Collaborative Water Planning: Context and Practice Literature Review

Volume 1

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ABS	Australian Bureau of Statistics
ANZECC	Australian and New Zealand Environmental and Conservation Council
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
ATSIC	Aboriginal and Torres Strait Islander Commission (abolished 2005)
CEO Group	Chief Executive Officers' Group on Water
CHRRUPP	Central Highlands Regional Resource Use Planning Project
CoAG	Council of Australian Governments
DEH	Department of Environment and Heritage (Australian Federal Government)
DMCE	Deliberative Multi-criteria Evaluation
DoW	Western Australian Department of Water
EPBC Act	Environment Conservation and Biodiversity Act 1999
ESD	Environmentally Sustainable Development
GIS	Geographical Information Systems
IAPP	International Association for Public Participation
IC Report	Industry Commission Report 1992
ICESD	Intergovernmental Committee for Ecologically Sustainable Development
IGAE	Intergovernmental Agreement on the Environment
ISS	Ideal Speech Situation
LWA	Land and Water Australia
M&E	Monitoring and evaluation
MCA	Multi-Criteria Analysis
MCASDS	Multi-Criteria Analysis Shell for Spatial Decision Support
MCE	Multi-Criteria Evaluation
MDBMC	Murray Darling Basin Ministerial Council
MLDRIN	Murray Lower Darling River Indigenous Nations
MSC	Most Significant Change
NAPSWQ	National Action Plan for Salinity and Water Quality
NCC	National Competition Council
NCP	National Competition Policy
NGO	Non-Government Organisation
NHT	National Heritage Trust
NRM	Natural Resource Management
NRW	Queensland Department of Natural Resources and Water
NSW	New South Wales

NT	Northern Territory
NWI	National Water Initiative
OECD	Organisation for Economic Cooperation and Development
Qld DNRW	Queensland Department of Natural Resources and Water
TR	Tropical Rivers
TRaCK	Tropical Rivers and Coastal Knowledge
TWG	The Wentworth Group of Concerned Scientists
UN Water	United Nations Water
WCED	World Commission on Environment and Development

Abstract

This literature review is the first in a series of three foundational documents prepared for the Tropical Rivers and Coastal Knowledge (TRaCK) Collaborative Planning Project (Volume 1). It provides a review and analysis of the literature to provide the conceptual foundation underpinning the project. This review:

- **outlines the biophysical characteristics of northern Australian rivers and catchments**, their human history, current land and water use, and development pressures to which they are subject;

- **chronicles the history of water management in Australia**, highlighting water policy and Council of Australian Governments (CoAG) reform in this area. The discussion locates water planning within the broader field of collaborative natural resource management (NRM), and introduces concepts germane to this topic, including collaboration, power, citizen participation, social capital and social learning. The place of and limits to collaborative NRM are also discussed;

- **examines citizen participation in water planning processes** from both international and Australian perspectives, particularly in light of current Australian water reform and the National Water Initiative. Various paradigms in water planning ranging from ad hoc, opportunistic planning; the development of large-scale, state-funded infrastructure development, through to the use of economic instruments and socio-economic assessments, nationally consistent entitlements, inclusion of environmental flow objectives and enhanced public participation are also summarised. The notion of a spectrum of increasing citizen participation is also discussed, as are the tensions evident in the National Water Initiative between regulatory, market-based and participatory planning paradigms;

- **discusses the treatment of values in NRM and water planning.** It addresses the different meanings of value, sociological theories of value and methods of valuation, particularly the way decision makers recognise and understand values of various participants in water planning;

- **focuses on issues of Indigenous participation in water planning in Australia.** The Australian Governments' National Water Initiative aims to address Indigenous interests in water through water planning processes. Several issues are identified including negotiating between the very different ways Indigenous and non-Indigenous people know, value and talk about water; differences in social, geographical and temporal scales; appropriate representation and structures for Indigenous participation in water planning; the need for adequate resourcing to allow effective Indigenous participation; and the need to redress power imbalances that disadvantage Indigenous people in decision making. The lack of any systematic studies of the outcomes of Indigenous involvement in water resource planning in Australia and the need to develop ways to address the issues identified above are emphasised;

- **explains a range of tools that may be used to reveal trade-offs**, or situations that involve decisions where each choice that may be made has both advantages and disadvantages. Tools discussed include multi-criteria evaluation; the citizens' jury; deliberative multi-criteria evaluation; consensus conferencing; deliberative polls; and focus groups;

- **explores the notion of collaboration in water and natural resource planning and management**, arguing that there is limited empirical evidence of the benefits of such an approach and an absence of an established framework from which to analyse and assess such evidence. A range of criteria, derived from the literature are presented as the basis for a monitoring and evaluation framework to assess collaboration in water resource planning.

1. Introduction

After Antarctica, Australia is the driest continent on Earth. Water is differentially distributed across its surface. Groundwater, water below the surface of the earth, is related to surface water in complex ways that sometimes span the boundaries of many surface water catchments. In Australia, this is particularly the case with deep groundwater. Climate change is causing changes in rainfall. In general terms, areas in the south of the continent are subject to drying, and areas in the north are experiencing greater rainfall and the prospect of more extreme weather events. While Council of Australian Governments (CoAG) agreements have sought to encourage consistency in terms of management of water, it is unsurprising that a federation of states and territories, experiencing climatic change in different ways, has varying legislation and government policies.

The vast majority of Australian people live within 50 kilometres of the coast (Natural Resource Management Ministerial Council 2006:4). The trend towards coastal living is continuing and is particularly evident in the major urban areas of Australia. This population pressure, combined with changing rainfall patterns, particularly lower rainfalls in urban water catchments, is placing significant pressure on urban water supplies. While many of the heavily populated areas of coastal and southern Australia are experiencing less rainfall due to the influence of climate change, the reverse is true in many parts of northern Australia. Demand for water for irrigation is high and, increasingly, not able to be met in areas of the south of the continent where agriculture is a dominant land use. There are growing calls to investigate the agricultural potential of the now wetter north of the continent in response to this pressure.

Yet water resource science and planning are in their infancy in north Australia and this vast area faces an enormous knowledge deficit, under-developed catchment management structures, low population numbers, and a growing Indigenous population facing multiple sources of social and economic disadvantage. Indigenous environmental knowledge will be of value in improving our understanding of water resource issues, but new pressures and changing institutional arrangements will require concerted efforts from all participants (Hamilton and Gehrke 2005).

Australia's pre-eminent water policy, the National Water Initiative (NWI) places a great deal of emphasis on water planning as the mechanism through which water resource management will be restructured and sustainable and equitable water allocations achieved. It calls on States and Territories to develop water entitlement and planning frameworks to:

- address systems where water is over-allocated or overused;
- address environmental and public needs for water;
- reflect regional differences in water supply; and
- identify and manage high conservation value water systems.

CoAG and the NWI have set an ambitious agenda for reform. Achievement of the central objectives of the reform depends on comprehensive planning systems based

on full basin wide hydrological assessment of the resource. Water planning is seen as “an important mechanism to assist governments and the community to determine water management and allocation decisions to meet productive environmental and social objectives” (Council of Australian Governments 2004: para 36). The NWI requires more transparent and comprehensive water planning that deals with key emerging issues. The plans, based on adaptive management, are to provide for secure ecological outcomes and resource security outcomes.

A strong principle that underpins planning is that water users, interest groups and the general community are to be involved as partners in catchment planning processes. Rising concern for environmental sustainability and the need for water planning, water entitlements and water trading processes to take account of local circumstances explain the emphasis given to public participation in the NWI (Connell, Dovers and Grafton 2005). Water planning processes usually involve some element of community consultation and participation, often via the establishment of advisory committees or reference groups comprising representatives of groups from industry, community and government. But despite the attempt to consult and involve the public in water reform and management, the scale and pace of change and the size of the water governance challenge has meant that implementation has been contentious.

Tensions will inevitably arise between different stakeholders particularly where over-allocated water systems are required to be returned to an environmentally sustainable level of extraction (Hussey and Dovers 2006). It is precisely for the purposes of reconciling conflict between stakeholders that the water planning process is required to be transparent. The whole planning process and management system is required to provide a much greater capacity to make trade-offs between competing uses in ways that will gain and maintain community support (Connell and Dovers 2006).

For all the recent discussion on the virtues of community-government partnerships, there is insufficient clarity and agreement amongst various parties as to what constitutes a partnership or collaboration, and how collaborative procedures actually operate. This review and analysis of the literature highlights the ill-defined and nebulous nature of the community-government partnership principle. This is due, at least in part, to the way power, responsibility and authority are understood by politicians and government agency staff involved and the way that, as a result, these ‘partnerships’ are then implemented and evaluated. While some may see empowering the community as potentially providing better outcomes from the implementation of government policy, others may see it as eroding the power, responsibility and authority of a democratically elected government. Depending on circumstances, both may be correct. Tensions between citizen participation and representative democracy gives rise to a variety of competing and sometimes contradictory interpretations and definitions of terms such as ‘partnership’ found in the literature on citizen participation, public involvement and participation and community engagement in government, and is mirrored in the literature on the role of citizens in natural resource planning and management. In practice, government water planners and those they involve in the process from community and industry may also understand such terms differently. For example, some may see ‘partnering’ as working together or collaborating with others in a way that involves re-negotiating

authority and responsibility. Others may see partnering as simply a relatively passive process of informing or consulting and seeking opinions of those who may be affected by water planning processes. This ambiguity extends to a wide range of terms relating to public participation in the water planning process, including 'collaboration'.

In this Collaborative Water Planning Project the research team has used the term collaboration to mean 'actively working together'. The research team is interested in better understanding the processes by which people engage in an active process of working together to manage water; in how collaborative procedures actually operate in the water management context. Government agencies usually initiate and lead water planning processes. This usually involves informing and consulting with community and industry affected by the outcomes of such a planning process. Collaborative approaches need to involve citizens more actively, as members of water planning committees, learning about water issues, undertaking joint fact-finding and deliberating over decision-criteria, making decisions together about advice to government on water planning matters. Implicit is the notion of inter-dependence, where the parties have something to gain from collaborating, indeed, believe they can only achieve their respective outcomes by doing so.

It is in this setting that the TRaCK Collaborative Water Planning Project has sought to understand the practice of collaborative water planning, and in particular, the barriers and enablers to effective public participation. TRaCK, the Tropical Rivers and Coastal Knowledge Research Hub, is a consortium led by Charles Darwin University, CSIRO, Griffith University, Land & Water Australia, the North Australian Indigenous Land & Sea Management Alliance and the University of Western Australia. In 2007, TRaCK was established as a research hub under the Commonwealth Environmental Research Facilities Program. TRaCK aims to provide the science and knowledge needed by governments, communities and industries for the sustainable use and management of Australia's tropical rivers and estuaries.

The Collaborative Water Planning Project seeks to improve water planning efforts at two levels:

- **nationally:** by developing a tool-kit of good practices to engage industry, Indigenous and rural communities; by setting guidelines and benchmarks to monitor and evaluate collaboration in water planning; by establishing procedures that integrate Indigenous values into water planning; and

- **regionally:** by assisting north Australian water agencies to improve water planning approaches; by helping to minimise conflicts between parties; by providing models and case studies for good collaboration; by helping stronger, long-term relationships between stakeholders.

The project has three components (See Figure 1 below):

1. a review and analysis of the literature to provide the conceptual foundation underpinning the project. As well as scientific literature relating to natural resource management, water administration and planning, collaboration and public participation (Volume One), this component includes a volume on public dispute resolution (Volume Two), and the legal and policy environment relevant to north Australia (Volume Three);
2. two retrospective case studies that sought to understand contemporary water resources planning in north Australian settings, one of the Ord River Water Resources Plan in Western Australia and another of the Gulf Water Resources Plan in Queensland; and
3. two prospective case studies, one in either the Greater Darwin region or Mataranka in the Northern Territory, and the other in the Wet Tropics Region of north Queensland.

While it was always the intention of the project research team to undertake a literature review as a foundation for the project, an initial literature scan revealed that this needed to be complemented by an analysis of institutions and legislation impacting on northern Australian water planning, if the team were to gain a comprehensive understanding of the project context and the ability to answer several key questions –

- "What is water planning?"
- "What is its place in Northern Australia?" and
- "How is water planning best conducted in such settings?"

An understanding of management of conflict arising from natural resource disputes, such as those associated with water resources, also emerged as key to this endeavour. The team has determined that the outputs of this review and analysis, for conceptual coherence, are most sensibly presented in three volumes. This document, *Collaborative Water Panning- Context and Practice,* is the first.

Figure 1 below shows the sequence of activities to be undertaken in two phases. The Literature Review (Volume One), Review of Public Dispute Resolution Over Natural Resources (Volume Two), The Legal and Policy Analysis (Volume Three) and The Two Retrospective Case Studies (Volume Four) are all to be undertaken in Phase One.

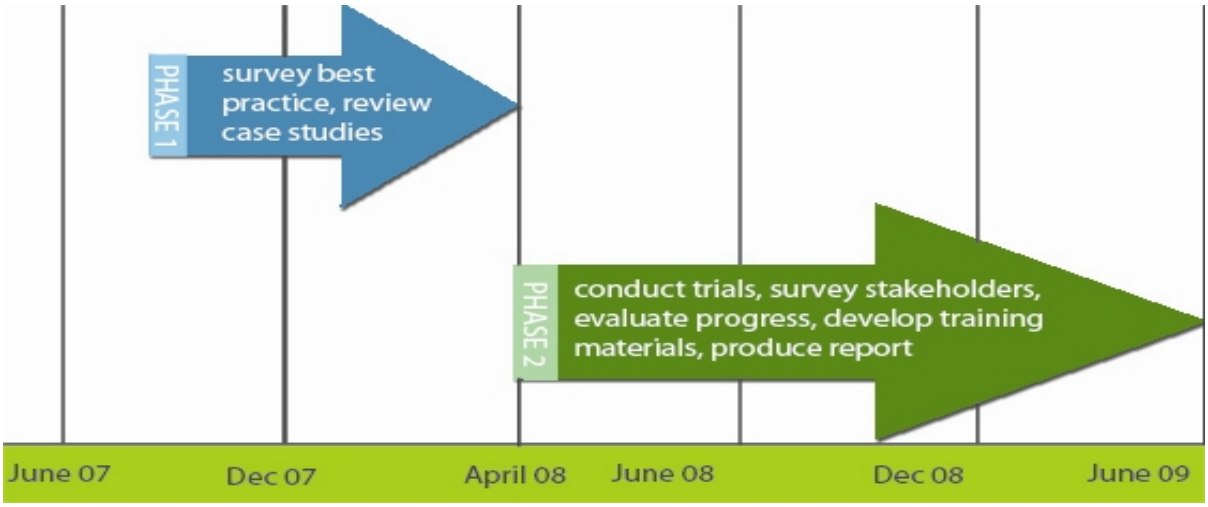

Figure 1: Diagram showing timing of various project components

The two prospective case studies, to be undertaken in Phase Two, will involve participants in action research[1] to implement and evaluate lessons from both the review and analysis of literature, institutional arrangements and the retrospective case studies. Outputs will form a toolkit of good practices and improved planning approaches which will be developed into a training program on collaborative water planning in Northern Australia. These products will also be available for use and further refinement in other collaborative water planning settings elsewhere in Australia and overseas.

The following section provides a brief overview of each of the volumes.

Volume One – Literature Review: Collaborative Water Planning, Context and Practice

- **outlines the biophysical characteristics of northern Australian rivers and catchments**, their human history, current land and water use, and development pressures to which they are subject.

- **chronicles the history of water management in Australia**, highlighting water policy and Council of Australian Governments (CoAG) reform in this area. The discussion locates water planning within the broader field of collaborative natural resource management (NRM), and introduces concepts germane to this topic including collaboration, power, citizen participation, social capital and social learning. The place of and limits to collaborative NRM are also discussed;

- **examines citizen participation in water planning processes** from both international and Australian perspectives, particularly in light of current Australian water reform and the National Water Initiative. Various paradigms in water planning ranging from ad hoc, opportunistic planning; the

[1] Action Research is an approach to applied research which participants take on an active co-researcher role. Researchers enter into a collaborative partnership with participants to facilitate improved practice through the direct application of research findings in a practical context. See Carr and Kemmis (1986) and Greenwood and Levin (1998).

development of large-scale, state-funded infrastructure development, through to the use of economic instruments and socio-economic assessments, nationally consistent entitlements, inclusion of environmental flow objectives and enhanced public participation are also summarised. A spectrum of increasing citizen participation is discussed, as are the tensions evident in the National Water Initiative between regulatory, market-based and participatory planning paradigms of resource management;

- **discusses the treatment of values in NRM and water planning.** It addresses the different meanings of value, sociological theories of value and methods of valuation, particularly the way decision makers recognise and understand values of various participants in water planning;

- **focuses on issues of Indigenous participation in water planning in Australia.** The National Water Initiative aims to address Indigenous interests in water through water planning processes. Several issues are identified including negotiating between the very different ways Indigenous and non-Indigenous people know, value and talk about water; differences in social, geographical and temporal scales; appropriate representation and structures for Indigenous participation in water planning; the need for adequate resourcing to allow effective Indigenous participation; and the need to redress power imbalances that disadvantage Indigenous people in decision making. The lack of any systematic studies of the outcomes of Indigenous involvement in water resource planning in Australia and the need to develop ways to address the issues identified above are emphasised;

- **explains a range of tools that may be used to reveal trade-offs** – situations that involve decisions where each choice that may be made has both advantages and disadvantages. Tools discussed include multi-criteria evaluation; the citizens' jury; deliberative multi-criteria evaluation; consensus conferencing; deliberative polls; and focus groups;

- **explores the notion of collaboration in water and natural resource planning and management**, arguing that there is limited empirical evidence of the benefits of a collaborative approach and an absence of an established framework from which to analyse and assess such evidence. A range of criteria derived from the literature are presented as the basis for a monitoring and evaluation framework to assess collaboration in water resource planning.

Volume Two – Literature Review: Best Practices Strategies and Techniques in the Resolution of Public Disputes over Natural Resources

- **characterises the nature of conflict in natural resource management,** advocating a new role for government as a catalyst for conflict management in water and natural resource planning and management. This volume emphasises the importance of designing appropriate systems to manage and, where possible, resolve conflict. Criteria for success, the nature of the system components, and case studies which exemplify these criteria and system components, are also presented.

Volume Three – Water Planning: a legal and policy analysis

- **introduces and analyses the legal and policy framework within which collaborative water planning exists**. This volume starts at the national level, looking at the constitutional basis of the Commonwealth's role in water planning, recent policy and legislative aspects of its role, including the National Water Initiative; Native Title and Cultural Heritage legislation; the National Water Plan and the Commonwealth Water Act (2007). The volume then addresses the legislative requirements at a State level, identifying the generic features of their water legislation. A description and analysis of the water planning legal framework state by state is included. This state by state analysis emphasises aspects germane to collaborative water planning referred to in earlier volumes, including public participation, socio-economic values, Indigenous participation, tools for tradeoffs and monitoring and evaluation of the water planning process.

While these three volumes may be read as stand-alone works, they together, along with the findings of the two retrospective case studies, will provide a sound foundation to inform the action research that comprises the two prospective case studies to follow in Phase Two of the project. At the time of writing the project team has begun an initial analysis of the data gathered in the two retrospective case studies, relating this to the review and analysis of literature presented in these three volumes and the reflecting on emerging themes that may inform this action research.

At this stage four major inter-related themes are prominent. Firstly, our literature review and analysis reveals that much is already known about the process of collaboration in natural resource planning and management. In addition, different disciplines such as planning, international development, cultural heritage management, economics and social science have developed tools and techniques to address issues such as Indigenous engagement, trade-off analysis and adaptive management. A key gap, which is in part addressed by this review, is the synthesis of these diverse and disparate tools and techniques into a consistent framework which can be applied to the specific area of water planning. Given this is the case, the question is as much one of determining where, when and which tools are 'fit-for-purpose' for water planning, as it is of building capacity amongst water planning practitioners in making decisions about tool selection and use.

Secondly, whilst Indigenous legal rights to water have now been recognised by the common law, matters of Indigenous participation and native title rights to water may not always be fully understood by agencies. For Indigenous participation and rights, issues arise relating to cultural differences in ways of knowing, valuing, communicating and making decisions. Depending on the circumstances facing each planning initiative, the Crown ownership of water may be contested by Indigenous groups. The issues affecting Indigenous participation are explored more fully in this volume, and the legal and policy context are described fully in Volume Three. An emerging paradigm of Indigenous participation in Natural Resource Management (NRM) and its relationship to non-Indigenous NRM need to be further explored, understood and articulated if participants from both Indigenous and non-Indigenous cultures are to collaborate effectively in water planning. Given that northern

Australian regions tend to have a relatively high proportion of Indigenous people, further attention will be given to these matters in the action research case studies being undertaken in Phase Two of the project.

Thirdly, water planning has undergone a series of phases over time during which different paradigms have been evident. Water planners have been, and continue to be, variously concerned with engineering efficiency, economic development, environmental sustainability and community and industry collaboration. The agencies within which they work also exist within a political environment, with staff working both as agents of the government of the day, as well as servants of the public. Further complexity, confusion and contestation arise from the interplay of potentially competing paradigms within the water sector, including market-based decision-making, engineering solutions and the demand for political action to halt the decline of freshwater ecological systems. Developing a toolkit of good practices in water planning may involve making tools that allow water planners to reflect on and, where necessary, adapt the structure and culture of their agencies in response to the internal barriers and enablers to collaborative water planning that they identify, as much as it is about seeking tools to build better ways to work with others outside their agency. Analysis of the prospective case studies will further understanding of this theme, particularly in terms of implications for water planning in northern Australia.

Fourthly, there appears to be a lack of a systematic, widely applied monitoring and evaluation framework for collaboration in Australian water planning. The discourse of collaboration (including citizen participation) has become increasingly evident in water planning legislation, policy, and practice for over two decades. However, a systematic framework for the evaluation of the outcomes and impact of collaboration in water planning appears lacking – both in terms of monitoring and evaluating the quality of the collaborative process, and in terms how it may have influenced on-ground water management outcomes. The lack of rigour in applying the term often results in water planners, and their government agency supervisors operating in an environment where terms such as ‘involve’, ‘consult’, ‘collaborate’ and ‘partner’ retain a cultivated ambiguity. Some have claimed that the outcomes expected of deliberative forms of collaboration are naïve and unrealistic underscoring limitations to current political and social theories of collaboration, deliberation and social learning. The dilemmas of when to collaborate, with whom, for what purpose, how frequently and by what methods, and how to report back on the usefulness of these collaborative endeavours arise. Empirically tractable methods for assessing collaborative outcomes are currently under-developed, particularly those suited to deliberative processes. Reporting on such matters logically involves comparing collaborative outcomes to those achieved using other approaches, meaning that the processes and outcomes achieved using other non-collaborative water planning paradigms would also be best evaluated using a similar framework.

These enhanced themes will form the focus of the two action research case studies in Phase Two of this project.

2.1 Australian Water Management: An Introduction and Brief History

2.1.1 Introduction

Water, like energy and clean air, makes an essential contribution to Australia's social well-being, lifestyles and the maintenance of the natural systems that underpin economic activity (Foran and Poldy 2002; Chartres and Williams 2006). Australia is the driest inhabited continent on Earth. Of all the continents, it has the least runoff per unit area, the lowest percentage of rainfall as runoff and the least amount of water in its rivers. Australia's water resources are highly variable and reflect a continental range of climatic conditions and terrain (Chartres and Williams 2006). The level of development of Australia's water resources in the north and south also shows a marked contrast.

