Australia as a result of river regulation, catchment-scale developments and water extraction, and wetland reclamation.



Plate 4.1 Artisanal fishers preparing the morning's catch from the Coorong.

Intimate local knowledge of fish species, climate and waterscape means that commercial fishers can harvest sustainably by setting nets to catch specific species, constantly monitoring catches, and moving between ecosystems and species. Self-imposed rules in relation to equipment and methods include the banning certain net mesh-size to exclude juvenile fish, and using manual net hauling to avoid damaging sensitive coral sites.

The primary species taken in the fishery include mullet (*Argyrosomus japonicus*) and Goolwa cockle, a species of pipi (*Donax deltoides*) from the ocean beaches. Yellow-eye mullet (*Aldrichetta forsteri*), greenback flounder (*Rhombosolea tapirina*) and black bream (*Acanthopagrus butcheri*) are caught in the estuarine Coorong Lagoon system, with mullet also caught around the Murray mouth. Golden perch or callop (*Macquaria ambigua*), bony bream (*Nematalosa erebi*), European carp (*Cyprinus carpio*) and redfin (*Perca fluviatilis*) are caught in the freshwater lakes. The catch is sold locally, at Kingston, and at the Adelaide, Sydney, Melbourne, Brisbane and Perth markets. Until the completion of the Murray Mouth barrages in 1940, the fishery produced about 50% by weight of South Australia's scale fish. Today it produces 9% - 11% of the States' catch (Jones et al. 2005: 6-7; Hera-Singh 19/7/04).

4.2.1.1 Flexibility of 'rotational harvest' the key to sustainability

Hera-Singh explained that while only 10% - 11% of the fishery is estuarine that section produces 75% - 90% of its production. He identified the key to the sustainability of the fishery as the 'rotational harvest method' that the fishers have developed, which is:

The ability to be able to move between the marine, estuarine and freshwater parts of the fishery. To be able to fish for different species in those different areas because you will have different species peaking under different events; whether floods or drought. For example, this year (2004), our second year of drought, the mullet have been the best they have been for the last 10 or 12 years. There's been a terrific run of mullet this year ... In years of high water flow you get good runs of mullet and also flounder. After the flow events, you get good runs of callop or yellowbelly ... You can transfer your effort. When you are getting lower catches and it becomes uneconomical to pursue one species, you can just leave off and fish another...

Our argument has always been to manage the fishery as a complete unit and if you start taking species out of that or taking areas away ... then you have the question of sustainability ... it just puts extra pressure onto other species or other areas.

Hera-Singh 19/7/04

Pierce (2004: 5) adds that the targeting of multiple species 'allows effort shifting for economic reasons in advance of undesirable resource depletion'.

4.2.2 Barrages

The greatest influence on the lower Murray lakes and Coorong are the five barrages constructed across the channels between Lake Alexandrina and the Coorong. They link a series of islands to form a barrier 24 kilometres long. They were constructed to prevent the intrusion of sea water to maintain freshwater in the lower reaches of the River Murray, and Lakes Alexandrina and Albert during periods of low river flow. They also stabilize the lower river and lake levels to provide for irrigation and domestic, urban and industrial consumption.



Plate 4.2 Tauwitchere and Ewe Island barrages near the Murray mouth.

The barrages separate the fresh water of Lake Alexandrina (right) from the estuarine Coorong, which in turn is separated from the Southern Ocean (far left) by the sand dunes of Younghusband Peninsula.

Without the barrages, agriculture on the lowest reaches of the Murray and surrounding the lakes would be severely restricted, and the pipelines supplying water to Adelaide from the lower reaches of the river would not be feasible. However, turning the lakes from estuarine to freshwater resulted in the loss of 89% of the most productive fishing grounds. Hera-Singh likened Lake Alexandrina before the construction of the barrages to a giant ‘mixing bowl’: ‘The production of that system then was just absolutely huge’.

The barrage network altered the morphology of the Murray Mouth and imposed impediments to natural fish passage. It has significantly reduced the flow of water into and out of the river mouth under tidal influence. It has generally had negative impacts on the overall health of the ecosystem, in particular the habitat available for estuarine dependant fish species, native plants and waterbirds. Flow management can also result in abrupt changes to salinity levels and overall water quality in the Coorong estuary, which disrupts the natural reproductive cycles and movement patterns of many fish species. In the past the structures to regulate river flows were ‘turned on and off almost like a tap’ which, according to Hera-Singh, stressed fauna and flora, such as disrupting the reproduction cycle of black bream that have specific salinity level requirements.

4.2.3 Reclaiming a place for community-based commercial fishing in twenty-first century Australia

Urbanization and rural exodus threaten many coastal areas, and significant changes in the sectors of national economies result in economic marginalization of primary production in agriculture and fishery.

Bruckmeier and Neuman 2005: 92

Since World War II, there have been significant changes of the social structures in most western industrial and post-industrial societies, resulting in change in the economies of many coastal regions from primary production and light industry, to tourism and leisure. In the fishery sector, that means fewer professional fishers and more recreational fishers, which weakens the knowledge base and traditions (social memory) of local fisheries management already eroded by a hegemony of decontextualised scientific knowledge and expertise:

Professional fishermen that can form a social base for local management are few, whereas those who own or use coastal waters and their resources, i.e. water[front] owners and recreational fishermen, are often non-locals or living only seasonally at the coast.

Bruckmeier and Neuman 2005: 92

The Southern Fishermen's Association was established in 1939 to represent the interests of the fishers in the area. Hera-Singh revealed that three issues of concern to the Association have emerged repeatedly since that time: the impacts of the operation of the barrages on the fishery; river flows; and conflicts with the recreational fishing sector. In 1984, the South Australian Government introduced the *Scheme of Management (Lakes and Coorong Fishery) Regulations 1984* to formally manage the Lakes and Coorong Fishery as a distinct fishery, separate from the Marine Scale fish Fishery (Jones et al. 2005:11-12). Hera-Singh suggests that the government assumed that there was a need to reduce commercial fishing in the lower Murray lakes and Coorong, and that it was politically expedient at the time to lump their small community-based artisanal fishery in with industrialized fisheries. The fishers suddenly came under pressure to assess, justify and articulate their activities. Pierce (2004: 5) states that the fishers believed that the fishery and their linked livelihoods were under threat from three main areas:

- Negative community perception;
- Habitat modification, degradation, and mismanagement; and
- Reduced access/ allocation in favour of the recreational fishing sector.

Hera-Singh suggested that after a period of shock, the 'big stick' approach helped to focus the group to reaffirm positive processes, to self-organize and become pro-active to reclaim their future and ensure that their fishery remained sustainable:

In 1996, fishers met and accepted responsibility for their own futures, and specifically for broad ESD principles – i.e. environmental sustainability, economic effectiveness, and community responsiveness.

Pierce 2004: 5

In 1998 the Southern Fishermen's Association launched the integrated management plan for the fishery; *Wild Fisheries with a Future – ethical sustainable harvest heritage fishery*, developed in association with the South Australian Research and Development Institute.

4.2.3.1 Community leadership

An important lesson from the pressures from government in the 1980s was the need to be pro-active; to self-regulate and self-organize, which led to the emergence of a leader, Henry Jones. As President of the Southern Fisherman's Association, Henry brought the commercial fishermen and fisheries

scientists together to assess the fishery and practices, and guided the integrated management plan for the fishery to fruition. After the achievement of that goal, he recognized the potential dangers to the resilience of the Association of becoming too dependent on one person. He was keen for younger members to take on leadership roles, and for all members to be able to represent the Association. He relinquished the presidency and took on broader roles, such as becoming a member of the Murray-Darling Basin Ministerial Council Community Advisory Committee (Jones 20/7/04).

4.2.3.2 *The roles of local knowledge and vernacular methods in sustainable resource-use*

Henry Jones (20/7/04) highlighted the importance of local knowledge for the effective management of the habitat and fish resource:

It's a very important part of our sustainability. If we see one species getting down, we just leave it alone – we don't fish it. Through experience, you can target any sort of species you like just by the areas you fish and the gear you use. You [can] target just one species. You don't have to get a whole heap of species you don't want. We can leave one species completely alone and let it get back.

He explained that different fish prefer different habitats and behave differently. With local knowledge and setting nets in different ways and using different mesh sizes, it is relatively easy to target or avoid species. Mullet, for example, feed in shallow water on the mudflats at night and bream are found in areas where there is coral on the bottom. He also explained that it is possible to target mullet and avoid juvenile mulloway in the same area by floating the nets which catch the top swimming mullet while avoiding the bottom-feeding mulloway. Johannes et al. (2000: 257) acknowledge the contribution of fishers' local knowledge for effective NRM on behalf of society in general:

Fishers can provide critical information on such things as interannual, seasonal, lunar, diel, tide-related and habitat-related differences in behaviour and abundance of target species, and on how these influence fishing strategies. Where long-term data sets are unavailable, older fishers are also often the only source of information on historical changes in local marine stocks and in marine environmental conditions.

Local knowledge is shared within the fishing community and between generations. Jones (20/7/04) stated that his grandfather 'could read the river and tell you what was going to happen six months away or twelve months away'. However, the accumulation of local knowledge is dynamic and iterative. Many new 'chapters' have been added in response to the unprecedented low flow situation that has occurred in the lower Murray lakes and Coorong during the first decade of the twentieth century (Eccleston 2008: 100-113).

4.2.3.3 *Access and harvesting rules*

Without fish there are no fishermen

Jones 20/7/04



Plate 4.3 Cockling on Younghusband beach.

Fishers have self-imposed bans on the use of mechanical cockle harvesters. They value-add by preparing the cockles for human consumption, which can result in the receipt of ten times the bait value. Inset: Goolwa Cockles (*Donax deltoides*)

The commercial fishery is limited entry, employs adaptive management through the fishers' intimate local knowledge of the waterscape and its fish, and uses multiple institutional solutions (Norberg et al. 2008: 71) including a complex mix of input and output controls aimed at matching harvesting capacity with resource availability and controlling growth in aggregate harvesting capacity. Existing controls include limitations on the number of licenses, a wide range of gear restrictions, spatial and temporal closures including voluntary set times, restrictions on the number of commercial agents permitted to assist fishing operations, and legal size limits for individual species.

The fishing strategies are limited to those that are considered to have minimal ecological impact such as limited length of mesh nets, limitations on net mesh size and ply-rating, and hand raking of cockles. The Southern Fishermen's Association established an industry position opposing the use of mechanized cockle harvesting to minimize the risk of overexploitation. Commercial fishers use cockle rakes and a limited number of 'rakers' to manually harvest Goolwa cockles from the ocean beaches. The Association banned the use of power to haul nets in coral areas because of the potential for habitat damage through the disturbance of ancient bottom structures. Hand-hauling allows the fisher to 'feel' the net, which minimises the likelihood of ripping coral from the

floor. The fishery also has a code of practice and educational materials about avoiding by-catch; non-target species, juveniles, crabs and birds, which is intended to reduce ecological impacts (Southern Fishermen's Association 2002).

The management system has the ability to incorporate closures. There are a series of commercial spatial and temporal closures for Goolwa cockles on the ocean beaches between 1 June and 31 October, and there are self-imposed exclusions from certain areas to accommodate recreational fishers. Commercial fishers recognise the importance of recreational fishing for relaxation as well as local businesses, as Jones explained:

We've excluded ourselves from certain areas on weekends. We don't fish in the Goolwa channel on weekends ... Over Christmas we have about a three-week period off from certain areas – just where recreationals mainly gather – so we don't fish there at all to leave room for them.

4.2.3.4 *Keys to successful governance*

Hilborn (2007: 300) proposes that successful fisheries management involves 'governance that is deemed transparent by the participants with a scale of decision making appropriate to the fisheries being managed and in which the regulated stakeholders feel represented in the process'. Pierce (2004: 7) carried out extended discussions with the fishers about their governance model, which revealed four key elements:

- Active daily application of ecologically sustainable development (ESD) principles by fishers 'on-the-water where sustainability actually happens'.
- Choice. Fishers made the collective decision through a process of deliberative democracy to embrace "green" practices within their community and business context.
- Principle-based power. Fishers self-regulate according to ESD principles, including in responses to new situations, 'without the necessity for massive compliance effort'.
- Increased individual self-esteem and confidence 'to accept and deal with setbacks' (resilience) through the adoption of an 'action learning' model.

Pierce explained that the fishers 'now firmly believe in themselves, their place in the community, and their role as environmental sentinels'. He posits that to achieve sustainability for Australia as a whole will require the adoption of a similar 'collective-power scenario' (see Appendix 6).

4.2.3.5 *Effective communication to maintain a positive public profile*

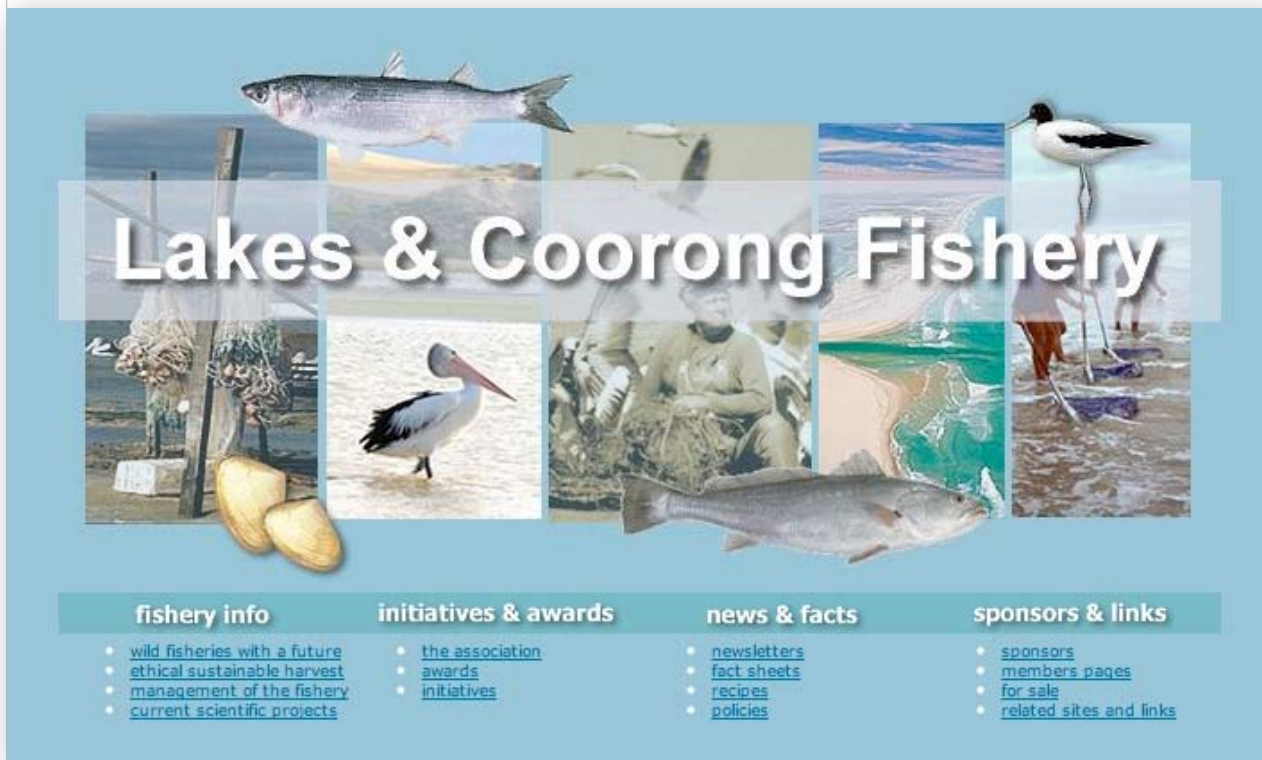


Plate 4.4 Southern Fishermen's Association website.

Fishers have established a website to keep the public up-to-date with their activities and initiatives.

Hera-Singh suggests that survival is as much 'about how to manage the politics of the day' as catching fish:

What we fishermen have learned is that you have to lobby. You have to be politically astute. You have to understand the politics because that's what it is all about – it's all about politics! It's not to do with sustainability and not to do with being fair, or jobs, or the economy – even though those issues support your case.

Association members continue to occasionally come under pressure from recreational fishers and some environmental groups, so they decided to quantify their contributions to local social-ecological resilience. A survey commissioned in 2004 revealed the variety and value of voluntary time spent by the commercial fishers on community and government-support activities. It found total value of the voluntary contributions of Association members to be around \$214 000 per year, or \$5 760.00 for each fisher, which did not include individual donations of fish or the provision of personal equipment to a variety of public causes.

Box 3. Monthly Community Support Activities of Lower Murray lakes and Coorong Professional Fishers

Activity	Hours per month	
	Average per licence holder	All licence holders
Conservation activities (e.g. bird watch, water watch)	0.9	34
Marine rescue and recovery	0.7	27
Attending meetings, seminars, workshops	7.0	257
Compiling fishing-related information for research purposes	1.9	70
Provision of technical advice to committees, panels	2.6	97
Volunteering for community services (e.g. Country Fire Service)	6.7	248
Other ('policing', pest species removal, rubbish removal, visitor assistance, Aboriginal site identification, care for elderly, school support etc)	4.3	158
Total	24.1	891

Econresearch 2004: 27-28

4.2.3.6 Value adding

Our aim is to catch less fish but to get more for it by value-adding.

Jones 20/7/04

Value adding involves a combination of processing and finding more lucrative markets to increase returns from products without increasing harvesting pressures. Processing, ranges from gutting, scaling and de-heading fish, which produces four to ten times the unprocessed value, to fishers operating their own restaurants. The value of cockles greatly increased as they were moved from the bait market to human consumption. Another important aspect of value-adding is quality assurance, which often necessitates independent assessment.

The Southern Fishermen's Association worked for five years with the World Wide Fund for Wildlife (WWF) towards international certification as a sustainable fishery. This included a pre-assessment of the fishery by Scientific Certification Systems Inc. in 2000, which found it to be inherently sustainable. Marine Stewardship Council (MSC) certification was achieved in 2008, following a further four years of evaluation; the first accredited multi-species, multi-method fishery in the world (Chaffee et al. 2008 and Hera-Singh 19/7/04).

The Southern Fishermen's Association claims of a sustainable fishery were finally vindicated following a rigorous four-year, eleven-step transparent independent review by Australian and international fisheries experts using a complex set of calibrated global assessment criteria developed by the MSC (www.msc.org/html/content_1504.htm accessed 17/7/08). The findings of that process were also peer reviewed. The fishery achieved average scores of between 81% and 87% against each of the three primary MSC principles; the state of the fish stock, environmental impact, and the management system ([www.msc.org/track-a-fishery/southern ocean/lakes-and-coorong-south-](http://www.msc.org/track-a-fishery/southern%20ocean/lakes-and-coorong-south-) accessed 1/6/10 and Chaffee et al. 2008). Multiple components were used to assess each of the three primary principles.

MSC is a non-profit organization dedicated to the sustainability of marine fisheries and related habitats. It started as a joint initiative between Unilever and WWF, but is now a fully independent organization that is governed by an independent Board of Directors advised by a panel of scientific, economic, and fishery experts. It identifies sustainable fisheries through independent third-party assessments. Certified fisheries are able to use the MSC promoted eco-label, which is becoming increasingly important to gain economic advantage in the marketplace (Macadam et al. 2004: 11). Hera-Singh identified another advantage of having an independent international authority assess activities, which was remarkably similar to that identified by Magnusson (26/11/07) in Sweden. He suggests that:

It debunks a lot of the myths and perceptions about our fishery being unsustainable and that we are commercial rapists and pillagers, only worried about catching the last fish and making a buck. It's about quantifying the sustainability of the fishery so that we can move on to other areas like developing the value-adding side of the fishery.

4.2.3.7 *The Dilemma of Scale*

Despite international recognition as a sustainable fishery and an excellent governance model, the Lower Murray Lakes and Coorong fishers and their fishery are vulnerable to activities, decisions and conditions that occur at scales beyond their region. Woodhill (2002: 318) identifies one of the primary reasons for the failure of local NRM projects as their dependency on processes and institutions at different scales. Jones et al. (2005: 13) explain that the biological productivity of most major fish species and the economic productivity of the fishery will continue to fluctuate in line with variations in catchment-scale and climatic conditions.

4.2.4 Advantages and disadvantages of being relatively close to a large urban population

The proximity of the lower Murray lakes and Coorong to the million residents of Adelaide is a double-edged sword for the resilience of the landscape and the local community. It is a high profile area that is well known and loved by people in Adelaide as a recreation and holiday destination. It is also known throughout Australia from Colin Thiele's 1966 book and later film, *Storm Boy* as 'an elemental place where it is possible to experience that sense of spiritual renewal' (Thiele 1997: 9; Hera-Singh 19/7/04). However, there can also be an urban assumption that numbers and 'buying-power', automatically affords privilege, which appears to be at the heart of the long-term tensions between recreational and commercial fishers. Despite that situation, the high profile of the lower Murray lakes and Coorong, its proximity to a large urban centre, and ready access to politicians provides greater social-ecological resilience than equally complex and ecologically significant areas, which are 'out-of-sight: out-of-mind'.

4.3 HELPING TO MANAGE THE LOWER MURRAY LAKES AND COORONG ON BEHALF OF AUSTRALIAN SOCIETY

I shall suggest that in the future, fisheries management and its associated science will have to deal with 'places' far more than they have in the recent past. Indeed, I shall suggest that they will have to return, in many cases, to ancient modes of allocating fisheries resources to local communities, rooted in physical places.

Pauly 1997: 125

Garcia-Quijano (2007: 529-534) highlights the importance of local ecological knowledge to complement western scientific knowledge by the provision of insights and information about ecosystem function, change, and in particular properties such as nonlinearity, unpredictability, and complexity. He contrasts the limited observation times and sampling efforts of western scientists with that of 'fishers' knowledge and experience that 'is based on thousands of hours "sampling" local ecosystems'; a situation highlighted by Henry Jones:

We look at the aquatic plants, we look at all the fish; we know what's going on. You see, we're on the water 24 hours a day – different ones of us ... Whereas scientists can only come down for an hour or so – so we work very closely with scientists. We record things that we see and make information available that they don't have the opportunity to collect.

20/7/04

4.3.1 A Requirement for both Active and Passive NRM

It is clear that progress towards improved social-ecological systems resilience in modified environments requires active as well as passive NRM. The United States Department of Agriculture,

for example, now requires farmers entering the Conservation Reserve Program to actively manage the land to improve habitat services, in contrast to the previous 'set aside' policy (Strappazzon et al. 2003: 4). Examples from the lower Murrumbidgee floodplain and from Kristianstads Vattenrike in Sweden (Magnusson 2004: 326; Blore 18/1/07; Magnusson 26/11/07) confirm the necessity for active habitat management to improve biodiversity conservation.

This chapter has demonstrated the dangers of the maintenance of decontextualized technocentric business-as-usual in NRM. It has also demonstrated that there are examples where progress has been made towards improved social-ecological systems resilience that can be models for the future.

I next develop the argument that rural communities have social memories that can be accessed to help deal with social-ecological crises, and that their members have a huge amount of expertise and energy to contribute to progress towards a sustainable future. Those assets can be released or realized through a suite of processes, policies and structures, or institutional change such as dismantling institutionalized obstacles (Frazer 2007: 255).

PART 2: A Critique of Government-Community NRM Partnership

2

PART





A CRITIQUE OF GOVERNMENT-COMMUNITY NRM PARTNERSHIP

The socio-cultural argument, that 'should this area be permitted to deteriorate any further, every Australian will suffer because of the severe impact on our quality of life' (Connolly 1983: 154), was used to initiate the integrated management of the Murray-Darling Basin. The Murray-Darling Basin Initiative that followed was built on the foundation of a government-community partnership to progress towards social-ecological resilience for the region (Murray-Darling Basin Ministerial Council 1990: v-vi, 11, 13; see 1.1.1).

This seemingly straight-forward collegiate arrangement has failed apparently due to technocratic dominance of the process. A gradual 'recourse to technocracy' (UNESCO 1980: 26) from the early 1990s has resulted in the abandonment of an authentic 'attempt to involve ordinary people, who come to be regarded as mere operatives or consumers', and a return to a simplistic 'industrial' process, identified as inadequate in the early 1980s. There is apparent denial that a major part of natural resources management (NRM) involves 'people management' through collaboration (Schultz et al. 2007: 150; Magnusson 26/11/07).

Recourse to technocracy occurs when bureaucracies lack 'necessary knowledge and processes' to address the complexities of progress towards social-ecological resilience, so attempt to apply inappropriate and inadequate technical 'solutions' (UNESCO 1980: 26). Technocratic NRM organisations tend to prefer to modify existing familiar structures to improve mechanistic 'efficiency', when there is a need for transformation to achieve greater social-ecological resilience.

Change is firstly 'political'. It will generally be contested and is complicated by a natural human reluctance to relinquish once useful institutions within which physical, mental and emotional investments have been made. The integrated management of Murray-Darling Basin natural resources necessitates traditional NRM technocrats to adjust to an unfamiliar situation. Westley (1995: 394) highlights the fundamental change in management from control of a single resource where 'effective organization was viewed as a machine'; to adaptive management that involves working with community members, and being 'responsive to the variations, rhythms, and cycles of change' in ecological systems and being able 'to react quickly with appropriate management techniques'.

The added pressure of having to work in partnership with the community, without the necessary skills or culture of cooperation, appears to have resulted in a 'crisis of perception' (Capra 1997: 5) within many staff of government NRM organisations. Such major adjustment anxiety is often 'characterized by unproductive rituals' (Burton-Bradley 1975: 10). In NRM organisations, adjustment anxiety combined with technocratic self-interest (See 2.1.1) appears to have manifested itself as denial of the necessity for an authentic government-community partnership to progress towards social-ecological resilience for the Murray-Darling Basin.

This has resulted in a dilemma where government does not have the resources, expertise, local knowledge, social memory, local ownership, and in many cases the authority to perform the task alone, and yet bureaucracy refuses to accept the community as a colleague. Pretty (1995: 1251) and Bouilly (interview 15/3/05) explain this relationship in terms of 'fear and need'. Bureaucracies need community support but fear that an authentic democratic partnership may upset their current power advantage, reveal vulnerabilities, and increase demands for downward accountability. This brings to mind Saul's (1995: 95) assertion that the protection of current structures and their myths appear 'more important than reality', or peoples' lives (See 2.3.2). It also brings to mind the common reactive opposition to change agents who may ultimately bring great benefits to the world (Midgley 2004: 77).

The following chapters discuss the community expertise and energy that is currently largely untapped.

CHAPTER 5: CAPACITY REALIZATION: RELEASING THE ‘GOD WITHIN’

The name of this chapter is inspired by the title of a book by microbiologist Rene Dubos, *A God Within. A Positive View of Mankind's Future* (1976). Pre-classical and classical Greeks used the word ‘entheos’ – *a god within* – to explain subconscious forces that inspire people to perform memorable deeds. It is the origin of the word ‘enthusiasm’. It implied ‘divine madness’; the flashes of inspiration or understanding sustained by passion that Socrates regarded as the mainspring of all worthwhile creations. It recognised that many valuable ideas are not accounted for by logic and methodical thought. The energy produced by an individual’s ideals and commitments are expressions of ‘entheos’ (Dubos 1976:11-12).

I have observed repeatedly the release of enormous creative energy and expertise from individuals where they have been given the respect, support, and opportunity to authentically address an issue, often within a frame of reference but on their own terms. Prescription appears to be a major impediment to the release of the ‘god within’, as the realization of the capacities of individuals and communities. It prevents them from responding to an issue with their own resources and from their own perspectives (see Appendix 3). I argue that the current narrow managerial–hierarchical or ‘industrial’ approach to progress towards greater resilience for the Murray-Darling Basin social-ecological system, favoured by the technocratic organisations managing the process, is not conducive to the release of the expertise, creativity, energy and social memory of community partners necessary for success.

This chapter explores successful cases where community institutions have realized their capacities by releasing and focusing the expertise, social memory, creativity, and energy held within their communities, and accessed outside resources where necessary, to contribute directly and indirectly to the management of ecologically strategic landscapes, on behalf of society. It also explores cases where transformation has not been successful because various structures, or interests that benefit from maintaining ‘business-as-usual’ (Halpin 2004: 199-204), have had the capacity to obstruct the release of the ‘god within’ their communities. Firstly, I examine the various manifestations of ‘capacity’ as the potential to perform tasks.

5.1 DIFFERENCES BETWEEN CAPACITY BUILDING AND CAPACITY REALIZATION

Capacity realization can be quite different from ‘capacity building’. However, capacity building is often a part of the process of capacity realization. I will continue the keyboard analogy (see 2.3.2.1) to introduce the difference. Capacity building may involve adapting to the *status quo* by attending courses to improve typing speed within the existing QWERTY system. Capacity realization would be a natural improvement in typing speed and accuracy resulting from a transformation to a new system that did not contain vestigial impediments. Most importantly, capacity realization involves having opportunities to apply skills.

Andrew and Robottom (2005: 64-65) suggest that capacity building is frequently seen by centralized organizations as a form of information transfer or ‘an instrument for achieving particular goals set by organizations that deem what information is appropriate and whose capacity should be built through adopting that information’. Diamond (2004: 180) adds that the ‘success’ of a capacity building exercise is often judged by whether it meets ‘externally fixed outcomes’ and that ‘invisible’ capacities that exist within communities ‘may be ignored or not seen because they do not “fit” the preferred model’ (*Ibid*: 183).

I demonstrate in this chapter that capacity is not an end in itself. Having the capacity to perform a task does not necessarily mean having an opportunity, the will, awareness, or the strength to use it. At times capacity building itself may be subverted as a displacement activity to prolong an unsustainable *status quo*. Finally, I argue that too much capacity by certain groups can be as great an impediment to progress towards an social-ecological systems resilience, as too little.

5.1.1 Emphasis on individual change and local initiatives distracts from the many structural causes of unsustainable resource-use

Fien et al. (1993: v) point out that ‘the root causes of environmental problems are located in the very nature of our current social, economic and political systems and in the world views, institutions and lifestyle choices that support them’. Capacity realization, to contribute to sustainable futures, therefore involves much more than simply building individual or community capacity:

[T]he central critique to be made of the institutional response to land degradation is that individual change and local initiative has been overemphasised while paying too little attention to structural issues, global market forces and the role of government policy.

Woodhill 1999: 134

I use the following images to illustrate Woodhill's statement:



Plate 5.1 An impact of 'not seeing the forest for the trees' – redundant policy made visible

Several thousand hectares of red gum (*Eucalyptus camaldulensis*) forest has died from thirst around the Lachlan-Murrumbidgee rivers confluence in the southern Murray-Darling Basin, this century. It is a casualty of lack of access to a greatly reduced volume of water now available to sustain the floodplain landscape. This loss of natural capital is a result of a combination of catchment-scale developments, over-allocation of irrigation water, operating the river as a mechanistic process, and inadequate government policy and institutional arrangements; exacerbated by climate change. The inadequacy of only two diversion points on the lower Murrumbidgee means that it is currently difficult to artificially protect this ecologically strategic natural asset.



Plate 5.2 Focus on the individual distracts from government responsibility

In contrast, selective logging of red gum on private property within a mosaic pattern involves leaving habitat trees and fulfilling numerous other legal requirements. Prescriptions for timber cutting in private native forests in NSW are detailed. They include consideration of specific management requirements for several hundred flora and fauna species, in addition to habitat tree preservation and buffer zones along streams and around other water bodies, before any tree can be cut.

5.2 CAPACITY – TOO LITTLE, TOO MUCH, TOO AMORPHOUS

There are three aspects of capacity relevant to progress towards an ecologically sustainable and humanly desirable Murray-Darling Basin social-ecological system:

- Managing too much capacity;
- Realizing existing and potential capacity; and
- Building capacity where there are inadequacies.

Considerable literature and funding have been devoted to capacity building over the past three decades. Projects this century of relevance to Murray-Darling Basin residents have included the *Cooperative venture for capacity building* funded by the Rural Industries Research and Development Corporation, which resulted in major reports by Macadam et al. in 2004 and Coutts et al. in 2005. However, this chapter is primarily about the linked ‘hidden’ capacity issues of too much capacity, and realizing existing or potential capacity.

5.3 TOO MUCH CAPACITY

Too much capacity or power is potentially as least as great a problem as too little, and can be used to obstruct the realization of existing or potential capacity, or to privilege particular outcomes, processes, or groups, primarily by avoiding putting competitive alternatives to the test. An illustration of too much capacity comes from Flyvbjerg’s case study of urban politics in the city of Aalborg, Denmark. Flyvbjerg (2006: 228) explained that he had been ‘trained in the neoclassical model of “economic man”, competition and free markets’ but as he ‘dug into what happened behind closed doors’ he found that economic man did not live there:

Members of the local business community were power mongers who were busy negotiating illicit deals with politicians and administrators on how to block competition and the free market and to create special privileges for themselves.

He also discovered that ‘democratic man’ had been replaced by a ‘highly undemocratic, semi-institutionalized way of making decisions, where leaders of the business community and of the city government had formed a secret council, which effectively replaced the democratically elected city council as the place where important decisions on urban politics and planning were made’ (Flyvbjerg 2006: 228).

My experience of the first decade of the Murray-Darling Basin Commission (1988-1998) and with the NSW catchment management structure (2006-2007), increasingly reflected Martin's observation that many projects were 'aimed at fulfilling the interests of the "managers" making the decisions rather than those who are affected by them' (1991: 777). Long-term programs to support the socio-cultural aspects of sustainability in the Murray-Darling Basin, prescribed by politicians following community consultation in the early 1980s (Connolly 1983: 155) were systematically contested by Murray-Darling Basin Commission technocrats, and resources diverted to technical activities or staff (Andrew & Eastburn 1997; Eastburn 1999b; Knudsen 23/11/2005).

Beck suggests that it is 'increasingly the case that experts rule, even where politicians are nominally in charge' (1996: 35). Burgman (2009: 37) proposes that one of the problems with that situation is that when experts assume positions of authority, reinforced by professional membership, qualifications and status, 'it can intimidate people who want to examine expert judgements critically'. He posits that the critical examination of expert judgement is important because experts 'are routinely overconfident in their own ability' and are 'sensitive to a host of psychological idiosyncrasies'. Frequently the 'experts' who rule are technocrats, particularly when there is a frequent turn-over of Ministers (Boully 15/3/05; Knudsen 23/11/05). Technocrats necessarily have a narrow focus and operate within a structured 'mechanistic' system, which frequently does not equip them with the vision, expertise or confidence to be ideal decision-makers in relation to complex social-ecological systems.

Some scientists complain that technocrats are not sufficiently 'expert' and are frequently not making fully informed decisions because keeping up-to-date with current literature is too time consuming (Koehn interview 29/9/05). Koehn (2004: 212) suggests that 'lack of access to appropriate information is of concern, but so to is a lack of willingness to seek and use it'. Kingsford (2003: 78) proposes that there needs to be a clearer understanding of the 'ecological consequences of choices to develop water resources', and that informed debate needs to replace 'poor decision-making in relation to water management'. He suggests that the current privileging of de-contextualised short-term mechanistic efficiency and the assumption that technocrats have adequate expertise and experience to make fully-informed decisions in relation to social-ecological systems, needs serious reassessment.

Flyvbjerg's explanation for technocratic behaviour is that 'the closer one sits to political power, the less use one apparently has for technical documentation, and the less rational one is in this sense' (1998: 31). Magnusson (26/11/07) also complained that bureaucratic priorities in Sweden appeared to be incompatible with the authentic consideration of proposals from outside of the system. He explained that the nomination of the Kristianstad area as a UNESCO Biosphere Reserve, as a

national submission, finally ‘forced the bureaucrats to read things carefully and to understand’. He explained that he received enthusiastic feedback from bureaucrats about components of the proposal that he had presented to them on numerous occasions over the previous two decades without response.

I will examine too much capacity through the linked concepts of ‘will to ignorance’ (Flyvbjerg 1998: 31) and ‘the politics of access’ (Ribot and Peluso 2003) to assist in making sense of this form of obstruction to capacity realization. The process of ‘will to ignorance’ involves a dominant interest group using its power to privilege a preferred outcome and to rationalize the avoidance of transparent examinations of issues that may result in a contradiction.

5.3.1 ‘Will to ignorance’ – avoiding contradiction of preconceptions

Power, quite simply, produces that knowledge and that rationality which is conducive to the reality it wants. Conversely, power suppresses that knowledge and rationality for which it has no use.

Flyvbjerg 1998: 36

The concept of ‘will to ignorance’ emerged from an in-depth case study by Flyvbjerg of the power-politics involved in the ‘Aalborg Project’. The project involved the integration of environmental and social considerations with the redevelopment of the historic town centre of the northern Danish city of Aalborg. However, the ‘prize-winning policy and plan degenerated into a string of petty incidents’, which resulted in ‘environmental degradation and social distortion’ (Flyvbjerg 1998: 225). Flyvbjerg suggests that the power-based politics that emerged were not necessarily a result of city officials and planners being particularly corrupt or incompetent but a ‘story of modernity and democracy in practice’:

The basic idea of the project was comprehensive, coherent, and innovative, and was based on rational and democratic argument. During implementation, however, when idea met reality, the play of Machiavellian princes, Nietzschean will to power, and Foucauldian rationality as rationalization resulted in the fragmentation of the project. It disintegrated into a large number of disjointed subprojects, many of which had unintended, unanticipated, and undemocratic consequences ... Institutions that were supposed to represent what they themselves call the “public interest” were revealed to be deeply embedded in the hidden exercise of power and the protection of special interests.

He explains (1998: 35-36) that power-based political decision ‘is given the appearance of having been technical-rational and democratic’ but the result of any evaluation is a foregone conclusion: ‘it serves to rationalize a prior political decision’. He adds that analysis, ‘instead of acting as a foundation for intelligent policy making, becomes a manipulated instrument of politics’. Flyvbjerg

points out that ‘rational argument is one of the few forms of power that those without much influence still possess’ (*Ibid*: 37). He suggests that rationality is part of the power of the weak and that the inequality between rationality and power can be seen as ‘a general weakness of democracy in the short-run struggle over specific policies and outcomes’ (Flyvbjerg 1998: 233).

5.3.2 The politics of access – control through isolation from resources or opportunities

Denial of access as oppression has a long history. It is the subject of one of Aesop’s Fables titled ‘How the stork out-foxed the fox’ about the intellectual dishonesty of offering to share some ‘soup’ but putting it into a container that ensures that the ‘guest’ cannot access it. The politics of access involves multiple mechanisms to gain, maintain, and control access. Access can be shaped or influenced by technology, capital, markets, knowledge, policy, law, social identities, and social relations. Ribot and Peluso (2003: 153-156) define access as ‘the ability to benefit from things – including material objects, institutions and symbols’ by all possible means. They differentiate between access as the ability to derive benefits, and ‘the right to benefit from things’ by explaining that:

Someone may have rights to benefit from land but may be unable to do so without access to labor or capital. This would be an instance of having property (the right to benefit) without access (the ability to benefit).

Ribot and Peluso 2003: 160.

5.3.2.1 Enclosures as denial of capacity

Lack of control over access to resources, whether physical, social, psychological, economic or epistemic, is one of the most common obstacles to the realization of capacity, as well as social control. One of the most powerful historic symbols of the politics of access is the ‘Enclosures’ that occurred in Britain between the fifteenth and nineteenth centuries (Allen 1982: 937). Common or public land was privatized and placed into the hands of the elite. It resulted in hundreds of thousands of people no longer being able to realize their capacities, and losing their independence, through the denial of access to previously freely available resources. St. Martin (2005: 70) states that enclosure can occur through a wide range of processes including ‘legislative redefinition of property rights, technological innovations, trade and market mechanisms, the availability of capital for investment, greed, violence, and the performance of a discourse and logic of enclosure.’ Allen (1982: 951) concludes that like many state sponsored agricultural and natural resources reform projects since, the enclosures were justified with efficiency arguments ‘while its main effect was to redistribute income’ to the already privileged.

5.3.2.2 *Insights into access from famine response*

According to the winner of the 1998 Nobel Prize for economics, Amartya Sen, famines are 'so easy to prevent that it is amazing that they are allowed to occur at all' (2000: 175). He proposes that when famines occur today that they have been 'allowed' to happen as a result of studious neglect, which can only occur where there is no transparency in decision-making and no downward or public accountability. Sen posits that democracy and a free press are more important in the prevention of famine than the supply of food (2000:16, 51-52, 178, 183) because they can force governments to be accountable. In contrast, authoritarian rulers, who are rarely affected by famines 'tend to lack the incentive to take timely preventative measures' (*Ibid*: 16).

According to the criteria for famine maintenance, bureaucracies can be ideal structures. They are monopolies that are neither democratic nor transparent, and their insulated hierarchical chain of command can encourage compartmentalization, authoritarianism, and unrealistic 'mechanistic' expectations. Internal cultures can develop in bureaucracies that 'distance' them from the public who fund them, and from socio-cultural reality. Sen (2000: 170-175) emphasizes that the 'social or political distance between the governors and the governed can play a crucial role in the nonprevention of famine.' He posits that 'distance' as cultural alienation in addition to lack of political incentives explain British inaction during the Irish and Indian famines.

I suggest that links can be made between the lack of incentive by technocrats to develop a collegiate (transparent, democratic and respectful) government-community partnership identified as necessary to progress towards an ecologically sustainable and humanly desirable future for the Murray-Darling Basin, and a lack of incentive by alienated administrators to avert famine. Unfortunately there are potentially similar outcomes. A major impediment to progress towards social-ecological resilience for the Basin appears to be a lack of commitment to modifying bureaucratic structures to reduce the current technocratic dominance of the NRM agenda in order to facilitate greater consideration of the socio-cultural aspects of sustainability.

5.3.3 **Failure to take advantage of the 'software of sustainability'**

The continued reflection of the technocratic origins of NRM organizations is a major impediment to progress towards a sustainable future for the Murray-Darling Basin. Observation and research findings (Knudsen 2005, Roughly 2005, Robertson and Curtis 1995: 16) suggest that the sentiments expressed in the following statement, made more than a decade and a half ago, remain relevant:

The vast majority of thought about a sustainable society...has to do with hardware. I think it is time to ask about the software of sustainability as well, and thus about the qualities people will need to build and maintain a durable civilisation.

Orr 1992: 181

Capacity realization for authentic community participation and the consideration of the socio-cultural aspects of sustainability has not been integrated with the activities of most NRM agencies. This appears to be a structural issue because senior staff is usually technocrats who typically do not have the breadth of expertise or experience necessary to effectively manage social-ecological systems:

An exclusive focus on instrumental reason, which is what most environmental management professionals are highly trained in, is not conducive to being able to deal appropriately with the complex multifaceted issues that characterize the environmental crisis.

Woodhill and Roling 1998: 51

The self-interested refusal by most NRM agencies to make effective use of available 'software'; the creative energy, expertise, social memory and local knowledge of the people of the Murray-Darling Basin, to help address the continued erosion of the resilience of the social-ecological system represents deliberate underperformance. Next, I use a mini-case study to demonstrate that the self-interest of powerful industry groups in the protection of their historical investments can also prevent transformation necessary to progress towards a resilient social-ecological system.

5.3.4 Goulburn-Broken Catchment, Victoria – an opportunity lost?

The Goulburn-Broken Catchment (GBC) in northern Victoria, Australia (see Figure 10.1), covers approximately 2 400 square kilometres and has a population of around 190 000. It includes the 300 000-hectare Shepparton Irrigation Area, which accounts for 25% of the State's export earnings through irrigated dairy and horticultural products, and food processing. Approximately 88% of the irrigated land produces pastures for dairy production (Andries et al. 2006; Walker and Salt 2006).

In the 1970s, exceptionally heavy rainfall generated a crisis in the GBC when water tables rose to the surface in many places causing extensive crop losses and threatening the economic base of the region. The high water tables mobilized salt deposits in the naturally dry soils, which made much of the groundwater unsuitable for irrigation or domestic use. Andries et. al. (2006: 868) point out that the 'crisis' was in the context of the particular state sponsored agricultural and economic system established during the late nineteenth and early twentieth centuries.

5.3.4.1 *Maintaining 'business-as-usual' by addressing symptoms*

The situation generated a need for crisis decision-making, but also provided an opportunity for transformation to create a more resilient social-ecological system. Olsson et al. (2006: 20) suggest that a 'critical opportunity for transformation' was missed following the crisis. Transformation being the development of a fundamentally new system when ecological, economic, or social (including political) conditions make the existing system untenable (Walker et al. 2004: 7).

Community groups formed to deal with the crisis, networks were established that were later formalized into decision-making and implementing organizations (Catchment Management Authorities), and leaders emerged setting the scene for transformation. However, they opted to 'invest in adaptability, devising strategies to maintain the current production and social systems while attempting to minimise their impacts on local ecosystems' (Olsson et al. 2006: 20). These included engineering 'solutions' primarily involving groundwater pumping, which relieved the symptoms. The management model that emerged conforms to Halpin's (2004: 199) representative institution where each participant represents pre-existing interests and the institution is 'constituted as an arena for the strategic bargaining of those interests'.

Anderies et al. (2006: 871) articulated the situation as the catchment community responding to the crisis by 'asking "What must we do to keep irrigated dairy running?" rather than "Is irrigated dairy a reasonable use of the natural resources in the GB, given inevitable biohydrological changes that will reduce the ability of the system to cope with minor change? And if not, what change would move the region towards a more suitable economic basis while simultaneously managing the economic disruption during the transition?' As a result, the management plan emphasized 'enhanced efficiency and engineering solutions' through complex, large-scale institutional structures, and diminished revegetation and alternative land-uses.

Olsson et al. (2006: 28) suggest that the decision was probably 'biased by vested interests' because the decision-making body consisted of a majority of farmers and business owners who would most likely bear the brunt of costs associated with transformation. However, they also revealed (*Ibid*: 23) that conflicts between interest groups in the GBC had led polarization in the community.

5.3.4.2 *Vulnerability to a 'tyranny of localism' and the diminution of resilience*

They suggested that GBC governance lacked the vision of a novel approach that could direct and frame the self-organizing process. It also lacked the 'knowledge and understanding of the long-term

consequences of not transforming, which led to the masking of feedback signals and moved the SES (social-ecological system) further down the undesired trajectory' (Olsson et al. 2006: 31). They also cautioned that the emergence of community leaders and the establishment of decentralised organizations, such as Catchment Management Authorities, may perversely work to prevent change, and obstruct alternative views and necessary transformation. The 'capture' of a process by a particular interest group or groups may result in 'gate-keeping' involving privileging processes and activities that reinforce the pre-ecological *status quo* and excluding perceived 'competition' or alternative views. Olsson et al. (*ibid*) elaborated by highlighting the fact that the GBC leaders 'played a "dampening" role by promoting adaptability' to attempt to achieve stability through a 'continuation of the current trajectory'. A final danger of this potential 'tyranny of localism' (Lane and Corbett 2005: 141) is the ability of particular interest groups to perpetuate a trajectory that continues to erode the resilience of a social-ecological system by accessing external assets to support an obsolete model and mask negative ecological symptoms.

Box 4. The Incremental Adaptation Trap

The historical development of the GBC provides a clear illustration of the problems that may arise when incremental adaptation is aimed solely at maintaining productivity. Each incremental adaptation has consequences for the economic and social structures within the community. These structures in turn, generate powerful economic forces and vested interests that work to ensure that the system stays on the current trajectory, continually trading off future options for short-term returns and reinforcing the incremental adaptation process. The capacity to reorganize around a fundamentally different set of principles and escape the incremental adaptation trap is critical to the long-term viability of SESs. To continue to provide a stream of goods and services, the GBC SES may now require transformation rather than marginal adaptation. But has the inertia generated by historical and biophysical processes become so great that it precludes transformative change?

Anderies et al. 2006: 877

As emphasised by Walker and Salt (2006: 52), focusing on improvements in production efficiency to maintain 'business-as-usual' through incremental adaptation, can in fact diminish the resilience of a system; increase vulnerability to future shocks, and reduce future community options. Their message is that being 'more efficient is not by itself a pathway to sustainability'. However, they suggest that social capacity 'might be the critical factor in this social-ecological system's resilience as it faces the future' because the community is aware of the problems and have developed a considerable capacity to work together.

In the next section, I use a mini-case study to demonstrate that is possible to build and sustain effective bridges between government and communities spread over a huge geographic area, and to release constructive energy and previously untapped expertise from residents.

5.4 REALIZING COMMUNITY CAPACITY - RELEASING THE 'GOD WITHIN'

The aim of the Murray-Darling Basin Commission was 'to foster joint action to achieve the sustainable use of water, land and other environmental resources of the Basin for the national benefit of present and future generations' (Eastburn and Milligan 1998: 55). A key bridging vehicle between the Commission and the Basin community was a comprehensive communication program that used 'a wide range of mutually reinforcing' approaches (Malcolm 1992: 33; Appendix 7) to inform and maintain relationships with a broad range of individuals and groups within and outside the Basin (Eastburn and Milligan 1998: 68). The following component of the program has helped realize the potential capacities of tens of thousands of members of two of the least powerful but key groups to the future of the Murray-Darling Basin; primary school students and teachers. As a primary school is at the centre of most Basin communities, almost complete geographic coverage of the vast area is achieved through the project.

5.4.1 'Special forever' environmental education-literacy- intergenerational equity program

'Special forever' is another way of saying 'a quality sustainable future'. It is an inclusive environmental education-literacy-intergenerational equity program for primary school children in the Murray-Darling Basin. I initiated the program while working for the Murray-Darling Basin Commission and brought it to fruition in 1993 in partnership with the professional organisation, the Primary English Teaching Association (PETA). It provides primary school children, the future custodians of the Murray-Darling Basin, with opportunities to explore, reflect on and to express what is important to them environmentally and socially, at arguably the most critical period of their lives for creativity and for establishing personal links with the environment (Cobb 1959; Snyder 1990; Sobel 1993; Nabhan and Trimble 1994; Thomashow 1996; and Cormack et al. 2008: 60). A written and visual story-telling approach to environmental education enables children to actively participate (MacIntyre 1984: 214). The philosophy of the program follows the Aboriginal axiom that 'all land has a "song" which is the story of the people in that land', and if we lose the 'song' the land will become 'a barren waste without life and without meaning' (Forrest 1990: 26).

The program is currently in its 17th year (2009), demonstrating the resilience of a self-organising and dynamic government-community partnership involving volunteers operating over an extensive geographic area. It demonstrates that a relevant strategy and governance model can help to realize

individual capacities, and release the creative energy that exists within all individuals and communities. It is a dynamic program with new approaches from teachers, children and community members welcomed and constantly flowing through and enriching it, like a stream with many tributaries. Ideas and innovations generated are quickly shared by the learning community, which rapidly raises standards throughout the region. A national inquiry into rural and remote education by the Human Rights and Equal Opportunities Commission (2000: 49-54) identified 'Special forever' as a significant model to contribute to improved rural and remote education throughout Australia.



Plate 5.3 Shooting a 'Special forever' television program in the SBS studios in Sydney

Last minute briefing as students from Surat in Queensland and Nathalia in Victoria prepare to 'go to air'. Arrangements were made to broadcast dedicated programs for 'Special forever' participants, which included live links with schools in various parts of the Basin.

5.4.1.1 The power of a changed perspective

An unusual feature of 'Special forever' is that it is primarily conducted through English classes. Broad consultation that I conducted between 1984 and 1992 indicated that science was not the best vehicle for environmental education because it was compartmentalised and did not adequately deal with the socio-cultural aspects of social-ecological systems resilience. In addition, generally children simply 'react' to scientific information rather than 'responding' with their own experiences. By changing perspectives and priorities to give students and teachers new experiences, the program is emancipatory and transformative. Significant emotional and values issues relating to quality of life, the impacts of natural and cultural resources degradation, human assets, and the future can be

explored. As language studies are process based, any topic can theoretically be discussed in English classes, minimising additional teacher workload. The children's writing, artwork and other forms of expression are then shared with authentic local, regional and national audiences through a range of publications, and radio and television exposure.

5.4.1.2 *Inter-generational equity 'insurance policy'*

The program contributes to the development of a holistic view of the Murray–Darling Basin, encourages awareness of the significance of local natural and cultural resources, and facilitates the development of communication skills. Critical thinking skills and improved self-esteem equip children with abilities to make informed decisions, and communication skills provide 'voices' to express them. The skills and knowledge put the children into a position to help protect their own futures. 'Special forever' could be said to be providing participants with an intergenerational equity insurance policy. Intergenerational equity involves taking the welfare of future generations into account but western society tends to discount possible future requirements in favour of immediate goals.

5.4.1.3 *Extensive Governance – the power of a community of common interest*

The large scale of the Basin (a million square kilometres) and the large number and diversity of participants involved in the program necessitated the development of a flat administrative structure to facilitate a collegial working relationship to be developed and maintained 'at a distance'. I posit that the cost and administrative requirements of a traditional hierarchical model would have prohibited the implementation of the program. The 'Special forever' management model is based on an epistemic network, and sustained by relationship building and trust, which demonstrates the efficiency of a social capital-fuelled approach for a large-scale dynamic program (Zalec interview 21/9/05):

A network is by definition nonhierarchical. It is a web of connections among equals. What holds it together is not force, obligation, material incentive, or social contract, but rather shared values and the understanding that some tasks can be accomplished together that could never be accomplished separately.

One role of local networks is to help reestablish the sense of community and of relationship to place that has been largely lost since the Industrial Revolution.

Meadows, Meadows and Randers 1992: 227

A network of twenty-three volunteer regional coordinators have supported to up to 1 200 volunteer teachers, who at the height of the program involved around 38 000 students each year (Murray-Darling Basin Commission 1996: 73). The program is delivered via a community of primary school teachers, generally with interests in improving the literacy levels of their students, and in the environment. In

addition, each year volunteer professionals (journalists, writers, librarians, teachers, PETA members) from the communities involved in 'Special forever' evaluate tens of thousands of pieces of children's work (every student who participates) at the school, region and Basin level. At this time, the children's work is generally also exposed to a range of audiences (through school publications, displays, local newspapers, radio, television) in their communities and regions, and some is selected for inclusion in an annual anthology of writing and artwork from throughout the Basin. An authentic 'audience' is a key element in the success of this program (Bradford interview 10/12/05; Wangmann interview 11/12/05; Zalec interview 21/9.05).

5.5 'BUILDING BRIDGES' FOR TRANSFORMATION

The following mini-case study from southern Sweden is an example of releasing 'the god within' community members and realizing social capacity to respond to ecosystem change through trust-building, dialogue, networking, and changed perceptions from the presentation of new perspectives. It demonstrates that transformation is possible and may result in the emergence of new opportunities.

This transformation success story was triggered by the perceived failure of the Ramsar Convention to protect local wetlands. In 1975, a large area of floodplain wetland on the lower Helgea River was proclaimed a wetland of international importance. However, soon after the proclamation, several individuals representing different interest groups began expressing concerns after observing declines in bird populations and overgrowth in lakes (Olsson et al. 2004: 7). Sven-Erik Magnusson, curator of natural history at the Kristianstad County Museum, made the connection between the decline in bird populations and the abandonment of traditional grazing and hay making activities that had been carried out on the seasonally flooded meadows in the Ramsar area for centuries.

Agricultural activities on the meadows had resulted in the establishment of a symbiotic relationship between farmers and wildlife, and especially with a number of bird species that prefer open areas of short grass adjacent to wetlands. As the activities ceased, the meadows were quickly colonized by tall reeds, sedges, and willows, and eventually wet forest (Magnusson interview 26/11/07), making it unattractive for the traditional visitors. This once common agricultural practice of utilizing meadows has been abandoned in most other parts of Sweden resulting in huge losses of meadow habitats, and hence the cultural and ecological significance of the remaining areas. The revelation highlighted the fact that humans are a part of a social-ecological system, and that active management and adaptive governance is required to sustain cultural landscapes.

5.5.1 Kristianstads Vattenrike, Sweden - transformation through social capacity realization



Kristianstad owes its existence and current profile to its surrounding wetlands. However, like wetlands in many parts of the western world, much of the population did not consider them to be assets until quite recently. Magnusson (2004: 324 and 2007) recounted how deteriorating water quality from the early nineteenth century onwards contributed to the public perception of the wetlands, which originally protected the town of Kristianstad, as unhealthy ‘worthless swamps’, which made it easy to abuse them further. Increasing discharge of untreated household and industrial wastes finally resulted in the abandonment of the Helgea River as Kristianstad’s water supply in 1941. As late as 1966 the municipality established a garbage dump in the wet grasslands near the town.

Figure 5.1 Kristianstads Vattenrike Biosphere Reserve location

Kristianstads Vattenrike (‘water kingdom’) is located in southern Sweden. It is a semi-urban and agricultural landscape with a population of around 75 000 people, living in 40 urban centres, the largest of which is Kristianstad. The Biosphere Reserve is 104 000 hectares in area and consists of the lower drainage basin of the River Helgea. It has a large floodplain wetland at its heart and includes almost 14 000 hectares of Hano Bay in the Baltic Sea.

5.5.2 Releasing the ‘god within’ – accessing social memory and mobilizing social capacity to respond to a natural resources crisis

As mentioned above, the decline of wetland health and productivity despite Ramsar proclamation led to a questioning of conventional conservation wisdom of the passive protection of ‘sites’ by the exclusion of human activities (Pretty 2002: 64) in an attempt to create ‘pristine wildernesses’, especially in modified cultural landscapes. While it was clear to the people who had identified the problems that there was a need for action; there was little cohesion or vision on how to go about it (Magnusson 26/11/07).



Plate 5.4 Kristianstads Vattenrike wetlands.

Magnusson took on the responsibility for guiding and facilitating a search for a more locally relevant adaptive co-management governance model for the complex social-ecological system. That involved accessing and linking social networks to tap community social memory to help realize the capacity within the community. Webb and Bodin (2008: 109) suggest that the abilities of a society to respond to a natural resources crisis ‘depends to a large extent on previous, somehow collectively stored, experiences’ generally referred to as ‘social memory’ (McIntosh 2000: 143; see 3.7.2). Hahn et al. (2008: 139) also propose that a ‘crucial challenge for adaptive governance of social-ecological systems seems to be the mobilization of social memory’. They encapsulate what has been achieved through the mobilization of social memory and the release of social energy to respond to ecosystem change, with the following comment:

What is special about KV [Kristianstads Vattenrike], and what seems to be lacking at many other places, is the social capacity to respond to ecosystem change in a way that seems to sustain and possibly enhance the capacity of ecosystems to generate essential ecosystem services. “Social capacity” in this context includes organizational capacity (stewards and organizations capable of adapting management to ecosystem dynamics) and institutional capacity to develop rules and norms that facilitate adaptive governance of social-ecological systems. This is all related to the capacity to develop social networks for horizontal and vertical collaboration. The “adaptive” aspect involves mobilizing the social memory of experiences with resource and ecosystem management when designing experiments and interpreting feedback.

Hahn et al. 2008: 141



Plate 5.5 Kristianstad.

Kristianstad with a population of 29 000 is the food and drink processing 'capital' of Sweden. It began as a frontier fort built on an island in the Helgea wetlands in 1614. It was established to protect Danish settlers from attacks by Swedes and was named for the Danish King, Christian IV. It was taken over by Sweden in 1658.

Hahn et al. conclude that social networks 'represent a new type of governance that provides bridges between people from different organizations or stakeholder groups' but creative leadership is also required for them to be effective (2008: 142). The Kristianstads Vattenrike case-study demonstrates that it is possible to realize capacity within a community to manage an ecologically strategic landscape, to maintain or improve its social-ecological resilience on behalf of society.

It suggests that 'learning and mobilization in projects for ecosystem management thrive in informal settings like social networks where participation is voluntary' (Hahn et al. 2008: 143), and where there is a willingness 'to take risks and to tolerate and learn from mistakes' (Gunderson et al. 2006: 22). It also acknowledges the strategic roles of key individual 'change-agents' in the initiation of the process, guiding it to fruition and finally sustaining it, which I will examine more fully in the next chapter.

CHAPTER 6: CELEBRATING CHANGE AGENTS

I argue in this chapter that in our current risk-averse society (Allan et al. 2008: 168-169), individual change agents conduct experiments, take risks and ‘bear witness’ (Brown and May 1989: 8) on our behalf, often at great personal cost. They should therefore be encouraged, acknowledged, and celebrated because they have a strategic role in progress towards ecologically sustainable and humanly desirable futures throughout the world. Many of the major developments in natural resources management (NRM) have been initiated by individuals or community groups, often against public ridicule, or direct opposition from scientific bodies, business groups, and bureaucracy because they generally have to operate outside of ‘the system’ in order to achieve change (Beck, Giddens and Lash 1994: 19). Change itself is usually threatening to the *status quo*:

The orthodoxy – with its assumption that the key problems are those identifiable by natural scientific investigation – fails to account convincingly for the startling fact that almost all of the most significant environmental issues, global or domestic, were crystallized first not by governments responding to or using ‘science’, but by poorly resourced NGOs and sundry individual environmentalists...too often...the role of scientists and official scientific institutions was to patronize so-called ‘emotional’ and ‘irrational’ expressions of public environmental concern – on issues much later acknowledged by official scientific bodies and institutions to be indeed genuine and serious problems.

Grove-White 1993: 20-21

6.1 THE ‘POLITICS’ OF CHANGE

One of the strongest messages to emerge about change agents is that they must be courageous (Glazer and Glazer 2005: 451-455). They must ‘be ready to withstand withering criticism of their credibility, competence, and integrity’, and also be willing to invest a lot of time and energy over a long period (*Ibid*: 453) for potentially considerable personal loss. They are rarely adequately rewarded, and often unjustly treated by members of society who may later benefit from their efforts. At the very least they will be marginalized (Rogers 1995: 336), ridiculed or accused of self-interest, often for no other reason than for thinking differently, presenting new perspectives, demonstrating commitment, not being able to be ‘controlled’ (Scutt 2004: 3), or for solving an obvious problem. The following comment made five hundred years ago illustrates the dangers of being a change agent:

(T)here is nothing more difficult and dangerous, or more doubtful of success, than an attempt to introduce a new order of things in any state. For the innovator has for enemies all those who derived advantages from the old order of things, whilst those who expect to be benefited by the new institutions will be lukewarm defenders ... Hence it is that, whenever the opponents of the new order of things have the opportunity to attack it, they will do it with the zeal of partisans, whilst the others defend it but feebly, so that it is dangerous to rely upon the latter.

Machiavelli 2004 (1513): 32.

The passionate 'divine madness' (see chapter 5) often displayed by change agents who desperately want to share their revelations with an unreceptive public, and the need for a survival strategy to protect themselves against continuous opposition, often makes them appear 'obsessive' or 'difficult', which serves as a self-fulfilling prophesy for further alienation. Land ecologist David Goldney (6/6/05) described the ridicule of one of Australia's current high profile change agents, Peter Andrews. He explained, on the Australian Broadcasting Corporation TV program *Australian Story* titled 'Of Droughts and Flooding Rains', that on his first visit to Andrews' property, he travelled with a group of bureaucrats 'who laughed about Peter all the way there, and after we'd spent half a day there they derided him all the way back'. On the same program, rural television reporter John Ryan revealed that he had been verbally abused 'for daring to do a story on Peter Andrews, because he was so contrary to popular opinions and popular beliefs'. Barrister and former Anti-Discrimination Commissioner (1999-2004), Jocelyne Scutt, identified a specific type of mobbing (see 2.2.3.1) directed at change agents and their supporters:

If change agents are halted in their tracks, change will be stultified and the hopes we have for a different world ... will be stymied.

Scutt 2004: 1

Firstly I will continue the story of Kristianstads Vattenrike and discuss the role of Sven-Erik Magnusson in the transformation of the management of a wetland landscape for greater social-ecological resilience. He helped retrieve and focus the social memory of his local community, release its energy, and realize its capacity to manage an ecologically strategic landscape. I will then look at two Australian change agents who have the potential to make major contributions to the social-ecological resilience of the Murray-Darling Basin, if allowed.

6.2 SVEN-ERIK MAGNUSSON - CREATIVE LEADERSHIP BY AN EXPERT CITIZEN

Successful ecosystem management obviously requires thorough knowledge about ecosystem processes, but just as important is knowledge of the social actors and structures that make these processes viable.

Schultz et al. 2007: 140

Magnusson has broad interests in the geological, natural and cultural histories of the local landscape developed since childhood. Inspired initially by Linnaeus' (Carl von Linne 1707-1778) descriptions of the Kristianstad region from 1749, read in preparation for an exhibition in 1978, he began a project involving the production of local ecological and cultural-historical inventories and synthesising the information onto maps, as part of his work at the County Museum. He appreciated the complementarities of the sciences and humanities and also recognized that ecosystem management is 'to a large extent people management' (Schultz et al. 2007: 150; Magnusson interview 26/11/07).



Plate 6.1 **Sven-Erik Magnusson, Coordinator, Kristianstads Vattenrike Biosphere Reserve**

Sven-Erik was originally trained as a geologist and worked as a curator of natural history at the Kristianstads County Museum, which equipped him to take on the key role as a facilitator-coordinator in a local collaborative process to maintain, restore and sustainably manage the natural and cultural values of the region.

He used his social capital, built on enthusiasm, broad knowledge, and holistic (temporal, spatial, and symbolic) perspective of the landscape, to build trust between different interest groups to find a vernacular adaptive co-management model for the lower Helgea wetlands after the standard Ramsar model of ‘locking up’ the site and minimising human activity had failed (see 5.5). Passive protection by the international agreement from 1975 appeared to accelerate degradation of the dynamic social-ecological system that had evolved in association with human activity. Magnusson convinced groups with interests in the wetlands that they were not competitors, and to abandon their media-based confrontation for collaboration to achieve their common goal of sustaining and capitalising on the many values of the regions’ wetlands. He emphasised that trust was the key to this transformation (interview 26/11/07). Gunderson et al. (2006: 21) propose that trust ‘is the oil that keeps the network lubricated’:

Trust is needed to keep information flowing, to adapt to changing circumstances and knowledge, and to provide the social capacity for confronting unknowns in these complex systems. One of the key functions of leadership is to foster and maintain trust in the social network.

Magnusson's unique combination of knowledge, skills, and personal attributes conform to Knowles' (1983: 26) concept of a creative leader (see 2.2.1) as one who 'releases the creative energy of the people being led'. He conforms to Bang's (2004: 5) definition of an expert citizen being 'common project oriented' and engaged in the 'building and running of governance networks and reflexive political communities'. He also fits Westley's (1995: 399-400) description of a visionary leader as someone who relies heavily on 'face-to-face exchanges and on generating intensive communication'; who emerges 'at times of crisis, to forge new alliances between knowledge and action'; and who has 'proved critical to the evolution of the social system and its relationship to the natural system'.

6.2.1 An advisor acting as an insider

Magnusson took an 'anthropological' approach (Abel and Stepp 2003: 19-20) to finding a solution to the problem. To 'make sense' of the issue, he began dialogue with concerned individuals and groups, and compiled and interpreted existing ecosystem knowledge and experience within temporal, spatial and symbolic contexts (Westley et al. 2002: 105). He also identified key individuals from different areas of interest who could access the social memory of their network members, to help identify locally appropriate management responses for the dynamic system. He then linked the horizontal social networks and also made connections with key individuals operating within organisations at different vertical scales. The overall goals and a vision for the adaptive co-management of the complex regional social-ecological system emerged from the knowledge generated by this decade-long cumulative process. Magnusson also continuously shared findings with the community, conforming to Pinto-Correia et al.'s. (2006: 333) concept of 'communication-led management', and promoted the wetland landscape was a valuable asset worthy of celebration.

In order to gain trust to build constructive relationships with and between groups with specific expertise in various areas and at different scales, Magnusson emphasised the importance of being genuinely interested, well informed, and constructive. He also highlighted that not being seen as an 'expert' or as representing a particular discipline, industry, or authority, as an advantage in relationship-building (Olsson et al. 2004: 18). He explained that one of the key problems encountered in landscape-scale management was the negative experiences that many farmers had with the top-down approaches of government authorities, frequently as a result of the preconceptions of farming and farmers by state officers, and vice versa.