Sustained below average rainfall, and even extreme drought, for many parts of Australia has affected the availability and reliability of water, while focusing public attention on the connections between human-induced climate change and water shortages. During the past ten years, the risks to Australia's water resources have been increasing, despite national attention and action. In spite of extensive and widely supported government programs, freshwater ecosystems across Australia continue their general decline (Nevill, Maher et al. 2001).

Australia's water consumption has significantly increased in both rural and urban regions. We are the fourth highest water users per capita in the Organisation for Economic Cooperation and Development (OECD). Water experts note that most studies report expanded water use of about 2-3% p.a. over the last 30 years, closely linked to economic growth (cited in Foran and Polzy 2002). The recent National Land and Water Audit has calculated a rate of increase of 4% during the 1990s, representing a doubling time of approximately 20 years (ibid).

In the recent past, the perception of an abundance of water and vast tracts of undeveloped land in northern Australia led to overly optimistic predictions of the development potential in northern Australia. This has resulted in some spectacular failures, including attempts to grow cotton and rice in the Kimberley region of Western Australia and the Northern Territory (Davidson 1969). Despite past failures, greater controls on land clearing and over-use of water resources in southern Australia have given rise to renewed interest in irrigated agriculture in the north and future economic development in the region will almost certainly involve the exploitation of its water resources (Australian Tropical Rivers Group 2004; Hart 2004).

2.1.2 The Ontology of Water

Before discussing the major water management issues facing Australia further, a brief consideration of the ontology of water is warranted because of the significant relationship between Indigenous people and Australian landscapes and natural resources. Over recent decades tensions between Indigenous and non-Indigenous

ways of knowing and relating to features of the world and managing our interactions with the environment have been observed by many researchers and resource managers (Verran 2002; Christie and Perrett 1996; Baker, Davies and Young 2001).

Contemporary NRM in Australia is dominated in most times and places by a western scientific paradigm and a key feature of this dominant system is the conceptual separation of nature from culture. According to this dichotomy Indigenous peoples' relationship with land and waterscapes is framed primarily through the lens of 'culture', and its corollaries 'tradition', and 'heritage'. This framing embeds a separation between so-called 'nature' and 'culture' which is pervasive and largely transparent in contemporary European-styled conceptions of land and waterscapes (McFarlane 2004) and the attendant policy responses in environmental management. The testimony of Western technoscience has 'nature' existing in and of itself - affording objectified 'nature' what we often refer to as 'intrinsic value'. In this framing, a universal 'nature' is the arena of human action (Latour 1993: 180); such that 'nature' or 'the environment' is 'out-there' (external to and separated from humans) while 'culture' or the social resides 'in here' (within people and their groupings). Nature is thus its own, distinct category and sits outside (or at best alongside) of the domain we label 'culture'. In much environmental management practice, Indigenous interests are treated as cultural phenomena, and much Indigenous environmental knowledge is marginalised by the dominance of scientific systems of knowledge that seek a complete understanding of the 'natural' world.

The nature/culture dichotomy described here is apparent in the government legal and policy documents that enshrine the domain of natural resource management in Australia. For example, the principle Commonwealth statute on environmental regulation, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) reflects the World Heritage Convention's distinction between 'natural' and 'cultural' heritage in the heritage protection regime it contains (see Australian Government 1999: 182). The *National Strategy for the Conservation of Australia's Biological Diversity* reiterates the separation of 'nature' (the sum of biological diversity) and 'culture'. The Strategy describes biological diversity (or 'nature') as the basis for cultural development and action (or 'humanity's needs'):

> Biological diversity is the primary source for fulfillment of humanity's needs and provides a basis for adaptation to changing environments. An environment rich in biological diversity offers the broadest array of options for sustainable economic activity, for nurturing human welfare and for adapting to change (Department of the Environment, Sport and Territories 1996: 108).

Aboriginal Australians argue, however, that the categories of 'nature' and 'culture' do not reflect or resonate with their ways of knowing or managing land and country, their relationships with those features, or the spaces and places classified as having a heritage value under Australian common law or policy. Indigenous territories are often referred to by Aboriginal people as 'country': a socialised place created by ancestral beings who established the social, legal and economic institutions governing Indigenous societies.

It is a challenge for the environmental sciences to interrogate the pervasive dichotomy between nature and culture in western science in order to credit the basis

of Aboriginal conceptions of the world.

For example, Aboriginal analysts explain that Aboriginal people in north-eastern Arnhem Land do not make a distinction between so-called 'natural' and 'cultural' or 'social'. In the Yolngu Aboriginal ontology, people and places are co-constituted and emerge together in the everyday practices of being in the world (Marika-Mununggirittj and Christie 1995; Yunupingu 1998). This is in contrast to the foundational categories of Western technoscience - the categories/things we know as 'nature' and 'culture' and the 'human' and 'non-human' - which order our world and our relations with it in particular ways.

The domains of 'nature' and 'culture' reflect another set of categories: that of the material and of the representational or symbolic respectively. Jackson (2006) alerts us to the problems associated with this ordering when considering Indigenous interests in water planning in the Daly River region of the NT:

> the implicit dichotomy between the material (e.g. environmental, economic) and a separate symbolic sphere of meaning (belief and value), otherwise understood as cultural, relegated Aboriginal interests to a realm of negligible significance to the political economy of regional agricultural development and marginalised them within environmental research and action (2006: 29).

The tension between different ways of knowing and acting within socio-ecological systems arises due to the fact that in endeavours such as land and water planning, Indigenous and non-Indigenous participants are actually talking about and acting upon *different kinds of things.* To put it another way, the objects that we are describing and acting upon (or using) are not understood in the same ways by Indigenous and non-Indigenous participants. And this observation refers as much to water as to any other 'natural resource' or environmental feature. This is a question of differing ontologies. Indigenous and non Indigenous participants are working within different theories of what is in the world, the categories that constitute it (for example, our 'natures' and 'cultures') and how these fit together to produce predictable outcomes (our logics).

To make the differences between Aboriginal and non-Aboriginal ontologies explicit is to open up questions of how things could be otherwise. It allows us to see that other ways of being in and knowing the world are legitimate and workable. This perspective dictates that mutual understandings about the 'value' of things coalesce around taken-for-granted objects/concepts such as 'water'. In contemporary European-style approaches to environmental management in Australia, this thing called 'water' has emerged in planning and policy discourses as a 'resource' or 'asset' (see Section 2.2) and is located in the domain of 'the natural'. For Indigenous peoples, however, water eludes this type of classification and is very different entity altogether.

Water, in Aboriginal life, is not in any way separated from people and their actions. As Raymattja Marika, Yolngu Aboriginal academic notes, estuarine water has both physical, metaphorical and spiritual elements and effects. Estuarine water or *Ganma* is a metaphor for knowledge that belongs to particular land and sea owning Yolngu groups in North-east Arnhem Land (see Marika 1999: 185). *Ganma* has been used by Yolngu people as a protocol and inspiration for negotiating cross-cultural curricula

for Yolngu students. *Ganma* is both a place (where the fresh and saltwater meet) and an 'intellectual and cultural notion' (Langton 2002: 132). It is a complex human and non-human entity.

Of course water also has multiple meanings and uses in non-Indigenous societies and the problem of identifying or delineating so-called 'cultural' or 'social' values of water relates equally to all groups involved in water planning. Nevertheless, to acknowledge that the element we call 'water' is not understood or known in the same way by Indigenous and non-Indigenous people is to reveal an ontological discord that can help us in our attempts to achieve better levels of Indigenous participation in water planning. This discord necessitates a translation between Indigenous and non-Indigenous knowledge of water and processes for governing it (see Section 3.3 for a discussion of Indigenous participation in water planning). Clearly valuation and planning exercises have to understand the basis of the ontological differences arising from cultural difference and seek ways of responding to multiple currencies of value and multiple inter-relationships between people and place (Syme and Hattfield-Dodds 2007).

Having raised the importance of cultural differences in environmental philosophies and knowledge of water, we now turn to a discussion of the water management sector by first briefly introducing the historical development of Australian water management institutions.

2.1.3 Institutional and Legal Arrangements Prior to CoAG Reforms

Indigenous people exercised communal property rights over water for many thousands of years. These rights were swept away under British colonial rule when the English common law became the basis of management of water resources upon British occupation of NSW (Tan 2002).

This following section will briefly describe the early history of Australian water sector management covering the introduction of English water law principles, their adaptation to Australian circumstances and the growing realisation of the need for change as the water economy matured during the 20th century. The current period of rapid policy reform which commenced in the early 1990s is described fully in Section 2.2 below. The history of Australian water resource law, including the interaction between the introduced British legal system and native title, is discussed more fully in Volume 3 (Legal and Policy Analysis).

A number of water policy analysts have described the trajectory of Australian water management and traced the part water institutions played in colonial land use policy, particularly sponsorship of irrigation to underpin settlement expansion (Powell 1997; Langton 2002; Connell, Dovers et al. 2005; McKay 2005). Heaney, Dwyer et al., (2006) argue that the initial focus of Australian water policy was to assist in resource development for consumptive use, whereas the current focus is on managing competing demands for a fully allocated resource (Heaney, Dwyer et al. 2006).

With colonial expansion throughout south-eastern Australia, the immediate concerns

of the early colonists were water supply and sewerage disposal: reticulated water was needed; as were secure sources of water; and control of water pollution by human and animal waste (Smith 1998). Water was also important for mining, most of which occurred in those early years in Victoria (Blackburn 2004). Access to water was allowed through miners' water rights. Powell writes that in the 1850s miners 'spurned the toils of mining itself and made a good living from the sale of water rights' (Powell 1976: 39) Despite evidence of their sale and purchase, these 'rights' were in reality privileges (Lloyd 1988).

Water policy in the colonial era

Infrastructure and sanitation concerns aside, raging droughts and the need for security of water for irrigation shaped water policy during the colonial era which ended with Federation. The first recorded major drought in colonial Australia took place in 1864-66. The little data available shows it was severe in Victoria, South Australia, New South Wales, Queensland and Western Australia. In the decades to follow drought was a commonplace event, occurring in 1868, between 1880 and 1886, and again in 1888. Practically the whole of Australia was affected by drought in 1895-1903.

Early Australian irrigation drew heavily on overseas expertise. India provided the 'premier irrigation model in the British Empire' with many colonial engineers having served there first and moving to Australia (Tyrell, 1999: 121; Hallows and Thompson undated).[2] Drought conditions in Victoria in the 1880s made the public conscious of the need for more dams. The Indian model for irrigation, dependent on huge public works and closely identified with imperial despotism, was abandoned as it could not garner popular support needed to justify large expenditure of public money. It was then that the colonial officials turned to the United States for lessons in water administration and policy.

The change was based on findings of the Victorian Royal Commission on Water Supply in 1884, headed by Alfred Deakin (Tyrell 1999; Powell 1989; Davis 1971). Deakin applauded Californian achievements in irrigation and horticultural developments, praised the self-reliance and energy of the American people and admired their institutions. Notwithstanding this he was appalled by the chaotic state of water law in California in the 1880s.

Deakin noted that the common law riparian rights system adopted by the Australian colonies stood in contrast to the principle of prior appropriation developed by gold miners and adopted by irrigators in the western parts of the United States (Davis 1971). The colonies in Australia had inherited the riparian doctrine of British common law, giving landholders conditional rights to the access and rights to surface water

[2] India had been a pioneer in irrigation since historical times. Under the British colonial regime army engineers under the direction of a military board first undertook the construction of all irrigation works. This was the pattern until 1854 when a Public Works Department was formed and military engineers were assigned to it until civilian expertise was available. See P.R Ahuja, 'Water Administration in India' in Department of Economic and Social Affairs, *National Systems of Water Administration,* United Nations, New York, 1974.

contiguous with and adjoining their land. These rights had certain limitations (Fisher 2000, Tan 2002). Riparian owners could use the water for all ordinary and domestic purposes provided water quality was not adversely affected. Users downstream had no legal remedy, even if upstream users exhausted the water supply, provided the upstream users were pursuing ordinary or domestic activities. Water used for any commercial purposes had to be reasonable.

Since common law principles were not suitable to fulfil the colonies' needs for secure water supplies for town use, mining, pastoral and agricultural pursuits, legislation was introduced to allow control of water resources by the state.

The *Irrigation Act* 1886 (Vic) allowed the State of Victoria a supervening right to the use, flow and control and certain water. The English law of riparian rights to surface waters was substantially replaced by a system of administrative grants to water with limited recognition of riparian rights in statute. At this time, public rights coincided with the protection of public irrigation because private investment to provide for irrigation had disastrous financial results (Clark and Renard 1972; Powell 1976). Large scale private development by the Chaffey brothers at Mildura collapsed, confirming in the minds of Victorians that state management of irrigation was preferable to private development (Davis 1971). NSW also adopted similar legislation in 1896 and with some variations; other states including Queensland followed the model of state control.[3] States rights over water as determined by the Commonwealth Constitution of 1901 will be further considered in the Legal and Policy Analysis found in Volume Three.

Dreams and developments in the 19th century

Besides a prosaic response to drought, the development of water resources was also romantically shaped by the yeoman ideal. The vision of small freehold properties owned and controlled by industrious families building a peaceful, productive rural society took hold in the mid 19th century. While the romantics dreamt of European visions, squatters moved illegally into tracts of grasslands establishing large pastoral properties. The squatter's occupation of land was later validated by a system of Crown land leases which were introduced as a response to 'the vociferous demands of squatters for some form of security for their "runs"' (MacDonald et al. 2005: 30). Thus by the mid 19th century two distinct systems of land usage developed in Victoria and NSW: pastoralism and closer settlement (Powell 1976). In an arid land, the yeoman ideal and closer settlement could only be made possible by one means - irrigation.

Scholars have offered the opinion that the squatters' implicit assumption that rights to the land automatically bestowed rights to water reflects the notion of the doctrine of 'prior appropriation' (Tisdell et al. 2002). The prior appropriation doctrine, which developed in the arid states of western United States, allowed those who first put water to use to have the right to continue that use regardless of subsequent

[3] See *Rights in Water and Water Conservation and Utilization Act* 1910 (Qld); *Rights Water and Irrigation Act* 1914 (WA); *Control of Water Ordinance* 1938 for the Northern Territory. Tasmania and South Australia preserved limited riparian rights.

diversions of others (Getches and Van de Wetering 2005; Tarlock, Corbidge and Getches 2002). That doctrine allowed an appropriator who need not be a riparian landowner to use water far from the stream of origin. It is more accurate to note that Australian squatters' expectations were based on the common law riparian doctrine that allowed occupiers of land along streams to use water, and for this use to be shared among other riparian users.

Meanwhile the Australian Arcadian dream was to be restricted to 'the white race'. All non-white people including the original Aboriginal inhabitants had no part in it. While visiting the Renmark scheme in South Australia in 1894, a noted Melbourne journalist reported that 'wonderful to relate, there are no Chinese or Hebrews in the settlement' (Thomas (1894) cited in Tyrell 1999: 138). When introducing the Victorian Chinese Influx Restriction Bill in 1881, Dobson said 'we should legislate here in time against them, before we find ourselves flooded with Chinamen.'[4] Tyrell summarises it well:

> Backed by the powerful complex of social forces made up of racial exclusion, gender relations and social classes, irrigators persisted in their dream of closely settled, egalitarian white mans' paradise made up of farms, gardens and suburbs. This dream of watering the outback continued to touch the Australian imagination deeply for many years to come (Tyrell 1999: 140).

Problems apparent in 20th century

Continuing into the 20th century, the Australian brand of state socialism and the increased governmental support of closer settlement had a huge impact on water development. After each of the two world wars, governments encouraged irrigation in schemes to resettle returned soldiers. This policy resulted in a tremendous expansion in the area irrigated, an increase in rural population and a resultant demand for water. State governments were the main builders of infrastructure. They built and managed dams both for large scale urban and rural supply. Statutory authorities responsible for supply of rural water became all powerful and progressively controlled the pattern of rural settlement, crop types and farm size (Smith 1998).

It became apparent in the 1970s in the heavily irrigated states of Victoria and NSW, that water was over-allocated, its quality had deteriorated, and land had become saline (AWRC 1978). Other problems included:

- The legal regime for water had become increasingly complex because the Acts overlapped, and were often unclear, imprecise and inconsistent.[5]

[4] Victorian Parliamentary Debates, 30 November 1881, p 931, cited in Tyrell, 1999, p138.

[5] For Victoria, see Hon D White MLC, Minister for Water Supply, in his speech advising parliament of the government's intention to comprehensively overhaul water law Victorian Legislative Council, *Parliamentary Debates,* 2 December 1983 for NSW, see Task Force to Review Reforms in the Water Industry, *Review of Reforms in the water industry - 1988: Report to the Minister for Natural Resources,* vol. 2, Background Paper No 1, Sydney, 1988, 3 which stated that as at 1984, 37 major Acts and 17 public bodies were involved in water administration.

- The legislation was dependent on administrative discretion, but did not prescribe either mandatory or discretionary deliberative criteria that may have helped to ensure that administrative discretion was exercised consistently.

- The legal and management regime itself was based on common law concepts like the 'watercourse', that were ill-suited for Australian conditions. Legislation mostly changed the common law ability to take and use river water, but the legislation was still based on the European concepts of rivers.

- The overall management approach was fragmented. Groundwater was subject to other legislation and its management was not integrated with surface water. In addition, water which did not flow in rivers but in floodplains, or in upper catchments before it reached the river was not subject to legislation. At this time planning and integrated catchment management was a theme much explored in the Australian literature (Burton 1984; Handmer and Smith 1985; Cunningham 1986) and elsewhere (Major 1977; Mitchell 1990; Dzurik 1990).

- A great variety of administrative grants with different tenure, rights and obligations (collectively referred to in this paper as 'administrative grants') developed over the years. In each of the States, and regions within those states, water managers had a great deal of autonomy over how they expanded the supply of water. Many of the differences in these administrative grants relate to the subtleties associated with local land use and development (Tan 2002; Shi 2005; Connell 2007).

- Water agencies had power to amend or cancel licences but this power was not exercised. In practice, water licences in all States were routinely renewed and were regarded by their holders almost as rights in perpetuity. Re-allocation of the resource to suit changing needs was politically unpalatable.

- The lack of consideration of the environmental impact of the consumptive use of water. During these years rivers were treated as supply channels for irrigation. This disrupted their natural flow patterns. Wetlands were drained for agricultural use, and floodplains and ecosystems have been affected.

- Water use efficiency and pricing were also major issues (AWRC 1978) Public policies promoted increased water use, and farmers were charged for water they were entitled to take under their grants regardless whether all of it was used. The price of water was also heavily subsidised.

These problems were not addressed in any significant way until the 1990s when the Council of Australian Governments (CoAG) introduced what were arguably the most significant changes to water resource management since Deakin's Victorian reforms. The following section describes the CoAG reform agenda.

2.2 National Water Policy and Reform

2.2.1 Introduction

Over the last few decades Australia has experienced momentous changes in water policy and reform. The pace and scale of change has not been matched in any other country with the possible exception of South Africa. The thrust of reform is the management of water in a more efficient and sustainable manner. Reform's first milestone was set in 1994 when the Council of Australian Governments agreed on a strategic framework for water policy and reform. The second milestone occurred in 2004 when CoAG renewed its commitment to water reform by developing the National Water Initiative (NWI). This part of the report briefly examines the factors prompting the CoAG reforms and then introduces the main elements of current water policy.

2.2.2 Background to Present Reform

Around the 1970s, the economic viability of irrigated agriculture became a fairly contentious issue, questioned by a few (Davidson 1969) and supported by others (Munro 1974). Construction costs of water supply schemes were seldom if ever subjected to basic cost accounting (Mulligan and Pigram 1989; Paterson 1987; Watson 1990) leading Paterson to argue that based on economic criteria, only 12 percent of land in irrigation production in 1987 would have been developed. From the early 1990s, the economic argument relating to the cost of supplying water and of maintenance of infrastructure grew more vocal (Johnson and Rix 1991; Hall et al. 1993; Watson 1996; Grey 1998), although this had been occurring in the US much earlier. North American economists were already concerned by the 1950s that the use of natural resources was destructive and dangerously biased toward present and near-term use, with a threat of poverty for future generations (Ciriacy-Wantrup 1952; Scott 1955; Barnett and Morse 1963; Hartman and Seastone 1970).

Jerome Milliman was one of the first proponents to champion private property and a water market in the U.S. (Milliman 1959). His opinion was soon enthusiastically supported by other Western water specialists (Hirschleifer, DeHaven and Milliman 1960; Trelease 1965; Hartman and Seastone 1970; Meyers and Posner 1971) although the idea had a handful of opponents (Maloney 1972). Based on Milliman's ideas, many argued that economic gains were realised by transferring water from lower-valued to higher valued uses (Anderson 1983; Saliba and Bush 1987; Howe Shurmeier and Shaw 1986; Michelsen 1994). Very complex arguments about market theory developed, for example on welfare economics, ecological economics or constrained market environmentalism (Eckersley 1995; Jacobs 1995).

Embracing water markets was very much a part of the adoption of economic rationalism in the 1990s as Australia's dominant economic ideology (Kinrade 1995). Public policy 'think tanks' and others advocated the application of neoclassical economic theory to Australia's environmental management systems (Moran et al. 1991; Bennet and Block 1991; Australia Chamber of Commerce 1991). Arguably the most compelling influence on early days of water reform in Australian was free market environmentalism. Terry Anderson, a leading proponent of this school,

maintained that if individuals were allowed to own water within streams, problems with overuse of the resource would be overcome. Environmental protection of streams would result (Anderson 1991). This line of thinking has formed the basis for over 15 years of research in Australia that has examined property rights and transferable water entitlements (Pigram and Mugrave 1990; Pigram and Hooper 1990; Hill 1992; Pigram 1993; Sturgess and Wright 1993; Babie 1997; Challen 2000).

At the same time water reform was part of the wider natural resource and environmental reform agenda. Against a backdrop of international concern over sustainable development (WCED 1987) Australian governments agreed in 1992 on a national strategy for ecologically sustainable development and signed the Intergovernmental Agreement on the Environment (Commonwealth Government of Australia 1992, IGAE). The principles of ESD are now widely known and cited in a range of natural resources policy documents and legislation.

A key contribution to water policy making is found in the 1992 Industry Commission report (IC Report) on water and waste water (Industry Commission 1992; Bjornlund 1999). The IC Report recommended major institutional change and pricing reform, and called for introduction of tradeable water entitlements. The two main objectives were to reallocate resources away from non-efficient usage and to protect the environment. Hence permanent and inter-sectoral transfers of groundwater and surface water in all irrigation systems were necessary and entitlements should be formalised specifically for maintenance of environmental systems. Though the Commission noted that changes in the seasonal flow patterns of rivers were threatening the long term survival of aquatic and riparian habitats and adjoining forests, it paid very little attention to addressing these concerns except through market–based measures, for example, tradeable discharge permits. Regulatory reform and environmental restoration received relatively minor attention compared to other matters such as pricing. The economic overtones of this report played a major influence on CoAG policy in 1994.

In NSW earlier reforms had taken place from about 1977. These included volumetric allocation schemes; embargoes on new licences; the right to suspend extraction during periods of water shortage. These measures could not effectively deal with over allocation that had already occurred and did not adequately address the two main problems of water use – the opposing demands of security of consumptive users and the need for water to be allocated for ecosystem needs. Perhaps the most significant of the reform measures in this period was to allow trading of water. Before reform, most persons wanting more water had to buy additional land to gain additional water (Sturgess and Wright 1993). Covert trade in water had taken place in Victoria, NSW and other States through ‘licence stacking’. The practice involved one person gaining ownership of two land holdings that had water licences attached. Then the licence was administratively transferred from one land parcel to the other (Tan 2002).

2.2.3 Current Water Policy

In 1994 CoAG adopted a strategy for the efficient and sustainable reform of the water industry (CoAG 1994). It noted widespread natural resource degradation of water

resources and called for new measures to be taken including an integrated approach to water management and institutional change. Specifically, key elements of 1994 CoAG water reform framework required:

- separating water entitlements from land title, and clearly specifying water entitlements in terms of ownership, reliability, volume and transferability;
- allocating water for the environment, and where river systems were over-allocated, aiming for 'substantial progress' to provide a better balance in water resource use;
- trading water entitlements, both intra and interstate, through arrangements that are consistent and socially, physically and ecologically sustainable; and
- consulting the public where new initiatives are proposed especially in relation to pricing, specification of water entitlements, and trading in those entitlements.

CoAG policy was closely aligned to the Murray Darling Basin Ministerial Council's moratorium on diversions of water use. The 'cap' on diverting water from Basin was introduced in June 1995 following an audit that revealed water consumption had increased by an overall figure of 7.9% between 1988 and 1994 and a consequent decline in river health. The Cap was not aimed at decreasing water diversions but to prevent them from increasing (MDBMC, 1996).

A year later, CoAG subsumed water reform to the National Competition Policy (NCP) to provide significant financial incentives for all jurisdictions to implement these reforms. Additionally two commissioned papers furthered policy directions. The first set up a strategic framework for converting existing statutory entitlements into property rights (ARMCANZ 1995). Comprehensive planning systems were to provide for consumptive and non-consumptive water uses before a property rights regime was implemented. Ecological needs and the involvement of the community in planning processes were recognised. These planning systems were to be based on hydrological assessment. In determining sustainable flow regimes, the ARMCANZ *Framework* recommended that best available scientific information be used.

A further report in 1996 for the provision of water for ecosystems recommended that tensions between consumptive and non-consumptive use of water be resolved by providing water to sustain ecological values of aquatic ecosystems, whilst recognising the existing rights of other water users (ARMCANZ and ANZECC 1996). These principles, endorsed by all Australian governments, gave pre-eminence to ecological values of water. It called for action in overcommitted systems including reallocation of water to meet environmental needs. Any future allocation should be on the basis that natural ecological processes and biodiversity are sustained.

National Principles for the Provision of Water for Ecosystems (ARMCANZ and ANZECC, 1996)

1. River regulation and or consumptive use should be recognized as potentially impacting on ecological values.
2. Provision of water for ecosystems should be on the basis of the best scientific information available on the water regimes necessary to sustain the ecological values of water dependent ecosystems.
3. Environmental water provisions should be legally recognized.
4. In systems where there are existing users, provision of water for ecosystems should go as far as possible to meet the water regime necessary to sustain the ecological values of aquatic ecosystems whilst recognising the existing rights of other water users.
5. Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.
6. Further allocation of water for any use should only be on the basis that natural ecological processes and biodiversity are sustained (that is ecological values are sustained).
7. Accountabilities in all aspects of management of environmental water should be transparent and clearly defined.
8. Environmental water provisions should be responsive to monitoring and improvements in understanding of environmental water requirements.
9. All water uses should be managed in a manner which recognizes ecological values.
10. Appropriate demand management and water pricing strategies should be used to assist in sustaining ecological values of water resources.
11. Strategic and applied research to improve understanding of environmental water requirements is essential.
12. All relevant environmental, social and economic stakeholders will be involved in water allocation planning and decisions-making on environmental water provisions.

Figure 2: National Principles for the Provision of Water for Ecosystems

Source: ARMCANZ and ANZECC, 1996

State and Territory governments are responsible for implementation of water reform measures. Commonwealth payments were based on satisfactory progress towards obligations as assessed by the National Competition Council. The reform was originally expected to have been fully implemented by the end of 2000. However National Competition Policy implementation proved more challenging than originally envisaged, and the National Competition Council said rural water reform would not be completed until at least 2005 and probably much later (NCC 2001). Assessments of water reform took place from 1999 to 2005 when the last assessment tied to Competition payments was made after a full review of government implementation of the agreed reform program (NWC 2006).

Rural water reform was particular difficult where water was over-allocated and tensions were high. A number of impediments to reform emerged in each jurisdiction. They were:

- property rights could not be better defined without disappointing the expectations of some users;
- the process of defining entitlements while introducing allocations for the environment disgruntled those who lost water in over-allocated catchments;
- calls continued to be made for compensation for water users where their use had been curtailed, and where their land values had been affected;
- the planning process had proved extremely contentious where environmental allocations had to be made with imperfect knowledge about ecosystem needs;
- community values determined the level of ecosystem health to be provided in catchment plans, and there was little consensus;
- markets could not work as water was not priced;
- legal and institutional complexities continued to impede widespread trading (CEO Group 2003).

CoAG required an action plan to address these impediments to reform. The report of Chief Executives Officers' Group on Water identified three areas for improvement:

- regarding the nature of the water entitlement (as a share of the consumptive pool), and its desired features (security of tenure, transferability);
- guidelines for paying structural assistance packages for those affected; and
- removing the barriers for water trading (CEO Group 2003).

The CEO Group's report was the culmination of meetings in five locations across the country and some 50 written submissions. From the perspective of environmental groups and the Aboriginal and Torres Strait Islander Commission (ATSIC)[6], the work of refining of the report which culminated in the NWI was limited to negotiation between inter-governmental agencies (Fisher 2004). However the Wentworth Group of concerned scientists, authors of a *Blueprint for a National Water Plan,* had access to CoAG at their August 2003 meeting (Mercer, Christesen and Buxton 2007).

In June 2004, CoAG released a further water policy package called the National Water Initiative. It is a primary statement of policy with which all water legislation, policy and management within all jurisdictions must comply. Implementation of the NWI is given priority: all jurisdictions are required to develop an implementation plan to ensure achievement of the aims by 2010. The 'rather strange character' of the NWI is attributed to the compromises required to gain acceptance by various elements in the Australian federal system (Connell, Dovers and Grafton 2005: 86). While the political agendas of key groups were incorporated, clear avenues to resolve conflicts were not created (Connell, Dovers and Grafton 2005).

At the Commonwealth level, responsibility for overseeing the NWI lies with the Natural Resources Ministerial Council (NWI, para 18) with significant support from

[6] The Aboriginal and Torres Strait Islander Commission was a representative Indigenous body. It was disbanded in 2006.

the National Water Commission (NWC). Established in 2004, the NWC is an independent statutory body with seven commissioners appointed for their expertise in relevant areas. The NWC has taken over from the NCC in assessing government progress in implementing water reform.

Key elements of the NWI include water entitlements and planning framework, water markets and trading, integrated management of water for environmental and other public benefit outcomes, knowledge and capacity building, community partnerships and adjustment (NWI 2004, para 24). The NWC itself sees a three part approach to the implementation of the NWI – water planning, water markets, and regulation. Action in just any one or two of these areas is not sufficient (Distilled, January 2006 cited in Connell and Dovers 2006).

Connell and Dovers (2006) argue that sustainable management has to be its primary goal. Many sections of the NWI refer to environmental sustainability:

- That the NWI will complete the return of all currently over-allocated or over-used systems to environmentally sustainable levels of extraction (NWI, para 23);
- that water access entitlements and planning frameworks will implement firm pathways and open processes for achieving that goal (NWI, para 25)
- Schedule A sets out a time table when environmental sustainability must be achieved (Connell and Dovers 2006).

The countervailing objective in the NWI is the establishment of clear, nationally-compatible water access entitlements to facilitate the operation of water markets within and between jurisdictions. In this vein, most of the research agenda in the NWI is focused on water trading (Connell and Dovers 2006, Hussey and Dovers 2006). It is these unresolved tensions between the demand for a national, property rights based water management system and recognition of the need to hold Australia's water systems to environmentally sustainable levels of extraction that compromise implementation (Connors, Dovers, Grafton 2005). These arguments are explored further in Chapter 3.

Water planning is seen as 'an important mechanism to assist governments and the community to determine water management and allocation decisions to meet productive environmental and social objectives' (NWI, para 36). The plans, based on adaptive management, are to provide for secure ecological outcomes and resource security outcomes. Tensions will inevitably arise between different stakeholders particularly where over-allocated water systems are required to be returned to an environmentally sustainable level of extraction (Hussey and Dovers 2006). It is precisely for the purposes of reconciling conflict between stakeholders that the water planning process is required to be transparent. The whole planning process and management system is required to provide a much greater capacity to make trade-offs between competing uses in ways that will have community support (Connell and Dovers 2006).

Water planning processes in north Australia will therefore be influenced by the objectives of the National Water Initiative. The following section describes the

development context for north Australian water planning, outlining the main resource use pressures, historical water use attitudes and patterns and key socio-economic factors of relevance to water planning.

2.3 North Australian Water Resource Development

2.3.1 The Region

The following discussion refers to Australia's tropical rivers region, defined by Land & Water Australia as the two major northern drainage divisions that drain into the Timor Sea and the Gulf of Carpentaria (Stoeckl, Stanley et al. 2006) (see Figure 3). Covering an area of more than 1.3 million km sq., the region is located within Australia's tropical savanna biome, where wooded grasslands are the dominant vegetation type. The region includes 55 river basins and extends across all catchments from the western half of Cape York to the Broome in the Kimberley. It has some of Australia's largest river systems, including the Flinders, Roper, Victoria and Fitzroy.

Tropical rivers and groundwater systems contain approximately 70% of Australia's freshwater resources, although there is a high level of uncertainty surrounding actual water availability because of the limited gauging network in many catchments (Gehrke, Bristow et al. 2004). Outside a small number of catchments which have existing irrigation areas, estimates of existing water use as percentage of sustainable yield are low (Gehrke 2005).

The region's monsoonal climate has pronounced wet and dry seasons and warm temperatures throughout the year. The result is a highly variable river flow pattern. Water may be abundant during the wet season, but scarce during the dry season when most of the rivers shrink to non-flowing pools. Aquifer-fed rivers such as the Daly in the NT and the Gregory in Queensland's Gulf, have flows that are sustained throughout the Dry. These are especially important for many terrestrial and aquatic species (Woinarski, Mackey et al. 2007), and of particular significance to resident communities (Stoeckl et al. 2006).

2.3.2 Sources of Literature

Pressure on tropical river systems worldwide and the water crisis in southern Australia has stimulated interest in Australia's northern water resources and river health. The lack of information about tropical river systems is immediately apparent to policy makers, scientists, industries and community groups with an interest in water resource development. From 2004, in an effort to 'be proactive in providing the knowledge to guide current and future policy and decision-making', research bodies such as Land and Water Australia initiated scoping studies and stimulated the consideration of R&D priorities and requirements. The TRaCK research program arose from this period of scoping work undertaken during 2004-2006[7].

[7] For further information on TRaCK's research program see www.track.gov.au

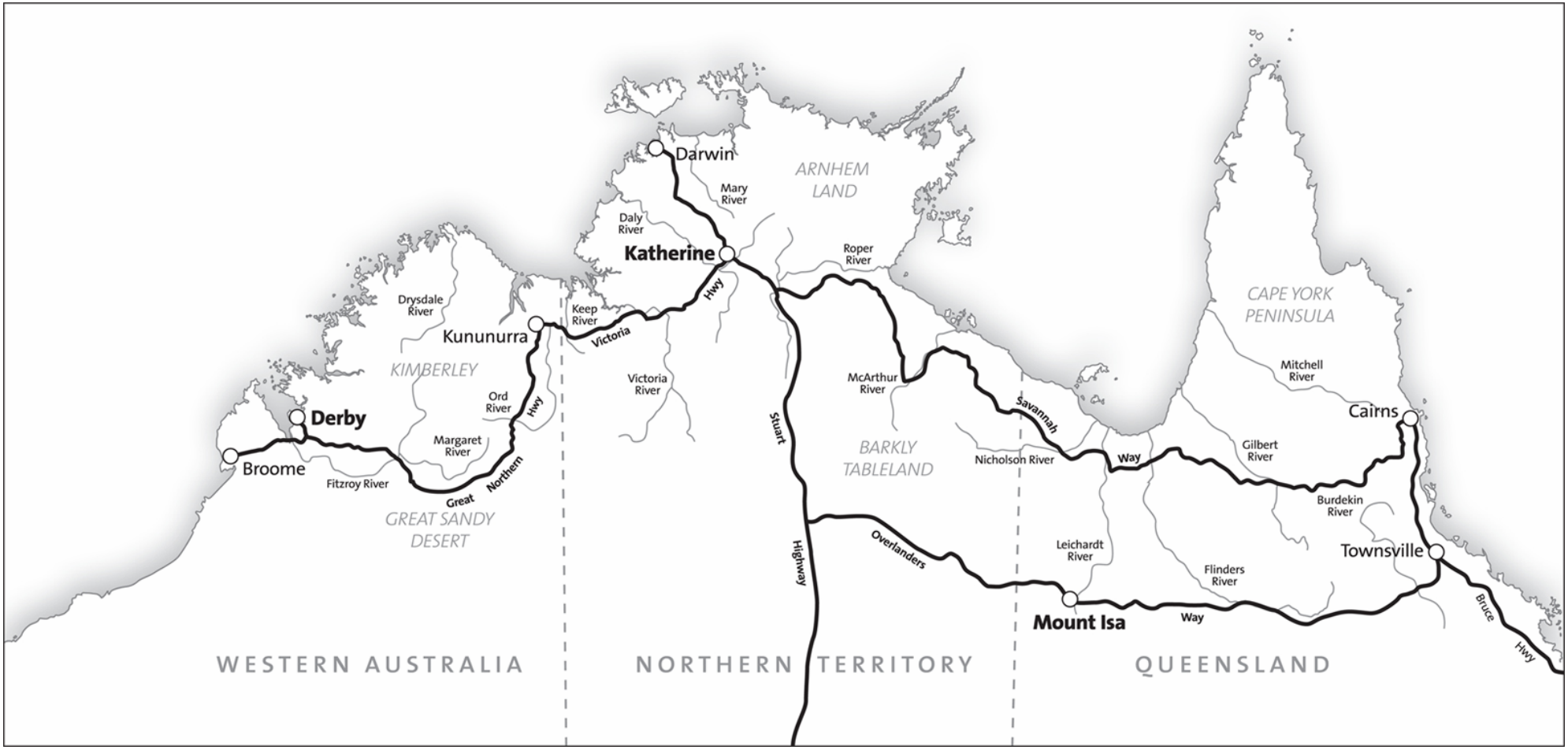

Figure 3: Showing north Australia with major towns, highways and river systems

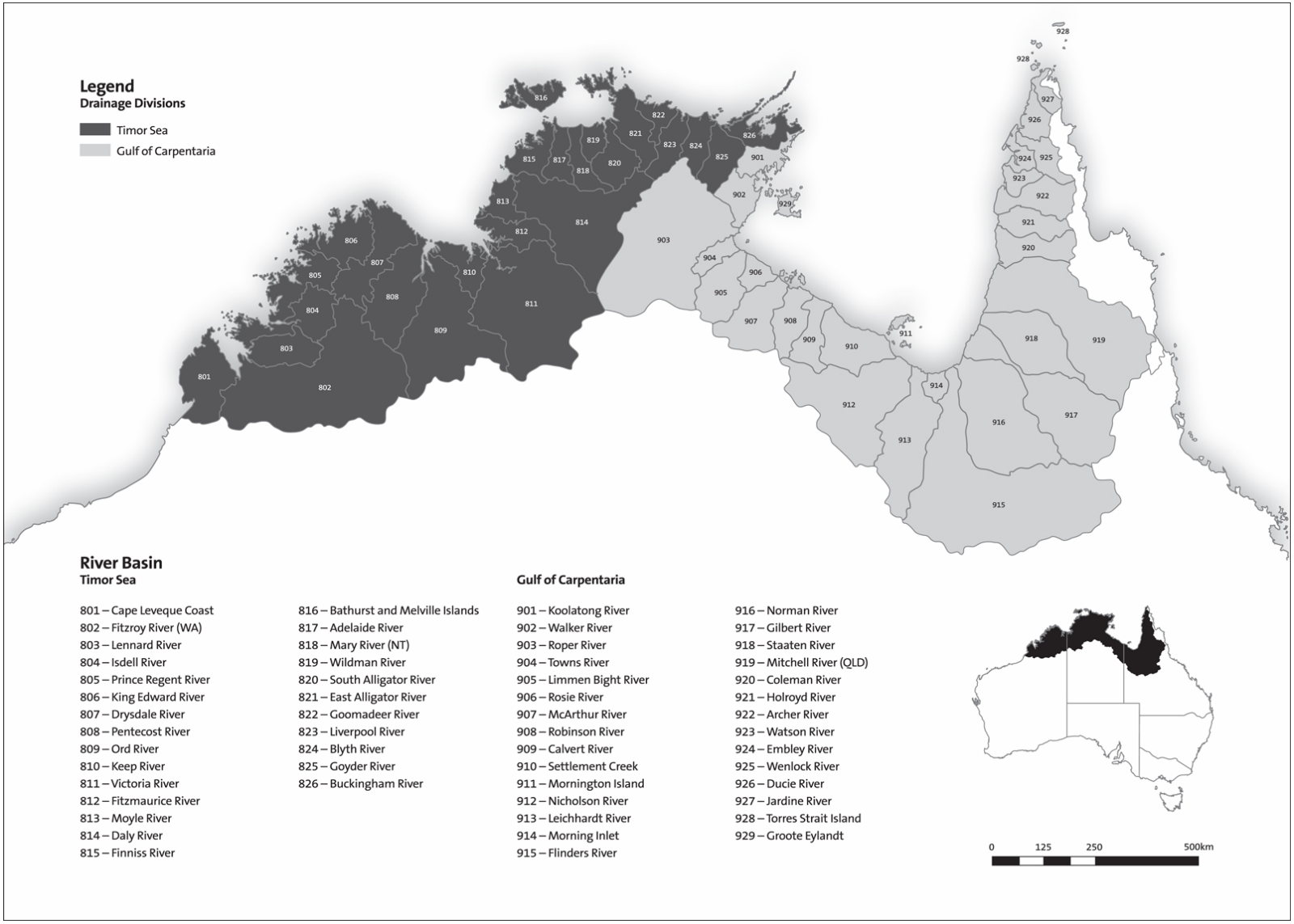

Figure 4: Map showing tropical rivers region (as defined by L&WA and TRaCK) with catchments

The 2006 LWA scoping studies of socio-economic values associated with Australia's tropical rivers (Stoeckl, Stanley et al. 2006), and Indigenous interest in tropical rivers (Jackson and O'Leary 2006) serve as key sources of descriptive information on the issues relevant to this background section. Other sources include an edited book on Australian tropical savannas (Ash 1996), a recent publication on north Australia's ecological assets (Woinarski et al. 2007), and background material generated by aquatic ecologists in the lead up to the formation of TRaCK (Gehrke 2005). Powell's history of water resource management during the colonial era, particularly in Queensland, offers insights into changing settler relations with the northern landscape (Powell 1991), and other historical accounts of settler relations with Indigenous society are also of relevance (McGrath 1987), as are studies of Indigenous customary water resource management (eg Toussaint et al. 2005).

2.3.3 The Ecological Significance of Tropical Rivers and Catchments

The conservation significance of tropical rivers is very high by numerous accounts (Hamilton and Gehrke 2005), and many authors make a comparison between northern and southern environmental condition, noting the important fact that many of the Australian tropical rivers retain their natural flow regimes.

Stoeckl et al (2006) found that there are significant differences between northern tropical river systems and those found in temperate southern Australia. The first difference relates to the duration of flow: tropical rivers tend to have episodic flows, whereas many the south-eastern rivers are perennial. Secondly, as most rivers are ephemeral, water used is mainly derived from local run-off or groundwater. And thirdly, there are complex and poorly understood interactions between groundwater and surface waters.

Freshwater biodiversity is higher in tropical catchments than in temperate Australia (Hamilton and Gehrke 2005), and tropical river systems support higher levels of endemism for many taxonomic groups, such as aquatic plants, fishes and aquatic invertebrates than more southerly river systems (Gehrke, Bristow et al. 2004). Northern estuaries are internationally important strongholds for marine biodiversity, and have suffered less pressure than those found in other locations in the broader Indo-West Pacific region (Hamilton and Gehrke 2005). The condition of many northern estuaries is described as near-pristine by one research report of tropical river systems (Hamilton and Gehrke 2005).

A recent report on the natural values of northern Australia highlights the international significance of northern wetlands. Extensive floodplains, such as the Kakadu and Gulf wetlands, form some of the country's largest and most diverse wetland systems, and support wildlife occurring no where else in the world (Woinarski, Mackey et al. 2007). North Australia was found to have the continent's largest expanse of intact river systems and catchment.

Some tropical rivers have, however, been significantly modified by water resource and agricultural development, such as the Ord in the Kimberley region of Western Australia. Changes to land cover from beef grazing and intensive row-crop

agriculture have modified catchments along the eastern Queensland coast, delivering excessive nutrient and sediment loads to the waters of the Great Barrier Reef lagoon (Gehrke et al. 2004; Hamilton and Gehrke 2005). Gehrke (2005) lists the following as management priorities for the tropical north:

- water-resource planning
- water quality
- fisheries
- invasive plants
- salinity
- conservation
- grazing and
- fire management.

Other studies have highlighted similar environmental management pressures that pose a threat to water resources through gradual deterioration (Storrs and Finlayson 1997).

The study by Woinarski et al. (2007) found that the world's largest expanses of tropical savannas remaining in good condition are in Northern Australia. Australia has more than 25% of the world's remaining savannas, a fact explained in part by the low proportion of land cleared for cropping.

2.3.4 Historical Water Use

As discussed in Section 2.2, there is a long history of interest in the agricultural prospects of northern Australia, and water availability has driven many grand schemes (Gehrke 2005). During the colonial era and many decades of the 20th century, river regulation and improved water storage and distribution (e.g. dams) were viewed as essential precursors to economic development and European settlement schemes, particularly in northern Australia (Davidson 1965; Powell 2000). Calls for greatly increased human settlement for defense purposes were common until the 1960s, but the arguments in favor of settlement on the basis of agriculture persisted beyond this period (Cook and Dias 2006).

Trials in plantation-style agricultural schemes were undertaken during a one hundred year period in the NT's Top End, while in WA, the Ord River scheme took hold in the 1960s and a small horticulture and cropping sector was established. Today, cropping and horticulture have been established in only small areas on the Ord and Katherine-Daly Rivers, around Darwin and in parts of the Gulf Country (Woinarski et al. 2007). Many of the early failures have been attributed to the harsh and variable tropical environment, and limited areas of fertile soils. According to Cook and Dias (2006), as early as the 1950s, some agricultural scientists foresaw the ultimate failure of agricultural development to significantly boost rural settlement in large parts of remote northern and central Australia. Low population density, poor agricultural prospects, and irregular and unreliable freshwater resources have continued to limit development and land-cover change in the region (Davidson 1972; Holmes 1996; Hamilton and Gehrke 2005).

A number of authors have described the ways in which the early settlers viewed the landscape of northern Australia (e.g. Rose and Clarke 1997). Alexander Forrest for example, who explored the Kimberley in 1879, found the Ord valley to be 'so well watered, and the soil so good, this district will support a very large number of sheep' (cited in Wasson 1991). Fewer historians and social scientists have focused their analyses on how riverine landscapes and water resources were perceived, although it has been noted that in general the water resources of the north were perceived to be abundant: where much of the water flowing out to sea was perceived to be wasted. The objectives of water resource management have for many decades been narrowly construed: the development imperative drove water policy. The following section draws heavily on Section 3.1 of Stoeckl et al. (2006) and Jackson et al. (in press).