Pinto-Correia et al. (2006: 341) suggest that the presence of 'advisors acting as insiders has been identified as one of the key factors explaining trends and potential in local landscapes', and without their leadership existing negative trends are likely to continue:

Advisors close to the local plan and feeling as insiders can be sensitive to local landscape authenticity, trace the temporal and spatial changes in distribution of ecosystems and follow people's relationships to their landscapes and also envisage and identify possible solutions.

Pinto-Correia et al. 2006: 342

They add that the specialised 'scientific' approaches taken by most NRM advisors 'sometimes results in too restricted perspectives, which can limit visions for alternatives within landscape management' (*Ibid*). From my experience, technocratic organizations will generally actively or passively obstruct a Magnusson-like approach; or not tolerate it at all. I experienced extraordinary opposition from management of a NSW Catchment Management Authority to a similar approach that I took to develop a NRM plan for the lower Murrumbidgee floodplain in 2006-2007.

6.2.2 Changing public perceptions

As research progressed, a vision of the region as a 'water rich' ('vattenrike') area or 'water kingdom' emerged that contradicted the generally negative public perceptions of wetlands being unpleasant, or 'water sick' places to be avoided. Magnusson actively communicated his findings through the media and his networks (Hahn et al. 2008:142). To further capitalise on the revelation, he proposed to the County Museum Board that the best way to get people to appreciate wetlands, and therefore to protect their ecological and cultural values, was to make them accessible to the public, rather than the conventional conservation wisdom of 'locking them up' and excluding people. That was achieved by the construction of boardwalks through strategic wetland areas, and interpreting them through the development of outdoor museums ('utemuseums') containing site-specific information about ecology, cultural history and geology, to enhance visitor experience.

Additional local ecological knowledge emerged from a cultural heritage program initiated in 1986 by the Municipality of Kristianstad, which included the development of inventories of archaeological sites, buildings and the cultural landscape. While mapping local land-use practices during that time, Magnusson developed the idea of improving the management practices and the economy of the region for greater resilience by combining all of the different sources of local knowledge under one flexible umbrella organisation, an Ecomuseum Kristianstads Vattenrike (EKV), to achieve collaborative landscape-scale governance. However, it was necessary to look beyond the County Museum for support for the ambitious proposal.



Plate 6.2 Kristianstads 'Water Kingdom' – access and interpretation

Boardwalks have been constructed throughout the wetlands to make them accessible to the public and interpretive nodes (utemuseums) have been developed to assist visitors to read the landscape.

6.2.3 Ecomuseum Kristianstads Vattenrike - a community bridging institution

Magnusson's suggestion to 're-name' and 're-make' (Volf 1996: 72) the wetland landscape around Kristianstad as a 'Water Kingdom', and his proposal for the establishment of a dynamic bridging institution to achieve adaptive landscape-scale co-management, received the support of a senior municipal politician and also the chair of the executive board during a meeting in late 1988. The presentation of the proposal to the Kristianstad Municipality Board in early 1989 fortunately coincided with the emergence of the environment as a top priority at the national political level, and the search by the Board for a new identity for the city. Magnusson (26/11/07) acknowledges that if that 'window of opportunity' had not been able to be capitalised on, it is unlikely that the project would have proceeded.

The Municipality Board considered that the celebration and preservation of the ecological and cultural heritage values of the wetlands surrounding Kristianstad may be a way of creating a point of difference to put the city 'on the map'. Ecomuseum Kristianstads Vattenrike (EKV) was established by the Board to develop and sustain the concept. It was also supported by local environmental groups, and farmers' associations, the World Wide Fund for Nature, the Kristianstad Tourism Board, two universities, the National Museum of Natural History, and the County Administrative Board. Magnusson was appointed director. The EKV is part of the municipality's organization and funding program, and while it reports directly to the municipality board, it is not an authority and has no power to enforce formal rules.

6.2.3.1 *Conditions for adaptive co-management*

As a neutral institution, the EKV provides a forum to further cement trust, mobilize social memory, synthesise knowledge, identify opportunities, conduct experiments in a supportive environment, resolve conflicts, and to build a shared vision through dialogue between local stewardship organizations. Westley (1995: 409) argues that flexible informal networks are more egalitarian and better able to authentically solve problems than government authorities or representative organizations because the participants are not under an obligation to represent their respective organization. They also shift the management perspective 'from control to responsiveness' (*Ibid*: 394-395), which is a prerequisite for adaptive management. Adaptive management requires institutions responsible for ecosystems to be 'responsive to the variations, rhythms, and cycles of change natural in that system and are able to react quickly with appropriate management techniques'.

Around thirty local stewardship organizations involving several hundred people are involved in the project today (Hahn et al. 2008: 126). Farmers, bird-watchers, historians, naturalists, commercial and recreational fishers, hunters, cultural heritage groups, and tour operators have been convinced that it is in the best interests of the sustainability of the area to co-operate, despite the differences in their focus. EKV also bridges local actors with other organizational levels (Schultz et al. 2007: 150) to access necessary inputs or support not available locally. The process is guided by social capital and shared enthusiasm for the landscape. The dynamic structure allows for flexible coordination and cross-scale responses to problem-solving because of experimentation and learning across the network. The progress and success of projects is continually communicated to the public.

6.2.3.2 *Human activities in core of a UNESCO Biosphere Reserve*

Since its establishment, the EKV has made the wetland area more accessible to the public with the establishment of increasing numbers of information sites, which receive increasing numbers of visitors each year. A further successful outcome was the completion of the requirements to nominate Kristianstads Vattenrike as a Biosphere Reserve. The region became a UNESCO Biosphere Reserve in 2005, and as a result of the perceptual change that came about as a result of the research by Magnusson, UNESCO's Man in the Biosphere committee modified its rules to allow human activities to take place in the core area of the Reserve. It accepted that 'human influence in the form of managing areas for grazing and haymaking, is one of the basic prerequisites for ensuring the high biological values of the seasonally inundated grasslands' (Magnusson et al. 2004: 8).



6.2.4 **New perspectives help realize social capacity for greater social-ecological resilience**

To keep the cultural and ecological values of a landscape you have to keep the farmers in it.

Magnusson 26/11/07

Magnusson created a shared vision for the region and transformed the management of its natural resources to improve resilience. The positive 'Water Kingdom' identity has put Kristianstad 'on the map' in Sweden and beyond, and is a key part of the regions' sense of place, economy and future.

Plate 6.3 Eco-label

The connection between healthy food and the role of farmers in maintaining biodiversity and cultural landscapes is also made through the regions' eco-label, the 'Spirit of Food'.

He presented wetlands from the perspective of ecologically, economically, socially, and culturally valuable assets, and fascinating 'water rich' areas to be celebrated, rather than 'water sick' areas to be avoided and further abused. The change in perception was achieved by interpreting the wetlands, telling their linked ecological-cultural 'stories' and making them accessible. He demonstrated that people were a key part of a dynamic social-ecological system in a modified landscape, which would have its ecological values and resilience diminished if they were excluded. He developed a process of networking to release social memory, expertise and energy from within the community to address the perceived crisis, with minimum reliance on outside expertise or technology. Magnusson established an institution to grow 'the living links' between the people and their landscape (Pinto-Correia et al. 2006: 334).

It is acknowledged by experienced agricultural and natural resources researchers that 'many agricultural innovations, if not most, are developed by farmers themselves', which is why we can learn so much from them (Roling 1988: 5). However, both problem-solving by farmers and learning from them, appears to be discouraged by Australian agricultural and NRM organizations. The reactive rejection of new ideas, while often presented as being in the name of scientific rigor, frequently appears to be a 'cultural' response related to 'technocratic self-interest' (Jacobi 1983: 193; see 2.1.1). Occasionally a change-agent introduces a perspective that is so revolutionary that it appears to create a threatening 'crisis of perception' (Capra 1997: 3-5) within traditional industrial agricultural and natural resources technocrats; generating hostility, inertia, and denial. Australian change-agent Peter Andrews has that distinction, but his work has also inspired many others.

6.3 PETER ANDREWS – RESTORING THE BASIC FUNCTIONS OF THE ANCIENT AUSTRALIAN LANDSCAPE

We have feed in the middle of a drought ... We don't have any irrigation as such. Lots of people use super and chemicals and so forth to grow their pastures, where we don't use any of that. So for us to have green feed on our flats when most other people's flats are quite dry, that's a bonus because I can still fatten stock when everybody else is having to sell them.

Stuart Andrews 14/6/05

Peter Andrews is a third-generation grazier and race horse breeder. In 1975, he bought a degraded property in the upper Hunter Valley in New South Wales and set about restoring it, using the observations and social memory, and testing theories developed over his lifetime. He perceived the primary source of the degradation problems to be the deeply incised gully containing a high velocity stream that passed through the property. The deep channel and fast-flowing water appeared to be 'draining' the property of soil, nutrients, and water, with the resultant desiccation and degradation

of the land, and loss of habitat. The deeply incised stream also appeared to cut deep aquifers and release saline groundwater into its waters. Water moved more slowly through the ancient Australian landscape and nutrients and water were stored in floodplain soils.

Recollections of the observations of the hydrology of natural waterways around Broken Hill in far south-western New South Wales where he grew up conformed to the 'chains of ponds' descriptions of inland Australian rivers and creeks by early nineteenth century European explorers (Andrews 2006: 51-52). Water slowly 'stepped' down the waterways at a low velocity through a series of broad terraces that resulted in a lateral spread across the whole floodplain. High watertables, and connectivity between the river channel and floodplain were characteristics (*Ibid*: 43-44, 175). Andrews also recalled that, counter-intuitively, these natural ancient Australian waterways also flowed along the highest part of the floodplain (*Ibid*: 47, 183, 226). The low velocity of the flows resulted in the deposition of clays in their beds that gradually raised them above the level of the surrounding floodplains, and frequent overbank flooding built natural levee banks paralleling the channel.

He suggests (Andrews 2008: 157) that most of the water in the ancient Australian landscape was stored in the floodplain soils rather than as open or 'blue water' (Falkenmark and Rockstrom 2004: 75-76) in river and creek channels, and that the high watertables of the floodplains meant that they were like 'grass-covered dams' (storages). Microhabitats of vegetation covered the floodplain according to a range of conditions, and reed-beds at the bottom of each terrace acted as dam walls, and also intercepted soil and nutrients, and filtered the water. A lens of freshwater in the upper layers of the soil profile kept saline groundwater deep and out of harm's way as it passed through the system (Andrews 2006: 74-82).

6.3.1 Recreating an ancient Australian landscape in microcosm

Andrews experimented to recreate the ancient Australian landscape in microcosm on his property. He restored the basic functions of the landscape with resources available and demonstrated its water conservation, drought mitigation, water quality, land rehabilitation, fish habitat, and economic and ecological productivity benefits (Keene and Bush *Australian Story* 9/6/05). He has worked for more than three decades to develop the process that he describes as Natural Sequence Farming (NSF). NSF is a landscape management technique aimed at restoring natural water cycles that allow the land to flourish despite drought conditions (www.nsfarming.com accessed 13/6/05)

NSF represents a paradigm shift from mechanistic (linear) to ecological (lateral) water management processes, and from the storage of water above ground in reservoirs near the top of river systems,

where it can be controlled by engineering, to storing water in the soil profile of floodplains throughout the length of a system with the largest storages in the floodplains at the ends of the rivers. Andrews (2006: 47) claims that in-ground water is ‘the ultimate key to our landscape’s survival’ because it is ‘what kept, and keeps, the Australian landscape alive’. However, policy developed mainly in the first half of the twentieth century sees water management as a technical issue involving the control of surface water, which Falkenmark and Rockstrom (2004: xvii) suggest is a barrier to progress towards sustainable development.

The current mechanistic model of river regulation and water management consists of above-ground storages near the head of river systems controlling water and feeding linear distribution channels to deliver it to specific compartmentalized locations for specific purposes as mechanistically efficiently as possible. Occasionally this system also includes mid-river balancing storages to reduce the time required for the delivery of water from up-river storages and to control (‘re-regulate’) and store any ‘surplus’ water that may come into the system below the main storages. An important aspect of mechanistic ‘efficiency’ in water delivery is ensuring that it is sent at the maximum velocity but kept within the river channel and prevented from escaping to the floodplains where it becomes ‘out-of-control’. Andrews appears to have exposed a major weakness in the current approach to NRM in Australia, which appears to attempt to find the right answer and then to ‘impose it on the whole system’ (Ife 2002: 42-43). It also tends to manage ‘sites’ that are easier to control than processes. Andrews’ alternative involves being responsive to specific contexts and situations through an ability to ‘read the land’ and the animals and plants in it, and then to apply an adaptive management approach for an appropriate period of time to address the issue.

6.3.1.1 Contested processes to rehydrate a landscape

The areas of greatest contestation with traditional NRM practices in Australia include the materials and processes that Andrews uses to rehabilitate the land and achieve the lateral distribution of water for its storage in the floodplain. He illegally dams waterways at intervals with ‘leaky’ structures made of available logs and rocks to slow water velocity, raise its level and spread it laterally onto the floodplain; mimicking the hydrated floodplain terraces created by the reed-bed barriers in pre-European waterways. In addition, he is raising watertables when the general message, originating from conventional industrial irrigation areas where naturally dry land is irrigated, is to keep them low to prevent salinisation. Another controversial process is Andrews’ use of deep-rooted inedible weeds as pioneer crops to rehabilitate bare patches of earth (Mason-Jones 2006b: 6-8). Many of his favourite pioneer plants are declared noxious weeds, which landholders are required to eradicate from their properties by law.

While some of the materials and method that he uses are illegal and unconventional, more importantly they appear to have created a 'crisis of perception' (Capra 1997: 3-5) that has triggered an emotional response from those whose worldviews are being threatened by his demonstrations. He has demonstrated that not only are current 'business-as-usual' approaches to NRM inadequate, but that there are cheap and effective alternatives that appear to produce rapid positive results in many different Australian landscapes. Richard Bush who is part of a team scientifically examining Andrews' methods acknowledges they have 'resulted in a river recovery to our knowledge unprecedented in Australia' (ABC TV *Australian Story* 6/7/09)

Like Andrews, Bob McFarland of 'Oxley' Station on the lower Lachlan River found that the cultural gap between NRM bureaucracies and their community 'partners' extremely difficult to bridge, despite more than a decade of determined effort to do so. Bob was a member and then Chair of the Lachlan Catchment Board, a member of the Murray-Darling Basin Ministerial Council Community Advisory Committee, and a member of the National Carp Taskforce. He is a passionate communicator and networker, who declares that:

I want to build bridges of communication with everyone involved in this huge task of restoring our natural resources.

McFarland 1995: 4

Finally, as a keen observer of the local landscape and inheritor of several generations of Riverina grazing social memory carrying the strong message of 'live with the land – get used to it or get out' (interview 1/4/05), Bob is working with networks throughout Australia to develop and share ways of better living with the Australian landscape, many of which complement Andrews' approach.

6.4 BOB MCFARLAND – PROBLEM SOLVING BY OBSERVATION AND SOCIAL MEMORY

Bob McFarland is a fourth-generation Riverina grazier whose ancestors founded a Merino sheep stud at Barooga on the River Murray in 1865 (Cox 1936: 57-58). Along with Samuel McCaughey, they were also pioneer irrigators in New South Wales (*Sydney Morning Herald*, 3 April 1902). His wife Errolly is the fourth generation of a north Queensland cattle grazing family with a similar rich social memory. As a change agent, Bob McFarland sees progress towards an ecologically sustainable and humanly desirable future for the Murray-Darling Basin to be an unconditional and cooperative process (interviews 1/4/05 and 23/6/05; McFarland 1995: 4, 6). He is actively involved in informal learning and problem solving collegiate networks (Lockie 2006: 34-35). He has been an active participant in



Plate 6.4 Errolly and Bob McFarland, 'Oxley' Station via Hay NSW

Errolly and Bob are keen observers of, and responsive to, the local landscape and members of rural communities. Their focus is on social and ecological resilience for rural Australia, in equal portions.

government-community partnerships at catchment, Murray-Darling Basin, and national scales. He is a practical change agent contributing to improved NRM specifically in the areas of saltbush utilization, European carp control, breeding more versatile and resilient sheep, and vernacular land rehabilitating processes. He also believes that a good way to control feral pests is to turn them into economic assets, which has included hunting tourism to help control feral pigs, and establishing a company called 'Charlie Carp' to convert European carp into liquid garden fertilizer:

In many ways he has been a catalyst for change but he was ten to twenty years ahead of his time. He used 'to wear the leather off his boots' with (his promotion of) saltbush, and now we hear that the Department (of Agriculture) is coming out and "talking saltbush". Yet, if he hadn't been there really pushing hard, the ball wouldn't have started rolling – it's the same with many things ... a lot of innovation is being stifled, unfortunately.

Errolly McFarland 23/6/05

'Oxley' Station is a traditional western Riverina Merino sheep grazing property consisting of natural 'saltbush' (*Chenopodiaceae*) rangeland of native grasses and shrubs, and floodplain adjacent to the Lachlan River with black box and red gum woodland and native grasses. Historically, stock was moved between these two complementary ecosystems annually, with saltbush grazed in winter and floodplains in summer.

Bob McFarland's land management philosophy, influenced by his grandfather, is to maximize economic and ecological resilience in semi-arid conditions by assuming that drought is the norm and preparing for it; rather than reacting to a culturally constructed 'unnatural' event. It involves developing around land; through improving soil and natural vegetation resilience, and breeding stock that are suited to the local conditions. Water as rain or flooding is treated as a scarce resource; 'a bonus', and irrigating naturally dry land is seen as 'courting trouble'. A fundamental management method on the property is the use of temporary internal fencing for greater flexibility in stock control, which combined with ongoing vegetation assessment, enables a rapid rotation of stock, the rehabilitation of eroded areas, and the maintenance of healthy pastures.

Areas can easily be excluded or grazed for specific periods of time according to vegetation condition, soil type or weather/climatic conditions. McFarland explains that 'it's not how many sheep to the acre you run; it's how long you leave those sheep on the acre'. This comment is supported by Heitschmidt and Walker (1996: 194) who suggest that the 'long-term success or failure of all grazing strategies hinges on management's ability to control the frequency and severity of defoliation of individual plants over time and space'.

6.4.1 'Living haystacks' and lamb-tail land rehabilitation

The McFarlands have used active adaptive management involving social memory, local knowledge and local resources to systematically rehabilitate the degraded parts of the property over the past 40 years. Large wind eroded ('scalded') areas on the property have been rehabilitated through a combination of processes including revegetation, livestock exclusion, and moving herds of cattle onto the areas for a short time during wet periods to break up the smooth, bare soil surface. Cattle hooves pug up the smooth surface enabling soil and seeds catch in the hoof-holes and begin to grow, with the help of the concentrated excreta that the cattle also deposit. This process is similar to 'folding' that was used in Britain before the Enclosures to maintain the fertility of common land (Williamson et al. 2003: 50).

Lamb tails placed on eroded areas also act as seed mediums, soil collectors, wind protectors, and fertilizer in the rehabilitation process. They emphasised that the rehabilitation of a modified environment requires active management, and contrary to the common assumption, removing stock and people would simply result in continued degradation, as was found in Sweden (Magnusson 26/11/07). They also demonstrated that the careful use of livestock can assist in the rehabilitation of land, improve vegetation productivity and contribute to biodiversity (Gill 2000: 224 and 230; Marty 2005: 1631).

In the late 1980s and 1990s, McFarland was commonly known as ‘Saltbush Bob’ because of his enthusiastic promotion of the use of native shrubs to address a range of NRM issues including the impacts of drought, salinity, high watertables, and to provide wind protection for livestock, increase biodiversity, and reduce erosion. His particular passion was the promotion of the planting of oldman saltbush (*Atriplex nummularia*), a shrub that is native to ‘Oxley’ Station, as a ‘living haystack’ fodder reserve. The ‘living haystack’ concept involves increasing oldman saltbush plantings throughout the landscape to make stock food available during drought periods, thus avoiding hand-feeding or agistment (removing stock from drought affected areas and paying other farmers for grazing rights). Oldman saltbush was seen as being good for the environment and saving farmers money, stress and hard physical work during drought periods. It is the largest Australian saltbush, reaching a height of more than two metres. It lives for 20-30 years and its deep and extensive root system enables it to withstand climatic extremes. While it is generally only lightly browsed when more palatable plants are available, it is readily eaten when other forage is scarce; similar to dry hay from traditional haystacks but with the added advantages of erosion control, livestock shelter and distribution throughout the landscape.

McFarland’s activities as self-appointed ‘saltbush ambassador’ included a fact-finding visit to South Africa in 1989 to discuss saltbush research at Groenfontein Agricultural College, which had obtained seed from Australia in the nineteenth century and conducted breeding programs to improve its production and palatability. He also conducted field testing, organized field days at ‘Oxley’ Station, and initiated informal networks that resulted in the widespread adoption of saltbush in the Murray-Darling Basin and south-western Western Australia.

6.4.2 The power of informal networks

McFarland found informal networks of colleagues cooperating for a common cause to be far more responsive, constructive, productive, and to produce much quicker results than his experiences in formal government-community partnerships. He proposed that positive government response and formal support would add great value to such community initiatives. However, he observed that government agencies are great self-promoters but generally refuse to ‘support a concept that hasn’t been of their initiative?’ (McFarland 1995: 6).

6.4.2.1 Century 21 Merino

In response to changing social, economic and climatic conditions, McFarland is working in a small network of sheep breeders in Western Australia, South Australia, Victoria, New South Wales, and Queensland who are sharing expertise, experiences, moral support, and resources (including breeding stock when necessary) to develop a Merino for the twenty-first century. This initiative supports Rogers' (1983: 334) claim that:

Instead of coming out of formal R&D systems, innovations often bubbled up from the operational levels of a system, with the inventing done by certain users. Then the new ideas spread horizontally via peer networks, with a high degree of reinvention occurring as innovations are modified by users to fit their particular conditions.

The network members are aiming to produce a multi-purpose sheep that is resilient, low maintenance (no mulesing, drenching), quick-growing, fertile, 'shearer-friendly', and able to be used for both lean meat and wool. Multi-purpose animals provide flexibility to deal with market fluctuations and an opportunity to value-add, such as through the production of boutique 'saltbush mutton'. Larger and stronger animals are better able to deal with hotter and dryer conditions and walk further to water.



Plate 6.5 Multi-purpose Merino field day at 'Oxley' Station

Bob McFarland (right) and son Andrew explaining the social, economic and ecological advantages of breeding multi-purpose Merino sheep.

Sheep with fewer wrinkles make the work of shearing quicker and easier, and the elimination of mulesing is responding to overseas market demands.

6.4.3 Government-Community ‘partnership’ – conditional progress towards social-ecological resilience

McFarland found that government-community partnerships that he had been involved in were not collegial. Bureaucracy determined the ‘conditions’ of the ‘partnership’ and retained the right of veto. It appeared to treat the community as an adversary to be ‘mined’ and controlled in order to maintain ‘business-as-usual’, rather than a valued partner with constructive contributions to improve the social-ecological resilience of the Murray-Darling Basin. There was obvious confusion over the role of each partner by the other in the processes, which had apparently never been explored or negotiated, much less regularly re-negotiated (see 1.2; Knudsen 23/11/05; Kweit and Kweit 1981: 31). While McFarland thought that ‘we’d have a huge role in developing policy and I was excited about that’, he perceived the reality to be ‘to give the community a “rosy-glow” feeling’ while bureaucracy subverted the process after ‘ticking the consultation box’ (interview 23/6/05).

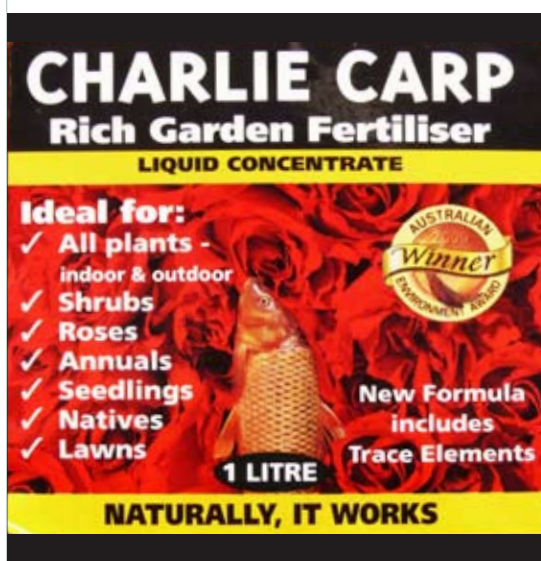
As suggested by Knudsen (23/11/05), the current government-community arrangements to progress towards social-ecological resilience in the Murray-Darling Basin are seriously flawed and need to be renegotiated so that the roles and responsibilities of both groups are clear, there is equity and accountability in the partnership, and clarity in its aim. As McFarland (23/6/05) explained:

I went in there with really a great deal of excitement because I thought that this is a wonderful opportunity to build bridges between the community, and the bureaucracy, and government. I thought here is an opportunity where we could all sit around together and come up with an amenable way to manage our environment and our resources, our economy and our ecology – I gave my all!

I know my family suffered a great deal due to the fact that 90% of the time I was disappearing in the car yet again to Canberra, Sydney, Forbes, Cowra, Orange ...

Errolly McFarland confirmed that even when Bob was at home he had a huge amount of paperwork to deal with, which was ‘really more than a full-time job’, in addition to running the property. She acknowledges that there were benefits such as the amount of knowledge gained. Bob McFarland added that other important benefits for him were exposure to the ‘big picture’ of natural resources management, meeting different personalities and forming new friendships, and that the experience had forced him ‘to look outside of that square of agricultural involvement’. He also explained that while he considered that ‘the wonderful opportunity for partnerships between us’ had been missed at the formal level, productive informal community networks had grown from the experience.

Errolly McFarland (1/4/05 and 23/6/05) explained that cooperation and ‘encouragement is so important when you want to change something’, which is in contrast to the government-community relations situation that they had experienced where apparently predetermined agendas and a hegemony of reductionist, scientific knowledge ‘overrides community input’ before it begins. This observation conforms to Lupton’s (1999: 10) suggestion that the scientific model has erroneously conceived of individuals as robotic and emotionless actors due to its linear understanding of relationships. She suggests that the main impediment in formal government-community ‘partnerships’ is that community members do not feel that they have an authentic ‘voice’: ‘I think it’s that frustration of the community not being heard; not understood, or their opinions being redundant or not valued’.



Bob expressed frustration about the fact that despite considerable input and constructive recommendations from workshops, there was very little follow up, and as Allen and Curtis (2005: 421) found, productive working groups and programs appeared to be dismantled if their recommendations or outcomes didn’t match bureaucratic preconceptions. McFarland also expressed incredulity that practical experience and demonstrated practical solutions, areas where technocrats were not expert, were generally dismissed rather than being seen as constructive and complementary.

Plate 6.6 Making feral pest control pay

I got very frustrated, I suppose. I presented practical solutions such as the use of saltbush, a plant that loves saline soil, to reclaim degraded areas, and the physical removal of European carp and turning them into a commercial, viable, money-making proposition. They encouraged people to utilize what they have and not ‘just to stand there and scratch their head and wonder what they were going to do about them’.

Bob McFarland 23/6/05

These frustrations are echoed by primary producers in many parts of the world who manage complex systems ‘governed by uncertainty which demand flexible local responses’ (Harrison et al. 1998: 313), and where NRM ‘should not be about replacing and discounting original sources of knowledge, but about adding new ones and employing them wisely’ (*Ibid*: 319). They suggest that ‘unless consultation processes recognise and address the knowledge residing with local people, there will be little room for establishing the mutual trust upon which all partnerships need to be based’. As Apple (1993: 123) highlights, there is no better formula for alienation than loss of ‘control of one’s expertise and time’. McFarland (23/6/05) emphasises that he is ‘not hard on the bureaucracy or the individuals involved; I’m hard on the system that I believe was flawed right from day one’. He suggests:

I think the structure was there, and the people were there ... But, you know we were sort of all handcuffed and hogtied and gagged and manipulated.

McFarland's experience revealed NRM bureaucracy to be an unresponsive, energy-draining and defensive 'information processing juggernaut'. Research by Paton et al. (2004: 263) revealed that it was common for experienced regional community members and even members of regional bodies like Bob to 'become disillusioned and disengaged' by the ultimately untenable nature of the government-community 'partnership' process.

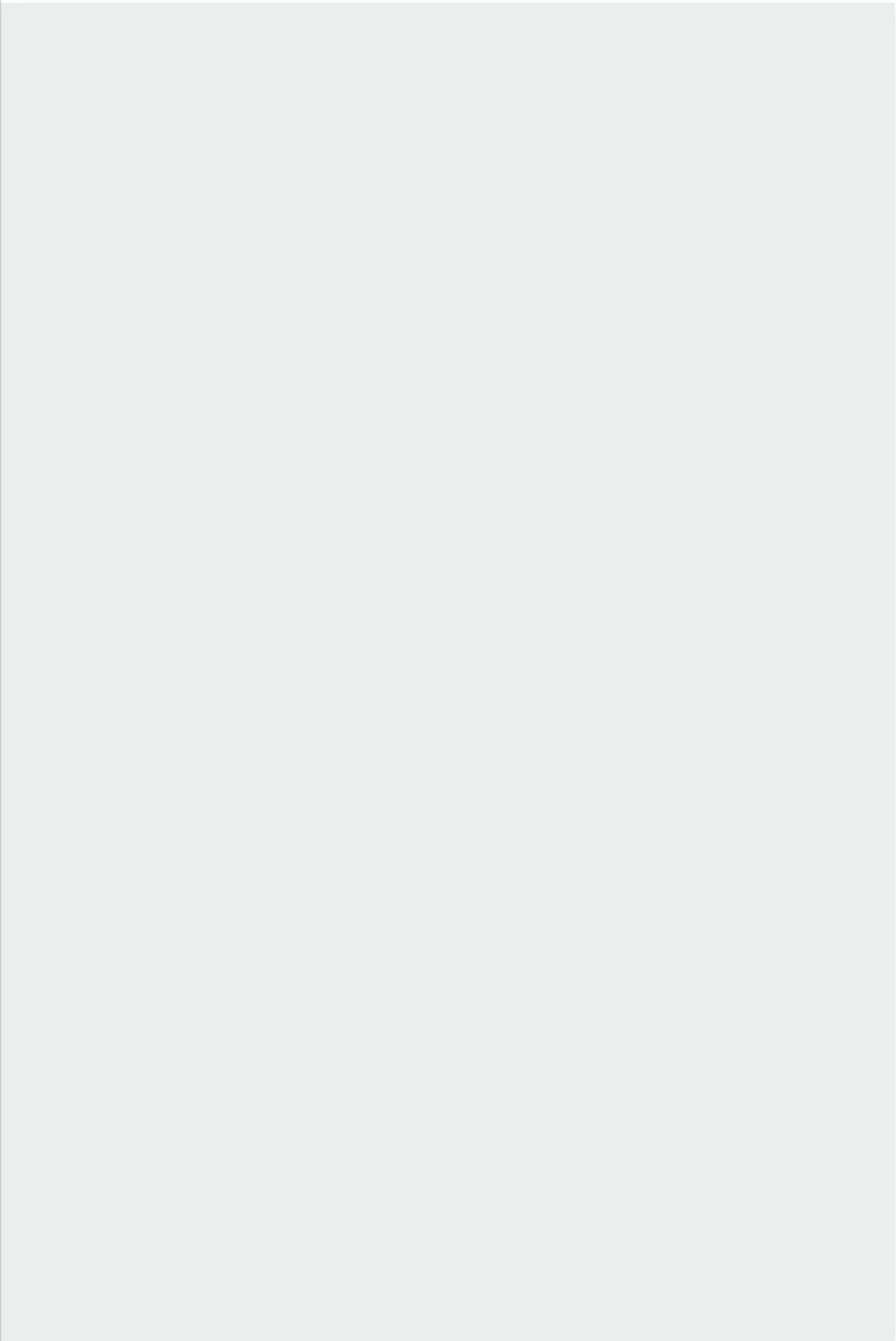
6.4.4 A critical review of the current NRM structure

Change agent experience has highlighted the inadequacy of current technocratic NRM structures, designed for the efficient operation of simplistic mechanistic processes, to improve the resilience of dynamic social-ecological systems. Improving the social-ecological resilience of Australia's landscapes currently appears to be 'conditional' on the continued technocratic dominance of NRM. The retention of current inadequate structures and processes appears to be 'more important than reality' (Saul 1995: 95). It is an example of a pathological 'lock-in trap' (Allison and Hobbs 2004: 17; Roper et al. 2006; Light et al. 1995: 153), where there is a reluctance to transform the current structure because of the investment that has been made in it. Stankey et al. (2003: 45) articulate the irrationality of the maintenance of the current stalemate situation, especially in relation to change agents:

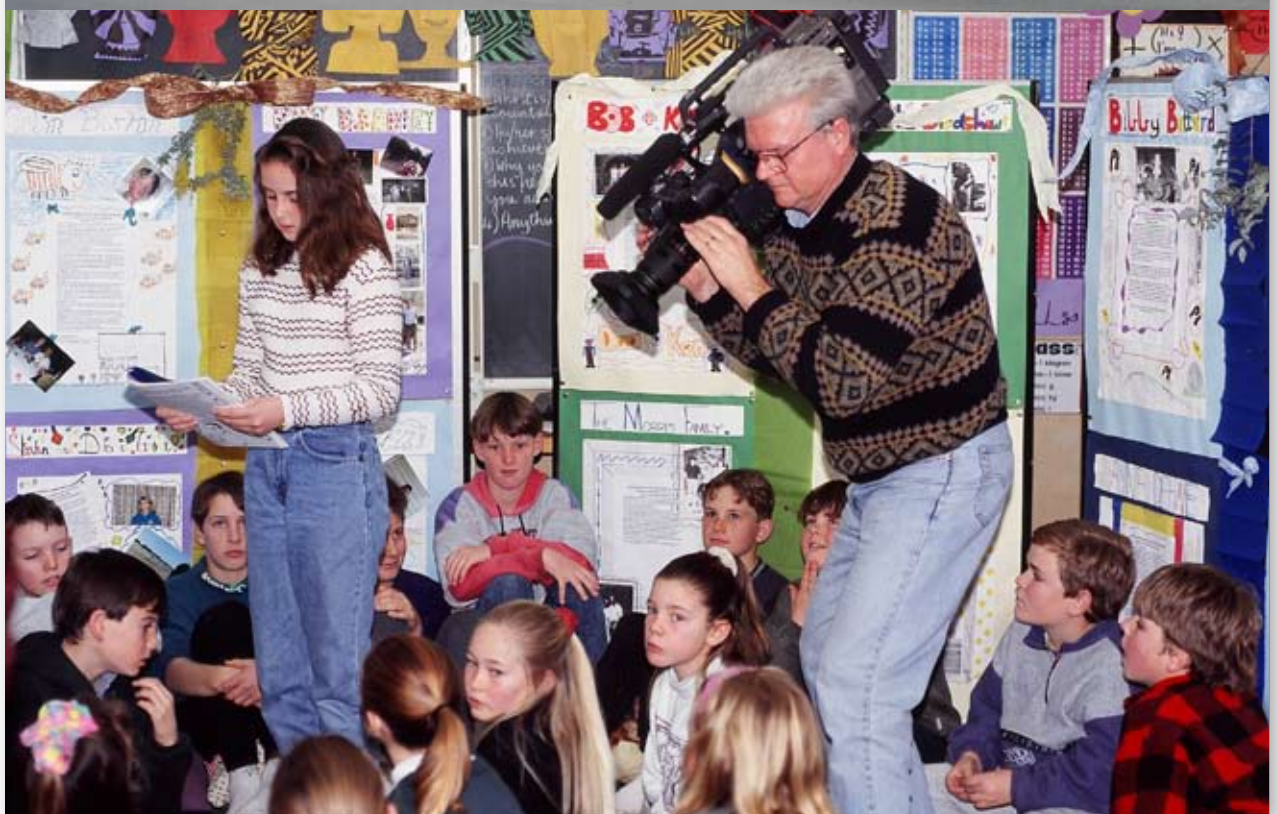
The irony here is that while continuation of policies that have not worked seems to ensure continued failure, undertaking actions where outcomes are uncertain is resisted because of the inability to ensure that unwanted effects will not result.

The Andrews' case demonstrates the importance of regularly critically reviewing NRM policies, structures and processes, to establish which are effective and which represent pre-ecological 'cultural baggage' being retained due to policy inertia and/or vested interests. De Marchi and Ravetz (1999: 755) offer a solution to the dilemma similar to that used in medical ethics issues 'where lay-persons are called in to help resolve problems of practice, on which science can provide crucial information, but cannot determine correct policies'.

Magnusson's success emerged from the establishment of an independent bridging institution that engaged all parties concerned in a neutral space to share ideas as colleagues, to unconditionally facilitate the ongoing adaptive co-management of the local landscape as a social-ecological system. I have demonstrated in this section of the thesis that there is a need to critically review the success of the current system itself, and not simply the success or failure of processes within it (Havens 1975: 106-107). In the next chapter I examine the 'politics' of sustainability more thoroughly.



PART 3: A Critique of Institutional Responses to Sustainability



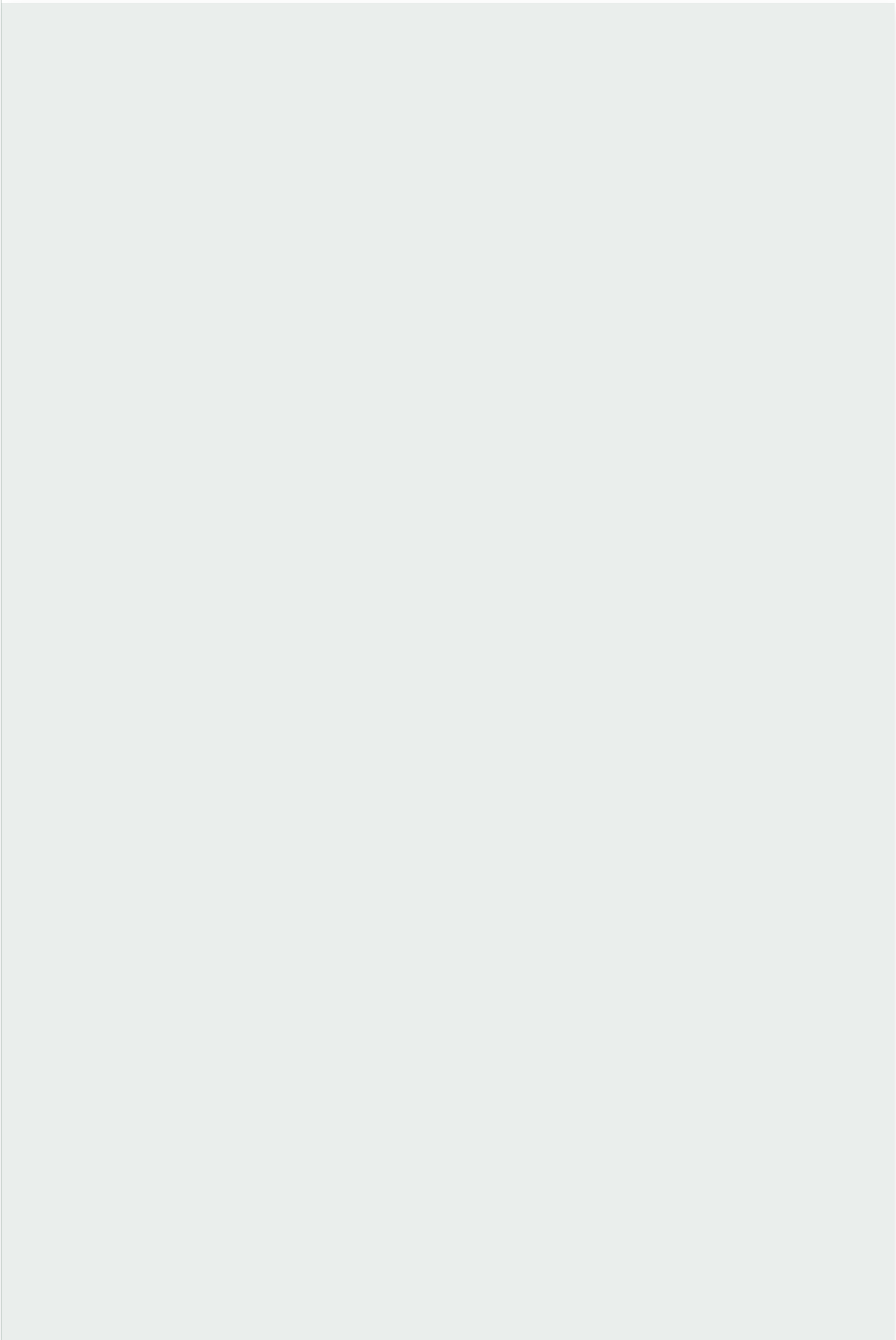
A CRITIQUE OF INSTITUTIONAL RESPONSES TO SUSTAINABILITY

Traditional mechanistic natural resources management (NRM) bureaucracies in Australia appear to afford greater priority to maintaining 'business-as-usual' than problem-solving. That observation is supported by Robottom and Hart (1993: 47) who suggest that 'the economic/ technological engine of western society is more interested in providing information to promote smooth functioning (efficiency, effectiveness, productivity) than knowledge to promote questioning, critical individuals'. Allan and Curtis (2005: 421) elaborate:

Machines are only useful when they operate correctly, and the same is assumed true of organizations. Therefore, maintaining a 'smoothly' operating, efficient organizational machine can dominate thinking, especially within government agencies.

Unfortunately, a smooth-running organization that is disengaged from the community will make little contribution to progress towards an ecologically sustainable and humanly desirably future for the Murray-Darling Basin.

However, mechanistic hierarchical structures have evolved safety mechanisms that make it easy to exclude, obstruct or transform anything that does not conform, which makes attempted modification difficult, if not dangerous. Allan and Curtis (2005) give an example of an effective community-based NRM group that 'was disbanded because it did not mesh well with the functional design of the management authority'. They suggest that the action 'removed most of the opportunities for a variety of community voices to direct the implementation and learning activities of the project'. They argue that the major constraint to the realization of the capacities of rural institutions to adaptively manage ecologically strategic landscapes is that 'it just does not fit with the current dominant approach to managing nature'. Landcare groups in many parts of NSW appear to have suffered a similar fate with the emergence of Catchment Management Authorities in 2004 (Personal observation; Torbay 2006; Murrumbidgee Landcare Inc. 2006; Benjamin, Murrumbidgee Landcare *pers comm.* 28/5/08; Thomas *Border Mail*, 18 July 2008).



CHAPTER 7: ‘THE KIND OF NONSENSE THAT ONLY A BUREAUCRACY CAN SUSTAIN’: THE POLITICS OF SUSTAINABILITY

Jacobi 1983: 190

Leith Bouilly, farmer and former Chair of the Murray-Darling Basin Ministerial Council Community Advisory Committee (1998-2005), and committee member (1992-1996), suggests that changes to NRM approaches within bureaucracy will not occur until the community reclaims its future and takes the lead, as it did for Federation in 1893 and the development of the River Murray Waters Agreement in 1902:

I think that communities themselves have got to have the courage to take a leadership role – a bit like communities did when they came together at Corowa a hundred years ago... I don't believe that bureaucracies will allow governments - and I say that deliberately, *bureaucracies won't allow governments* - to move the agenda forward in terms of the Basin without the community standing up and saying ... 'ignore borders and boundaries and work together'.

Bouilly 15/3/05

This chapter examines bureaucracy as a direct and indirect barrier to the realization of the capacities of community institutions to help maintain the resilience and productivity of strategic landscapes on behalf of Australian society. It discusses the abilities of members of bureaucracies to insulate themselves and maintain values or prescribe processes that may be redundant, in the name of administrative convenience and maintenance of 'business-as-usual'. It also refers to the situation of bureaucracies using their structure, longevity and knowledge to defy both politicians and the community to exploit or obstruct change that may threaten their privileged positions. Finally, I will examine the vulnerability of 'public good' programs in technocratic organizations to transformation into resources to support technocratic processes:

Bureaucratic organisations are formally the most rational means of exercising authority over human beings. They develop their own momentum and, in so doing, accumulate power and monopolise knowledge. Yet bureaucracies control and dehumanise human beings, and they ultimately become irrational. Uniform bureaucratic procedures stifle spontaneity, creativity and initiative.

Kenny 1999: 102

7.1 INTRODUCTION

The statement, it is 'the kind of nonsense that only a bureaucracy could sustain' was made by Ralph Jacobi, Member for Hawker in South Australia (Appendix 1), during a debate as part of the second reading of the River Murray Waters Amendment Bill in 1983. He was illustrating the inadequacy of the

River Murray Commission running the River Murray as if it was a 'pipeline'; without understanding its ecology to help inform management and with no influence over human activities in the surrounding catchment that impact on water quality. Jacobi insisted that the river 'must be viewed as an entire ecological system if it is to be maintained effectively' (1983: 193), and that de-contextualized mechanistic 'efficiency' in the delivery of a quantity of water was an inadequate management aim.

In this chapter, I will use the fundamental principle of the active cooperation of residents, identified as necessary to progress towards greater resilience for the Murray-Darling Basin social-ecological system, to demonstrate 'the kind of nonsense that only a bureaucracy could sustain'. As discussed by Kenny above, bureaucracies are non-reflexive processing 'engines' that develop their own momentum, which makes them difficult to modify to perform new tasks. Unless closely monitored, the tyranny of administrative convenience dictates that discomfort will trigger a default, 'recourse to technocracy' (UNESCO 1980: 26; see 2.4.1), in technocratic bureaucracies that have been modified to perform social-ecological tasks. I demonstrate that such a situation occurred in the Murray-Darling Basin Commission between 1990 and 1998. I also argue that because it is difficult for the community to monitor bureaucracies, there tends to be little downward accountability and that bureaucracies will attempt to maintain that situation, which impacts on communities being able to take control of their futures.

7.2 MANAGEMENT FOR WATER QUALITY – A REVOLUTION IN NATURAL RESOURCES MANAGEMENT

A revolution in NRM in the Murray-Darling Basin began in 1982 with the amendment of the River Murray Waters Agreement, which broadened the scope of the River Murray Commission to enable it to consider water quality, environmental, and recreational issues. It was the most significant change in the management of the river since the signing of the first Agreement in 1914. The amendment was triggered by concerns about increases in salinity levels in River Murray water, which can limit irrigated crop yields, degrade soil, negatively impact biodiversity, and increase costs of industrial production. Successful salinity management required intergovernmental cooperation.

The requirement for the River Murray Commission to assume responsibility for the improvement of water quality impacted NRM in two main areas. Firstly, water quality depends on land-use activities in the surrounding catchments, which necessitates the cooperation of residents to adopt sustainable land use practices. Secondly, the new responsibility required a major change in NRM thinking, which traditionally separated the administration of different resources into categories like agriculture, fisheries, and forestry (Suzuki 1993: 163).

Responsibility for improved water quality and ecological health ultimately required the integrated management of the whole Murray–Darling Basin. A bipartisan River Murray Parliamentary Committee was established to lay the foundations for the integrated management of the vast region, which ultimately led to the implementation of the Murray–Darling Basin Initiative.

7.2.1 The inadequacy of legal and technical processes to address Australia-wide social impacts of natural resources degradation

On 24 August 1983, the Chairman of the Parliamentary Committee (Connolly 1983: 151 – 156) made a presentation to Federal Parliament about improving the water quality in the River Murray and some of its implications for NRM throughout the million square-kilometre Murray–Darling Basin. Recommendations called for a ‘long-term 25-year development program for the entire River Murray system’, which would include ‘an extensive public awareness campaign’ to be conducted by the River Murray Commission ‘at the national level with the assistance of State authorities, community groups and schools and organisations’. He emphasised the national economic and social consequences of further degradation of the Basin with the warnings that ‘should this area be permitted to deteriorate any further, every Australian will suffer because of the severe impact on our quality of life’ and ‘equally as important, the impact that it will have on our balance of payments’. Finally, he cautioned against taking a legal-technical approach to the issue:

There is a tendency, I think, for governments to believe that the only way to overcome these problems is by regulations, controls and other measures of that type. We believe ... that we have to put tremendous emphasis on education. Not only do we need to make every Australian aware of the national significance of Australia’s one and only major water resource but also, within the region itself, the educational program must be directed to the individual.

Connolly 1983: 154 - 155

Rapid transformation of NRM followed with the establishment of the Murray–Darling Basin Ministerial Council (1985), Murray–Darling Basin Agreement (1987), Murray–Darling Basin Commission (1988), the Natural Resources Management Strategy (1989) and the development of the Murray–Darling Basin Initiative to cooperatively manage the resources of the million-square-kilometre Murray–Darling Basin as one unit. However, many issues of concern identified by the Parliamentary Committee and highlighted by Jacobi in the early 1980s have yet to be authentically addressed. In the rest of this chapter I will use my personal experience of working with NRM bureaucracies in the Murray–Darling Basin between 1984 and 1998 as a frame of reference to interrogate the bureaucratic politics of sustainability.

7.3 NATURAL RESOURCES MANAGEMENT IN THE MURRAY-DARLING BASIN 1984-1998: A PERSONAL JOURNEY

In 1984, the River Murray Commission created a 'communication-liaison' position in response to the Parliamentary Committee recommendations. On my appointment, I was informed that in the relatively near future the organization was likely to become a Basin Commission. I was directed to develop foundations on which a long-term, integrated environmental communication and education program could be built. The key role of the program was to gain the broad support of the Australian public, and particularly the residents of the Murray-Darling Basin, for the integrated management of its natural resources. It was to introduce all Australians to the Murray-Darling Basin, to assist Basin residents into the debate about the future of the region, and to encourage their active participation in its management.

I carried out extensive research and consultation with resource management organizations (such as the Great Barrier Reef Marine Park Authority and State departments), non-government organizations and relevant individuals to establish a large scale environmental communication program. It specifically identified video/television as a key medium to reach both urban and rural audiences, and to provide a 'voice' for Basin residents and scientists. The process of producing videos was also identified as an effective way to facilitate ongoing consultation with the community and associated government and non-government organizations. Consultation also identified a need to directly involve Basin residents and the future managers of the region in the telling of its 'story'.

7.3.1 Snowy Mountains Hydro-Electric Authority cultural influence

Both the Chief Executive of the River Murray Commission, and the Commonwealth Commissioner of the River Murray Commission, who was also the Commissioner for the Snowy Mountains Hydro-Electric Authority (SMHA), were supportive of the development of a large-scale far reaching innovative communication program that could tap into television and other mass media, and also reach and involve members of communities throughout the region. Both had experience of the ground-breaking communication program that promoted the Snowy Mountains Scheme between 1950 and the late 1970s, and were familiar with the impact of effective communications on the outcome of the Scheme. They demonstrated the qualities of creative leadership, defined by Knowles (1983: 26) as being able to release the creative energy of their staff, which they attributed to the culture of the Snowy Mountains Authority developed under the direction of the original Commissioner, Sir William Hudson.

The Chief Executive was a cautious ‘champion’ of a video program that had emerged as a priority through consultation, as it would enable a huge number of people throughout Australia to ‘see’ the tasks and achievements of a Murray–Darling Basin Initiative and support them. It would also provide a valuable record of the evolution of the Initiative. He saw video and television, in part, as substitutes for the busses that brought people to ‘see’ what was happening with the Snowy Scheme and to gain their approval.

The potential of video and television to provide ‘two-way communication’ between different audiences was acknowledged, as was relationship and ‘team-building’ through the involvement of Basin residents in the process. A final lesson from the Snowy Mountains Scheme experience was to give a ‘face’ to staff, researchers, and community members working towards a sustainable future for the Basin, through the video program. These were very different values from large State water ‘engineering’ departments that appeared to strongly discourage public interest (Bowen 1994: 12).

7.4 MURRAY-DARLING BASIN COMMUNICATION AND CONSULTATION

At the launch of the Natural Resources Management Strategy for the Murray-Darling Basin in April 1989, the Murray-Darling Basin Ministerial Council announced the establishment of a communication and consultation unit with a strategic role to encourage community understanding, support, and participation in the Murray-Darling Basin Initiative. One responsibility highlighted by the Council was to ‘show how local concerns fit into a broader Basin-wide picture’. Powell (1993a: 84) proposed that part of the Murray-Darling Basin Commission’s *raison d’être* was ‘the production and maintenance of regional consciousness’ and that:

This logic insists that, with the establishment of an improved ‘sense of belonging’, the collective conceptualisation must influence the decisions and behaviours of individuals. And thus, the region will truly live - no longer a perplexing abstraction, it will have real meaning in the affairs of the communities residing within and beyond it.

A generation-long communication strategy for the Murray-Darling Basin, as recommended by the River Murray Parliamentary Committee (Connolly 1983:154), was developed in 1989 with input from an Intergovernmental Communication Working Group. It consisted of a cumulative process that would evolve through three broad, but not exclusive, eight year themes. Stage one (1990-1998) would be *about* the Murray-Darling Basin in order to raise its profile within the region and to all Australians.

Stage two (1998-2006) would involve relationship-building, human resources development and capacity realization *with* communities in the Murray-Darling Basin. Stage three (2006-2015) would involve working with empowered and informed community members and community institutions *for* the Murray-Darling Basin. The strategy aim was:

To contribute significantly to the achievement of an informed, ecologically literate, empowered and active community with a Basin (holistic) ethic, in one generation (2015).

Eastburn and Milligan 1998: 67

The communication program was to be a key component of a Murray-Darling Basin metagovernance umbrella that was designed to complement and bridge existing institutions and networks and improve their capacities to produce public benefits (Lund 2009: 248).

7.4.1 An experiment in deliberative democracy

The first Murray Darling Ministerial Meeting in 1985 and the Murray-Darling Basin Ministerial Council (1990: iv, 11, 13) emphasised the necessity for the active involvement of an informed Basin community to progress a Murray-Darling Basin Initiative (see 1.1.1). Accordingly, the communication program was designed to be generative. It aspired to assist Basin community members to actively contribute to the Murray-Darling Basin Initiative to maintain or improve the ecological, social and economic resilience of the region, rather than simply reacting to it.

Ife (2001: 123-124) emphasises that the key element of deliberative democracy is that 'citizens are enabled to be part of the process of studying alternatives, researching possible outcomes and formulating proposals; they are asked to contribute to the process rather than simply react to a proposal'. Bouilly (15/3/05) agreed that what 'communities absolutely need is access to the knowledge-base and the ability to ask questions about it and challenge it in an open way; so that they own it'. The single strongest message from the people interviewed about the realization of community capacity to contribute to the effective management of natural resources was the need for authentic two-way communication (Hera-Singh 19/7/04; Jones 20/7/04; Beck 15/7/04; Davy 23/7/04; Gorman 1/3/05; Spinks 4/3/05; McFarland 1/4/05 and 23/6/05; Zalec 21/9/05; Hillman 28/9/05; Koehn 29/9/05; Knudsen 23/11/05; Bradford 10/12/05; Wangmann 11/12/05; Blore 18/1/07; Murphy 19/9/07; Magnusson 26/11/07). There was a strong desire to be able to share information, and appreciate what is being done in different areas, what research is being carried out, and what policies are being developed and why.

While deliberative democracy, like sustainability, is a journey rather than a destination, the vision for the communication program was to contribute to an authentic government-community partnership to maintain or improve the ecological condition of the Murray-Darling Basin. O'Riordan and Stoll-Kleemann (2002: 87) suggest that in today's complex and specialised politics, 'no one seriously believes that full-blooded participatory democracy can replace some form of accountable representative democracy' and that it is possible that there cannot be deliberative democracy at all; 'only many quasi-deliberative democracies'. Participative processes are also vulnerable to subversion by bureaucracy through attrition at one extreme, and overwhelming voluntary community participants ('snowing') to create 'participation fatigue' at the other (Hera-Singh 19/7/04; McFarland 1/4/05).

Ife (2001: 123) equates deliberative democracy to an extension of the jury system into the public arena. He suggests that people can make wise decisions 'if they are given full access to all relevant information and the time to study and debate the issues in some depth'. An effective communication-education program to help build and realize community capacity is also necessary to fulfil Uhr's definition of deliberation as 'a process of weighing options for action and deciding priorities on the balance of probabilities' (1998: 230).

7.4.1.1 *A whole-of-community project*

Uhr (1998: 10) also posits that deliberation is a check against 'majoritarian democracy' in which law and policy are formed 'on the basis of the preferences of the majority, with few protections for the rights of minorities, either to be heard ... or even left alone on the margins of the polity'. He adds that it also provides checks and balances against 'the speedy acceptance of the apparent wisdom of a governing elite, and barriers and restraints against the easy prosecution of government officials through popular impeachment' (*Ibid*: 30). Most importantly, for capacity realization and progress towards an ecologically sustainable and humanly desirable future, Uhr highlights the fact that public deliberation 'is an important safeguard for diversity of opinion and not simply as an instrument of shared appreciation of the common good'.

The Murray-Darling Basin deliberative democracy experiment was a whole-of-community project. Kristin Shipway, 'Special forever' Coordinator for the Tuggeranong region in the Australian Capital Territory (23/7/1998, in Eastburn 1999b: 94-95), suggested that primary school children learned a lot about their own areas through involvement in 'Special forever'. She suggested that they also gained satisfaction from sharing their knowledge because it is 'valuable to everybody else' and they enjoyed hearing about activities and other places from children of their own age. She suggested that the children were the 'experts' in the program, which was important for critical

thinking, appreciation of diversity, and confidence building. Similar sentiments were expressed by Linda Marsh (23/10/1995, in Eastburn 1999b: 95) when commenting on a 'hazard-type' board game produced by her son who was a student of distance education. She explained that through the process of developing the game he had learned a lot about making a living from a grazing property north-west of Bourke in far western New South Wales. She and her husband had been amazed at the local knowledge that their son had retained. She also enjoyed seeing her son working closely with his father and gained satisfaction from the interest that the local community had shown in the project because it articulated their lifestyles.



Plate 7.1 The opening of the Murray-Darling Basin touring exhibition 'A Changing People: A Changing Land' at Albury-Wodonga in September 1993.

This National Museum of Australia – MDBC co-production visited Albury-Wodonga, Bendigo, Goolwa, Mildura, Toowoomba, Dubbo, Canberra, and Melbourne. The exhibition had four themes: 'You are part of the Murray-Darling Basin', Host community presentation, 'Reading the Landscape', and 'Making the Future'. Curators worked with members of each host community to develop and present its unique story.

'Special forever' enables students to 'respond to issues' from their own experiences rather than simply 'reacting' to prescribed positions, which reduces the polarization of views; it provides vehicles for students to communicate their ideas within and outside of their communities; and has a flat administrative network structure that enables input to the program from teachers from throughout the Murray-Darling Basin as well as facilitating efficient knowledge sharing (Zalec interview 21/9/05; Bradford interview 10/12/05; Wangmann interview 11/12/05). The combination of education,

deliberation, and communication through the 'Special forever' program helps to provide primary school students with an intergenerational equity 'insurance policy' because they are equipped with critical thinking skills to 'bear witness' (Brown and May 1989: 8) to activities that may negatively impact on their futures, and to bring them to public attention through communication skills.

7.4.1.2 *Vehicles for deliberative democracy*

The key vehicles in progress towards deliberative democracy in the Murray-Darling Basin Initiative included video and television, which have the potential to provide opportunities for two-way communication (Appendix 5), as well as community education and capacity realization programs such as the Murray-Darling Basin Touring Exhibition, 'Special forever' and 'Reading the Land'. Ife (2002: 130) posits that:

Programs of deliberative democracy necessarily involve community education; realising that problems are not easily solved, it is necessary to provide people with the resources and the knowledge to engage with the problem and to share with the government the complexity and the contradictions of dealing with issues and problems in contemporary society. It also requires government to admit that it does not have all the answers ... and to be prepared to seek the wisdom of the people.

Groups given information, acknowledgement, and a 'voice' through video and television included Basin community members, community group facilitators, research scientists, government decision-makers, politicians, opinion-leaders, and individuals or organisations contributing to the sustainability of the region. The broader Australian public outside of the Murray-Darling Basin were also able to be informed of actions and options for the region through electronic



media. The co-operative process of video-production was as important as the final product for communication, and building and reaffirming community relations.

Plate 7.2 Jim Bowler at Lake Mungo, where in 1968, he discovered ancient human skeletons that revealed that Aboriginal people had reached Australia around 40 000 years ago.

Geomorphologist, Bowler was one of many people who helped to tell the story of the Murray-Darling Basin and discuss issues through the video program. Others included farmer, eco-historian and opinion leader Eric Rolls; children's author Colin Thiele; pioneer cotton grower Frank Hadley; June Barker, Aboriginal cultural historian and educator; environmental musician Bill O'Toole; bush-tucker chef Andrew Fielke; fish biologist Robyn Watts; artist Pro Hart; Sir Ronald East, water engineer; and palaeontologist Alex Ritchie.

The Murray-Darling Basin Commission Communication Unit produced one hundred broadcast quality videos between July 1991 and February 1998, which received an average of 23 hours of television coverage annually and were distributed to more than 400 community networks throughout the Basin. There were four broad video categories:

- relationship building and maintenance;
- Murray-Darling Basin perspective;
- natural resources management; and
- River Murray management.

Box 5. 'Tributaries' Video Newsletter

'Tributaries' was a 25-minute news magazine produced three times per year (February, June and October). It featured short (2-5 minute) topical items about the Murray-Darling Basin and the management of its resources. It included news items; information spots; updates; and stories of community involvement and interstate co-operation in natural resources management. It also included interviews with opinion-leaders and people who, as individuals or members of a group, had contributed significantly to the management or awareness of various parts of the Basin. Acknowledgement of the work of individuals, community groups and government departments involved in the great variety of NRMS projects throughout the Basin area, was seen as particularly important provide encouragement, contribute to morale, and to build a Basin-wide 'team'.

A key role of 'Tributaries' was to improve the 'two-way' flow of information about the management of natural resources and to raise the profile of the Basin itself. It helped to provide a 'voice' against the disempowering "out-of-sight: out-of mind" situation that many rural people feel. It provided images of many parts of the region to help people to begin to visualise and relate to the Basin as a whole. Stories from every 'Tributaries' edition received television coverage.

The process of producing 'Tributaries' was a valuable vehicle for consultation and relationship-building. Planning and research facilitated consultation with a broad range of individuals involved in natural resources management throughout south-eastern Australia. The videoing field trips provided regular opportunities for relatively intensive face-to-face contact with individuals, community groups and government officers over a large part of the Basin. They also provided opportunities to maintain personal contact with 'Special forever' co-ordinators and similar individuals and groups working in partnership with the Commission.

Informal discussions and feedback in the field were conducive to the establishment long-term personal links and provided an indication of community feelings on a range of issues to complement more formal processes. Trust was established and strengthened through return visits. The video format was also sufficiently flexible to accommodate 'early warning' stories about issues of concern flagged by community members. Finally, the trips provided opportunities for radio, newspaper and television interviews about the NRM, the Basin and the Commission, thus building relationships with rural and regional media.

Videos discussed in accessible language, issues such as salinity, native fish, irrigation, wetlands, blue-green algae, and river regulation. They were designed to assist Australians, and particularly Basin residents, to participate in discussions about an ecologically sustainable and humanly desirable future for the Murray-Darling Basin by providing the context and images of the issues and access to formal and informal 'experts' working on the problems. At the heart of the video program were 'Tributaries' video newsletters.

7.5 INTERNAL CONTESTATION

A change in executive responsibility in late 1989 as a result of extended sick leave by the Chief Executive, and a newly appointed Chair of the Murray-Darling Basin Commission, saw the attempted introduction of a narrow, instrumental role for the Communication Unit; expressed as 'arms and legs' for the Commission office (Blackmore *pers. comm.* 1/90). There appeared to be an attempt to reconstruct the status of Unit members as technicians who would transfer given information like 'extension officers' in the redundant research, development, diffusion, adoption (RDDA) process (Roling 1988: 66; Vanclay and Lawrence 1995: 116-118; Appendix 8).

Contestation included disbanding the Intergovernmental Communication Working Group that had input to the development of the generation-long communication program, and vetoing a strategic environmental communication conference for the Murray-Darling Basin. A particular focus of contestation were activities that involved communication and partnership-building directed towards adult community members, especially the video program, which were previously considered to be fundamental to the success of the Initiative. Andrew (1997: xi) provides a possible explanation for the response:

[G]overnment focus on policy implicitly defines community education as a means of overcoming barriers to government-initiated change, rather than as input to governmental decision-making. The role of education is thus viewed as instrumentalist rather than dialectical in nature ... this role has been reinforced and driven by economic rationalism.

There also appeared to be an element of resentment that the communication program was a directorate. The Community Participation Coordinator expressed that she also felt that there was resentment that her position had been 'imposed' on the Commission office, and that a socio-cultural position should be considered 'professional' (Knudsen 23/11/05). Roughley (2005) interviewed a number of social scientists who had worked in technocratic organisations who had similar experiences.

7.5.1 'Recourse to technocracy'

While there was contestation of the strategic role and scope of the communication program from the acting Chief Executive, fortunately there was support from the Chief Executive until his retirement in mid-1990, a number of Commissioners and Deputy Commissioners, several community opinion-leaders and a former politician who had ownership of the original vision. The momentum developed by 1990, and the dedicated annual budget secured by the Ministerial Council ensured that most of the proposed activities initially agreed were implemented (video program, publications, primary schools program and touring exhibition). While the overall program was increasingly slowed by contestation within the Commission office, I had sufficient 'breathing space' to demonstrate its potential.

The broadcast quality videos received regular television exposure, reaching both urban and rural audiences, as well as feeding into community networks, and supporting researchers and field officers. The 'Special forever' environmental education-literacy-intergenerational equity program reached an annual participation level of almost 38 000 primary school children (Murray-Darling Basin Commission 1996: 73) from throughout the Murray-Darling Basin, producing and sharing writing and artwork to contribute to the 'story' of the region. Several of the programs and products initiated were acclaimed as landmarks in environmental communication. They included the 300-plus page books *The Murray* (Mackay and Eastburn 1990) and *MDB Resources* (Crabb 1997); the MDBC video program (36 half-hour broadcast quality videos plus 70 smaller productions); the touring exhibition in partnership with the National Museum of Australia that visited and involved the communities of a number of centres in the Basin, and also visited Melbourne; 'Special forever'; and the 'Reading the Land' bioregional environmental education and assessment strategy.

The multi-faceted program received seven major environmental, media and educational awards, between 1992 and 1996, including; Vision for Australia, Banksia, Landcare, Australian Geography Teachers Association, and *The Australian* (newspaper) Awards for Excellence in Educational Publishing, which were judged by leaders in the fields of science, education, the media, industry, and the environment. However those achievements were not seen by technocratic Commission office executives as valuable as would be the transformation of communication resources into technical projects. On one occasion, notification of the receipt of an award was not passed on until after the presentation ceremony. On another, acceptance of substantial funding from the Australia Council to develop the 'Reading the Land' project was delayed for around six months (Powell 24/2/98) until after the original communication program was abandoned. A proportion of the funding was eventually returned unspent. Ongoing, internal contestation slowed the 'tremendous emphasis on education' initially recommended in 1983 (see Connolly 7.2.1) and the pendulum began its 'recourse to technocracy' (UNESCO 1980: 26; See 2.4.1), as I explained to Andrew in 1996:

[I]t is difficult to maintain an authentic education program within a technocratic organisation because of the constant possibility that commitment and resources allocated to environmental education may be undermined or taken away.