Perhaps the largest body of work is Powell's water resource histories (Powell 1991; Powell 1997; Powell 2000). In a series of water management histories, some of which are referred to in Section 2.2, Powell analyses water management in the colonial era detailing the way in which 'water and progress ran together' (2000; 59; 1997, 1991) Water resource development was driven by social and political ideals sustaining the promotion of European settlement and 'nationalistic hopes for extensions of white civilisation into Australia's 'vast empty spaces'' (Powell 2000; 56). These aspirations applied equally to north Australia. By harnessing surface and ground water resources in regions such as north Queensland the colonial society would generate the 'plains of promise' (Powell 1991). Bauer adds:

> It is a matter of vast chagrin to Australia's hydraulic engineers that the rivers of NW Australia flow virtually unused to the sea through regions which are far from the major centres of population. Their frustration can be better appreciated when it is realised that while NW Australia comprises only 8.2% of the continent area, it contributes 23.5% of its runoff. Those same engineers justly complain they know little about the nature of NW Australian rivers, for at best regular gaugings began only in the early-to-mid 1950s, and on most rivers not until into the 1960s (Bauer 1985: 586).

From the earliest explorers, there was a growing conviction that the Gulf rivers of Queensland provided access to a 'fabulous interior awaiting development (Powell 1991: 14). An exemplary description is revealed in John Lort Stokes' vision for the plains lying between the Albert and Flinders Rivers of the Gulf:

> … ere long the now level horizon would be broken by a succession of tapering spires rising from the many Christian hamlets that must ultimately stud this country, and pointing through the calm depths of the intensely blue and gloriously bright skies of Tropical Australia, to a still calmer and brighter and more glorious region beyond… (cited in Powell 1991: 14).

The effect of the expansion of the 'hydrological frontier' on Indigenous societies is examined briefly by Langton (2002), who has also published papers on the significance of water to Indigenous societies (see Langton et al 2006). In what has been termed 'the battle for the waterholes', introduced animals: buffalo, cattle, and horses, all had a widespread negative effect on Aboriginal traditional life-ways (McGrath 1987). Enormous ecological pressure was created as waterholes became watering points and the resulting social impact included severe anxiety from disturbance to sacred sites, and conflict over hunting of introduced animals which had often displaced native game. McGrath writes:

> The waterhole was a prime focus of land-use in the Aboriginal economy. Besides the resource of water itself for drinking and bathing, waterholes were the centres of many forms of edible life… They served as settings for big ceremonies. The waterhole was a focus, representing for respective individuals a birthplace, a symbol of creation and reproduction, of plants, and animals and people. It religious and economic symbolism and social significance as camp and meeting place made loss or damage hurtful to the traditional owners (1987: 5).

Defending the waterholes from non-Aboriginal intruders was, according to McGrath, one of the shorter-lived phases of the conflict which lasted many years (1987). Violence was employed over a number of decades to ensure that Aboriginal people did not impede the colonising endeavour, including stocking the pastures and struggling with agricultural schemes along various river systems such as the Adelaide, Daly, Ord and Fitzroy. The marginalisation of Aboriginal interests can be seen clearly in the damming of the Ord River and utilising the water for irrigation and hydro-electric power in the East Kimberley. Construction of two dams and lakes altered the landscape and alienated the lands flooded by those waters from the native title holders.

As industries, especially mining, expanded throughout the second half of the nineteenth century, and as colonial centres grew, governments recognised the need for local environmental data and technical expertise in what Powell terms 'the pursuit of foundational geographical knowledge' (2000: 51). The environmental limits to growth slowly dawned upon the colonial intelligentsia,

> [t]he new Australians had to contend with the nagging profundity of a simple set of hard-earned geographical findings: there was no inland sea; no mighty interior river system capable of sustaining a new civilisation (2000: 51).

The wider dissemination of these ecological parameters took longer for they were 'second billing to a frenetic preoccupation with the perceived under-utilisation of comparatively well-watered fringes' (2000: 51). For many influential colonial authorities, water resources presented the biggest obstacle to increased security and prosperity (Powell 2000). Governments were seen to be responsible for meeting the costs of overcoming this shortcoming in Australia's environmental endowment. For the next few generations, engineering knowledge and effort was devoted to overcoming Australia's water problems. In the Northern Territory, where European settlement occurred much later in the 1870s, little government investigative activity took place until 1955 when the first water resource department or agency was established (Anon 1998). The purpose of this agency was surveying and investigating the water resources of the Territory.

Powell pinpoints the 1960s as the era in which the mindset that embraced dam construction and hard engineering solutions to water shortages and variability was seriously challenged in the public arena. Davidson's critique of irrigation projects and agricultural development in the tropics was an exemplary exposition on the problems inherent in subsidising inefficient and inappropriate land uses (Davidson 1972).

Notwithstanding the challenges to modernist water resource development visions,

major water resource projects continued to capture the public imagination in the contemporary era and there have been a number of debates about the need to 'drought–proof' capital cities such as Adelaide and Perth by supplying water by canal or ship from the abundant catchments of tropical Australia.

2.3.5 Current Land and Water Use and Development Pressures

In the tropical rivers region (see Figure 4) the majority of land is pastoral leasehold (about 70%) or held under Aboriginal title (about 20%), where customary and other land use activity is undertaken (Woinarski et al. 2007). Stoeckl et al. (2006) describe the key socio-economic characteristics of the region. Despite the fact that the region covers approximately 15% of Australia's mainland, it is home to fewer than 2% of all Australians (approx. 250,000 people). All but one basin has fewer than 1 person per km^2 indicating how sparsely populated is the region. In 2001 there were only three communities (Darwin, Mount Isa and Broome) with a population of more than 10,000 and almost half of the tropical river basins (24) had fewer than 500 persons (Stoeckl, et al. 2006). Notwithstanding this small and sparsely distributed population, the region accounts for around 30% of the nation's exports and over one third of Australia's export growth over the past 30 years (Greiner et al. 2004a). Another significant characteristic is the very significant proportion of the population that is Indigenous, particularly in non-metropolitan regions.

Hamilton and Gehkre (2005) identify two primary drivers for development of tropical catchments: social pressures to provide infrastructure and employment for people living in the region, and economic pressures for agricultural enterprises seeking to expand or relocate from southern Australia (Gehrke et al. 2004). The predominant regional industries include pastoralism, mining, Indigenous enterprises, fishing and tourism – all of which use, and rely on the region's water resources. Future economic development of northern Australia is highly likely to involve the exploitation of its water resources, with irrigated agriculture and other water-based industries likely to expand (Hart 2004). It is also possible that demand for water for urban consumption in southern Australia will influence northern water use decisions. For example, in Western Australia, demand for water doubled over the previous 15 years (NCC 2004) resulting in closer examination of the feasibility of sourcing extra water from the Kimberley's northern rivers.

A 2004 workshop on the future of tropical rivers identified the following drivers likely to influence development pathways:

- agricultural expansion and land release for large-scale development;
- large-scale water resource development;
- increased water harvesting (e.g. floodplain development, small dams, groundwater extraction);
- aquaculture expansion (freshwater, estuarine, marine);
- mining expansion;
- spread of pest species, including plants, terrestrial and aquatic animals;
- climate variability impacts, including sea-level rise and resultant saltwater intrusion; and

- social pressures, e.g. development to provide regional employment (Gehrke et al. 2004: 11).

Some of the above scenarios may interact and generate cumulative impacts, such that direct impacts may not be immediately noticed, or at least ascribed to particular causes (ibid). Other scenarios, if they eventuate, may serve to mitigate adverse effects. The mitigating influences identified by the authors included:

- the pastoral industry (stable productive pastoral use may preclude the introduction of activities that rely on more intensive use of the land or water);
- ecotourism and cultural tourism (by providing a return on protection of natural and cultural values);
- natural resource industries (e.g. fishing); and
- conservation.

Global climate change is also likely to be an increasingly significant driver of ecological change in the region, with sea level rise being one of the most immediate impacts. Low-lying freshwater wetlands are particularly vulnerable to salt-water intrusion.

There has been a marked change in rainfall patterning in northern Australia over the past thirty years, affecting vegetation patterning at least (Woinarski et al. 2007). Some regions have experienced more rainfall and others less. There is increasing evidence of saltwater intrusion to coastal floodplains and wetlands, and spread of mangroves further up coastal waterways (Woinarski et al. 2007).

Although climate change predictions are still imprecise, plausible scenarios include:

- minor rise in temperatures;
- increased rainfall, and
- increased incidence of severe storm events (particularly cyclones which may be less frequent, but more intense in terms of wind strength and rainfall).

Hamilton and Gehrke (2005) note that although there is substantial uncertainty about the magnitude of climate change, changes in total rainfall and its seasonal variability may well result in runoff and stream-flow changes, affecting the delivery of sediments and nutrients to downstream habitats. These changes may result in increased fire intensity, frequency and extent, if fuel loads increase following wetter seasons, and a range of impacts on particular species sensitive to temperature. Woinarski et al. (2007) conclude that, relative to other areas, the direct effects on north Australia may be subdued, because:

(i) the projected climate changes are relatively minor;
(ii) the environments remain highly connected and extensive; and
(iii) there are no abrupt and pronounced climatic specialised features (e.g. alpine areas).

Indirect effects are likely to be significant, however:

> The future is likely to bring greater pressure on Northern Australia for production, if the prime horticultural areas of temperate Australia, and

> perhaps even more importantly, much of south Asia, become increasingly unproductive in the future as a result of critical decline in rainfall and water availability (2007: 83).

This section of the review and analysis of literature has focused on northern Australia, the ecological significance of the tropical rivers and catchments in the region and historical and current land and water use development pressures. The next section provides more general information on collaborative natural resource management that will help in understanding the place and practice of collaborative water planning in the management of these tropical rivers.

3.1 Collaborative Natural Resource Management

This section of the review and analysis of literature situates collaborative water planning within the broader field of collaborative natural resource management (NRM). It outlines the goals of NRM, defines collaboration and summarises relevant literature. In particular it focuses on five concepts – power, citizen participation, social capital, social learning and dialogue – knowledge of which is central to the understanding and practice of collaborative NRM. Importantly, the limitations of collaborative NRM and the significance of the context within which it occurs are also discussed.

Australian governments have taken three approaches towards sustainability:

- A green planning (rational policy) approach;
- An institutional reform approach; and
- A social mobilization approach (Buhrs and Aplin 1999).

The green planning approach relies on the formulation and implementation of longer-term policies, strategies, and plans (e.g. Ecologically Sustainable Development (ESD) Strategy (Intergovernmental Committee for Ecologically Sustainable Development (ICESD) 1996). The institutional reform approach looks at developing and enforcing legislation and regulations (e.g. Environmental Protection Act of Queensland 1994) or redesigning organizations (e.g. Murray-Darling Basin Commission) to produce changes in practices and behaviour. These two approaches focus on the role of government. The social mobilization approach focuses on action by the community. In this approach initiatives that combine community ownership with local knowledge and experience are seen as critical in turning the discourse of sustainability into action (Buhrs and Aplin 1999). Collaborative NRM is situated within this social mobilisation approach.

3.1.1 Natural Resource Management

NRM is concerned with the management of ecosystems for human purposes, usually aiming at increasing the sustainability of this interaction (Fisher et al. 2007). Collaborative management of natural resources seeks to involve all affected parties in meeting the competing needs and interests of government, industry and community in the management of land, water and biodiversity. It assumes active

participation of the citizenry. Collaborative water planning sits as a sub-set within this broader set of planning and management activities that comprise collaborative NRM. Collaborative planning accords with certain features of contemporary society; including the putative shift to new modes of governance that acknowledge the need to involve multiple stakeholders, and neo-liberalism's attempts to dismantle stark boundaries between the state and market-place (Brand and Gaffikin 2007).

In Australia, NRM has three broad, long-term goals (National Natural Resource Management Taskforce 1999). The first of these goals is biophysical in orientation and relates to use, maintenance and enhancement of healthy ecosystems. The second and third goals focus on social aspects, namely how people interact with each other and the natural resources (i.e., land, water and biodiversity) that make up these ecosystems. Over more than twenty years, successive Australian governments like many governments elsewhere have increasingly used a policy of social mobilisation (Buhrs and Aplin 1999; Pretty and Ward 2001) to encourage collaborative, community and industry action to address shared NRM problems, initiating programs including the National Soil Conservation Program, National Landcare Program, Natural Heritage Trust (NHT) I and II and the National Action Plan for Salinity and Water Quality (NAPSWQ) (Whelan and Oliver 2005; 2006).

Reflecting this policy, the role of all parties is increasingly being emphasised in NRM planning documents and strategies. For example, at a State level, in the 2006-2011 Strategic Plan for the Queensland Department of Natural Resources and Water, Minister Craig Wallace underscored that the way his department delivers services to citizens should be the subject of ongoing examination and improvement, focusing particularly on:

> collaboration, cooperation, support and sharing. This means working together – within the department and with central agencies, fellow natural resource agencies and stakeholders - to achieve the outcomes sought (NRW 2006: 3).

Other government agencies throughout Australia also place an emphasis on working with stakeholders, those individuals and groups who may impact on, or are impacted by, the way natural resources are managed, in planning and management of these resources. For example, the Northern Territory Department of Natural Resources, Environment and the Arts' Vision is one in which:

> Territory communities … flourish in healthy and productive environments and … [are] inspired through understanding of our culture and history (Natural Resources, Environment and the Arts 2006: 1).

Such a vision, while not explicitly stating a process by which this will be achieved, highlights that communities, their culture and their history should be at the centre of efforts to manage natural resources in the Northern Territory. In statements of Western Australia government policy, consultation with the community and industry appears to be central to natural resource management (Department of Water 2006: 147-167). The theme pervading these three quotations from agencies is one of cooperating and collaborating with other parties to maximise the impact of their efforts in terms of the sustainable management of natural resources.

3.1.2 Defining Collaboration

As mentioned in the introduction, numerous terms are used to refer to an array of participatory forms, including collaboration. Before addressing the term collaboration it is necessary to first place it within the literature on classificatory systems for public involvement or participation.

Despite the explosion of discourse around the processes and practices of public participation (Tippett 2004), Arnstein's canonical 'ladder of citizen participation' (1969) continues to constitute the standard approach to classifying the various modes of public participation. Similar spectrums have been proffered by Robertson and Minkler (1994), Mostert (2003a), Margerum (2008), and the International Association of Public Participation (IAP2 cited in Cole-Edelstein 2004). These typologies present public participation on a spectrum ranging from non-participation (such as manipulation and therapy) to tokenism (such as information provision, placation and consultation) through to the delegation of decision-making power and direct citizen control. Within each of these categories, a variety of methods for public participation are available. The general thrust of this analysis is that despite the high degree of endorsement for collaboration, there are still no established definitions of participation, and terms such as 'consult' or 'involve' retain a cultivated ambiguity in policy discourse (see Kuehne and Bjornlund 2006).

Many citizen participation conceptual frameworks include collaboration and partnership as forms of citizen participation, generally situating these two processes at one end of a power-sharing continuum, with one way transfers of information from the more to the less powerful being located at the other (Arnstein 1969; Pretty 1994; Connor 1994; Fischer 2000; Hemmati 2002; Queensland Department of Premier and Cabinet 2001; South Lanarkshire Council 1998; Taylor-Powell et al. 1998). Most typologies of participation are based on the locus of decision-making. According to the Lilja and Ashby (1999):

> In (our) typology, consultative participation would be considered functional, while collaborative and collegial would be considered to be empowering (1999: 515).

The concept of power is considered by some to be central to citizen participation and the theories of democracy and community development that underpin it (e.g. Fischer 2000; Cooke and Kothari 2001). It is apparent from the literature on citizen participation, collaboration and partnerships in NRM that there is not one commonly accepted set of terms with corresponding agreement on the role of power in every given step or stage along the spectrum. For example, Trainor (2006) argues that deliberative processes are synonymous with collaborative decision-making and that processes higher up the 'ladder of participation' (Arnstein 1969), such as collaboration, require a relative balance of power between parties (e.g. Trainor 2006). The terms 'public participation', 'community participation', 'community involvement', 'community engagement', 'citizen involvement' and 'citizen participation' are often used to describe similar processes (e.g. Arnstein 1969; Pretty 1994; Connor 1994; Fischer 2000; Hemmati 2002; Kumar 2002; Queensland Department of Premier and Cabinet (QDPC) 2001; South Lanarkshire Council 1998, Taylor-Powell et al. 1998).[8]

[8] A full discussion of these terms, their origins, similarities and differences is beyond the scope of this review and analysis of literature. Other authors in this area tend to use

Fischer defines citizen participation as “deliberation on pressing issues of concern to those affected by the decisions at issue” and says that it is “the normative core of democracy” (2000: 32). Other scholars and practitioners interested in democratising policy have been calling for greater deliberation. Hendriks (2005) argues that legitimate policy decisions, especially on highly complex and contested issues, require inclusive and deliberative forms of public participation. However, there are unresolved tensions in western representative democracies which hinge around power relations between citizens, experts and decision makers and the way decisions about the management of natural resources and our environment ought to be made (Fischer, 2000; Lee, 2007). These occur for two reasons.

Firstly, NRM problems are usually complex, like many other problems that face decision makers in western democracies. They are an amalgam of economic, social, ecological and, sometimes, spiritual issues. Their resolution relies on the ability of decision-makers to integrate and reconcile information from different disciplines and sources, as well as different ethical viewpoints.

Secondly, in Australia, NRM citizen participation processes are usually government-initiated and funded, with industry and environmental non-government organisations involved, but as participants (Oliver, Whelan and Mackenzie, 2005). Large sums of money are involved in this process and decisions are likely to affect public resources and interests, therefore, the authority and responsibility rests with elected governments and in the Westminster system, with the relevant Minister.

In this review we adopt the definition of collaboration offered by Gray, an organisational theorist. Gray defines collaboration as:

> (1) the pooling of appreciations and/or tangible resources, e.g., information, money, labour etc., (2) by two or more stakeholders, (3) to solve a set of problems which neither can solve individually (Gray 1985: 912).

The table below presents a continuum of participation that will be used in this research project. It is written from a government perspective and gives examples of objectives that a government agency may wish to achieve by using different modes of participation. Power is re-negotiated within the relationship between government and public as we move along this continuum. As a result, the level of public activity also increases, with the public moving from being a passive recipient of information to being actively involved in decision-making processes. Presenting these different modes of participation as a continuum does not mean that one mode of participation is superior to another, simply that those seeking to involve the public should choose the most context and issue-appropriate mode of participation. In the chapter to follow we will outline the methods considered to be suitable for water planning corresponding to each mode of participation.

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different terms to describe largely similar processes. This may be due to the differing backgrounds of the authors and the settings in which they are working.

Mode	Objectives
Information Provision	To provide the public with balanced and objective information to assist them in understanding the problems, alternatives and solutions
Consultation	To obtain public feedback on analysis, alternatives and decisions
Collaboration	To work together with the public and establish spaces for dialogue and deliberation (e.g. water planning committees, community reference panels), to agree on decision-making criteria, assist in development of alternatives and the identification of a preferred solution. This is also referred to as deliberation and/or co-designing.
Partnership	To re-negotiate power within the collaborative relationship between government and public to one of power sharing. Power-sharing need not be equal.. This is also called co-deciding.
Citizen control	Re-negotiation of power between government and public, devolving final decision-making power into the hands of the public.

Figure 5: Modes and Objectives of Public Participation

The concept of power is clearly a fundamental issue in collaborative approaches to NRM. Eisler explains how power may be viewed in a very positive sense and that partnership-based relationships are ones in which participants share power with each other rather than exercise power over each other (Eisler and Koegel 1996; Eisler and Montuori 2001; Eisler 2002). Taylor-Powell, Rossing and Geran (1998: 5) remark that "collaboration is the process of creating, new, more effective power relations in order to bring about desired change", indicating that collaborations should be viewed as "shared power worlds". Fung and Wright (2003) use a concept of "collaborative countervailing power". This is based on the premise that those who have greater power in collaboration may need to relinquish power if they truly desire the stated purpose of the relationship to be achieved. Others use the term 'partnership' to describe these power-sharing collaborations (e.g. Eisler 2002, Long and Arnold 1995; Tennyson and Wilde 2000; Oliver 2004), with the 2002 World Summit on Sustainable Development focusing on such partnerships between civil society, business and government as a means to resolve the many chronic often complex environmental and natural resource management problems facing humanity at many levels (Calder 2002). Long and Arnold (1995) and Tennyson and Wilde (2000) also see these partnerships as central to the resolution of such problems. However, critics of partnership-based approaches to NRM have noted that it may be easy for participants to exercise power and control by capturing the discourse of partnerships and collaboration, ignoring conflict or indulging in public relations 'green-wash', while carrying on with business as usual (Anon 2002a; Anon 2002b; Fung and Wright 2003; Kanno 2002; Krishnakumar 2002; and Poncelet 1998, 2001a, 2001b).

For collaborations to be effective, issues of power must be addressed. Mostert (pers comm) reminds us that power is never absolute, and that the very fact that partnerships involve inter-dependent groups means there is scope for collaboration. A power differential "may make collaboration more difficult, but it is not realistic to

require complete equality or to expect that collaboration removes inequalities" (Mostert pers comm). Moreover, as stated above, collaboration is not always desirable, for example, in circumstances where important stakeholders have been left out, and where power differences are too large, resulting in some groups seeking confrontation.

In some circumstances the re-negotiation of power within a collaborative relationship may be inappropriate. For example, it is unwise to give an individual or group involved in collaboration the authority to make decisions on a particular matter while making others not involved in the decision-making responsible for implementing these decisions (Oliver 2004). Authority and responsibility for the consequences of its exercise should be kept linked.

In other circumstances, power may need to be re-negotiated and shared within a collaborative relationship if the mutually-desired objectives of those involved in that relationship are to be achieved. Participants may need to work in partnership and share authority and responsibility. At a further extreme, a total shift in power may also be appropriate in certain circumstances. For example, the only way a government may achieve its objectives on a particular matter may be to exercise decision-making on its own.

Adequate knowledge of the participation context and the issue at hand is critical. Several authors note the need to choose the right citizen participation tool for the job. Selecting from information sharing, to consultation through to collaboration and partnership-building is also important (Lawrence and Deagen 2001; Oliver and Whelan 2003; Oliver 2004). The way these participatory processes are structured and facilitated will also play a critical part in their success (Creighton 2005; Dukes, Firehock and Leahy 2001; Linden 2002; Wondolleck and Yaffee 2000). And of course, citizen participation, including collaboration, is only one of many NRM tools available to the practitioner. Provision of economic incentives, education and awareness, and legislation and regulation, or a context-appropriate mix of these tools, may also be an appropriate way to plan and manage natural resources (Cosgrove, Evans and Yencken, 1994).

Not all NRM planning and management issues are amenable to a collaborative solution. One party may have sufficient authority and resources to plan and manage an NRM issue, and may gain no practical advantage, or be legally or ethically obligated to involve others (Lawrence and Deagen 2001; Linden 2002; McCloskey 1999; Oliver 2004; Oliver 2007). Sometimes participants may simply be too far apart, philosophically and pragmatically, to come together to work in any meaningful way on a shared NRM problem. The limits to collaborative NRM are discussed further below.

3.1.3 Limits to Collaborative NRM

Several authors provide checklists and decision support systems as to when particular issues may be amenable to a collaborative solution, and when it may simply not be appropriate to collaborate (e.g. Dukes, Firehock and Leahy 2001; Linden 2002; Oliver 2004, 2007; Susskind and Thomas-Larmer 1999; Whelan and Oliver 2003). There are also other concerns relating to citizen participation in NRM.

They include:

- The need for agencies to embrace their statutory responsibility under Acts of Parliament and not to abrogate these by attempting to devolve NRM responsibility to collaborative, partnership-based NRM groups;
- The argument that groups who have not participated in this process may be alienated from any advice given to government, decisions made, or resources that are made available to participating groups; and
- The proposition that citizens participating in these processes may lack the scientific and technical expertise necessary to provide sound NRM advice, make good decisions, or undertake practical works that lead to better NRM (Wondolleck and Yaffee 2000).

Wondolleck and Yaffee (2000) propose a three-way test to respond to these concerns. They advocate that any NRM advice, decision or project undertaken that involves citizen participation should be subject to the following scrutiny:

- **"Is it legitimate?"** Does it provide for normal public review and opportunities for comment?
- **"Is it fair?"** Have all parties who may be affected by the matter been invited to be involved in the citizen participation process? Are the processes they are using in their deliberations open and transparent? Are the requests that are being placed on citizens in terms of their participation reasonable and in proportion to the significance of the NRM problem under scrutiny?
- **"Is it wise?"** Have adequate sources of knowledge been identified and brought to bear on the matter at hand? Do the participants understand areas of uncertainty in this regard (2000: 231)?

These statements echo the concerns of Tsing who says that NRM bureaucracies are sites of "negotiation and debate in this area" (1999: 2). Given that many collaborative NRM activities are government-initiated, there is a need for agencies to think clearly about the purpose of citizen participation in their particular NRM setting. Participation may be 'instrumental', used as a tool for a specific end or it may be 'transformative' and used as a means for social change (Nelson and Wright 1995, cited in Buchy and Race (2001: 294). If citizen participation is to be transformative then the processes used and the degree of sharing of decision-making and responsibility between participants may be markedly different from that found in instrumental or functional citizen participation programs. Levels of resourcing will also be commensurately greater. There is, indeed, a need to match the 'right tool with the right job'.

Few (2001) and Walker and Hurley (2004) highlight the potential for political capture and containment of collaborative NRM processes. Parties involved in NRM may sometimes wish to capture the discourse of NRM citizen participation, in order to exercise power over others. It is also important to remember that there is not necessarily a positive causal relationship between increased citizen participation and more sustainable NRM. As well as the possibility of manipulation of the citizen participation process, other factors such as deregulation of an industry, drought or changes in global market prices may come into play and render inert the positive

effects of citizen participation (Buchy and Race 2001). At a micro-level other issues, for example issues of gender, may also be significant (Westermann, Ashby and Pretty 2005).

Nevertheless, collaborative approaches to NRM are gaining in popularity. As Pretty (2003: 1912) says:

> Communities have shown in the past and increasingly today that they can collaborate for long-term resource management. The term social capital captures the idea that social bonds and norms are critical for sustainability. Where social capital is high in formalised groups, people have the confidence to invest in collective activities, knowing that others will do so too.

This brings us to an allied concept within citizen participation and collaboration – the notion of social capital.

3.1.4 Social Capital

The literature on social capital has developed almost exponentially over the last twenty or so years to encompass a notion of 'something' that can be built through social interactions and that has value at varying levels within society - from individual relationships, through to those occurring at a family, community, business, government and government agency and national level (OECD 2001).

There is also a growing literature on the role of social capital in collaborative NRM (e.g. Pretty and Ward, 2001; Pretty, 2003; and Westermann et al., 2005). Four major treatments of the concept of social capital can be readily identified:

- Economic – focusing on individual's preparedness to interact with others out of self-interest and the way institutions impact on these interactions and social capital;
- Political – highlighting the role of political and social norms in influencing human interaction and social capital;
- Sociological – linking human motivation to its social antecedents and the role of social organisations in the development of trust, reciprocity and networks; and
- Anthropological – exploring the biological basis for social order (OECD, 2001; Productivity Commission, 2003).

For the purposes of this project, social capital is defined as being comprised of trust, moral obligations and norms, values and social networks with an emphasis on the political and sociological perspectives mentioned above. These two perspectives are the most useful in this instance as they emphasise the normative and social organisational aspects of institutional arrangements for NRM collaboration. They also make it easier to comprehend how social capital may be viewed as one of a suite of social science tools useful in understanding, developing, operating within and improving these institutional arrangements.

Three different types of social capital are defined in the literature:

- **Bonding -** referring to the social capital that exists in relationships between members in relatively homogeneous groups that strengthen ties between members (e.g. members of a primary production group, such as pineapple growers);
- **Bridging -** referring to social capital that may exist in relationships between members of different homogeneous groups (e.g. social capital that a facilitator may wish to develop between two different groups concerned with NRM, such as pineapple growers and non-farming members of a city-based conservation group); and
- **Linking -** referring to social capital that may exist in relationships between members of different levels within a hierarchy or where differences in power, status and wealth exist (e.g. the relationship between members of a small Landcare group and the State Minister for Primary Industries and Fisheries) (Productivity Commission 2003).

The concept of social capital has its critics. Some are critical of the way social capital theory, as propounded by Putnam (1993 and 2000), may be used to justify racism or attacks on multiculturalism (Snyder 2002). Kadushin (2004) finds the concept overused, preferring instead to replace it with a concept of "networked resources". Putnam (1993), Gabbay and Leenders (2001) and Westermann et al. (2005) recognise a 'dark side' of social capital where bonding social capital (within a social group) can override bridging social capital (that which may exist between people from different social groups), leading to anti-social activity (e.g. gangs, mafia). Importantly, in terms of any discussion on social capital and NRM, Westermann et al. (2005) highlight extensive empirical work they have undertaken that indicates social capital has negative effects on gender balance in NRM group decision-making. They indicate that it is important to consider the impact of social capital in collaborative NRM, in terms of power relations that exist within NRM groups, as the two are intimately inter-related.

The extent to which governments can initiate and implement policy that builds social capital is open to debate, with some theorists varying widely in their views the role and ability of government in this area (e.g. Cox, 1995; Fukuyama, 1995; Siisiäinen, 2000).

Whatever the outcomes of these debates, it is important to recognise that government policies already affect social capital and that governments begin to take this into account when formulating policy (Field, 2003, Productivity Commission, 2003). Government may have an enabling rather than a 'doing' role. As Field says, "Probably the best role for government is to serve as an enabler, and then stand back" (2003: 134).

Social capital, be it a somewhat elusive concept, is central to collaborative NRM. People are not going to work collaboratively in situations where levels of social capital are low, unless they are coerced into doing so. The following section provides an overview of the concept of social learning – a process by which participants involved in collaborative NRM can learn together about an NRM issue that is important to them, each other, how they perceive this issue and why. As can be seen from the above discussion governments may have to tread wearily when they initiate,

support or are involved in collaborative NRM. Inter-related issues of participation, power, social capital and social learning all come into play.

3.1.5 Social Learning

Social mobilisation, the third NRM approach described by Buhrs and Aplin (1999), requires the development of social capital. It also requires social learning, an expression or idea that is also used in diverse ways. Milbrath (1989) sees learning in social settings as the process by which people could envision and move towards a more sustainable society. For this research project, we use the definition offered by Schusler, Dekker and Pfeffer (2003) who draw on public deliberation and social learning literature to define social learning as a process that occurs when people "engage one another, sharing diverse perspectives and experiences to develop a common framework of understanding and basis for joint action" (2003: 311). The deliberation and dialogue that ensues when people engage in social learning and "share diverse perspectives and experiences" can also build social capital.

When people learn what is normal and acceptable in a certain social setting, they build social capital. Such learning drives a positive 'trust accumulation loop' – a virtuous cycle of learning (Cavaye, 1999: 28-31). Falk and Kilpatrick have undertaken a study on the way social capital was 'produced' in a small rural community in Australia, investigating the nature of the interactive productivity between the rural networks (1999: 7). Such interactions in social networks can lead to learning which can help drive this virtuous cycle of social capital building. This 'social learning' is also important in the development of effective NRM collaborations and partnerships.

Participants in collaborative NRM also make decisions together and take joint action to address NRM problems that are of common concern to them. Social learning is a mechanism by which they may gain information and learn values to guide these decisions and actions.

Milbrath (1989) advocates the need for a "learning society" that would:

- utilise a wealth of information;
- find better ways to disseminate and utilise information;
- emphasise integrative and probabilistic thinking (rather than emphasising reductionist, linear thinking);
- emphasise values as much as facts;
- be critical of science and technology (rather than automatically paying it undue deference);
- combine theory with practice;
- be consciously anticipatory;
- believe that change is possible;
- examine outcomes to learn form them;
- develop institutions to foster systems and futures thinking;
- institutionalise a practice of analysing future impacts;
- reorient educational institutions toward social learning;
- support research; and
- maintain openness and encourage citizen participation (Milbrath 1989: 94-113).

The process by which people adapt the nature of their interactions with their natural, non-human surroundings can take place in a systematic manner. In NRM circles this has become known as adaptive management – "treating the economic uses of nature as experiments" (Lee 1993: 8). Lee (1993) describes adaptive management as an iterative, reflective process, providing those involved with information and skills to better manage natural resources. It is a process of continuous improvement. Social learning can help us learn to better relate to each other and manage the conflict which inevitably arises when people with values derived from different ethical frameworks come together in an attempt to manage natural resources (Merchant 1992). Lee (1993) uses metaphors such as 'road', 'compass' and 'map' to describe how these two learning processes interrelate. Lee observes that conflict is common in NRM, generated when people with different values come together in adaptive management and social learning processes (ibid). This conflict can be creative, but it needs managing. Lee identifies this process of "bounded conflict" as politics and says that the map allows us to chart our progress along the road (Lee 1993: 8-11).

These descriptions above characterise a process by which a group of people may develop the social capital, knowledge, skills and values to live in a more sustainable society – a society in which collaboration is an integral part of the planning and management of natural resources.

3.1.6 Dialogue

Successful collaborative NRM planning and management relies on mutual understanding between participants. Such an understanding may be gained through dialogue (Yankelovich 1999). Dialogue occurs when participants achieve "mutual understanding" as to why others involved hold the viewpoint they do on the topic at hand (ibid: 14). Figure 6 summarises the main points that Yankelovich (1999) argues are critical for effective dialogue.

The Yankelovich Strategies for Effective Dialogue
Check for the presence of three requirements of dialogue – equality, empathic listening, and surfacing assumptions non-judgementally – and learn how to introduce the missing ones (p.46).
Focus on common interests, not divisive ones (p.56).
Keep dialogue and decision making compartmentalised (p.57).
Clarify assumptions that lead to subculture distortions (p.65).
Bring forth your own assumptions before speculating on others (p.66).
Use specific cases to raise general issues (p.67).
Focus on conflicts between value systems, not people (p.70).
When appropriate, express the emotions that accompany strongly held values (p.71).
Initiate dialogue through a gesture of empathy (p.71).
Be sure trust exists before addressing transference distortions (p.86).

Where applicable, identify mistrust as the real source of misunderstandings (p.106).
Err on the side of including people who disagree (p.107).
Encourage relationships in order to humanize transactions (p.108).
Expose old scripts to reality check (p.108).

Figure 6: Strategies for dialogue (Yankelovich 1999)

These strategies are a useful checklist for guiding dialogue between individuals and those that occur between organisations. NRM collaboration facilitators need to be able to identify key people within organisations who are able to influence their organisation either through use of power, the social capital they possess within their organisation, or skills they have in facilitating social learning. Gladwell (2000) identifies people in the last two categories as 'connectors', people who are able to influence social change within an organisation – as he puts it – people who bring about 'positive social change epidemics' (ibid: 30). Figure 6 above presents a list of strategies that may be useful in facilitating dialogue between key people or 'connectors' within organisations, and in evaluating the efficacy of the dialogue process. Dialogue may not necessarily lead to agreement between parties involved about a specific issue. However, effective dialogue will lead to greater clarity and understanding between parties regarding the nature of positions held on the issue and the values underpinning these positions. It is integral to deliberation and social learning about shared issues and power re-negotiation between the parties involved.

Habermas (1974) developed a yardstick, the Ideal Speech Situation (ISS), which may be used to evaluate the effectiveness of any communicative act, including dialogue (Young, 1989). The ISS makes four assumptions:

- that what we are saying or hearing is intelligible;
- that what we are saying or hearing is true in so far as it implies the existence of states of affairs;
- that the persons speaking are being truthful or sincere, and
- that the things said are normatively appropriate considering the relationships among the people and the situation they are in (cited in Young 1989: 75-76).

True dialogue and consensus among participants involved in collaborative NRM may appear a lofty goal, and certainly Habermassian notions of communication have been criticised for the extent to which they assume equality of power relations (Hillier 1997). The strategies documented by Yankelovich (1999) summarised in Figure 6 above and the ISS (Habermas 1979) provide two useful tools to guide and evaluate dialogue in collaborative NRM.

Sharing understanding of the values that underpin participants' positions in relation to a particular issue is central to collaborative natural resource management, including water planning and management. The next section turns to values and the meaning of the term 'value' when used in this field.

3.2 Social and Economic Values

This section will discuss the meaning of value in natural resource management, theories of social value and methods of valuation in environmental management. It will briefly describe the values attached to water, however, it is more concerned with how values are understood and addressed in water resource management, than in reviewing the content and conclusions of valuation studies.

3.2.1 The Meaning of Value

The concept of values is one of the most widely used to characterise the social dimensions of natural resources (Gibbs 2006a), and yet there are many different definitions and disciplinary interpretations of values. Value in common usage is understood as something that has merit or importance, of worth or that which is cared about. Valuation refers to the process of estimating an object's values, often with a common metric (most conveniently, a monetizing one), such that comparisons can be made (Ascher and Steelman 2006).

The natural resource field tends to draw on value concepts from either economics or psychology, and some have noted that socio-economic valuation is privileged over other perspectives (Reser and Bentrupperbaumer 2000). Valuation has increased in popularity in an effort to take into account a fuller range of social values, and it is almost invariably premised on socio-economic assumptions, constructs and language (ibid). A number of analysts have suggested that value formulations from both sociological and political theory can assist in providing a more nuanced understanding of the complexity and dynamism of social values, and in addressing the tensions arising between public participation and scientific input to natural resource decisions (Norton and Hannon 1997).

Before turning to a discussion of the way that values are being treated in water management processes (particularly methods of valuation), it is important to emphasise how imprecisely and uncritically the term 'value' is used in resource management discourse. Philosophers, environmental policy analysts and others with an interest in environmental valuation have critically analysed value concepts and theories, and many point to misconceptions and misunderstandings in meaning and application within environmental management fields (Reser and Bentrupperbaumer 2000, O'Brien and Guerrier 1995, Williams 2000, Gibbs 2006b). For example, Reser and Bentrupperbaumer describe how values had been construed in the management of the Wet Tropics World Heritage Area during the 1990s:

> To a layperson the adjective 'environmental' preceding 'values' can suggest that values are literal and intrinsic features of environments, and 'environmental valuation' can be taken to mean a more economic and monetary valuation of the environment, as well as an evaluation or assessment of the perceived cultural, life-support, leisure, or spiritual value of the environment to the human community.
>
> The environmental management and non-social science research discourse on Wet Tropics and the Great Barrier Reef World Heritage values repeatedly locates values *in* the environment (2000: 44).

Gibbs (2006a; 2006b) has considered valuations of water in Australia water resource

management, particularly the Lake Eyre Basin. She finds that values are used very loosely to refer to broad normative precepts such as ecological sustainability, equity, social justice, and economic equity (Gibbs, 2006b). Over time, interpretations from the heritage management paradigm have been taken up such that "environmental values can be seen as a discursive intersection between value concepts and practices developed in philosophy, economics, ecology and heritage management" (Gibbs 2006a: 74).

The most obvious point of contention in environmental debates is whether 'environmental values' are considered utilitarian/instrumental or intrinsic, defined as value that exists independently of human values and motives (Norton 2000). Another controversial distinction is made between what have been called objective (inherently in natural objects) and subjective values (held by a person) (Winter and Lockwood 2004). Many philosophers have questioned the distinctions made in formulating these polarised dimensions of value. Norton (2000) for instance, argues that the two, polar positions share important assumptions and that the two sides of this debate can be reconciled by appreciating that there are many ways in which humans value nature and these ways range along a continuum from entirely self-directed and consumptive uses, and include also human spiritual values and aesthetic values, and also non-instrumental valuations (2000: 1038).

This requires that we resist the tendency to think of valuation as an exercise in categorising objects (the entity bias), and instead direct our attention to assessing the impacts of existing and proposed technologies and policies on ecological and social processes.

Other commentators have sought to distinguish between value, valuation and value systems, the latter referring to:

> the normative and moral frameworks people use to assign importance and necessity to their beliefs and actions. Because 'value systems' frame how people assign rights to things and activities, they also imply practical objectives and actions (Farber et al. 2002).

Reser and Bentrupperbaumer (2000) attribute these commonplace misconceptions to a lack of awareness of the complexity of value inquiry, both philosophically and empirically, with important distinctions existing between value, values, valuing, kinds of value(s), systems of value, valuation, and so on. Very often people are referring to environmental attributes, or qualities of particular significance or even to environmental attitudes held by members of the public. It is clear to these authors at least, that there is more at stake than semantics. If values are to be monitored in any management process, there has to be a precise understanding of what they are and how they can be measured:

> The application of value theory to natural resource management requires systematic development and consensus, as well as clear objectives and analytic clarity with respect to which value domains are being addressed. Ideally a standardised protocol and procedure will be developed which will distinguish between and independently measure knowledge, attitudes, beliefs, values and concerns relating to the natural environments (Reser and Bentrupperbaumer 2000: 49-50, see also Jackson and Morrison 2007).

Jackson (2006) similarly found that confusion about values affected a water planning exercise in the Daly River, NT. An under-developed and naïve understanding of values in that context prevented decision-makers from developing a comprehensive, integrated, inclusive and deliberative methodology for analysing and incorporating them in planning.

For the purposes of this review of water planning literature, perhaps the definition of social values offered by Jepson and Canney (2003: 272) is the most useful:

> Social values are sets of ideals and beliefs to which people individually and collectively aspire and which they desire to hold. They structure the traditions, institutions and laws that underpin our society.

3.2.2 Social Values in Australian NRM, Including Water Management

NRM practice has come to acknowledge that resource management is fundamentally about managing people's interactions with the environment, and yet the scope of that task is poorly understood by practitioners, who tend to be trained in the physical sciences. The psychological and social dimensions of environmental experience and encounters require knowledge about intra and inter-individual processes, including human perception, cognition, emotional response, motivation, social dynamics, cultural imperatives, community dynamics and functioning, and behaviour change (Reser and Bentrupperbaumer, 2000). Social scientists will be interested in these variables, and influential constructs such as equity, ethics and values, which reside in people, not places or things (ibid). Consideration of these complex notions, variables and constructs will necessarily bring the resource management discourse and decision making of scientists, agencies, decision-makers, including stakeholders and the public, to the attention of social scientists.

Water values are diverse and the Australian community is strongly affiliated with water resources and its management:

> …a single body of water will often provide for survival, livelihoods, wealth, identity and status. Water frequently plays a central role in our appreciation and understanding of our landscapes, providing a basis for cultural stories, shared identity and fundamental aspects of the human psyche and spirituality (Syme and Hatfield-Dodds 2007: 11).

There is a tendency in Australian NRM discourse to establish separate categories of value that embrace evaluations described as economic, social, environmental and sometimes, cultural. This categorisation reflects the consideration given to the 'triple-bottom line' in ecological sustainability. The social and cultural values tend to be considered to be non-use or non-consumptive values[9], and were given relatively little emphasis in the early period of the CoAG water reform (Syme and Hatfield-Dodds 2007). The main emphasis has been on delivering the desired economic and environmental changes within 'social constraints', which were not explicitly defined, although there was to be an emphasis on consultation and public education (ibid).

[9] Referred to as amenity values in the preamble to the NWI.

Expansion of water markets may have framed the reform agenda in terms of individual self interest and appear to have privileged economic criteria as the measure of success over the achievement of a balance between social, economic and environmental considerations. It appears from Syme and Hatfield-Dodd's review that the social goals of the CoAG water reform were restricted to avoiding unacceptably large negative social impacts[10]. Nor are they surprised, therefore, that "there is less attention to social or ethical principles that might govern water resources, including the role of the community in decision making" (2007: 18) than in countries such as South Africa, where social considerations and community roles and responsibilities are made explicit within statute and policy.

More recently, social issues have been granted greater systematic attention in Australian water reform (Syme and Hattfield-Dodds 2007). For instance, the responsibility of governments to achieve socially beneficial outcomes is affirmed in the NWI Preamble, and fairness and responsiveness in dealing with change are given as explicit objectives of the NWI. Notably, the NWI retains its emphasis on socio-economic assessment in the provisions relating to water planning, although there is frequent reference to public benefit outcomes, which could pick-up a range of social values.

Syme and Hatfield-Dodd note that "culture as an input to water resource policy has been given little or no substantive attention" (2007:18) in the Australian water reforms. Similar to the problem of poor definition discussed above, the term 'cultural values' is rarely defined in water management and there are no nationally endorsed guidelines for how best to account for 'cultural values' to provide consistency in water planning, indeed any NRM activity. The NWI does not define the range of terms used to encompass Indigenous interests in water, including "social, spiritual, and customary objectives" and water for "traditional cultural purposes" (Jackson and Morrison 2007). It is common for the notion of 'cultural values' to be associated with spiritual significance, and particularly with Indigenous heritage values, where values are objectified as places, products and performances (Jackson 2006). For instance, the National Water Quality Management Strategy's guidelines for protecting 'environmental values' reveal a spiritual and exclusively Indigenous focus to its interpretation of a subsidiary concept called 'cultural value'.

It is doubtful whether the distinction made between cultural and social values has been particularly helpful in NRM processes. It appears to be based on a number of assumptions that some scholars wish to challenge, as outlined by Head et al. (2005). The first is the widespread view that culture refers purely to the "mythical and irrational parts of human life that are not amenable to rigorous research and scholarship" (ibid: 256). The second is the idea that culture occupies a separate sphere; that it does not pervade all our lives and institutions, including scientific ones. And lastly, that culture is usually associated with a high level of difference manifested by Indigenous or ethnic minorities (ibid). All human groups 'have culture', or create cultural forms and processes, and are socialised to think about land, water and

[10] In some jurisdictions, for instance Queensland and NSW, social impact assessment methods have been employed to gauge and ameliorate negative social impacts arising from water use decisions.

nature in particular ways (ibid). Strang provides a rich description of values and how they are formed:

> Beliefs and values are received, inculcated and passed on through a process of socialisation that creates a culturally specific relationship with the environment. This process consists of several elements: the creation of categories, the learning of language, and the acquisition and dissemination of cultural knowledge. Each involves an interaction with the physical, social and cultural environment and contributes to the formation of individual and cultural identity (Strang 1997: 178).

It is likely that attention to 'cultural values' has arisen in contexts where Indigenous interests are significant, in an attempt to ensure that the values held by this group(s) receives due attention, and indeed many Indigenous people use this term in preference to the term 'social value'. Not withstanding this arguably valid attempt at including the interests of an often neglected sector, for the sake of conceptual clarity and consistency in value inquiry, we consider that the term social value encompasses the values held by all communities, including Indigenous ones.