Andrew and Eastburn 1997: 15

7.5.2 Self-celebratory technocratic monologues

Sampson (1993: 4) provides an explanation for the downgrading of the status of communicators, community engagement facilitators, and their programs in technocratic organisations. He suggests that dominant groups give priority to their own experiences and places in the world through 'self-celebratory monologues' and have constructed 'serviceable others' to provide for their needs and promote their values, interests and points of view. A key element of self-celebratory technocratic monologue is that alternative voices or views are not tolerated:

In order to provide the service, the other cannot be permitted to have a voice, a position, a being of its own, but must remain mute or speak only in the ways permitted by the dominant discourse.

Sampson 1993: 13

He explains that while specific forms may change through history, the construction of serviceable others by dominant groups is a characteristic of western society. The 'serviceable others' over time have included women, non-western people, people of colour, and people of perceived subordinate social classes. The unofficial downgrading of my position as Director of Communication and the Community Participation Coordinator's position from 'professional' to 'technician' (Knudsen 23/11/05) fits both the hierarchical technocratic worldview, and the construct of staff members involved in developing relationships with the community being 'serviceable others'. Plumwood (2002:110) provides a similar explanation:

Radical class differentiation is reinforced through a division of labour which is often framed in terms of reason/body dualism in which rational managers control hired 'hands', while inequality is justified as a matter of desert through a culture of rational meritocracy rewarding 'rationality' ... Many tasks of decision-making and management which can beneficially be amalgamated with the practical or manual aspect of work are reserved for managers, for the purpose of setting them apart as a distanced and controlling elite.

Knudsen (23/11/05) interpreted the situation from her experience, as follows:

In general, it was a case of the organisation 'not knowing what it didn't know' and having no mechanisms for expanding its understanding of the social disciplines. The problem also came down to the CEO's controlling management style. My experience is that genuine 'community engagement' is seen as an unnecessary complication to many managers in technical environments. They only see that dialogue with communities adds another layer of complexity to an already complex decision-making environment and that issues may escalate out of their control, or conflict may occur. Superficially, the CEO appeared to support community input, but without an understanding of the philosophical and theoretical

rationales behind social approaches like community development he didn't see the ethical and practical benefits. Indeed, one could go further and say that he did see a 'benefit' of engaging, i.e. it could be useful to persuade communities to support the MDBC's agendas ... I think he genuinely believed in the 'rightness' of technical/scientific responses and that communities needed to be converted – pretty much the missionary position. I found this was a common response amongst water management bureaucrats, who contrasted 'emotive and uninformed' community input against the 'rationality' of their own professional decisions. Individual managers frequently took community disagreement very personally.

The last point conforms to an observation of technocrats often articulated by politician Ralph Jacobi (see 2.1.1; 2.1.2; 7.1) that people from the most rational vocations could be some of the most irrational in debates that moved outside of their narrow area of expertise, or contested its importance. He posited that 'their discipline came from their discipline and not from self-discipline' and therefore they generally could not appreciate the need for debate about context, preferring the presentation of a *fait accompli*.

The brief flirtation with deliberative democracy certainly demonstrated potential but was doomed by apparent technocratic insecurity never to develop into a long-term relationship, much less a government-community 'marriage'. However, a flickering flame remains in the 'Special forever' primary school environmental communication program, currently in its seventeenth year (2009). It is structured to enable 'citizens to participate in the deliberative process, so that they can be part of actually forming the plan and developing the proposal' (Ife 2002: 130).

7.5.3 'Re-engineering'

In 1998, well after the original members of the Ministerial Council who had supported the communication program had been replaced, a 're-engineering' of Murray-Darling Commission office staff took place (see 9.1.2.3). All five members of the Communication Unit were forced to take involuntary redundancies as a 'business decision' (Blackmore *pers. comm.* 7/5/98) in order to fund additional technical staff. This age-old strategy used by bureaucracies to cover mistakes, fund privileged projects or 'balance the books' was described by Machiavelli in the sixteenth century:

For that which belongs neither to him nor his subjects, a prince may spend most lavishly ...
The spending of other people's substance will not diminish, but rather increase, his reputation;
it is only the spending of his own that is injurious to a prince.

Machiavelli 2004 (1513): 83

The practice of appropriating funds and human resources from 'soft' areas within bureaucracy was well known to the members of the Murray-Darling Basin Ministerial Council when the Communication Unit was established in 1989. To attempt to avoid that situation from arising, funding for communication was clearly identified and separate from Commission office funding.

In addition, in an attempt to avoid the ‘capture’, ‘absorption’ or substitution of socio-cultural staff within the technocratic Murray-Darling Basin Commission Office, Apple’s (1982: 250-253) concept of ‘deskilling-reskilling’(see 2.5), the Ministerial Council had given the Communication Unit the status of a directorate.

7.5.3.1 *‘Things may look up if you roll over’*

While there were adjustments in other sections of the Commission office, the Communication Unit was the only area to lose positions in the re-engineering process. Two and one half communication positions were available for those who wished to reapply but the unwritten conditions of acceptance are well expressed in the following quotation from Kundera:

He knew their game: selling peoples futures for their pasts...They’d force him to repudiate his life; to become a shadow, a man without a past, an actor without a part; to turn even the life he’d repudiated into a shadow...Only after transforming him into a shadow would they let him live.

1982: 15

The position of Director of Communication was renamed and ‘reborn’ with a more technical role. Knudsen (23/11/05) suggests that the dismantling of the participatory communication program and its replacement with monologue was a ‘serious error of judgement’ and that:

A comprehensive participatory communication program should be central to an organisation like MDBC. To achieve sustainable environments, Basin communities need to be encouraged, inspired and involved. In effect, ‘communication’ should be central to all MDBC activities, internal and external.

7.5.3.2 *Socio-cultural survival in a technocratic organization*

Knudsen’s own position of Community Participation Coordinator (CPC) was the only socio-cultural position not to be impacted by the re-engineering. She attributed that situation to still being, at that time, a ‘serviceable other’ (Sampson 1993, see 7.5.2). She suggested that she had survived because:

- (1) the CPC role was never developed to its full capacity, so it didn’t become a threat to the office’s status quo. This was because in late 1994 (I arrived at MDBC in October ‘94) I was coopted into managing the Lake Victoria Project, which was the MDBC’s first priority project at the time.
- (2) The ‘re-engineering’ coincided with the final (and most crucial for the Commission) phase of the Lake Victoria Project. After four years in the Project I had all the knowledge and relationships to guide a very complex Environmental Impact Statement (EIS) through the regulatory and legal hoops.

The Lake Victoria Project involved delicate negotiations with the local Aboriginal community for the satisfactory rehabilitation of a huge Aboriginal burial area, exposed when the lake level was lowered for infrastructure maintenance. It required skills that the technocratic executives did not possess. Lake Victoria is a strategic component of the regulation of the River Murray system because it is the key storage for guaranteeing water for South Australia. However, on the completion of this project, Knudsen and her position became increasingly marginalized and she resigned in 2000.

7.6 INDEPENDENT PROFESSIONAL PARTNER A KEY TO COMMUNITY CAPACITY REALIZATION WHEN DEALING WITH BUREAUCRACY

‘Special forever’ is the only surviving component of the Commission’s generation-long multi-faceted communication and environmental education program, abandoned as a bureaucratic ‘business decision’ after only eight years. There were a number of elements behind the reinstatement of the program. Initially there was considerable community protest from parents directly and via politicians from throughout the Basin about the termination of the program. However, I suggest that the program’s survival is primarily attributable to a second element; the support of an independently credible authority outside of the bureaucratic structure.

‘Special-forever’ was developed and conducted in partnership with the professional organisation, the Primary English Teaching Association (PETA), which was in the position to authoritatively argue the value of the program, and importantly, to also offer to take over its administration. A key element in the success and survival community-government ‘partnerships’, which emerged from a number of interviews, appears to be the involvement of an independent professional non-government partner, such as the PETA or World-wide Fund for Wildlife (WWF), to act as an authoritative ‘honest broker’ and ‘witness-bearer’ (Magnusson 26/11/07; Wangmann 11/12/05; Bradford 10/12/05; Zalec 21/9/05; Hera-Signh 19/7/04). ‘Bearing witness’ is a form of peaceful protest traditionally associated with the Quaker religion that ‘involves going to the scene of an objectionable activity and registering opposition to it simply by one’s presence there’ (Brown and May 1989: 8).

I posit that the life of the Murray-Darling Basin Commission’s communication program as a whole was also extended as a result of the involvement of Mike Hayes during the period 1990-1998. He was a highly experienced journalist contracted to co-write and present videos, and provide input to the overall program. He was able to argue from an independent position of expertise and experience in

the mass media. He was in a position to make informed comment on uninformed executive decisions, which was difficult for an employee in a hierarchical organisation; so performed an important quality assurance role. Like the abovementioned PETA, he acted as a witness-bearer (Brown and May 1989: 8) to decisions made by the chief executive.

The Southern Fishermen's Association was also primarily assisted in the achievement of Marine Steward Council accreditation as a sustainable fishery by the non-government World Wide Fund for Wildlife. Gunderson et al. (1995b: 527) noted that non-government groups with independent expertise 'tend to focus on collaboration and therefore create and enhance connections that are otherwise lacking in the traditional management institutions'. They also identified the pattern of non-governmental groups and epistemic community networks forming 'critical bridges, which appear to fill gaps in existing institutional hierarchies and serve as conduits or media for information flow'.

7.6.1.1 'The kind of nonsense that only a bureaucracy could sustain'

I have demonstrated in this chapter that the attempted adaptation of mechanistic structures and processes to manage complex social-ecological systems is problematic. While they cannot adequately deal with diversity, adaptive processes, and the reflexive socio-cultural aspects of sustainability; they are resistant to transformation for reasons summarised by Pahl-Wostl (2006: 10-11):

Different elements of the management regime such as technologies, management practices, legal frameworks, or social norms have coevolved and have stabilized each other. Furthermore, individual and collective cognitive processes have a strong tendency to maintain internal coherence, despite a potential increasing mismatch with the changing context in which they are embedded, and thus, they resist change.

I have demonstrated that the current narrow technocratic dominance of NRM in the Murray-Darling Basin is a major barrier to progress towards an ecologically sustainable and humanly desirable future. Transformation is necessary to enable holistic management, experimentation, and the authentic integration of community input to effectively produce resilient social-ecological systems. However, in order to retain power, in many circumstances technocrats and dominant interest groups will adopt dysfunctional strategies such denial, backlash, subversion, appropriation, depoliticisation, and inertia to mask inadequacies and exclude contradictions to preconceptions.

Habermas (1971: 111) encapsulates the situation and the need for transformation with the proposal that 'with the veiling of practical problems it not only justifies a particular class's interest in domination and represses another class's partial need for emancipation, but affects the human race's emancipatory interests as such.' Leadership, courage, witness bearing, and new perspectives will be required to declare that 'the technocratic emperor has inadequate clothing', to paraphrase Hans Christian Andersen (Andersen 2004: 71), and more importantly, to address the 'wardrobe malfunction'.

In the next chapter I reveal that decentralisation does not necessarily provide a simple solution to 'the kind of nonsense that only a bureaucracy could sustain'.

CHAPTER 8: THE DECENTRALISATION DILEMMA –‘POTENTIAL FOR PERNICIOUS OUTCOMES’

Lane et al. 2004: 113

Realizing the capacities of rural community institutions to manage ecologically strategic landscapes on behalf of Australian society necessitates the decentralization of natural resources management (NRM). This conforms to the principle of subsidiarity which proposes that problems are best solved near their source and ‘decisions within a political system should be taken at the lowest level consistent with effective action’ (Jordan and Jeppesen 2000: 66). Subsidiarity aims to avoid ‘the risk of “technocratic tyranny”’ (BIICL 2003: 2) but is not a simple devolution of authority. It seeks a balance of non-interference with assistance or intervention if requested (*Ibid*: 6). Decentralised NRM intuitively appears to be effective, just and democratic; as well as being ecologically responsive, able to tap local social memory to help deal with crises, and able to perform tasks cost-effectively through established social networks. Kristianstads Vattenrike demonstrates the successful community governance of an ecologically strategic landscape 110 000 hectares in area, on behalf of Swedish society (see 5.5.1 and 5.5.2).

A bio-cultural landscape or bioregion appears to be an ideal natural resources planning and management unit for a community institution. Bioregions are naturally defined geographic areas with common biophysical characteristics such as soils, climate, native plants and animals, and share common human cultural practices and a sense of community (Sale 2000: 55; see 1.1.2.3). Eckersley (1992: 35) highlights that bioregional-scale management helps residents to understand the ‘metabolism’ (Boyden interview 17/2/06 and 2004: 154) or the inputs and outputs of their regions, which assists them to make more ecologically-informed decisions:

Bioregionalism can play an invaluable educational role in underscoring the importance of ecological relationships, asking where everything comes from and where everything goes, learning to become ‘respectful neighbours’ with local flora and fauna. This orientation is crucial to the critical evaluation of existing development decisions.

A catchment appears to be a natural integrating governance unit to complement, support and add value to the management of ecologically strategic landscapes or bioregions (sub-catchments) by community institutions. An information sheet titled *Catchment Management Authorities. Local people working with their communities to protect and restore catchments in NSW* (New South Wales Government 2005; www.cma.nsw.au), describes Catchment Management Authorities (CMAs) as ‘locally driven organisations’

that coordinate NRM in each catchment. They are described as being 'responsible for involving regional communities in the management of the NRM issues facing their region' (see Appendix 2).

8.1 THE PARADOX OF DECENTRALISATION

No matter how ideal a particular management unit appears, or how intuitively desirable that decentralised community-based NRM may be; as change from 'business-as-usual' there will be contestation (see 1.2.2). Change is political, and intra-community, inter-community, and government-community power-plays are little different from intra-government politics discussed in the previous chapter. As Castro (2002: 210) cautions 'instead of assuming good-for-all outcomes by returning power to the local populations, it is important to understand the local politics in the decision-making process'. Jennings and Moore (2000: 184) add that no matter the scale, 'powerful individuals [or groups] can manipulate or distort decision-making or co-opt the process', for their own benefits. The realization of the capacities of rural community institutions to manage ecologically strategic landscapes on behalf of Australian society necessitates picking a way through an apparent 'mine-field' of contradiction, self-interest, dysfunction, intellectual dishonesty, subversion, and misunderstanding.

An examination of the Goulburn-Broken Catchment Management Authority (CMA) in this thesis revealed numerous contradictions in relation to the benefits of decentralised NRM (see 1.2.1 and 5.3.4). The first is that the catchment governance model can be an additional barrier to necessary transformation from an unsustainable *status quo* rather than facilitating change (Olsson et al. 2006: 31), perversely abetting continued social-ecological erosion. It is vulnerable to 'capture' by vested interests who then have the capacity to perpetuate unsustainable 'business-as-usual' activities (see 4.1 and 5.3.4.1) by masking the symptoms of negative ecosystem change and the erosion of social-ecological resilience, thus lulling the community that they represent into a false sense of security. Walker et al. (2009: 15) attribute the capture of the Goulburn-Broken CMA agenda by the irrigation industry, and its determination to maintain 'business-as-usual', largely to a legacy of existing major engineering infrastructure that 'tends to remain in operation for long periods, partly because of the costs of changing it', which is the 'stranded infrastructure' argument (Roper et al. 2006, Allison and Hobbs 2004: 17; and Light et al. 1995: 153). Quiggin (1988: 636) suggests that historically, Australian society 'placed a high value on irrigation activities and many farmers have made substantial investments on the assumption that public support would continue'. It appears that the CMA is seen as the current vehicle for channelling public support into the region. However, Walker et al. (2009: 25) propose that the assumption of support to maintain 'business-as-usual' for the irrigation industry may be contested in the future:

Historically, the political power of and social support for the irrigation industry has dominated political discourse through extensive lobbying efforts. Proponents of the *status quo* will, in the future, be competing with proponents of change to secure policies and investments that favour their interests.

By attempting to maintain 'business-as-usual' through a process of incremental adaptation by ever-increasing publicly subsidised investment in physical and social infrastructure, the Goulburn-Broken CMA appears to have contributed to locking its catchment and community into a pathological cycle of resource degradation and a progressive erosion of social-ecological resilience, iteratively limiting future options (Anderies et al. 2006: 877). I will further examine this apparent 'paradox of decentralisation' (Tendler 1997 cited in Wallington et al. 2008: 70) through a review of the New South Wales (NSW) CMA model to attempt to establish whether the Goulburn-Broken Catchment case is an anomaly.

8.2 CATCHMENT MANAGEMENT CONFUSION BETWEEN AUTHORITY, KNOWLEDGE AND SKILLS

Unchecked authority for community-level decisions is likely to lead to perverse conservation outcomes.

Agrawal and Gibson 1999: 640

Curtis and Lockwood (2000: 70) identified some of the risks of making large public investments through regional catchment strategies, including inadequate knowledge base and an inappropriate range of skills to identify priorities across issues, and:

(O)ngoing concerns about co-option, including those arising from limited stakeholder representation on catchment bodies and the impact of different regional and state contexts; the importance of adequately resourcing and professionally managing volunteer programs... and the potential political costs and loss of community confidence of not establishing rigorous and transparent cost-sharing arrangements.

The risk of exacerbating the above concerns appeared to have been increased in NSW in 2004 with the establishment of CMAs with a corporate approach to NRM. Of particular concern is the reduction of the size of the governing board and especially the replacement of regional community representatives with nominated 'skills-based' members, reporting directly to the Minister (Kelly 2005: 243). Another concern is the potential for a general manager and key board members to establish a cartel, especially if they had previously worked together or there is a frequent change of Minister (State Catchment Management Coordinating Committee 1999: 50).

The current CMA executive structure, while presumably designed for flexibility and quick response, perversely also places a dysfunctional executive in a position to do the opposite, which does nothing to allay the concerns identified above by Curtis and Lockwood (2000). As I will discuss, the NSW CMA model is perceived to lack transparency and downward accountability, to be 'distant' from the community as a result of a lack of direct representation, to be hostile towards Landcare, to be primarily involved in reductionist management by not funding regional projects, and to discourage grass-roots feedback. There are also fears that appointed board members could be *de facto* regional or industry representatives with the potential to 'capture the agenda' for an increased concentration of privilege, or the exclusion of perceived 'competition'. Regulatory capture (Productivity Commission 1999: 13) occurs when the policy making process is heavily influenced by groups affected by the regulation:

People's perceptions of an NRM institution's accountability, together with their perceptions of its representation, legitimacy, transparency, fairness and justice collectively influence the perceived credibility of that institution.

Pero and Smith 2008: 16

Confusion over the roles of CMAs in NSW and their relationships with landholders was raised in evidence provided to an inquiry into the 'Management of the Murray-Darling Basin system' conducted by an Australian Senate Standing Committee on Rural and Regional Affairs and Transport on 9 September 2008. Bill Phillips, wetland consultant, former Assistant Secretary for water programs in the Commonwealth environment department, and former Deputy Secretary General of the Ramsar Convention on Wetlands in Switzerland, stated that his work with rural landholders in recent years had revealed frustration with current processes. Phillips (2008: 105) explained that landholder 'pleas for action and their enthusiasm to get on with improving river health' and working towards more sustainable farming enterprises were 'gaining no traction' and that there is a 'need to find different ways to support and assist them'. He made the following observations:

It is quite clear that the CMAs were established to become the front line in working with landholders. They have struggled to build momentum in many parts of the country, in New South Wales most notably, because they have been allowed to become mini state government bureaucracies, rather than operating as catalytic bodies that help to facilitate action by landholders. Rather than playing this role to facilitate and encourage action by landholders ... these organisations have been through prioritisation processes and focus their efforts only in particular areas. I believe that it is counterproductive in terms of trying to get broadscale community and landholder action to address the problems that are causing the difficulties we currently have with water management across the basin.

8.2.1 The dangers of adopting a corporate model to manage social-ecological processes

A feature of NSW CMAs is the use of corporate management methods (Fidelman 2006) for a 'public good' process that is reliant on community, and particularly landholder, goodwill, local knowledge,

and voluntary support for success. The prescriptive hierarchical model appears to have been adopted for reasons of administrative convenience, upward accountability, mechanistic 'efficiency', and community control, but represents a 'poverty of process' (Woodhill 1999: 109, 112) when used in the management of social-ecological systems. Social-ecological systems are not mechanistic structures that work on predictable simplistic linear 'cause and effect' or 'reward and punishment' bases that can be controlled by a regulating 'governor', like a steam engine. They predominantly consist of complex interconnected networks that operate organically through response and reflexivity and are sustained by the accumulation and exchange of social capital, through established relationships.

8.2.1.1 *Insulated management*

Within a 'closed' hierarchical corporate structure it is possible for management to make uninformed, inappropriate or no decisions at all, sometimes with long-term negative consequences. Rolling and Wagemakers (1998: 4) propose that:

By virtue of their privileged position, the elites who have a formal or social mandate to provide leadership are often shut off from direct or even indirect experience of the signs of change. They have the power to maintain their lifestyles and the way things are when it is no longer prudent to do so.

Executive decisions within a bureaucracy or corporation can be sustained by 'pulling rank' and ignoring staff advice or other feedback, thus ensuring that pre-conceptions are not contradicted (see 5.3.1). Pero and Smith (2008: 16) point to a possible explanation of such behaviour in the grooming of senior bureaucrats for leadership. They found that Australian leadership programs emphasise the development of 'executive or individual leaders over facilitative or generative leaders'. However, the latter are necessary for effective NRM in social-ecological systems to release the expertise and energy of rural community groups to manage ecologically strategic landscapes on behalf of society. Kelly (2005: 47) notes that some government officers will resist involvement in facilitation because of concerns that it devalues their expertise. She adds that poor communication skills and abilities among some bureaucrats can also exacerbate power inequalities between them and the public. As 'gatekeepers of information', if the communication of government institutions and staff is poor, 'local people's ability to access information is hindered'. Kelly (2005: 246) concludes:

The current technologies of government – their structures, policies and discourses – tend to limit rather than facilitate participatory processes, despite the rhetoric. The intent for community engagement may be voiced, but the current institutional frameworks make it difficult to implement genuine power sharing in decision-making.

Technocratic insecurity with community engagement as a result of inadequate or inappropriate expertise and communication skills, and possible resentment, may manifest itself in defensive management methods. My observation of one NSW CMA over a 19 month period revealed the most extreme form of civilian, non-correctional, command and control management witnessed in my four decade-long career. Such a management culture has the potential to add additional barriers to staff and community capacity realization, to authentic government-community partnerships, and to stifle adaptive management. Hillman (2002: 355-356) commented that the experience of NRM in NSW is that 'the State Government is not prepared to let community participation to go beyond a certain point, and certainly will provide very limited, if any statutory basis for such participation'. He ponders whether such government-community partnership policies 'actually promote more participation or act as a form of control or domestication of "feral" community concern and anger'; a 'co-option and control agenda'.

8.2.1.2 *Command and control*

A danger of an undemocratic corporate model with upward accountability and pressure to achieve 'quotas' but little or no downward accountability, is the temptation by lazy management, or one that feels threatened, to adopt a culture of 'command and control' (Holling and Meffe 1996: 228; Briggs 2003: 161), which paradoxically can represent considerable risk:

Institutions managed by command and control have low resilience to new challenges, because the system discourages innovation and punishes alternative perspectives by employees ... a growing isolation of agency personnel from the systems being managed and insensitivity to public signals of concern.

Briggs 2003: 161

A command and control management culture may exclude valuable community and staff input, such as experience, knowledge and up-to-date methods, in addition to quality assurance, and staff and community 'ownership'. As a result, planning decisions and implementation processes are vulnerable because they are limited by the imaginations, experience, and expertise of a small pool of insulated executives. What I describe as the 'big frogs in a small pond' syndrome. Such a situation has the potential to bring with it a danger of introspection, and uninformed, under-informed or defensive decision-making; unless there is a feedback loop from those affected, or there is authentic independent expert input to provide a 'reality check'. Lopez-Ridaura et al. (2002: 138) suggest that the 'evaluation of sustainability is a participatory process requiring an evaluation team with an interdisciplinary perspective' and should include external evaluators and internal participants.

My observation of an attempt by a NSW CMA to organise the NRM program as an industrial undertaking through ‘command and control’ (Hollings and Meffe 1996; Briggs 2003), and a ‘Gantt chart-centred’ linear approach, indicated an inadequate, out-dated knowledge base where ‘effective organization was [still] viewed as a machine’ (Westley 1995: 394). A Gantt chart is a horizontal bar chart used in project management that illustrates project schedule and progress on a calendar grid. However, it is unsuitable for the management of complex social-ecological systems, which require a ‘shift in focus from control to responsiveness’ (*Ibid*: 395), and in fact can have undesirable outcomes, as discussed below.

Hunting and Tilbury (2006: 37) begin one of the chapters of their document, *Shifting towards Sustainability* with the question: ‘Does your organisation still use Gantt charts for projects?’ as a key indicator of an organisational approach that ‘is not appropriate for change for sustainability’. The prescriptive project management methodology with upward accountability, and driven by deadlines or quotas made visible in Gantt charts, is a mechanistic process designed for short-term individual outcomes. Its application to dynamic, volunteer-based social-ecological systems, combined with little or no downward accountability, is inappropriate as it is not systemic, resilient, or empowering, and can seriously erode existing social and human capital.

The lack of downward accountability combined with a ‘treadmill mentality’ of achieving Gantt chart milestones, risks the subversion of the focus and priorities of CMA staff with the potential to normalise a culture of contempt and hostility towards the community for their ‘inconvenience’ in slowing milestone achievement. The emergence of a similar unpleasant culture of downward blame was one of the main reasons for the abandonment of the diffusion model of agricultural extension, for all but specific mechanistic training processes, in the late 1970s (Vanclay and Lawrence 1995: 116-118; see Appendix 8).

8.2.2 ‘Old wine in new bottles’ – a ‘crisis of perception’

From my observations, the NSW CMA model has the potential to be structured and staffed for the redundant paradigm that saw NRM as primarily ‘a biophysical problem to which there were technical solutions which, once developed, can be “extended” to landholders’ (Woodhill et al. 1992: 263).

Expertise and experience in the management of social-ecological systems, social and institutional analysis, and community relations appeared to be inadequate or suppressed in the CMA that I observed. Attempts to use an industrial structure and to ‘recycle’ technical staff without comprehensive retraining and updating of skills to perform effectively in social-ecological systems, or to suppress

those who have appropriate expertise, is flawed. Inadequate expertise and knowledge to manage non-technical situations, and/or resentment at having to do so, appears in certain circumstances to result in a psychological 'crisis of perception' (Capra 1997: 3-5; See 2.3.3). In turn, this may precipitate the development of a defensive-subversive culture resulting in unconstructive relationships with certain community groups or individuals. As Bartley et al. (2008: 167) propose:

One reason decentralization has fallen short has to do with the persistence of older routines. Although reform scrapped the old organizations and created several new ones, the main players still operate with the logic and habits of the old regime.

They (*Ibid*: 165) suggest that the linchpins of successful decentralised programs are local politicians and government officials who have to bear the weight of new responsibilities and demands from a variety of different stakeholders. However, if those individuals do not understand or are not qualified for those responsibilities they are 'likely to neglect or even subvert their new responsibilities, thus frustrating reform efforts'.

8.2.3 Landcare – Catchment Management Authority dilemma

The failure of all levels of government to value and actively support local voluntary organizations, including Landcare, has generated widespread community cynicism and undermined commitment to regional NRM processes.

Paton et al. 2004: 263

Fidelman et al. (2005: 4) suggest that the structure and roles of CMAs reflect a shift from a community-based NRM model 'towards a quasi-government system', which appears to have had negative impacts on Landcare and other community groups working on a scale larger than individual farms. This observation is supported by the following statement by Murrumbidgee Landcare Incorporated (2006: 3):

Throughout the 1990s the landcare movement in the Murrumbidgee Catchment was enthusiastically embraced by land managers and the urban community alike. By 2001 the Murrumbidgee Landcare Association (as it was then known) was representing the interests of over 2,000 members in 140 independently governed landcare groups. During the four years from 2001 to 2005, repeated restructuring of State Government agencies delivering Natural Resource Management (NRM) lead to a loss of momentum, uncertainty and frustration within the landcare community.

Hillman and Howitt (2008: 62) also flagged concerns about government assumptions that 'community networks can and will survive long funding and management hiatus'. The perceived commencement date of the decline of Landcare and other community groups involved in NRM in NSW is frequently identified as 2004 (Personal observation; Thomas, *Border Mail* 18 July 2008), coinciding with the establishment of CMAs. The structure and culture of the CMA, that I observed,

appeared to paternalistically perceive community members as needing external input to move them in a preordained direction, and to be ‘used’ (Murrumbidgee Landcare Incorporated 2006: 10) to achieve various apparent government ‘quotas’, such as vegetation protection. They certainly did not appear to be considered as knowledge and skill-rich partners with the ability to make decisions that are in their own interests (Vanclay and Lawrence 1995: 100), in a participative learning process.

The numerous potential advantages of having CMAs administering catchment management and planning, such as ‘a “one-stop-shop” for planning and funding, access to expert advice, “big-picture” (regional) planning, and more efficient project co-ordination’, were acknowledged by Landcare groups (Murrumbidgee Landcare Inc. 2006: 4-5) but community expectations appear to have generally been disappointed (Personal observation; Benjamin *pers. comm.* 28/5/08). A report titled *Redefining Landcare* (Murrumbidgee Landcare Inc. 2006) on the outcomes of focus workshops held across the Murrumbidgee Catchment in 2006 stated (page 4) that despite the drought, ‘the most significant change that has confronted landcare members over the past two years has been the establishment of the regional Catchment Management Authority (CMA)’, which has had a ‘dramatic effect on landcare’ in two main ways. Firstly, Landcare Coordinators were removed from being under the auspices of Landcare groups and networks and became CMA employees, rebadged as Community Support Officers (CSOs). However, CSOs can only dedicate ‘one day a week’ to Landcare work. Secondly, NRM funding administered by CMA ‘now bypasses local landcare groups and goes directly to individual landholders’. The important community and social capital aspects of NRM are eroded and the scale of projects is reduced, as a result of the policy. The report states that:

This has served to diminish the perceived purpose of these [Landcare] organisations which have in the past made a significant contribution, not only to NRM, but also to the social fabric of the community; particularly during periods of hardship. Consequently these organisations are now struggling for relevance as the changes in funding strategies and support has often diminished their responsibility, investment and organisational capacity.

A recurring issue at both the workshops and Forum was the perceived lack of recognition given to the contribution made by the landcare community to the partnership with the MCMA. It was felt that landcarers’ skills, community networks, corporate NRM knowledge and volunteered time were largely unacknowledged and required genuine recognition if the partnership between the landcare community and the MCMA is to mature.

Murrumbidgee Landcare Incorporated 2006: 4

8.3 REALITY TESTING

Early in 2006, after the completion of two years of my doctorate research, I had an opportunity to test some of my findings by spending an extended period of time in one of my case study areas and to:

Work with the community to develop an integrated natural resource management plan for the Lowbidgee floodplain. Develop an implementation program to improve wetland health and the management of natural resources.

<https://jobs.nsw.gov.au/JobDetails.asp?JobAdvertId=45316> (Accessed 30/01/06)

The project involved the production of a 'Lowbidgee NRM plan including quantified water sharing rules', which it was anticipated would result in the achievement of 'a high degree of community ownership, protect environmental water needs of the Lowbidgee floodplain, leading to rehabilitation of wetland ecosystems, and define a mechanism for the quantification of irrigator access annually' (MCMA 2006: 12).

I took leave from my research and commenced work with a CMA to carry out an apparently straight-forward task. For that project I was an 'advisor acting as an insider', which Pinto-Correia et al. (2006: 341) identified as 'one of the key factors explaining trends and potential in local landscapes'. I was familiar with the history, ecology and geomorphology of the region and aware of its strategic ecological location within the Murray-Darling Basin context. I had also worked with the community in the past (see Appendix 3).

I was aware of the century-long struggle by community members to maintain water for the floodplain, and its semi-official marginalisation often manifested as diminution or omissions (Taylor et al. 2006) from programs; such as the fact that the floodplain had been excluded from a recent water sharing plan for the catchment (DLWC 2002 Part B: 27). I was also comfortable with the fact that such projects are always 'political'. As Yaffee (1997: 336) proposes, intergroup conflict 'is the basic engine of social change, and hence at times, it should be valued, not minimised'.

8.3.1 Maintaining 'business-as-usual'

The NSW CMA model appears to perform a similar role to the Goulburn-Broken CMA in Victoria, in attempting to achieve more efficient 'business-as-usual', rather than facilitating change (Olsson et al. 2006: 31; Andries et al. 2006: 871). 'Business-as-usual' includes the lower Murrumbidgee floodplain having access to surplus water only, as established under a pre-ecological mechanistic river regulation

process and state-sponsored industrial irrigation model from the early twentieth century. These are vestiges of a time when 'there was a general principle that irrigation schemes should be undertaken whenever it was technically feasible' rather than being market-driven (Quiggin 1988: 636), and without ecological considerations. The production of a NRM plan for the lower Murrumbidgee floodplain had the potential to contribute to the questioning of the maintenance of those values.

Approximately two weeks after my commencement date, the Chair of the CMA Board announced that CMAs had no authority to carry out the water sharing and water-use aspects of the Lowbidgee Natural Resources Management (NRM) Plan, so the project would have to be revised. This revelation appeared to expose a major lapse in quality assurance by management and had not been picked up by a large meeting of technical experts a few weeks earlier. Detailed 'Special Conditions' were added to the project brief excluding the major water elements of the plan, which brought into question the project justification and the legitimacy of its funding, it compromised project outcomes, and contradicted project outputs and a number of key 'milestones'. This resulted in the challenge of producing an NRM plan for a water-created and flood-dependent landscape in isolation from its river 'life-line'. Further layers of difficulty were added by long delays in the modification of the plan, and further delays in their approval, during which time I was forbidden to discuss the plan with the community. These delays were followed by delays in the establishment of a Liaison Committee prescribed to oversee the project.

A pattern of frequent and apparently systematic obstruction, minor insults, delay, disregard of prescribed procedures, inflexibility and secrecy, beyond reasonable bureaucratic dysfunction, quickly emerged. The perplexing behaviour appeared to have the perverse goal of making it almost impossible for me to complete the task that I had been employed by the same organisation to perform. In particular, the actions and in-action appeared designed to isolate me from members of the community that I was to work with to develop the plan, contrary to the advertised position (see 8.3). The combination of incidents triggered a recollection of an Australian Broadcasting Corporation (ABC) radio program called *Life Matters* that featured a story about mobbing on 14/10/2004 (www.abc.net.au/rn/talks/lm/stories/s1219388.htm accessed 15/10/04). It described mobbing as 'insidious workplace behaviour' that 'isolates' targets 'in an effort to drive them from their position'. A guest on the program, Kenneth Westhues, described workplace mobbing as 'a furious collective attack made with undisguised glee on an overachiever or someone seen as threatening', to rob them of their dignity and self-respect, with the ultimate goal of 'eliminating' them from the workplace (2004: 1). He suggested that mobbing is generally performed on a worker where there is 'no legally defensible grounds for termination' but who 'fails to pick up subtle hints

and leave voluntarily' (2002: 34). Links and references accessed from the *Life Matters* web-page indicated that I was being mobbed (Workplace Mobbing Australia www.uq.net.au/~zzlshall/ accessed 15/10/2004).

8.3.2 A case of mobbing

Mobbing involves frequent acts of passive aggression by a small group on a target over a long period of time. The cumulative effects are reduced productivity, stress-induced illness, loss of income, invalidity or death, suicide, and very occasionally a workplace massacre-suicide. Unfortunately it is often only after an extreme event, such as the latter, that the issue receives national attention (Westhues 2002: 30-36). German psychologist Heinz Leymann first used the term 'mobbing' to describe psychological 'terrorism' in workplaces. He borrowed the word from animal behaviourists who use it to describe the harassing actions of a group, such as birds, to drive off a threatening individual. Leymann (1996: 167) found that the word 'bullying', commonly used in Britain to describe physical aggression, was an inadequate description of the often subtle, passive-aggressive characteristic of workplace mobbing:

(P)hysical violence is very seldom found in mobbing behaviour at work. Rather, mobbing is characterised by much more sophisticated behaviours such as, for example, socially isolating the victim.

Westhues states that mobbing among birds and mammals should not be seen as a metaphor for what happens between humans (2007:4). The phenomenon of mobbing is a natural part of human group behaviour and is as old as human society. However, its pernicious application in workplaces was not systematically described until 1982 (Leymann 1996: 165). Leymann articulated the process while conducting clinical studies on Swedish workers who had encountered traumatic events in their work places. He found that people who had experienced mobbing were generally more traumatised than workers who had experienced extreme single events, such as bank tellers who had been victims of armed robberies. He suggests that the consequences of mobbing are 'so grave and out of balance' that the process 'should be seen mainly as an encroachment of civil rights' (1996: 172). He estimated that about 12 percent of people who committed suicide in Sweden had been recently mobbed at work and made the following statement to emphasize its seriousness:

In the highly industrialised western world, the workplace is the only remaining "battle field" where people can "kill" each other without running the risk of being taken to court.

Leymann 1996: 172-173

He considered mobbing to be an occupational health and safety issue that needed to be evaluated in the same way as events that lead to physical injuries because it produced 'psychological occupational

injuries with profound consequences' (1996: 173) including the potential for life-long damage to the target, and considerable expense for society as a whole. Westhues describes mobbing 'as the stressor to beat all stressors' (2002: 32). Paparella, Rinolfi and Cecchini (2004: 1) give the figure of 60% as the reduction in a targets' work performance.

8.3.2.1 *Isolation, attrition, and disregard of established procedures*

Confirmation of mobbing for me came with a telephone call from one of the managers while I was in the field, approximately three months after the commencement of my employment, warning me not to discuss project details with community members until it had been approved by management. The tiny CMA executive with 24-hour mobile telephone access had not found time to approve my task. In the past I had experienced the approval of contingency plans for an equally complex project, in a much more isolated situation with limited two-way radio communication and involving two levels of government and an international organisation, in 24 hours (Koroba Provincial High School 1980: 1). Management refusal to clearly define responsibilities (Leymann 1996: 166), and avoiding appropriate and timely decision-making or action (Westhues 2004:1), are primary mobbing instruments. They are often part of a process of 'setting up to fail' (Yuceturk and Oke 2005: 68), which if unsuccessful can be followed by a sham peer review or manipulation of work performance (Westhues 2006: 12).

The core mobbing strategy involves distracting and isolating the 'target'. In addition to limiting interaction with the community, I was also isolated from the Project Liaison Committee (PLC) that was to oversee my work and provide guidance, firstly by management taking seven months to establish the group and have the first meeting, and its refusal to appoint a socio-cultural representative despite the availability of an excellent candidate. The Committee was then abandoned after only one of the seven quarterly meetings prescribed for the project. That action was reminiscent of the disbanding of the Intergovernmental Communication Working Group by Murray-Darling Basin Commission management (see 7.5).

It also contradicted an earlier explanation by the General Manager that management could not take any decisions without input from the PLC. Westhues (2004:1) identifies disregard of established procedures as a common mobbing instrument. The exclusion of an independent network of experts capable of 'bearing witness' (Brown and May 1989: 8) or providing necessary quality assurance, appears to be a predictable action in power strategies designed to ensure the easy exclusion of anything that does not contribute to management's preferred outcomes.

8.3.2.2 *The key stages of mobbing*

Leymann identified a generic pattern of key stages that the process of workplace mobbing passes through to achieve its goal. Subsequent researchers have presented the stages in slightly different ways and may use slightly different terminology but there is remarkable conformity in the process. Davenport et al. (1999: 38) explain that typically there are five phases, with the fifth being the expulsion of the target from their employment. Shallcross et al. (2008a: 10) also identified a sixth, post-expulsion phase, where transformation can take place.

Box 6. Key Stages of Mobbing

STAGE	SHALLCROSS et al. (2008b: 57)	WESTHUES (2004: 1)
1	Unresolved conflict/ trigger incident.	Avoidance and ostracization of the target.
2	Increasing psychological abuse.	Petty harassment: making target's life difficult.
3	Involvement of management to the detriment of the target	A critical incident that triggers formal sanctions: "something has to be done".
4	Target branded as 'difficult' or mentally ill.	Aftermath of the incident: hearings, appeals, mediation.
5	Expulsion	Elimination: target quits, retires, is fired, become disabled, dies of stress-induced illness, or commits suicide [occasionally murder-suicide].

After becoming aware of being mobbed, I identified, anticipated, and experienced the following stages of the process:

1. Unresolved conflict/ Target rationalization (7 April-19 June 2006).
2. Escalating passive-aggression (30 June 2006-19 July 2007).
3. Critical incident requiring executive action (19 July – 3 August 2007).
4. Negative target branding (3 August – 23 November 2007).
5. Exclusion (23 November 2007 – 21 July 2008).

I have also used these stages to structure an analysis of the marginalization of the lower Murrumbidgee floodplain and its residents from the beginning of the twentieth century (see Chapter 13).

Several threats of disciplinary action were made by management in the course of my consultation with and providing feedback to the community on project progress (Francis 2007 and Bugden 2007). Westhues (2004: 1) identified a high value on secrecy, confidentiality, and communication control as important mobbing principles. I was also the accused of conflict of interest: undermining targets' social capital and reputation is a key strategy (Westhues 2004:1, Westhues 2006:19). Accusing and putting the target on trial (Leymann 1996: 167) through a spurious 'kangaroo court' process (Duffy and Sperry 2007: 402) are characteristic of stages three and four of the mobbing process, which I experienced. That process is necessary to officially negatively 'brand' the target in order to justify further mobbing and to encourage a 'voluntary' exit. While I have the capacity to perform the tasks prescribed to produce the plan, and I did produce it along with a broadsheet and a ground-works program, mobbing attempts to ensure that it cannot be (easily) realized (Rosen et al. 2007: 4). Ultimately, preconceptions can still be upheld by ignoring or 'editing' work and/or denigrating the producer (Westhues 2004: 1 and 2006: 12; Flyvbjerg 1998: 31; see 5.3.1).

8.3.3 The power of an existing system to obstruct change

My personal experience of mobbing, and the difficulty to bring up-to-date knowledge and more than four decades of relevant experience to a task, highlights the significance of the capacity realization aspect of my research topic. Building and achieving capacity is sometimes the easy part of the journey but being 'allowed' to realize even some of it may involve considerable struggle, sometimes with high stakes.

The nature of mobbing meant that I could realize only part of my capacity when developing the Lowbidgee Natural Resources Management Plan, and that only with great effort and discipline. That situation was despite my training and experience of change, familiarity with NRM bureaucracies, local knowledge of the landscape, established relations with a broad range of community members and scientists, and an awareness of being mobbed. Had I not recognized the mobbing pattern relatively early in the process and developed a strategy to minimise the distraction and psychological damage, I would have achieved much less. As Meadows et al. (1992: 223) propose:

An existing system can constrain almost entirely the attempts of an individual to operate by different rules or to attain different goals than those sanctioned by the system.

8.3.3.1 *Rationalization presented as rationality*

Flyvbjerg (1998: 2) claims that rationalization 'presented as rationality is shown to be a principal strategy in the exercise of power'. In other words, if a group is sufficiently powerful, or has representatives in

positions to 'gate-keep', it can 'manage' its accountability, define its own reality, and avoid rational justifications or contestation through a 'will to ignorance' (*Ibid*: 31) if that proves convenient. A 'will to ignorance' involves ensuring that pre-conceptions, perceived 'rights', and privilege are not contradicted, which is achieved by the political act of refusing to consider all relevant information equally. As Flyvbjerg (1998: 31) explains:

The documentation not produced is just as interesting as that which is produced. The decision to resolve a clear-cut controversy over arguments by simply refusing to investigate it further is "political" by any sense of the term. We can see that the closer one sits to political power, the less use one apparently has for technical documentation, and the less rational one is in this sense.

8.3.4 A crisis of trust

I have illustrated the vulnerability of decentralised NRM models to subversion, with 'the potential for pernicious outcomes if participatory opportunities are not carefully facilitated and mediated' (Lane et al. 2004: 113). Without sufficient transparency, upward and downward accountability and democratic representation, such models are vulnerable to 'capture' by groups wishing to protect their interests, which may not be in the interest of broader social-ecological resilience.

The current simplistic structure has created a crisis of trust between CMAs and many community-based NRM groups, in a number of areas in NSW (Torbay 2006). It demonstrates the potential 'local trap' (Brown and Purcell 2005: 607) in the assumption that local actions and decision-making, in this case at a catchment-scale, will inherently be 'more socially just or ecologically sustainable' than centralised decision-making (Marsden 2006:185). The problem appears partly to be due to the difficulty of achieving a balance between responsibility and accountability in government-community relations:

Responsibility and accountability can work together, but getting the balance right is never easy ... Democratic governance needs both the initiative that comes with officials taking responsibility for their own discretionary contribution to public affairs and the public protection that comes with the obligations of accountability expected of officials ... accountability, although necessary, is of itself insufficient to generate effective democratic governance. The other side of the story is that discretionary responsibility is in fact too powerful to be left alone, where it can descend into irresponsibility in the absence of checks of accountability.

Uhr 2005: 28-29

8.3.4.1 Institutional fallacy

The current NSW CMA model serves to highlight the dangers of assuming that the prescription of a particular structure or scale of management will result in a pre-determined positive outcome, which will not require on-going review and adjustment. Hillman and Howitt (2008: 62) refer to that

situation as ‘the “institutionalist” fallacy’ which assumes ‘that by getting the formal settings and structures right the rest will follow’. It also reveals a problematic gap between the assumptions of policy-makers and those of implementers, and possibly more significantly an apparent reluctance of the initiators of the model to quickly address flaws; a process that they may perceive would reflect poorly on their initial judgements. The inadequate consideration of human requirements, or ecological uncertainty, for effective adaptive management of social-ecological systems, appears to be a major flaw in the current NSW CMA model.

8.3.5 Re-engaging farmers and Landcare

A review of integrated catchment management in Australia more than a decade ago recommended the following skills for field staff in order for the process to be effective and to re-engage farmers:

The idea of giving legitimacy to local knowledge and of working with groups demands new skills of those involved in information exchange. In particular, it demands that extension workers (where still in place) not only have a well-developed technical knowledge, but also an understanding of adult learning principles and a capacity to facilitate interaction between agribusiness, consultants, researchers and land users ... a shift in role from technological problem solving to one of managing local knowledge systems.

Ewing et al.1997: 32

Advisors ‘acting as an insiders’ (Pinto-Correia et al. 2006: 341) are required to work closely with communities on a landscape or bioregional scale to improve social-ecological resilience, and to establish and maintain links to larger scales. Bioregional management would help to mediate the current escalating conflict between community-based and culturally defined Landcare regions, and government-controlled and biophysically defined CMA catchments (Baker 1997: 65).

Sven-Erik Magnusson (see 6.2) exemplifies a person with the types of skills necessary for a team leader to help realize the capacities of community institutions to manage ecologically strategic landscapes on behalf of society. The team and the leader in particular, would require an ability to take a multi-dimensional (temporal, spatial, symbolic, social-ecological) view of a landscape, to access both social memory and scientific knowledge, and to integrate them as required to contribute to a strengthening of social-ecological resilience. In addition to effective communication skills; facilitative, interpretive, and deliberative-analytic skills would be required. The team leader would also require sufficient social capital to be considered to be an honest-broker by a majority of community members.

I posit that leadership must also be demonstrated by the NSW Natural Resources Commission, which is responsible for the CMA model, by quickly and unconditionally transforming it, in order to break the increasingly counter-productive deadlock with large parts of the community, and especially Landcare groups, in many catchments. Further persistence in attempting to incrementally adapt inadequate mechanistic models, corporate management methods, and predominantly technical staff, to manage social-ecological systems, may result in increasing incidents of 'crises of perception' (Capra 1997: 3-5; see 2.3.3) within staff (see 8.2.2), in addition to further community disengagement.

8.3.6 Evaluation of community-based natural resources management

Increased community-based natural resources management is at the heart of social-ecological systems resilience. Community-based NRM has considerable potential if subversion can be avoided and limitations acknowledged. As Kellert et al. caution:

The rhetoric and promise of CNRM [community-based natural resources management] remains powerful and persuasive, but this should not be substituted for rigorous and objective evaluation.

2000: 714

The most vulnerable aspect of CNRM is the general lack of influence or control over activities, processes and institutions operating at greater scales (Woodhill 2002: 318). This is a result of the continued compartmentalisation of NRM due to the vestigial influence of a mechanistic worldview. However, the 'politics' of CNRM, and the desire by privileged groups to maintain business-as-usual, is no less intense than inter-government, intra-government or government-community rivalry. It is frequently more confronting but it is also more open to the influences of democracy through direct social pressure and the media. A huge range and intensity of contestation may occur within and between rural communities and there are advantages in having centralised NRM partners as independent arbiters to help avoid the 'tyranny of localism' (Lane and Corbett 2005: 141; see 1.2.1). A key difference that I have experienced in dealing with direct community contestation, in comparison with NRM bureaucratic contestation, or even more difficult indirect community contestation using bureaucracy as a vehicle, is that the former can be brought to a head and either resolved or an agreement to disagree established. However, there is a tendency for the latter to 'manage' contestation through strategies of inertia and attrition. A 'problem' may be 'managed' for decades or longer if it is expedient to do so (see Chapter 13) deliberately maintaining tensions (Hera-Singh 19/7/04, and Dovers 2005: 33) to generally privilege dominant interest groups and gain their approval (Woster 2001:213), while eroding the social-ecological

resilience of ‘others’. Even when reforms are made, they can be subverted or overturned after the reformers move on due to bureaucratic continuity (see 7.5.3).

Powerful community interest groups will generally attempt to maintain privilege through a range of strategies including legal threats, or letters of complaint to government ministers if a government employee is involved. Field workers are often placed in the ‘Catch 22’ position of being resented by community groups who fail to ‘capture’ them and being ineffective if they are ‘captured’. Intra-community and inter-community rivalry can sometimes result in hostility being transferred to an innocent field-worker. That situation can be made more complex if they are employed by a government authority or private interest group with particular expectations, which may not always accord with the publicly stated task of the field worker. In addition, the generally low status attributed to field officers and lack of appreciation of their complex roles by generally technocratic NRM managers (Knudsen interview 23/11/05), frequently results in inexperienced and inadequately trained personnel being employed, resulting in unsatisfactory results, which may be used to rationalise abandoning the process (Bishop and Gibson interview 26/3/06). An independent and responsive arbitration process is essential for effective CNRM, and regular authentic reviews and renegotiation of relationships or partnerships must take place to avoid ‘pernicious outcomes’, particularly where CNRM is administered by small government-appointed boards.

8.3.6.1 Regular review and renegotiation

There appears to commonly be a lack of communication between policy-makers and bureaucratic managers due to compartmentalisation, and mismatched expectations in community-government partnerships. There are also cultural differences between biophysical sciences and the social sciences/humanities. These are in addition to the tendency to ‘recourse to technocracy’ (UNESCO 1980: 26) in many NRM agencies, and their preference to ‘set and forget’ the conditions of relationships imposed or established at a particular time. This situation creates enormous potential for misunderstanding of roles, status, and expectations in the relationships between different partners. Effective working relationships require considerable consultation, education, negotiation and deliberation to establish (see 9.1.1.2); and on-going dialogue, and regular review and renegotiation to maintain. Unfortunately, frequently none of this occurs, which potentially creates an environment for maintaining business-as-usual for dominant groups and the disaffection of others.

A problematic aspect of the technocratic culture that dominates NRM in the Murray-Darling Basin is that it is based on biophysical science that proceeds by closing down debate and establishing a narrow instrumental approach, which it is extremely reluctant to review or renegotiate. Such decontextualised technocentric business-as-usual is inadequate for the management of dynamic social-ecological systems and may seriously erode resilience, as illustrated by the global fisheries collapse (see Chapter 4).

The current situation represents a 'poverty of process' (Woodhill 1999: 109), which I discuss in the next chapter.

CHAPTER 9: 'POVERTY OF PROCESS' – MECHANISTIC MALADAPTATIONS

The natural resources management (NRM) methods used by bureaucracies in western industrialised societies are primarily legacies of a worldview constructed during the European Enlightenment and scientific revolution of the seventeenth and eighteenth centuries, whose fundamental principles were dualistic, mechanistic, and reductionist. It emphasised control and predictability, and assumed that human and natural systems could be treated separately. However, as Capra (1997: 187) explains, the interconnected and interdependent world works in a very different way from the compartmentalized mechanical model that classical western science constructed:

Instead of being a machine, nature at large turns out to be more like human nature -unpredictable, sensitive to the surrounding world, influenced by small fluctuations. Accordingly, the appropriate way of approaching nature to learn about her complexities and beauty is not through domination and control but through respect, cooperation, and dialogue.

There is a realisation that we must take both holistic and reductionist approaches to NRM, that ecological relationships and processes are as important as 'sites', and that socio-cultural structures and processes play a key role. Klug (2002: 703) highlights that what is profoundly different in the social-ecological systems approach to NRM 'is the recognition that all human activity within and even from outside of the particular ecosystem is implicated in the sustainability of the resource'.

Woodhill (1999: 204) suggests that from a 'historic perspective, the positivist, technocentric and reductionist mode of agricultural science and NRM both contributed to and failed to respond to land degradation' and by implication the erosion of social-ecological systems generally. He explains that while the limitations of 'technocentric' approaches are now widely accepted, 'there is little evidence within regional [natural resources] management of the active development and use of alternative methodologies that have the sophistication to cope with the complex and multi-dimensional nature of the problems' (*Ibid*: 109). He describes that situation as 'a poverty of process'. He defines 'process' as the way in which humans and their organisations identify problems, make decisions, take action and reflect on what they have done.

NRM bureaucracies and agricultural industries in Australia's Murray-Darling Basin remain largely locked into mechanistic worldviews and retain predominantly technocratic staff. However, they have been given tasks to progress towards an ecologically sustainable and humanly desirable future for a social-ecological system that cannot be achieved through an 'industrial' model. As

Westley et al. (2002: 118) explain:

During the twentieth century, scientists and engineers (the heart and soul of technology and technologic solutions) became the key arbiters of understanding complex resource systems. But there has been a growing sense that traditional scientific approaches are not working, and indeed make the problem worse.

There is a gradual recognition that environmental problems are 'people problems' that can only be addressed through an integration of their technical, economic, social, cultural, historical, and political dimensions. However, the scientific-materialist worldview is so embedded in the cultures of western industrial societies and ingrained in the thinking of individuals that it exerts hegemony.

9.1 'POVERTY OF PROCESS'

Woodhill identified three main components that contribute to a poverty of process in NRM in Australia, which I will explore in this chapter. They are the limited range of problem-solving methodologies; the use of inappropriate processes for the task; and too little critical reflection on the process. He also identified five reasons for the persistence of a poverty of process:

1. Culturally, there is still great adherence to the linear, technocentric, and instrumental modes of problem solving and analysis that evolved from classical scientific thought ... NRM is still dominated by professionals and organisations that have a strong tradition in the biophysical sciences and, hence, are heavily influenced by the assumptions and methods of positivist science.
2. By their very nature, bureaucracies find it difficult to deal with open-ended and flexible, adaptive and values-based processes of planning.
3. By and large, our education systems have focused on teaching people facts and theories and training them in the methods of science, rather than encouraging them to reflect critically on underlying assumptions and become conscious of the processes through which they learn.
4. Australian culture, and in particular rural cultural, has a tendency to value physical work over intellectual activity and be derisive of academic pursuits.
5. The problems that NRM must deal with and the use of more sophisticated methodologies requires a level of conceptual analysis and understanding. Yet this is difficult to reconcile with the background and time availability of most people involved with NRM.

Woodhill 1999: 112

9.1.1 Limited range of problem-solving methodologies

The Enlightenment sought to dispel the shadows of superstition, religion, and political tyranny from the individual with the light of reason and scientific enquiry. The resultant production of universal knowledge and values brought about technological, industrial and institutional and political progress,

and an assumed mastery of nature. However, as we are now experiencing, it also produced negative effects. As Macey (2000: 97) proposes:

Reason does free human beings from superstition, but it also establishes itself as a court against which there is no appeal, and the only objective that it recognizes as legitimate is the transformation of the world into an object that can be subjugated and manipulated. At this point, reason degenerates into 'instrumental reason' governed solely by the logic of ends and means ... it also creates an unfettered market which does not obey rational principles, and the power of that market destroys reason ... Enlightenment can thus become a form of totalitarianism which establishes a tyranny of instrumental reason.

Hegemony of the narrow mechanistic western industrial worldview has actively excluded the consideration of alternative processes that may provide significant contributions to social-ecological resilience, and perversely continues to do so.

9.1.1.1 *The analysis – synthesis imbalance*

The great shock of twentieth-century science has been that systems cannot be understood by analysis. The properties of the parts are not intrinsic properties, but can be understood only within the context of a larger whole. Thus the relationship between the parts and the whole has been reversed.

Capra 1997: 29

Effective NRM requires a balance between two dissimilar but complementary activities; analysis and synthesis. Analysis involves breaking a problem down into its component parts to understand how they function, while synthesis involves putting pieces together in a creative way to reveal relationships and context to establish the contributing factors to a problem or a success. Woodhill (1999: 231-232) suggests that analysis is currently the primary tool of NRM where training in the biophysical sciences is the norm. He proposes that such training teaches the methods of science, and specialist knowledge and techniques, but with little regard for critique of underlying assumptions and the place of specialist knowledge in a broader picture of society and social values. A situation that he posits has 'resulted in a whole cadre of professionals who are largely uninterested and certainly intellectually ill-equipped to deal with the more fundamental questions of human existence'.

Contanza (2003: 654) agrees that 'both natural and social-science research and education focuses almost exclusively on analysis', which is why people trained in synthesising humanities studies such as history, human geography, human ecology and anthropology need to play a much larger role in NRM in order to progress towards greater social-ecological resilience. He also cautions about the difficulty of synthesis in complex adaptive systems because of the 'necessity of studying and understanding phenomena at multiple scales simultaneously' (*Ibid*: 653).

9.1.1.2 *Tensions between the Physical and Social Sciences/ Humanities*

Roughley (2005) recorded the reflections of social scientists involved in five different natural resources agencies over the period 1978-2002. The immediate 'poverty of process' to emerge from the document is how few people are involved in the socio-cultural aspects of NRM when it has been recognised since the mid-1970s that people are 'both the central cause of environmental degradation and central to sustainable resource management' (*Ibid*: 5). The document also revealed a lack of understanding by biophysical NRM managers of the role of social science, and a mismatch of values and *modus operandi*, which often generated distrust and marginalization. There was a common assumption of social scientists having a 'service' role to persuade resource users to change their behaviour in line with agency objectives and biophysical management solutions' (*Ibid*), and that social science was just 'common sense'.

Redclift (1999: 268-269) suggests that the deeply rooted epistemological differences between physical and social scientists means that their 'expectations are mutually incompatible'; especially between the more interpretive (hermeneutic) social sciences and humanities, such as anthropology and sociology, and the most positivist natural sciences. He explains that 'while the natural sciences proceed by closing down debate, by establishing near-consensus between everybody, the social sciences proceed by opening up debate, by admitting the existence of competing controversial universes, or distinct epistemic communities'.

The social sciences and humanities appear to be confronting to the technocratic dominance of NRM, partly because critical socio-cultural disciplines are likely to reflect 'on the practices and norms of the agencies themselves as much as on the beliefs and behaviours of resource users' (Gill 2006: 13). The involvement of social scientists may also result in 'crises of perception' (Capra 1997: 3-5) within biophysical scientists and engineers involved in NRM with the realisation that technical solutions alone are inadequate for the task and that there are now witnesses to the fact.

Technocratic discomfort with the socio-cultural aspects of NRM appears to frequently trigger a 'will to ignorance' (Flyvbjerg 1998: 31) response. That particular 'poverty of process', involving the systematic obstruction, or exclusion of the humanities and social sciences by NRM authorities is preventing the establishment of an authentic government-community partnership that is fundamental to the viable future of the Murray-Darling Basin. It is also preventing the realization of rural institutional capacity to manage social-ecologically strategic landscapes on behalf of Australian society. Knudsen (interview 23/11/05) suggests that NRM bureaucracies frequently see a community partnership as a liability rather than an asset and proposes that government and community need to be involved in 'constructing a philosophical base for partnerships' together, to mitigate continued misunderstandings.

Rhetoric generally hides the tension between the physical and social sciences in NRM organisations. Knudsen (23/11/05) explains that she arrived at the Murray Darling Basin Commission (MDBC) 'with the impression that there was a good understanding of the social dimensions'. She also revealed that during her six years at the Commission that she 'came across many academics who admired the MDBC because they thought the organisational model must reflect a democratic organisational philosophy and practice'. However she had found neither of those propositions to be true:

I found that there was actually little understanding of (or interest in) community engagement amongst managers in the Commission office ... anything to do with social/cultural contexts was largely ignored or if not, actively (often with hostility) dismissed.

She resigned from the Murray-Darling Basin Commission in 2000 as 'a direct consequence of working in isolation in an environment where my particular skills were not valued'. Her experience reflected those other socio-cultural specialists working in NRM despite the fact that 'it is now widely acknowledged, in theory, that without social scientists, sustainable management of natural resources is not possible' (Roughly 2005: 111).

9.1.1.3 *Exclusion of historical perspectives*

In practice, modern managers are careless of history, when they are not actively hostile to it ...
Eradicating institutional memory is a conscious method of control.

Davison 2000: 225

McIntosh et al. (2000: 5) posit that in their 'disdain for history, policy makers tend to look only to the recent past to understand the sources of problems', and suggest that a possible benefit of climate change may be to force policy makers 'to extend the temporal range of their thinking, into to both the past and the future'. Reliance on observations over short periods of time can result in distorted management strategies. An example discussed in 4.1 is the 'shifting baseline syndrome' where the first observation of each separate period is assumed as the norm, which contributed to poor fisheries management. A major weakness in the use of instrumental reason for NRM is the lack of a temporal perspective to provide insight into variations in ecological processes, which resulted in the false assumption of a 'balance of nature'.

History has demonstrated that ecosystems are intrinsically unpredictable and require variability rather than stability to thrive. This has resulted in the abandonment of notion of equilibrium ('balance of nature') and the adoption of the idea that ecosystems are actually or potentially multi-equilibrium systems in which alternate states may exist over time, and an ecosystem may

“flip” from one state to another (Berkes 2003: 9). The conception of the ‘flux of nature’ requiring responsiveness to variability (Klug 2002: 702) has necessitated a change in management approach from control to adaptive management:

[A]daptive management is a way of managing in order to ensure that the organizations responsible for ecosystems are responsive to the variations, rhythms, and cycles of change natural in that system and are able to react quickly with appropriate management techniques.

Westley 1995: 394

Andrew (1997: 94) highlights that government policies still tend to assume that technical and scientific responses adequately address environmental issues and therefore give inadequate attention to contextual social, historical and cultural aspects. She suggests that the reduction of environmental debates to economics has the effect of ‘concealing history’ in a number of ways. It ‘diverts attention away from the essentially non-renewable nature of resources and the cumulative effects of environmental deterioration’. It ‘denies the validity of contextual experience and of the lessons learnt from the past in favor of generic management models such as cost-benefit analysis’. She (*Ibid*: 99) also reveals the inability to readily accommodate crises as a major weakness of short-term economic models that drive government policy.

Social memory (McIntosh 2000: 143) has emerged as a valuable community asset to progress towards social-ecological resilience, and particularly for crisis management (Hahn et al. 2008: 139; Magnusson 26/11/07; Nathan 2004: 185; see 3.7.2; 5.5.2; 6.1; 6.2; 6.3; 6.4). Historical perspectives are also necessary to appreciate the social and political contexts of policy development that have led to current management and distribution priorities, which in turn have resulted in ecological degradation and environmental inequities (Pellow et al. 2001: 426-429; Callewaert 2002: 264-266; Pellow 2004: 512). This understanding is necessary in order to review them within the context of current values and priorities. Kinzig (2001: 713) proposes that the present-day problems of reduced productivity and diversity in marine fisheries ‘can ultimately be traced to outdated institutions, fashioned in a different era, that cannot accommodate these changing values’. Current policies are generally path dependent which means that past decisions can constrain current options (Kaivo-oja et al. 2004: 532-534). Ife (2002: 290) proposes that historical perspectives can be emancipatory by helping to overcome the hegemony of ahistoric instrumental reason through demonstration that positive change and different futures are possible:

An understanding of historical processes helps one to realize that the present social, economic and political system, with its injustice, inequality and loss of community, is a relatively recent phenomenon, and that major change is not only possible but is normal and inevitable. The obstacles to change seem insurmountable only if one takes an ahistorical view, whereas a historical perspective helps to open up other possibilities and helps one to realize that we are living in a period of massive change, and that it is precisely such periods that new options become real possibilities.

Environmental historian, Alfred Crosby proposes that our ‘sources of wisdom are current science and past history’ (1994: xiv). It is increasingly recognised that knowledge of historical patterns and processes, in addition to spatial context, are prerequisites to informed NRM. As Magnusson explained; reading Linnaeus’ accounts of the Kristianstad region from 1749 were ‘an eye-opener regarding the important connection between natural and cultural history’ (see 6.2). He suggested that without landscape history, ‘there can only be poor understanding of how today’s landscape functions’ (Olsson et al. 2004: 8; Magnusson 26/11/07). Historical perspectives help provide reference conditions, evidence of iterative institutionalised marginalization of ecosystems and landscapes, and an appreciation of the dynamics of ecological processes.

9.1.1.4 Legal lag and policy inertia

Finally, neither legal nor policy assumptions have kept pace with the rapidly changing ecological and management perspectives that have developed over the past three decades. Hillman et al. (2003: 232) suggest that processes such as adaptive ecosystem management and participative learning that can address complexity and uncertainty are still ‘alien to legal and bureaucratic systems, which, like the engineering profession, have traditionally emphasised certainty and stability’. Klung (2002: 703) attributes legal lag and policy inertia in NRM to the demise of the equilibrium paradigm that ‘informed the structure of environmental law and policy’. He also suggests that the emergence of the science of non-equilibrium ecology has ‘not as yet been reflected in the legal tools available to resource managers’. Clarke (2002: 305-320) also proposes that the main impediment to increased biodiversity management on the 60% of Australian land in private hands is the difficulty in designing appropriate regulations and contracts.

9.1.2 Inappropriate processes to address the task

The experience of the world by members of western industrialized societies is fragmented, rather than coherent (Suzuki 1993: 155). The isolation of elements from their surroundings, which is critical to western science, has also justified a ‘tyranny of small decisions’ (Mackay 1990: xvi) which has caused enormous cumulative damage to the environment. Western rationalist thought also emphasizes distinct ‘levels’ of vertical organizational structures and the separation of the social and biophysical dimensions of the environment itself rather than connectedness. Hillman (2002: 357) proposes that:

The fragmented approach of traditional European resource management is a barrier to recognizing scale as a continuum and working accordingly. A failure to acknowledge, let alone incorporate, indigenous [or other vernacular] perspectives into resource management, has vastly increased the damage and injustice associated with environmental degradation.

Gray (2007: 792) also argues that the ‘primary cause of environmental and social problems’ is the “disembedding” of people from the natural world.

9.1.2.1 *Hierarchy-network mismatch*

Roughly (2005: 113) suggests that the preoccupation with hierarchical organisational structure ‘overshadows the evidence that resource management problems are most effectively addressed in horizontal teams’. This comment is supported by the experiences of Magnusson (see 5.5.2; 6.2; 6.2.1; 6.2.3), McFarland (see 6.4; 6.4.2), and my own experience in the collegial governance of the ‘Special forever’ primary school environmental education-literacy-intergenerational equity program involving a network of volunteer teachers that reached almost every community in the million square kilometre Murray-Darling Basin (see 5.4.1.3). I posit that the program would not have been physically or economically feasible through a hierarchical structure. As such, while I agree with Roughly (*Ibid*: 99) that network models ‘remain substantially untested within government natural resources management agencies’, her assertion that they ‘will be more resource intensive than the familiar hierarchy because communication will be multi-directional’ has not been my experience. I suggest that networks, or ‘horizontal teams’ are very effective for addressing sustainability issues and are not difficult to identify, formalise and maintain for those with appropriate skills to build and maintain trust.