As for the literature on the cultural significance of water, there are a growing number of Australian studies of water and its symbolic meanings. These studies employ frameworks of analysis drawn from anthropology and cultural geography (Strang 2002, Strang 2004, Toussaint et al. 2005, Gibbs 2006b, Langton 2002), disciplines that are concerned with the documentation and analysis of society and culture. These studies reveal the role of water in the creation of cultural systems of value within Indigenous and non-Indigenous communities, although most have given greater attention to Indigenous landscape interpretations and attachment to water.

3.2.3 Economic Theories of Value and Valuation Exercises

As stated above, value has been construed narrowly in environmental or natural resource management discourse for most of the 20th century. From this perspective, environmental value is modelled in a market system where environmental decisions represent the decisions of individuals acting in markets (Norton and Hannon 1997). Cost-benefit analysis institutionalised a narrow economic definition of costs and benefits requiring monetisation (Ascher and Steelman 2006). Since the 1970s there has been a long debate about the utilities produced by resources (Buttoud 2000, Ascher and Steelman 2006), such as timber and water, and more recently, the different ways human groups engage with the non-human world (Waitt et al. 2006).

Current debates on sustainable development have focused still more on the concept of full or total value, addressing social, economic and ecological aspects of resource development, and exploring new ways to reveal and assess non-market values. This notion of full value is now a paradigm on which most of the economic approaches is based (Buttoud 2000).

Buttoud describes how total economic value is arrived at and its positivist assumptions:

> This global, total, full, etc, value is an objective assessment, which can be recorded and measured, of individual's preferences concerning the forest, which is supposed to provide the basis for evaluating the common welfare that the public authority is in charge to promote…there exists only one

> body in charge of decision-making, and also only one solution which has to be evaluated by the scientists and used by the decision maker (2000: 170).

New valuation methods and concepts relating to non-market values have been rapidly developing in the field of environmental economics for the past 30 years (e.g. contingent valuation, existence value, option value). Many studies are now conducted to estimate the full value of forests, for example. But some doubt is cast over their usefulness to policy makers (Buttoud 2000; Ascher and Steelman 2006). The limitations to these quantitative methods include:

- technical limits in calculations;
- the option value is extremely difficult to evaluate given the multitude of possible outcomes;
- many values and uses are overlapping;
- some of the components of value are impossible to measure;
- the assessment of environmental damages are rarely adequate; and
- scaling up from small scale studies to the scale at which environmental planning and decision-making occur (Buttoud 2000).

Qualitative assessments have sought to overcome some of these limitations by finding simplified models which could approximate the weight of various components of the full value. These approaches are based on subjective and normative considerations, just as the quantitative assumptions could be.

The failure to evaluate correctly the full value of a forest, for example, has undermined the imperative that policy makers incorporate that estimate into policy (Buttoud 2000). However, these positivist approaches suffer from conceptual as well as technical problems:

- any kind of aggregation is problematic because the unit to be used for valuing each component will change from one to another;
- it is unclear whether the total sum reflects the total value, given that the value of each component takes into account the existence of others; and
- various actors give different values to the same objects.

Buttoud concludes that all these limitations 'prevent the instrumentalist rationalist model from being really used for policy decisions' (2000: 172). Ascher and Steelman (2006) identify other risks arising from a heavy reliance on expert valuation studies, especially the privileged place of the 'expert' who may become an intermediary for public-preference input into environmental policy processes (see also Smith 1995). Ascher and Steelman argue that econometric analysis or survey technique,

> puts citizens in the position of research subjects rather than participants. It places technical experts between citizens an policymakers, ignoring citizen policy preferences by focusing in instead on their values for outcomes presumed to come from various policy options (2006: 73).

Their criticism acknowledges that some valuation advocates argue that valuation studies provide a channel, albeit a passive one, for the public or community values to be considered where they may ordinarily be ignored (2006).

There are two significant consequences that may arise from a reliance on expert valuation and benefit-cost analysis, according to Ascher and Steelman (2006). Firstly, the less tangible values are under-represented, because the expert is biased towards values that have an influence on policy choices. This bias arises because 'valuation experts may have to protect their professional standing by relegating these values to a status likely to have little influence on policy choices' (Ascher and Steelman 2006: 73). Secondly, the legitimacy of conventional cost-benefit analysis as the preferred decision-making paradigm diminishes and undermines the basis of other claims to influence policy choices, such as the assertion of rights (ibid). This point could be a highly pertinent one in relation to Indigenous interests in water planning where Indigenous claims against the nation state remain unresolved.

As stated above, current methods employed to value water, and more inclusively wider interactions with the environment, are frequently criticised for their reliance on a limited definition of value, and therefore, a failure to capture and measure the full significance of water to people and the non-human world (Gibbs 2006a; 2006b; Jackson 2006). Gibbs argues that value systems, for example, are not readily incorporated into the practice of valuing nature (2006b). None of the disciplines that usually address natural area values (philosophy, psychology and economics) offers a comprehensive measurement method, and past work has failed to adequately measure intrinsic value (Winter and Lockwood 2004).

Jepson and Canney (2003) conclude that an over-emphasis on expert-led science and economic methods will obscure some values, and stress others. Affective values are particularly vulnerable to under-emphasis, according to a number of analyses (Jackson 2006; Smith 1995). Non-instrumental spheres of public concern and their dependence on environmental interaction and attachment, such as emotional and spiritual well-being, need to be voiced and addressed in decision-making. Collaborative methods that provide opportunities for people to express these values are perhaps the most direct means of revealing the sentimental and affective values associated with natural places and human-environmental relationships.

3.2.4 Taking Account of Values in Decision-Making

Many analysts observe that economic approaches to valuation assume that values are relatively stable, unitary and individual (Chase and Panagopoulos 1995). However recent work in social and psychology suggests that values, along with other phenomena such as attitudes, may be more dynamic and complex than economic theory assumes. Williams argues that the science of values applied to natural resource decision-making needs to be enlarged to include theories that recognise values (or more accurately valuation) as continuously produced through social interaction (Williams 2000: 12).

In some rational planning exercise, public involvement can be likened to 'information gathering' (Williams 2000: 12). Thus, an expert is contracted to elucidate and reveal the values held by people 'out there' in the region in which the environmental planning or resource management issue is occurring. When such values enter the room in which a multi-stakeholder group may be making decisions or deliberating, the values motivating the actions of stakeholders may be conceived, even dismissed,

as rent-seeking or 'political bargaining and positioning disconnected from the 'truth' that science provides' (Williams 2000: 3). In such a situation, the behaviour of members of the public is being modelled as driven by the 'limited motives of *Homo economicus'*, and not as participants or actors in processes that involve expressions of short run preferences, dynamic values, and aspirations for future generations on a communitarian scale (Norton and Hannon 1997: 228). This tendency is also observed by Reser and Bentrupperbaumer (2000) who argue that so often the discussion of economic valuation slides from 'that which is valued to essentialised values' (2000: 46).

Another point of contention in water management processes, according to Syme and Hatfield-Dodds (2007), arises from the different emphases given to the goals of water management by professionals and the communities they serve. Working within a managerial decision-making paradigm, the former tend to emphasise efficiency, control, and industry outcomes. Whereas the general community places considerable importance on underlying concerns relating to equity and distributional impacts. Addressing this disconnect in communication requires greater capacity within Australian water resource management agencies, which currently suffer from limited ability to interpret, incorporate and integrate expert, local and professional knowledge and social science expertise (Syme and Hatfield-Dodds 2007).

Williams points to the contradiction between science and public dialogue in environmental planning as a factor in explaining poor rates of public participation in natural resource decision making. The tension is particularly acute when the science interprets values in economic terms as "pre-given, autonomous preferences of individuals; in other words making values primarily a technical matter and rendering superfluous any conversation about values in public policy" (2000: 3). He says

> Ambivalence about public conversation and values is deeply rooted in the natural resource tradition of scientific management and its technical impulse to separate facts from values. As scientists and science-minded managers, we value the power of analytical tools to reveal not just biophysical truths, but the valuations the public holds toward alternative management regimes. But we also see the public as uninformed about natural resource matters and discount public values as criteria for sound management (Williams 2000: 2).

Elsewhere, Jackson (2006) has highlighted an underlying presumption in value inquiry within water planning: values are treated as exogenous to policy deliberations. There are many ways in which values are talked about within a planning process, for example, and developments in social theory reveal the way in which values are constructed during conversation and discussion (Burningham 1995). Another strand of work attends to the active generation of values in response to perceived contextual demands and cues, rather than "their passive retrieval from memory as assumed by economic models" (Chase and Panagopoulos 1995: 71). Thus, it is possible that the same issue may be valued in different ways and at different times by the same person.

As a result of water's diverse values, different groups will have different objectives for water management. Syme and Hatfield-Dodds (2007) argue that the multiple layers of value and meaning associated with water add to the social complexity inherent in

the formidable technical complexity of water reform. Success in water management, they contend, will require that practitioners attend to multiple contested values rather than looking for trade-offs between two dominant values or the optimisation of a constrained single value (2007). But as yet we don't have the tools to bring about this re-orientation, although multi-criteria shows considerable promise for generating consensus around criteria for assessing alternatives for decision-making.

The challenge lies in creating processes that allow for the recognition of 'multiple currencies of value' (Symes and Hatfield-Dodds 2007: 12). Elsewhere, there is considerable interest in the potential of social learning exercises to generate understanding and learning (Orr et al. 2007), thereby transforming preferences, not simply taking stock or aggregating those (Williams 2000). Such process seek to build a coalition of support

> through identifying packages of action that give rise to outcomes of value to different constituencies. This approach focuses on the potential to expand the negotiation space and craft win-win solutions, rather than framing the entire process in terms of trade-offs between opposing values (Syme and Hatfield-Dodds 2007: 12).

When values, preferences or interests are conceived as fixed and sovereign, public involvement, conservation and deliberation would seem pointless (Williams 2000). Further, the assumption that environmental valuations are made by 'placeless, rational, utility maximising individuals' who are able to relocate without cost, needs to be reformed by a place-based theory that models environmental decisions made by people who are deeply influenced both by their individual perspective and by a local, community perspective (Norton and Hannon 1997). Norton and Hannon argue for a stronger role for place and local scale attachments to the environment in theories of environmental value. Placing an emphasis on the actions and preferences of citizens who relate from a place and are deeply attached to a locale immediately resonates with Indigenous people's expressions of value evident in north Australian studies at least (Jackson 2005). Likewise other social groups also exhibit some form of territoriality that influences cultural traits such as identity, and there is a body of psychological research that shows how one's physical surroundings contribute to one's sense of identity (Chase and Panagopoulos 1995).

Processes designed to take account of competing and conflicting values will be further discussed in Section 4.3 on Tools for Trade-Offs.

4.1 Public Participation in Water Planning

Unsurprisingly, given the previous discussion of the emergence of a collaborative paradigm in NRM, participation and collaboration have grown in importance in water planning and management, to the extent that public participation is now regarded as a 'key water management principle' (Mostert 2003a:179). This chapter describes the public participation trends internationally and in Australian water resource planning, showing it is a relatively recent phenomenon. Moreover, the participatory and collaborative phase can be seen as part of a series of successive phases of water planning. In general terms, these phases have moved from centralised decision-making in the era of big dam building (Tan 2006), to technocratic managerialism in

the 1970s and 80s (Connell et al. 2005: 85-86), to the emergence of the participatory approach from the mid-1990s, which is also marked the expanded use of economic instruments (McKay 2006). According to the historical narrative of this trajectory,

> participatory approaches generally stand for a number of reversals: from top-down to bottom-up, from verbal to visual, from a 'blueprint' to a learning approach, from closed to open, from professional to personal. These reversals indicate that participatory approaches subvert existing power relations through stressing the importance of so-called indigenous or local knowledge and competence, and empowering local communities and stakeholders by regarding them as responsible actors and by starting from their local and personal needs and interests. (Quaghebeur et al. 2004).

But can such claims of dramatic reversal be sustained for water resource planning? This section will chart the ascendancy of the participatory approach in water planning through the international and national policy conventions and instruments. It will use this introduction to explore the underlying tensions between the competing approaches, before a discussion about the modes and techniques of public participation relevant to water planning.

4.1.1 International Instruments on Participation in Water Planning

The first evident introduction of participation into the discourse of water planning emerged in January 1992, at the International Conference on Water and the Environment, in Dublin. Over 500 participants, including representatives from 180 countries and 80 international, intergovernmental and non-governmental organisations, adopted a statement of principles with regards to Water and Sustainable Development. Of the four principles outlined in what has become known as the Dublin Statement, two pertain directly to the endorsement of a participatory approach. Most significantly, Principle Two states that 'water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels'.

This principle has been reinforced in a series of international conventions and conferences,[11]most notably at the Second World Water Forum and Ministerial Conference, which published the Ministerial Declaration of The Hague on Water Security in 21st Century in March 2000. The Hague Declaration confirms that 'integrated water resources management depends on collaboration and partnerships at all levels, from individual citizens to international organisations, based on a political commitment to, and wider societal awareness of, the need for water security and the sustainable management of water resources'.

Before we discuss the effect on international instruments on participation in water planning, a note of clarification is useful. International sources of law are not as clear cut as domestic law. International law is generally divided into 'hard' and 'soft' law, with hard law considered binding on nation states. There are a number of traditional sources of hard law, but the most relevant for present purposes are international treaties or conventions. In contrast 'soft' law comprises principles that are gaining increasing recognition within the international community but has yet to attain the status of 'hard' law. Most of the documents that are discussed in this section would fall into the category of 'soft' law.

After Australia enters into international treaties, it accepts international obligations on the matters only when these treaties are 'ratified' by the federal government in consultation with the States. These international obligations are frequently put into action through the passing of domestic legislation. However, even in the absence of domestic legislation on the matter, Australian courts in cases over the environment may accept international law whether it be hard or soft law (Bates 2006).

The Hague Declaration also introduced the notion of values to consideration of participation in water planning, a concept which has continued to structure much of the consideration of participation in the ensuing years. One of the main challenges to water security identified in the Declaration was valuing water and its signatories recognised the challenge 'to manage water in a way that reflects its economic, social, environmental and cultural values for all its uses' (2000) This represents a subtle shift in the forms of participation, one in which the public participation component is intended to operate as a conduit to a greater understanding of the subjective preferences of 'consumers' in emerging water markets, as opposed to 'citizen participation' in the governance of a public good.

Declarations from subsequent international forums 'further reaffirm[ed] the importance of the involvement of relevant stakeholders' (UN Water 2006). Indigenous

[11] Among these, the UN Conference on Environment and Development (1992), the UN General Assembly Special Session Programme for the Further Implementation of Agenda 21 on Freshwater (1997), International Conference on Water and Sustainable Development (1998), the First Petersburg Roundtable: International Dialogue Forum on Global Water Politics: Co-operation for Transboundary Water Management (1998), and the Commission on Sustainable Development 6th Session: Decision of the Commission on Sustainable Development on Strategic Approaches to Freshwater Management (1998).

perspectives on water are now included in the scope of issues under consideration at the world water forums.

The role of participation was particularly emphasised in the development context, where water planning was seen as co-constitutive of initiatives to address socio-economic development and poverty alleviation (Schriener and van Koppen 2003; UN Water 2003). More recently, though, participation has been subsumed within a broader discussion of improving governance arrangements in countries generally, as water reform is seen to coincide with reforms that provide greater possibility for participation, transparency, decentralisation and, in turn, the possibilities for integrated resource water management (UN Water 2006: 7-9). For example, *Water: A Shared Responsibility* states:

> Unless water concerns are integrated within broader national and international processes of trade, stability and more equitable governance, the chances of achieving the international water targets remain poor. Thus there is a need to collaborate with new partners outside the water realm and form more inclusive water development networks. (UN Water 2006: 8).

Simultaneous with the widespread agreement on the value of collaboration, evaluative studies of water planning have substantiated the benefits of participation. A statistical analysis by Narayan (1994), for example, examined 121 rural water supply projects in Asia, Africa and Latin America. This analysis found unequivocally that participation was the single most important factor in determining the overall quality of the implementation of water supply projects. Participation was also demonstrated to provide significant benefits to project effectiveness, and had a significant statistical correlation with the health of the water systems, the overall economic and environmental benefits for the community from the project and the level of engagement as a proportion of the population. The effects of participation extended to capacity-building at an individual and community level, resulting in community members acquiring new water-related and organizational skills and strengthened community organisations which went on to undertake further development activities. Similar reviews of participation in France (Rinaudo and Garin 2005), the United Kingdom (Page 2003) and the United States (Creighton 2005) have confirmed that including community knowledge, values and preferences generally assist in identifying issues and formulating policies for water management planning.

The ascendancy of the participatory paradigm for water planning internationally has a number of implications for water planning in Australia. Firstly, it has established the platform upon which the national water reform process in Australia has been launched. This has been required in a formal sense, as Australia is a signatory to these agreements and protocols. This gives rise to Taberner's assertion of "co-operative sovereignty" with regards to the regulation of environmental and planning matters (1996). This term is seen to capture the diminished autonomy of Australian governments with respect to both the growing influence of international law and the rise of public participation (1996: 265). Secondly, the broad statements regarding the participation in the proliferation of instruments of international law do not specify appropriate means of community participation or paths for implementation. Under international law and policy, the implementation of participatory approaches to water

resource planning is left to the discretion of individual nation states.

One example of implementation is evident in the European Water Directive Framework. In December 2000, the Directive was established which binds the Member States of the European Union to an agreed framework for the water management, with a key target of "good water status" for all European waters by 2015. Public participation is both endorsed in principle and regulated as a key management principle, particularly in relation to the central instrument for the achievement of Directive: the development of river basin management planning. In principle, public participation is affirmed in Preamble 14 of the Directive, which explicitly states that the success of its success "relies upon close cooperation and coherent action at the Community, Member State and local level as well as on information, consultation and involvement of the public, including users." The principle of public participation is likewise evident in Preamble 46, which establishes a requirement for thorough and timely information provision "with a view to the involvement of the general public" so as to "ensure the participation of the general public including users of water in the establishment and updating of river basin management plans". Regulatory mechanisms to ensure meaningful public participation are stipulated in Article 14 and Annex VII of the Directive. Under Article 14, Member States are to "encourage the active involvement of all interested parties in the implementation of this Directive" although the definition of "active involvement" is still remains at the discretion of individual Member States (Mostert 2003b).

4.1.2 Public Participation in Australian Water Reform

The principle of public participation in water planning has been given effect in Australia through three main national policy initiatives: the 1994 CoAG Framework Agreement; the 1996 National Principles for the Provision of Water for Ecosystems (and its 2001 revision) and the 2004 National Water Initiative. These three initiatives are the keystones of the ambitious national water reform agenda. In addition to the international ascendancy of a participatory model of water planning outlined above, a number of other factors contributed to the inclusion of public participation components in these reforms. First, the enactment of this reform process was contemporaneous with international and national agreements on the principles of 'environmentally sustainable development' (Pigram 2006; McKay 2006: 117; Tan 2006: 13) and the emergent success of a community-based natural resource management movement in Australia (discussed in the previous chapter)(Martin and Halpin 1998; Curtis 2003; Cary and Webb 2000), both of which endorse public participation as a means to sustainable environmental management. In addition, though, McKay argues that the reform was also prompted community demands themselves, namely 'by community reactions to large dams and environmental degradation of land and water' (2006: 117).

The CoAG agreement specifically required that public consultation processes be instituted in relation to its recommendations on water allocation and trading, and required jurisdictions individually and jointly develop public education programs in relation to the water use and the need for and benefits from reform. Stronger support for participation is found in the National Principles for the Provision of Water for Ecosystems, devised in 1996 to provide national policy direction for the allocation of

water for ecosystems and revised in 2001. Principle 20 in this document provides for public participation specifically in consideration of environmental water provisions, and extends participation to 'all relevant environmental, social and economic stakeholders' (ARMCANZ & ANZECC 2001).

Adoption of the National Water Initiative (NWI) in June 2004 re-established the core principles of the 1994 water reform, based on ten years of experience in implementation. Whilst Connell et al. (2005) suggest that the NWI represents a 'new philosophical approach to water management', it can be better understood as a consolidation of the logic of micro-economic reform in water which had been established by the preceding reform instruments (Tisdell et al. 2002). The departure of the NWI from the proceeding reform agreements is in the scope of its operation, namely the establishment of a nationally 'compatible, market, regulatory, and planning based system for managing surface water and ground water resources… that optimises economic, social and environmental outcomes' (Pigram 2006).

As discussed in Section 2.2, the outcomes envisaged by the NWI include the improvement of security of water entitlements, the restoration and maintenance of ecosystem health through the protection of identified environmental assets at a catchment scale, the encouragement of 'best use' of water resources through the expansion of water markets and trading, and greater efficiencies in water management, particularly in urban environments (McKay 2006; Pigram 2006; Connell et al. 2005).

The scope of the NWI, the requirements for unprecedented collaboration between multiple levels of government, and the unresolved tensions between the regulatory, market and participatory components have been recognised by a number of authors as engendering significant challenges, 'the resolution, or at least negotiation, of which will need to be attended to in implementation, as they were unresolved in the policy formulation stage' (Hussey and Dovers 2006: 36; also Connell et al. 2005). The role of improved mechanisms of collaboration and participation as a means to resolve these inhering tensions in the NWI is touched upon in the agreement. In substantive terms, Section 93 identifies the three objectives of participation as:

- improving certainty and building confidence in reform processes;
- transparency in decision making; and
- ensuring sound information is available to all sectors at key decision points.

These objectives are to be achieved through 'open and timely consultation' (Section 95 & 97) in some instances, and the provision of 'accurate and timely information' (Section 96) in others. Consultation with stakeholders is required in relation to:

- structural adjustment pathways;
- the periodic review of water plans;
- impact mitigations from reductions in water availability; and
- other significant decisions that may affect the security of water access entitlements or the sustainability of water use.

Hence, whilst the NWI does have general sections pertaining to public participation,

the requirement for water planning to involve the public is more implied than explicit within the document. Like much of the NWI, the methods and approach to public participation is to be resolved through implementation at the level of catchment-based water resource plans. The NWI provisions on participation are 'discretionary' (MacFarlane 2004), and whilst this does allow planning processes sufficient flexibility to be tailored to the needs, context and aspirations of individual catchments, it does create uncertainty and could undermine transparency in implementing water reform. To date, there are no national guidelines to give effect to the implied role of public participation in water reform in Australia, and, as a consequence, 'stakeholder input to the decision making process for prioritising water resource plan scenarios is not transparent to all stakeholders' (Arthington 2006).

In substance, public participation receives only cursory attention in the content of the NWI. Of the 72 key actions outlined in Schedule A of the NWI, only three pertain to public participation under the theme of Community Partnerships and Adjustment, and the figure below is indicative of the greater emphasis on water markets and trading, water pricing and water resource accounting. The treatment of public participation can be compared with Article 14 of the European Water Framework Directive, which requires member European Union member States to encourage the 'active participation of all interested parties' (Mostert 2003b).