Hierarchical organisational structures account for the difficulty of integrating the multi-disciplinary social sciences and humanities with NRM bureaucracy because the former usually operate on a network model that ‘in theoretical and operational terms is opposite of a hierarchy’ (Roughly 2005: 99). Knudsen (23/11/05) proposes that hierarchies represent ‘power over’, and networks ‘power with’, and suggests that transition to the latter is required to work towards greater social-ecological resilience in the Murray-Darling Basin. However, she reflects that from her experience, technocrats find the necessary behavioural change and relinquishment of existing power bases to achieve an authentic government-community partnership extremely difficult, which suggests that technocratic dominance of NRM may no longer be appropriate.

9.1.2.2 *Confusing Management for Leadership*

That management itself may indeed be part of the problem rather than part of the solution is not acknowledged.

Ife 1997: 63

I propose that current government NRM initiatives in the Murray-Darling Basin are generally ‘under led and over managed’ (Bennis 1990: 18), which is stifling the process. Both leadership and management are crucial for the effective running of organisations but their roles differ profoundly (*Ibid*). Progress towards an ecologically sustainable and humanly desirable future for the Basin is a dynamic process that requires a very different approach and mindset to those for managing industrial activities or pre-ecological single-issue natural resource bureaucracies. It requires leadership to capture the imaginations and harness the energy of Basin residents, and gain the support of other Australians (Knowles 1983: 26). Danter et al. (2000: 538) suggest that leadership, as contrasted to management is an ‘overlooked tool for achieving an ecosystem approach to natural resources management’. There is a voluntary aspect of leadership that is different from power. A manager who threatens his/her subordinates into submission or conformity or entices them through incentives is exercising power; not leadership (Eriksen 2001: 23). Similarly, a leader cannot use his/her power to promote personal interests or specific views but is required to provide reasons and explanations for decisions (*Ibid*: 29). Finally, a leader must accumulate sufficient social capital to be trusted to make decisions without consensus (*Ibid*: 33).

Saul suggests that managerial schools and corporations led by technocrats have had the ‘effect of confusing management with leadership’ (2005: 12). Technocrats frequently take prescriptive, ‘command and control’, approaches to gain a predictable minimum outcome, rather than providing sufficient flexibility to enable people to realize their capacities. Far from providing support to release the energy of staff or community members, to enable them to realize their capacities to contribute to sustainable futures, managers often assume roles of ‘gatekeeper’ or bureaucratic ‘prince’ who re-determine how and to whom public resources are to be allocated, with virtual impunity. Moore (1995: 17) encapsulates this dilemma by suggesting that public managers adopt the mindsets of bureaucrats and administrators and not of facilitators and leaders.

The facilitation of progress towards an ecologically sustainable and humanly desirable future for the diverse and dynamic Murray-Darling Basin social-ecological system cannot be achieved through the current narrow perspective of a positivist, hierarchical managerial paradigm designed for an industrial process. The industrial model has ‘erroneously conceived of individuals as robotic and emotionless actors’ (Lupton 1999: 10), with its assumption of mechanistic linear relationships devoid of reflexivity.

9.1.2.3 *Managerialism – a model unsuited to achieving NRM goals*

The restructuring of Australian bureaucracy in line with a new economic paradigm, in the 1990s, resulted in the imposition of the corporate model of ‘managerialism’ onto NRM agencies (Roughly 2005: 28). This model, which relies on managers arranging organisations for maximum economic and administrative

efficiency through strategic planning and competition, is unsuited to the achievement of NRM goals. NRM is complex, sensitive, long-term, and is dominated by uncertainty. It requires cooperation, trust-building and experimentation. In addition, the preoccupation with organisational structure, and ongoing restructuring, tends to become introspective and distract agencies from their overall missions (*Ibid*: 28-30). At its most perverse, this model treats information collected from the community, or on its behalf, as 'commercial in confidence', and views working cooperatively with community members as a conflict of interest (Francis 26/4/07; Bugden 3/8/07). O'Brien and Crandall (2005: 16) found that such strategies are designed to protect the *status quo* from perceived threats.

The current managerial approach also reverses the traditional direction of the accountability of professional service providers from 'downward' to the client or 'outward' to the community; with accountability 'upward' to management (Ife 1997: 63-64). That priority is not conducive to the establishment of a trusting, collegial government-community partnership necessary to address issues relating to the resilience of the Murray-Darling Basin.

9.1.2.4 *Deliberative injustice*

Sampson (1993: 97-99) suggests that humans are fundamentally conversational creatures, whose lives are created, sustained and transformed through conversation. Human conversation has always been the starting point for new ideas, new ways of being and new ways of doing things. Stewart (1998: 23) suggests that small groups genuinely concerned about questions that mattered to their common future have, for centuries, been the focal point for bringing about change. He also emphasises that 'trust' and 'passion' are required to achieve it:

When we listen to someone's story ... it builds trust and leads to people saying more about their ideas and passions. Without conversation there is no trust; without trust there is no expression of passion; without this there is no change, everything is done according to existing regulations.

Stewart 1998: 25

My experience of the Murray-Darling Basin Commission was that the necessity to inform discussion and encourage the active participation of members of the Basin community in the transformation to greater social-ecological resilience was increasingly contested by technocratic executives from the mid-1990s. That situation, which appeared to be a result of the introduction of managerialism and an increase in the employment of technocrats from private enterprise or State bureaucracies, was confirmed by Roughley (2005: 67) and Knudsen (23/11/05). The elimination of the 'long-term', multi-faceted communication program in 1998 symbolised the successful depoliticisation (Di Chiro 1992: 25) of the Murray-Darling Basin Initiative. From that time, NRM was framed as a technical issue to

be left to technical and scientific ‘experts’ (see 2.1.1 and 2.5). I experienced even stronger obstruction from NSW Catchment Management Authority management to attempts to inform, build trust, and involve the public in planning the future for their local social-ecological system in 2006-2007.

I suggest that these recourses to twentieth-century technocratic ‘business-as-usual’ are examples of deliberative injustice (see 7.5.3) because they deny Basin community members the opportunity to participate in informed conversations about their futures. It is also a major impediment to the realization of the capacities of rural community institutions to effectively manage ecologically strategic landscapes, and paves the way for continued technocratic self-celebration (Sampson 1993: 4-5). With limited conversation opportunities there are no adequate ‘sounding boards’ to test reality and to decide on priorities and possibilities. The fewer ways people have to test reality, establish trust and express passion, the more vulnerable they become to a few dominant messages.

9.1.3 Little critical reflection

Woodhill (1999: 204-205; 266) proposes that in many ways, a gross lack of critical reflection about underlying ontological and epistemological assumptions upon which modern institutions have been founded must be considered a central structural cause of land degradation. He suggests that excessive faith in science has meant ‘a lack of critical philosophical reflection about the validity of science’s own assumptions, foundations and practices’. Westley et al. (2002: 118) add that in western industrial societies, there is frequently a belief in science as the final arbiter of all knowledge rather than to treat scientific claims as problematic. In addition, Gunderson et al. (2006: 19-20) suggest that ‘science does not pursue novel, unknown areas that could objectively evaluate policy effects’ but:

Instead, the agencies filter the type of work done through funding schemes that do not foster the development of the sort of broad integrative studies that might bring their policies into question but instead channel the available funding into studies that reinforce existing dogma.

As discussed, the reinforcement of ‘business-as-usual’ (see 1.2.2; 2.4.1; 2.4.1.1; 4.1; 5.3.4.1; 8.1; 8.3.1) is ultimately risky because it potentially erodes resilience (Walker and Salt 2006: 6-7). However, the assumption of the universality of the western scientific model, dogmatic rejection of non-positivist, non-quantitative data (Gill 2006: 13), and the exclusion of community members, remains the starting point for many technocrats involved in NRM.

9.1.3.1 *The 'efficiency' distraction*

Westerners tend to equate linear mechanistic processes with efficiency and control, which has resulted in the use of the spurious argument of the pursuit of greater 'efficiency' to justify the diminution vernacular methods and local knowledge (Cheng et al. 2003: 101). It limits the range of problem-solving methodologies and obstructs the examination of alternatives. In more extreme cases it has resulted in the widespread degradation or 'sacrifice' of certain ecosystems, such as wetlands (Giblett 1996: 16-21), because they are difficult to 'control' using mechanistic processes; and to justify land theft and even genocide (Kiernan 2007: 29, 177-179, 422-423, 436-437).

Paradoxically, the improved 'efficiency' argument, frequently accompanied by convenient 'engineering solutions', continues to successfully attract public resources to maintain 'business-as-usual' and delay the transformation of redundant practices (Beeby 2008; Walker and Salt 2006: 52; Andries et al. 2006: 871-877; Walker et al. 2009: 12-21). The pursuit of decontextualized mechanistic efficiency does not encourage the search for solutions to the problems eroding the resilience of social-ecological systems, and ultimately reduces future options for the land and its residents.

9.1.3.2 *A hegemony of impoverished assumptions*

NRM today grew out of a primarily reductionist 'divide and rule' structure designed to mechanistically and economically efficiently control, exploit and process natural resources for trade and consumption:

The history of "resource management" is closely related with the commodification of people and nature in the service of efficient and often rapacious exploitation for industrialization, capitalism and colonialism ... the dominant philosophy ... assumes that the world is predictable and controllable.

Berkes 2003: 9

The assumption that the same processes used to exploit nature and people can be used to progress towards social-ecological systems resilience is problematic. The legacies of that history include the assumption that humans are separate from nature, an assumption of a 'balance of nature', an assumption that instrumental reason is 'all that counts', an assumption of 'one best answer' (Ife 2002: 43-44), an assumption that all common property management is open access and will result in a 'tragedy of the commons', and assumptions that the passive protection of 'sites' through public ownership and the exclusion of people is sufficient for effective conservation.

Reductionist assumptions about efficient NRM resulted in fragmentation through its division into areas such as fisheries, forestry, and water (Suzuki 1993: 163), which still have not been successfully reintegrated and remain in 'silos'. Past emphasis on human use of nature has resulted in manufactured assets and infrastructure being more highly valued than ecologically strategic natural assets such as wetlands.

It resulted in rivers being regulated to ensure a minimum reliable flow for human needs, and mitigating property damaging floods by separating rivers from their floodplains, without adequate consideration of ecological requirements. Indigenous land management techniques such as regular burning were also rejected.

9.1.3.3 *The private-public property dilemma*

Survival of rural communities depends on the health of their natural resources. It is therefore imperative that a balance is struck between conservation and production to ensure the survival of both.

Williamson et al. 2003: 10

The assumption that production occurs on private property and conservation on public property established in the late nineteenth century is iteratively unravelling. A new social-ecological paradigm, characterised by uncertainty and disequilibrium, emphasizes the importance of cross-boundary ecological processes for ecological resilience, rather than the passive protection of sites alone. It is increasingly accepted that biodiversity conservation requires at least landscape-scale management to ensure connectivity between different ecosystems and the protection of communities (Harvey 2007: 150-158), and that humans are an integral part of ecosystems and have an active role in their management (Haddad 2003: 20, Magnusson 26/11/07).

The traditional government acquisition of ecologically or culturally significant sites as a conservation tool to protect them for the public by 'locking up' was based on the redundant paradigm of a 'balance of nature', which assumed that property boundaries could protect values (Hurley et al. 2002: 298). Resultant 'island' national parks are both inadequate in number and location for necessary biodiversity conservation, and vulnerable to degradation without links to surrounding ecosystems (Jackson et al. 2007: 310). Briggs (interview 18/7/05) explains that public funding to maintain or improve the productivity of strategic ecosystems, such as wetlands, on private property should not be an issue because 'you are publicly funding a publicly-owned asset, which is wildlife and indeed now native vegetation; broadly biodiversity', on behalf of society. This accords with Berkes' (2007: 15188) statement that biodiversity is a 'global commons'.

In addition, conventional agricultural production scales in Australia frequently do not match ecological scales. The Australian landscape does not have the resilience of other environments that operate under similar property arrangements in North America or Europe. Australian soils are generally ancient, infertile and shallow, which combined with generally low and variable rainfall, exacerbated by climate change, means that conventional agricultural production is low and requires large landholdings for resilience.

The underestimation of sustainable 'living areas' as a result of Australian conditions was evidenced by notorious rates of failure of Closer Settlement and 'Soldier Settler' schemes of the late nineteenth to the mid-twentieth century (Williamson et al. 2003: 9; McFarland interviews 1/4/05 and 23/6/05).

Ostrom (2007: 4) and Briggs (18/7/05) advise the avoidance of 'standardised blueprint solutions' and to look for solutions that match particular situations, in order to overcome a 'poverty of process' in relation to land-use. This may involve adopting landscape-scale common property management (Williamson et al. 2003), a system of 'social utility property' on private land (Geisler 2000: 51), or incorporating biodiversity management 'as a legitimate industry sector' (McDonald 2006: 2).

9.2 REFLECTION ON THE PARADOX OF EFFICIENCY AND ORDER

We are, whether we like it or not, inheritors of the Enlightenment tradition.

Harvey 1996: 149

My experience of working in Papua New Guinea for more than a decade brought into sharp focus the influences of the European Enlightenment and scientific revolution on western industrialised society. By reflecting on several mini-cases, I demonstrate in the following section that the mechanistic-petrochemical hegemony in industrialized societies, and emphasis on competition rather than cooperation, are blinkering our perception of options for progress towards social-ecological systems resilience. There are many land-use principles developed by Niuginians and other groups throughout the world, both non-western and western, and used both today and in the past, that are worthy of reflection, which may trigger ideas for greater resilience in western land-use and more appropriate approaches to NRM (Williamson et al. 2003: 34). They include the utilization of different ecological zones, matching specialist crops to microhabitats, using natural vegetation buffer zones to protect crops, companion planting, and planting numerous varieties of primary crops as an 'insurance policy' against pests, climatic variability and soil variation (Barth 1971: 172-173).

9.2.1 Felling trees on top of the garden – revealing 'monocultures' of the western industrial mind

Monocultures of the Mind is the title of a book by Vandana Shiva in which she explains that people brought up within the western scientific tradition have difficulty in dealing with too much diversity, which they are unable to see as anything but 'chaos' needing to be put into 'order' (1993: 13-28), often by the application of reductionism, straight lines and petrochemicals. That was the response of an Australian

patrol officer when conducting a census of the people living in the rainforests of the Great Papuan Plateau in south-western Papua New Guinea in the late 1960s. He was confronted with an unusual agricultural practice of planting food crops under the forest canopy, and when they begin to grow, felling trees on top of them. To his 'western eyes' that process appeared outrageous; 'inferior even by primitive standards,' and he estimated that 'as much as 40 per cent of the crop was destroyed' (Schieffelin 1975: 31).



Plate 9.1 Cutting the 'key' tree to set up a domino effect to clear the garden

This is an energy-efficient method of clearing in a sparsely populated area. The fallen tangle of trees form an excellent defence for the communal house built in the centre of the garden area, as well as providing a ready supply of firewood and fencing materials.



The unusual method of cultivation, while mechanistically apparently inefficient, is brilliant from the perspective of social-ecological resilience. It is uniquely suited to maintaining the resilience of a high rainfall and sparsely populated lowland rainforest environment. Both human energy and soil disturbance are minimised. The latter enabling the area to be quickly reclaimed after the garden is abandoned. The undergrowth beneath the forest canopy is first cleared, and planting material such as taro (*Colocasia esculenta*) tops and banana (*Musa sp.*) suckers, is planted into the minimally disturbed humus on the forest floor with only a few centimetres showing above the surface. The canopy protects the new garden from rain and filters the sun in its first weeks. Each tree in the garden area then has a scarf cut into one side to direct its fall, and after a few weeks when the crop has 'taken root' a large tree is cut, creating a 'domino effect' resulting in all of the trees falling 'slowly' together in a tangled mass. The fall is softened by the branches breaking and dissipating energy like the safety 'crumple zone' of a car. Anthropologists, who have studied the process, have found that the impact on the crops ranges from 'virtually no damage' to less than five per cent (Schieffelin 1975: 31), and the plants can easily grow through the tangle and quickly form a structure like a microcosm of the surrounding forest.



Plate 9.2 Rainforest gardening on the Great Papuan Plateau

Advantages of this method of agriculture include the protection of the soil by the initial mulch of leaves and twigs, the release of nutrients as the mulch decomposes, and breaking up heavy raindrops by the tangle of fallen trees preventing erosion from runoff. The original condition of the forest floor is maintained enabling a quick reversion to rainforest after the garden is abandoned.

9.2.2 The *didiman*'s demonstration plot – western 'science fictions'

The above example highlights the mechanistic hegemony in the western worldview and reveals assumptions, such as links between 'best management practice', straight lines and neatness, to be frequently cultural 'baggage'. The western industrial worldview, with its assumption that western science is the 'only science', also blinds us to alternatives and opportunities, especially by dismissing local knowledge and vernacular processes. Langton (1998: 9) labels as 'science fictions', the assumption of the superiority of western science and the practice of making Indigenous knowledge systems 'invisible'. Western epistemic inadequacies can often be covered up, or its 'magic' inflated, through the capacity to access external resources, as the following example illustrates.

In the early 1970s an agricultural officer (*didiman* – Melanesian Pidgin) trained in western science cleared a rectangular patch of rainforest as 'demonstration plot' to teach the local villagers, who use the same methods as described above, how to make a 'proper' neat garden. Unfortunately the timing, during the heaviest rainfall period, was not good. The exposed soil was leached and its surface packed

by the impact of the heavy raindrops, and the tropical sun baked it hard. The officer unsuccessfully attempted to recover the situation by ordering a large amount of chemical fertilizer that was delivered by government chartered aircraft (Shaw 1993: 54). When I visited the area almost a decade later, the 'didiman's demonstration plot' remained like an oversized abandoned tennis court in the rainforest.

9.2.2.1 *Lost timing*

The first issue to emerge from this case is that of 'timing', which is very important for effective primary production in its many forms, in both western and non-western societies. Hera-Singh (interview 19/7/04), Jones (interview 20/7/04), and Neis (1992: 155, 169), for example, emphasise its importance in small-scale artisanal fishing operations. However, its value appears to have been diminished by the western scientific requirement of objectivity and decontextualization, and the dominance of 'time' in industrial societies. Closely related to timing, is the reluctant recognition in the still largely linear mechanistic river regulation priorities in the Murray-Darling Basin that patterns of flow and variability, including timing, depth, and duration, can be more important for ecological health than the maintenance of a minimum reliable volume of water (DLWC 1996, Vol. II: 22).

9.2.2.2 *A capacity to hide both mistakes and external support*

The second issue from the 'didiman' case is the technocratic culture of hiding or denying error. While the abovementioned failure could not be hidden, according to Bouilly (interview 15/3/05), the capacity to cover mistakes and epistemic inadequacies is a priority for technocentric NRM bureaucracies in the Murray-Darling Basin, so that technocrats can continue to dominate the area. That statement conforms to my observations that the 'myth' of technocratic capability and mechanistic efficiency is sometimes maintained by a capacity to hide mistakes; often by cross-subsidizing or appropriating resources allocated for other purposes, by narrow framing, or simply controlling the agenda (Flyvbjerg 1998: 31).

Luke and White (1985: 41) explain that many of the promoted efficiencies, achievements and benefits of the western industrial worldview rely on the exploitation of 'hidden' or un-costed resources, such as 'free' environmental services, 'behind the scenes' workers, publicly funded and maintained infrastructure subsidising privileged industries, self-funded change-agents, women, and volunteers. This is in addition to the exploitation of cheap non-renewable energy sources, which cumulatively afford western industrial societies the luxuries of specialisation, competition, administrative convenience and a mechanistic worldview. I posit that the application of a measure of embodied sustainability to western industrialised societies by monitoring the 'metabolisms' (inputs and outputs) of bioregions may result in more accelerated responses to progress towards social-ecological resilience.

9.2.2.3 *Avoiding the 'technical expert' trap with environmental anthropologists*

Using the Murray-Darling Basin Initiative as an example, I suggest that there is a danger of a continuation of a technical 'expert trap' (Holling et al. 2002: 7-8; Fischer 2003: 7-8; Ostrom and Janssen 2004: 246; Folke 2007: 15193) with the maintenance of the technocentric business-as-usual in NRM. Society may be lulled into a false sense of security by the 'infallible technical expert' myth, which limits options to the imaginations and expertise of technocrats, and appears to result in policy inertia when mechanistic processes fail. As Fischer (Ibid) cautions:

Not only do experts lack answers to the complex technical questions that confront us, but expertise itself turns out not to be the neutral, objective phenomenon that it has purported to be. Indeed, it has all too often served the ideological function of legitimating decisions made elsewhere by political rather than scientific means. Nowhere... has this phenomenon been more evident than in environmental politics, one of the most technologically driven of the policy fields.

Answers within the social memories of communities themselves are generally not recognised or are diminished when responsibility is handed to a technical expert (Paolisso 2002: 227). Woodhill (1999: 204) acknowledges that knowledge specialisation since the Enlightenment has enabled dramatic scientific and technological progress. However, he suggests that the cost of that specialisation and commoditisation has 'unwittingly devalued the importance of individual, organisational and social learning', and that the structural causes of land degradation must be considered within that context. That dilemma may be addressed by the employment of socio-cultural experts (Steffen 2008: 512-513) to help access and articulate community knowledge.

From my experience in Papua New Guinea, I can see value in the greater employment of applied environmental anthropologists (McCay 2001: 254) to work as 'bioregional facilitators' (Brunckhorst 2000: 62; Gorman interview 1/3/05; Magnusson 26/11/07) with primary producers and rural communities, to help address the current 'poverty of process' in NRM, inequities, and assist in the realization of the capacities of rural community members and institutions.

Environmental anthropologists could assist rural community members to access social memories, highlight the social and cultural factors in primary production and NRM, and realize capacity to develop systems of common resource management. They could improve communication and deliberation by recording the contributions of change agents, the contributions and problems of rural community institutions, and by providing social-ecological and historical perspectives for more effective NRM (Pinto-Correia et al. 2006: 343-344; Abel and Stepp 2003: 19-20) and greater environmental justice (Johnston (2001: 147). They could articulate and help present to the public

primary producers' knowledge and experience 'based on thousands of hours of "sampling" local ecosystems' (Garcia-Quijano 2007: 534; Jones 20/7/04). Equally importantly, they would provide quality assurance to help avoid scientific-technocratic hegemony and its resultant 'poverty of process', such as that which led to the Newfoundland fishery collapse, by critiquing scientific models, assumptions, and technocratic NRM institutions (McCay 2001: 226; Carpenter et al. 2009: 13; Saenz-Arroyo and Roberts 2008: 316-327; Milich 1999: 532; see 4.1.1). As Garcia-Quijano (*ibid*) suggests, anthropologists are skilled translators of different systems of knowledge placing them in 'a privileged position to foment alliances' between often-competing stake-holders by being 'advisors acting as insiders' (Pinto-Correia et al. 2006: 341-342).

9.2.3 Transformation facilitated by experienced 'advisors acting as insiders'

The imposition of top-down rationality designed to direct technicians involved in industrial processes is inadequate and inappropriate for dealing with dynamic social-ecological systems as it leaves little room for professional discretion necessary when dealing with individuals and communities in politically sensitive situations. As Ife (2002: 204) explains:

A community is essentially organic (plant-like), rather than mechanistic (machine-like). Therefore, community development is not governed by simple technical laws of cause and effect but is a complex and dynamic process; tending and nurturing this development is more an art than a science. The community has its own inherent capacity to develop its true potential, and community development is about providing the right conditions and nurturing to enable this development to occur.

The right conditions will not be provided by 'technicians' whose activities are prescribed by technocrats, and most issues relating to improving the resilience of social-ecological systems will not be resolved through top-down managerial processes alone. Progress towards an ecologically sustainable and humanly desirable future for the Murray-Darling Basin will require a transformed collegial management structure to support large numbers of skilled professionals who are able to bridge the natural sciences, humanities and social sciences, and work directly with communities as 'advisers acting as insiders' (Magnusson 26/11/07; Pinto-Correia et al. 2006).

9.2.3.1 Social-ecological professionals

As Ife explains, the 'idea of a profession is that workers need to be able to exercise professional judgement', but currently this is 'heavily circumscribed in a system that devalues professional judgement in favour of managerial expertise' (1997: 63). Johnston (2001: 139) also provides an example of an anthropologist's testimony being dismissed as biased in a court of law because his primary ethical responsibility was to his subjects.

Flyvbjerg (2006: 239) differentiates between *real* human expertise and *expert systems*. I demonstrate that the real expert is often the practitioner or adaptive manager operating on the basis of experience rather than the technocrat in charge of NRM programs operating within a simplistic mechanistic system, which is retarding progress towards an ecologically sustainable and humanly desirable future. Woodhill (1999: 204) concludes that 'not only has the legacy of the classical scientific outlook limited human capacity to cope with complexity and uncertainty, it has also dramatically influenced conceptions of democracy and, hence, impacted significantly on power relations within the social order of modernity'.

PART 4: Discussion of rural institutional capacity realization using the lower Murrumbidgee floodplain as a frame of reference

The Riverine Grazier

Published at Hay, N.S.W.,
EVERY TUESDAY AND FRIDAY

Tros Tyrius-ve mihi nullo discrimine age ur

TUESDAY, JUNE 11, 1901.

A CASE AGAINST THE YANKO CUTTING.

At the last meeting of the committee of the River Defence Association, it was decided that "a short history of the progress of the work in the vicinity of the Yanko from time to time" should be published.

It is assumed that the work will be done in the honor of the association. No one does cutting of the progress of the work in progress which time but surely the residents of the stream croached this work.

larging and deeper it would be impossible constantly upon the that the position is to what it was in difference is whole there can be no various Government departments, cannot blame in the matter.

said that the reasonable and moderate protests of those who had a right to expect the Government to protect the rights they possessed as matters of natural justice, have received the attention they should have received.

then was three feet. cutting w level, and residents the cutting feet above the The reports of the departmental officer, Mr. H. G. McKinney, referred to the

before the water would flow into the creek. The objectors to the weir made

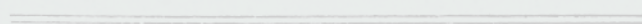
BARREN JACK RESERVOIR.



MURRUMBIDGEE NORTHERN
WATER SUPPLY

AND

IRRIGATION BILL.



*REPORT BY J. MONASH, Esq., M.C.E.,
L.L.B., Assoc. M. Inst., C.E.*

SHOWING THE EFFECT OF ABOVE SCHEME ON THE

LOWER MURRUMBIDGEE
RIVER

WITH SUGGESTIONS.



WITH THE COMPLIMENTS OF

*The Lower Murrumbidgee River Looking
League.*

RECORDER PRINT, BALRANALD.

DISCUSSION OF RURAL INSTITUTIONAL CAPACITY REALIZATION USING THE LOWER MURRUMBIDGEE FLOODPLAIN AS A FRAME OF REFERENCE

Flyvbjerg (1998: 236) identified three strategies to enable 'the public sphere to make a real contribution to democratic action', which I suggest apply equally to community institutions attempting to make a contribution to the sustainability of ecologically strategic landscapes on behalf of Australian society. He proposes that:

At times direct power struggle over specific issues works best; on other occasions changing the ground rules for such struggle is necessary, which is where constitutional and institutional reform come in; and sometimes writing genealogies and case histories like the Aalborg study, that is, laying open the relationships between rationality and power, will help to achieve the desired results. More often it takes a combination of the three, in addition to the blessings of beneficial circumstance and pure luck.

This section of the thesis involves Flyvbjerg's third strategy of 'writing genealogies and case histories' to reveal the context of the current status of the lower Murrumbidgee floodplain.

The non-conformity of both the lower Murrumbidgee floodplain landscape and its people with the dominant worldview has resulted in more than a century of marginalisation. It has been denied access to water to compensate for upstream developments by legislation and infrastructure. The area is used to store floodwaters that are potentially damaging to property elsewhere in the catchment during flood events but has the lowest priority for water access at other times. As a result of its construction as a 'sacrificial landscape' (Hooks and Smith 2004: 558), its future is the first to be traded off when a compromise is needed.

Coordinated community action to protect water access to the flood-dependent region, in the face of increasing upstream water extraction, began in 1899. That was more than sixty years before the beginning of the modern environment movement, and ninety years before most non-indigenous Australians recognised the ecologically strategic importance of wetlands in the Australian landscape, or the key role of flooding in maintaining catchment health. The current Lowbidgee League, which represents the interests of the lower Murrumbidgee floodplain landholders, can trace its origins to 'river defence' associations and leagues established by communities between the towns of Hay and Balranald more than a century ago. The Lowbidgee League is a community institution that governs the sharing of water across the floodplain landscape today. Ongoing vigilance by residents has been acknowledged as having played a major role in the survival of the area:

The past actions of the local landholders in highlighting the problems caused by the construction of major storages and upstream water extraction has been central to the survival of the Lowbidgee wetland systems up until this point ... The significant positive role that the landholders have played in the maintenance of the wetlands to this point should be acknowledged.

Bales 2003: 2-3

Murrumbidgee floodplain landscape and vernacular land-use activities appeared to be 'backward', but also threatening to the establishment of 'industrial' irrigated land-use and river regulation systems at the beginning of the twentieth century because they contradicted the arguments being used to justify the latter. In addition, floodplain wetlands were administratively inconvenient to incorporate with mechanistic river regulation and irrigated agricultural models. Wetlands and wetland dwellers also carried negative cultural 'baggage' from Britain.

Today, the floodplain and its agri-ecological land-use activities once again appear to be seen as a threat to traditional river regulation and agricultural 'business-as-usual'. The vernacular land and water-use activities developed to work with the landscape, climatic variability, and natural river flows, appear to be targeted because they may represent a more resilient alternative to the increasingly vulnerable and expensive 'industrial' methods. Targeting is made easier by a precedent of marginalisation. However, it is becoming increasingly clear as a result of climate change that traditional river regulation and irrigation models will need to be transformed in order to avoid serious negative ecological and social consequences (Anderies et al. 2006). The options for the further adaptation of mechanistic NRM and industrial agricultural methods in inland south-east Australia, into which huge investments have been made, and continue to be made by Australian society on the advice of technocratic experts, are diminishing:

The technical-rational model has become inadequate, incomplete and discredited as a way of dealing with complex and ill-defined issues in spheres of uncertainty, instability, and unpredictability. We need ... to pay closer attention to the intuitive ways in which skilful and artistic practitioners are able to make sense of confusing and contradictory circumstances.

Smyth 1987: 9

There is gradual vindication of the vernacular land-use methods developed to work in harmony with the floodplain landscape, and a demonstration of social-ecological resilience by surviving a century of marginalisation. There has also been a reversal of the status of wetlands from a century ago, in relation to benefits to society and the environment. The landscapes that produce 'greatest good for the greatest number' of people (Davis 1906: 11) today are those with the capacity to produce a diversity of ecosystem goods and services, which benefit people and the biosphere well beyond the immediate area, in addition to agricultural jobs and products.

The lower Murrumbidgee floodplain landscape has been degraded by its marginalization. However, resilience focuses on the on-going capacity of social-ecological systems to provide social and ecosystem goods and services as the key indicator of sustainability, rather than the current state of the system or service (Walker et al. 2004).

CHAPTER 10: ‘THE FLOODED COUNTRY BELOW HAY’: A CRITICAL ANALYSIS OF THE LOWER MURRUMBIDGEE BIOREGION

Landscapes are the interface between people and the earth (Eastburn and Milligan 1998: 53), and between time and space. They also bridge the natural and human sciences (Tress et al. 2001: 137). The lower Murrumbidgee and lower Lachlan floodplain landscape forms an approximate triangle of around 300 000 hectares in area between the towns of Hay and Balranald, and the village of Oxley in south-western New South Wales, Australia (see figures 10.1 and 10.2). It is an active wetland area and a working agricultural, ecological and cultural landscape located on the western end of a giant alluvial fan that forms the Hay Plain. This chapter examines the lower Murrumbidgee floodplain bioregion from a Murray-Darling Basin perspective and within a twenty-first century global context.

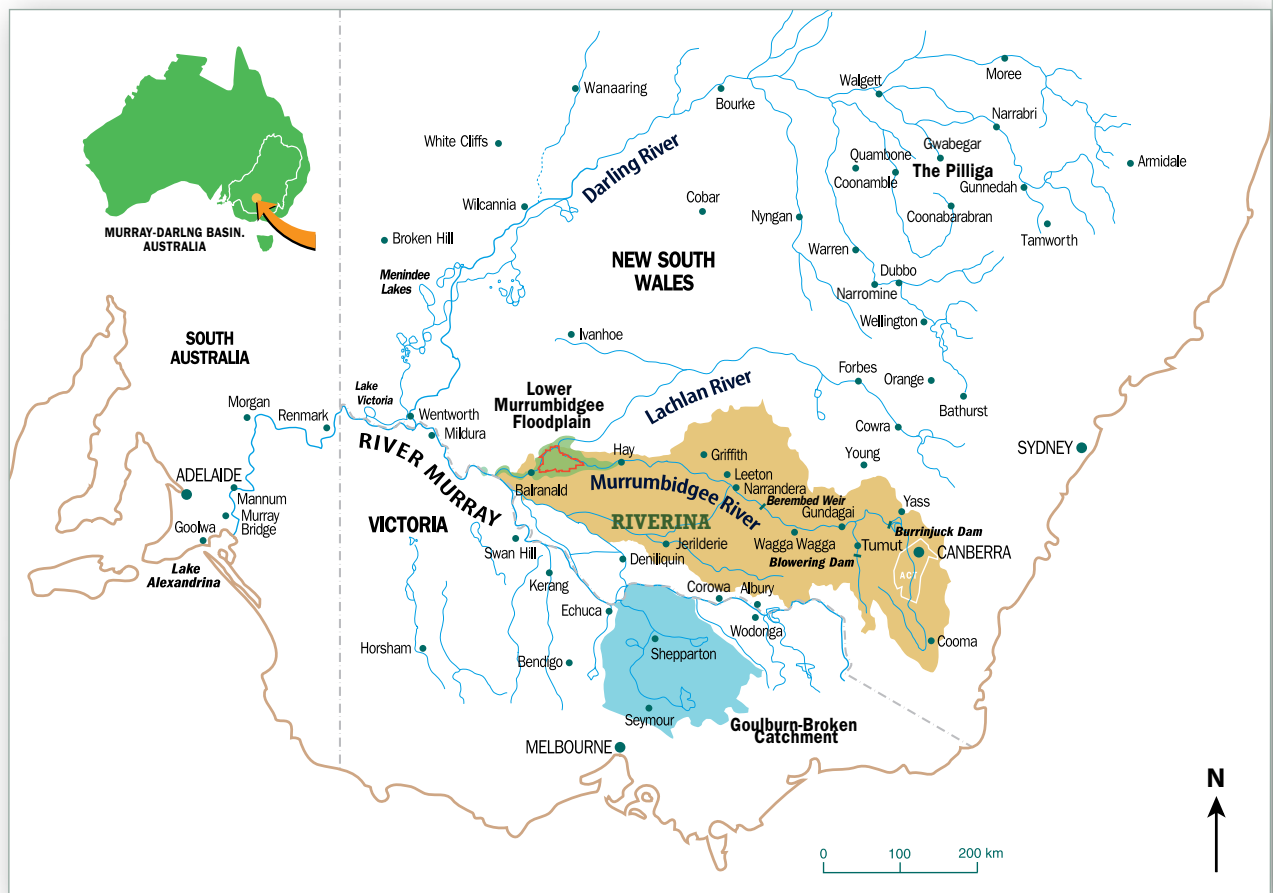


Figure 10.1 Ecologically strategic location of the lower Murrumbidgee floodplain

The ecologically significant size, strategic location, and capacity to cleanse and rejuvenate the waters of the River Murray, and restock a much greater area with native fish and water birds, makes the floodplain key to the resilience of the southern Murray-Darling Basin.

10.1 'SENSE OF PLACE'

'Sense of Place' for the community on the lower Murrumbidgee floodplain today is specified by river hydrology; floodplain geomorphology, wetland vegetation and deep cracking alluvial soils; and a vernacular agri-ecological land-use response to a flood-dependent landscape. The management of water across the landscape requires an intimate spatial and temporal knowledge above and below the surface, and an effective system of governance. It necessitates landholder inter-dependence, cooperation, negotiation, and intensive communication, which reinforces a sense of community. That level of cooperation requires constant maintenance of social capital. Most importantly, 'sense of place' comes from community resilience in the face of marginalization, and the vindication of a century of community defiance of 'modernist' exclusion of their landscape, land-use methods, and wish to work in harmony with natural systems.

10.1.1 Authors interest in the region

I was introduced to the lower Murrumbidgee and lower Lachlan landscape as a child through stories. Family links with the region began in the 1860s when my paternal great-great-grandfather moved to the area with his family to work as a wool classer on pastoral stations. Throughout my childhood my grandmother received regular letters from her sisters with news of the Balranald district and my grandfather's stories about the region and its people fired my imagination.

My grandfather interpreted a landscape quite different from the northern NSW landscapes of the Pilliga and Warrumbungles that I knew. His stories were about sandy waterless mallee (low multi-stemmed eucalypts) country, treeless saltbush plains, flooded red gum forests, vast rush and reed beds, lignum covered floodplains, and the joining of the lower Murrumbidgee and Lachlan floodplains as one great wetland that came alive with waterbirds each winter and spring. He described a cultural landscape of huge 'ash heaps' (middens) in places forming 'mazes' where Aboriginal people had been living for thousands of years, and how they caught ducks in nets strung between trees across deep billabongs, and poled bark canoes throughout the wetlands during the annual flooding, to fish and collect waterfowl eggs. There were stories about the annual movement of stock between the frontage country and 'backcountry', local characters, duck-shooting expeditions, the joy of watching flocks of Bluebonnet parrots (*Psephotus haematogaster*), paddle steamers, and life on large pastoral stations. There were also stories of hardships, hard times, sadness, resilience, and the impacts of historical events on the people of the district:

[I]f a child's vision of nature can already be loaded with complicating memories, myths, and meanings, how much more elaboratively wrought is the frame through which our adult eyes survey the landscape. For although we are accustomed to separate nature and human perception into two realms, they are, in fact, indivisible. Before it can ever be a repose for the senses, landscape is the work of the mind. Its scenery is built up as much from strata of memory as from layers of rock.

10.2 THE LOWER MURRUMBIDGEE BIOREGION

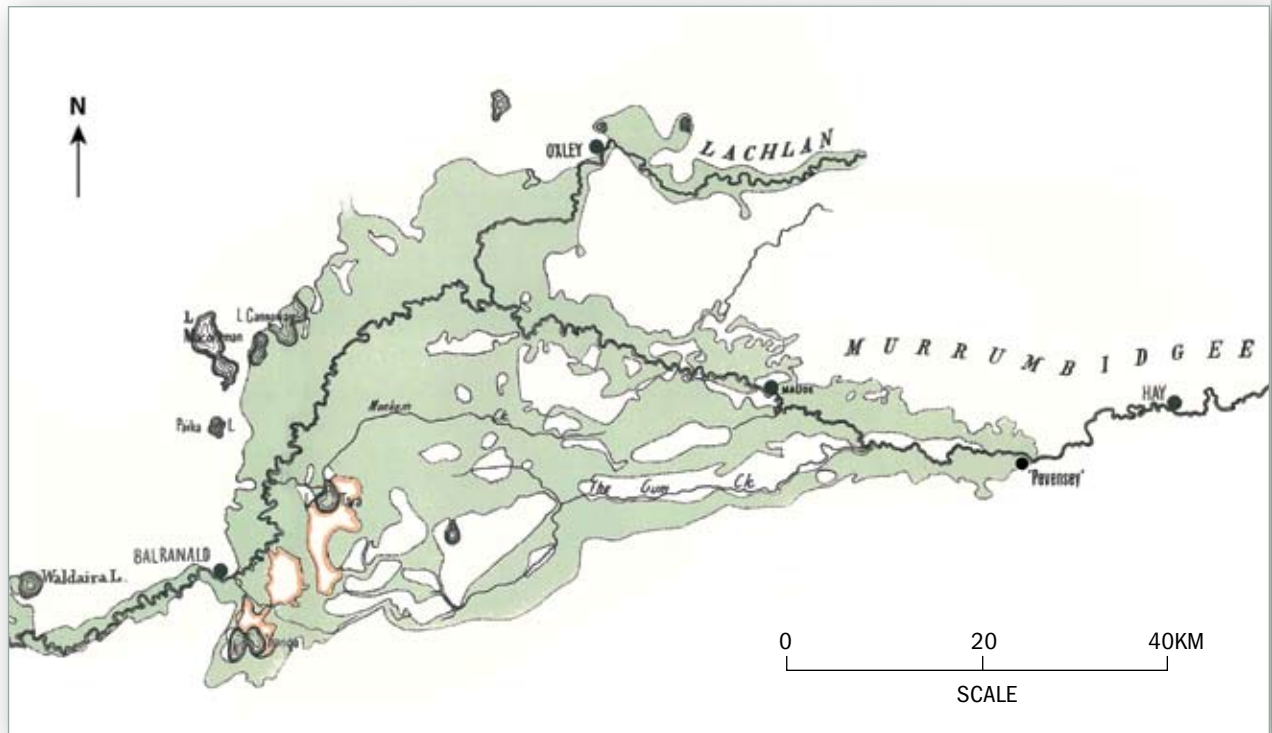


Figure 10.2 Lower Murrumbidgee floodplain bioregion defined by the historical extent of flooding

The inundated area corresponds with alluvial soils that have been built, layer upon layer, over more than thirty million years. (NSW LA 1905. *Murrumbidgee River Northern and Southern Irrigation Schemes. Map showing Irrigable Areas 1/9/1905*).

The vegetation, landforms, soils, wetland ecosystems, and distinctive land-use activities on the clearly defined flood-dependent alluvial fan landscape of the lower Murrumbidgee floodplain conform to Sale's (2000: 55) definition of a bioregion (see 1.1.2.3). It is a rare wet-landscape in the semi-arid western Riverina, and as such is a biodiversity 'hot spot'. The Riverina is broadly the region between the Murrumbidgee and Murray rivers, in southern New South Wales. In particular, it is strategically placed to protect and provide significant ecosystem services to the River Murray.

The bioregion holds the largest area of wetland remaining in the Murrumbidgee Valley (217 000 ha), which assumes significance in the context of the Murrumbidgee River being one of the most developed in Australia, with 98% of its divertible flow now exploited (Kingsford and Thomas 2001: 4). It has the most water diverted of any river in the Murray-Darling Basin; accounting for around 23% of total Basin diversions (Crabb 1997: 34, DLWC 1996: 54). The lower Murrumbidgee floodplain wetlands are also significant in the context of national and global wetland losses over the past century and the resultant negative impacts on river health. Schofield et al. (2003: 12) estimate that there has been a 90% loss of floodplain wetlands in the Murray Darling Basin.

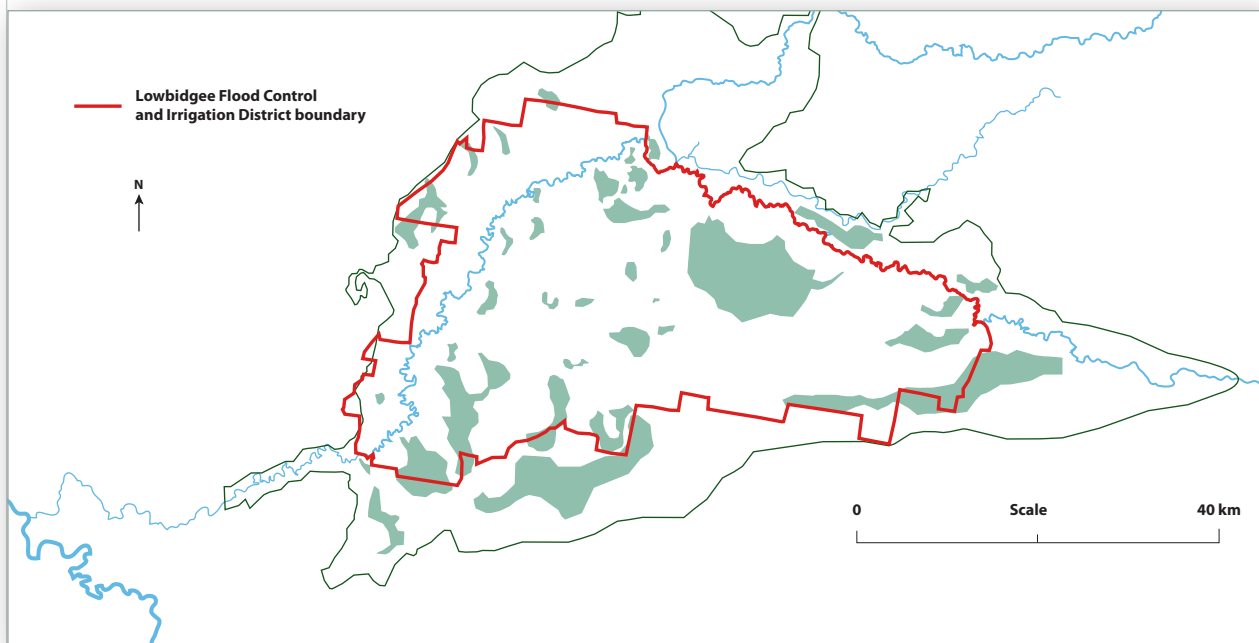


Figure 10.3 Areas above flood level

Not all parts of the lower Murrumbidgee bioregion are flooded. Almost 43 000 hectares of land is above flood level. Elevated areas include sand hills built from sand blown from the west during past dry periods, lunettes on the eastern sides of lakes, naturally high saltbush plains, and ironically, the channels of prior-streams. These 'islands' in the floodplain act as refuges during major floods, and also add to landscape, land-use, and ecological diversity.



Plate 10.1 Oldman saltbush (*Atriplex nummularia*) shrubland

Under the traditional grazing regime, pastoral properties utilized elevated saltbush plains to feed their stock over winter and spring, when the floodplain was inundated, before returning them to the floodplain pastures that grew after the floodwaters receded in summer. The symbiotic relationship between the two ecosystems enabled the area to sustain a high stock carrying capacity.

The large floodplain wetland area and diversity of inland wetland types are important factors for resilience. It includes one of the largest red gum (*Eucalyptus camaldulensis*) forests in Australia (34 000 hectares) and the largest area of lignum (*Muehlenbeckia florulenta*) wetland in New South Wales (24 000 hectares). The lower Murrumbidgee River channel also provides significant in-stream habitat as one of the longest heavily snagged reaches in the southern Murray-Darling river system.

The main statutory land management unit on the floodplain is the Lowbidgee Flood Control and Irrigation District, which was established in 1945 (NSW 1946: 19). It occupies 162 800 hectares of the central section of the floodplain, of which approximately 105 000 hectares is able to be artificially flooded. The District is divided into two administrative sections dictated by the two water diversion points; Maude and Redbank weirs. It is the only designated irrigation district in New South Wales without a specific water allocation. Flood control was an important role for the District before the completion of Blowering Dam regulated the Tumut River in 1968. However, extreme climatic conditions resulting from global warming may reinstate that role in the future.

Governance of the Lowbidgee Flood Control and Irrigation District is by land owners through the Lowbidgee League in partnership with NSW Water. Vernacular agricultural processes developed by landholders to work in harmony with the floodplain landscape and to opportunistically deal with extremes of water availability, are becoming increasingly significant as management models within the context of climate change. The cooperative distribution of water across the floodplain means that there is landscape-scale management in addition to the priorities of individual landholdings, which along with the diversity and size of ecosystems and land-use activities, appears to have contributed to the resilience of the region.

More than 25% of the floodplain is protected in Yanga National Park, Toogimbie Indigenous Protected Area, and as Protected Areas and Private Agreement Areas on private property (see Figure 11.1). There are mutual benefits in having a mix of commercial and eco-cultural land-uses in a relatively isolated and sparsely populated landscape, including people with local knowledge active in all parts of the area. A mixture of agricultural and ecological land-uses on private property surrounding Yanga National Park helps to protect its integrity by providing a complementary buffer zone that includes corridors linking ecosystems beyond the park boundary. The importance of sympathetic buffer zones around core areas protecting biodiversity and ecosystem services is emerging around the world (see 1.1.2.2).

Harvey (2007: 154) adds that there are also benefits for agricultural lands adjacent to national parks, which are 'more likely to have a more intact flora and fauna than landscapes surrounded by a sea of agriculture'. The integrity of the lower Murrumbidgee floodplain landscape as one of the largest producers of high value specialist organic grain and oilseed in the nation is also enhanced by its distance from intensive industrial agriculture and its insulation by the surrounding low density semi-arid ecosystems.

10.3 A UNIQUE LANDSCAPE CREATED BY A DRAMATIC REDUCTION IN RIVER CHANNEL CAPACITY

In the nineteenth and early twentieth centuries, the section of the Murrumbidgee Valley between the towns of Hay and Balranald was generally referred to as 'the flooded country below Hay' (NSW LA 1905b: 17). Distributary channels, commonly referred to as 'flood-runners' begin leaving the Murrumbidgee River on 'Pevensey' Station around 30 kilometres west of Hay, to take water onto the floodplain which eventually broadens to 45 kilometres in width. At the beginning of the twentieth century, the landscape was described as follows:

[T]he lower river, where the contour and nature of nearly 1,000,000 acres of country had been designed for and accustomed to receive an overflow periodically from the river, and, as a result, besides endless natural creeks, lakes, billabongs, anabranches and depressions receiving replenished water supplies, it left an immense product of food-stuff as a granary for stock in times of abnormal drought.

Riverine Grazier, 30 May 1902

The lower Murrumbidgee floodplain is maintained as a result of the progressive reduction in river channel capacity between Hay and Balranald by 90%, causing overflow and extensive flooding of the surrounding land. Flooding rejuvenates the giant alluvial fan formation with silt suspended in the floodwaters. At the village of Maude, the channel capacity of the Murrumbidgee River is 25% of that at Hay, and at Chaston's Cutting a few kilometres upstream from Balranald it is only 10% of Hay's capacity.

The explorer Charles Sturt (1999 [1833]: 170) noted the reduction in the capacity of the river channel and its consequences in his journal on 24 December 1829:

[I]t struck me, that the river had fallen off in appearance ... The river evidently overflowed its banks, on both sides, for many miles ... The flats of polygonum stretched away ... to an amazing distance ... and the very nature of the soil bore testimony to its flooded origin.

The reduction in channel capacity appears to be a result of the low-energy of the river flow as it travels through very flat country, causing its sediment load to be dropped within the channel, slowly filling it. The flow energy is also reduced as its westward path is obstructed and diverted to the south by a major geological feature; an uplifted basement ridge complex known as the Ivanhoe Block (Kellett 1989: 333). The Ivanhoe Block contributes to a more subtle, but similar damming effect and ‘choke’ on the Murrumbidgee just above Balranald, as the Cadell Tilt Block on the River Murray near Barmah; both resulting in the establishment of major red gum forests. However, the ‘choke’ in the channel above Balranald would make the re-establishment of connectivity with the floodplain relatively easy.

LOCATION	Approximate channel capacity
HAY	80 000 ML/d
MAUDE	20 000 ML/d
REDBANK	11 000 ML/d
CHASTON’S CUTTING	8 000 ML/d
BALRANALD	11 000 ML/d

10.3.1 Simply a ‘full river’ at Hay will result in extensive flooding downstream

The Murrumbidgee River at Hay, above the vast floodplain, and at Balranald below, appears to be quite ‘normal’ so it is difficult to for people to comprehend that its character and the surrounding landscape changes dramatically in between. This, combined with the fact that little but semi-arid *chenopod* (‘saltbush’ and goosefoot) shrub rangeland is seen when travelling on the Sturt Highway across the Hay Plain, contributes to the assumption that the area out of sight is more of the same. As explained by Fred Nelson of ‘Moatfield’, Maude, ‘the river can be 3 or 4 feet from the top of the bank in Hay and people are surprised in Hay that we are getting a flood down here’ (*pers comm.* 12/9/2002).

10.3.2 Natural Flooding Pattern and Frequency

Up to the present we have never known more than two years without a good flood, but this time we have gone three years without; this is the longest period I know for twenty-nine years.

Tyson (junior) 1885: 327

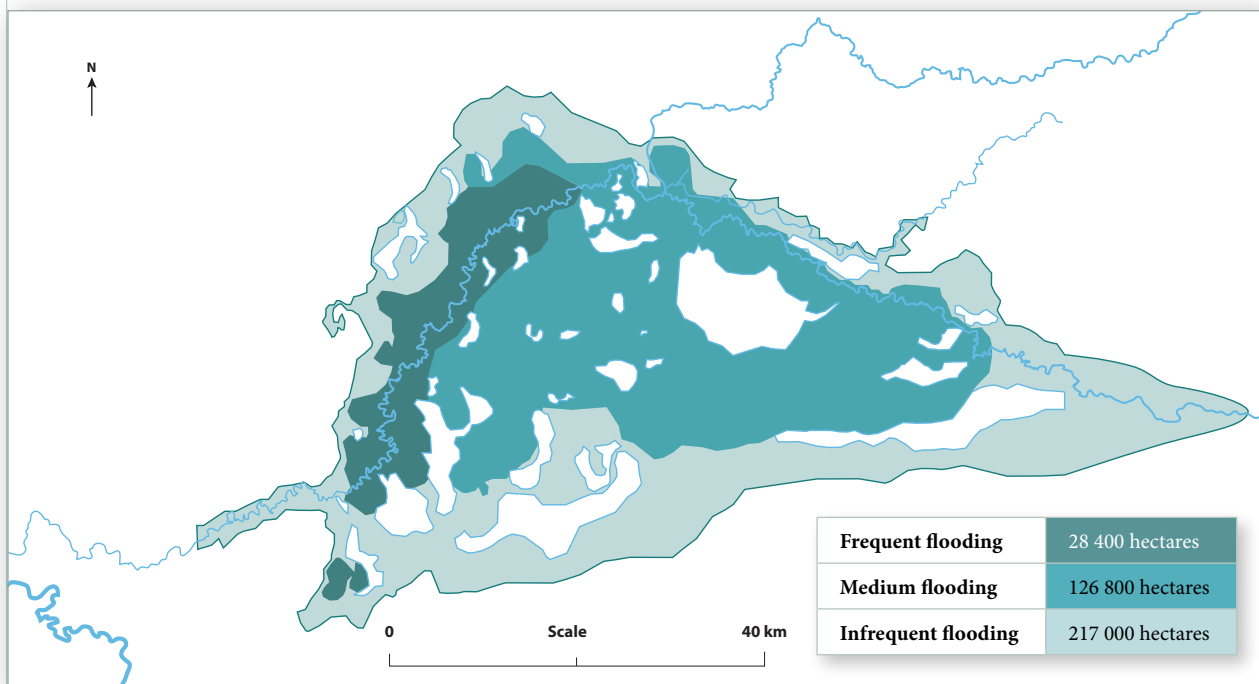


Figure 10.4 **Flooding terraces**

Under natural conditions, the area inundated by the lowest level floods, between Balranald and the Lachlan confluence appeared to receive flooding in at least nine out of ten years, and often more than once in a year. Medium flooding occurred in around four years out of ten. The highest zone appears to have flooded two to three years in ten.



Plate 10.2 **Flooded red gum forest**

Red gum forest corresponds approximately to the most frequently flooded area of floodplain. Its 34 000 hectare area is divided evenly between Yanga National Park and private property.

The progressive reduction in the channel capacity of the lower Murrumbidgee River, results in three broad terraces of natural flooding on the floodplain, as explained by L.A.B. Wade (1902: 3), Principal Engineer for Water Supply and Sewerage in New South Wales:

The first flooding takes place where the banks are very low between Balranald and the junction of the Lachlan; the next zone, where the banks are slightly higher between the Lachlan and Maude; the very highest zone, which is only covered in exceptional floods, is the zone above Maude.

The most frequently flooded area corresponds to the core red gum forest on the floodplain. The medium flood area corresponds broadly with lignum communities. Lignum and black box (*Eucalyptus largiflorens*) vegetation communities dominate the areas flooded during high events. The terrace structure accords with Andrews' (2006: 43) assertion that 'floodplains all over Australia consisted of a series of steps, each with wetlands at the top and bottom'.

10.3.2.1 *Flood-runners: floodplain 'lifelines' and river 'health-lines'*

Flood-runners once performed the dual key roles of distributing large volumes of water throughout the floodplain and also draining it off. Water was also able to flow through breaks in the natural levees along the river to supply strategic wetlands well before general overbank flooding occurred. After European settlement, that process was particularly important for sustaining drought refuges for domestic stock (Gibson 1915), as well as wildlife, and for providing watering points well away from the river to enable the utilization of large areas of saltbush plain for grazing. The failure or a reduction of flow frequency of some of the high off-take runners provided the first indications of the impacts of upstream water extraction on the lower Murrumbidgee floodplain.

The construction of only two weirs a long distance apart, rather than a connected series, meant that many flood-runners, the natural water distribution 'infrastructure' connecting the river with its floodplain, and maintaining the health of both, became redundant. Upstream water diversions, and regulation policies of running the river at a low level, has resulted in flood-runners outside of the influence of weir pools being left 'high and dry' and therefore redundant. Others had to be blocked off by landholders so that the water artificially diverted onto the floodplain could be held long enough to mimic natural flooding and facilitate vegetation growth, rather than immediately draining back to the river.



Plate 10.3 Flood-runner or distributary off-take channel

The frontage country is as a rule 2 to 3 feet lower than the immediate banks of the river. At numerous points along both banks there exist depressions or openings leading into shallow creeks or gullies having a decided fall, in most cases, away from the river. As a result, a flow in the River insufficient to overtop the natural banks, leads to the flooding of a considerable area of country and provides what may be designated a moderate flooding.

Monash 1904: 2.

Two weirs are also inadequate to support a conventional industrial irrigation system. In order to effectively spread water from only two distribution points, landholders have had to construct a complex network of channels and banks on the floodplain over the past 60 years. The roles of flood-runners have had to be replaced by artificial channels. Artificial channels mimic the roles of the major natural flood-runners that distributed much higher flows over the floodplain in the past (Cawley 2000: 80). In the future, some runners may be able to be recommissioned by the installation of regulators equipped with carp screens so that they could be operated by landholders to improve floodplain and river resilience through greater and timely connectivity.

10.3.2.2 Flooding is everything

Flooding is everything – without flooding this country is basically worthless.

Spinks, 11/9/02

One of the most consistent messages about the lower Murrumbidgee region over the past 150 years is that the economy and ecology of the district are flood-dependent (McKinney 1900: 248, Monash 1904: 2, Spinks 2002, Gorman 2002). The deep cracking alluvial soils of the lower Murrumbidgee floodplain evolved to be flooded. In evidence given to the NSW Royal Commission on the Conservation of Water, pioneer squatter James Tyson (1885: 116) explained: 'I am dependent in a large measure on floods – I should be starved off the country if it were not for flood-water'.

10.4 CAPITALISING ON THE CHARACTERISTICS OF FLOODPLAIN SOILS

In addition to being the driest inhabited continent on earth, with the exception of a few regions, Australia also has notoriously poor soils. In the late nineteenth century, water engineer H.G. McKinney (1893: 400) was aware of the importance of matching scarce water resources with limited areas of rich soils:

The river waters of this country ... are highly suitable for purposes of irrigation, and all that is required in utilizing them is to make certain that they are used only on suitable land.

The lower Murrumbidgee floodplain consists of approximately 217 000 hectares of rich alluvial soils. Large areas of flood-dependent land are underutilized due to an inadequate number of diversion weirs and policy that gives the lower Murrumbidgee floodplain access to 'surplus' water only for all ecological and agricultural requirements. This has greatly reduced agricultural and ecological productivity, because floodplain soils evolved to be flooded. The natural rainfall of around 317 millimetres per annum, is insufficient for them to reach their productive potential, as Gorman (12/9/02) explains:

This black alluvial soil needs to be flooded. Good rain is just useless in this country; it just runs into the cracks. The soil has plenty of nutrients and everything, but it just won't grow without flooding.

Andrews (2006: 47) concurs, and explains that the natural 'floods were what really soaked the floodplains. The rain didn't soak them – there wasn't enough rain to do that'. Today, floodplains rely on rain and smaller and less frequent quantities of water, generally from artificial flooding, so they are gradually drying out. The importance of flooding to sustain the lower Murrumbidgee floodplain was fully appreciated well over a century ago. A sustainable future for the floodplains of inland south eastern Australia may depend on re-learning local knowledge and re-visiting vernacular processes.

10.4.1 Resilience and water storage capacity

From her research on lake-bed cropping, Briggs (Briggs and Seddon 1998; Briggs and Jenkins 1997) suggests that farming floodplain soils is generally more sustainable than farming, and especially irrigation farming, dryland soils. She suggests that alluvial floodplain soils are likely to be more resilient than dryland soils because they are naturally subjected to much more disturbance as they wet and dry. They also contain high levels of calcium that helps to retain structure (interview 18/7/05).

Floodplain soils self-mulch as a result of ongoing wetting and drying, and are periodically rejuvenated by layers of alluvium, which can help restore organic carbon depletion. Nevertheless, former CSIRO plant scientist Maarten Stapper (*pers comm.* 22/5/07) states that cropping and reduced natural flooding will result in organic carbon depletion in floodplain soils. Following an examination of the lower Murrumbidgee floodplain he suggested that organic carbon can be maintained while retaining organic accreditation by spreading animal manure collected from short-term organic cattle feedlots. This is a modern version of the Medieval British practice of folding where stock were concentrated on fields for a short time before a period of fallow to fertilize them with their wastes (Williamson et al. 2003: 50). In addition, accumulated timber waste from more than a century of logging in the red gum forests is readily available for conversion into biochar, which if combined with animal manure has the potential to rehabilitate soil carbon and improve nutrient availability (Lehmann et al. 2006: 410-412; Lehmann 2007: 385; Steiner et al. 2007: 286-288).

The self-mulching alluvial soils of the floodplain evolved to quickly absorb huge quantities of floodwater. When dry, the floodplain clays shrink, forming cracks more than a metre deep. As a result of deep cracking, around one third of the total soil volume is available to absorb water:

The cracks were a brilliantly efficient intake system. Water would fill them, the surrounding clay would absorb the water, and then the cracks closed up. The beauty of this process was that, having entered the cracks, the water moved laterally into the surrounding clay. In other words, it didn't leach the soil's surface fertility by sinking in from the top. On the contrary: when the water filled the cracks, any organic matter in the cracks floated to the surface and was left there.

Andrews 2006: 58.

After the cracks seal very little more water is absorbed (Roberts et al. 2000: 66-67) and floodwaters continue to move across the floodplain and deposit their suspended sediment as a layer of alluvium, further enriching the soil surface. The alluvial soils built over tens of millions of years of inundation with silt-laden floodwaters, today support an extensive organic grain industry.



Plate 10.4 **Maintaining soil fertility**

Biochar produced from the waste of over a century of sleeper-cutting operations and manure collected from short-term holdings of cattle in organic feedlots is available to help maintain soil fertility after cropping. Inset: Deeply cracked alluvial floodplain soils.

The paradigm shift, triggered by the observations and work of Peter Andrews (2006), is slowly occurring with recognition of the historical role of water stored in floodplain soil profiles in sustaining the ancient Australian landscape. The new perspective has been championed by a number of high profile supporters, including a former Governor General and a leading retailer, and receives regular coverage in the print and electronic media (Williams 2005; Goldney 2005; Kretowicz 2008; Bush 2009; Thistleton 2009; Myers 2009). The lower Murrumbidgee floodplain conforms to Andrews' description of how the ancient Australian landscape functioned. It may therefore be possible to use it as the foundation on which to reconstruct a water management system suited to inland south-eastern Australian conditions, including being able to cope with predicted climatic extremes.

10.4.2 The historic role of floodplains as water 'storages' in the landscape

Inground water is what kept, and keeps, the Australian landscape alive. It's the ultimate key to our landscape's survival.

Andrews 2006: 47

Floodplains were the in-ground water storages of the ancient Australian landscape. From an ecological perspective, water stored in the wetlands and soil profile of floodplains is more important than that in river channels because it provides a greater diversity of ecosystem services. Before regulation, only the largest rivers in the Murray-Darling system flowed year round, and even those were reduced to 'chains of ponds' during severe droughts. In the ancient Australian landscape, the largest water 'storages' occurred in floodplain wetlands on the lower ends of inland river systems, such as in the Macquarie Marshes, the Gwydir wetlands, Great Cumbung Swamp on the Lachlan River, and the lower Murrumbidgee Floodplain. However, the lower Murrumbidgee floodplain differs from other bottom-of-river wetlands, in that it is not a terminal system. It has an ecologically strategic mid-system position, in relation to the River Murray, which could be incorporated with an environmentally friendly river regulation model involving greater floodplain-river channel connectivity.

10.4.2.1 *A natural mid-river water storage*

Extensive flooding under pre-regulation conditions resulted in the lower Murrumbidgee floodplain performing the role of a natural 'mid-river balancing storage' in relation to the southern Murray-Darling river system. It helped to regulate the system by temporarily storing floodwaters and slowly releasing them to the river. Lake Victoria on the Murray and Lake Brewster on the Lachlan, perform similar roles on regulated rivers today. However, the capacity of the lower Murrumbidgee floodplain deal with floodwaters that were potentially damaging to property and infrastructure elsewhere was its only place in the mechanistic river regulation model developed in the first half of the twentieth century. That role resulted in the designation of a large part of the floodplain as a *Flood Control* and Irrigation District.

10.5 WETLANDS

The lower Murrumbidgee floodplain has been identified as a nationally important wetland area (Environment Australia 2001: 9-11, 39). Its wetlands have a key role in maintaining the health of the Murray-Darling river system and the Australian environment through the provision of ecosystem services to cleanse, rejuvenate and restock the river system. They maintain biodiversity, through the provision of waterbird, amphibian, and fish breeding habitats, and also provide refuges, and migratory bird 'stop over' areas. Floodplain wetlands are the richest and most diverse parts of the inland Australian landscape because they are at the interface of aquatic and terrestrial systems. Kingsford (*pers comm.* 20/9/02) suggests that:

The Lowbidgee is the most important wetland system on the Murrumbidgee. It's the largest; it has the most in terms of the fauna and flora that you could find in the Murrumbidgee catchment; and even though a lot of it has been degraded and lost over the last 150 odd years, there are still some really important parts. If you think about it in relation to the other important wetland areas in the Murray-Darling Basin – like the Macquarie Marshes or the Narran Lakes – it's every bit as important as those.

The area contains nationally important breeding colonies of Australian White Ibis, Glossy Ibis, Straw-necked Ibis, Royal Spoonbill, Great Egret, and Intermediate Egret. In addition, it is an area of national importance for the Little Egret, Little Bittern, Australian Bittern, and Freckled Duck. It is visited by species listed under the Japan-Australia Migratory Birds Agreement (JAMBA), China-Australia Migratory Birds Agreement (CAMBA), and the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), such as the Caspian Tern, Japanese Snipe, Cattle Egret, Curlew Sandpiper, Red-necked Stint, and Bar-tailed Godwit. Sixty species of waterbirds have been recorded on the lower Murrumbidgee floodplain and 41 of the species have bred on the wetland (Kingsford and Thomas 2001: 42, 69). It also holds rare, vulnerable and endangered flora and fauna species, including large populations of the endangered Southern Bell Frog; and Regent Parrot, Pink [Major Mitchell] Cockatoo, Yellow Rosella, Painted Honeyeater, Painted Snipe, Blue-billed Duck, Fishing bat, and Mossgiel Daisy (Maher 1990).