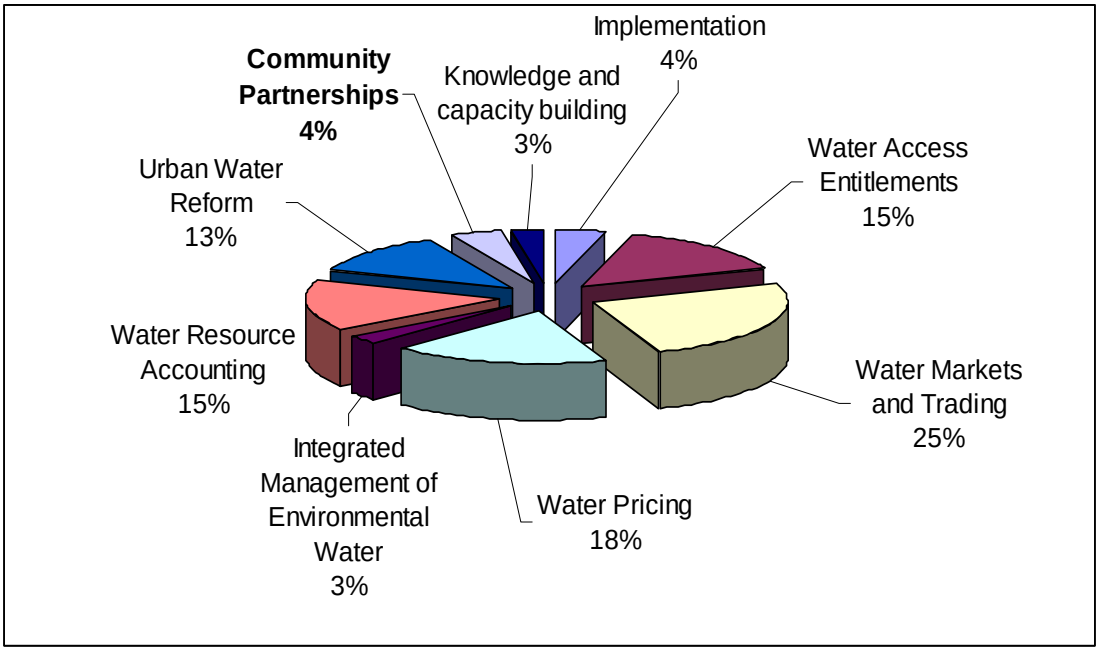

Figure 7: NWI Actions by Key Element

Clearly, the bulk of the NWI is directed towards establishing trading systems and pricing mechanisms. Comparatively, public participation (alongside consideration of environmental water and capacity-building) receives little attention. But there is also significant emphasis on the establishment of clear uniform property rights in water. The establishment of property rights is crucial to the establishment of an effective water trading scheme, and on the face of it, this seems to be the direction of the NWI. The establishment of property rights is dependant upon secure access entitlements and appropriate systems of water resource accounting, and these components are

also integral to the establishment of any trading scheme.

It is important to recognise that clear, comprehensive and enforceable property rights are a fundamental requirement for the effective governance of common pool resources, including water, even in the absence of markets or trading. Blomquist et al. (2004) argue that in the absence of clearly defined property rights, the community bears the costs of resolving conflict and negotiating solutions in the co-ordination of water management:

> all other things being equal, more completely specified water rights will be conducive to resolving water management problems. Incomplete, or unclear and therefore contested, rights will exacerbate the management problems water user's face.... [D]ual or multiple water rights systems ... raise substantially the costs of reaching agreements and implementing projects. (2004: 41).

Whilst the establishment of property rights around water forms part of the requisite governance regime, regardless of the whether a regulatory, market-based or participatory approach is adopted, the establishment of market-based mechanisms are impossible without them.

To the extent that public participation is provided for in current water reforms, clearly the emphasis is on two aspects: firstly, 'mitigating the adverse impact of changing economic circumstances rather than promoting the growth of communities' (Connell et al. 2005: 85); and secondly, establishing 'community acceptance of the NWI and belief in its fundamental fairness' to shore up its credibility and legitimacy (LWA 2005: 11-12). This leaves the NWI open to the critique that its does not promote meaningful collaboration in water resource planning *per se*, but uses the rhetoric of participation to facilitate the emergence of a new policy regime based on market-based mechanisms. Connell et al. (2005: 83) argue that the NWI augurs an emergent approach to water management which extends 'neoliberal thinking about the role of governments and markets with regard to the management of public goods'. Hussey and Dovers (2006: 41) state this point categorically:

> It is clear that the overarching objective in the National Water Initiative, upon which all other objectives depend, is the establishment of clear, nationally-compatible water access entitlements to facilitate the operation of water markets within and between jurisdictions.

The 'neo-liberal thinking' that these authors refer to regards the establishment of national markets, including tradeable water entitlements, as a more efficient means of resource allocation than by government regulation, with or without wider community input. Market-based mechanisms, including the establishment of trading schemes, provide incentives to stimulate economic opportunities, and, if well designed, are capable of providing certain efficiencies, flexibility and scope for innovation. The extent to which public participation or dispute resolution is provided for in the NWI could be seen as merely a means to facilitate the establishment of a nationally uniform water trading regime (Connell et al. 2005).

The establishment of water trading as a resource allocation tool does, therefore, place the role of public participation in contention. Arguably there is a contradiction between the promise of enhanced public participation, and the imperative of the market-based instruments to prioritise governance by the functioning of economic

logic over that of community aspirations. Issues of justice and equity, which were to be addressed through enhanced community access, may not be part of a governance regime premised upon economic instruments (McKay and Bjornlund 2002). The over-emphasis on economic design considerations could exclude other significant facets of water management, including biophysical imperatives, social values, local knowledge and expertise and community and regional aspirations, from consideration (Mackenzie 2007; Syme and Hatfield-Dodds 2007: 18).

4.1.3 Water Planning and Participation Under the NWI

The tensions inherent in the NWI between the regulatory, market-based and participatory elements are intended to be resolved through implementation, and in particular in the detailed delivery of NWI through statutory water resource plans (Gentle and Olszak 2007). Under the NWI, statutory water plans outline the catchment-based allocation of water in the surface and groundwater systems for consumptive, environmental and other purposes, detail water access and use entitlements and provide the management arrangements, including the establishment of rules for water trading. As a form of subordinate legislation enacted by state ministers, the mosaic of catchment-based water resource plans across the landscape is linked through state water legislation and the overarching national regulatory framework to comprise the basis of water allocation and management across Australia (Gentle and Olszak 2007). A high degree of variability in the content and form of water resource plans exists in Australian jurisdictions, and this flexibility reflects the variability of circumstances in the specific watersheds and basins. In the development of water resource plans, under the NWI, water resource plans are to be based on detailed scientific and technical assessment to determine the appropriate balance between allocation for water users and the maintenance of environmental flow.

The NWI explicitly provides for public participation in its definition of water resource plans, which are defined as:

> statutory plans for surface and/or ground water systems, consistent with the Regional Natural Resource Management Plans, *developed in consultation with all relevant stakeholders on the basis of best scientific and socio-economic assessment*, to provide secure ecological outcomes and resource security for users. (Emphasis added) (NWI 2004: 30).

Schedule E to the NWI provides guidelines for the preparation of water plans, which are required to include consultation with stakeholders including those within or downstream of the plan area and the application of socio-economic analyses. In addition, the preparation of water plans is to provide adequate opportunity for consumptive use, environmental, cultural, and other public benefit issues to be identified and considered in an open and transparent way (NWI 2004). In the achievement of these requirements for water resource planning under the NWI, the requirement for public participation is most apparent, but even in this context the modes, methods and rationale of involving the public in the planning process are not specified.

In order to understand the rationale underlying participation in the preparation of water resource plans, it is useful to locate the current approach to water planning in

its historical context. McKay (2006) identifies four successive 'paradigms' of water planning in Australia since 1788. Whilst this historical reading of water planning in Australia does not include the 'original and most enduring water management regime in Australia [which was] comprised [of] fine scale cultural and resource management practices of hundreds of indigenous nations and language groups' in Australia prior to European occupation (Hussey and Dovers 2006: 38; see also Jackson 2008), it does present an analytic framework for understanding transition stages in Australian water management. Each of these paradigms represents a distinct historical context, different values and different policy thinking. Through a close examination of these paradigms, the rationale for improved participatory techniques under the NWI can be demonstrated.

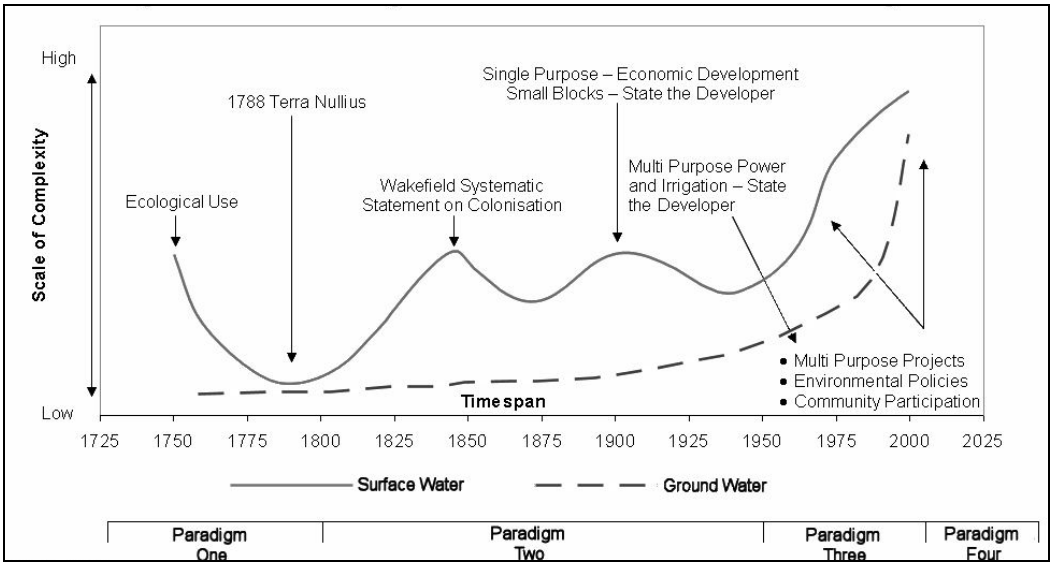

Figure 8: Australian water resource paradigms since the 18th century
Source: McKay 2006.

In McKay's analysis, Paradigms 1 and 2 extend from European occupation of Australia through to the 1950s, and reflect a predominantly administrative approach to water resource planning. These two paradigms are characterised by water resource development that was intended to promote economic expansion, development and progress across the Australian landscape. Paradigm 1 can be characterised by ad hoc and opportunistic water development, with little consideration of a planning or development strategy, potential water scarcity or environmental imperatives (Tisdell et al. 2002). Paradigm 2 retains a similar emphasis on growth and expansion, but is characterised more by large, state-funded infrastructure development, including flood control and irrigation works. Much of the water reform agenda in Paradigms 3 and 4 in Australia is an attempt to redress the excesses of past water administration, where water resource policies were focused on economic and demographic growth (Tisdell et al. 2002), and often motivated by opportunities for political leverage rather than highest value or sustainable management objectives (Freebairn 2005).

Whilst the majority of the literature on water planning in Australia is critical of the planning methodology operating in Paradigms 1 and 2, some commentators point out that this approach to water planning has generated social and economic benefits for

the wider Australian public. Among other things, government investment in irrigation systems and water infrastructure allowed for the provision of low-cost quality food for Australian consumers, the supply of secure reliable water at delivery cost for primary producers, and facilitation of a competitive advantage for Australian producers in the global export market (Byrne et al. 2006). Generally though, this form of water planning is now seen to have directly contributed to the poor ecological health of Australia's water systems and water scarcity and over-allocation in some catchments (Tisdell et al. 2002; Lake and Bond 2007).

These issues were key drivers of the reform process which has included extensive adjustments to allocation, management and governance systems, including the use of economic instruments, socio-economic assessments, nationally consistent entitlements, inclusion of environmental flow objectives and scope for enhanced public participation (Pigram 2006; Qld DNRW 2004). According to Sewell (1985: 3), the 'virtual revolution' in water planning between these periods is marked by the following transitions:

- from a minor, ad hoc activity to a mainline and continuous activity of government;
- from a conception of water as a commodity or a service to a conception of water as a key ingredient in economic and social policy;
- from a process that involved a small group of professionals to one that now involves many different disciplines and the public at large; and
- from a discrete area of policy to one which is influenced by a large array of political considerations from the promotion of development in particular regions to meeting the social and economic needs of particular social groups.

The fundamental changes to water planning over the last thirty years have required significant institutional restructuring and capacity building in water agencies to accommodate these changes. It has been recognised that in this adaptation, a more systematic approach to the public participation would strengthen and accelerate the reform process, and in turn deliver significant improvements to the processes and outcomes of water planning (Syme and Hatfield Dodds 2007: 19; LWA 2006; Gentle and Olszak 2007).

Improving the scope of public participation in water resource planning responds to a series of shortcomings in the administrative approach to water resource planning. First, the use of public participation can serve to complement the technical analysis. Under the administrative approach, 'water planning was seen as a technical task… the preserve of engineers and hydrologists, whose fundamental brief was to develop and manage surface and groundwater systems for beneficial use' (Gentle and Olszak 2007: 59). There is no doubt that water planning requires a sophisticated level of technical analysis to determine current and future water availability, risks, use patterns, flow regimes and environmental constraints. Because water planning has important economic, social and cultural consequences for the development aspirations of a region, it also requires a high degree of community involvement to determine the needs and aspirations of the catchment population. Decisions about how water will be allocated and shared between users, negotiating acceptable levels of impact that water allocation will have on local communities and livelihoods, and

balancing the complex trade-offs between competing water uses cannot be answered by technical means (Adamski 2002). Neatly summarised by Syme and Nancarrow, allocative 'decision-making is a socio-political exercise' (1996: 1843), and the emphasis on technical planning has been preferred over processes that focus on structuring negotiation between governments and stakeholders with an interest in the outcomes of water resource planning (CHRRUPP 1999).

The legacy of the technical approach has created problems for water planners, who have not been able to objectively analyse the complex trade-offs between economic, social and environmental water demands, nor had skills in collaborative planning (Gentle and Olszak 2007; CHRUPP 1999). Technical analysis tends to emphasise efficiency, regulatory control and industry outcomes, but falters in resolving issues with fairness and distributional impacts, which are the primary concerns of the wider community in water reform (Syme and Hatfield-Dodds 2007: 12). Inclusion of a participatory process in the technical analysis ensures that community values. knowledge and preferences, and not only those of experts, form part of the decision-making process. The recognition of the value of stakeholder input contrasts with water planning under Paradigms 1 and 2, where 'generally, it was believed that planners and politicians could accurately gauge what the public wanted and how it would react to what was provided' (Sewell 1985: 11). As a result, the ability of our water agencies to reconcile community values with technical analysis is 'underdeveloped, with a limited capacity to integrate expert and local knowledge and social science expertise' (Syme and Hatfield-Dodds 2007: 12).

Second, water planning under Paradigms 1 and 2 did not adequately consider the question of equity in allocation decision-making, which has led to uneven development and different advantages for different sectors (CHRUPP 1999; McCreddin et al. 1997). In addition, it has given rise to contestation over water planning allocations. As conflict resulting from water allocation decisions has become more acute, there has been increasing interest in the role of conflict management strategies as components of water planning (Syme and Nancarrow 1996: 1843; Boully et al. 2006). Concurrently, there has been a public demand for a greater level of transparency in decision-making. In developing mechanisms for the resolving trade-off disputes in specific catchments (particularly in over-allocated systems), there is recognition that greater levels of public participation may assist in achieving distributional justice in the allocation process. This is evident in Section 97 and Sections 41-45 of the NWI. Particularly where water resources are over-allocated or over-utilised, difficult decisions are required by authorities to determine and impose limits on extraction or to 'claw back' entitlements from the users in the system. Research has demonstrated that public participation increases the likelihood of distributive justice considerations in the decision-making process (Syme and Hatfield-Dodds 2007: 12), which in turn reduces the likelihood of ex post dispute resolution mechanisms (Huang 2006: 747). Protracted conflict around allocation decisions increases costs, time-delays, frustration amongst the community and investment uncertainty.

Third, public participation in the planning process increases the capacity for water planning to incorporate local knowledge and experience, such that it is able to adequately include the social, economic and cultural drivers and issues of the

specific catchment. This is part of the transition from an approach to water planning as service provision to the recognition that water allocation decisions are 'a vehicle for accomplishing social and economic change' in regions (Sewell 1985: 4). By including community knowledge and experience in water planning, the outcomes from the planning process are likely to be more compatible with and responsive to the needs, livelihoods and aspirations of the affected community (TWG 2002). Hamilton and Gehrke (2005: 249) argue that the need for improved participation as a means to incorporate local knowledge is especially critical in Australia's tropical river systems, particularly in the development of 'scenarios of preferred futures'. The inclusion of local knowledge is not only about ensuring the opportunity for local issues to be considered; community knowledge and experience can prove a rich source of additional information, review, or a source of innovation for alternative and unconsidered solutions (Beirle 1999). Further, exchange of knowledge between scientists, researchers and local community participants provides the opportunity for building better understanding within the local community and contribute to an on-going process of capacity building for water management. In this way, collaborations between researchers, water managers and community members can contribute to effective responses to global pressures (e.g. climate change) and introduced problems, (e.g. weeds) that may have been beyond the capacity of local community to address.

Fourth, it is a formal requirement of water plans under the NWI to include socio-economic assessment and impact assessment. Historically,

> it was not uncommon to give [these assessments] too little attention, especially to social impacts, and to assess them hastily and unprofessionally with a low budget and without involving the local population' (Vantanen and Marttunen 2005).

In some jurisdictions, the recognition that water planning has a wide range of impacts on the community has prompted early impact assessment as part of the planning process, and for projected scenarios resulting from different water allocation futures be used to inform decisions, implementation and impact mitigation. There is widespread recognition amongst social assessment scholars that public participation is integral to the robustness, validity and community acceptance of such assessments (Burdge 1998, 2001; Vanclay 2002; Taylor et al. 2004). This in turn is seen to improve the quality of resource planning decisions and their implementation. Moreover, participation in impact assessment corresponds with the foundational principle of democratic governance: namely, that people should have a say in decisions about actions which affect their lives (IAPP 2003).

Fifth, the reform process requires unprecedented levels of collaboration between different levels of government. According to McKay (2006), just under half of the NWI's indentified key actions involve actions by different levels of government working in collaboration. Water plans under the NWI are intended to link with broader regional natural resource management planning processes and synchronise with cross-jurisdictional water planning cycles (CoAG 2004). Effective collaboration of this magnitude, particularly in a multi-levelled federated system of water management in Australia that includes both statutory and non-statutory components, requires the development of both improved methodologies and institutional arrangements to

facilitate co-operation and compatibility.

Finally, the scope of the reforms and its impact across Australia will require participatory mechanisms to build confidence, transparency, trust, and ultimately support, in the reform process and the agencies charged with its implementation. This point is recognised in the NWI itself, and has also been noted by nationally by leading social scientists in assessing the sociological research needs of water reform (LWA 2006). In the report published by Land and Water Australia, these authors posit:

> Community acceptance of the NWI and belief in its fundamental fairness will have a significant influence over its effectiveness, certainly in the short to medium term. Unfortunately, the NWI is not well or widely understood, even among key stakeholder groups. In the community, knowledge and awareness are thought to be minimal, despite the NWI's commitment to openness, accessible information and public debate (LWA 2006: 12).

Developing trust in the reform cannot be established unilaterally by governments, but 'require approaches that are less focused on one-way communication and the delivery of education and more focused on discussion, debate and open exploration of policy directions, problems, instruments, potential impacts and implementation responsibilities' (LWA 2006: 12). Given that adaptive water management involves uncertainty, establishing legitimacy in the evolving governance through the reform process requires collaboration which widens the opportunity for dialogue between water users, planners and policy makers (Gearey and Jeffrey 2006: 129). According to Beirle (1999: 8), establishing an empowering relationship between the community and government is "one of the most effective ways to regain public trust".

4.1.4 Modes of Public Participation in Water Planning

The concept of public participation has a wide ambit, and both the objectives and provisions for public participation in the Australian water reform process admit a wide array of potential modes of participation. The requirements for consultation with relevant stakeholders on the development and review of water resource plans, on structural adjustment pathways, and means of ensuring the incorporation of Indigenous values are open to interpretation by State authorities in the development of specific catchment resource plans or water allocation plans. However, not all approaches to 'consultation' and 'information provision' can be considered participatory, and closer examination into the substance of these requirements is warranted.

Whilst the different modes of participation can be located on a spectrum of increasing citizen involvement, this is not to imply that these options are to be ranked in terms of their value or desirability. Participation spectrums assist in:

- Characterising the levels of expectation for participation;
- Identifying participatory tools for effective participation;
- Evaluating participation efforts; and
- Identifing appropriate levels of participation for stages in the adaptive management cycle.

In terms of characterising the levels of expectation for participation in water planning, McCreddin et al. (1997) used the participatory spectrum to survey community and agency expectations for community involvement in water planning, which was mapped against the perceptions of present levels of interaction (their findings are summarised in the Figure 9).

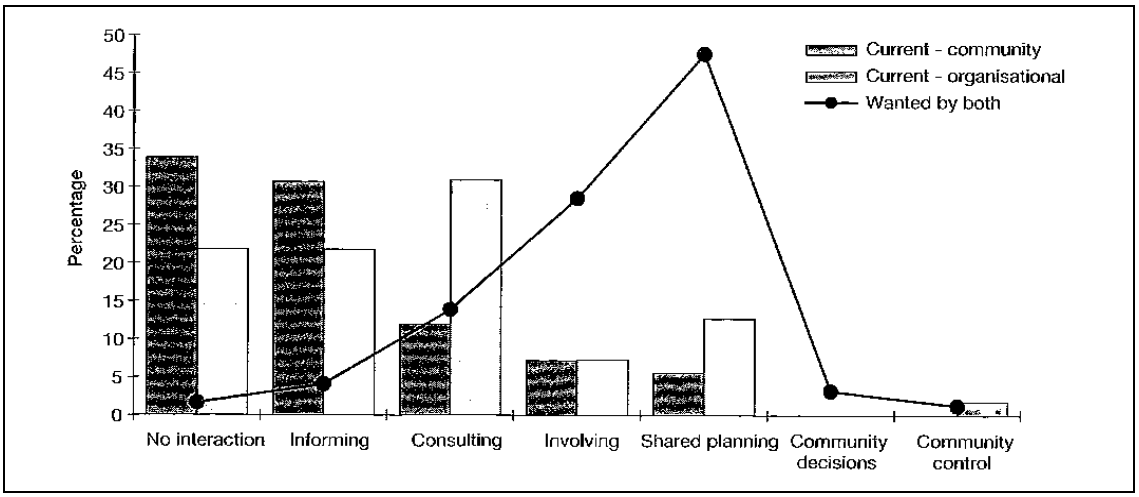

Figure 9: Perception of Community Roles and Preferred Influence in Water Allocation
Source: McCreddin et al. 1997

More commonly, the participation spectrum is used as a basis to identify potential techniques for participation which correspond with each mode (Mostert 2003a; Janssen et al. 2006; Faysse 2006; Cole-Edelstein 2004; Sewell 1985). By combining this research with general synopsis of participation techniques, such as Whelan et al. (2004), Renn et al. (1995) and Wates (2000), it is possible to align the modes of participation with both objectives and specific methods which are of relevance to improved water planning. The table below provides a non-exhaustive list of participatory techniques which may be applied to water planning in northern Australia. This table also serves to clarify the objectives of participation, which is critical to efforts for monitoring process and evaluating the success of participation.