10.5.1 A mid-river ecological 'storage'

Wetlands are the cheapest and most effective river and water quality protection systems that we have at our disposal. The strategic location of the lower Murrumbidgee floodplain as a mid-river, rather than a terminal, wetland area, and its considerable size, increases its potential ecological value. Large-scale high quality 'habitat patches' such as the lower Murrumbidgee floodplain act as nursery areas producing both terrestrial and aquatic 'source populations' for export (Warren et al. 2008: 165). The floodplain could relatively easily be reconnected to the river channel to perform its historic role of cleansing and rejuvenating waters going to the Murray, in addition to restocking the rivers and landscapes of the southern Murray-Darling Basin, reclaiming a label of a 'life giving place' (Roe and Hoogland 1999: 30).

10.6 AQUATIC HABITAT

The degradation of in-stream habitat has had a huge impact on the aquatic life of inland rivers, the most obvious being a decline in native fish populations. It is currently estimated that native fish populations in the Murray-Darling Basin are about 10% of pre-European settlement levels (Murray-Darling Basin Ministerial Council 2004: 6). Nine of the 35 native fish in the Basin are classified

as nationally ‘threatened’; two of which are ‘critically endangered’; and 16 are listed as threatened under State jurisdictions (Barrett 2004: 17). The serious need for the protection and restoration of in-stream habitat is illustrated by the almost desperate calls for the establishment of a network of freshwater protected areas, possibly in the form of demonstration reaches, over the past decade (Harper 2008: 17, Neville 2007: 35-47, Anon 2005: 3-8, Barrett 2004: 15-23, Bond and Lake 2003: 193-198, Barrett and Ansell 2002: 601-612).

In-stream habitat damage can result from snag (fallen tree and woody debris) removal, a reduction in floodplain-river connectivity, the degradation of the riparian zone, and sedimentation and algal blooms as a result of run-off from surrounding land not being intercepted by wetlands or riparian vegetation. Reductions in flooding size, seasonality, and flow variations, and obstructions such as weirs, have also contributed to the decline in native fish populations.

Box 7. Decline of Native Fish – a River Health Indicator

The abundance of native fish in the rivers of the Murray-Darling system when Europeans first visited the region was recorded in the journals of many explorers and squatters (Humphries 2007: 108-110). In 1813, the explorer George Evans gave the name Fish River to the first significant waterway that he came upon west of the Great Dividing Range (Weatherburn, 1966: 34). In 1817, John Oxley recorded from the banks of the Lachlan River, that ‘the river is rich in the most excellent fish, procurable in the utmost abundance. One man in less than an hour caught eighteen large fish [one weighed 70 pounds/ 31.8 kilograms and the rest] from fifteen to thirty pounds each’(Oxley 1964 [1820]: 24).

George Hobler, the first European settler on the lower Murrumbidgee floodplain wrote in his diary on 19 March, 1845 that the waters of the Murrumbidgee River in that area were ‘better supplied with fine fish than any part of the country I have seen’(Creelman 1992: 300).

Huge quantities of snags were removed (desnagging) from the major rivers of the southern Murray-Darling Basin, over a 150 year period until around 1990, for navigation safety and to improve flow. Snags, the branches, trunks and whole trees that have fallen into waterways, are valuable ecological assets. Desnagging and the prevention of recruitment, has been identified as a major cause of in-stream habitat loss, and a resultant decline of macro-invertebrate and native fish populations. Snag structures in rivers are being compared with reefs in the ocean in that they were essentially ‘permanent’ features of the rivers of inland south eastern Australia (Anon 2001: 11). Red gum timber resists rotting in water and may last for thousands of years due to its unpalatable high density and fungal resistant tannins. The parts of the fallen timber that emerge from the water also provide relatively safe basking sites for some birds and animals.

While largely a ‘thing of the past’, the legacy of desnagging continues. Research indicates that there is now a critical shortage of snags to provide habitat in the Murray and many other waterways of

inland south eastern Australia. Their natural replacement has been hindered by the lack of riparian vegetation remaining along many streams and rivers. Resnagging, where feasible and practical, is increasingly becoming a priority for the rehabilitation of native fish populations (Murray-Darling Basin Commission Media Release, 21 July 2006). Fortunately, this is not an issue along the reach of the Murrumbidgee within the lower Murrumbidgee floodplain. The final 300 kilometre reach of the lower Murrumbidgee River passes through one of the largest areas of red gum forest in Australia, with the result that its channel is heavily snagged and new snags are constantly being recruited, providing excellent native fish habitat to help restock the River Murray.

Just as a major change in perspective is required after a long tradition of seeing snags as ‘the enemy’; a similar change is necessary to view the lower Murrumbidgee floodplain as strategic component for the resilience of a social-ecological system, rather than an inconvenient part of a mechanistic system. The enormous ecological service capacity of the floodplain to cleanse and rejuvenate the River Murray, and restock a much greater area with aquatic and terrestrial wildlife, is currently greatly underutilised due to the mechanistic framing of the region.



Plate 10.5 **Excellent in-stream habitat is provided by the heavily snagged lower Murrumbidgee**

Snags were the main danger to the safe navigation of the Murray, Murrumbidgee and Darling rivers in the past (see wreck), but today are recognised as being vital to the health of freshwater aquatic life. The lower Murrumbidgee can assume a key role as a native fish nursery area to feed into, and help restock the River Murray, especially when reconnected with wetlands on the floodplain.

10.7 CONCLUSIONS – ERODING AN ECOLOGICAL ‘KEystone’

Under the current mechanistic river regulation regime, water is kept within the river channel as much as possible. It is diverted around this vast floodplain wetland complex, excluding a huge ecological asset that would greatly enhance the health and resilience of the southern Murray-Darling river system. All flows to the floodplain, including environmental components, are treated as surplus. The lower Murrumbidgee floodplain has the lowest priority for water in the Murrumbidgee Catchment, and at times it has a lower priority than water supply commitments to the Murray (DLWC 2002, Part B: 27). The situation reflects the hegemony of an outdated mechanistic paradigm that considers water outside of the river channel to be ‘out of control’ or ‘lost’, and therefore ‘inefficient’ regulation. This contradicts the findings of Page et al. (2005: 576) that much of the large surface storage capacity of floodplain wetlands is temporary and as flood peaks decline the water is returned to the channel, prolonging the duration of high flows.

River regulation through the lower Murrumbidgee reflects the redundant nineteenth century approach of delivering a reliable minimum supply of water to communities and privileging mechanistic ‘efficiency’ over social-ecological systems resilience. Flows are minimised to avoid or overbank flooding (bankfull discharge) where possible (Kingsford and Thomas 2001: 61). Its effect has been to ‘halve the frequency, number and duration of flows that connect channel and floodplain’ (*Ibid*: 577). Flood peaks (pulses) that result in bankfull discharges are now seen to be the ‘major force controlling biota in river-floodplain systems’ with the ‘overwhelming bulk of riverine animal biomass’ being derived directly or indirectly from production within the floodplain (Page et al. 2005: 567, Bayley 1991, Junk et al. 1989). The frequency and duration of connectivity between a river channel and its floodplain is significant for the ecological and chemical health of both in-stream and floodplain ecosystems.

The ecologically strategic location, natural assets, complementary mix of land-use activities, and the philosophy of matching scarce resources of water and rich soils that evolved to be flooded, would appear to make the lower Murrumbidgee floodplain bioregion a model for resilient agri-ecological land-use.

CHAPTER 11: LAND-USE AND GOVERNANCE FOR SOCIAL-ECOLOGICAL RESILIENCE

Perhaps the greatest attitudinal change we must make is to learn to look at our surroundings in their totality rather than as separate fragments.

Suzuki 1993: 163

The lower Murrumbidgee floodplain is a palimpsest on which is recorded land-use change over time. The term palimpsest refers to an effect that resulted from the reuse of Medieval printing blocks whereby earlier inscriptions were never completely erased so could be still faintly seen in the backgrounds of new prints (Crang 1998:22). At Toogimbie Indigenous Protected Area (see Figure 11.1), evidence of millennia of traditional Indigenous land-use is overlaid, in turn, by nineteenth century pastoral activities, mid-twentieth century industrial irrigation agriculture, and finally twenty-first century Indigenous land-use. Local land-use activities have modified the landscape but some of the greatest and most long-term impacts have occurred as a result of decisions influenced by cultural values, and structures at catchment, state, national and global scales. Crang (*Ibid*) suggests that landscapes are in an ongoing process of development, dissolution and replacement.

11.1 LAND-USE

The lower Murrumbidgee floodplain is a cultural landscape. The regular inundation of the huge floodplain provided a biologically rich and diverse environment that supported a large Aboriginal population over a very long period of time. The explorer Mitchell made the following observations about the size and density of middens, associated with cooking cumbungi (*Typha orientalis*) root, when he passed through the area in 1836:

One artificial feature, not observed by me in other places, distinguishes the localities principally frequented by the natives, and consists in the lofty mounds of burnt clay, or ashes used by them in cooking ... I saw the first of these heaps, when near the end of the last day's journey along the Lachlan, where the river partook of the reedy character of the Murrumbidgee. I understood that the "Balyan" or bulrush-root, which is the chief food of the natives there, is prepared in those kilns, when a family or tribe are together.

Mitchell 1838: 80-81

Land-use Areas

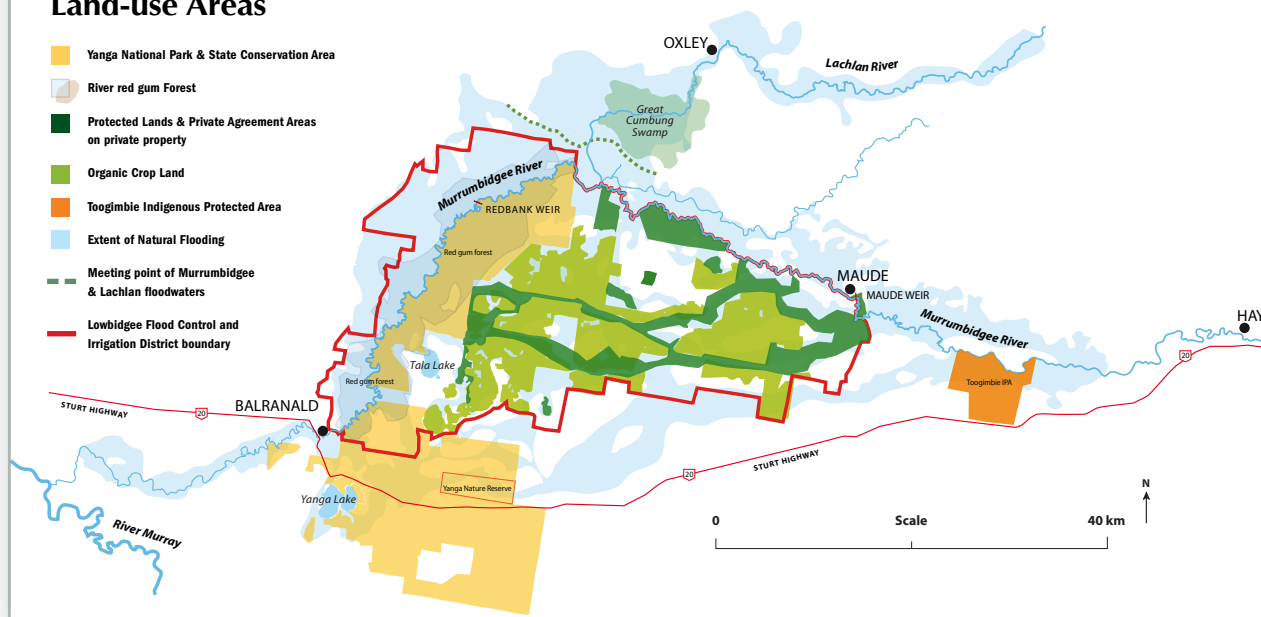


Figure 11.1 Floodplain Land-use

Current land-use activities on the floodplain range from intensive industrial agriculture to organic farming, traditional sheep and cattle grazing, forestry, cultural activities, conservation, and ecological production.

Box 8. Floodplain Land-use Activities

COMMERCIAL	AREA
Grazing	160 000 hectares
Ponded cropping	42 000 hectares (organic 36 000 ha.)
Agro-forestry	17 000 hectares
Dryland cropping	4 500 hectares
Conventional irrigation	3 000 hectares
226 500 HECTARES	
ECO-CULTURAL	AREA
Yanga National Park	31 190 hectares (red gum 17 000 ha.)
Yanga State Conservation Area	15 820 hectares (total area 33 890 ha.)
Protected Lands & Private Agreement Areas	23 800 hectares
Toogimbie Indigenous Protected Area	4 600 hectares
Yanga Nature Reserve	1 773 hectares
Enterprise Based Conservation	400 hectares (total 8 200 ha.)
76 583 HECTARES	
TOTAL	303 083 HECTARES

11.1.1 Commercial land-use

For more than a century-and-a-quarter from the mid-1840s, the primary commercial activity on the lower Murrumbidgee floodplain was cattle and sheep grazing. From the late 1950s, grazing became increasingly less profitable in relation to farming, partly as a result of the end of the 'wool boom' in 1958, which had been stimulated by demand for warm clothing for soldiers fighting in the Korean War. In 1966, the NSW Water Conservation and Irrigation Commission (W.C. & I.C) constructed a cutting and installed a regulator, upstream of Maude Weir, to improve water access. The more reliable access to water and its more effective distribution on the floodplain produced by this development facilitated the conversion from grazing to farming on the Nimmie-Caira (eastern) section of the floodplain.

The first large-scale clearing of lignum vegetation for farming on the floodplain occurred in the late 1960s when an area of 400 hectares was cleared for irrigation. However, only isolated areas were cleared for cropping until the late 1970s (Hodgson 17/10/07). The trigger for the rapid transition from grazing to farming was a highly profitable winter cereal crop produced in a lake bed in 1975 (Beck 15/7/04; Davy 23/7/04; Hodgson 17/10/07). Today, the lower Murrumbidgee floodplain is one of Australia's largest organic grain and oilseed producing areas. Around 42 000 hectares of land has been developed for cropping on the heavy alluvial floodplain soils, although generally a little over one-third of that area is planted in any given season. Approximately 36 000 hectares of the area has organic accreditation (Spinks 4/7/05; Blore 18/1/07).



Plate 11.1 Poned cropping land next to a protected lignum floodway

Organic wheat, barley, canola and safflower crops are grown using methods developed by local farmers to work in harmony with the unique soils and other floodplain conditions.



Plate 11.2 Lignum floodway and rookery site

In the late 1980s, in response to lignum clearance for agriculture, a system of Protected Lands and Private Agreement Areas was put in place to protect 23 800 hectares of lignum floodways, rookery sites, and other ecologically important areas on private property.

11.1.2 Ecological and cultural land-use

More than 25% of the floodplain area is dedicated to ecological and cultural activities. There has been a tradition of protecting special habitat areas extending back more than a century. Yanga Fauna Reserve was gazetted in 1909. It became Yanga State Forest in 1915 and a nature reserve in 1972. In addition, as mentioned above (10.6), the reach of the river that passes through the lower Murrumbidgee floodplain consists of 300 kilometres of high quality in-stream habitat.

Since the beginning of the twenty-first century, new ecological and cultural land-use activities have emerged on the floodplain. Toogimbie Indigenous Protected Area, on the eastern end of the floodplain, was declared in 2004 to support cultural land-use activities and Indigenous NRM. The New South Wales Government purchased the historic pastoral station, 'Yanga', in 2005 to create Yanga National Park. More than 47 000 hectares, or around 72% of the total Park area, is on the floodplain.

In 2007, Biodiversity Stewardship payments were introduced by the New South Wales Government to reward landholders for NRM practices that produce ecosystem services from private property. This development has the potential to make a major contribution to the production of ecosystem services

from the lower Murrumbidgee floodplain as it assists landholders to realize their capacities to manage significant ecosystems on behalf of Australian society.

11.2 VERNACULAR STRATEGIES FOR SOCIAL-ECOLOGICAL RESILIENCE

European settlers on the lower Murrumbidgee floodplain quickly realised that both river frontage land and saltbush rangeland away from the river, known as ‘backblocks’ were required for successful grazing. Gideon Lang, a landholder who settled near the present town of Hay, wrote to the Chief Commissioner of Crown Lands on 14 January 1850, to explain that on the lower Murrumbidgee floodplain the ‘back plains are an integral part of the frontage runs’ because the frontage land was unavailable for grazing due to its inundation from May until ‘sometimes the middle of October’ and the saltbush backblocks could not be grazed during summer due to heat and lack of water (NSW LA 1862: 8-9). Henry Bingham, the Commissioner of Crown Lands for the Murrumbidgee District, recommended in correspondence dated 18 April 1850, that lower Murrumbidgee runs include both frontage and back land in one parcel (*Ibid*: 11).

11.2.1 The annual floodplain-saltbush cycle

Flooding was the key element on which the large pastoral properties between Hay and Balranald were built during the nineteenth century. A feature of traditional European land-use was the utilization of different ecosystems, or ‘ecological complementarity’ (Martinez-Alier 2001: 311). During the pastoral (sheep and cattle grazing) era, between the 1840s and the 1980s, landholders practiced annual stock movement or transhumance between floodplain and saltbush rangeland ecosystems. Stock was moved to graze on the elevated areas of land occurring within the floodplain or to surrounding saltbush plains in winter-spring, and back to the floodplain pastures in summer, after the floodwaters had receded. This process enabled relatively high stocking rates in comparison with single ecosystem utilization, it allowed both ecosystems to be ‘spelled’ providing time for recovery, and provided a variety of feed for healthy stock (Connellan interview 16/7/04).

The annual movement of grazing stock between floodplain and saltbush pastures, and the once in a generation large-scale utilization of red gum forest resources during difficult economic periods, evolved in the nineteenth century as strategies to deal with the natural flooding regime, and the vagaries of climate and markets. Properties still generally retain frontage-floodplain blocks, which include areas of lignum, red gum forest, black box woodland, and sometimes reed (*Phragmites australis*; *Typha orientalis*) and rush (*Eleocharis sp.*) beds, and back or ‘saltbush’ blocks in their ecosystem mix. According

to Barry Hodgson (17/10/07), one of the pioneers of cropping on the lower Murrumbidgee floodplain, flexibility resulting from the utilization of the two ecosystems remains essential for ecological, social, and economic resilience. Red gum forests in particular, have a strategic place in the social resilience of the lower Murrumbidgee, in addition to the biodiversity of the region as a whole.

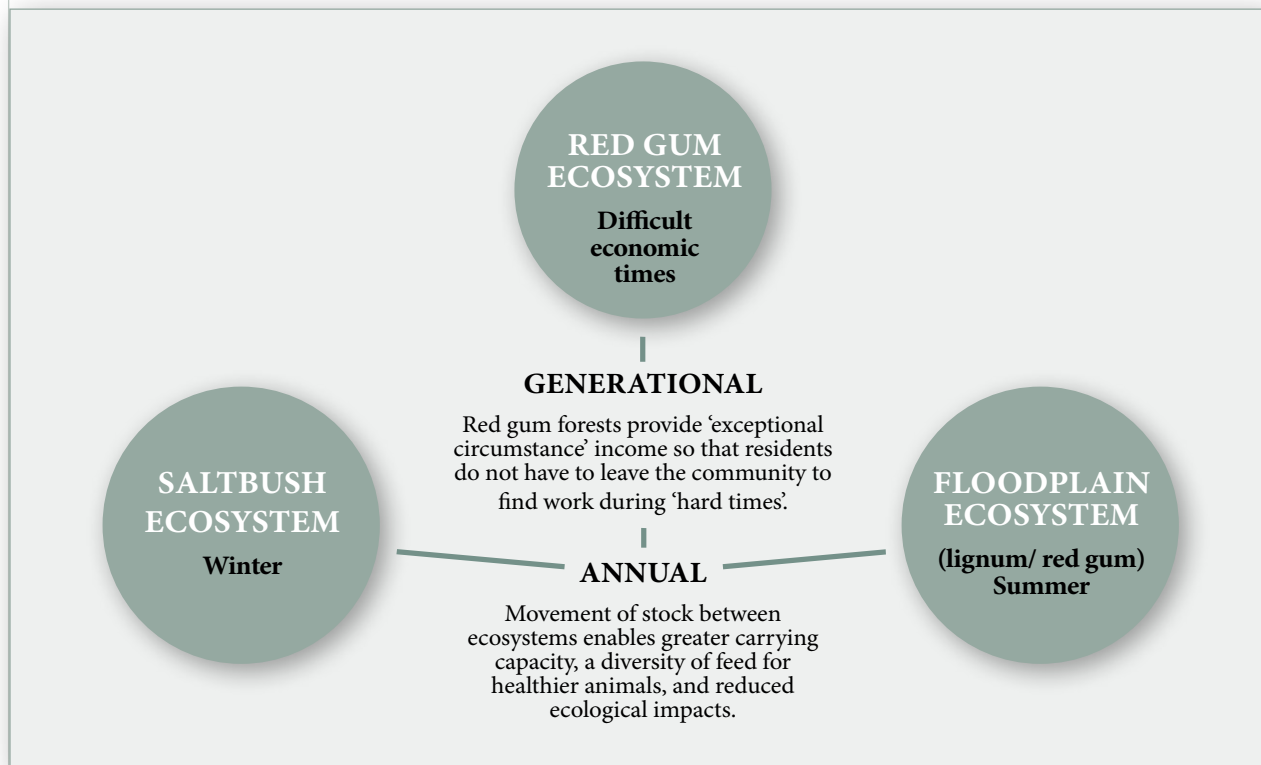


Figure 11.2 Historical utilization of multiple ecosystems for economic, ecological and social resilience



11.2.2 Red gum and social resilience

During difficult economic conditions, such as droughts or economic depressions, which appear to occur at approximately generational intervals, red gum forests are utilized to support the local economy and community. While there has been continuous forest product extraction in the district for more than a century, red gum forests are generally looked upon as a community 'insurance policy' (Campbell 23/8/07; Eddy 21/9/05; Sullivan 8/9/05; Spinks 4/7/05; Gorman 1/3/05).

Plate 11.3 Red gum has been central to the social and economic resilience of the Balranald district for more than a century.

During the dry first decade of the twenty-first century employment in the red gum industry has been very important for the local economy due to a huge drop in agricultural production. Sponsorship of the local football team and other social, cultural and educational activities by the red gum industry has been critical to community resilience.

It means that families do not have to leave their community to find work and the local economy is sustained during economically 'hard times'. When families leave a community to find work elsewhere, they frequently do not return. Many residents attribute the maintenance of a stable population in the town of Balranald for more than a century to the availability of work in the forests when necessary. As the local economy improves, workers leave the 'hard' forest work and return to less dangerous, often less strenuous and more profitable activities allowing the forest to regenerate.

11.2.3 The 'Tyson pattern' - a climatic insurance policy

A recent development in the process of improving resilience by utilizing different ecosystems has seen floodplain landholders purchasing properties between the Warrego and Darling rivers in far western NSW to access an apparent increase in monsoonal-influenced summer rain and likely increased flows in that system due to climate change. This is an example of accessing social memory in times of crisis:

A crucial challenge for adaptive governance of social-ecological systems seems to be the mobilization of social memory. Social memory has been defined as the arena in which captured experience with change and successful adaptations, embedded in a deeper level of values, is actualized through community debate and decision-making processes into appropriate strategies for dealing with ongoing change.

Hahn et al. 2008: 139

The first Australian-born millionaire, pastoralist James Tyson (1819-1898) squatted in the Great Cumbung Swamp near the Lachlan-Murrumbidgee 'confluence' in 1846 after being forced off less well watered land due to drought. He developed a form of climatic risk management known as the 'Tyson pattern' in the 1860s, which involved purchasing a chain of complementary properties with a diversity of ecosystems, and floodplains in particular, over a range of climatic zones. It gave him the flexibility to deal with drought, to maximise advantage from productive seasons, and to breed, fatten or prepare stock for sale in the most advantageous locations. Tyson's pastoral empire extended from Gippsland in Victoria to Cape York in Queensland, including a large part of the Warrego Valley that formed a key linking corridor between his properties. Properties around the Lachlan-Murrumbidgee 'confluence' formed the keystone of the system (*Riverina Recorder*, 7 December 1898; Morey 1907; Denholm 2002: 32, 124, 185-199).

11.2.4 Subsoil Irrigation

In the nineteenth century, landholders recognised the value of directing water into low-lying wetlands via natural distributaries, generally referred to as 'flood-runners', to store it in the soil profile as a drought 'insurance policy' for their livestock. It enabled feed to be produced on soil moisture for some

time, with little additional rainfall, to support breeding stock during periods of drought. Evidence of knowledge of the value of soil profile water storage at that time can be found in quite a large article discussing 'Subsoil Irrigation' that appeared in the *Riverine Grazier* at Hay on 3 November 1899. The following comment about using deep-cracking floodplain soils as 'storages' to help 'drought proof' the landscape was made in response to the impacts of the serious 1914 drought:

If it had been possible for the previous five or six months for a large portion of this water [that flowed by in 1913] to have been put over, by means of diversion weirs and channels, as large an area as possible, say 12 in. deep, the year 1914, even with its low rainfall and without any river floodings, would have been a fairly good one, on the country so treated. Experience has proved this in the naturally flooded country below Hay. Anyway, the dry grass will retain its nutriment on that country into the second year, as I have personally proved.

Gibson, *Riverina Recorder*, 17 February 1915.

Since the 1980s, the social memory of the water storage properties of floodplain soils has been transferred to grain and oilseed cropping. Farmers use a vernacular process of ponding on historically inundated land to replicate natural flooding that took place on a regular basis, before river regulation and intensive upstream water-use over the past century. Ponding enables water to be stored, via deep cracks, in the soil profile as occurred under natural flooding. Evaporation is minimised as water is on the floodplain surface during the cool months between July and October, as occurred under natural conditions. Recent field tests have revealed that the soil becomes saturated more quickly than previously thought, so the ponding time has been shortened to three to four weeks and the water can be moved rapidly across the floodplain (North et al. 2008: 30).

Following ponding, the soil surface is sealed by ploughing, when it is sufficiently dry to work. Storing water as soil moisture is an efficient way of reducing evaporation loss over the hottest months in a semi-arid climate. Soil moisture is available around 40 centimetres below the soil surface in the following autumn to irrigate winter crops from beneath. Crops are sown after autumn rains and can be sustained by the stored soil moisture so are not totally reliant on further rainfall. The advantages of watering crops 'from beneath' by applying water directly to the soil profile have recently been discovered for conventional irrigation (Mason-Jones 2006: 30). An article in *Small Farms* magazine entitled 'Cropping – Efficient irrigation below the ground. Watering crops from beneath', outlined some of the advantages of the system:

The underground system delivers the water precisely to the root zone of the plant being watered ... the big advantage is that, being underground, there is no evaporation and the irrigation is just as effective on a hot windy day as it is on a cool day with no wind ... The end result of the underground system is less use of water for the same productivity result and fewer farm management tasks in weed control and the moving of surface sprays.

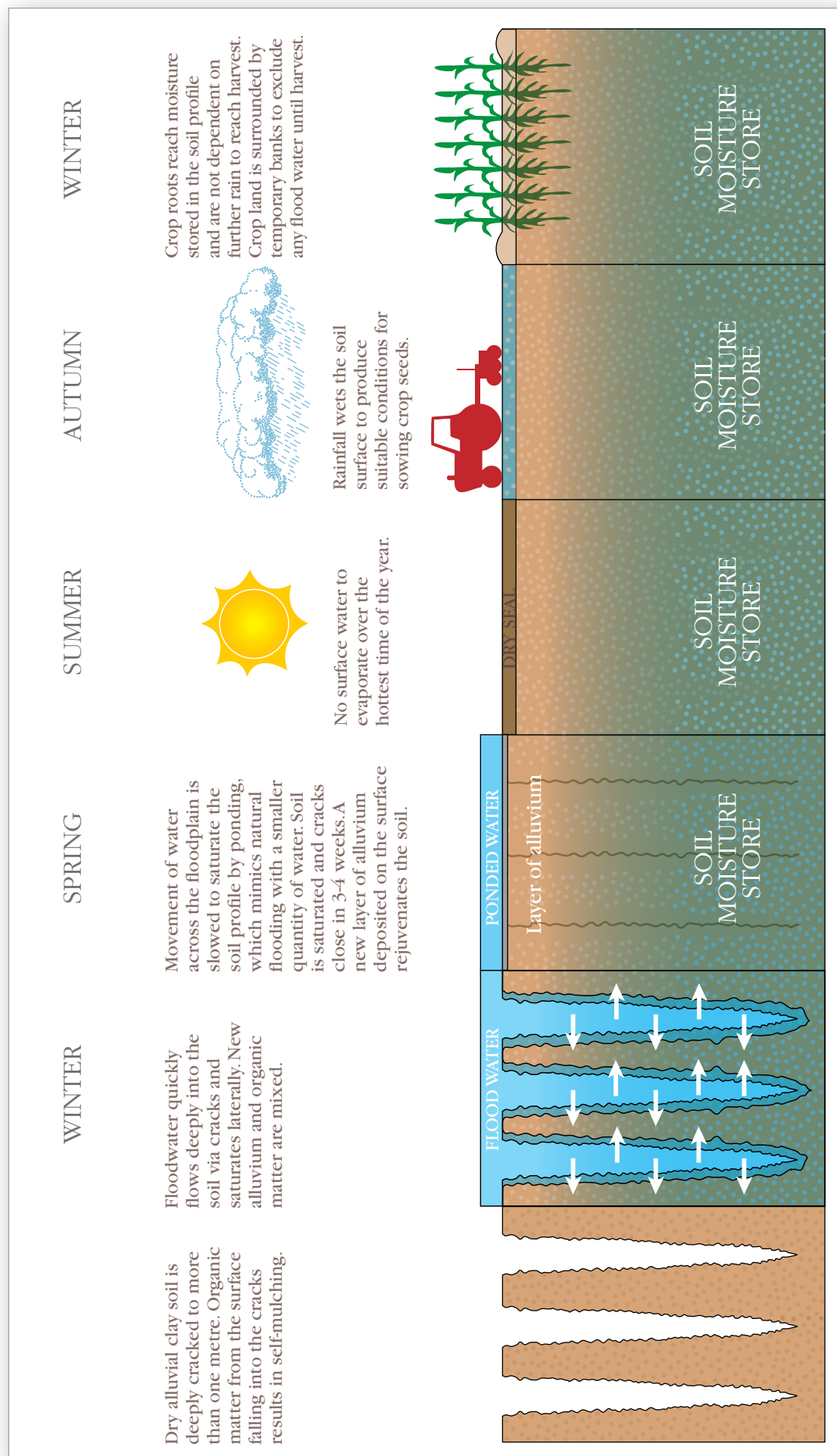


Figure 11.3 A vernacular cropping method that takes advantage of social memory and the characteristics of floodplain soils

11.2.5 Floodwater Farming

A similar process to the ‘ponding’ method used by the floodplain farmers today, known as floodwater farming, coexisted with irrigation farming in the Nile Valley for more than 5 000 years (Mazoyer and Roudart 2006: 128, 144-148). The process combined watering and soil improvement by top-dressing. While the fertilizing effect of the deposition of alluvium is less than natural flooding, a layer of silt is taken into cracks and settles at the bottom of the pond to help to maintain soil fertility. A similar process of water-bourne top-dressing known as ‘warping’ (Williams 1970: 176) was carried out in the past on the Somerset Levels in the south-west of the United Kingdom.

11.2.6 Maintaining flexibility and diversity

Climatic variability as a result of global warming, catchment-scale developments and increasing competition for water may lead to the further development of vernacular land-use models in order to improve economic, social, and ecological resilience. As proposed by Sorbo (2003: 113), the challenge for resource management in situations of climatic variability and environmental instability is ‘not to maintain stability but to maintain diversity and flexibility’. That can be achieved through a variety of social-ecological processes such as ‘mobility, diversity (keeping different types of stock, exploiting different resources), monitoring of resources, key-site management, flexible drought-adapted strategies, and common property regimes’. Norberg et al. (2008: 71) provide two general guidelines for resources managers for sustaining diversity and resilience in social-ecological systems:

1. Promoting local adaptations, such as local crop varieties and the associated knowledge of how to use them or enabling co-management, which promotes locally crafted solutions for managing resources, creates a regional diversity of species, experiences and knowledge that can be transferred and shared among local areas. Too much sharing, however, such as nationally enforced “blueprint solutions” ... may reduce regional diversity.
2. Enabling the diversity of local governance or decision units in order to minimise the dominance of single solutions.

Ostrom et al. (1999: 282) propose that protecting institutional diversity related to how different groups govern CPRs (common pool resources) ‘may be as important for our long-run survival as the protection of biological diversity’. Ostrom (1990: 1) observed that neither the state nor the market has been ‘uniformly successful in enabling individuals to sustain long-term, productive use of natural resource systems’. The institutions that have been successful in governing resource systems over a long

period frequently bear little resemblance to those of state or market. Williamson et al. (2003: 7-9) agree, suggesting that in both historical and contemporary societies, the land management systems that are socially and ecologically most resilient are common property (pool) resource systems. They also suggest that this model of governance is particularly applicable in Australia where conventional farm sizes are generally too small to be economically or ecologically viable long-term because production scales do not match ecological scales.

11.3 COMMON POOL RESOURCE GOVERNANCE

Misunderstandings arise from the assumption that a common property, where individual users have greater incentives to cooperate than to pursue individualist strategies, is the same as open access that is associated with Garrett Hardin's (1968: 1244) parable of the 'Tragedy of the Commons', where there are no restrictions on exploitation. In addition to causing confusion, there are large numbers of successful and long-standing examples of common property governance from throughout the world, contradicting Hardin's proposal that they cannot be sustainably managed (Ostrom 1990: 58-102). There are also huge numbers of examples of the degradation of private and state-controlled property (Sneath 1998: 1147-1148) that he posits as a solution. Burger and Gochfeld (1998: 6) suggest that a useful role of Hardin's parable has been in 'illustrating the importance of integrating social and political theory with biological data'.

For clarification, I will briefly describe the four broad property rights regimes that have evolved; open access, common or group property, state property, and private property (Berkes et al. 1989: 91). Open access means that there are no defined or enforceable property rights so that resources may be exploited by anyone without restraint e.g. recreational fishing in the open ocean and use of the atmosphere. Common property is controlled by an identifiable community of interdependent users who regulate resource-use by members and can exclude non-members e.g. water-users' associations and inshore artisanal fisheries. State property is controlled by government which decides conditions of access and resource-use, and may subsidize use e.g. national parks and state forests. Private property rights give an individual or corporation exclusive access to use and manage a resource that may be sold or rented. Private property rights are recognized and can be enforced by the state e.g. resources on a farm.

Governance refers to any social mode of coordination in which the aim is to control, guide or facilitate economic and social activities distributed across the landscape, including activities involved in transforming nature (Jonas and While 2005: 72). The primary requirement for governance on the lower Murrumbidgee floodplain is for the equitable distribution and management of water across the flood-

dependent landscape. As Adger and Luttrell (2000: 87) explain ‘the indivisibility of wetland resources leads to common-property regimes or complex territorial regimes being adopted for such resources’. Flora, fauna and landholders alike rely on access to water for survival. Pahl-Wostl (2002:409) suggests that effective governance ‘is more important to deal with water resource management problems than technical solutions’. Janssen and Ostrom (2006: 1466) propose that the main challenge for the study of governance of social-ecological systems is improving the understanding of the conditions under which cooperative solutions are made and sustained in the face of uncertainty and incomplete knowledge.

11.3.1 Evolution of landscape-scale governance on the lower Murrumbidgee floodplain

The Lowbidgee League represents the interests of the lower Murrumbidgee floodplain landholders (both private landowners and the NSW Government through ‘Yanga’ National Park). It also administers the distribution of water across the floodplain with NSW State Water. Its origins can be traced to community ‘defence’ associations and leagues established between 1899 and 1901, to protect the wetlands and their linked livelihoods against the impacts of upstream water diversions. League members, as landholders, are the key stakeholders in the governance of the lower Murrumbidgee floodplain. The League is the umbrella organisation that includes members involved in specific land management activities in specific parts of the floodplain, such as the Redbank Riparian Landcare Group, the Nimmie-Pollen League, and Yanga National Park. The first community governance institution established to manage common pool resources, specifically the equitable movement of water across a shared floodplain landscape, was the Nimmie-Pollen League. It was established in the early 1930s. Its establishment is an example of the abilities of members of rural communities to self-organize in times of crisis. [Note that ‘Nimmie’ and ‘Nimming’ appear to be interchangeable and different spellings are favoured at different times.]

11.3.1.1 Nimming-Pollen Creeks Scheme

In 1927, a severe drought, exacerbated by low river levels and reduced flooding as a result of increased upstream diversions on the completion of all works relating to the Murrumbidgee Irrigation Areas (MIA), were negatively impacting the lower Murrumbidgee pastoral industry (*Canberra Times*, 29 February 1928). Those events coincided with the passing of the scheduled completion date for the construction of the nine lower Murrumbidgee locks and weirs that were to compensate for the upstream diversions, and there was no evidence of impending commencement. The issues combined to create considerable anxiety within the community. In addition to direct negotiations by community representatives with the Prime Minister, pastoralist Robert B. Ronald of ‘Nap Nap’ Station proposed a more immediate project to help sustain the floodplain and reduce future livestock losses. It involved utilizing local knowledge of floodplain geography:

It may be possible to interest a number of landholders in a scheme to develop the flow of water from the Nimmie Creek to Tala Lake, via Pollen Creek, and also, if possible to Loorica Lake, of course flooding a considerable area on the way.

Riverina Recorder, 28 January 1928

He proposed that, if enough people were interested, the Water Conservation & Irrigation Commission (W.C & I.C.) may be encouraged to carry out the relatively small amount of work involved to artificially divert water onto the parts of the floodplain that were naturally annually flooded before the recent upstream developments had taken place. A cutting was made to enable water to be diverted from the Murrumbidgee into Nimming Creek at a lower river level than previously possible. A second cutting was made to link the Nimming and Pollen creeks to further improve water distribution on the floodplain. The cuttings afforded a stock water supply to around 35 000 hectares and enabled the flooding of around 24 000 hectares of natural pastures. In 1931, the Nimming-Pollen Creeks Water Trust District was proclaimed to cover an area of 66 000 hectares of the eastern part of the floodplain (*Riverina Recorder*, 27 April 1929, and 21 February 1931; *Sydney Morning Herald*, 13 November 1933).

11.3.1.2 Self-organization to avert ‘tragedy of the commons’

Weirs completed at Maude and Redbank in 1940 enabled the establishment of the Lowbidgee Flood Control and Irrigation District in 1945, which absorbed the Nimming-Pollen Water Trust District. The new District included 50 farms and covered an area of 142 500 hectares, of which 38 000 hectares of historically naturally flooded native vegetation could be artificially flooded. In 1966, the W.C & I.C constructed Caira Cutting and installed Caira regulator, upstream of Maude Weir, to increase the efficiency of flows in Caira Creek to better distribute water on the floodplain. In 1981, the Water Resources Commission installed Nimmie Creek regulator in Maude Weir pool and constructed a channel to increase the efficiency of flows in Nimmie Creek and further improve the controlled flooding of the floodplain. Improved access and control of water as a result of these developments enabled the conversion from grazing to farming on the Nimmie-Caira section of the floodplain.

By the mid-1980s, government policy and institutional inadequacies began to be exposed as landholders, who until that time had been the unpaid stewards of the lignum wetlands on their freehold properties, were clearing increasing areas for grain and oil-seed production. While there was mounting concern from environmentalists about the rapid clearing, there was no government policy provision to either reward landholders for protecting wetlands on behalf of Australian society, or to supply the wetlands with water in order to maintain their resilience. In addition, there were no regulations within the Department of Water Resources, which had greatest control over the activities on the floodplain, to prevent landholders from clearing native vegetation on freehold land. In fact, until 1983 it was government policy to promote native vegetation clearing and

wetland drainage for primary production through the *Income Tax Assessment Act 1936, Section 75A*, 'Deduction of Certain Expenditure on Land used for Primary Production' (Main, 2004: 91; ATO).

In 1984, uncoordinated clearing for cropping on individual properties was beginning to result in conflicts between landholders over water access, and to have obvious impacts on the environment. Such individual rationality but collective irrationality (Durant 2004: 356) had the potential for tragedy. However, the landholders recognized that agricultural development on the floodplain needed to be coordinated to protect ecologically sensitive areas, and to effectively and equitably manage the water that moved across it as a common pool resource. In response to the problem, they sought assistance from the Department of Water Resources to help them to develop a management plan for the part of the floodplain supplied with water from Maude Weir pool (Millington correspondence 25/2/1988).

11.3.1.3 *Protected Lands and Private Agreement Areas*

In 1988, the Department of Water Resources nominated lignum wetlands on the lower Murrumbidgee floodplain as Protected Lands under Section 21 of the *Soil Conservation Act of 1938*. This action enabled the development of a floodplain management plan for the Nimmie-Caira section of the floodplain, watered from Maude Weir pool, which recognized and conserved environmentally sensitive land:

Biodiversity conservation can be treated as a commons problem, specifically as a multi-level commons problem. Biodiversity is a global commons important for humanity as a whole, a regional commons important for ecotourism and other benefits, and a local commons that produces ecosystem services for human well-being at a community level. As a multilevel commons, the ownership and control of biodiversity are complex.

Berkes 2007: 15188

The Department then established an inter-departmental steering committee to guide the development of a plan for the floodplain, with landholders. The aim was to achieve a balance between agricultural and ecological production. The outcome of the planning exercise included:

- the protection of native vegetation in the natural distribution floodways used to deliver water throughout the Nimmie-Caira section of the floodplain; and
- the division of the floodplain into agricultural land and Protected Lands. Protected Lands and Private Agreement Areas cover a total of 23 800 hectares, which includes around 50% of the original area of lignum and smaller special habitat areas (wetlands, red gum woodlands etc.).

Voluntary private agreements were negotiated with landholders covering smaller areas of high ecological value, such as rookery sites. Together, the Protected Lands and Private Agreement Areas (PAAs) form an almost continuous corridor of lignum along the major natural drainage lines. Some PAAs are away from the floodways, including areas of red gum forest along the riparian corridor of the Murrumbidgee and isolated wetlands. The Protected Lands and Private Agreement Areas cover more than 25% of the Nimmie-Caira section of the Lowbidgee Flood Control and Irrigation District. A limited range of agricultural activities are permissible within the Protected Lands but it is necessary to apply for an authority before undertaking them.

11.3.1.4 Operating rules for water distribution across a landscape

The landholders also established a three-tier priority system to equitably share water diverted onto the floodplain (Wall and Parmenter 1999: 28) according to the quantity available:

- Tier one is used to deal with small diversions. Water is distributed through the floodways for environmental purposes, to wet the main distribution runners, and for stock and domestic purposes. It cannot be used for agriculture.
- Tier two water can be used for agricultural purposes on land that traditionally received regular flooding.
- Tier three deals with large diversions and can be used for agricultural purposes on areas traditionally only irregularly flooded, after all other priorities have been fulfilled.

To ensure equity, watering cannot move to the next tier until it is agreed that all requirements of the current tier have been fulfilled, and when there is inadequate water to supply all requirements, the following watering will commence at that point where the last stopped. The distribution of water across the landscape involves considerable consultation, negotiation, trust, transparency, cooperation and ongoing maintenance. The Lowbidgee League that is responsible for the distribution of water on the eastern end of the floodplain, in association with NSW State Water, has many of the elements of a successful Common Pool Resource (CPR) institution (Ostrom 1990: 90):

1. Clearly defined boundaries (physical and human membership);
2. Congruence between appropriation and provision rules and local conditions (time, place, technology, quantity etc);

3. Collective-choice arrangements (individuals can participate in modifying rules – participative democracy);
4. Monitoring (active/ iterative audits of conditions and behaviour);
5. Graduated sanctions (punishment fits crime/ ‘officials’ accountable to residents);
6. Conflict-resolution mechanisms in place (rapid, low-cost local processes);
7. Recognition of rights to organize (local institutions not challenged by external government authorities); and
8. Nested enterprises (multiple layers for CPRs that are parts of larger systems)

Dietz et al. (2003: 1908) suggest that effective commons governance is easier to achieve when:

- the resources and use of the resources by humans can be monitored, and the information can be monitored, and the information can be verified and understood at relatively low cost;
- rates of change in resources, resource-user populations, technology, and economic and social conditions are moderate;
- communities maintain frequent face-to-face communication and dense social networks – sometimes called social capital – that increase the potential for trust, allow people to express and see emotional reactions to distrust, and lower the cost of monitoring behaviour and inducing rule compliance;
- outsiders can be excluded at relatively low cost from using the resource; and
- users support effective monitoring and rule enforcement.

11.3.1.5 *Inadequate policy*

While lignum, red gum forest and other nationally ecologically valuable wetland areas on private property now have a significant level of formal ‘protection’, no formal provision has been made by government to provide them with the water on which they depend for their survival; much less establishing an ideal watering regime:

Patterns of flows are as important as the actual total volume of water. This includes the timing and duration of floods and freshes and of low or zero flow periods. Streamflow patterns including levels and volumes determine water levels in wetlands and how often riparian vegetation is flooded.

DLWC 1996 (Vol. 2): 22

This situation reflects redundant mechanistic thinking, which assumed that ecosystems services were free and automatic, and that an administratively convenient fence was sufficient to preserve ecologically sensitive areas. The essence of the issue is explained by Richard Kingsford of the University of New South Wales:

Effective river and wetland conservation does not follow the accepted rules for conservation. You cannot simply buy land, slap a fence around it, call it a National Park, then sit back comfortably in the knowledge that the grandchildren will be grateful.

Sydney Morning Herald, 6 December 2005

Box 9. Overcoming Policy Inertia: Managing Flow Regimes as well as Sites

The Lower Murrumbidgee floodplain illustrates a problem for protection of wetland areas under [current] conservation legislation and policy. Conservation legislation is primarily designed to protect areas of significance as reserves (e.g. National Parks and Nature Reserves). Two examples from the Lower Murrumbidgee floodplain illustrate how this can fail. Yanga Nature Reserve lies in the Fiddlers-Uara stratum and was primarily conserved for its Black Box woodland vegetation community. Similarly 23,800 ha of the Lower Murrumbidgee floodplain was protected in the Lower Murrumbidgee floodplain from clearing by legislation ... But the long-term prospects for flood dependent vegetation in both areas are probably poor because the flooding regime may not be sufficiently frequent to sustain the flood dependent vegetation ... Legislation and policy measures usually protect actual sites of wetlands from development but do not control threatening processes upstream ... To protect wetland areas, policies and legislation for wetland conservation need to be applied to flow regimes. This necessitates the interaction of policies applied to the floodplain with legislation that governs the management of water [in rivers]. Until there is protection of the flow regimes that define wetlands and their biota, their long-term future, even if they have reserve status, cannot be guaranteed.

Kingsford and Thomas 2001: 74

As a result of catchment-scale development, and increased competition for water over the past three decades, it is now necessary to both secure an appropriately patterned water allocation for flood-dependent areas of ecological importance and for landholders to be actively involved in their management. The recent (2001-2009) drought in south-east Australia has highlighted, in a graphic way, the inadequacies of pre-ecological policies, structures and institutions, to achieve an ecologically sustainable future for the lower Murrumbidgee floodplain. The massive destruction of natural capital on the floodplain is attributable in large part to policy inertia maintaining inappropriate and outdated NRM processes and values, based on mechanistic-reductionist principles of protecting 'sites' rather than sustaining ecological systems and processes.



Plate 11.4 Yanga Nature Reserve graphically illustrates the policy flaw in protecting ‘sites’ without also securing water supply and flow regimes.

This scene of stressed and dead black box trees is typical of the condition of trees in the 1 772 hectare, Yanga Nature Reserve. It illustrates the impact of pre-ecological government policy, which ‘protects’ sites but not ecological processes, such as flow regimes necessary to sustain them. The location of this flood-dependent habitat means that it has not been fully flooded for more than 30 years.

11.3.2 Governance similarities between the lower Murrumbidgee floodplain and lower Murray lakes and Coorong fishery

There are unexpected links between the degradation of the lower Murrumbidgee floodplain and the degradation of the lower Murray lakes and Coorong fishery. The first was via Joseph Davis, the Under Secretary for the New South Wales Department of Works at the turn of the twentieth century who considered the supply of water to both the floodplain and the lower Murray lakes to be a ‘waste’ and ‘most unjustifiable’ (NSW LA 1903:26). The main connection, however, is via the amendment to the River Murray Waters Agreement in 1934 that reduced the number of weirs to divert water onto the lower Murrumbidgee floodplain from the original nine weirs with navigation locks to only two weirs, which has resulted in large areas of ‘stranded landscape’ today. That decision helped to fund the construction of the five barrages across the channels between Lake Alexandrina and the Coorong between 1935 and 1940, which resulted in a huge reduction of estuarine habitat; the richest fishing grounds.

Diversity and common pool governance are the most obvious similarities between the two communities and their bioregions. Both groups have adapted to making a living in dynamic landscapes subject to extremes of drought and flood. Neither group is confined to one ecosystem or one product/species for their livelihoods. There is a high percentage of the area of both bioregions formally protected (see Appendix 6).

11.3.2.1 Dependence on decisions made at larger scales

A final significant similarity between the lower Murray lakes and Coorong and the lower Murrumbidgee floodplain is that both are ultimately dependent for their social-ecological resilience on activities and decisions made at larger scales. Woodhill (2002: 318) cautions that local level activities will generally eventually encounter constraints that are related to broader scale institutional arrangements. The effective governance of the Lower Murray Lakes and Coorong Fishery was acknowledged with Marine Stewardship Council Accreditation as a sustainable fishery in 2008. However, it is being undermined by the stress on the ecosystems in which the fishers operate due to Murray-Darling Basin-scale developments and redundant policies, in addition to drought and global warming. Similarly, historic catchment-scale, and apparent state-scale, marginalization and exploitation of the lower Murrumbidgee floodplain means that effective bioregional-scale governance will continue to be impeded in its progress towards greater social-ecological resilience until the region is viewed from at least an inter-state or Murray-Darling Basin scale.

Adger and Luttrell (2000: 87) suggest that recognition of the regional and global services that wetlands provide, and the realization that they cannot be managed in isolation from upstream inputs 'must lead to the development of policies and management that are meaningfully and effectively co-ordinated between local and national levels'. In the interim, non-government organizations with recognised expertise appear to be providing the link in some situations. The key role played by the World Wide Fund for Wildlife (WWF) in the Lower Murray Lakes and Coorong Fishery achieving Marine Stewardship Council Accreditation in 2008 was acknowledged by both Hera-Singh (19/7/04) and Jones (interview 20/7/04).

11.4 THE POLITICS OF SCALE

The choice of scale becomes an intended or unintended means of inclusion or exclusion.

Hillman and Howitt 2008: 59

As mentioned above, the lower Murrumbidgee floodplain has been historically constructed as being of low value within the Murrumbidgee catchment scale (DLWC 2002 Part B: 27). This is despite the

fact that it holds the largest area of wetland remaining in the Murrumbidgee Valley, which assumes significance in the context of the Murrumbidgee River being one of the most developed in Australia with diversions accounting for almost 12% of total national water use (Crabb 1997: 34).

11.4.1 Global and National scale

The large floodplain wetland area on the lower Murrumbidgee is significant in the context of huge national and global wetland losses over the past century. Floodplain wetlands are the most biologically diverse and productive parts of the Australian landscape. They maintain biodiversity through the provision of water-bird and fish breeding habitats, refuges, and migratory bird 'stop over' areas. They are also recognized as the most effective and cheapest river protection systems available. The loss of ecosystem services formerly provided by wetlands has contributed to events such as the 1 000 kilometre blue-green algal bloom in the Darling River in the summer of 1991-1992.

Australia as a nation also has very limited areas of fertile soils. The floodplain consists of more than 200 000 hectares of rich alluvial soils, around 30% of which is underutilized for both ecological and agricultural production because it no longer receives water. The deep cracking alluvial soils evolved over millions of years to be flooded and do not respond to the naturally low rainfall of the district with vegetation growth.

11.4.2 Murray-Darling Basin scale

The large size of the lower Murrumbidgee floodplain wetland area and the diversity of its inland wetland types are important factors in the resilience of the southern Murray-Darling river system. It includes one of the largest red gum forests in Australia, the largest area of lignum wetland in New South Wales, and one of the longest heavily snagged river reaches in the southern Murray-Darling river system, which provides significant in-stream habitat for aquatic life in an impoverished system. In addition to its considerable size, the strategic location of the floodplain as a mid-system, rather than a terminal wetland area greatly increases its ecological value to protect the River Murray, and to restock and rejuvenate river system.

The politics of scale involves 'continuous reshuffling and reorganisations of spatial scales' which are 'an integral part of social strategies and struggles for control and empowerment' (Swyngedouw, 2000: 70). Paasi (2004: 542) emphasises that scales are not fixed but 'may be destroyed or transformed in social and political practices and struggles'. McIntosh et al. (2000: 4) propose that equity solutions 'that are not based on considerations at the appropriate scale will merely shift the inequities, not solve them'. The next two chapters provide a context for apparent government sponsored contestation, exclusion and degradation of the lower Murrumbidgee floodplain since the beginning of the twentieth century.

CHAPTER 12: ENVIRONMENTAL JUSTICE

[S]ustainability is at least as much about politics, injustice, and inequality as it is about science or the environment.

Agyeman 2005: 43

The environmental justice debate became public in the United States of America in 1982 as a result of protests against a state proposal to dump soil contaminated with PCBs in Warren County, North Carolina, a region which consisted mainly of disadvantaged minority groups. The landmark 1987 study by the United Church of Christ titled 'Toxic Wastes and Race in the United States' confirmed that minority groups were at disproportionate risk of exposure to toxic wastes as a result of the frequent location of toxic landfill near their communities (Agyeman 2005: 14-15). Since that time the concept of environmental inequality has been expanded to consider the social and geographical distribution of a wide range of environmental risks to social-ecological systems.

Historically, in western industrial societies, environmental injustice has occurred against certain ecosystems, such as wetlands and their inhabitants (Giblett 1996; Prince 1997; Park 2002; Speich 2002); against certain geographic locations and their inhabitants, such as the bottom of river systems (Stone 2000: 30-33; Ward 2001); and against minority groups. Minority groups are vulnerable if they have a small population, are 'out-of-sight: out-of-mind', or are involved in cooperative, ecological or other land-use activities perceived to be unconventional or 'inefficient' by dominant groups (Hooks and Smith 2004; Windsor and Mcvey 2005; Kiernan 2008). In this chapter, I will examine the lower Lachlan and lower Murrumbidgee floodplain bioregion in the southern Murray-Darling Basin, which fulfils the criteria for potential ecological marginalization. I explore environmental justice within the context of ecological marginalization in rural areas.

12.1 ECOLOGICAL MARGINALIZATION

Kousis (1998: 101) explains that ecological marginalization 'entails the take-over of local resources by powerful private and/or state interests and the gradual or immediate disorganization of the ecosystem' by altering its 'functional integrity' through the reduction or elimination of 'production and decomposition functions' (*Ibid*: 86), resulting in erosion of social-ecological resilience. Hillman et al. (2005: 99-100), highlight that investment in large-scale resources development in one area 'can result in the degradation of other parts of the same natural resource system leading to serious disbenefits to regional communities'. The Aral Sea, straddling the border of Uzbekistan and Kazakhstan is the world's most infamous examples of that situation (Stone 1999: 30-33).

The fundamental environmental justice issue of sustaining the lower Murrumbidgee floodplain while accommodating upstream irrigation and other developments has not changed since the first natural resources management assessment was carried out by John Monash in 1904. He expressed the issue as the floodplain and its residents being 'equally well served by a lesser quantity of water' (1904: 6).

Monash (1904: 7) concluded that upstream diversions for irrigation developments could take place without sacrificing the floodplain and the livelihoods of its inhabitants by the introduction of 'effective remedial measures' in the form of 'not less than five' ecological diversion weirs, in addition to a weir and lock that had already been approved. A minimum of six weirs would artificially raise a smaller volume of water and enable it to cover the traditionally flooded areas of the floodplain to sustain it and therefore provide equity. This seemingly straightforward issue of equity and government duty of care has perversely been studiously avoided over the past century, severely eroding social-ecological resilience on the floodplain and beyond.

12.1.1 Open access to floodwaters

A further dilemma for the flood-dependent lower Murrumbidgee floodplain is that floodwaters are generally considered to be 'open access' water resources, as explained by George Chamier (xvii) in 1903:

Flood waters are held to furnish a 'surplus' which may legitimately be drawn upon for purposes of general utility. There is no recognised vested interest in floods ... Of course there are some peculiar cases where this rule might not fairly apply ... there are no rules without exceptions, and a law may need to be modified to meet the common interests involved.

This issue is increasingly problematic because policy has not kept pace with ecological research findings or technology. Accessing water from the flood crest causes ecological damage by reducing connectivity and water available for ecological processes. In addition, due to developments in pumps and earthmoving equipment, huge quantities of water can now be accessed from floods and stored on farms, severely diminishing the amount of water available downstream.

12.1.2 The lowest priority for water supply

The ecological marginalization of the lower Murrumbidgee floodplain has resulted in its desiccation and subsequent dramatic reduction of ecosystem and agricultural goods and services production. Approximately 65 000 hectares of historically regularly inundated flood-dependent land has become 'stranded', primarily due to an inadequate number of diversion weirs to access a greatly reduced volume of available water due to catchment-scale development. That situation is compounded by mechanistic river regulation and operations policy that actively tries to keep water within the 'delivery' channel.

Within the linear mechanistic model, priority is given to a reliable minimum volumetric flow rather than variable flow patterns, which would have greater ecological benefits (DLWC 1996: 22), and water that 'strays' onto a floodplain is considered to be 'out-of-control' and perversely 'out-of-place'.

Within the current primarily pre-ecological mechanistic river regulation model, the only 'useful' role for the lower Murrumbidgee floodplain wetlands is as a 'dump' for what is regarded as potentially asset damaging floodwaters. In addition, this largest area of floodplain wetland in the Murrumbidgee Valley, being 'the lowest priority of all' for water in the catchment (DLWC Part B 2002: 27), has access to 'surplus' only for all agricultural and ecological requirements. As such, I will demonstrate that there are environmental justice parallels between the exposure of the lower Murrumbidgee floodplain residents to risk as a result of alternatively too much and too little water, and the exposure of minority groups in the south of the United States of America to disproportionate risk from exposure to commercial toxic waste. However, ultimately I will reveal that the resilience demonstrated by the landscape and its residents over more than a century of ecological marginalization provides valuable lessons for the development of a model to progress towards greater social-ecological systems resilience.

12.1.2.1 Stranded landscapes

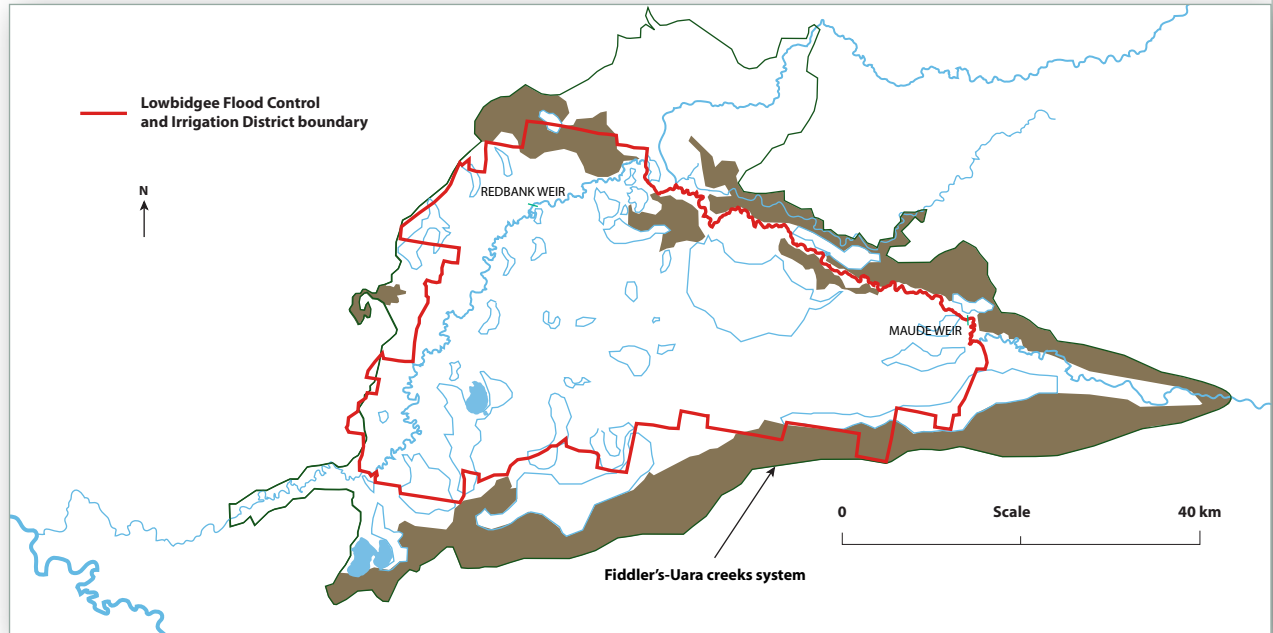


Figure 12.1 Stranded flood-dependent landscapes on the lower Murrumbidgee floodplain

The stranded landscapes now receive water only during rare major flood events. In a country with notoriously poor soils, a significant area of rich but flood-dependent alluvial soils has been lost to ecological and agricultural production. Some areas within the stranded landscapes, identified as having high conservation value, are now 'dying from thirst'.

The last time water travelled to some sections of the floodplain was 1974 (Nelson 12/9/02; Davy interview 23/7/04; Gorman interview 1/3/05). The main areas of stranded landscape occur in the Fiddler's-Uara creeks system, along the southern section of the floodplain, and within the Murrumbidgee River corridor, between the top of Redbank Weir pool and Maude Weir. Both areas are above the influence of the two weir pools so cannot be artificially flooded. The essence of the issue is captured by Kingsford (*pers comm.* 20/9/02), as follows:

The Fiddler's system has really been impacted – probably one of the worst because in fact the water that used to go down there is the water that we've captured in Burrinjuck and Blowering [reservoirs] and actually goes to the MIA and Coleambally Irrigation Areas, upstream.



Plate 12.1 **A degraded lignum floodway formerly watered via the now stranded Fiddler's-Uara creeks system**

I bought in here in 1950 ... and this country was completely covered in lignum. It was impenetrable – you could only muster on a horse. Your Holden wasn't strong enough to drive through ... It's hard to believe now when you look. That whole area was just impenetrable! ...

The change has been very quick ... to a flood probably every 15 years!

Gorman 12/9/02

My use of the term 'stranded landscapes' was influenced by a working paper of the Australian Government's Productivity Commission titled *Stranded Irrigation Assets* (Roper et al. 2006), which discussed the possibility irrigation infrastructure becoming under-utilized or 'stranded' as a result of permanent outward trade of water entitlements. The adjective appeared equally relevant to describe the impacts of denying water to flood-dependent landscapes. It struck me as ironic that in the market-driven

water trading process there appeared to be greater concern about the loss of obsolete infrastructure with limited life spans, than with the sacrifice of valuable and limited natural assets capable of producing ecosystem goods and services for Australian society indefinitely.

12.1.3 The high cost of an industrial dream

Progress cannot abide that farmland and marshland, wild and tame, exist in mutual toleration and harmony.

Leopold 1949: 172

The combination of new nation enthusiasm, modernist ideology, and mechanistic confidence at the beginning of the twentieth century appeared to combine to attempt to 'subordinate biological systems to the dictates of industrial production' (Boyd et al. 2001: 561) and to treat the landscape as a generic medium for the application of engineering control. Imaginations fired by visions of neat irrigated oases in a dry landscape, provided the motivation to use public funds for the development of massive irrigation infrastructure 'with little prospect of a positive rate of return, let alone a market rate' (Quiggin 1988: 636; Anderies 2006: 870). The complex 'ecological infrastructure' of nature was to be replaced by simpler 'engineering infrastructure' (Birkeland 2008: 201). Controlling nature and making the 'deserts bloom' by putting water onto dry land appeared to be seen at the time to be much more progressive and triumphant than working in harmony with 'chaotic' natural wet-landscapes.

Quiggin (1988: 636) highlighted the emphasis on the nonmarket objectives for irrigation in Australia during the first half of the twentieth century. He explained that there was a 'general acceptance of the principle that irrigation schemes should be undertaken whenever it was technically feasible ... As a result, water use for irrigation expanded well beyond levels which could be justified on market grounds'. He suggests that the economic benefits of farmers' irrigation decisions are private, but the costs are borne collectively (*Ibid*: 638).

By the beginning of the twenty-first century, the dream of ordered green artificial wet-landscapes on naturally dry land could still only be maintained at high public and ecological cost. A 'pathological cycle' had been established in the irrigation areas formed at the beginning of the twentieth century where resource degradation is 'followed by a social response aimed at re-establishing or maintaining productivity of the resource-degrading activity, leading to further degradation, and so on' (Anderies et al. 2006: 877). The focus on improving mechanistic efficiency 'typically requires ever-increasing investment in physical and social infrastructure'. Vested interests work to 'ensure that the system stays on the current trajectory, continually trading off future options for short-term returns' rather than preparing for transformation to a resilient social-ecological model.

I argue in the rest of this thesis that despite the lower Murrumbidgee floodplain being ‘mined’ to support the dream of industrial irrigated agriculture for a century; its land-use methods represent a viable agri-ecological future option. However, that option is continuing to be traded off in an attempt to support an increasingly expensive obsolete system elsewhere.

12.2 UNEQUAL LANDSCAPES

Historically, the landscapes that western societies, and particularly industrial societies, have had most difficulty with are contradictory wetlands. Being neither solid ground nor water, wetlands are difficult to access, understand, measure and control (Giblett 1996: 3-24; Adger and Luttrell 2000: 75-89). Our relationship with wetlands is complex, invoking a mixture of emotions including fear, suspicion, insecurity, threat, awe, and revulsion; overlain by moral judgments about people who live in harmony with wetlands being ‘out of place’, ‘out of control’, and possibly as recalcitrants who are letting the ‘industrial side down’ (Gasteyer and Flora 2000: 145-146; Speich 2002: 429-432). Wetlands were also often considered to be unhealthy or ‘water sick’ areas (Magnusson 2004; Giblett 1996: 103-126). The response of western industrialized societies to wetlands has traditionally been drainage (‘reclamation’), exclusion or neglect.

12.2.1 Origins of negative western wetland mythology

Animosity towards wetland dwellers extends at least to the Roman Empire, apparently because they could not be brought under control quickly by conventional force. Local knowledge and specialized skills were required to live with wetlands, which conquerors did not possess so that wetland dwellers were demonized (Chamberlain 1975: 15; Giblett 1996: 205-210).

Wetlands and their human residents were also devalued and demonized in Britain during the period of the Enclosure Acts from 1720-1840 in order to justify the exclusion of commoners from access to traditionally freely available resources and for the redistribution of land to wealthy landholders (Runge and Defrancesco 2006: 1714-1717; Allen 1982: 950-951). In addition, poor people were often forced to live in the most flood-prone parts of urban areas, such as the East End of London, in the eighteenth and nineteenth centuries. The ‘blame the victim’ mentality (Sibley 1995: 55-57) at the time associated poor people with poor morals, poor health and ‘laziness’, which reinforced calls for drainage to address social issues (Speich 2002).

Negative European ‘cultural baggage’ or psychohistory about wetlands was brought to Australia and to a certain extent remains. It is also possible that it was reinforced by a desire to eliminate wetlands because of their association with Indigenous Australians (Main 2005: 24-26) and to mark the landscape with straight lines as a subconscious response to reinforce the British claim to Australia under the concept of *terra nullius*. Wright (1989: 14-15) explains the role of the straight line as a symbol of ‘industrial man’ and control over nature:

It has frequently been asserted that the inflexibility with which the straight line was stamped on the countryside both in Europe and the New World during the eighteenth and nineteenth centuries... sprang from the desire to exert mastery over nature. That urge impressed on many land managers a distinctive aesthetic sense. Wild, unkempt, ‘backward’, ‘unimproved’ nature was not as attractive to the eye as the ordered, partitioned landscape where every activity had its place – village, common, field, forest, park – and every place its boundary. It was economic, civic and moral progress made visible.

Our society still appears to view wetland dwellers with suspicion.

12.2.1.1 *An engineering perspective*

I became aware of the lower Murrumbidgee floodplain as an unequal landscape when I commenced work with the River Murray Commission in 1984. Due to its historical links with navigation, the Commission shared responsibility for the management of the Murrumbidgee River below Hay with the New South Wales water authority. It was a vestige of the original River Murray Waters Agreement of 1914, which had included plans for the construction of a series of nine weirs with navigation locks on the lower Murrumbidgee River.

From the ‘engineering’ perspective of river regulation officers, the floodplain was a ‘difficult and untidy’ area where there was potential for water to ‘escape’ from the channel. Its only instrumental value within the mechanistic river regulation model was for flood control to prevent property damage elsewhere. However, even that role had been greatly diminished since the construction of Blowering Dam in 1968 reduced flooding from the Tumut River. The floodplain and the operation and maintenance of the two weirs to divert surplus flows to sustain its low status ‘native pastures’ were considered expensive administrative ‘inconveniences’.

The low status of the landscape, and unfamiliar land-use activities, combined with the difficulty of getting water through the constricted reach of the river without over-bank flooding, compounded by upstream and downstream pressures, sometimes resulted in Commission technocrats transferring their frustrations onto landholders with the use of derogatory labels such as ‘cowboys’ (*pers. comm.* Jacobs MDBC 5/9/2002).

12.2.1.2 *Two 'masters': Little 'ownership'*

While the responsibility for the lower Murrumbidgee is shared by two bureaucracies, it appears to be 'owned' by neither, as the 'core business' and political pressures on each are from elsewhere. Upstream irrigators are the major clients of the New South Wales authority. Its priority is to maximize water availability to them for economic return through the products of irrigation. The greatest political pressure for the Murray-Darling Basin Commission/ Authority is to efficiently provide a reliable supply of water with the lowest possible salinity levels as efficiently as possible to downstream irrigators, urban residents including Adelaide, and the industries of Adelaide and the 'Iron Triangle' (Whyalla, Port Pirie, and Port Augusta). The Lowbidgee Flood Control and Irrigation District has no specific allocation of water, unlike all other irrigation areas in the Murray-Darling system (Beck 1997). It is one of the few flexible parts of the system from a regulators perspective so they are happy with the marginalized *status quo*, as are water users with allocations who benefit from the exclusion:

The history of water development in the Murray-Darling Basin is a history of articulate interest groups seeking to have the waters used for their particular advantage. There has always been a tension between the upstream States and the downstream State who had differing views of the public good. These tensions continue, although the issues now relate to over-extraction of water and salinisation of land and water.

Cullen 2002

12.2.1.3 *Blaming the victim*

A briefing meeting with a NSW Catchment Management Authority in 2006 highlighted the information from Kingsford and Thomas' report (2001: 2) that the 'building of about 394 km of channels and 2,145 km of levee banks have caused most of the destruction of wetland in the middle of the Lower Murrumbidgee floodplain', and by implication that floodplain residents were 'environmental vandals'. Such statements taken out of context may encourage a 'blame the victim' (Zapf and Gross 2001: 518) mentality among those who are not informed of the circumstances, or for whom it is convenient. Many of the changes made in order to survive as agriculturalists on the floodplain were ecologically damaging, but doing nothing would arguably have resulted in greater degradation.

Banks and channels were constructed by landholders attempting to use two weirs to do the work of 'not less than five' (Monash 1904: 7). The weir construction made the natural water distribution (flood-runner) network on the floodplain redundant but did not adequately replace it (Kingsford 2003: 77). Landholders were forced to construct channels and banks in order to hold the available water on the floodplain for sufficient time to mimic natural flooding. This included blocking flood-runners to prevent water from quickly draining back to the river channel. Kingsford (2003: 77) emphasizes that culpability 'should not be leveled at individuals or communities but with Government' that set the conditions.

Peter Andrews' (2006: 46-57) revelations, and subsequent research on his theories about the importance of lateral spread of water from rivers and storage of water in soil profiles on floodplains in the pre-European Australian landscape, has revealed that some works, such as 'spreader banks', frequently pointed to as evidence of landholder ecological vandalism, perform ecologically as well as economically important roles. Kingsford and Thomas (2001: 42, 70) acknowledge that many of the best colonial waterbird rookery sites in the district are located where water is ponded behind artificial 'spreader banks' and that the largest waterbird populations on the floodplain occur in the area of greatest agricultural development.

12.2.1.4 A hegemony of negative assumptions

The resilience of negative branding and the dangers of organizational 'cultural' assumptions (Gill 2000: 58-59) are illustrated by the following situation. I was directed by a junior government officer (28/4/09), following consultation with peers, to delete from the draft text for an interpretive sign about land-use on the floodplain, reference to the specific area of land (23 800 hectares) that private landholders had formally put aside as Protected Land and Private Agreement Areas. The directive prompted me to point out the practical ecological/biodiversity importance of the position and size of the area put aside, particularly in relation to the resilience of an adjacent National Park (McNeely and Scherr 2007: 408; Figgis 2003: 200-203). The land put aside included lignum floodway corridors, red gum forest and black box woodland, and special habitat areas that included rookery and wildlife foraging sites.

To demonstrate that it was much more than a 'gesture' by the landholders, I calculated the very high annual value of the area put aside for Australian society, based on current biodiversity stewardship payments for similar land. I highlighted that the contribution came from a few families who received little farm income over the past decade, and who receive neither ecological, nor financial benefits from protecting ecologically important habitat areas on their properties. I also pointed out the significant cumulative contribution made to Australian society over the past two decades, which has gone almost unrecognised. Sinden (2004: 204) expresses similar concern about lack of acknowledgement of public benefit from landholder cost as follows:

Vegetation protection that imposes uncompensated losses on landholders may be an infringement of the landholders rights and raises questions of equity within the community. To design better policies to protect vegetation, the private losses must be identified, valued, and balanced against the public gains.

Fortunately, the decision was passed up the hierarchy to a regional manager who accepted my argument. However, I posit that my request for reconsideration would have been difficult to sustain had I not had intimate knowledge of the area, had I not worked constructively with the decision-maker in the past, and had I not been considered an 'honest broker' by some senior officers in the organization (Murphy interview 19/9/07). I also suggest, from personal experience, that in a less receptive government organization, or had I been a junior employee, the directive would most likely have been sustained without any consideration. These incidents appear to confirm Samson's assertion (1993: 3) that it is easy to sustain the oppression of an 'other' who has 'already been constructed as worthy of receiving our contempt' or 'have survived our abuse'.

In the rest of this chapter and the next, I focus on the socio-historical process (Pellow 2004: 514) of the development and maintenance of the environmental injustice towards the lower Murrumbidgee floodplain and its residents:

In order to understand how and why environmental inequality disrupts communities, we must extend our research further into the history and the roles of the many people and organizations involved.

Pellow et al. 2001: 426

12.3 THE BEGINNING OF A UNIVERSAL UPSTREAM-DOWNSTREAM POWER STRUGGLE 'TO BE EQUALLY WELL SERVED BY A LESSER QUANTITY OF WATER'

Monash 1904: 6

Water began being diverted from the Murrumbidgee River through cuttings and by pumping in the 1850s. A report in the *Sydney Morning Herald*, on 29 September 1856, stated that 'a large number of men are gone up to cut the bar down which prevents the flow of water into the Yanko ... when accomplished this will ensure a regular stream during the ordinary season to the Billabong'. Work on deepening and widening the entrance to Yanko Creek, downstream of the town of Narrandera, to improve the diversion of water from the Murrumbidgee, took place on a number of occasions during the second half of the nineteenth century (*Sydney Morning Herald*, 4 July 1867). The activity was funded by local squatters, and in particular Samuel McCaughey (Crowley 1954: 308), who was an influential member of New South Wales Society; as a wealthy pastoralist, irrigator, and from 1899, a member of the Legislative Council.

From the 1880s, lower Murrumbidgee residents became aware of the impacts of upstream diversions on the area of floodplain inundated. The failure or a reduction of flow frequency of some of the high off-take distributary channels or flood-runners provided the first indications of the impacts of upstream water extraction:

The Paika Lake ... was originally filled by the overflow of the Murrumbidgee, and in 1878 a flood 18 feet high at Wagga Wagga sent a good supply into it. This season the lake was not affected by a 27-feet flood at Wagga, and some persons, therefore, think that the Yanko cutting may divert so much of the flood-waters as would influence the overflow at Paika.

Sydney Mail, 9 April 1887

As the lower Murrumbidgee floodplain is flat, a reduction in flood height of a matter of 20 centimetres can mean that hundreds or even thousands of hectares of land are not watered (McKinney 1901: 239). Reduced flood heights also mean that outlying billabongs and lakes were not filled, thus excluding stock access to large areas of grazing land on the surrounding saltbush plains, as explained by Monash (1904: 2):

Utility of this backcountry depends ... upon the ability to turn the stock, for summer feed into the River frontages ... whatever tends to check or destroy the regular natural irrigation of the one class of land, renders untenable the other class also. In this way an enormous area of land is affected. The area actually subject to inundation to the west of Hay exceeds half a million acres, while the area directly dependent upon it is more than double.

The main landholder concerns were the impacts on the flooding of the lower Murrumbidgee floodplain of the ongoing widening and deepening of a cutting into Yanko Creek, and later a cutting to divert water into Cudgel Creek, both near Narrandera. The greatest fear was of the construction of a diversion weir across the Murrumbidgee River. Correspondence from Humphrey Davy to *The Australasian Pastoralists' Review* protested the 'absurdity and injustice' of governments 'permitting water distribution before any attempt is made at conservation' (1897b: 481) and suggested that 'the policy of robbing one portion of the community to divide the proceeds among another portion, or the impoverishment of one part to enrich another part' (1897a: 157) was 'arbitrary and unjust' (*Ibid*: 156). His main argument was that flooding was essential for the survival of the pastoral industry in the low rainfall Western Riverina, whereas upstream diversions were a 'bonus'.

Floodplain wetlands were seen as core assets in the Western Riverina economy. They allowed a relatively high stock carrying capacity in the district through a policy of spreading impacts of grazing over floodplain and surrounding saltbush ecosystems in different seasons. Wetlands provided a reliable district drought refuge for domestic stock as well as wildlife. Red gum forests were particularly valuable assets during difficult economic times because they provided continuity of work within the district, and were seen as community 'safety nets'. A premium was paid for flooded land for both purchase and rent (*Riverine Grazier* 17, April 1900).

12.4 FLOODPLAIN WETLANDS KEY TO INLAND 'DROUGHT PROOFING' IN THE NINETEENTH CENTURY

Government water engineer, Hugh McKinney (see Appendix 1), was a supporter of natural flooding to sustain wetlands in the Australian landscape as part of a 'drought proofing' strategy for semi-arid south-western New South Wales:

An important point to be aimed at in a general system of [natural] irrigation for pastoral purposes is to have the country so dotted over with what have been termed protected areas that at least all the more valuable stock can be saved in time of drought without removing them to distant pastures. Throughout the whole of the plain country ... not only should there be no necessity for moving stock in any season however dry, but on the contrary that district should have a surplus of grass and fodder available for stock depastured in adjacent districts.

McKinney 1889: 83

This concept was similar to the sanctuary system of the Wiradjuri people further up the Murrumbidgee Valley, discussed by Mary Gilmore (1963 [1934]: 145), where hunting and collecting was forbidden in certain areas, allowing populations of plants, fish, birds, marsupials and reptiles to breed and spread during good seasons and be protected during droughts to repopulate the landscape when conditions improved (Main 2005: 5).

12.4.1 Environmental 'compensating' weirs

While McKinney was an advocate of irrigation development (Proust 2003: 46; McKinney 1890: 270), the potential for which on the Murrumbidgee River brought him to New South Wales from India, he did not believe that it should be at the expense of naturally flood-dependent areas (Powell 1993a: 32; McKinney 1900: 248), or that the rights of the 'lower' landholders 'in any degree be overlooked' (McKinney 1901: 239). Later, John Monash (1905b:16) expressed a similar sentiment that he did not think that it was 'sound policy' to sacrifice existing valuable natural assets, 'in the somewhat vague expectation that you may create prosperity elsewhere'.

McKinney (*Riverine Grazier*, 19 February 1889) acknowledged that if large-scale upstream irrigation development occurred, the landholders on the lower river 'would be seriously affected by the diversion of the waters if no measures are adopted for their compensation'. However, he pointed out that the plans for the first large-scale irrigation development in the Murrumbidgee Valley, which emerged from the (Lyne) Royal Commission on Water Conservation (1884 and 1887), included seven weirs with navigation locks to be built between the Murray-Murrumbidgee confluence and Hay. As such, he

submitted that instead of opposing the upstream irrigation development, which would be of national benefit, that 'those affected should agitate for compensation of an equitable and ample nature' in the form of a series of 'environmental' diversion weirs to artificially raise the river level to spread a lesser volume of water over the same area of floodplain as was flooded under natural conditions:

In my first report on irrigation from the Murrumbidgee River I pointed out that if large supplies of water were diverted from the river near Narrandera or Wagga Wagga it would be necessary, by way of compensation, to construct weirs at several places between Hay and the junction with the Murray.

McKinney 1891: 15

12.5 WETLAND DEFENDERS 1899-1903

Our businesses are built on utilizing these wetlands, and it's a sort of a symbiosis – we rely on them and we've fought politically to ensure that the water is maintained to them ... If it wasn't for the fact that the landholders over three or four generations were here fighting ... the water would have been lost.

Connellan 10/9/02

This short period between 1899 and 1903, saw an explosion of activity in relation to water management in south-eastern Australia. It was possibly due to increased cooperation as a result of Federation, and certainly a result of agitation by landholders for increased water security following the recent extreme drought of 1895-1902. It was a time when the community and private enterprise took matters into their own hands and provided leadership in policy, research, and development. Activities included a community-initiated Water Conference at Corowa in 1902, which led to an agreement on the sharing and use of Murray waters that was unable to be achieved in 39 years of discussions between colonial bureaucrats (Eaton 1945: 10), and Robert Gibson's and Hugh McKinney's detailed proposal in 1903 for a large-scale private irrigation development for the Murrumbidgee Valley. The period also marked a change in leadership, experience, and philosophy in the water division of the New South Wales Public Works Department, when Leslie Wade succeeded Hugh McKinney in 1901. It marked the beginning of the 'industrial era' for NRM and agriculture in the Murray-Darling Basin.

McKinney (1901: 239) had appreciated the concerns of the residents of the 'flooded country' in relation to upstream diversions and development, and was sympathetic towards their vigilance. He acknowledged that they had 'not hitherto received the attention they deserve' and recognised the dependency of floodplain properties on overflows from the river, for stock water and to naturally irrigate flood-dependent pastures. He was aware that after flooding, the land 'will carry from one to four sheep per acre' but without it 'requires five to ten acres' to support each sheep. As such, McKinney felt that

it should not be surprising that the landholders would be concerned about upstream developments or that they would 'regard with distrust the operation of the two most important outflow channels, namely, Cudgel Creek on the north side of the river, and Yanko Creek on the south side'.

12.5.1 Community action

After decades of steadily increasing upstream diversions, and with frequent calls for vigilance and encouragement by local newspaper editors and district correspondents (*Riverine Grazier*, 6 January 1899, 14 February 1899; *Riverina Recorder*, 22 March 1899) communities at Hay, Maude and Balranald were moved to establish 'river defence' leagues and associations to lobby for the continued receipt of floodwaters to sustain the wetland ecosystem and their linked livelihoods. This time also saw the emergence of self-appointed community educators who gathered and presented information to inform debate on issues of concern through local newspapers and public meetings.

A meeting of concerned citizens was held in Hay on 26 July 1899, to discuss the likely impacts on the 'flooded country' of the proposed construction of a weir across the Murrumbidgee to divert water into Yanko Creek, and to plan a response. The concern was twofold; firstly that the NSW Government was involved in the project that would have negative impacts on their landscape and livelihoods, and secondly, that it would not be 'surplus' water being diverted. Water would be diverted under normal, rather than high flow conditions. A report in the *Riverine Grazier* on 1 August recorded that a letter received from Samuel Lindsay, manager of 'Yanga' station near Balranald, stated that in his opinion 'the land owners on the river ought to protest in a body', a telegram supporting a protest was received from the Mayor of Balranald, and that R. W. Ronald of 'Nap Nap' station moved that the meeting view the proposal with alarm and funds be collected 'for the purpose of taking whatever steps necessary to preserve our interests'. The outcome of the meeting was the formation of a River Defence Association, a recommendation that the government establish a committee of inquiry to investigate the Yanko Creek proposal and its downstream impacts, and the collection of two hundred and sixty-five pounds and ten shillings for a fighting fund.

12.5.2 Department of Public Works inquiry, findings and recommendations

A Public Works Committee was established and collected evidence from lower Murrumbidgee residents between Hay and Balranald in 1900 in an attempt to find an acceptable compromise to compensate for increasing upstream diversions into Yanko Creek. In a report in 1901, the Department of Public Works Board of Reference acknowledged that past diversions and proposed future diversions,

'has had and will have, a deleterious effect upon the low-lying lands below Hay' due to a reduction in flood heights. It agreed that 'some provision should be made whereby this land can be at least placed in the same position with regard to inundation as it was before the diversion took place'. In an attempt to achieve equity between upstream diversions and lower Murrumbidgee floodplain maintenance, the Board recommended on 12 December 1901 that a weir and lock be constructed 'in the vicinity of Gum Creek, above Maude, for the purpose of diverting a supply of water for the irrigation of the large area of polygonum country below that point' (NSW LA 1906: 277-278).

12.5.2.1 Lower Murrumbidgee Irrigation Area proposal 1902

Further to the Gum Creek Weir proposal, in minutes of evidence provided to the Interstate Commission on the River Murray in relation to future irrigation development in the Murrumbidgee Valley, Leslie Wade (1902: 285) who was now Principal Engineer of the Water Supply and Sewerage Branch of the Public Works Department suggested that:

It is ... considered that more good will will accrue from the application of the waters of the Murrumbidgee to the most arid areas that can be commanded, and with that view the original schemes have been recast, and the points of diversion altered from Narrandera to Pevensey slightly below Hay ... and the whole of the available supply from the Murrumbidgee will be utilized mostly below Pevensey, and if sufficient is available a small quantity probably between there and Narrandera.

12.5.3 The 'Gibson Scheme' – a large-scale private Murrumbidgee irrigation proposal

In 1903, Robert Gibson, the Mayor of Hay, presented the NSW Parliament with a detailed proposal for a large-scale private irrigation development for the Murrumbidgee Valley, which he had developed with former Chief Engineer of Water Conservation in NSW, H.G. McKinney. The 'Gibson Bill' (Murrumbidgee Northern Water Supply and Irrigation Bill) involved a plan for the establishment of an irrigation district between the Murrumbidgee and Lachlan rivers, the construction of 'a dam near Barren Jack Mountain ... a weir across the Murrumbidgee River near Narrandera ... a canal and subsidiary works on the northern side of the Murrumbidgee River' (*Riverine Grazier*, 24 July 1903).

The 'Gibson Scheme' would require the diversion of a huge amount of water, which meant that previous concerns about the impacts of other upstream diversions on the lower Murrumbidgee floodplain paled into insignificance. In addition, initially the scheme made no provision for 'compensating weirs' to sustain the lower Murrumbidgee floodplain wetlands, despite McKinney's involvement and his previous advocacy of such measures in the name of equity.

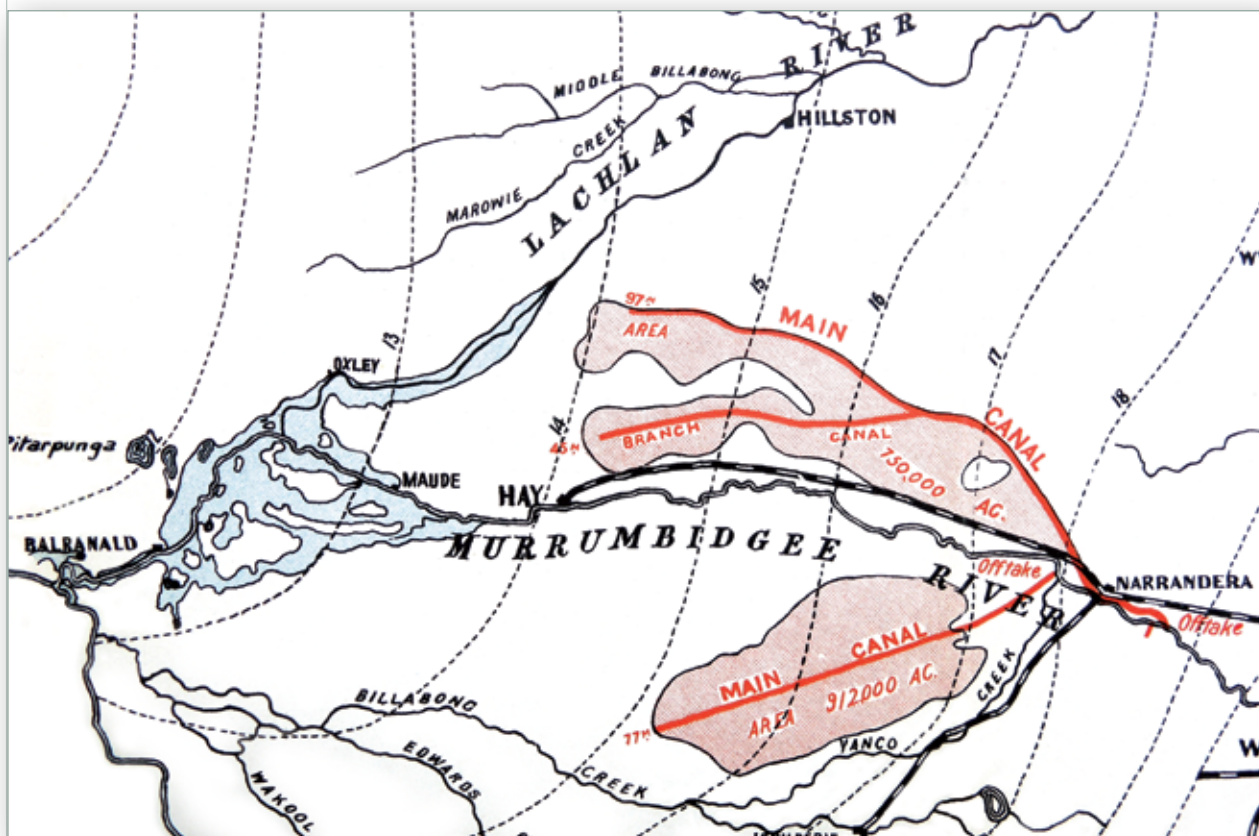


Figure 12.2 The ‘flooded country below Hay’ in relation to areas proposed for irrigation development

Initially, there was an attempt to achieve equity between sustaining the lower Murrumbidgee floodplain and the livelihoods of its landholders and the establishment of a large-scale irrigation development upstream (NSW Public Works Dept. 1905. Part of *Proposed Murray and Murrumbidgee Irrigation Schemes*).

While the residents of the lower Murrumbidgee appreciated the benefits of the proposed upstream irrigation developments and did not wish to deny others the right to a living by objecting to them, neither did they wish to lose their own right to a living through the reduction or loss of flooding. The Gibson proposal was later amended to include three weirs, due to public pressure, debate, and evidence by expert witness, private civil engineer John Monash (later to become the famous World War I General, who appears on the A\$100 note. see Appendix 1). Monash, in fact, insisted that at least five weirs, in addition to the proposed ‘Gum Creek’ lock and weir, would be required to sustain the floodplain.

12.5.4 Demonstrating the feasibility of irrigation and wetland coexistence

Monash was retained by lower Murrumbidgee residents between 1903 and 1906 as an independent advisor and expert witness to provide practical ways to assist them to achieve equity within the context of the large-scale upstream private irrigation proposal. Six years earlier, Monash had acted as advisor and expert witness to residents of the Jerilderie district, against David and Samuel McCaughey who

had dammed the Billabong and Colombo creeks to irrigate their properties, greatly reducing the amount of water available downstream. Monash negotiated a successful outcome against the powerful figures, including a large compensation payment for his clients (McCaughey 1955: 96).

In April 1904, Monash conducted a personal inspection of the lower Murrumbidgee. His assessment of the landscape and suggested solutions demonstrated a personal capacity as a systems thinker. He recognised that anything that ‘will materially interfere with this natural irrigation spells ruin alike to large and small holdings, to townships and to all directly or indirectly dependent’. He acknowledged that, in such a semi-arid area, pastures dependent on rainfall alone would not endure throughout the year (Monash 1904: 2). He produced a summary report of his findings that was printed locally and distributed to community members for deliberation.

Monash (1904: 7) stated in the report that he did ‘not hesitate to arrive at the conclusion that the [Gibson] Bill as it as present stands is most injurious’ to the interests of the district and should be vigorously opposed, ‘at least until satisfactorily amended’. He explained that:

Unless all the interests of the Lower River ... are to be wholly sacrificed, no such scheme of storage and diversion can be permitted without effective remedial measures. Fortunately such measures are not impossible. Fortunately so, because the benefits to large tracts of country which would ensue from extensive schemes of irrigation can be cordially and sympathetically recognized. The problem is to permit of the interests named being equally well served by a lesser quantity of water.

Monash 1904: 6

12.5.4.1 *A sustainable floodplain with six weirs*

Monash (1904: 6-8) recommended a simple engineering solution to the issue; the construction of a series of six weirs to artificially raise the river level so that a lesser quantity of water would facilitate effective flooding. He explained that much of the water required for flooding under natural conditions was ‘merely lifting the upper strata of the flow to a sufficient height to do its work’ so that an equivalent coverage could be achieved with a smaller quantity by using weirs to artificially raise the water level. The weir sites were chosen so that their ‘beneficial influence’ would ‘extend continuously along the River’ and took into account the most important flood-runners to enable moderate floods to ‘directly control the largest areas of flooded country’. He was critical of the three weirs proposed in the modified Gibson Bill as being inadequate and providing only limited local benefit because of their lack of continuity. Finally and prophetically, Monash (1904: 7) was adamant that the works to protect the lower Murrumbidgee floodplain wetlands should be completed before the upstream developments were in operation, otherwise there would be no incentive to do so.

Leslie Wade of the Public Works Department, on the other hand, appeared to see an opportunity to appropriate Gibson and McKinney's irrigation proposal for the government, to fulfil his own 'empire-building' aspirations. His focus and energy suddenly shifted to that task. The lower Murrumbidgee floodplain and its residents (see 12.5.2.1) became frustrating impediments to the new goal.

12.6 AN 'EMPIRE-BUILDING' OPPORTUNITY

Environmental issues are affected by the biographical and intergenerational histories that shape and imbue settings with meaning for individuals and communities.

Andrew 1997: 99

Wade's apparently competitive upbringing may have helped to drive him, resulting in his grasping the opportunity to establish a large-scale government irrigation development in the Murrumbidgee Valley. His father was a civil engineer and he had two high profile brothers. Sir Charles Wade (1863-1922) was a lawyer (barrister), judge, and politician including Attorney General (1904-1910) and NSW Premier (1907-1910). Sir Robert Wade (1874-1954), was an orthopaedic surgeon who played a major role in improving community health care in NSW in the first half of the twentieth century (Ward 1990: 240-242; Lloyd. 1990: 342-343; Blackburn 1990: 343-344; NSW Members of Parliament online).

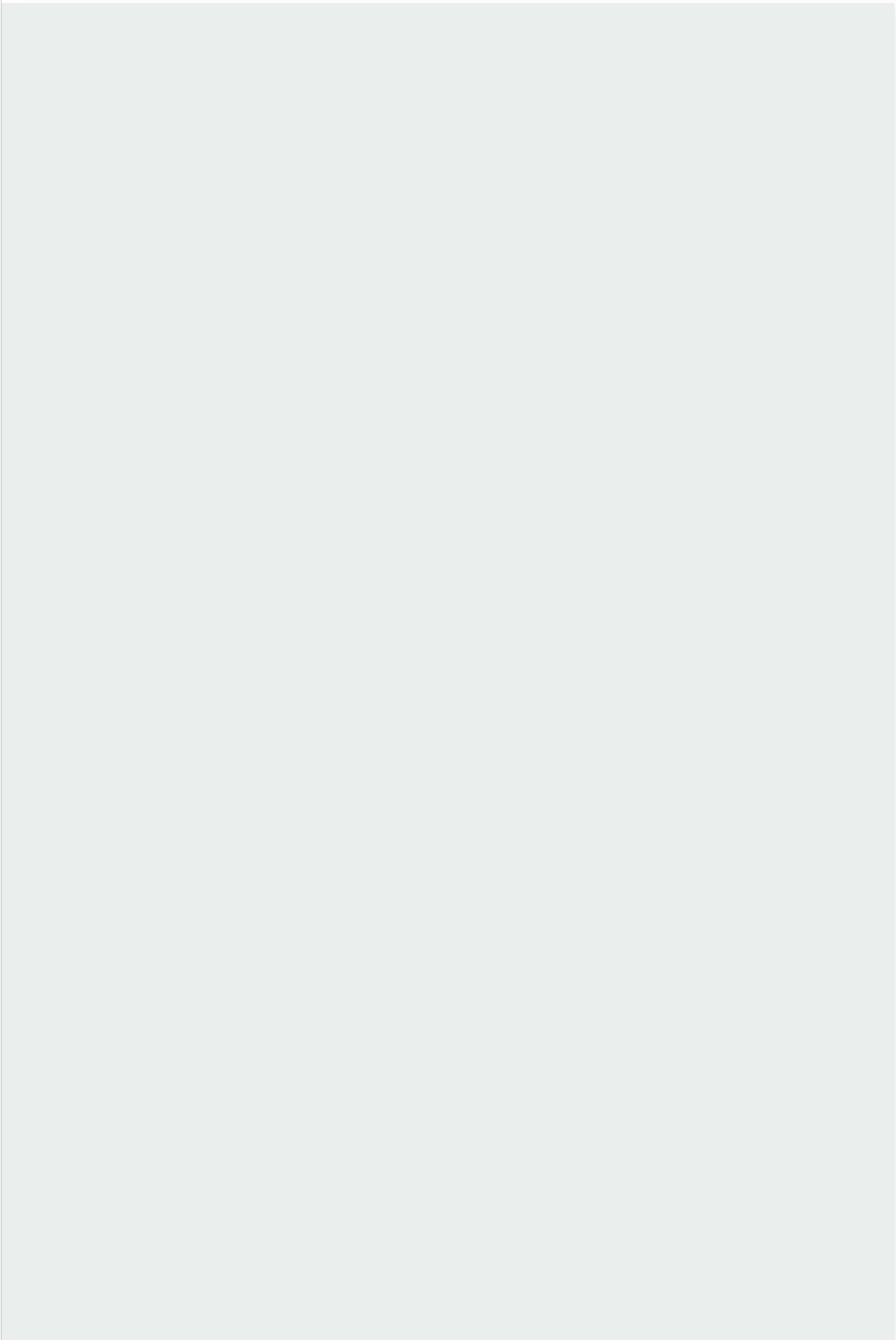
Leslie Wade was single-minded in his determination to bring his irrigation 'empire' to fruition at any cost (see Appendix 1). The impact of that quest is being felt a century later, manifested in the announcement in 2002 by the NSW Minister for Land and Water Conservation, and ironically Minister for Fair Trading, that the water-dependent lower Murrumbidgee floodplain was to be excluded from the catchment's water sharing plan (DLWC 2002. Part B: 27).

12.6.1 'Not part of this water sharing plan'

The largest area of floodplain wetland in the most highly developed catchment in the Murray-Darling Basin and one of the most ecologically strategic wetland locations in the Basin appeared to be planned for sacrifice. This decision contradicted more than three decades of awareness of the critical importance of wetlands to the health of river systems; awareness that 90% of the wetlands of the Basin had been lost (Schofield et al. 2003: 12); despite the fact that NSW had formally adopted the policy of integrated catchment management in 1989 (see Appendix 2); and despite knowledge of the huge loss of wetlands globally over the past century.

In the following chapter, I write a case history (Flyvbjerg 1998: 236) of the past century of events to reveal the context of the current status of the lower Murrumbidgee floodplain having the 'lowest priority of all water in the water source, and also at times of lower priority to water supply commitments to the Murray River' (DLWC 2002. Part B: 27). I discuss the 'capture' of the fate of an ecologically strategic landscape by a small group of technocrats and its consequences.

The proximity and historic relationship of the lower Murrumbidgee floodplain to the Murrumbidgee Irrigation Areas brings into focus a power struggle between agri-ecological and industrial land-uses. It is more complex than the usual upstream-downstream struggle over water. It involves broader social tensions apparently relating to land-use ideologies and moralities, such as the historic tensions between pastoralists and farmers (Turner 2004: 883). It also highlights the potential negative impacts of egos on ecosystems, as discussed by Beresford (2001: 403-414) in relation to the environmental legacy of developmentalism on the Western Australian Wheatbelt during the twentieth century.



CHAPTER 13: AN EXCLUDED LANDSCAPE AND CONTESTED LIVELIHOODS

(C)ommunity resilience, or the “capacity” to cope with or adapt to water scarcity, is influenced by historically contingent mechanisms to gain, control, and maintain access, factors that are generally not captured in quantitative models.

Langridge et al. 2006: 27

Just as an historical perspective was necessary to achieve the shift from the ‘balance of nature’ paradigm necessary for effective ecological management (Swetnam et al. 1999: 1201-1202), a single point in time or short period is inadequate to appreciate the cumulative impacts and injustices of apparent institutionalised erosion of the social-ecological resilience of the lower Murrumbidgee floodplain. In this chapter I demonstrate that an ideological, moral and epistemological power struggle over the past century between ‘industrial’ and agri-ecological land-uses in the Murrumbidgee Valley has shaped the lower Murrumbidgee floodplain as a political landscape (Olwig and Mitchell 2007: 530).

I interpret ideology as the collective beliefs and attitudes of a class or social group to justify an arrangement of power (Macey 2000: 198). I mention morals because historically wetland dwellers were often portrayed as being ill-disciplined like their landscapes (see 12.2.1); both of which could be brought ‘under control’ by draining the wetlands (Speich 2002: 430-431). In addition, ‘industrial’ farming would have been considered superior from evolutionary and mechanistic ‘efficiency’ perspectives to the land-use practices of floodplain residents (Turner 2004; Kiernan 2007: 177-180).

13.1 A CENTURY OF MOBBING OF THE LOWER MURRUMBIDGEE FLOODPLAIN AND ITS RESIDENTS

‘Modernity triumphed’ (Lyotard 1989: 199) with the establishment of the Murrumbidgee Irrigation Areas (MIA), which involved ‘engineering’ an orderly artificial wet-landscape (Janssen et al. 2006: 22); the transition from pastoralism (extensive sheep and cattle grazing) to intensive industrial farming; and the triumph of humans over a harsh environment in a new nation. However, the following description highlights an ‘institutionalist fallacy’ (Hillman and Howitt 2008: 63; see 8.3.4.1) in the assumed omnipotence of the ‘industrial’ model and its technicians:

From the start, the scheme was regarded essentially as an engineering undertaking. Practically the whole of the early planning was carried out by engineers, including the choice of lands suitable for irrigation farming. On examining any of the early reports, one is struck by the great emphasis given to engineering design, and the very minor place accorded to what should have been the salient feature – the ability of the land to produce goods which could be marketed at an economic price ...

What does seem strange ... is the apparent lack of any hydrological investigations in respect of water tables – the significance of which to an irrigation scheme should surely have been obvious. Again, the crops and trees to be grown received very scant attention, and the problem of securing suitable markets even less.

Langford-Smith and Rutherford 1966: 30-31

The installation of the engineering infrastructure was apparently considered an end in itself (Proust 2003: 48; Proust 2004: 176), with the chauvinistic assumption that everything else was secondary. This simplistic ‘heroic’ mechanistic approach to river regulation and irrigation development combined with inadequate government resources and knowledge (Cowper 1987 cited in Proust 2003: 47) meant an unwillingness to accommodate apparently complex floodplain wetlands. As much as possible they were excluded, as Giblett (1996: 19) explains:

The response of ‘Progress’ to the obstacle of the marsh has been to avoid it wherever possible, or to fill it or drain it where avoidance has not been possible, or more precisely where modern technology has made avoidance unnecessary ... Modern ways and the marsh are totally and irretrievably inimical to each other. They cannot co-exist; the marsh must go to make way for the modern.

13.1.1 Mobbing as Epistemic Violence

In addition to the perceived obstruction to Leslie Wade’s empire-building aspirations (see 12.6), I argue that the adaptive agri-ecological land-use by the residents of the lower Murrumbidgee floodplain did not conform epistemologically (Mills 2001: 742) to the ‘industrial’ vision of the government engineers charged with both the regulation of the river, and establishment of an intensive irrigation settlement upstream. The landholders would have been categorized with similar contempt to the ‘laggards’ in the post-World War II agricultural ‘extension’ model (Roling 1988: 66; Vanclay and Lawrence 1995: 116-118; see Appendix 8). The wish of floodplain residents to retain their vernacular land-use methods to work in harmony with the natural river regime, was expressed by local grazier Humphry Davy’s statements in *The Australasian Pastoralists Review* that: ‘Every aim should be to work in unison with, and not in opposition to the laws of Nature’ (1897a: 157), and that regulation should be ‘done on the lines so plainly indicated by Nature’ (Davy 1897b: 481). Engineers, and later agricultural scientists, would have assumed their technical-rational epistemology to be superior landholder ways of knowing involving reflection-in-action. I will demonstrate that the exclusion of the lower Murrumbidgee floodplain landscape and contestation of its residents’ land-use methods are outcomes of an epistemological struggle.

13.1.1.1 *The Mobbing Cycle*

The marginalisation of the floodplain and its residents conforms to a pattern of workplace mobbing (see 2.2.3.1; 8.3.2) with its goal of excluding, and preferably eliminating, an individual perceived to be ‘threatening’ (Westhues 2004: 1). Workplace mobbing is orchestrated by a small number of key mobbers through a cumulative process of frequent acts of passive-aggression over a long period of

time (Leymann 1996: 168). I demonstrate that a similar process has been used to attempt to eliminate the ‘threatening’ lower Murrumbidgee floodplain landscape and its residents.

I use the five broad steps in the process of ‘mobbing’ (Shallcross et al. 2008b: 57; Westhues 2004: 1; Leymann 1996: 171-172) as ‘epistemic violence’ (Berg 2001: 745) discussed in 8.3.2.2, to provide a framework to help make sense of the marginalisation of the floodplain landscape and its residents over the past century:

1. Target rationalization to ‘manage’ an unresolved conflict, following trigger incidents (1903-1906)
2. Escalating passive-aggression (1907-1927)
3. A critical incident requiring executive action (1928-1934)
4. Negative target branding (1935-1997)
5. Exclusion or Transformation (1998-)

13.1.1.2 *Damage caused by frequency and duration*

The pernicious aspect of mobbing is the cumulative effects of its frequency and duration, not the individual insults, their severity, or how they are executed. As such, a temporal scale is required to expose the insidious process; to reveal its consequences on the immediate community and landscape; to reveal its larger scale ecological, economic and social impacts; and its effects on intergenerational equity:

The historical origins of environmental inequity are key to understanding these conflicts and promoting solutions. The sociopolitical processes by which hazards are created and distributed must be the focus.

Pellow et al. 2001: 429

Like a war of attrition, mobbing has the effect of ‘wearing down’ its targets over time (Westhues 2002: 34, Matthiesen and Einarsen 2007: 736). A related characteristic is the maintenance of an atmosphere of menace. Saul suggests that ‘if leadership is reduced to management, well then, problems are not to be solved. They are to be managed’ (2005: 12), which is the environment of mobbing. Mobbing is about avoiding problem-solving, especially if it risks exposing privilege or injustice.

13.1.1.3 *Spread like a ‘virus’*

The analogy of a ‘virus’ to explain the spread and maintenance of mobbing (Shallcross 2005: 40; Westhues 2002: 32), is useful to make sense of how the negative image of the landscape and its residents has been passed on and sustained over such a long period of time. The mobbing process helps to explain the origin of the hostility towards the floodplain, the maintenance of the hostility, and its recent escalation.

Once a negative image of the lower Murrumbidgee floodplain and its residents had been established within the NSW State water bureaucracy by Wade, the first Commissioner in charge, it was relatively easy to 'pass on' and sustain as Commissioners generally had long tenures (Eaton 1945: 53). The same men were also Commissioners on the River Murray Commission/ Murray-Darling Basin Commission, which made decisions about the fate of the floodplain and its residents because of historic responsibility for river navigation (see 12.2.1.2).

13.2 TARGET RATIONALIZATION TO 'MANAGE' AN UNRESOLVED CONFLICT 1903 - 1906

Leslie Wade, Principal Engineer of the NSW Water Supply and Sewerage Branch of the Public Works Department, with the support of the Under Secretary of the Department of Public Works, Joseph Davis, presented a suite of negative arguments over a period of three years to justify the exclusion of the people and landscape of the lower Murrumbidgee from any debate on water access in the Murrumbidgee Valley. I posit that resentment towards Monash 'bearing witness' (Brown and May 1989: 8) would have also been transferred to the lower Murrumbidgee community for commissioning him to inform their decisions.

13.2.1 A wasteful and extravagant use of water on a poor class of country with inferior pasturage

Wade appeared to begin his campaign to diminish the value of natural flooding of floodplain vegetation in 1903, with the statement that it was 'an absolute waste, as the water could be put to much better use' (*Riverine Grazier*, 16 October 1903). On 14 January 1905, he presented the natural flooding of floodplain wetlands as a luxury (see Box 10). He continued to sow seeds of doubt about the value of natural flooding until at least 1 February 1906, when he proposed that there was 'a very decided difference of opinion as to this flooding' and that the flooding of the floodplain wetlands was 'wasteful' (1906: 91; NSW LA 1906:91).

The following is an extract from a paper presented by Wade in January 1905, to delegates at the beginning of the Conference on Water Conservation and Irrigation in NSW. It appeared to be providing ammunition for those opposed to environmental justice and equity for the lower Murrumbidgee floodplain wetlands and its residents. It also appeared to be a test to establish the likely response to the exclusion of the residents and their landscape from the agenda.

Box 10. A Final ‘testing of the waters’ before Mobbing?

A matter that must be considered in the division of the waters of the Murrumbidgee is the claims of the holders on the Lower River to the natural irrigation of the low lying lignum country below Hay by flooding. Under natural conditions this country is flooded more or less every year according to the height of the spring freshets and floods. The construction and use of the irrigation canals and storage at Barren Jack will diminish the number and area of these floodings. The lower holders ask for the construction of weirs on the length of the river affected for the purpose of artificially raising the river level and affording the natural irrigation that would otherwise be lost.

Two points must be considered. Firstly, that this is a wasteful and extravagant method of applying water to a poor class of country, the results being the growth of a comparatively inferior class of pasturage that lasts but a short time. Secondly, that as a compensation for the loss of floods, a volume equal to all demands of irrigation by pumping will be assured in all seasons by the construction of the storage, and the landholders will be placed in a better position in very dry seasons than ever before.

Wade 1905a: 271-272

Monash (1905a:119) objected to Wades’ references to ‘poor class of country’ and ‘inferior class of pasturage’, on behalf of the Lower Murrumbidgee delegates to the conference.

13.2.2 Character attacks on floodplain residents

The vernacular land-use methods of the floodplain landholders, and their calls for equity resulted in a campaign by Wade and Davis to demonize them and trivialize their concerns about a loss of wetland flooding and their linked livelihoods. An illustration appeared in a report presented by Davis to the NSW Legislative Assembly, about the sharing of Murray waters. It included the apparently irrelevant statement that he considered ‘the hostility of the lower Murrumbidgee residents, who protest against any diminution of flood heights or interference with navigation, is a factor that does not enter into the Murray Scheme’ (Davis 1904: 10; NSW LA 1904: 10). Undermining targets’ social capital and reputation with defamatory rhetoric are common mobbing instruments (Westhues 2004:1, Westhues 2006:19).

13.2.3 Commencement of Mobbing

I suggest that the following statements made on 24 August 1905, marked the formal commencement of the mobbing of the lower Murrumbidgee landscape and its people:

[T]hey should be made to use the water for intense cultivation. If the people below Hay wish to use the waters of the Murrumbidgee they should have properly constructed irrigation channels, for which, of course, they would pay interest, and use the water in a proper scientific manner’.

Wade 1905b: 46

A short time later he added that ‘if the Government carry out the [Murrumbidgee Irrigation] scheme instead of Mr. Gibson, I should recommend them not to construct any [ecosystem compensation] weirs at all’ (*Ibid*: 47). If total denial of environmental justice was unsuccessful; restrictive water access conditions were proposed:

[I]t is doubtful if the proposed weirs will be able to divert a sufficiently large volume of water to give the results anticipated. If such weirs are constructed, it should be on the understanding that the water to be diverted is the surplus after the requirements of the canals and other works for intense irrigation are met.

Wade 1905a: 272

13.2.4 Attrition

Wade began ‘avoiding appropriate and timely decision-making or action’ (Westhues 2004: 1), as part of his mobbing arsenal on 7 September 1905, with a familiar bureaucratic excuse that no decision could be made in relation to the ‘flooded area’ until ‘full information’ was available from an officer currently ‘on the ground’ (1906:74). Davis made a similar comment on 3 January 1906, and added that he considered it unimportant in relation to ‘a work that is likely to prove of such immense benefit to the country, by the settlement of many thousands of industrious people’ and considered that the ‘doctrine of the “greatest good for the greatest number” should here prevail’ (Davis 1906: 11; NSW LA1906: 11). That statement accords with Freudenburg’s (2006: 3) ‘double diversion’ strategy, which involves the diversion of environmental rights to privileged groups through the diversion of attention from inequity by the use of taken-for-granted assumptions. On 4 January 1906, Davis, finally admitted that there was no report and blamed the floodplain residents for government failure of due diligence with the defence that ‘Mr Wade thinks, and I am disposed to agree with him, that we should not burden ourselves, as far as this scheme is concerned, with the cost of satisfying them’ (Davis *Ibid*: 57). Blaming the victim for being ‘difficult’ (Zapf and Gross 2001:518) is a common mobbing strategy.

13.2.5 No legal right to flooding or claim to equity

Mr. Wade is of the opinion that the holders of the lands have in this matter neither a legal nor an equitable claim, in which opinion so far as the legal aspect is concerned, he is supported by the Crown Solicitor.

Davis 1906:41

The floodplain between Hay and Balranald evolved from regular flooding for over 30 million years before the arrival of humans. Perversely, Wade denied any claim to flooding based on precedent, by suggesting in evidence presented on 7 September 1905, that although the landholders may have purchased their properties:

[U]nder the impression that they would have a right to the flood-waters, and although they may have had the benefit or otherwise of these floods for many years, their use during the period that they were not required for more useful purposes, does not, I consider, give even an equitable claim for expenditure by the Crown.

Wade 1906:74

In a statement made on 9 August 1906, the NSW Crown Solicitor found that the Water Rights Act of 1902 did 'not include a right to the natural irrigation of the frontage lands and the filling of the swamps and creeks in the backcountry by the flooding of the river' (NSW LA 1906:555). The issue of water access to the flood-dependent lower Murrumbidgee floodplain had been depoliticised (Di Chiro 1992: 25) by law to establish it as an open access system (Burger and Gochfeld 1998: 9; see 11.3) for government.

It appears unlikely that Leslie Wade's use of legal arguments to avoid further debate on equity was not informed by his brother, Charles, who was NSW Attorney General between 1904 and 1910, and NSW Premier 1907-1910 (Ward 1990 ADB online accessed 9/7/08; NSW Members of Parliament online) Charles Wade had also attended the Conference on Water Conservation and Irrigation 1905, so was familiar with the issues and arguments.

13.2.6 Neglect of government 'duty of care' responsibilities

Stuart Murray, Chief Engineer of Water Supply and Chairman of the State Rivers and Water Supply Commission of Victoria, invited to comment on the Scheme, stated that 'even if the holders of land liable to be flooded have no legal right to the flood water, Parliament can hardly evade the responsibility of making provision for them, on the grounds of justice and public policy' (NSW LA 1906:41; Murray 1906: 41 and 577). Wade's apparent lack of 'duty of care' towards the floodplain residents was also opposed by Monash and McKinney, but focus on the 'goal' of an irrigation empire appeared to diminish any ethical concerns of peers.

13.2.6.1 *Mobbing 'approval'*

Duffy and Sperry (2007: 399) suggest that mobbing 'requires a level of acquiescence by management' and that even in a bully-prone culture, mobbing will not occur if the manager does not permit it. They suggest that 'it is not uncommon for workplace mobbing to begin at the top of the bully-prone organization, with top management and trickle down through the ranks'. Wade's self-approval to mob the floodplain residents despite the disapproval of peers may be explained by the apparently highly competitive family culture of his upbringing, the support of his politically powerful elder brother, and his mechanistic worldview (see 12.6).

13.2.7 New South Wales Government to develop the Murrumbidgee Irrigation Areas

In 1906, Wade achieved his goal of having the New South Wales Government take over the construction of Burrinjuck Dam and the development of the Murrumbidgee Irrigation Areas. However, as highlighted by Langford-Smith and Rutherford (1966: 30-31) above, once that goal had been achieved, the purpose of the project became clouded (Proust 2004: 179). In this exercise in 'State socialism' (Rutherford 1968: 137), economic development appeared to slip to fifth place in priority behind personal empire-building, social security, new nation bravado, and national security (Quiggin 1988). Proust (2004: 179-182) explained that the haste to commence the project in order to avoid a land speculation scandal had also resulted in the government beginning development on second-class lands, which 'had serious long-term effects for the whole scheme'. Lloyd summarized the confusion as follows:

The Murrumbidgee Irrigation Area (MIA) was founded on an amalgam of rationalisation, inspiration, myth, sound engineering and ignorance. Virtually every initial assumption made about land use turned out to be wrong.

1988: 201

In the following section I will examine the second stage in the five part mobbing process: Escalating passive-aggression (1907-1927)

13.3 ESCALATING PASSIVE-AGGRESSION AS ATTRITION 1907 - 1927

What we call Man's power over Nature turns out to be a power exercised by some men over other men with Nature as its instrument.

C. S. Lewis (cited in Woster 1985: 50)

Upstream diversions of water from the Murrumbidgee River increased rapidly over this 1907-1927 period with the commencement of the development of the Murrumbidgee Irrigation Areas and the completion of supporting infrastructure. Berembred Weir was completed near the town of Narrandera in 1910 to divert water to the irrigation blocks, and the filling of Burrinjuck Dam delayed and reduced late winter-spring flooding from 1912.

13.3.1 Epistemological 'enclosure' - the transition of the Murrumbidgee from an ecological to an industrial river

The impacts of increased regulation of the Murrumbidgee to support upstream irrigation developments, and a resultant loss of access to water downstream, emerged as erosion of

landholder control over their landscape and linked livelihoods, in addition to the devaluation of local knowledge that had served them well in the past:

We judge the state of the river from the heights of it at certain points – say at Wagga and Gundagai. When it reaches a certain height at these two places, we can judge with tolerable accuracy what extent of country will be flooded lower down.

Bowden 1885: 130

The timing and size of river flows were increasingly determined by engineering decisions rather than natural events. While the signs of natural events could be ‘read’ and appropriate action taken by floodplain residents; the minds of engineers could not, as the following quotation suggests:

We found the Balranald people wondering where the small flood came from ... They were expecting no flood by the old signs. But the old signs are all failing them nowadays. Heavy rain on the headwaters used to mean a flood, and dry spells a low river. But these changes came at any time nowadays, due to causes of which they know nothing, to the workings of the brain of an engineer at Barren Jack ...or perhaps to alterations in the needs of the people at Yanco [MIA irrigators] ... When the Murrumbidgee shows a sudden rise or fall today they know that somebody 400 or 600 miles up river is, or has been, doing or thinking something.

Riverina Recorder, 3 June 1914

The increasing loss of control over the management of the lower Murrumbidgee floodplain by its residents and the devaluation of their local knowledge, brings to mind a situation discussed by Haebich (2005: 27–28) in relation to the loss of Aboriginal custodianship of bunya forests in Queensland in the nineteenth century. Aboriginal systems of environmental knowledge, management and dreaming stories were simply swept aside and replaced by a completely new knowledge system. They were taken over by scientists and became the domain of the western scientific society, disempowering Aboriginal custodians and excluding tens of centuries of accumulated local knowledge. Both of these examples appear to support Foucault’s thesis that any form of epistemology is also a regime of power (Foucault 1980: 82).

13.3.2 The River Murray Waters Agreement

The River Murray Waters Agreement of 1914 included provision for the construction of nine weirs with navigation locks on the lower Murrumbidgee River between the Murray-Murrumbidgee confluence and Hay. It was a huge relief for the community as it fulfilled all of their wishes. The proposed Gum Creek weir and lock (See 12.5.2) became incorporated as Murrumbidgee weir and lock number 8 in the River Murray Commission works program. However, the sense of security provided by the Agreement gradually dissipated as it became clear that the proposed weirs and locks were not going to be completed by the deadline of 1927.

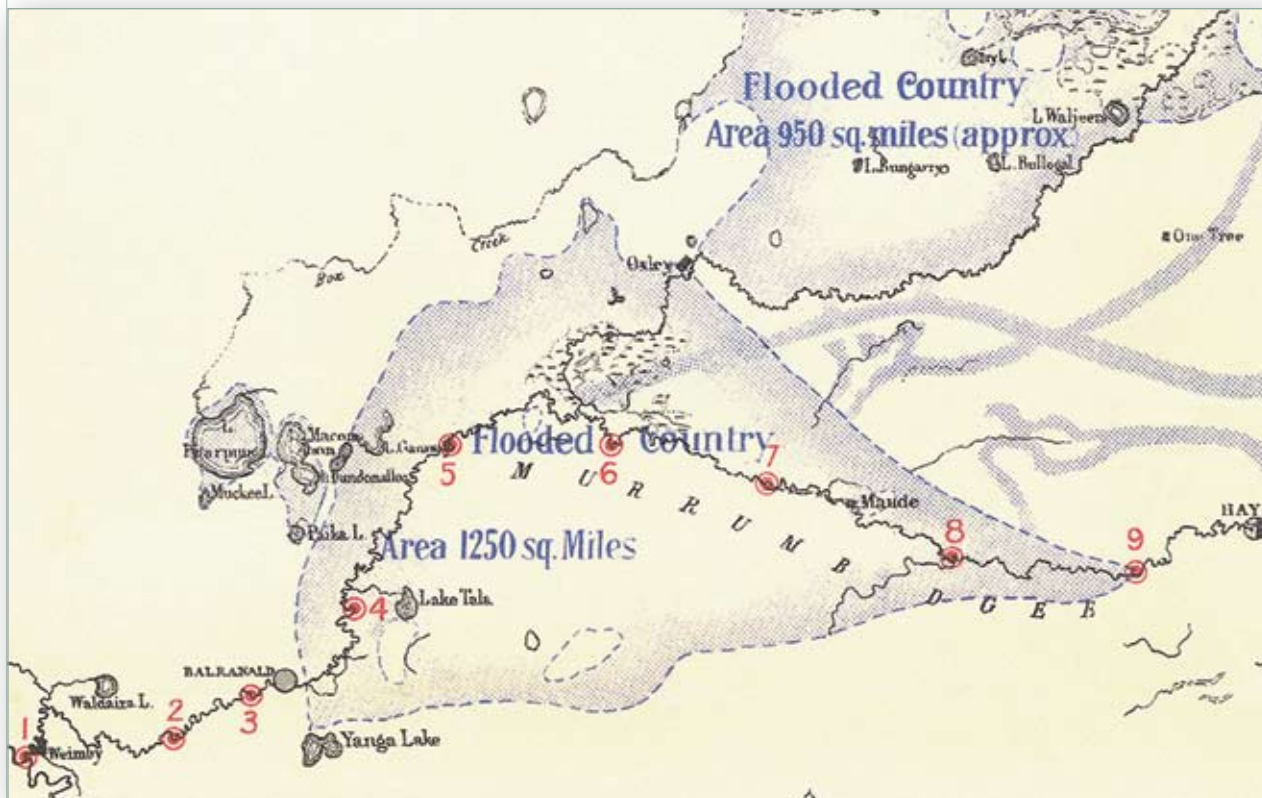


Figure 13.1 The locations of proposed weirs with navigation locks on the lower Murrumbidgee River

In 1901, the NSW Government approved the construction of a weir and lock near Gum Creek off-take (site 8) to compensate for reduced flooding due to upstream extractions. The weir would raise and divert water onto the floodplain along its southern boundary, via the Fiddlers-Uara system. The commitment was delayed for 33 years and finally eliminated with a major amendment to the River Murray Waters Agreement in 1934, resulting in the Fiddlers-Uara system becoming a 'stranded landscape' today.

Under the River Murray Waters Agreement of 1914, the River Murray Commission was to construct a series of nine weirs with navigation locks between the confluence with the River Murray and the town of Hay. In 1934 the Agreement was amended to construct two weirs. In 1940, Redbank Weir was completed at site 5, and Maude Weir was completed midway between sites 7 and 8. Unfortunately, two weirs were inadequate to supply water to sustain the whole floodplain. Weirs were later built near Balranald (site 3) in 1980 and Hay (site 9) in 1982, largely for urban supplies (NSW LA 1902. Part of *Plan shewing Lachlan River District 1/12/1902*).

13.3.3 Crisis of combined impacts of increasing upstream diversions and drought

Rapidly increasing upstream diversions and river regulation, combined with several drought years (1914, 1915, 1919, and 1927), reduced the occurrence, area, and duration of flooding, and began eroding the social-ecological resilience of the floodplain. Reduced flooding impacted the floodplain ecology and the linked incomes of landholders, which in turn, impacted other district residents and town economies.

In 1927, ninety-thousand sheep died and one hundred-thousand were sent out of the lower Murrumbidgee district on agistment (*Canberra Times*, 29 February 1928) as a result of drought and upstream diversions following the completion of all aspects of the MIA development. This

was in marked contrast with the past when sheep from surrounding areas were agisted on the lower Murrumbidgee floodplain during drought periods (McKinney 1889: 83). While no work had commenced on the lower Murrumbidgee infrastructure, Yanko diversion weir upstream was nearing completion (completed 1928), which would further negatively impact the floodplain. The two decade period of government inaction established attrition as the preferred bureaucratic mobbing strategy for maintaining the marginalization of the lower Murrumbidgee floodplain landscape and its people.

In the following section I will examine the third stage in the five part mobbing process, which is dominated by a crisis that demanded a decision to be made.

13.4 CRITICAL INCIDENT REQUIRING EXECUTIVE ACTION 1928 - 1934

The impacts of large upstream diversions and storage in Burrinjuck Reservoir, exacerbated by a severe drought, created a crisis on the lower Murrumbidgee. As no work had begun on the locks and weirs by the 1927 completion date (*Canberra Times*, 29 February 1928), in desperation, a delegation from the district travelled to Canberra and met with Prime Minister Bruce in February 1928, to plead their case for water access. In an attempt to reduce the costs and speed the construction of diversion weirs necessary to sustain the floodplain wetlands, the delegation members suggested the deletion of the navigation locks and also a possible reduction in the total number of weirs.

13.4.1 Two weirs ‘take it or leave it’

Commissioners of the River Murray Commission visited the lower Murrumbidgee in May 1930 to consult with community members on the possible modification of River Murray Waters Agreement to eliminate the navigation locks and reduce the number of weirs to ‘accelerate’ construction schedules. This ‘consultation’ appeared to have been to establish the minimum that the desperate lower Murrumbidgee residents would accept after more than two decades of increasing upstream diversions and no protection against drought. Mr. T. Hill, Deputy Commonwealth Commissioner, suggested on at least two occasions that locks and diversion weirs were mutually exclusive:

You appreciate that if you had a navigable river it would be difficult to give you flooding as well?
Locks would confine the water to the river.

Riverine Grazier, 30 May 1930



Plate 13.1 **Berembred Diversion Weir and Lock** (in Brady 1911: opposite page 178).

Hill's statement appeared to be either poorly informed or deliberately misleading, but was not corrected by any of the other commissioners. At the time, Berembred Weir, the main diversion weir for the Murrumbidgee Irrigation Areas, completed in 1910, incorporated a navigation lock, as did weirs on the Murray. It was clearly possible to have diversion weirs that incorporated locks.

Box 11. John Johnston (1888-1939) – 'honest broker'

John Johnston, editor and proprietor of the *Riverine Grazier* at Hay felt that the local landholders were being dictated to and patronized, rather than consulted at the meeting with the River Murray Commissioners. He pointed out to that:

They [the people of the Lower Murrumbidgee] had got absolutely nothing since the Murray Rivers Agreement came into force, and that night the Commission was bargaining with them not to give them what they were entitled to, but for how little they could be put off with ... The Murray River Agreement provided for nine weirs between the junction of the Murrumbidgee and Hay, but that night there was only mention of two, which would not keep the river in a reasonably fair condition ...

The Chairman [Mr. T. Hill] said the Commission did not want to put forth any minimum; they only wanted suggestions as to requirements. He did not wish the interpretation put on them that they were bargaining.

Mr. Johnston said that that was the impression made on him by the various speakers ... perhaps he was wrong to attribute that to a desire to reach the minimum the people would accept ...

He asked the Commission to report to the Government that the people of this district were entitled to better treatment than they received.

Riverine Grazier, 30 May 1930

13.4.2 Major Amendment to the River Murray Waters Agreement 1934

A major amendment to River Murray Waters Agreement 1934 emerged from a combination of the effects of economic depression, the end of river navigation, and the empire-building aspirations of state water authorities. Weirs and locks on Murray and Murrumbidgee were reduced and Yarrawonga Weir and the Murray mouth barrages were to be constructed. River Murray Commission politics would have dictated that each state was seen to 'win' from the amendment. South Australia would have been cooperative because the Murray mouth barrages would improve water quality in the lower river for irrigation and stock and domestic supply. Both New South Wales and Victoria would benefit politically and economically from an irrigation diversion weir on the Murray at Yarrawonga to further develop irrigation in their states.

The reduction in the numbers of weirs and the exclusion of navigation locks on the lower Murrumbidgee helped to fund the construction of Yarrawonga Weir and the Murray Mouth Barrages. These works would have been much more appealing to the three State water authorities involved in the River Murray Commission, than the lower Murrumbidgee constructions.

Box 12. River Murray Waters Agreement amendment 1934

- Three of the originally planned 16 weirs with locks on the Murray between the Darling junction and Echuca to be constructed.
- Two weirs of the nine weirs with navigation locks planned for the lower Murrumbidgee to be constructed.
- Yarrawonga Weir to be construction for irrigation diversion to southern NSW and northern Victoria.
- Five barrages to be built near the Murray Mouth to keep Lake Alexandrina and the Lower Murray fresh by preventing seawater entering during low river flows.

In the following section I will examine the fourth stage in the five part mobbing process. It is dominated by official negative branding of the landscape.

13.5 NEGATIVE TARGET BRANDING 1935 - 1997

The values people or societies ascribe to landscapes, whatever those values, have a major influence on the way they interact with and manage them.

Land and Water Australia 2001: 11.

In 1940, weirs were completed at Redbank and Maude on the lower Murrumbidgee River, 39 years after the approval of the construction of 'Gum Creek' Weir and lock. Two weirs were quite inadequate to divert sufficient water to sustain the floodplain, but were considered, by the now desperate landholders, to be better than nothing. As had been predicted by Monash in 1904, a large part of the southern section of the floodplain, the Fiddler's-Uara system, and a section of riparian red gum forest in the Murrumbidgee corridor between Redbank and Maude weirs has been 'sacrificed' (Hooks and Smith 2004: 558) as a result of the decision, because they are above the influence of weir pools. As the areas cannot be artificially flooded, and natural floods have been greatly reduced in frequency, extent, and height by catchment-scale developments and river regulation, they have become degraded 'stranded landscapes', with greatly diminished agricultural and ecological productivity.

Landholder attempts to use two weirs to do the work of six (Monash 1904: 7), and as the first diversion of water from Redbank Weir immediately returned to the river a few hundred metres downstream (*Riverine Grazier*, 10 November 1944), they were forced to make time-consuming and costly changes to the natural floodplain landscape to keep the water on the floodplain. That involved constructing banks and channels. The weir construction made the natural water distribution ('flood-runner') network, on the floodplain largely redundant but did not adequately replace it (Kingsford 2003: 77).

13.5.1 Unprecedented conditions attached to Flood Control and Irrigation Districts – an irrigation area without a water allocation!

Water will not be released from Burrinjuck storage or from any other artificial storage to supplement the flow in the vicinity of Maude Weir or of Redbank Weir for the purpose of enabling flood irrigation of the lands within the District.

NSW Government 1946: 19

A meeting between landholders and Chief Engineer of the Water Conservation and Irrigation Commission was held in Balranald on 29 April, 1944, to discuss the constitution of the proposed Lowbidgee Flood Control and Irrigation District. A report of the meeting in the *Riverine Grazier* of 5 May 1944 revealed that the proposed Lowbidgee Scheme was to be the first flood control and irrigation district to be established in New South Wales. The creation of a new Ministry of Conservation necessitated amendments to the Water Act that enabled the inclusion of the two new water-use categories; flood control districts, and flood control and irrigation districts (Appendix 9). It also revealed that the new flood control and irrigation district 'was different to an irrigation district, where certain water right(sic) were attached to each holding and were guaranteed'. An unprecedented decision had been made not to give this category of 'irrigation' district a specific volumetric water allocation:

It was emphasised that the diversion of water from these weirs depended on the flow in the river ['surplus' flow], and that there would not be any water released from Burrinjuck or any other storage to supplement the flow for flood irrigation [to mimic natural flooding].

No guarantee of a flood, or the degree of flooding would be given.

The second surprise was that landholders would be charged an annual rate for their previously naturally flooded lands whether they received natural flooding, artificial diversions, or nothing at all. The weirs constructed at Maude and Redbank enabled the establishment of the Lowbidgee Flood Control and Irrigation District, in 1945. It included 50 farms covering a total area of 140 000 hectares of which 38 000 hectares could be artificially flooded (NSW Government 1946: 19).

13.5.2 Long-term ecological consequences of negative labelling as part of epistemic contestation in the Murrumbidgee Valley

Within the mechanistic river regulation, agricultural, and NRM model of the twentieth century, where the priority was for mechanistic efficiency rather than social-ecological resilience, there were advantages in the exclusion of the lower Murrumbidgee floodplain from the process. River regulation was much simpler and administratively more convenient if water was confined to the river channel, rather than flowing onto the floodplain where it was considered to be out of control or 'lost'. The declaration of the core of the lower Murrumbidgee floodplain as a flood control and irrigation district without a water allocation further depoliticised it (Di Chiro 1992: 25). The 'life' of the flood-dependent landscape was at the discretion of the NSW Water Conservation and Irrigation Commission and the River Murray Commission; both of which had priorities elsewhere (See 12.2.1.1 and 12.2.1.2)

13.5.2.1 Policy inertia

The floodplain and its residents were permitted access to 'surplus' water only, which was problematic because subsequent catchment-scale and technology developments means that 'surplus' water available today is much less than in 1945, when the arrangement was made. The flood-dependent landscape is dependent on the vagaries of ever decreasing 'surplus' flows. Limiting water access to that which is surplus to all other requirements, also enabled the region to be effectively 'mined' of its water. 'Surplus' water that traditionally flowed into the region was later 'transformed' by being captured in Blowering Reservoir. It was then redistributed to irrigation areas with specific volumetric allocations, including Coleambally Irrigation Area that began operations in 1960.

Part of the origin of the Lowbidgee having no specific water allocation related to its role of flood control, which was primarily to dissipate floodwaters from the Tumut River before it was regulated by the completion of Blowering Dam. The flood control aspect of the title means that the landscape is used as a 'safety valve' for floodwaters that are potentially damaging in other parts of the catchment, but access to surplus water only, also means that the region is not taken into account during low flow periods. Despite the drastic reduction in the frequency of small and medium floods since the completion of Blowering Dam, no provision has been made to compensate for this radically changed situation. In addition, the Lowbidgee did not benefit from water input from the Snowy catchment.

13.5.3 The 'Cap' and water trading

In July 1997 the Murray-Darling Basin Ministerial Council set an upper limit on the amount of water that could be taken from the river system, which was commonly known as the Cap. It represented a starting point to seriously 'take stock' of the consequences of past water policies. It had serious implications for the Lowbidgee Flood Control and Irrigation District, which having never had a specific allocation of water from storage and was now excluded from ever obtaining one. On the other hand, it appeared to introduce a degree of security against ever increasing water extraction, as expressed by this landholder:

The introduction of the Murray-Darling cap on diversions in the 1990's has been the single most positive initiative for the Lowbidgee in the past 60 years. As the Lowbidgee's access to unregulated flows is entirely discretionary (unlicensed), increases in Basin extractions threaten the existence of Lowbidgee as a floodplain and the livelihoods of the landholders.

Spinks 2002: 63

The potential benefits of 'the cap' to the lower Murrumbidgee floodplain were largely negated by the first permanent inter-state water trade, completed in September 1998 (Young et al. 2000: 9). Water trading resulted in reduced 'surplus' flows in the system, as 'sleeper' (never used) and 'dozer' (rarely used) water licenses are either activated or sold.

In the following section I will examine the last critical stage in the five part mobbing process. It is designed to finally exclude or eliminate the landscape by ecological collapse, unless there is a paradigm shift in river regulation, land-use and natural resources management that will result in a transformation.

13.6 EXCLUSION OR TRANSFORMATION 1998 -

How much easier to employ force against an other who has already been constructed as worthy of receiving our contempt ... How much easier to deny subjectivity to those who have survived our abuse.

Sampson 1993: 3

At the close of the twentieth century, the ecological significance of the size and location of the lower Murrumbidgee floodplain to the resilience of the southern Murray-Darling river system, and the importance of its agri-ecological methods to future land-use, continued to be denied within both the catchment and the state. The 'throw-away' status of the floodplain, a term used by Sedden (1999: 314) to describe the Snowy River, similarly 'sacrificed' to modernity was established as a result of a century of mobbing. The twenty-first century introduced the final stage of the mobbing process.

13.6.1 Exclusion from the Murrumbidgee Water Sharing Plan

The consequences of the century-long mobbing campaign, and exclusion of floodplain residents from input to decisions about their futures, were manifested in 2002, when the lower Murrumbidgee floodplain was excluded from the Draft Murrumbidgee Water Sharing Plan (DLWC 2002. Part B: 27). The omission of the largest floodplain wetland area in the Murrumbidgee Catchment, from a future share of water had the potential to finally destroy the floodplain by denying it access to water until the plan was next to be reviewed in a decade.

13.6.1.1 *Deadline expiry for inclusion in Water Sharing Plan*

Lobbying by residents secured a three-year extension to include the floodplain in the Plan (DLWC 2004: 43). However, the failure of government to meet its own 1 July 2007 deadline, compounded by the fact that the process had not commenced by the nominated completion date was *déjà vu* in relation to government 'duty of care' at a time of great stress for the lower Murrumbidgee landscape and its residents.

This latest delay may be designed to further degrade the ecological, economic and social resilience of the floodplain to make it easier to 'sacrifice'. However, that is mechanistic thinking; resilience (Walker et al. 2004: 6) focuses on the *capacity* of social-ecological systems to provide social and ecosystem goods and services as the key indicator of sustainability, rather than the current state of the system or service.

13.6.1.2 *Neutralizing potential threats to business-as-usual*

Johnston (2001: 139-140) suggests that ongoing backlash and subversion is inevitable in struggles to achieve transformations because power structures are challenged. She proposes that:

Oftentimes, political response to environmental justice movements involves providing services or meeting demands in ways that serve, intentionally or not to co-opt the goals of the movement and deflate the power of movement leadership. Disinformation campaigns, publicly acknowledging culpability but responding to problems and victims in relatively minor ways, and creating regulatory and decision-making frameworks that give the image of addressing the concern but are implemented in limited and restricted fashion, are all actions that neutralize a potential threat to the *status quo*. In other cases backlash is more overtly violent ... Governments may be directly responsible, or, through their approval or 'blind eye', indirectly responsible.

The potential for the above situation was revealed at a workshop hosted by the NSW Department of Environment, Climate Change and Water on 21-22 September 2009, titled 'Better Use of Environmental Water in the Lowbidgee'. The primary focus was on the Yanga National Park, indicating the possibility of a change in government strategy for 'managing' the lower Murrumbidgee floodplain 'problem' by attrition and exclusion, to privileging the now government controlled section of the floodplain thus distracting attention (Freudenburg 2006: 3) from other parts.

13.7 BREAKING THE MOBBING CYCLE - TRANSFORMATION

As discussed, for over a century the fate of the lower Murrumbidgee floodplain and its residents has been in the hands of a very small number of NSW and Murray-Darling Basin technocrats. I have demonstrated that there was epistemic 'distance' between them and the landholders (Sen 2000: 170). The technocrats had little 'ownership' of the area and as a cartel, privileged self-interested and 'self-celebratory' (Sampson 1993: 4-5) projects, which frequently involved trading away the futures (Andries 2006: 877) of the floodplain and its residents to subsidise more privileged projects. Ostrom (2007: 12) reveals that researchers have repeatedly generated 'tragedy of the commons' scenarios where subjects make similar 'independent and anonymous decisions in CPR (common pool resource) settings'. The consequence of the technocratic hegemony in water management is enormous resource and capacity depletion (Burger and Gochfeld 1998: 9) on the floodplain, which is continuing; increasingly to support redundant mechanistic river regulation and industrial agricultural models, delaying necessary transformations (Andries 2006: 871-877).

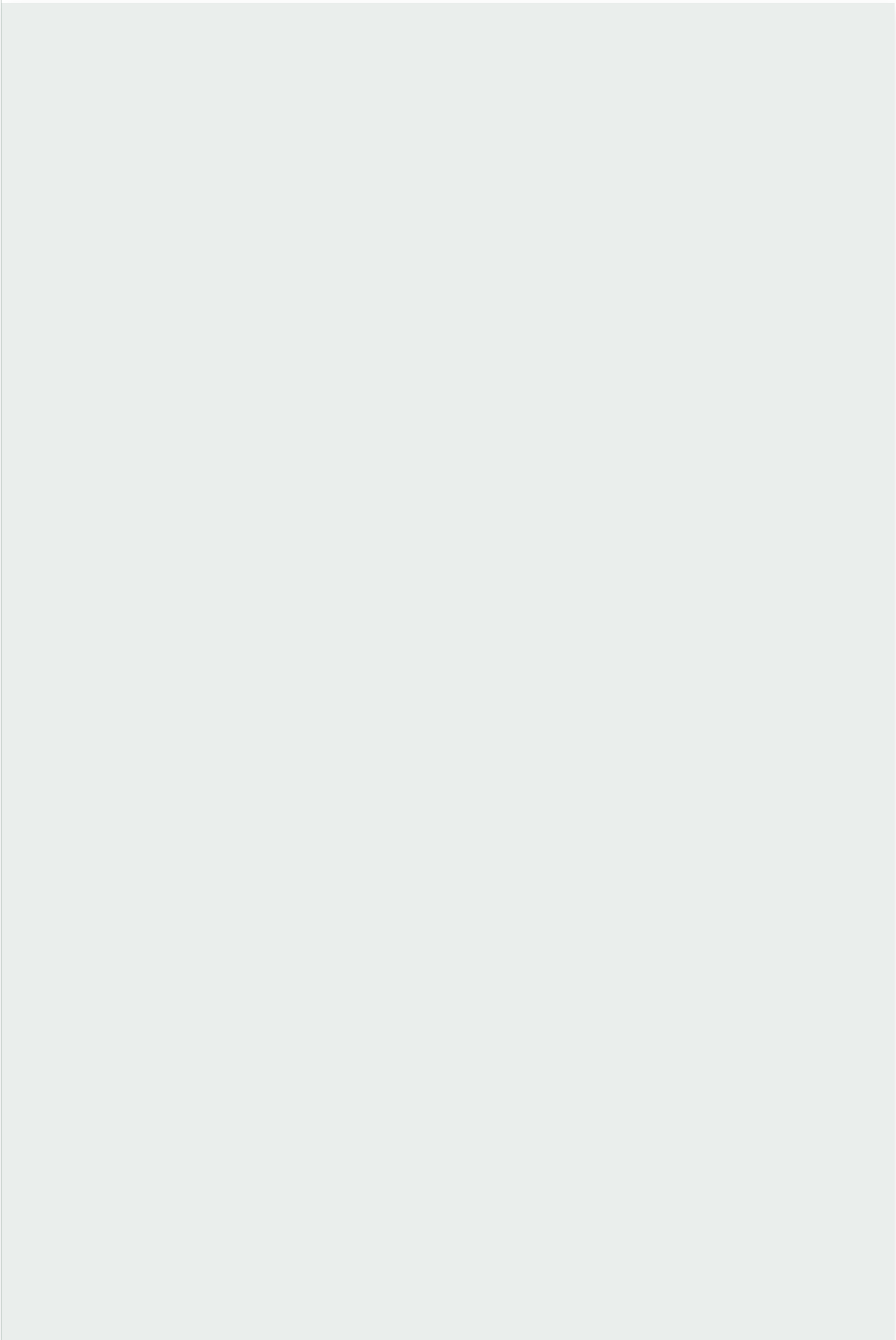
I have established that policy that places the fate of one of the most strategic social-ecological systems to the resilience of the southern Murray-Darling Basin river system into the hands of a small number of 'distant' (Sen 2000: 170-175) narrowly focused technocrats or appointed board

members, for whom there is potentially a conflict-of-interest, is a miscarriage of social-ecological justice. The lower Murrumbidgee floodplain must be reconceptualised within the systemic Just Sustainability Paradigm (JSP) (Agyeman 2005: 6) that can incorporate the social-ecological aspects of water management to accommodate current societal values. JSP acknowledges the fundamental importance of the environment as our 'life-support system' and also highlights justice and equity as key elements of sustainability. The present arrangement is redundant within the context of current scientific understanding of healthy Australian river systems, agri-ecological land-use, climate change, and human rights.

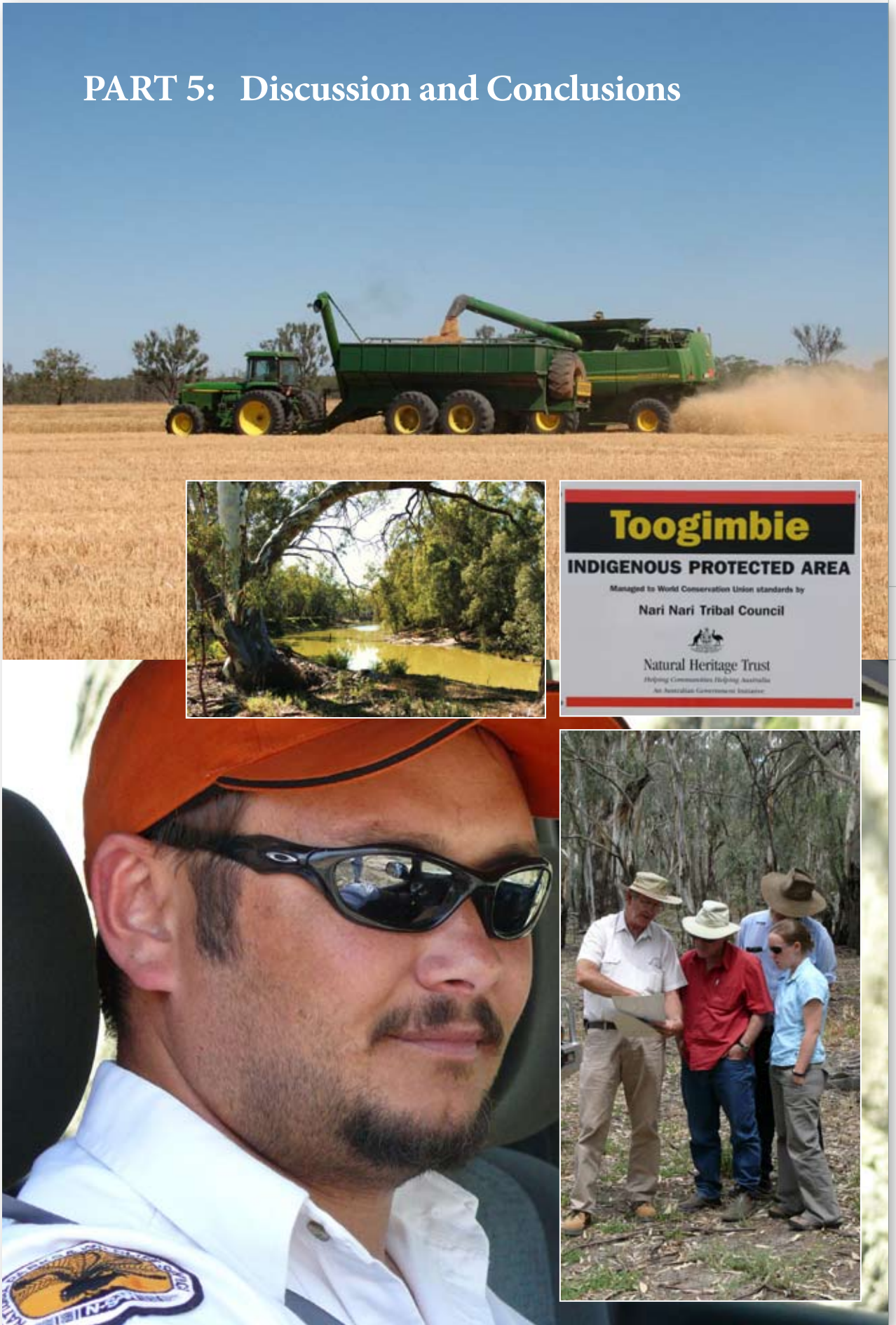


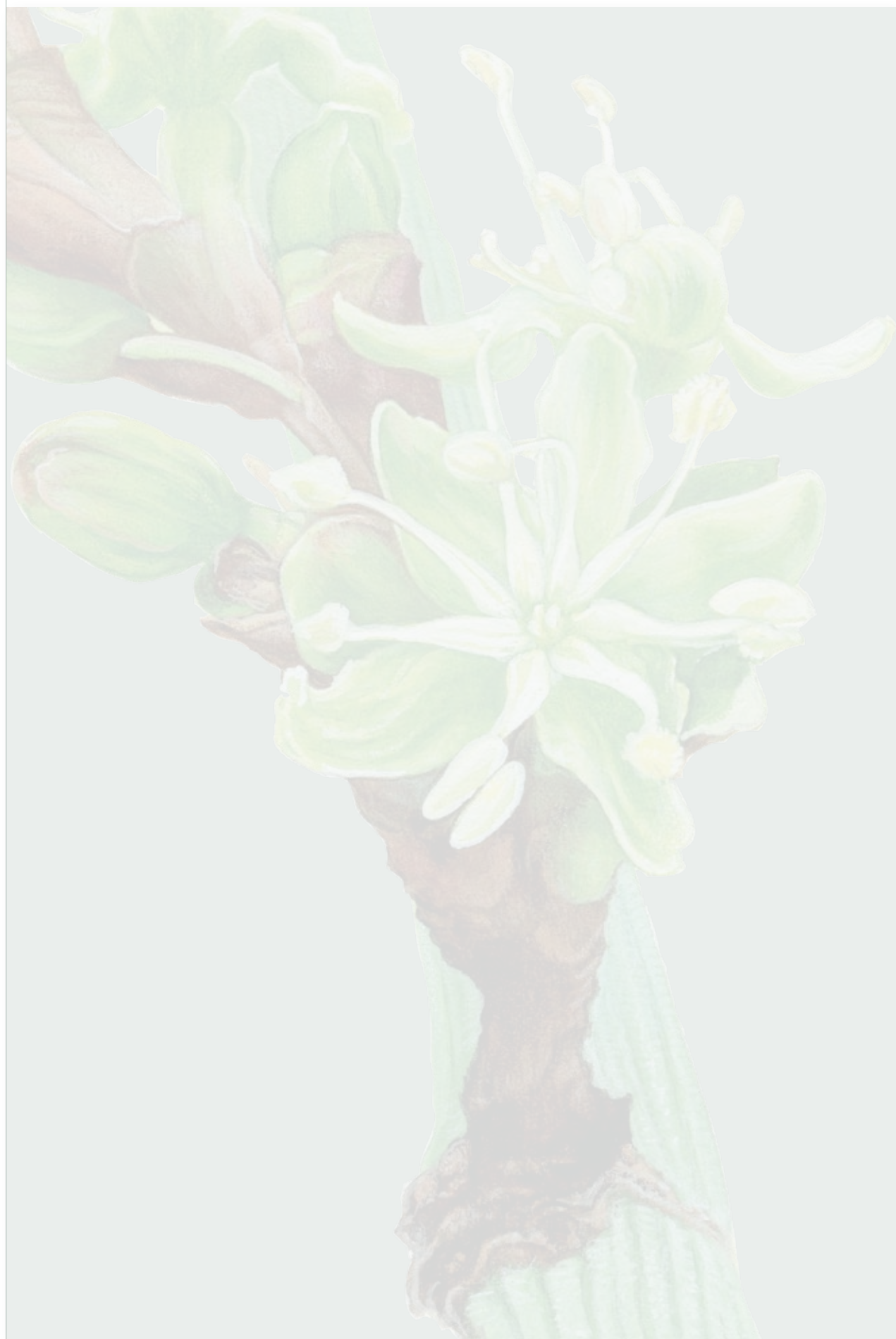
Plate 13.2 Landscape trauma

The 'traumatizing consequential events' (Leymann and Gustafsson 1996: 272) of mobbing on people include stress, anxiety, resignation, and suicide. Landscapes also suffer marginalization trauma.



PART 5: Discussion and Conclusions





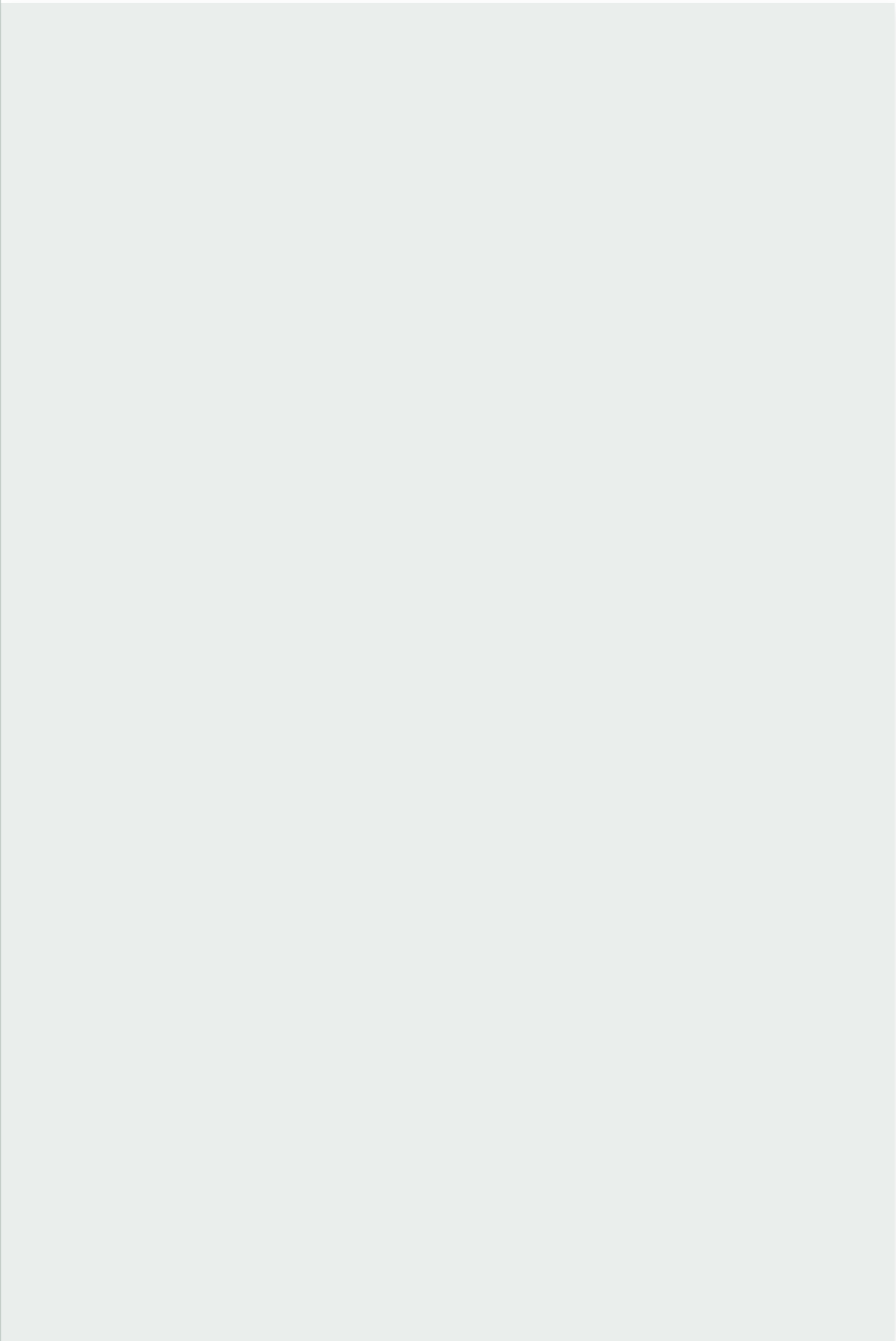
DISCUSSION AND CONCLUSIONS

As discussed in Chapter 1, almost four decades ago Stephen Boyden (1970: 18) articulated that environmental degradation is a result of the ‘intensification of the interaction between cultural and natural processes’, and that solutions would depend on understanding both; especially ‘the way they interact together’. Since that time little effort has been made to understand how these two equally important elements interact in order to progress towards greater resilience for the Murray-Darling Basin social-ecological system. His prophetic caution about privileging scientific/ technical ‘solutions’ to social-ecological systems issues as being not only ‘foolish but in fact dangerous’, has also yet to be appreciated.

NRM bureaucracies tend to attempt to maintain a level of comfort (Allan and Curtis 2005: 423), as well as power, by privileging areas under direct government control and where there is existing expertise. Such ‘path dependency’ (Martin and Sunley 2006: 399-403) has involved the perverse process of diminishing the crucial role of rural community institutions as NRM partners and effective land and water managers, thereby denying access to enormous problem-solving expertise, practical experience and social memory. The preference for investment in the adaptation of familiar mechanistic models to improve their efficiencies, and the failure to invest an equivalent amount in the transformation to agri-ecological land and water-use to contribute to greater social-ecological systems resilience, represents a lack of leadership.

Centralised technocratic bureaucracies operating to standard procedures can make important but limited progress towards social-ecological systems resilience. However, community institutions with thorough knowledge of local bioregions must be embraced as authentic partners to fine-tune and accelerate procedures. Successful vernacular developments must be recognised, supported and shared through effective two-way communication to inspire others in order to achieve a sufficiently rapid learning curve to progress towards a resilient social-ecological future. Many of the cutting-edge concepts discussed in this chapter are only beginning to be examined in academic papers, and may be decades ahead of bureaucratic consideration. It illustrates the importance of community institution and change-agent input to the ‘sustainability’ debate, and the involvement of facilitators with expertise in the socio-cultural aspects of NRM to help address the current technical-rational hegemony that has created an apparent epistemic impasse.

I demonstrate that both the sustainability agenda and rural Australia will benefit if rural community institutions are accepted as valuable assets and their members respected colleagues of government to manage local landscapes that have large-scale ecological significance, on behalf of Australian society.



CHAPTER 14: A FUNDAMENTAL RETHINKING OF THE ROLE OF RURAL COMMUNITY INSTITUTIONS IN THE SUSTAINABLE FUTURES OF AUSTRALIA'S ECOLOGICALLY STRATEGIC LANDSCAPES

The transformation of agricultural production from one of the greatest threats to global biodiversity and ecosystem services to a major contributor to ecosystem integrity is unquestionably a key challenge of the 21st century.

McNeely and Scherr 2007: 415

At the heart of lack of progress towards greater resilience of the Murray-Darling Basin social-ecological system over the past 25 years is the struggle between social reproduction and transformation. As Freire (1970: 9) would express it; a struggle between 'domestication' as technocentric business-as-usual NRM, and 'freedom' as transformation to social-ecological systems orchestration. He proposes that the 'elites are anxious to maintain the *status quo* by allowing only superficial transformations designed to prevent any real change in their power of prescription' (*Ibid*: 66). Progress towards greater resilience perversely currently appears to be 'conditional' (Halpin 2004: 201-203) on the maintenance of business-as-usual through technocentric dominance of the process. This dilemma exists despite clear evidence that the current 'industrial' approach to NRM in the Murray-Darling Basin is inadequate, and despite lessons of the dangers of the maintenance of decontextualized mechanistic management from the global fisheries collapse in the 1990s.

Throughout this thesis, I have revealed backlash from the technocentric NRM *status quo* in response to a perception of threat as a major impediment to the realization of the capacities of rural community institutions to manage ecologically strategic landscapes on behalf of Australian society. Havens (1975: 106-107) explains the response in terms of obsolete models becoming ends rather than means and 'infused with value', which makes change an emotional rather than a rational process. Capra (1997: 3-5) also describes the impacts of paradigm shifts on those most closely associated with the former dominant worldview as an emotional and intellectual 'crisis of perception'. I suggest that the effects of a shift from a mechanistic to a social-ecological worldview for many technocrats and 'industrial' agriculturalists today is not dissimilar to the 'intense emotional and, one could say, even existential crisis,' which Capra (1997: 5) describes classical physicists as experiencing when they were introduced to quantum physics in the 1920s. He states that in their 'struggle to grasp this new reality' they became 'painfully aware that their basic concepts, their language, and their whole way of thinking were inadequate'.

I suggest that governments and society in general have so far failed to fully appreciate the enormous emotional impacts of the current paradigm shift, much less the far reaching structural impacts (Dovers 1996: 308-314) necessary to move towards greater social-ecological systems resilience.

The impacts of the paradigm shift from a mechanistic to a social-ecological worldview need to be acknowledged and formally addressed by organizational restructuring to match skill requirements, and counselling and re-training of pre-ecological NRM managers. The latter is particularly important for technocrats who necessarily have a narrow focus and operate within a structured system that does not equip them to be ideal decision-makers in relation to complex and dynamic social-ecological issues, which often require an ability to respond rather than to control. Knudsen (23/11/05) indicated that most decision-makers that she was in contact with when employed by the Murray-Darling Basin Commission office were inadequately prepared by their qualifications or experience to make informed decisions in relation to social-ecological systems management. If the issue is not formally addressed, I suggest that Bouilly's (15/3/05) prediction that technocrats will continue to prevent governments from transforming to achieve greater resilience for the Murray-Darling Basin social-ecological system, until the community takes action (see Chapter 7).

Boyden (2004: 10 and interview 17/2/06) proposes that transformation is necessary to correct the 'cultural maladaptation' of the decontextualized mechanistic worldview that emerged from the 'partial' European Enlightenment. He explains that human capacity for culture can result in dysfunction, which can lead to dead-ends similar to those that occurred to a large number of species branches in biological evolution since the beginning of life on earth. He suggests that an important difference between present cultural maladaptations and those of the past is the scale of their consequences.

14.1 THE INADEQUACY OF ATTEMPTING TO ORGANIZE NRM IN THE MURRAY-DARLING BASIN AS AN 'INDUSTRIAL UNDERTAKING'

Transformation involves changes of perspective, process and values, and especially the prioritisation of the development of human resources, as social scientists associated with NRM in various parts of the world have been calling for over the past three decades (Nancarrow et al. 1993: 55; Milich 1999: 632; Roughley 2005; Knudsen 23/11/05). Walker et al. (2004: 11) define transformability as:

The capacity to create a fundamentally new system when ecological, economic, or social (including political) conditions make the existing system untenable. Transformability means defining and creating new stability landscapes by introducing new components and ways of making a living, thereby changing the state variables, and often the scale, that define the system.

I posit that the past 25 years of denial that progress towards social-ecological resilience for Murray-Darling Basin cannot be made through a primarily ‘industrial’ process parallels the time when armies were ‘bogged down’ during World War I, using redundant and costly tactics while some generals learned how to fight a twentieth century war. An equivalent transformation is necessary before progress can be made towards an ecologically sustainable and humanly desirable future for the Murray-Darling Basin.

Like nineteenth century ‘cavalry’ generals confronted with the enormous destructive power of a mechanized war, many NRM policy-makers and executives appear to suffer ‘crises of perception’ (Capra 1997) as they unsuccessfully attempt to apply or adapt familiar compartmentalized and linear technical processes in the management of a huge and dynamic social-ecological system. I identified the studious maintenance of technocratic ‘business-as-usual’ as a primary contributing factor in the collapse of some of the world’s great fisheries in Chapter Four. The necessary transformation to make progress in World War I was clearly articulated in January 1918 by Australia’s most successful military leader and systemic strategist, John Monash:

Try as one will, it proves quite impossible to organise an Army on the basis of an industrial undertaking ... the leading principle in the exercise of command ... is care for the welfare of the men ... not so much on the grounds of humanity as upon the grounds of expediency... We do this because we want to win the battle.

Serle 1982: 392

I have demonstrated that the same requirement applies to NRM in the Murray-Darling Basin. Monash’s leadership created conditions that maximised the opportunity for each soldier to realize his capacity. Leadership is a dynamic process about ‘releasing the energy of people’ (Knowles 1983: 26-30; see 2.2.1, 6.2 and 9.1.2.2) and helping to guide it. An industrial process is ‘governed’ rather than led. It prescribes a minimum standard output from minimum input, and cannot tolerate diversity, self-organization or initiative.

14.1.1 Valuing human resources and resoucefulness to ‘win the battle’

The lesson from Monash’s leadership is that he was able to combine technology with psychology in a systemic process. He recognised that Australian soldiers were ‘easy to lead’ when demonstrated respect, but ‘difficult to drive’. While his soldiers received rigorous training and a high level of support, he also respected their self-reliance and ability to self-organize to work as a team in a crisis; attributes that were highlighted during fighting in France and Belgium (White 1981: 131-134; Seal 1993: 363-366). Similar characteristics and attributes are to be found in rural communities throughout the Murray-Darling Basin today.

Olsson et al. (2004: 1) found the ability to self-organize to be ‘an important characteristic for building resilience in social-ecological systems’. They also observed that certain institutional structures impede

‘local initiatives and commitment that otherwise contribute to the diversity of ideas and solutions to environmental problems’. As Roughley (2005: 113) reveals, a preoccupation with hierarchy in NRM organizations ‘overshadows the evidence that resource management problems are most effectively addressed in horizontal teams’. The ‘welfare’ of the members of rural communities in the Murray-Darling Basin, through greater support and improved communication, must also be a priority in NRM to enable them to realize their capacities to contribute to greater social-ecological resilience.

Many technocratic ‘captains’ of NRM that I have observed over the past generation have been inadequately equipped to facilitate progress towards more resilient social-ecological systems and attempted to maintain the illusion of ‘control’ of nature (Saenz-Arroyo and Roberts 2008: 321) through technocratic chauvinism. A significant contributor to social-ecological systems erosion is technocratic chauvinism (4.1.1) that often appears to view community members and institutions, and non-technocrats as ‘serviceable others’ (Sampson 1993: 4, 10-13), rather than respected colleagues, and to assume technocratic privilege in the use of taxpayer funds. Some NRM executives observed who were provided with opportunities to bring the Basin community with them did not appear to have the expertise or vision to capitalise. As a result, policy principles and directions, as well as available resources, information and advice were often ignored or subverted (personal observation; Knudsen 23/11/05; Bouilly 15/3/05; Jacobi 1983), in the ‘recourse to technocracy’ (UNESCO 1980: 26), and comfort. The severe limitation on the diversity of problem solving options as a result of the technocratic hegemony of NRM is a major impediment to progress towards a more resilient Murray-Darling Basin social-ecological system.

14.1.1.1 Establishing an Authentic Government-Community Partnership

The most important condition on which to establish an authentic partnership is trust (Magnusson 26/11/07). As explained by McDonell (1997: 822), the primary ingredients of societal management of risk and uncertainty in everyday life, and in particular in the conduct of environmental initiatives, ‘turns out to be, not knowledge and rational choice, but trust and experiential judgement’. NRM agencies must demonstrate respect for their community colleagues and to gain their trust by firstly abandoning the commonly perceived semi-adversarial relationship:

Our experience has been that the government always likes to keep divisions within an industry, or divisions between sectors; so it can come in and say: ‘You guys can’t sort this thing out amongst yourselves – you had better let government do it’. Government has had a history of that over the last 30 – 40 years.

Hera-Singh 19/7/04

14.1.2 Looking within the community for solutions

Magnusson’s experience in Kristianstads, Sweden is that many of the solutions to local ecological crises can be found within local community networks without going to outside experts, if time

is taken to seek them out and especially if new perspectives are presented (Magnusson 26/11/07; Hahn et al. 2006, 2008; Olsson et al. 2004, 2004b, 2006, 2007; Schultz et al. 2007). A current successful government-community-independent authority partnership operating throughout the Murray-Darling Basin is the self-organising, community-led 'Special forever' environmental education-literacy-intergenerational equity program, which commenced in 1993. It consists of an extensive network of primary school teachers with interests in the environment, critical thinking and literacy. The 'Special forever' program demonstrates how the energy and expertise of ordinary Australians, who are generally not scientists or technicians, found in communities throughout the region, can be harnessed to contribute to the realization of their capacities and that of other groups within their communities. However, it is dependent on the program being locally relevant and beneficial, and participants being supported as respected colleagues.

Hahn et al. (2008: 142-143) also observed that learning and mobilization for ecosystem management 'thrive in informal settings like social networks where participation is voluntary'. They found that social networks 'can be key mechanisms for drawing on social memory at critical times, enhancing information flow across scales', and that social memory appeared to play an important role in self-organization processes. Social memory provides frames of reference to inform decisions-making, thus complementing scientific models.



Plate 14.1 Regional 'Special forever' co-ordinators at an annual planning and evaluation workshop

The key to the success of the program is the network of volunteer regional co-ordinators who act as advocate-experts or 'advisors acting as insiders' who support participating class-room teachers in twenty-three bio-cultural regions identified in the Murray-Darling Basin.

14.1.2.1 *Tapping epistemic networks and documenting social memory*

McIntosh et al. (2000: 32) advocate the documentation of social memory so that it is fully understood at the local level and accessible to help communities to deal with change, and climate change in particular. They acknowledge that this is a daunting task that will require ‘anthropological fieldwork among a great many communities and production systems around the world’. However, they caution that failing to do so ‘will mean that economists and governments will continue to formulate policies that may hinder local adjustments to environmental change’. In addition to helping to access and record problem-solving social memory, social scientists and representatives of the humanities working closely with communities could identify and help articulate other relevant assets (Campbell and Vaino-Mattila 2003: 434), and also perform the role of cultural broker between government and community:

Here the participation of social scientists acting as cultural brokers is often valuable and sometimes essential, especially where mistrust or even hostility between government resource managers and resource users has resulted in difficult communication. Biologists and resource users alike cannot be expected to understand attitudes born of values and perspectives of which they are unaware. Someone who is well known to a community and familiar with its culture and historical patterns of resource use, as well as the culture of researchers and managers, can be critical in bridging the gulf and re-establishing useful dialogue between them.

Johannes et al. 2000: 267

In many ways this role conforms to Brunckhorst’s (2000: 62) description of a bioregional facilitator who would ‘link site specific community actions as well as agency activity to collectively contribute to broader scale ecosystem management goals’. Such a position would require quite different skills and experience from past community liaison positions such as agricultural extension officers or Landcare coordinators.

14.1.2.2 *Anthropologists to assist rural communities to realize their capacities*

Garcia-Quijano (2007: 534) suggests that anthropologists are ‘uniquely positioned to serve as translators between the different systems of knowledge and meaning of cultures’. He proposes that applied anthropologists working in interdisciplinary teams and mediating between the formal scientific culture and the cultures of local peoples are in a position to establish alliances between these often-competing stakeholders. Johnston (2001: 134) describes some of the roles that anthropologists are already performing in areas of natural resources management and environmental justice:

In articulating and illustrating the synergistic ties between culture, power, and the environment, anthropologists are playing a central role in expanding the environmental justice framework from a race/class analysis of environmental inequity to a broader consideration of the historical conditions, relationships, and beliefs that give rise to patterns of selective victimization and the human rights/ environment crisis intersect. Their work is typically structured in interdisciplinary arenas and weaves together historical data, sociocultural analysis, and ethnographic voice to map out the culture/ power dimensions of human environmental crises – identifying explanatory factors that more quantified analysis may miss.

Anthropologists are also able to critically examine the current hegemony of technical-petrochemical 'solutions' and the western linear evolutionary model of land-use (Giri 2008: 878), to identify possible alternatives within the social memory of the community, or beyond (Dove 2001: 104-105). In Midgley's (2004:2) words, they would find out what has made people or the land 'unhappy in the first place' and examine alternative solutions rather than automatically prescribing 'more and better Prozac' (see 2.5.1). As Clarke (1990: 238) proposes, the time has passed when traditional agricultural systems 'were generally condemned as primitive and inefficient' and to re-examine 'the merits of traditional polycultures, the often high energy-return rates of nonindustrial agriculture, the avoidance of agricultural toxins, the maintenance of genetic diversity' and the fine-scale planting of specific crops in microhabitats. This generally would not involve adoption but rather broadening the diversity of possible alternative approaches, which may help to trigger appropriate solutions to local NRM issues.

14.1.3 Progressing with the Past

Anticipated climatic extremes, limited areas of fertile soil and diminishing access to cheap water, fertilizer and energy will necessitate a transformation of industrial agriculture in the Murray-Darling Basin as incremental adaptation through 'ever-increasing investment in physical and social infrastructure' (Anderies et al. 2006: 877) becomes socially, economically, and ecologically unsustainable. Williamson et al. (2003: 34) suggest that 'looking to history for the principles of sustainable land management relevant to the future can sometimes be a more efficient and reliable approach than seeking scientific and technical solutions.' These may include strategies such as dealing with climatic variability through 'diversity and flexibility' (Sorbo 2003: 113; Brunckhorst and Coop 2003: 17-21). Clarke (1990: 245) proposes that:

Traditional knowledge and conservationist techniques can strengthen and enrich modern science and resource management. Progressing with the past can help in avoiding destructive environmental pitfalls while encouraging local communities to maintain and respect traditional approaches to the use of their environment.

As Feeny et al. (1990: 10) assert there is 'abundant evidence, contrary to Hardin, on the ability of social groups to design, utilize, and adapt often ingenious mechanisms to allocate use rights among members.' Work by Ostrom over two decades (1990, 2004, 2007), and by Dietz et al. 2003, Janssen and Ostrom 2006, and Norberg et al. 2008, have confirmed the assertion. Geisler (2000) and Brunckhorst (2000; Brunckhorst and Coop 2003; Williamson et al. 2003), provide evidence that common land governance of a cluster of private properties and the management of public good land on private property to be both resilient and practical, especially for a potentially climatically dynamic future. St. Martin (2005: 75) proposes a rereading of the commons and opening it up to 'experimentation, negotiation, and multiple economic identities' to free it from the negative

associations of Hardin's parable. Pretty (2005: 174) acknowledges that 'theoretical developments on both governance of the commons and on social capital' have resulted in the emergence of local groups as an effective 'third' option for managing ecologically strategic landscapes 'instead of strict regulation or enclosure'.

Andrews (2006 and 2008) reminded Australian society of the characteristics of the ancient south-eastern Australian landscape which were largely ignored in the compartmentalized development of industrial agriculture and technocentric NRM over the past century. The metabolism of ancient Australian landscape is barely recognizable in today's controlled industrial rural landscape (Main 2004: 90-93) and waterways. Andrews (2006: 47) explained that it was 'inground water' stored in floodplain soils that kept the pre-industrial landscape alive. His descriptions of variable flow regimes in pre-industrial rivers, the greater importance of floodplains than river channels for social-ecological resilience, and the importance of lateral flows for the health of the system, illustrate the incompatibility of the metabolism of the inland south-eastern Australian landscape and industrial agriculture. Public response to Andrews' exposition has highlighted how the industrial hegemony of land-use has distanced and desensitized people to their dependence on ecosystem services.

Learning from the past does not mean returning to the past but it is possible to address mistakes and to work in much greater harmony with the Murray-Darling Basin social-ecological system. Over a century of industrial agriculture and mechanistic river regulation in the southern Murray-Darling Basin has resulted in the desiccation of naturally wet areas of the landscape and often the saturation of naturally dry areas, reducing the ecological and economic productivity and social-ecological resilience of both. The saturation of naturally dry soils for irrigated agriculture mobilizes salts, and the removal of freshwater lenses from floodplains, which naturally keep saline water below the surface, also allows salts to concentrate on the soil surface (Andrews 2006: 188). I will use the lower Murrumbidgee floodplain to discuss how 'progressing with the past' has the potential to help both landscapes and their institutional stewards to realize their capacities.

14.1.3.1 Rethinking River Regulation and river operations to incorporate floodplain 'storages'

There is potential for the lower Murrumbidgee floodplain to be integrated with an ecological river regulation model that would more closely resemble the natural regime. The paradigm shift could be part of a national 'biodiversity insurance policy'. Parts of the floodplain could be 'recommissioned' to perform its pre-regulation role as a major 'in-ground', mid-river 'balancing storage', natural water treatment plant, and biodiversity 'increase site' (Strang 2003: 112 and 132), within the context of

the southern Murray-Darling Basin river system. Advantage could be taken of the rapid and large storage capacity of the floodplain soils and flood-runners could be 'recommissioned' and fitted with regulators (with carp screens) to improve channel-floodplain connectivity and health. There may also be the potential to restore the productivity of currently stranded landscapes with the reintroduction of temporary twenty-first century versions of McKinney's environmental diversion weirs (see 12.4.1). The current policy not to construct new weirs in the southern Murray-Darling Basin is based on the negative ecological impacts of nineteenth century irrigation diversion models. The floodplain storage would be used in conjunction with the upper river above-ground storages of Burrinjuck and Blowering to complement and fine-tune environmental flows.

In an interview on ABC TV *Australian Story* about Peter Andrews, John Williams, Commissioner of the NSW Natural Resources Commission and Commissioner to the Australian Centre for International Agricultural Research, supported Andrews' claim that more water should be held 'in the landscape' rather than relying entirely on the current system of releasing water from upstream storages for supply and regulation (2005). Williams emphasised that water is not 'lost' through this process because it is similar to filling a upper river above-ground storage; 'once you've gone through the first stage of filling up these wetlands ... the actual flow regime of the stream is largely unaffected'.

The biodiversity 'hot spot' and river protection 'storage' created would generate social and ecological benefits over a huge geographical area. The new biodiversity insurance function would complement the narrow 'flood control' role that the lower Murrumbidgee floodplain performs within the current mechanistic river regulation paradigm. The 'safety valve' flood control function of the floodplain would be retained to deal with the anticipated extremes as a result of climate change.

14.2 THE POWER OF CHANGED PERSPECTIVES, PERCEPTIONS AND PRIORITIES

A change of perspective or contestation of an assumption can result in a change of perception, which occasionally, can overcome apparently insurmountable obstacles cheaply and efficiently. By changing public perception of the wetlands in and around Kristianstad, Sweden from 'water sick' to 'water rich' areas, they are now appreciated, protected, celebrated, and are central to the local economy (Magnusson 2004 and interview). The Murray-Darling Basin Initiative came about as a result of changes in water management priority in the River Murray. Management for quality as well as quantity necessitated management of the surrounding catchment, which revolutionized natural resources management over the whole Murray-Darling Basin. The 'Special forever' program (5.4.1) is also emancipatory and

transformative because unconventional perspectives and priorities give students and teachers new experiences. Using English classes as the main vehicle for discussing sustainability rather than science, enables issues to be considered from a socio-cultural perspective, rather than as compartmentalized technical problems. As English classes are primarily about process and synthesis rather than content, a broad range of topics can be discussed and emotional and values issues explored. A broadening of the audience for children's work from the classroom teacher to the local and Basin community, and sometimes the Australian public, has also resulted in increased creativity.

A significant impediment to the sustainability of the lower Murrumbidgee floodplain arises from negative public and institutional perceptions resulting from the redundant title of 'Flood Control and Irrigation District' (FC&ID) for the major land-use unit in the region. Cheng et al. (2003: 98) suggest that in natural resources politics, 'controversies frequently come down to a contest over place meanings'. The redundant name and role are preventing the residents from realizing their capacities to effectively manage this ecologically, economically and culturally significant area on behalf of Australian society.

14.2.1 Re-naming and re-making the Lower Murrumbidgee Floodplain to Realize the Capacities of the Landscape and its Residents

Landscapes that are ecologically sound, and that also evoke enjoyment and approval, are more likely to be sustained by appropriate human care over the long term.

Nassauer 1997:69

The FC&ID title brings with it the 'baggage' of second-class status formally established in mid-twentieth century. I posit that the sustainable future of the Lowbidgee FC&ID is dependent on the double strategy of 're-naming and re-making' (Volf 1996: 73) in order for it to be valued by Australian society as an ecologically strategic, multifunctional, agri-ecological region. As proposed by Frazer (2007: 255):

Overcoming injustice means dismantling institutionalized obstacles that prevent some people from participating on a par with others ... by institutionalized hierarchies of cultural value that deny them the requisite standing; in that case they suffer from status inequality or misrecognition.

Both parts of the current title create confusion. The 'flood control' role was primarily to dissipate the floodwaters from the Tumut River. That role has been greatly diminished since the completion of Blowering Dam regulated the Tumut River in 1968. Despite the resultant drastic reduction in the size and frequency of floods, no provision was made to compensate for this radically changed situation. The 'irrigation' part of the title is also misleading as it implies a specific volumetric water allocation for traditional (inefficient) flood irrigation. Those assumptions are also incorrect: crops are irrigated

from beneath with water stored in the soil profile of naturally flooded land, and as a result of an unprecedented policy decision in 1945, the Lowbidgee FC&ID is the only 'irrigation' land-use category in New South Wales that does not have a water allocation (see Appendix 9).

Policy inertia, which has resulted in the maintenance of a redundant pre-ecological title for the area is seriously affecting the justice that it is receiving, its resilience, and the ecological health of the southern Murray-Darling river system. Current policy inertia in relation to the future of the lower Murrumbidgee floodplain, is both directly and indirectly responsible for enormous degradation of this vital 'life support' area, which has negative impacts well beyond the lower Murrumbidgee landscape and its residents.

'Re-badging' the lower Murrumbidgee-lower Lachlan floodplains as an agri-ecological bioregion would reflect the current reality, and identify its strategic place in the sustainable future of the southern Murray-Darling river system. New cultural and conservation land-use activities that have emerged on the floodplain during this century now occupy 25% of the area. The historic and geographic circumstances that prevented the development of intensive industrial agriculture on the Lower Murrumbidgee floodplain, the formal protection of a considerable proportion of the area for the production of ecosystem services, high quality aquatic habitat, the suitability of the alluvial soils to organic farming, and the mosaic of land-uses, now places the 300 000 hectare bioregion in the position to provide a model for agri-ecological land-use in Australia.

At minimal cost or change in land-use, the nomination of the bioregion as a UNESCO Biosphere Reserve would give it a new name that would proclaim it as a multifunctional agri-ecological area. The combination of agricultural, ecological, and cultural land-use activities in the lower Murrumbidgee floodplain bioregion conforms to the desired structure and function of an ideal Biosphere Reserve. An agri-ecological land-use label frames the management of ecological and agricultural areas in the landscape as complementary and mutually interdependent.

14.3 BIOREGIONAL AGRI-ECOLOGICAL LAND-USE

Transformation to ecoagriculture would be achievable in many parts of the landscape but for frequently emotionally-based 'conditions' imposed by interest groups or their organizers to change. 'Ecoagriculture' is generally landscape or bioregional in scale, collaborative in governance and adaptive managerial in operation. It is designed to meet four broad goals (Buck et al. 2006: 13):

- conserving, maintaining and restoring biodiversity and ecosystem services;
- providing agricultural products and services on a sustainable basis;
- supporting viable livelihoods for local people; and
- establishing and maintaining institutions for integrated ecological and agricultural production, and human capacity realization. Effective governance structures, markets, and social capital are keys to successful ecoagriculture.

Williams and Saunders (2005: 61-62) suggest that restoring an ecologically sustainable environment in Australia 'will require a nation-wide revolution in land use'. They suggest that this would involve the development of 'a mosaic of commercial enterprises in partnership with natural ecosystem services' that capture the leakage of carbon, water, nutrients and sediment, and transform them into agricultural products and ecosystem goods and services. It would also result in many rural enterprises complementing incomes from traditional food and fibre production with those from new products and services, including ecosystem management (*Ibid*: 72). To realize the vision there will be 'a need to pioneer the development of new landscapes' (*Ibid*: 71).

This vision for sustainable landscapes is similar to the aspirations of the 'Satoyama Initiative' launched by the Japanese Government in 2007 (*Sydney Morning Herald*, 28 May 2007) to promote the restoration of the traditional model of coexistence between humans and nature. This is another example of drawing on social memory to help address a current crisis. However, the initiative also proposes promoting Japan's satoyama-based lifestyle to the rest of the world to preserve a healthy and rich natural environment. Satoyama is a cultural landscape developed over centuries of agricultural land-use. It consists of a mosaic of mixed forests, rice paddy fields, dry rice fields, grasslands, streams, ponds, and reservoirs for irrigation. There is no separation of environmental and consumptive water as they are valued equally. The landscape provides a variety of habitat types for wildlife and also facilitates movement between habitats. Satoyama has a high level of biodiversity and is also agriculturally and ecologically highly productive (Kobori and Primack 2003: 308). As Williams (2005) suggests:

One of the things that I think Peter Andrews' work demonstrates is how we as a society need to recognise those ecosystem services and functions that Peter is recreating and realise that farmers and landholders are the people who are the guardians and carers of our life support system ... I think one of the reforms we need in Australia is to recognise the keepers and managers of our life support systems.

Williams 2005

14.3.1 Matching limited water to limited areas of fertile soils

Australia is notorious for its poor soils, which was recognised in the late nineteenth century by water engineer McKinney (1893: 400) who highlighted the importance of matching scarce water resources with limited areas of rich soils. The suitability of the rich alluvial soils of the lower Murrumbidgee floodplain for cropping was also recognised over a century ago. Samuel McCaughey, pioneer irrigator and one of the most influential landholders in New South Wales at the time, stated that ‘I know of no soil better suited for the growth of sorghum than the immense polygonum areas below Hay’ (1902: 166). Research by Briggs (Briggs interview 8/7/05; Briggs and Seddon 1998; Briggs and Jenkins 1997) suggests that floodplain soils are more suited to sustainable agriculture than dryland soils because they have evolved through considerable and ongoing disturbance as a result of regular wetting and drying, and are therefore resilient.

A further advantage to concentrating limited water onto rich soils of the lower Murrumbidgee floodplain would be a reduction in the distance for water delivery because it has approximately 200 kilometres of direct river frontage. Delivery of water to the Murrumbidgee Irrigation Areas (MIA) from Berembend Weir pool, by way of comparison, involves a 230 kilometre primary delivery system before distribution within the area (Water Conservation and Irrigation Commission 1971: 147-148).

14.3.1.1 Utilizing ‘young’ resilient landscapes

Speaking on the ABC Radio National program, *The Science Show* (26 January 2008) about protecting the rich biodiversity of Australia’s ancient landscapes, Professor Stephen Hopper, Director of the Royal Botanic Gardens, Kew, London, suggested that future human development in Australia needs to be concentrated on the resilient younger parts of the landscape. These include alluvial floodplain areas, ‘with the proviso that you allow enough space for some of those communities to persist in their natural state’. While alluvium has been deposited on the lower Murrumbidgee floodplain for more than thirty million years, the landscape is considered to be ‘young’ in relation to the dryland areas of the Murrumbidgee Catchment because the process is still occurring. He emphasised that we cannot continue to attempt to farm and manage the natural resources of ancient Australia ‘uniformly as though it is a post-glacial northern hemisphere landscape’ because the results of disturbance are unpredictable and can cause very long-term or permanent damage. Peter Andrews goes further to suggest that many of our most serious ‘environmental’ problems, including salinity and water shortage, could be significantly reduced by re-hydrating floodplains, and using only floodplains for irrigated agriculture:

Irrigating in a floodplain in accordance with the natural processes requires only a fraction of the water that's consumed by conventional irrigation, the reason being that the irrigator is merely topping up the water table. In most cases, an irrigator duplicating natural processes in a floodplain needs to use only 15 per cent of the water that other irrigators [on historically dry land] use. This type of irrigation – and this type alone – is sustainable.

Andrews 2006: 222

14.3.1.2 *The dilemma of scale*

Magnusson (26/11/07), Woodhill (2002: 318) and Berkes et al. (1989: 93) have all highlighted that the success of governance at one scale often depends on legitimization at a higher scale. I will use the lower Murrumbidgee floodplain to illustrate the dilemma in relation to the scarcity of rich soils and wetlands in Australia. As discussed, the ecological and agricultural production of around 65 000 hectares of flood-dependent alluvial soils and wetlands, has been severely reduced due to denial of access to water. From an international scale, and particularly from a national and a Murray-Darling Basin scale, the lower Murrumbidgee floodplain is ecologically, agriculturally, spatially and strategically extremely valuable. However, for historical political reasons, at the catchment scale it is a very lowly valued landscape (DLWC 2002 Part B: 27) and as such neither it nor its residents are likely to realize their capacities without contesting its status within New South Wales and the catchment. Jones (1998: 28) proposes that 'scale may be implicated in enabling particular relationships of power and space that advantage some social groups but disadvantage others'. She suggests that it is 'scale's taken-for-granted quality that provides its power' but in fact it is a result of contestation and should be approached 'not as an ontological structure which "exists", but as an epistemological one – a way of knowing'. She proposes that:

As epistemology, scale may be intimately linked to our knowledge of power and space. And, as a concept, it will also be contextualized both socio-culturally and historically.

14.4 AN INDEPENDENT NATIONAL BRIDGING ORGANIZATION

The lack of opportunities to publicly explore the above issues, or for community groups to share and be acknowledged for vernacular NRM successes due to the technocratic dominance of the NRM agenda, emerged in the late 1990s as an impediment to the realization of the capacities of rural community institutions to manage ecologically strategic landscapes on behalf of Australian Society. The hegemony of the technocratic cultures of government NRM structures appeared to be increasingly precluding effective dialogue with their 'community partners', and not adequately addressing the socio-cultural aspects of the 'sustainability debate'. Curtis (1998: 571), for example, cited the 'absence of an independent Landcare communication network' as a major impediment to

the realization of the capacities of groups in Victoria. At the end of the Decade of Landcare (1989-1999) there was a missed opportunity to complement the Landcare network with the establishment of a national bridging organization that could facilitate public deliberation of NRM and land-use issues in a neutral arena. Nordstrom Kallstrom and Ljung (2005: 376-382) identified a similar need to establish closer connections between citizens and farmers, and to encourage innovative collaboration between landholders in Sweden. Bridging organizations provide leadership in order to facilitate a common vision. They are 'honest brokers' that help 'to make new sense out of diversity' (Westley 1995: 424), build trust, mobilize knowledge and social-capital, and link local actors and communities with organizations at other scales to facilitate collaboration for adaptive co-management (Hahn 2008: 123, 138; Folke et al. 2005: 461; Westley 1995: 409; Gunderson et al. 1995).

14.4.1 Australian National Sustainability Centre and Network

In a situation not unlike that of Kristianstad in Sweden, a community group in Australia's Capital, Canberra, responded to the perceived crisis of the inadequacy of formal government arrangements to progress towards greater national social-ecological resilience. It perceived diminished opportunities for public deliberation, and that the energy and innovation of the Australian people were not being tapped or acknowledged. A sub-group of members of the Nature and Society Forum (NSF), including Moss Cass, Australia's first Environment Minister, formed in 2002 to explore and attempt to address the dilemma. The NSF is a community-based organisation dedicated to public understanding and action in relation to environmental and human health issues, and the causes and solutions to human impacts on the biosphere. It links academic, business, government and community sectors.

In 2004, an action plan for an Australian National Sustainability Initiative (see Appendix 10: DVD) was released that was 'grounded in the needs of the community' (Carr 2002: 130). It involves the acknowledgement, support and sharing of vernacular projects contributing to progress towards a resilient social-ecological future to inspire others and to achieve a rapid learning curve. It proposed the establishment of a network of bioregional interpretive centres, both physical and virtual, throughout Australia, linked to a National Centre in Canberra where stakeholders could be supported, successes professionally publicly showcased, and ideas shared in a supportive space (ANSI Board 2004: 19-22). It would, for example, provide valuable exposure and support for pioneering developments of new landscapes (Williams and Saunders 2005: 71). It also proposed to expand the network to involve near neighbours in the south-west Pacific and south-east Asia to facilitate greater appreciation of those areas and non-western approaches to NRM, which may result in the creation of networks of learning and joint problem solving (Berkes 2007: 15193).

The establishment of a bridging institution to promote social-ecological systems resilience introduces issues not unlike those involved in the management of common pool resources, such as how to avoid its subversion by government or the 'industrial' *status quo*. Like similar socio-cultural issues, such as equal opportunities or racial prejudice, it requires both direct government intervention as affirmative action and increased public deliberation to address. In a further dilemma, similar to Ecomuseum Kristianstads Vattenrike, while the project must be approved and supported by government; to achieve success it must necessarily be distanced from direct government control. The management perspective must be 'responsive' rather than 'controlling' (Westley 1995: 394-395).

14.5 CONCLUSION

The European Enlightenment/ scientific revolution model with its decontextualized mechanistic worldview, the foundation of modern Western culture, was highly effective for dealing with 'plenty' but we have now crossed a threshold into a state of 'scarcity' and the model does not transfer well:

The luxury of living with a self-repairing and forgiving biosphere seems to be history.

Folke 2003: 2027

This thesis revealed the difficulty of overcoming a significant cultural barrier to shift from mechanistic thinking to social-ecological systems thinking to be the primary weakness in the sustainability process in the Murray-Darling Basin over the past 25 years. It revealed transformation to be most difficult for technocrats and others who have been closely associated with a mechanistic worldview; creating adjustment anxiety and 'crises of perception' (Capra 1997: 5). As technocrats are the dominant group involved with NRM in the Murray-Darling Basin, technocratic backlash helps to explain why only a fraction of the potential capacity of rural community institutions available to contribute to the resilience of the Murray-Darling Basin social-ecological system has been realized since they were identified as critical partners in 1985.

I have demonstrated that there are powerful structural and emotional barriers to the acceptance that the management of networks of biophysical and human *relationships* through active adaptive processes, in addition to the management of static *parts*, are at the core of maintaining or strengthening the resilience of the Murray-Darling Basin social-ecological system. I revealed that compartmentalisation of responsibility and status between policy-makers, bureaucratic managers, and community implementers, along with inadequate feedback loops, results in poor communication and inadequate coordination between the three key components of effective NRM. I demonstrated that decontextualised mechanistic efficiency does not necessarily equate to social-ecological resilience. Some findings

reflected the observations of Flyvbjerg (1998: 225) that contrary to representing the 'public interest', some government NRM authorities have long been involved in the hidden exercise of power, at various times over both politicians and the general public, to protect 'special interests', including 'self-interest' (Jacobi 1983: 193). The thesis also revealed a potentially particularly problematic situation created by small government-appointed panels of decision-makers privileging traditional mechanistic processes and 'industrial' landscapes that they are most familiar with and marginalising those that they do not appreciate. Such a situation can be sustained over a very long period of time with the potential to erode social-ecological systems resilience if there is no effective system of regular independent review and arbitration. To address these issues, the thesis revealed a need for NRM ethical guidelines to be developed, authentically implemented, and most importantly, enforced.

I have provided graphic evidence of the consequences of continued attempts to manage dynamic social-ecological systems through impoverished mechanistic models, such as protecting 'sites' alone. I have illustrated the negative consequences of inertia in the development of policies and processes to facilitate the effective adaptive management of social-ecological systems in increasingly modified landscapes. I identified mismatched expectations in government-community and physical-social-sciences/ humanities 'partnerships', and a reluctance of dominant technocentric NRM authorities to negotiate or regularly review the relationships as a further reason for the lack of progress in the Murray-Darling Basin Initiative over the past quarter century. I identified the failure of technocentric NRM authorities to appreciate the importance of social capacity and social memory in social-ecological systems resilience as an example of 'poverty of process' (Woodhill 1999: 109). I also identified primary producers as a huge under-utilised pool of expert, experienced and willing adaptive managers living throughout the Murray-Darling Basin.

To paraphrase Monash, try as we have over the past 25 years, it has proven quite impossible to organise a sustainability initiative for the Murray-Darling Basin social-ecological system 'on the basis of an industrial undertaking' (Serle 1982: 392). The primary principle in the exercise of leadership to progress towards greater resilience for the social-ecological system is the development of 'enabling' processes to allow community partners and their institutions to realize their capacities; a philosophy ironically used in modern industry (Liker 2004: 143-148). Alex Warren, former Senior Vice-President of Toyota Motor Manufacturing in Kentucky, United States of America (cited in Liker 2004: 171), proposes, that until 'senior management gets their egos out of the way and goes to the whole team and leads them together' they will continue to miss out on the necessary energy, 'brain power and extraordinary capabilities of all their employees'; or community-based colleagues. I have demonstrated in the thesis that egos can have a great and long-term negative impact on the resilience of social-ecological systems.

I identified key ‘enabling’ processes for the realization of the capacities of rural community institutions to manage ecologically strategic landscapes to be social capacity to self-organize, deliberative democracy, and creative management. The Ecomuseum Kristianstads Vattenrike (EKV) in Sweden, examined in the thesis, provides many of the characteristics of a generative or ‘enabling’ community institution. It was established after a few community members took a leadership role to enable a range of potential partners to adaptively govern a local social-ecological system for greater resilience. EKV is a neutral forum for frank and open deliberation, and experimentation without retribution, to unconditionally strengthen the social-ecological resilience of the local bioregion. Counter-intuitively, the institution’s strength is its lack of ‘authority’. Its only condition of participation is authentic commitment to problem-solving and planning. It has government support but not direct control. Vertical and horizontal relationships built on trust and shared passion are maintained or enhanced through informal networks facilitated by democracy and open communication.

The thesis also examined land-use, and landscape governance alternatives that could be put in place to enable rural communities to realize their capacities to sustain strategic local landscapes or waterscapes. The bioregion emerged as an effective primary NRM unit for social capacity realization to contribute to social-ecological systems resilience but potential pernicious ‘traps’ in decentralised NRM were also revealed. I identified viable alternatives to compartmentalised industrial agricultural production and structure, including the adoption of agri-ecological land-use models for integrated agricultural and ecosystem goods and services production. However, I also revealed that the hegemony of industrial primary production makes an authentic examination of alternatives difficult. It was only through the social capacity to self-organise and support of a non-government partner, for example, that the members of the Southern Fishermen’s Association were able to resist pressures to abandon fishing and demonstrate that their governance model was of world standard (see 4.2.3.6).

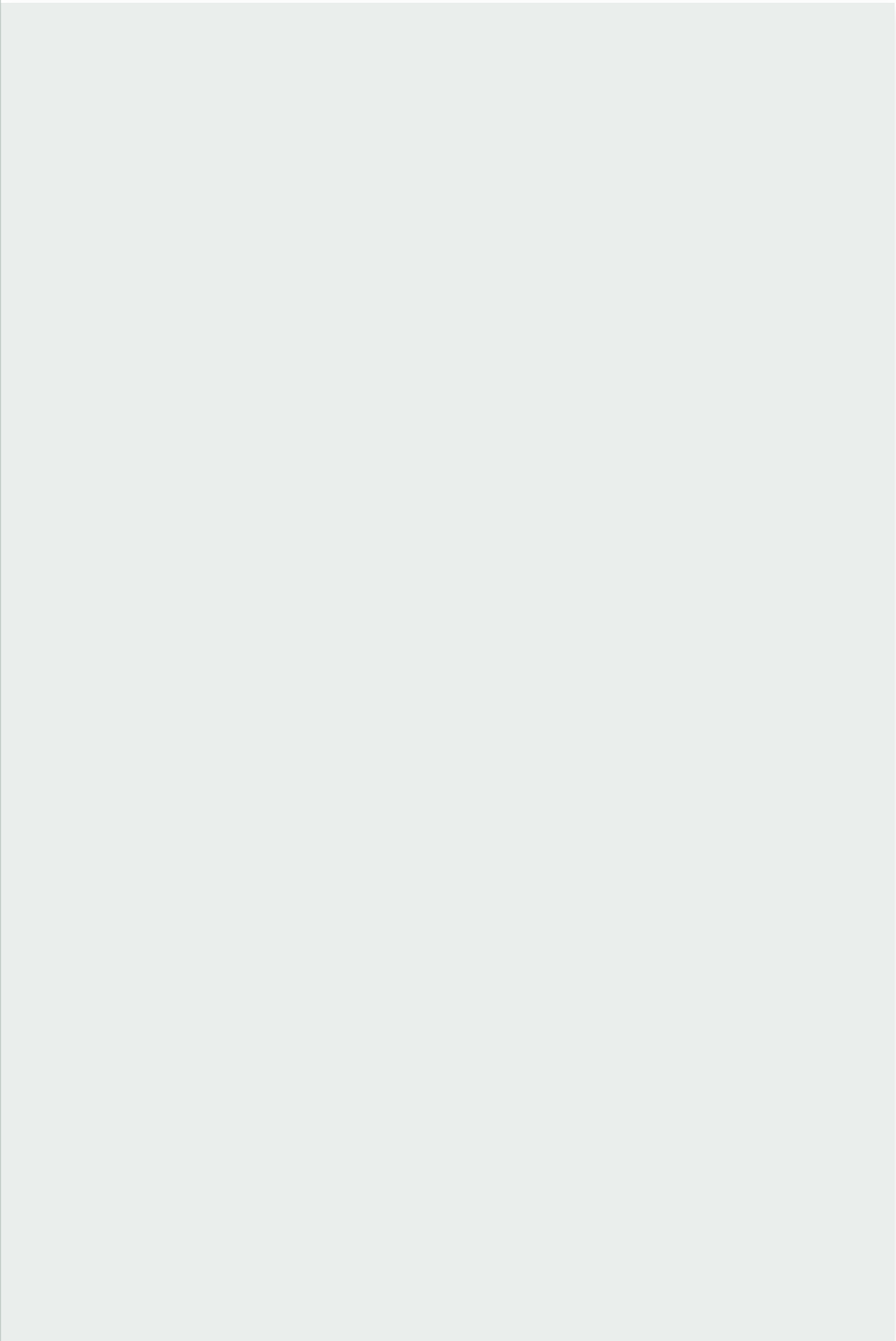
The thesis revealed advantages in some situations of commons governance for greater social-ecological resilience. Commons governance facilitates land-use at a scale that better matches the Murray-Darling Basin’s soils, ecological productivity, climatic variability, and predicted future climate change. It also revealed that looking to history, and re-examining vernacular land-use and traditional conservation methods for principles of resilient land-use, to complement scientific and technical solutions, is important preparation for a future with increased climate variability and without cheap water, fuel or fertilizer. Diversity and flexibility, rather than stability, were revealed to be the keys to resilient primary production under predicted future conditions (Sorbo 2003: 113).

I have demonstrated that the realization of the capacities of rural community institutions to manage ecologically strategic landscapes to achieve greater social-ecological resilience is a multi-faceted and multi-scalar (Otte et al. 2007: 668), historically-influenced, socio-cultural process, with the application of technology as only one aspect. As Malouf (1998: 45) proposes:

We are makers, among much else, of landscapes. The land under our hands is shaped by the food we eat; by farming methods and ways of preparing and rotating fields; by the ways we hedge or wall or fence them; and by the laws we make for passing them on. We remake the land in our own image.

I have revealed that ‘sustainability is at least as much about politics, injustice, and inequality as it is about science or the environment’ (Agyeman 2005: 43). I have identified the primary impediments to the realization of the capacities of rural community institutions to manage ecologically strategic landscapes on behalf of Australian society to be “cultural”: ‘difficulties in designing appropriate regulations or contracting biodiversity management’ on private land (Clarke 2002: 318), ‘conditional’ (Halpin 2004: 201-203) commitment to progress towards greater resilience for the Murray-Darling Basin social-ecological system, and technocratic backlash. I have demonstrated that attrition and policy inertia are two of the most common risk avoidance strategies in the organised irresponsibility repertoire of bureaucracy to protect business-as-usual. I have demonstrated the strategic roles of change agents in the resilience of social-ecological systems. I have identified social memory as a valuable and empowering resource within communities to provide a frame of reference to help deal with crises (Hahn et al. 2008: 139-140; Folke et al. 2005 453; McIntosh 2000: 143).

I have demonstrated that releasing the energy of community members and realizing the capabilities of community institutions to manage ecologically strategic landscapes can be achieved, as the Kristianstads Vattenrike project has demonstrated. However, it is unlikely to be achieved or sustained without rural community leadership through the realization of social capacity to reclaim their futures, including demand for unconditional deliberation on futures, a responsive arbitration process, vigilance, and an independent communication network.



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APPENDICES

APPENDIX 1: Change Agent Input to NRM in the Murray-Darling Basin

ERNEST ‘WATERSHED’ JACKSON (1901-1990) AND RALPH JACOBI (1928-2000)

Two change-agents who I had the privilege to talk with on a regular basis over a number of years were former irrigator turned environmental lobbyist ‘Watershed’ Jackson, who has been described as the ‘father of integrated catchment management’ in Australia (see Appendix 2 and 5), and politician Ralph Jacobi, Federal Member for Hawker in South Australia (1969-1987) who introduced the concept of managing rivers for water quality and to maintain environmental integrity, as well as for quantity. With input from Dr Keith Walker, a zoologist from the University of Adelaide, he developed a proposal for the establishment of a National Institute of Freshwater Studies. Jacobi put forward a Private Members Bill in 1981 that led to the establishment of the Murray-Darling Freshwater Research Centre to better understand inland rivers, and better inform their management beyond mechanistic ‘efficiency’ in water delivery.

‘Watershed’ Jackson lobbied governments for decades to try to convince them of the benefits of a holistic ‘catchment philosophy’ (integrated catchment management/ integrated natural resources management), and effective two-way government-community communication, for the management of the Murray-Darling Basin. He also correctly claimed some credit for the establishment of the communication-education program in the River Murray Commission in 1984 and was an advocate for the use of video/television as a vehicle of deliberative democracy. A third change-agent from within the bureaucracy, John Paterson who was Commissioner representing Victoria on the Murray-Darling Basin Commission in 1988-1989, had implemented integrated catchment management to improve water quality and maintain environmental integrity in the Hunter Valley in New South Wales in the early 1980s.

The two major changes in NRM thinking helped facilitate the implementation of the Murray-Darling Basin Initiative, and enabled the integration of the management of natural resources over an area of one million square kilometres. It is unlikely that the Initiative could have been successful using the previous model involving the compartmentalized management of different resources (Suzuki 1993: 163) designed to achieve mechanistic ‘efficiency’ rather than social-ecological resilience. Under that model there was little integrated management. The ‘efficient’ management of one resource frequently resulted in damage to another and an uncoordinated ‘tyranny of small decisions’ reigned.

HUGH MCKINNEY (1846-1930)

Mr. McKinney was a progressive man, and he desired to go almost further than it was possible for the Government to go.

Riverine Grazier 18 April 1899

In 1875, Irish-born Hugh Giffin McKinney came to New South Wales on leave from India to visit his sister Sarah, wife of Riverina squatter William McGraw, at 'Kooba' station near Whitton, between the present town of Griffith and village of Darlington Point in today's MIA. He was struck by the similarity of the Riverina landscape with the country irrigated by large canals in the Punjab and North-West Provinces in India, where he worked as an irrigation engineer and canal magistrate with the Indian Civil Service. While the Murrumbidgee was a trickle compared with the Ganges and Jumna rivers, fed by Himalayan snowfields, McKinney was the first to appreciate the potential of the Riverina for large-scale irrigation. He returned to India but his imagination had been fired by the possibilities for irrigation in NSW. He migrated to Australia in 1879 and took up a position as an engineer with the New South Wales Department of Public Works, initially to work on the Sydney water supply.

McKinney was highly opinionated but his practical experience of working on irrigation projects in India appeared to have given him a much less 'industrial' view of irrigation than engineers with only theoretical knowledge. He worked with people and learned first-hand about the landscape where he was to develop projects through extensive travel. He believed in irrigation development with equity. He was adamant that the most valuable models for water administration in New South Wales came from the 'dry' parts of the world such as Spain, Italy, India, France, and the colony of Victoria.

In 1884, McKinney was appointed Engineer to the Royal Commission on the Conservation of Water, presided over by the Honourable (later Sir) William Lyne between 1884 and 1887. He produced a report on appropriate water rights legislation for Australia, developed a program to measure stream flow, and produced the first proposal for large scale irrigation schemes supplied by canals from the Murray and Murrumbidgee rivers. Most current NSW irrigation areas in those valleys are based broadly on McKinney's original plans. In addition to its three reports and two conferences, a tangible outcome of the 'Lyne' Royal Commission, was the establishment of a Water Conservation Branch in the NSW Department of Mines and Agriculture, under McKinney's direction (in May 1892, the Water Conservation Branch was transferred to the Public Works Department).

In 1890, Henry Parkes, Premier of NSW, appointed him Commissioner in charge of the River Murray; an outcome of which was the production of the first map of the Murray-Darling Basin in 1891. McKinney worked tirelessly to overcome NSW Government disinterest, insecurity and procrastination on the water issue. To gain government confidence and focus, he suggested inviting Colonel Frederick Home, who had been Inspector-General of Irrigation Works in India, to review NSW proposals and provide

advice. In 1897, after examining various rivers, dam sites, and reports prepared by McKinney, Home concluded that only the Murray and Murrumbidgee rivers were suitable for large-scale irrigation but that it would be politically much easier to develop the latter because it was entirely within NSW.

Frustrated by 20 years of delays and political indecision, McKinney resigned from the Department of Public Works as Chief Engineer of Water Conservation in 1900, and went into private practice. Almost immediately, he joined Robert Gibson, a stock and station agent, landholder, and mayor of Hay, to provide engineering expertise for a large-scale private irrigation project – ‘The Murrumbidgee North Water Supply and Irrigation Scheme’ (1903). While the ‘Gibson’ private irrigation project did not come to fruition, it provided the NSW Government with a blueprint and the benefit of a huge amount of research. The government developed an ‘almost’ identical scheme, involving the construction of Burrinjuck Dam and the establishment of the Murrumbidgee Irrigation Areas (Proust 2005; Powell 1993; Darbyshire 1963; McKinney 1910; McKinney 1900; McKinney 1891).

JOHN MONASH (1865-1931)

In the world of his time, and perhaps even now, he was unique: he was colonial, non-athletic, a reservist, and he was Jewish. Yet he rose to the rank of full General and received the first British knighthood given in the field in 150 years. An engineer and an attorney he developed a concept of methodical command and control similar to present day systems analysis and operations research.

Beaumont 1967

In the 1920s, General Sir John Monash was probably regarded as the greatest living Australian, and today he is the only internationally recognised Australian military leader. In addition to being a leader in the art of mechanised warfare, an engineer, and an administrator, John Monash also painted and illustrated, was an accomplished pianist, spoke French and German, and enjoyed chess, carpentry and bushwalking. He had degrees in arts, engineering (Master of Civil Engineering) and law, and was qualified as a municipal surveyor, engineer of water supply, and patent attorney. After he returned from World War I, he completed the first Doctor of Engineering to be awarded by an Australian university and became Doctor of Laws.

Monash was born in West Melbourne in June 1865 of Prussian-Jewish parents. As he was growing up, his parents had stores at different times in Melbourne, and in the Riverina towns of Jerilderie and Narrandera. In the mid-1870s, he spent some important years of his childhood in Jerilderie and retained great affection for the Riverina and its people throughout his life. After leaving secondary school in 1881, he entered Melbourne University to study engineering. Financial difficulties forced him to leave university before completing his degree.

His early career included bridge construction, railway construction, and work for the Melbourne Harbour Trust. In 1894, he went into private practice in partnership with Joshua Anderson. Monash and Anderson were agents for the Monier reinforced concrete process and built some of the earliest reinforced concrete bridges in Australia.

In late 1897 and early 1898, he acted as advisor and expert witness to residents of the Jerilderie district, against David and Samuel McCaughey who had dammed the Billabong and Colombo creeks to irrigate their properties, greatly reducing the amount of water available downstream. He acted as advisor in the Supreme Court case *Blackwood v. McCaughey*, in which Blackwood was awarded 2 000 pounds damages. After long negotiations involving Monash, the McCaugheys also settled the remaining cases around Jerilderie at considerable cost (a total of 27 000 pounds), and a guarantee that they would desist from extracting so much water in the future.

Monash's success against the McCaugheys no doubt influenced the decision, six years later, by the Lower Murrumbidgee Locking League, to retain him to investigate the impacts of the proposed 'Gibson' private irrigation scheme on the lower Murrumbidgee floodplain and its people. Another possible reason for obtaining his services specifically was that the son of Samuel Lindsay, the manager of 'Yanga' station and foundation member of the Lower Murrumbidgee Locking League, worked for Monash's company in Melbourne. Monash's on-ground research and evidence to support the continued regular flooding of the lower Murrumbidgee wetlands and the need for their protection against upstream diversions was very important to the people of the Balranald and Hay districts, but received only one sentence in Geoffrey Serle's six hundred page biography of Monash:

Between 1903 and 1906 he was to make several more trips to the Riverina and Sydney as advisor to the Lower Murrumbidgee River Locking League.

1982: 129

Monash provided informed expert evidence to the government committees assessing the original Gibson Bill for a large-scale private Murrumbidgee irrigation development (Murrumbidgee Northern Water Supply and Irrigation Bill 1904), and its amended version (1905). He was also an expert witness in the assessment of the government scheme (Barren Jack Storage Reservoir and Northern Murrumbidgee Irrigation Scheme 1906).

Attempts were made, in the examination of Monash's evidence in support of water equity and security for the residents of the lower Murrumbidgee floodplain, to discredit his methodology and expertise, and to question his objectivity. This experience may have contributed to his highly critical view of technocrats. His presidential address to the Victorian Institute of Engineers (1913: 12) included the following:

[T]he engineering practice of many public and municipal departments is on strictly conservative and stereotyped lines...there is a notable absence of any powerful stimulus to intellectual enterprise.

Monash's military career began in 1884, when he joined the University Company, 4th Battalion Victorian Rifles. He maintained his involvement in the militia and by 1913 he had the rank of Colonel. At the outbreak of World War I, Monash briefly took the position of Chief Censor before being appointed to command the 4th Infantry Brigade of the Australian Imperial Force (A.I.F.) and sent to Gallipoli, Turkey. While at Gallipoli, he was promoted to the rank of Brigadier-General and later supervised the evacuation of his Brigade from the Peninsula.

In July 1916, he was promoted to Major-General and sent to England to organise and train the recently arrived 3rd Australian Division on Salisbury Plain. By 1917, the 3rd Division was stationed in France holding the Armentieres sector. It took a leading part in the battle of Messines and the Passchendaele offensive and continued to occupy vital parts of the allied front line. In March 1918, Monash was given the task of holding the Germans between Ancre and the Somme, and in June he was promoted to the rank of Lieutenant-General and given command of all five divisions of the Australian Army Corps. He was the first Australian-born Corps Commander, and at various times he also commanded a British Division, and two Canadian and two American Divisions.

The Battle of Hamel in July 1918 illustrated Monash's unique systemic management abilities. He integrated aerial and artillery bombardments, with tanks, infantry and psychology in a lightning attack which achieved its objective in 93 minutes. This was an extraordinary feat in a theatre which gave us the metaphor 'trench warfare' to indicate battles of attrition where armies were literally 'bogged down' and made little or no progress for months at a time. It was also the first unqualified demonstration of the value of tanks in battle. In addition to facing the Germans, at this crucial time Monash also had to cope with his political master Prime Minister Hughes, and a last minute attempt by General Pershing to withdraw American participation because he felt that his troops were not sufficiently trained for the task.

Following successful action at Hamel, and shortly after the beginning of the Australian offensive of August 1918, Monash received a knighthood from King George V of England, at Bertangles, near Amiens. This was the first time a British sovereign had conferred a knighthood on the field of battle since George II created knights at the Battle of Dettingen in 1743.

Following the signing of the Armistice, Monash undertook the task of repatriation and demobilisation of the Australian forces in Europe. On his return to Australia, he became General Manager of the Victorian State Electricity Scheme in 1920. In 1921, he was appointed Chairman of the State Electricity Commission. He was Vice-Chancellor of the University of Melbourne from 1923 to 1931. In 1929, he was promoted to full General (Serle 1982; Spaul 1970; Beaumont 1967; Monash 1913; Monash 1906; Monash 1905b; Monash 1905a; Monash 1904 b; Monash 1904a).

LESLIE WADE (1864-1915)

Commissioner Wade may have lacked the breadth of outlook which would have been so beneficial to a vast scheme of this nature in its formative stages, but all available evidence indicates that he was fanatically keen to see the MIA a permanently successful enterprise.

Langford-Smith and Rutherford 1966: 45

Leslie Augustus Burton (L.A.B.) Wade was a water and sewage engineer whose father was also a civil engineer. He was a technocrat and the first Commissioner of the New South Wales Water Conservation and Irrigation Commission. He commenced work as a cadet with the NSW Department of Public Works in 1880, and worked on Sydney's ocean outfall sewerage scheme. In 1890, he joined the newly formed Water Conservation Branch of the Department of Mines and Agriculture (transferred to the Public Works Department in 1896) as assistant engineer under Hugh McKinney.

After McKinney's resignation in 1901, Wade was promoted to Principal Engineer of the Water Supply and Sewerage Branch of the Public Works Department. In 1906 he became Chief Engineer for Rivers, Water Supply and Drainage; in 1909 Chief Engineer for Irrigation and Drainage; and in 1911 he was made Chief Engineer for Irrigation. Also in 1911, he assumed the position of executive officer of the Murrumbidgee Irrigation Trust, to establish the Murrumbidgee Irrigation Areas (MIA). This responsibility continued after he became the first Commissioner of the NSW Water Conservation and Irrigation Commission, when it was established in 1913.

Wade appeared to think that the world should run like a machine. His administrative style has been described as blended authoritarianism with paternalism. He was loath to delegate responsibility and his administration was marred by friction with his subordinates. His skills in land settlement and social planning in the first years of the MIA were also criticised (Lloyd ADB 1990: 342-343). He directed every aspect of the settlement and development of the Murrumbidgee Irrigation Areas, 'exercising the powers of a virtual pro-consul from his headquarters in Leeton' (ADB online accessed 9/7/08), apparently with the political support of his brother.

Unfortunately, the difficult mix of people, the environment, politics, agriculture, and engineering, required the skills, vision, and wisdom of a leader rather than the narrow focus of a narcissistic technocrat. The impacts of too much capacity combined with too little understanding of the complex social-ecological system, and inadequate leadership skill are being felt more than a century later.

APPENDIX 2: Evolution of Integrated Catchment Management in NSW

Former Victorian irrigator, Ernest ‘Watershed’ Jackson (1901-1990) tirelessly promoted the concept of the catchment or watershed as the primary unit for natural resources management in the Murray-Darling Basin, for almost forty years; hence his nickname. He had been inspired by the Muskingum Watershed Conservancy District model in Ohio, United States of America. The original idea of river basins being ‘the most logical of natural units’ was advocated by American Civil War hero, explorer and technocrat, John Wesley Powell (1834-1902) around 1890, for the management of the natural resources of the sub-humid west of the United States of America (Powell 1993a: 49).

Soil conservation agencies in both Victoria and New South Wales used an integrated NRM model to rehabilitate catchments and protect water quality in the 1950s and 1960s (Reeve et al. 2002: 13). Total catchment management was introduced in NSW in 1984 and formally adopted in 1989 with the *Catchment Management Act*, which enabled the establishment of 43 Catchment Management Committees (CMC) to coordinate natural resources management at the watershed level, through a government NRM department (Hillman et al. 2003: 222). CMCs were advisory bodies made up of landholders or resource users, environmental group representatives, and local and state government representatives, appointed by the responsible minister from nominations.

Catchment Management Regulation 1999 replaced CMCs with 18 Catchment Management Boards (CMBs). The Boards included Aboriginal representation and were mainly involved in the development of advisory integrated catchment management plans (Catchment Blueprints) for their representative areas.

In January 2004, CMBs in NSW were replaced by 13 Catchment Management Authorities (CMAs), established under the *Catchment Management Authorities Act 2003* and ‘based on the principles put forward by the Wentworth Group of Concerned Scientists and key recommendations of the Native Vegetation Reform Implementation Group’ (New South Wales Government 2005). CMAs are statutory authorities with responsible and accountable boards that report directly to the Minister, and are not under the responsibility of a State government agency. The boards comprise between five and seven members, including a chair, appointed on the basis of expertise, rather than representatives of interest groups or geographical areas. A distinguishing feature of CMAs is the application of a corporate (private sector) approach to NRM (Fidelman 2006: 2-3).

CMAs have governing and operational roles in addition to the provision of advice. They are responsible for the preparation and implementation of Catchment Action Plans and the administration and management of native vegetation consents under the *Native Vegetation Act 2003*, including the production of Property Vegetation Plans (PVPs).

APPENDIX 3: Experiences that informed Method Design and Data Interpretation

PAPUA NEW GUINEA

One of my earliest professional experiences in relation to capacity realization was as a junior panel member involved in reviewing a Social Science syllabus in Papua New Guinea in the early 1970s. The syllabus had proven to be unsuccessful from both student and teacher perspectives. The 'problem' appeared perverse. Almost anyone could 'administer' Social Science lessons but it was difficult for even highly regarded teachers to teach it well, and it held little interest for students. The Social Science 'kit' was structured to be 'teacher and student proof'. Classes were forced to plod from prescribed lesson to prescribed lesson with little thought to where it was leading, virtually eliminating innovation in teaching, and excluding rich local knowledge, resources and examples available.

The Education Department demonstrated leadership by addressing the structural problem of the syllabus quickly and transparently. That situation was in contrast with my later experiences of technocratic NRM organisations in Australia where there was a tendency to deny or 'manage' similar problems, rather than addressing them. The review of the Social Science syllabus revealed prescription to be a huge impediment to capacity realization; it stifled the imaginations of both teachers and students who were effectively excluded from the syllabus. They could only react to it, they could not respond using their own experiences or expertise. The initial Social Science syllabus was an inflexible externally imposed structure that could not be 'grown' and had no ownership. According to Robottom, the managerial-hierarchical approach to education for change, favoured by technocratic organisations, often:

[P]resupposes that curriculum materials, if properly prepared, can be effective change agents; that 'experts' can bring pre-existing, positive 'solutions' to classroom practitioners; that 'solutions' developed centrally have universal effectiveness; and that there is a 'passive' consumer at the end of the delivery system.

1992: 98

COUNTRY AREAS PROGRAM

On my return to Australia, I worked as a Curriculum Research Officer with the Commonwealth Schools Commission Country Areas Program (1982 to 1984) on a community-initiated project with a cluster of communities on the lower Murrumbidgee and mid-Murray area of south-western New South Wales. The Country Areas Program involved the provision of funding, administrative support and expertise to enable rural communities to develop education-related initiatives that they had

identified as important for their social resilience. My role involved facilitating a project to help address a perceived rural 'identity crisis' that appeared to be leaving many young people feeling increasingly alienated from their own heritage and also isolated from the rest of the nation.

It was decided to develop a schools-based program to study Australian history and geography from a local perspective, using local resources, including natural and human assets, local newspaper files and historic photographs held by community members. The whole-of-community asset-assessment model was designed to enable students to be better able to respond to generic themes presented in the classroom. The rich social memory (McIntosh 2000: 143) of the district, revealed by the process, had been under-utilised by the schools until that time.



Plate B1 **Adrian Gorman, a custodian of community social memory**

Adrian was the initiator of the project because he was concerned that the loss of social memory and awareness of local assets was eroding community resilience. He was aware that social memory means that communities are not powerless to deal with crises. His great-uncle, E.J. Gorman had been a key organizer of the community-initiated Corowa Federation Conference in 1893 and Chair of the community-initiated conference on sharing the waters of the River Murray in 1902 that led to the River Murray Waters Agreement. Unproductive inter-colonial conferences about sharing the waters of the Murray had been held between bureaucrats over a period of 39 years, before the community took the matter into its own hands.

The program involved community members, ranging in age from six to eighty-seven, exploring and articulating the region's assets, history and place in Australia. School children from the different communities developed and tested resources that were then shared with peers, community members, and students in neighbouring schools. Students responded positively to activities that they saw as being for a purpose, valuing their knowledge, and being relevant to their interests. They valued having an authentic audience for their work, beyond the classroom, and were proud to have products to which they had contributed being legitimised by quality display or publication. Once empowered, through the mastery of new skills and raised self-esteem, senior primary school students became the driving force to involve almost all members of their communities:

The Project gave the older members of the community an interest and increased their status and self-esteem; younger members learned new skills and an increased appreciation of their heritage; and minority groups had the opportunity to increase their understanding and appreciation within the community.

Eastburn 1984: 40

My observations of the extraordinary energy of children realizing their capacities, through the expression of their own knowledge and new skills, and their community's knowledge, inspired the later development of similar projects on a much larger scale for the Murray-Darling Basin Commission (see 5.4.1).

THE MURRAY-DARLING BASIN INITIATIVE

My NRM philosophy is strongly influenced by my involvement in the Murray-Darling Basin Initiative (1984-1998). The Murray-Darling Basin Commission was given a clear mandate and resources by Australian society in the 1980s through some of the nation's most powerful politicians, to integrate social and technical aspects of natural resources management. It was in a unique position to demonstrate leadership and to encourage active community participation as an authentic partner in the Basin's sustainable future, but within a short time it chose, or had chosen for it, a traditional technocratic approach, which I have demonstrated is inadequate to progress towards sustainable resource-use and sustainable communities. Such 'recourse to technocracy' (UNESCO 1980: 26) appears to have potentially been taken a further step backwards by catchment management authorities (CMA) in New South Wales, since their latest manifestation in 2004.

APPENDIX 4: Interviewees

BIOREGIONAL LANDHOLDERS AND COMMUNITY MEMBERS

NAME	POSITION	LOCATION	DATE
Amaral, Mr G.	Landholder, 'Torry Plains'	Balranald, NSW (resident of California USA).	5/11/06
Black, Mr G. and Guest, Ms N.(sister)	Director, Sims Cooper & Co (Aust) Pty Ltd., and floodplain landholder. Former owners of 'Yanga' Station (1918-2005)	Balranald, NSW (residents of Melbourne, Victoria, and UK).	22/9/05
Blore, Mr S.	Organic grain farmer, 'Warwaegae' & share-farmer of 'Torry Plains'	Balranald, NSW.	18/1/07
Campbell, Mr G.	Red Gum sawmiller, Campbell's Sawmills.	Balranald, NSW.	23/8/07
Connellan, Mr A.	Farmer, grazier & forest owner, 'Narwie' & 'Geraki'	Balranald, NSW.	24/7/04
Connellan, Mr P.	Farmer, grazier & forest owner, 'Narwie' & 'Geraki'. Participant in the Western Lands, Enterprise-based Conservation pilot Program.	Balranald, NSW.	11/9/02*, 16/7/04, 21/7/04, 3/8/06
Cullenward, Mr H.	Manager of 'Nap Nap' Station. Farmer & grazier.	Maude, NSW.	4/9/07
Eddy, Mr V.	Forester for privately owned lower Murrumbidgee red gum forests, A.B. Rowe, Sawmills.	Merbein, Victoria.	10/9/02*, 21/9/05
Gorman, Mr A.	Grazier and farmer, 'Willow Vale', on the Fiddler's Creek system.	Balranald, NSW.	12/9/02*, 1/3/05
Hera-Singh, Mr G.	Commercial fisher, President, Southern Fishermen's Association Inc.	Meningie, SA.(Lower Murray lakes and Coorong fishery)	19/7/04

NAME	POSITION	LOCATION	DATE
Hodgson, Mr B.	Pioneer floodplain farmer.	Swan Hill, Victoria.	17/10/07
Jones, Mr H.	Commercial fisher, Southern Fishermen's Association Inc.	Clayton SA.(Lower Murray lakes and Coorong fishery)	20/7/04
McFarland, Mr R. & Mrs E.	Graziers, 'Oxley' Station.	Oxley via Hay NSW	1/4/05, 23/6/05
McNiven, Mr B.	Rural worker.	Balranald, NSW.	8/9/05
Murphy, Mr M.	Area Manager NSWNPWS including Yanga National Park.	Hay, NSW.	19/9/07
Murray, Mr B.	Heritage Sites Coordinator 'Yanga' Station/ Yanga National Park. Former overseer/stock manager, 'Yanga' Station. Fifty years of employment on the station.	Balranald, NSW.	10/9/02*, 22/7/04
Nelson, Mr F.	Grazier, 'Moatfield'.	Maude, NSW.	12/9/02*
Old, Mr F.	Organic grain farmer and grazier, 'Emu Park,' & share-farmer of 'Torry Plains'.	Balranald, NSW.	11/9/02*
Spinks, Mr M. & Mrs H.	Organic grain farmer and grazier, 'Is-Y-Coed' & share-farmer of 'Torry Plains'. Chair Lowbidgee League. Teacher.	Balranald, NSW.	11/9/02*, 4/7/05
Sullivan, Mr W. & Mrs J.	Manager, 'Yanga' Station. Farmer and grazier.	Balranald, NSW.	8/9/05
Treweek, Mr J.	Charcoal manufacturer	Balranald, NSW.	30/3/05
Woods, Mr I. & Brettschneider, Mr M.	Initiators and manager of Toogimbie Indigenous Area.	Hay, NSW.	28/6/06

* Edited interview on 20 minute DVD *Lowbidgee Flood Country* 2003.

NATURAL RESOURCES MANAGEMENT DECISION-MAKERS, INFLUENCERS, FACILITATORS AND PHILOSOPHERS

NAME	POSITION	LOCATION	DATE
Beck, Mr L.	Manager, Murrumbidgee Region, NSW State Water.	Leeton, NSW.	15/7/04
Bishop, Ms M. & Gibson, Mr G.	Community Facilitators.	Huskisson, NSW.	26/3/06
Bouly, Ms L.	Chair, Community Advisory Committee of the Murray-Darling Basin Ministerial Council 1998-2005 (member 1992-1996); member of the Wentworth Group of Concerned Scientists; ABC Board member; farmer & grazier 'Kelso'.	Dirranbandi, Qld.	15/3/05
Boyden, Prof. S.	Biohistorian. Founder Nature and Society Forum. Co-organizer of the first environmental education conference in Australia 1970.	Canberra, ACT.	17/2/06
Bradford, Ms A.	Special forever coordinator (1994-).	Swan Hill, Victoria.	10/12/05
Briggs, Dr S.	Principal Research Scientist, Biodiversity Research & Management Division, NSW NPWS.	Canberra, ACT.	8/7/05
Cass, Dr M.	First Federal Environment Minister 1972-1975.	Melbourne, Victoria.	21/7/05
Davy, Mr T.	Water Superintendent, Lowbidgee Flood Control & Irrigation District, NSW State Water.	Balranald, NSW	10/9/02* 23/7/04
Dole, Mr D.	Director, River Murray Water, Murray-Darling Basin Commission.	Canberra, ACT.	30/3/06

NAME	POSITION	LOCATION	DATE
Hillman, Prof. T	Dept. of Environmental Management and Ecology, La Trobe University, (Albury-Wodonga campus). Former Director of Murray-Darling Freshwater Research Centre	Albury, NSW	18/6/05 28/9/05
Kingsford, Prof. R.	School of Biological, Earth & Environmental Sciences, UNSW, former wetland scientist NSW NPWS	Sydney, NSW	20/9/02*
Koehn, Dr J.	Principal Scientist, Freshwater Ecology, Arthur Rylah Institute for Environmental Research.	Heidelberg, Victoria.	29/9/05
Knudsen, Ms E.	Former MDBC Community Participation Coordinator (1994-2000).	Brisbane, Qld.	23/11/05
Magnusson, Mr S-E.	Director, Kristianstad Vattenrike Biosphere Reserve.	Kristianstad, Scania, Sweden	26/11/07
Pratt, Mr B.	Organic wheat buyer, Weston Milling.	Sydney, NSW	20/9/02*
Shepherd, Ms R.	Project Officer, Enterprise Based Conservation, West 2000 plus DIPNR	Dubbo, NSW	24/1/05
Wangmann, Ms D.	Special forever coordinator (1993-).	Broken Hill, NSW	11/12/05
Wright, Mr M.	Catchment Coordinator, Murrumbidgee Catchment Management Authority	Wagga Wagga, NSW	17/8/06
Zalec, Mrs R.	Special forever coordinator (1994-).	Mildura, Victoria.	21/9/05

* Edited interview on 20 minute DVD *Lowbidgee Flood Country 2003*.

APPENDIX 5: Murray-Darling Basin Commission deliberative Video Program 1991-1998

BACKGROUND

The importance of the use of video and television as a medium to take messages to a large number of people over the huge geographic area of the Murray-Darling Basin, and beyond, and to bring messages from those people, emerged quickly during wide-ranging consultation soon after my appointment to the River Murray Commission in June 1984. An example of this appears in a letter dated 9 July 1984, from Mr Neil Dufty of Griffith, Chairperson of the Country Region of the Association for Environmental Education (NSW), who suggested: 'From experience, television is the medium for the message and you must utilize this form of media in your Strategy.' A decision was made early in the consultation process to produce broadcast quality videos to achieve television exposure.

A great advocate of the use of the 'film' (video/ DVD and television) medium for education and to encourage community participation was the late Ernest, 'Watershed', Jackson (1901-1990) of Albury in southern New South Wales. He strongly recommended that the River Murray Commission include video as one of its key communication mediums in preparation for its likely expanded responsibility as a Basin Commission. Jackson was a campaigner for integrated catchment management, hence his nickname. Jackson claimed some credit for the establishment of the communication-education position within the Commission and I spent a considerable amount of time with him discussing his vision for the integrated management of the Murray-Darling Basin to achieve sustainable resource-use.

Jackson had been an irrigation farmer and after World War II became involved in lobbying, community participation and education in order to improve agricultural efficiency in northern Victoria. As Information Officer for the Victorian State Rivers and Water Supply Commission, Officer in Charge of the Mobile Extension Unit of the Department of Agriculture, and Director of the Educational Films Unit of the Save the Forests Campaign, he was acutely aware of the value of the process of film-making in community relations. He considered film as a product and a medium for information transfer to be valuable, but only one element in the education process.

He filmed the everyday activities of districts where he was working, and particularly the children, and screened the films in local halls. This approach, he claimed, attracted almost all members of a community to his extension talks. He considered the inclusion of local people and the process of consultation during

the making of the film to be more important than the final product. He emphasised that ‘conservation’ must also be concerned with people and that any education project must be locally relevant so that people could ‘put themselves into the picture’ and participate with governments as equal partners.

The Chief Executive of the River Murray Commission until 1990, Ken Johnson, appreciated the potential of video and the use of television for community awareness and education. He was a cautious ‘champion’ for a video program (despite its scale and apparent high initial cost) as potentially a huge number of people would be able to ‘see’ the tasks and achievements of the Murray-Darling Basin Initiative and hopefully support them. Having worked as an engineer on the Snowy Mountains Scheme, he appreciated the parallel with bussing people in to ‘see’ what was happening with the Snowy Scheme and to gain their approval.

During the period 1987-1990, I consulted with electronic media experts, representatives of the Great Barrier Reef Marine Park Authority (GBRMPA), Agmedia Victoria, officers from associated government departments and organisations including the Murray-Valley League (now Murray-Darling Association) and Commission officers about the philosophy, effectiveness, audience, topics and management of a video program.

The video activities of the GBRMPA were of particular interest because it is a resource management organisation which covers a large geographic area and involves more than one government, so is similar in many ways to the Murray-Darling Basin Commission. Its quarterly video newsletter ‘Reef Report’ and other products had also been evaluated.

MDBC VIDEO PROGRAM SUMMARY 1991-1998

Programs completed	100
MDBC videos released	36 (thirty-five television half-hour/ one television hour)
Basin Profile spots	33 stories
Co-productions	9
Support productions	14 (introductions to conferences, exhibitions etc.)
Community Service	8
Newsfile footage	6 (a range of images to be run behind tv news stories)
Total video footage	250 hours (a valuable asset that could be quickly tailored to a range of requirements)

MDBC VIDEO PROGRAM SUMMARY 1991-1998

Kits	3 (Blooming Algae, River Runners, Dryland Salinity)
CD-ROM	3 (eight videos)
Basin distribution	400 plus (community groups: ICM, Landcare etc, tour operators, field officers, universities, associated organisations)
Television networks	every Australian network with Basin links plus Australia Television (ABC Overseas), China and Korea.
Television coverage	120 hours (stories, segments, complete programs, series, repeats) since July 1991. Average annual exposure 23 hours.
Value of free TV coverage	\$3 million (to May 1998) – <i>Landline</i> , <i>World Around Us</i> , news etc.

THE VIDEO PROGRAM

The Murray-Darling Basin Commission video program consisted of four categories to meet the requirements of different audiences and to provide a framework to enable issues to be addressed systematically. Video also plays a pivotal role in relationship building:

1. MURRAY-DARLING BASIN PERSPECTIVE

- Murray-Darling Basin Series
- ‘Snapshots’ series
- Basin Profile Spots

2. RELATIONSHIP BUILDING AND MAINTENANCE

- ‘Tributaries’ newsletter series
- Co-productions
- Support Videos
- Community Service Announcements

3. NATURAL RESOURCES MANAGEMENT

- Natural Resources Management Series
- Murray-Darling Basin Issues series
- State of the Basin series
- News file footage

4. RIVER MURRAY MANAGEMENT

- River Murray Management Series

MURRAY-DARLING BASIN PERSPECTIVE

This video category provided images of many parts of the region to help people to begin to visualise and relate to the Basin as a whole:

Perhaps the greatest attitudinal change we need to make is to learn to look at our surrounding in their totality rather than as separate fragments

Suzuki 1993:163

Murray-Darling Basin Series

- **‘Discovering the Murray-Darling Basin’** [July 1991]

Introduction to the size, diversity and statistics of the Murray-Darling Basin. A reminder that its produce and water resources contribute to the standard of living of all Australians. Definition of a basin. Song by Mike Hayes tracing the flow of water through the system. Piped water to Adelaide, the ‘Iron Triangle’ and Woomera in SA. Supermarket tour of MDB produce. History – Aboriginal (ancient – Lake Mungo; modern – Brewarrina Cultural Centre), European – using rivers as highways. Mike Hayes song about paddle steamers. Diversity of the Basin, from rainforest to desert – ‘I’m in a ...in the MD Basin’. Most of the Basin’s water is produced from a very small area – Australian Alps. Interconnection of all parts of the Basin – message to ‘think of the folk downstream’. Forests – Pilliga and Barmah-Millewa. River regulation. Natural Resources Management Strategy for the coordinated management of resources.

- **‘Links with the Land’** [12 Mar. 1996]

This 50-minute video is a story about the relationship between people and the Murray-Darling Basin environment in the past and present, along with some of the possible directions for the future. ‘Links with the Land’ is strategic to the Commission’s video series. It provided a context for the activities of the Murray-Darling Basin Initiative which aimed:

To promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of water, land and other environmental resources of the Murray-Darling Basin.

‘Links with the Land’ was designed to contribute to the re/introduction of the Murray-Darling Basin into the consciousness of the Australian public (both rural and urban), by making it relevant and presenting it in an entertaining way. The region is significant for all Australians - it contains our most important river system and is our agricultural heartland. It also helped to forge our identity. Despite our highly urbanised society, deeply ingrained in the Australian psyche is a link with ‘the bush’.

The video built a framework of links between communities within the Murray-Darling Basin as well as with those in the large urban centres on the coast by identifying a shared heritage and experiences. Attention was drawn to produce from the region that is consumed by Australians everyday and that contribute to our quality of life. It attempts to fire the imaginations of a broad range of people by presenting unique natural heritage features; identifying flora and fauna associated with the area and; drawing attention to historical and cultural connections. It also acknowledged the enormous efforts of individuals, community groups and organisations working on a diverse range of projects throughout the region to maintain or improve the Basin for the benefit of present and future generations of Australians.

‘Snapshots’ Series

- **‘Murray-Darling Snapshots 1’** [28 May 1992]

Lead story – Gundagai in southern NSW, Australia’s best known country town due to its frequent reference in songs (‘dog on the tuckerbox’). Tragic flood of 1852 and bravery of two Aboriginal men, Jacky and Yarri who rescued many people with their bark canoes. Two minute stories - Murray cod, Murray mouth, Salt of the Earth, River red gums, Paddle steamers, Murray cray, Ephemeral lakes, Murray source, Charcoal burners, The Pilliga, Darling headwaters, and Inland Sea.

- **‘Murray-Darling Snapshots 2’** [27 Mar. 1993]

Lead story – Bourke on the Darling River in far western NSW is recognised in Australian folklore as the gateway to the outback – the back o’ Bourke. The characters and land around Bourke were immortalised by Henry Lawson in his poems and stories written in the 1890s. Bourke has an important place in the cultural heritage of the MDB. Two minute stories - Ladders for fish, The Condamine, Hovell’s Tree, Quandongs, Great Cumbung Swamp, Wetlands, Bush Capital, Saltbush, Floods, and The Coorong.

- **‘Murray-Darling Snapshots 3’** [12 Mar. 1994]

Lead story – Gold! Australia’s first gold rush took place at Ophir near Orange in NSW in 1851. Many towns in the Basin have a gold mining heritage, including Adelong, Bendigo, Beechworth, Castlemaine, Grenfell, Gulgong, Parkes, Temora, West Wyalong and Young. Case study of Bendigo in Central Victoria, one of Australia’s great gold cities. Two minute stories - The Paroo, Pilliga mouse, Dubbo Zoo, New yabby, Macquarie Marshes, Mulga, Bottle trees, Special Forever, Artesian water, Eucalyptus oil, and Prickly Pear.

Basin Profile Spots

Basin Profile Spots provide two minute ‘snapshots’ of various aspects of the Murray-Darling Basin to build an image of the vast and diverse region.

Ten, 2 minute ‘Snapshots’ stories about the central Murray-Darling Basin were shown on Prime TV (Orange) to advertise the National Museum of Australia’s travelling exhibition of the Murray-Darling Basin, ‘A Changing People: A Changing Land’ Basin, at Dubbo, NSW in 1994. A 30 second CSA was also used to advertise the exhibition.

The ten stories were: Darling headwaters, Paddle steamers, Murray cod, the Pilliga, Quandongs, the Paroo, Macquarie Marshes, Artesian water, Pilliga mouse and mulga. Prime TV co-sponsored the spots. Due to local relevance and interest, each story was shown ten times between 27 November 1994 and 7 January 1995 (100 segments or 3 hours & 20 minutes of free coverage).

RELATIONSHIP BUILDING AND MAINTENANCE

The key to effective communication is relationship building and maintenance. The video newsletter ‘Tributaries’ formed the framework on which to build and reaffirm relationships. There are many messages within product to contribute to relationship building – information is only one. Evidence of acknowledgement, respect, listening, relevance and the location of appropriate ‘talent’ and audience are also important.

Stories from ‘Tributaries’ regularly received national television exposure on the ABC rural program, *Landline*, and the format is well suited to the Open Training & Education Network’s (OTEN) *tvED* (adult/ student, social/ educational/ environmental ‘behind the news’ type) program which is put to air by SBS. Most stories from every edition of ‘Tributaries’ were broadcast (and frequently repeated) on *tvED*. Both *Landline* and *tvED* had important urban and rural audiences. ‘Tributaries’ and other Commission videos also received frequent exposure on the *Community Education Channel 1* in Adelaide.

‘Tributaries’ Newsletter Series

Series 1

- **‘Tributaries’ 1** (July 1991)

Stories: Natural Resources Management Strategy (NRMS); Woolpunda Groundwater Interception Scheme, SA; Eric Rolls (farmer, social-ecological historian, author, opinion-leader); Woody Weeds.

- **‘Tributaries’ 2** (October 1991)

Stories: MDB Ministerial Council; Chowilla; Tragowel Plains; Dryland Salinity - Inverell; Aboriginal Cultural Museum - Brewarrina.

- **‘Tributaries’ 3** (February 1992)

Stories: Algal bloom - Darling River; Red gum charcoal; Woodlots for drainage water; Dr Brian Roberts (Landcarer – Toowoomba); Wild willows.

- **‘Tributaries’ 4** (June 1992)

Stories: Hovell Tree - Albury; Queensland joining MDB Agreement; Phosphorus connection; Saving a lake - Wagga Wagga; Colin Thiele (children’s author); Workshop for regional project managers.

- **‘Tributaries’ 5** (October 1992)

Stories: Wetlands; Vision for Australia Award; Where land and water meet; Watering the red gum forests; Chowilla; Vanishing frogs; Murray-Darling Association.

- **‘Tributaries’ 6** (February 1993)

Stories: The Paroo; National Museum of Australia-MDB Travelling exhibition; Murray cod radio tracking; Quandongs; Murray-Darling Freshwater Research Centre; Zooplankton.

- **‘Tributaries’ 7** (June 1993)

Stories: Queensland theme - ‘Special forever’; Artesian bores; Bottle trees; Mulga country; Border Rivers Commission; Fish genes.

- **‘Tributaries’ 8** (October 1993)

Stories: Travelling exhibition; Leith Bouilly - CAC representative; Fish nursery; Streamwatch; ‘Special forever’; Macquarie Marshes.

Series 2

- **‘Tributaries’ 9** (October 1994)
Stories: Drought; Electrofishing; Yarrawonga Power Station and fish lock; Cobb and Co; ‘Special forever’.
- **‘Tributaries’ 10** (February 1995)
Stories: SW Qld. Mulgalands Strategy; ATCV School tour; Alligator weed; Botanical Engineering.
- **‘Tributaries’ 11** (June 1995)
Stories: Carp in drains; Urban Salinity; Carnarvon National Park Qld.; Superb Parrot.
- **‘Tributaries’ 12** (October 1995/February 1996)
Stories: MDB water audit; Queensland weeds, Brigalow Floodplain integrated management program Qld; Adult Study Circles; Native grasses; Torrumbarry Weir construction.
- **‘Tributaries’ 13** (June 1996)
Stories: Strip farming-Darling Downs; Vetiver grass, Catchment sign; Biodiversity survey; Voluntary conservation agreement; Hume Dam rehabilitation; Artificial billabongs.
- **‘Tributaries’ 14** (February 1997)
Stories: Mallee stock & domestic water pipeline; Impact of pesticides on rivers; Sunrise 21 - a regional sustainable irrigation model centred on Mildura; Lake-bed cropping; Carp fertilizer.

Series 3

- **‘Tributaries’ 15** (October 1997)
Stories: Cap on water extraction; Opening of new Torrumbarry Weir: Remnant vegetation Toolkit; ‘Project Platypus’ Wimmera River management; ‘Listening to the Lachlan’ community input to river health research; ‘Reading the Land’ community participation proposal.

- **‘Tributaries’ 16** (February 1998)

Stories: ‘Back to the Barrages’(workers reunion); Paddle-steamer Marion ‘as good as new’ after 100 years; Brigalow Country; Lake Mungo with Dr Jim Bowler; Enjoying our rivers in safety; Broken Hill town.

Co-productions

- **‘A Snakes Tale’** - 1 hour prime-time *World Around Us* story about the River Murray [Channel 7, 22 August 1992].

- **Murray-Darling Basin’** [Classroom Video, Aug. 1993]

- **‘A Changing People: a Changing Land’** [National Museum of Australia, travelling exhibition introductory video, Sept. 1993]

- **‘The Wetlands-Sirocco Acoustic’** [Sirocco/ABC, 22 Oct. 1994]

This video consisted of 60 minutes of scenes of Murray-Darling Basin wetlands, with an emphasis on the Macquarie Marshes. It included eleven original music tracks written about wetlands by the band Sirocco, which are separated by natural wetland sounds. The music was written for a concert to celebrate the Macquarie Marshes which was performed in the Marshes on 4 September 1993: Wetlands Acoustic; Ibis Suite – Golden Afternoon Night/ Dying of the Light/ Nesting; Turbulence; Billabong; Eagle; Mist; Garden of Rivers; Wetlands; Wetlands Reprise. It helped to introduce the Murray-Darling Basin to a coastal urban and capital city audience in a way that they can easily relate to. Over 8 000 copies of this video were sold through Australian Broadcasting Corporation bookshops.

- **‘Special forever’ TV Special** [TVED - OTEN – SBS, 29 Sept. 1995]

This television program about ‘Special forever’ was linked by satellite throughout the M-DB. Students from New South Wales (Campbell Marsh – Bourke School of Distance Education), Queensland (Helen Neill – Surat), South Australia (David Oliver – Barmera) and Victoria (Rebekah Van Leest – Nathalia) along with a parent (Linda Marsh – Bourke), a Special forever coordinator (Mary Moore – Shepparton) and a community member (Peter Foley – citrus grower, Kingston-on-Murray) discussed the Murray-Darling Basin and their involvement in the Special forever project. Participants were introduced with video footage from their part of the Basin.

- **‘Murray Darling Basin Aboriginal Heritage’** [Classroom Video, Jan. 1997] ‘Aunty Beryl’s Story’ documents the personal history of Beryl Carmichael who lives at Menindee on the Darling River in south-western NSW. She shares her story over a campfire; discussing her childhood, family life, formal and traditional education, the history of the Barkindji and Ngyampaa people, and the culture camp that she runs at Menindee today.
- **‘Special forever on Screen’** [TVED - OTEN - SBS]
This video made from a television program extended ‘Special forever’ into the electronic media - David Eastburn (MDBC) and Vivienne Nicholl-Hatton (PETA) discuss the development. It included student videos, sketches, poems, songs, and multi-media CD-ROMs, produced by children throughout the Murray-Darling Basin. To give children ‘tips’ and confidence to use a variety of electronic media, Annette Shun Wah discussed the children’s work with a panel consisting of storyteller Pauline McLeod (ABC *Playschool* etc), musician Bill O’Toole of the band Sirocco and writer Mike Hayes, creator of the ‘Prickle Farm’ stories. The video also included a live link with children involved in ‘Special forever’ in Griffith NSW who tell the other children in the Basin a little about where they live.

Support Videos

- **Woolpunda Salt Interception Scheme** [Opening Dec.1990]
- **‘Salt’** [Meredith Memorial Lecture TV forum – Wagga Wagga, Oct. 1991]
- **‘Wetlands’** [International Conference - Albury, Oct. 1992]
- **‘Wetlands’** [Ecotone Conference - Barmera, South Australia, Oct. 1992]
- **‘Co-operative Management of the Murray-Darling Basin’** [3 hour loop for NMA display, exhibitions - Sydney Show/Orange Field Days, Mar. 1994]
- **‘Blooming Algae’** [Algal Management Strategy consultation, Aug.1993]
- **‘Salt’** [NSW CALM Dryland Salinity Speakers Kit, Feb 1995]
- **‘Tributaries’ story Vanishing Frogs** [Australian Museum, Sydney - Frog Exhibition, Apr.-Sept. 1996]

- **NRMS Fish Projects** ['NRMS Fish Research - applying the results', Albury]

- **'Special People'** ['Special forever' theme 1995]

This video was produced to support the 'Special People' theme of the 'Special forever' program. It is designed to promote awareness of the valuable human resources in every community and to acknowledge them. Every community has people who can enrich our lives if they can be identified and accessed. People from all walks of life and many different cultures have contributed to the rich cultural heritage of the Murray-Darling Basin. People are also working in every part of this vast region to increase our understanding of it and to ensure a sustainable future. The 'special people': Dr Alex Ritchie - palaeontologist; Andrew Fielke - bush tucker chef; June Barker & Les Darcy - Aboriginal cultural historians and educators; Joan Jack - Chinese cultural historian; Colin Thiele - children's author; Eric Rolls - Australian natural & cultural heritage author; Bill O'Toole - environmental and cultural musician; Gary Duncan - artist; Chris Williams - travelling environmental educator; Effie Barry - grandmother & story teller; Sir Ronald East - water engineer; Dr Russ Shiel - macroinvertebrate scientist; John Koehn - fish biologist; Robyn Watts - fish biologist; Michael Sutherland - farmer; David Strugnell - primary school student.

- **'Portraits of Our Land' - the Murray-Darling Basin** [Special forever support 1997]

A Special Environment: The Barmah-Millewa Red Gum Forests - a special environment with special people (the Yorta Yorta Aboriginal people) and a special place (the Dharnya Education Centre). A Special Place: The Thinking Tree - Rebekah Van Leest, Nathalia Primary School, Nathalia, Victoria. Special People: Nana Gordon - a botanical artist who died in a car crash (her illustrations included one of the parent plants of *Grevillea* Robyn Gordon, a very well known garden shrub originally identified by her botanist husband). Helen Neill, Surat State School, Surat, Queensland. Bee Keepers - it takes a special kind of person to work with bees to bring us our honey. The skills are often passed from one generation to the next. Apirists must take their hives to where the trees are flowering; often travelling long distances throughout the Murray-Darling Basin. Bonita Barton, Cohuna Consolidated School, Cohuna, Victoria. Special Fauna: Malleefowl - Neville Forde talks about this fascinating, endangered, mound-building bird. A Special Event: Cobb & Co. Anniversary - the 70th anniversary celebrations at Surat in Queensland of the last horse-drawn coach trip in Australia; from Surat to Yuleba. Jan Ritchie, Principal, Surat State School, Queensland. (tvED program 1217 28/11/95)

Support for 'Special forever' themes in Snapshot Series

SNAPSHOTS 1	SNAPSHOTS 2	SNAPSHOTS 3
Special Environments • The Pilliga	Special Environments • Wetlands • The Coorong	Special Environments
Special Places • Darling headwaters • Murray source • Murray mouth • Gundagai	Special Places • Bourke/Back o' Bourke • Bush Capital (Canberra) • The Condamine • Great Cumbung Swamp	Special Places • The Paroo • Dubbo Zoo • Macquarie Marshes • Bendigo
Special People • Charcoal burners • Paddle steamer crew	Special People	Special People
Special fauna • Murray cod • Murray cray	Special fauna	Special fauna • Pilliga mouse • 'New' yabby
Special flora • River red gums	Special flora • Quandongs • Saltbush • Hovell's tree	Special flora • Bottle trees • Mulga
Special events	Special events • Floods	Special events • Gold rush

Community Service Announcements (CSA)

- **Low phosphate detergents** [NSW DWR, July 1993]
- **Composting** [NSW DWR, July 1993]
- **Disposal of cooking oils** [NSW DWR, July 1993]
- **Alligator Weed** [NSW Agriculture, Nov. 1994]
- **Superb Parrot habitat protection** [NRMS remnant vegetation, 1995]

- **Trout Cod habitat protection** [NRMS fish, 1996]
- **Wildlife watch – Black cockatoos** [NSW NPWS, 1997]
- **Wildlife watch – Pink cockatoos** [NSW NPWS, 1997]

NATURAL RESOURCES MANAGEMENT SERIES

This Series was designed to provide an outline of the broad natural resources management areas of concern in the Basin and how the Natural Resources Management Strategy is to address them.

- **‘Salt’** (Salinity & Drainage Strategy) [30 Aug. 1991]
What is Salinity? Effects of salt on plants (graphics); Effects of salt on soils; European farming methods and salinity; Dryland Salinity; The Murray Darling Basin Commission; managing the Murray-Darling Basin through the Natural Resources Management Strategy; Salt harvesting; Origins of salt; Rising watertables and salinity; Salinity and Drainage Strategy (graphics); The Woolpunda groundwater interception scheme (graphics); Community salinity management - Barr Creek project; Kerang Agricultural Research Farm; Social impacts of salinity; Managing high watertables - Shepparton; Graphic summary of the Salinity and Drainage Strategy; Irymple South Primary School students; Conclusion
- **‘Fish for the future’** (Native fish management) [12 Feb. 1992]
Native fish of the MDB; Impacts on native fish populations; the Murray-Darling river system; Aboriginal fishing; Murray cod – a part of legend and folklore; Status of native fish – past and present; Endangered native fish – Macquarie perch and Trout cod; Snobs Creek breeding program, Victoria; Fish habitat – good and bad; Golden perch migration; Fish ladders to assist migration; Importance of flooding and the floodplain to native fish; Radio tagging fish; Murray cray; Native fish – the future.
- **‘NRMS’** (Natural Resource Management Strategy) [28 May 1992]
- **‘Water’: Inland rivers - lifelines or polluted pools?** [27 Aug. 1992]
Murray-Darling river system characteristics ; Water quality problems of the Basin ; Public awareness of water quality ; Comparison of Basin and overseas water quality problems and solutions ; Salinity ; Turbidity ; Nutrients ; Darling River algae crisis (1991) - a warning to adopt

new land management and waste disposal methods ; Research - the phosphorus connection in nutrient pollution ; Industry - Australian Newsprint Mill - Albury, NSW ; Urban - river disposal of treated sewage effluent - Albury, NSW ; Upstream/ downstream conflict; Case studies: Large urban centres - stormwater management - Canberra, ACT ; Recycling wastewater - Wagga Wagga, NSW ; Dairy waste management - Kiewa Valley, VIC ; Woodlots for wastewater - Loxton, SA; River decline by the 'tyranny of small decisions' - what can be done

Murray-Darling Basin Issues Series

This series explored some of the specific natural resources issues of concern in the Murray-Darling Basin and revealed plans and progress being made to manage them within the Murray-Darling Basin Initiative.

Where appropriate, the program managers from the MDBC office responsible for the various issues were involved in the presentation of the video. This was to give viewers confidence in the MDBC as an 'honest broker' as the people behind the programs are identified and the information is coming 'from the horses mouth' so to speak. As most of the managers were relatively young it may also send a message that there is long-term commitment. This approach helped to ensure quality control, ownership of the video and also provided the opportunity for some professional development in video/tv presentation through peer tutoring by highly experienced communicators.

- **'Wetlands-wonderlands not wastelands'** [6 Mar. 1994]

What are wetlands?; degradation; cultural values; snapshots of Basin wetlands - Barmah-Millewa, Kerang, Great Cumbung Swamp, Chowilla, Macquarie Marshes, Coorong, Paroo; cheapest river protection; management strategy; importance of drying; microscopic life; effect of flood reduction; better use of reduced flows; environmental water allocations; wetlands versus agriculture - competition for water?; rehabilitation of a disaster area-Disher Creek SA; improving wetlands; research - Macquarie Marsh case study; community involvement; artificial wetlands; wetland values; Sirocco concert - 'a celebration of the Macquarie Marshes'.

- **'Blooming Algae'** [22 Oct. 1994]

Statements about blue-green algae and its impacts; summary of problem & possible solutions-Peter Millington, NSW Commissioner; extent of blue-green algae 1991-2; Algal Management Strategy – improved flow, reduced nutrients, community awareness, research; improved flow; reduced nutrients; Case studies – Australian Newsprint

Mill (Albury), Dairy effluent management (Kiewa Valley), urban sewage treatment, artificial wetlands (Blayney & Carcoar). Community awareness; Research – phosphorus tracing (Bob Wasson CSIRO), role of micro-organisms (Russ Shiel MDFRC). Algal management summary.

- **‘Dryland Salinity - it...or us!’ [1996]**

A personal and professional struggle with dryland salinity - John Powell Yass NSW; The ‘big picture’ of dryland salinity in the MDB; A case study from the upper Lachlan - the Boorowa Catchment; Costs of dryland salinity; Impacts on urban areas - Wagga Wagga and Boorowa NSW; Impacts on individuals, the environment and industry; Managing dryland salinity - recognition of its complexity, local action and catchment planning; Tree planting - myth and reality; Facing reality - learning to live with dryland salinity.

- **‘Just add water... Irrigation in the Murray-Darling Basin’ [1997]**

The Australian environment; Irrigation in the MDB - contributing to quality of life and the economy; striking a balance and learning from history; living in a dry and unreliable climate; history of irrigation development in the MDB; Cotton - interview with father of Australian cotton industry, Frank Hadley; Environmental impacts; the role of the Murray-Darling Basin Commission; Water extraction - interview Don Blackmore MDBC; A changing industry - cut flowers at St George, Qld.; Lowbidgee organic farming south-western NSW; responsible irrigation - interview with Brian Western of Western table-grapes SA regarded by peers as an excellent irrigator; The future.

State of the Basin Series

The deterioration of the Murray-Darling Basin’s natural resources is the result of many years of often seemingly minor abuses and a fragmented approach to resource management. This cumulative damage will not be repaired overnight. Essential steps towards sustainable resource-use include an integrated approach to natural resources management and taking a holistic view of the Basin. The State of the Basin series dealt largely with projects funded through the Investigation and Education category of the NRMS.

State of the Basin reported progress being made in the achievement of specific objectives in the Riverine, Dryland and Irrigation management strategies;’ in place to work towards ecologically sustainable resource-use in the Murray-Darling Basin.

The Rivers' [1996]

Sustainable rivers; Flow-the key to improvement; Cap on water extraction; MDBC Sustainable Rivers Program-a decision support mechanism; Riverine Assessment Survey - Lachlan catchment; Cooperative research; Summer School; Blue green algae rapid assessment; Phosphorus reduction using ferrous chloride; Impact of flows on native fish; Illegal fishing; the state of the rivers in 1996.

TV File Footage

- Blue green algae
- Red gum forest
- Wetlands
- Hume Dam
- Rivers
- Mountains

RIVER MURRAY MANAGEMENT SERIES

This series was designed to assist greater public appreciation of the diversity of our most important river along its length and promote awareness that management requirements vary accordingly. It was to provide information and promote discussion of river regulation.

- **'The River Runners-regulating the Murray'** [Oct. 1993]

River regulation - a balancing act; The Murray - source to sea; Natural flow; Community values before regulation; Social, patriotic and economic reasons for regulation; Sir Ronald East - personal experience of the impact of river regulation; Benefits of a reliable water supply; Recreation and tourism; Role of the Murray-Darling Basin Commission in the regulation of the Murray; History of regulation: Navigation V's irrigation debate in the late C19th; Drought 1895-1902 and Corowa Water Conference; River Murray Waters Agreement 1915; Running the river - River Murray Commission 1917-1987 and Murray-Darling Basin Commission 1988-; Upper Murray catchment Hume and Dartmouth Storages; Mid-river storages - Lake Victoria and Menindee; Navigation past and present; Maintaining locks and weirs; Murray Mouth Barrages; Problems caused by river regulation; Floods; Future challenges.

APPENDIX 6: Governance similarities between the lower Murray lakes and Coorong and the lower Murrumbidgee floodplain Bioregions

- Employment of landscape-scale, adaptive management to work with local land and waterscapes, under a range of natural and human-influenced conditions;
- The use of local knowledge and vernacular processes developed over generations of observation and experience, in addition to the latest scientific information, to work in harmony with local ecosystems.

Intimate local knowledge of the fish species, climate and waterscape means that commercial fishers can harvest sustainably by setting nets to catch specific species, constantly monitoring catches, and moving between ecosystems and species. Farmers also move between ecosystems, have protected large areas of ecologically significant habitat on their private land, and utilize knowledge of soil characteristics to store water in its profile to minimise evaporation over the summer period;

- Recognition that healthy ecosystems are crucial to livelihoods;
- Vulnerable geographic location. The problem of ecosystems and communities at the bottom-ends of rivers 'dying from thirst', as a result of catchment-scale developments and excessive upstream diversions, is a global issue;
- Cultural landscapes with long history of intensive Aboriginal occupation;
- Large negative impacts of mechanistic river regulation priorities. The construction of an inadequate number of environmental weirs to divert water onto the lower Murrumbidgee floodplain has left stranded 65 000 hectares of flood-dependent land consisting of rich alluvial soils. On the lower Murray, 89% of richest fishing grounds were lost as most of the natural estuarine area was turned to freshwater by barrage construction, with a further 4% loss of estuarine fishery to hyper-salinity since construction;

- Self-imposed rules to minimise negative impacts on species and natural habitat.
Self-imposed rules in relation to equipment and methods include the banning certain net mesh-size to exclude juvenile fish, and using manual net hauling to avoid damaging sensitive coral sites. Fishers have also imposed bans on the use of mechanical cockle harvesters. A large area of land on the lower Murrumbidgee floodplain is farmed organically;
- Independent accreditation of activities e.g. Biological Farmers of Australia (BFA), Marine Stewardship Council (MSC);
- Recognition of the importance of co-operation for social-ecological resilience because of the indivisibility of resources (establishment of industry institutions and on-going communication to maintain support networks);
- Activities and 'land-use' complement public conservation areas;
- Value-adding to maximise returns while reducing impacts e.g. farming organically and growing specialist or niche cereal varieties (for biscuits, pasta, bread, breakfast cereals), and also offering buyers on-farm storage of grain until required. Fishers value add by operating fish restaurants; and by preparing products so that they are more attractive for consumers, such as filleting. By preparing the cockles for human consumption, for example, the fishers can receive ten times the bait value.
- Appreciation of the importance of ongoing communication with Australian public so that community contributions to a sustainable future are recognised.

APPENDIX 7: The Murray-Darling Basin Commission Communication Package 1990 – 1998

In-depth environmental education depends on using a wide range of mutually reinforcing educational approaches in long-running programs.

Malcolm 1992: 33

It was the policy of the Communication Unit to develop at least one major strategic project each year to add to the framework of mutually reinforcing education programs and communications methods to create a broad-based flexible cumulative process:

1990	Development of a broad-based, on-going publications program and establishment of a photograph library;
1991	Initiation of on-going video program, and a survey of 40 Basin communities to discuss a proposed touring exhibition;
1992	Co-production of MDB touring exhibition, A Changing People: A Changing Land (1993-1996);
1993	Initiation of 'Special forever' primary school environmental education-literacy -intergenerational equity program;
1994	Research and development of Adult Learning Circle community decision support kits; implementation of major media liaison program and; initiation of the on-going production of MDB flora, fauna and landscape watercolour illustrations;
1995	Re-establishment of interstate communication program integration working group and on-going research into community education for sustainable resource-use;
1996	Initiation of on-going audio program; co-production of a monthly magazine supplement;
1997	Research, development and co-production of multi-media CD-ROMs;
1998	Proposed initiation of MDB 'Reading the Land' regional asset assessment.

APPENDIX 8: The traditional Agricultural ‘Extension’ Model

In addition to ‘command and control’ management, operating ‘in the shadow of the old regime’ (Bartley 2008: 167), the NSW CMA model is vulnerable to the reintroduction of a variation of the prescriptive research-development-diffusion-adoption (RDDA) process, in its relationship with the community. The simplistic linear RDDA, ‘agricultural extension’ model was introduced after World War II and was largely abandoned by agricultural departments in western industrial societies by the late 1970s in favour of systemic approaches. It was strongly rejected as a suitable model for developing a government-community partnership by the originators of the Murray-Darling Basin Initiative in the early 1980s. It was used as a frame of reference for what was undesirable for the achievement of an effective government-community partnership to progress towards an ecologically sustainable and humanly desirable future for the Basin.

The RDDA process was designed for one-way information transfer; generally to train farmers in the use of new technologies before access to that information became readily available. While it is easy to appreciate the administrative appeal of a prescriptive, mechanistic model to technocrats naively attempting to use ‘technical means to achieve social ends’ (Kemmis et al. 1983: 28); the model is seriously flawed, as Curtis (1995: 38) explains:

Diffusion theory has been criticised on the grounds that it had a bias towards new technology and ignores the social and environmental impacts of technological change; underestimated the importance of local or indigenous cultures in rural development; ignored the importance of feedback and farmer innovation in agricultural systems; and assumed there would be a ‘trickle down’ of the benefits of new technology from the more innovative opinion leaders or progressive farmers to other members of a social system.

The RDDA process failed to take into account the complex socio-cultural aspects of change and cooperation, it failed to reconcile diverse stakeholder interests, and tended to privilege technologically and chemically ‘progressive’ farmers and exclude others. It blamed individuals for non-adoption of technologies, assumed homogeneity, excluded local knowledge, ridiculed vernacular farming practices, and did not have a feedback loop to the developers (Roling 1988: 49, 66; Vanclay and Lawrence 1995: 116). In some situations, a particularly unpleasant ‘blame’ culture developed where late adopters were labelled ‘laggards’ without considering the circumstances. A pernicious downward coercive culture emerged due to unrealistic pressures ‘from above’ to achieve prescribed ‘quotas’. Each part of the chain blamed the next down the line for any lack of success, (Rogers 1995: 116-120).

APPENDIX 9: Flood Control Districts and Flood Control and Irrigation Districts

The *Water (Amendment) Act, 1940*, enabled two new water-use categories to be established under the *NSW Water Act 1912*: flood control districts for the purpose of controlling floods; and flood control and irrigation districts for controlling floods and enabling land to be irrigated by flooding, mimicking natural events (NSW Government, 1941: 6-7).

The two new categories appeared to simply formalize the lack of rights of floodplain landholders and bring them under the control of the Water Conservation and Irrigation Commission, with few obvious benefits. The floodplains could be formally used as ‘dumps’ for floodwaters, which at the time were generally viewed as damaging to economic production and infrastructure in other parts of a catchment, and rates could be charged for flooded land, but unlike all other ‘irrigation’ areas in New South Wales, there was no volumetric water entitlement attached to the new districts. Part VII of the *Water Act, 1912* dealing with Flood Control Districts and Flood Control and Irrigation Districts includes the following:

162. (1) Nothing ... shall render it obligatory upon the Commission to provide flood irrigation to any land or person in any flood control and irrigation district.

(2) The control of works within a provisional district or district, the arrangements for distribution of water for flood irrigation, and the order of supply or diversion of water for flood irrigation shall be entirely under the control of the Commission, and in the exercise of its authority in those respects the Commission shall not be under any restraint nor shall compensation be payable to any person by reason of or for any cause arising out of the flooding of his land ...

163. (1) For the purposes of this Part the Commission or any person authorized by it may enter any lands and take levels and make surveys and marks and fix pegs and stakes and inspect any works.

Water Act No. 44, 1912 (1975): 207-208.

It appears that only two Flood Control and Irrigation Districts (FC&ID) were constituted, the Lowbidgee FC&ID (1945), and Medgun FC&ID (1946) on the lower Gwydir floodplain, north-west of Moree. The latter appeared to have been small and short-lived.

APPENDIX 10: Australian National Sustainability Initiative (ANSI)

DVD includes ANSI Action Plan and 20 minute *Lowbidgee Flood Country* 2003