Mode	Objectives	Methods of Participation
Information Provision	To provide the public with balanced and objective information to assist them in understanding the problems, alternatives and solutions.	Leaflets, brochures, mailings, information centres, media, field trips, briefings, contact, websites
Consultation	To obtain public feedback on analysis, alternatives and decisions.	Written submissions, public hearings, interviews, focus groups, reply forms, opinion polls, advisory groups, Delphi Study, surveys, photo-voice, structured observations, expert panels
Collaboration	To work together with the public and establish spaces for dialogue and deliberation (e.g. water planning committees, community reference panels), to agree on decision-making criteria, assist in development of alternatives and the identification of a preferred solution.	Workshops, round-tables, planning cells, study circles, citizen juries, working groups, MCA, GIS techniques, charrettes, scenario evaluation, values mapping, citizen-science/action research, consensus conferences, Formal negotiations, management agreements, community reference panels, stakeholder representation, mediation, data or cost-sharing agreements
Partnership and citizen control	To re-negotiate power within the collaborative relationship between government and public to one of power sharing. This re-negotiation may even involve devolving final decision-making power into the hands of the public.	Devolved public functions eg. citizen initiatives

Figure 10: Table aligning the modes and methods of collaboration

Historically the predominant approaches to public participation in water planning can be located in the first two categories (Cole Edelstein 2004), with the more recent novel approaches extending to the establishment of multi-stakeholder platforms (Blomquist and Schlager 2005) and multi-criteria analysis (Mendoza and Martins 2006). Multi-stakeholder platforms themselves can incorporate a variety of tools, including reference panels, focus groups and citizen juries. Due to the high level of interest in the trial of these latter two techniques, they will be outlined more substantially in the following chapter in this review. Most of the participatory tools listed above are generic public engagement strategies that have been or have the potential to be adapted for use in water planning. However, in addition to these, there has been the development of participatory techniques specific to water planning.

The “Shared Vision Planning” approach described by Connor et al. (2004), for example, integrates technical analysis into a collaborative planning and negotiation

process where stakeholders jointly construct a computer simulation of a river system which can be used to experiment with allocation scenarios. The developers of this model point to its advantages as building confidence and trust in the technical modelling, facilitating cooperation to aid in trade-off identification, incorporating stakeholder knowledge and experience and focusing discussion away from technical solutions and towards negotiating 'underlying value judgements' (2004: 1).

A participatory methodology using geographical information systems (GIS) called "WaterGroup" has also been developed as a collaborative spatial decision support system to enable stakeholder groups to participate in water resource administration (Nyerges et al. 2006). The developers of "WaterGroup" found that this technology assisted in striking a balance of the analytic and deliberative activities which comprise water resource management. Similar GIS technologies for decision-support, mediation and negotiation tools are outlined in Janssen et al. (2006) and Calijuri et al. (2005).

Tippett (2004) outlines a participatory water planning methodology called "DesignWays", which uses a range of techniques to stimulate conceptual and system design thinking that considers the underlying dynamics between social and ecological systems. "DesignWays" specifically includes:

> education about sustainability as an integral part of its process, and implicitly encourages discussion about how the ideas which participants are developing relates to principles of sustainability" (Tippett 2004: 605).

Participatory techniques to facilitate Indigenous engagement in water resource planning in Australia have been examined by the Murray Lower Darling River Indigenous Nations (MLDRIN). MLDRIN have used cultural mapping methods, incorporating Indigenous land use and occupancy mapping with recordings of oral histories, which has potential to be applied directly to water resource planning as a means of incorporating the Indigenous values into water allocations (Jackson 2007; 2008).

Kallis et al. (2006) review three participatory methods that have been employed in Europe: scenario workshops, mediated modeling, and social multi-criteria evaluation. Their review highlights the utility of different approaches for different stages in the planning process. For example, whilst mediated modeling proved effective in problem solving and identification of goals and alternatives, it was not suited to the evaluation of alternatives and or the achievement of group-level consensus. Social multi-criteria evaluation proved much more effective in these latter stages of planning (Kallis et al. 2006). The analysis from Kallis et al. provides an important reminder that different approaches to public participation at different stages of the planning process will be required. Vantanen and Marttunen's (2005) research on public participation in Finnish water planning confirm that multiple techniques of public involvement increases the validity of the process, but also that deciding on the most effective technique for each stage of the process is complex (see also Wagner 2005).

A normative framework for adaptive management developed by Bennett and Lawrence (2002) indicates that there are five distinct stages of catchment planning and plan implementation. The stages – information collation, system analysis and

vision, plan making, implementation, and monitoring and review - each have different informational requirements, and require a unique balance between technical, analytic and participatory input. Different information and engagement requirements exist at each stage of this cycle, and there is a corresponding need to establish a 'fit-for-purpose' framework to identify what mode of participation is most effective at each stage. Whilst there is disquiet in the literature about optimal levels of participation (see Crase et al. 2004), clarity could be achieved through assaying the objectives of participation against the knowledge requirements of each stage.

In selecting the appropriate methods of collaboration, attention must be paid to the cultural appropriateness of the selected approach. This is recognised in Section 52 of the NWI, which makes explicit the need for Indigenous participation. Planning processes are required to include Indigenous representation wherever possible, and water plans are required to incorporate Indigenous social, spiritual and customary objectives and strategies for achieving these objectives. Whilst Connell et al. (2005: 88) describe this section as 'impressive', the lack of direction on integrating Indigenous concerns into 'normal management practice' is noted. There are a number of long-standing and well-established impediments to Indigenous engagement in environmental planning processes which are not addressed in any substance. Fundamental incompatibilities between the scale of Indigenous social organisation, Indigenous notions of regionalism and catchment-scale units of management; and between Indigenous knowledge and aspirations for holistic management and the technical aspects of the NWI create significant challenges may frustrate the achievement of these objectives at the outset (Jackson and Morrison 2007; Jackson, Storrs and Morrison 2005; Altman 2004). Participatory deliberative tools tend to be developed by non-Indigenous researchers and are rarely used in Indigenous group decision-making. The degree to which the tools that require common metrics, weighting and rankings are amenable to differing cultural assumptions and Indigenous approaches to problem-solving requires further attention. There is however considerable interest in geographic information systems (GIS) amongst Indigenous groups because of their ability to depict clearly spatial patterns and causal relationships. Tools that combine such information may be more appealing to some Indigenous groups.

It is to Indigenous participation in water planning that we now turn.

4.2 Indigenous Participation in Water Planning

4.2.1 Introduction

In Section 2.1.2 we raised the importance of cultural differences in environmental philosophies and knowledge of water, noting that ontology clearly has a bearing on water management activities. The following discussion will highlight the importance of water to Aboriginal societies of northern Australia, and then will address the literature on Indigenous involvement in water planning. A number of issues central to Indigenous participation are then discussed.

An extremely close affinity between Aboriginal societies and northern riparian environments has generated distinct cultural perspectives on water relating to identity and attachment to place, environmental knowledge, resource security, and the exercise of custodial responsibilities to manage inter-related parts of customary estates.

According to a national discussion paper on onshore Indigenous water rights prepared to stimulate debate in Indigenous communities,

> Aboriginal peoples have never drawn a distinction between the land and the waters that flow over, rest upon or flow beneath it. The land and waters are equal components of 'country', all that require care and nurturing, and for which there are ongoing responsibilities (Lingiari Foundation 2002:6).

Water plays a central role in Aboriginal cultures and societies: 'their lives and various religious, legal, social and economic beliefs and practices' (Barber and Rumley 2003: 3). Aboriginal groups conceptualise water sources and rivers, as with the land, as having derived from the Dreaming, the time when the world attained its present shape. Recent north Australian studies emphasise the importance of mythic beings as significant to the origin and maintenance of all water sources (Yu 2000; Langton 2002; Barber and Rumley 2003; Toussaint, Sullivan et al. 2005). For example, Miriam-Rose Ungunmerr describes the cultural topography of a place called Malfiyin on the NT's Moil River, which begins from a spring in the Wingate ranges:

> As the Moil makes it way down the mountain and runs into the flood plain below, there are many special places. We call them Creation places. It is where things begin or where they come from.
>
> Our Dreamings have special places on the River. We believe that there is a place where an animal or a bird has a Creation place. They are responsible for creating that particular area… The animals and plants that have formed at Malfiyin are part of the landscape and we belong to them. We believe we are the Pelican, Water, King Brown, Magpie Geese and others. They are our Dreamings. Other birds and animals live there. We only claim the ones that come from Malfiyin (2003: 5).

Cultural institutions governing peoples' systems of rights and interests were also created by the Dreamings. Rights and responsibilities in relation to places under Aboriginal law arise from what Langton refers to as 'wide mytho-geographical bodies of knowledge' (2002: 45). Knowledge of the environment, the natural features and vitally, its spiritual dimensions, is a prerequisite to exercising rights to land, including water bodies. Cultural affiliations to water are expressed in many different ways:

through social etiquette, place-based-knowledge, narratives, beliefs and daily practices (Toussaint, Sullivan et al. 2001:39).

Until recently, Aboriginal people's rights and interests in water resource development have been largely overlooked (Langton 2002). Their strong and enduring interest in the diverse and relatively intact riverine and riparian systems of Australia's north motivates Indigenous communities to undertake management activities, thereby fulfilling cultural responsibilities. In addition, Indigenous communities express a desire to collaborate with government agencies and stakeholders; and to develop partnerships with researchers to exchange knowledge and solve identified problems.

For the first decade of the current national water reform era, Indigenous interests in water were not acknowledged (see (Lingiari Foundation 2002); (Tan 1997); (Lane 2000). Tan observed that the native title aspects of water law had been neglected:

> No mention has been made of the possible existence of Indigenous rights to water resources in various policy documents discussing the reform of the water industry. This is surprising given that Indian water rights in the United States of America have been the subject of much attention (1997: 178).

A further consideration in the water reform process relates to matters of procedural justice: the need for effective Indigenous participation in developing land and water management activities, such as integrated catchment management and water resource planning (Jackson 2005). Over the past few years a number of resource management mechanisms have been adapted to recognise cultural values. For example, there is the notion of a 'cultural flow'; an idea emerging from contributions to the Living Murray Initiative from the Murray Darling Basin's Indigenous Nations (Morgan, Strelein et al. 2003) and New Zealand's Cultural Health Index designed to accommodate Maori measures of river health (Tipa and Teirney 2003). These emerging initiatives are yet to be evaluated to ensure they are adequately addressing the needs of Indigenous people to pursue their own water use plans, to participate equitably in multi-stakeholder processes and derive benefits from changes to the water sector.

Recent developments in northern Australian water management indicate that the water sector, and the wider NRM sector, is interested in learning more about Indigenous water values and how to better protect them in large-scale landscape planning exercises (Morgan et al. 2004; Jackson 2004; Toussaint et al. 2001). Northern water resource assessment studies are increasingly engaging with Indigenous communities in their research activities (e.g. Yu 2000) and, to varying degrees, attempting to document and acknowledge customary knowledge, social arrangements and cultural practices amongst Indigenous land owners and water consumers. Further impetus to incorporating Indigenous interests in water management is given by the National Water Initiative (Jackson and Morrison 2007).

4.2.2 Recognition and Incorporation of Water Values

There is a growing body of literature explicitly documenting and analysing the ways in which Indigenous societies attribute meaning to water and the place of water in their formalised systems of knowledge and social institutions (Langton 2002; Langton

2006; Strang 2001;Toussaint, Sullivan et al. 2005; Barber and Rumley 2003; Rose 2004; Jackson 2005). Much of this literature is drawn from ethnographic studies carried out in northern Australia, in regions such as the Kimberley, reflecting a geographical bias found in our general knowledge of Indigenous societies (Maddock 1972). Water is examined as a feature of the Indigenous cultural landscape with significant attention devoted to the symbolic dimension of individual and group attachment to water. Northern studies describe and interpret stories relating to water represented in myth, painting, film, and dance, and the local customary practices, beliefs and ideas associated with water (Toussaint et al. 2005). As well as examining the symbolic, metaphorical and conceptual significance of water, these same studies also reveal the material use of water according to Aboriginal custom. Many commentators refer to water's economic significance as a vital element underpinning the Indigenous harvest and intra–community distribution of aquatic life (see for example, Behrendt and Thompson 2004; Strang 2002; Altman 2004). Historically, Indigenous interventions improved rates of harvest of certain species, for example, river flows were manipulated with the construction of fish traps, weirs and small dams in numerous Australian river systems (Tan 1997).

Jackson and Morrison observe that the Australian literature dedicated to water planning and Indigenous interests is extremely limited (2007). As noted by these authors, the very limited literature available describes the types of mechanisms and approaches developed in only a few jurisdictions. Some degree of critique, particularly with respect to the NSW water legislation, is provided by Behrendt and Thompson 2004; see also Douglas 2004; Tan 1997, and McFarlane 2004. Jackson's case study of the Northern Territory's Daly River (Jackson 2005; Jackson 2006) reveals certain conceptual and technical challenges to addressing Indigenous interests in catchment and water planning. At present there is no overview of the various Australian methods of identifying and incorporating Indigenous objectives within water planning upon which to draw. An ability to compare and evaluate the range of techniques would be ideal; however, it appears from Indigenous water management initiatives that matters of 'assessment technique' are presently less important than the establishment of appropriate terms of engagement for partnerships:

> It is clear that foremost attention is being given to resource governance with Indigenous groups seeking to assert their rights, create inclusive processes and collaborative relationships based on recognition of cultural difference, including Indigenous law and custom (Jackson and Morrison 2007: 26).

Indigenous systems of customary law dictate that traditional land–owners have a substantive role in land and water management and resource regulation, and hence, a particular interest in environmental governance structures ((Morgan, Strelein et al. 2007); (O'Faircheallaigh and Corbett 2005). Recent Australian studies observe that Indigenous expectations of the extent to which they can directly participate in water management institutions are not being met (McFarlane 2004; Behrendt and Thompson 2004). Indigenous participation in a range of environmental management sectors has previously been described and barriers analysed (Baker, Davies et al. 2001); (Lane 1997); (Howitt 2001); (Lane and Corbett 2005) and recent guidelines for

the NRM sector have been produced (Smyth, Szabo et al. 2004)[12]. Attempts have been made to assess the level and nature of participation (see (McGurk, Sinclair et al. 2006), although not for the water sector, and independent assessments of participatory natural resource management programmes are not widespread. Notably few empirical studies have evaluated the effect of growing numbers of Indigenous reference groups supporting regional NRM bodies, or the quality of Indigenous participation in multi–stakeholder catchment groups (Lane and Corbett 2005). Jackson and Morrison (2007) summarise research issues discussed in the literature on Indigenous participation in environmental management. These issues are likely to be pertinent to achieving enhanced Indigenous participation in water planning, as sought by the NWI, and will be briefly referred to below.

4.2.3 Indigenous Representation in Multiple Stakeholder Fora

North Australian regions are socially complex, as are the catchments draining their river systems. They are characterized by a distinct spatial pattern where most Aboriginal people are located in relatively small settlements, invariably remote, while the vast majority of the non-Aboriginal population resides in larger urban centres or cities. Catchments in north Australia, and indeed in other parts of Australia, are not culturally, linguistically or politically homogenous. In any given catchment there may be numerous Aboriginal groups with rights and interests in particular river locales, hence the intra-Aboriginal socio-political relations will require consideration when decisions are made that affect a catchment (Jackson, Storrs et al. 2005).

In many Australian jurisdictions, the mechanisms for achieving consultation in water planning revolve around the creation of multi-stakeholder committees or community reference panels (see Volume 3). Indigenous representatives are usually invited to participate. Efforts to establish catchment management groups and water allocation advisory committees requiring direct Indigenous representation on consultative committees will need to be mindful of socio-political processes operating within a catchment and the traditional modes of decision-making of Indigenous peoples.

Seeking the involvement of all groups will give rise to considerable logistical and political difficulties, as has been witnessed in a number of northern catchments. Western Australia's Fitzroy Valley for instance, an area of some 95,000 square kilometres, is home to at least 30 Indigenous communities and crosses seven ethno-linguistic areas with a consequent complex array of cultural and political affiliations (Toussaint et al. 2001: 14). As a result of social change brought about by colonisation of Indigenous lands, 'river' and 'desert' groups share cultural responsibility for river management through marriage alliances and totemic relationships with conceptions sites (Toussaint et al. 2001: 54). Langton describes the Aboriginal land tenure system as it typically occurs in Arnhem Land in the NT:

[12] Commonwealth documents include Guidelines for Indigenous Participation in Natural Resource Management (Commonwealth of Australia 2004). Some states have also drafted Indigenous engagement guidelines.

> The territories of these groups are not simply the length of river systems but wedges of differential ecological resource locales, including specific stretches of river systems, combined in a patchwork effect (2002: 51).

The impact of a particular water management activity or policy might be felt on downstream groups, or on neighbouring groups outside the catchment, depending on the system of regional social organisation and the rules for using and managing resources. Langton makes the important point that it is not only the physical impact of a water use decision which must be considered, but also the social impact 'on all the groups who draw from water sources their identity and traditional relational patterns' (2002: 53). These relational patterns of social organisation may take different forms, as observed by Cooke in Arnhem land (cited in Langton 2002). In Central Arnhem Land, where the river is not spoken of in its entirety, there is no one name for a river, rather many locality names. Yet in Western Arnhem Land there is a classificatory title which applies to all people of a catchment, whether or not they are the same clan or language group (cited in Langton 2002: 50).

In most catchments, and particularly in those subject to development pressure where catchment planning is most needed, there are also likely to be significant non-Aboriginal interests, such as recreational fishing and tourism. Thus, the intra-cultural interactions contribute to complex socio-political catchment relations, as do the contemporary interactions between Aboriginal and settler societies.

Relationships between emerging regional land management structures, such as catchment management authorities, and Indigenous organizations have received little attention from researchers, although there is a growing interest in suitable forms of regional governance for service delivery to remote Northern Territory Aboriginal communities (see Holcombe 2004). The adequacy of Aboriginal representation and participation in newly created or adapted regional management structures may be severely constrained by poorly conceived models of political representation, such as the community reference group designed to oversee the development of a Daly River Integrated Land-Use Plan (see Jackson 2004). In that instance, insufficient consideration was given to ensuring that all affected Aboriginal groups could contribute to the deliberations of a multi-stakeholder committee where traditional owners held only one place at the table of 18. The diversity of Aboriginal interests and inability of one person to act as a representative of all seven language groups limited the capacity of the traditional owners to contribute to the planning process. Weir has made a similar criticism in her studies of Indigenous participation in water management in the Murray Darling Basin:

> piecemeal representation of Indigenous peoples on NRM boards is played out again and again in the creation of new NRM structures, as was the case, for example, with the local water management committees in New South Wales, which had two positions allocated for Indigenous representation (cited in (Jackson, 2006: 21).

Regional resource governance structures need to be cognisant of contemporary Aboriginal socio-political networks, customary resource rights, and traditional methods of decision-making, although these are not beyond adaptation and transformation (Martin 2003). It is equally important for Indigenous people, who no longer operate in an 'autonomous arena of Indigenous values and practices' (Martin 2003: 5) to consider how to adapt existing or design new institutions to enhance

engagement with mainstream governance structures.

4.2.4 Cultural Values and the Provision of Indigenous Access to Water

It is very common to hear Indigenous people's environmental philosophy described as holistic. For example, the term 'country' encompasses land, water, sky, stars, ancestral pathways, minerals, people and social relations (Rose 1996). Yet in many resource management contexts, cultural values are very narrowly defined and many assumptions about Indigenous societies affect how the term is interpreted by resource managers and stakeholders. Jackson's study of the Daly River planning process conducted in 2004, shows that attention was given to sacred sites and cultural heritage when the range of values were being assessed, but no action was taken to incorporate Indigenous people's interests in, and potential contributions to, environmental research and economic activity (Jackson 2006). As shown by Jackson (2006), the identification of 'cultural values' in north Australian water management is fraught with methodological failings:

> Separate treatment of indigenous and non-indigenous social values (in the Daly River) compounded the reification of Aboriginal 'cultural values' which were perceived largely within the confines of a cultural heritage paradigm. The heritage paradigm, and other common influential theories of value focus on objects, entities and places at the expense of recognition and valuation of relationships, processes and connections between social groups, people and place and people and non-human entities. Perversely, in the application of this particular value construct, which had originally sought to recognise the prominence of Aboriginal place attachment, indigenous interests, values and perspectives were starkly isolated from the other values categories, and thus marginalised and de-emphasised in the research effort undertaken to ascertain those other values, and in a subsequent planning report to government (2006: 27).

The NWI requires that water planning processes 'take account of the possible existence of native title rights to water' (Paragraph 53), but how the process might do that is not articulated. Presumably, this would encompass consideration of the effect of water use activities that may impair native title rights, as well as the potential to allocate water to title holders to ensure their continued enjoyment. In relation to impairment, one of the principle objects of the *Native Title Act 1993* is to recognise and protect native title and it provides a mechanism for permitting actions that may affect native title, such as granting water licences. Behrendt and Thompson (2004) discuss how these 'future acts' may affect Indigenous interests in rivers and water (e.g. whether they are compensable), noting that certain procedural rights of notification apply. Again, there is uncertainty as to how broadly the courts might construe the manner in which native title rights and interests might be affected, and Behrendt and Thompson observe from overseas experience that the courts have taken a broader view 'than what some governments may prefer' (2004: 80). They detail the USA example, where Indigenous people have enforced a level of access to water to ensure not only that their lifestyle can be sustained but to also have sufficient water to pursue agricultural livelihoods. These and other authors argue that despite different legal and historical circumstances the principles upon which native title can be considered to be affected are arguably equally applicable to Australia's

situation. One such principle is the implied right to water because it is an integral component required to uphold Native American interests in fishing (Behrendt and Thompson 2004; Lombardi 2004).

Recent commentary on Indigenous issues and the NWI state that there is little guidance in determining how these issues might be resolved for the following reasons:

- the effects of expanding existing water markets and the creation of new water markets on Indigenous people are not known;
- native title decisions made to date have not considered the effect of unsustainable water use on Indigenous rights and interests;
- nor is there clarity on the consequences of a failure to provide the procedural rights set out in the *Native Title Act*, or how compensation may be determined (Jackson and Morrison 2007).

4.2.5 Benchmarking Effective Indigenous Participation

Our understanding of the barriers and incentives to Indigenous participation in the water sector is inadequate. Overall there is no system in place to monitor Indigenous involvement in either water–based enterprises or water management institutions, making it impossible to accurately describe the present situation and access trends (Jackson and Morrison 2007). Recent assessment of research gaps in Indigenous issues consider that a significant contribution to establishing a baseline for monitoring and evaluation would be made by a national review of each jurisdiction's legislative and policy framework to determine:

- the extent and quality of Indigenous engagement and participation in preparing plans, particularly their role in advisory or reference groups;
- the compatibility of Indigenous and non-Indigenous notions of political representation
- the extent to which the States are meeting other implementation tasks, such as allocating water to Indigenous uses, upon what basis and by what methods;
- the extent to which they are identifying and assessing the effect of water use decisions on native title;
- the resources available to Indigenous communities to participate
- monitoring and evaluation systems;
- the relative merits of the available range of participatory, deliberative and modelling techniques in cross-cultural contexts.

There are currently no national guidelines, prescriptions or standards for reaching agreement with Indigenous people over water resource use and management, and the measuring success of varying techniques and approaches. Notwithstanding national legal requirements under the *Native Title Act 2004* (Cth), regional differences in history, land use, legislation, social organisation and capacity are likely to require that co-management and benefit-sharing arrangements are negotiated on a case-by-case basis. This can be expected to take some time as organisations and communities come together and map out a course for information exchange,

relationship building and articulation of management goals and implementation strategies. Nonetheless national standards against which to rate regional progress are still required.

Standards could include the need for slow and inclusive processes, as well as requirements for provision of financial support for Indigenous organisations to improve their capacity and ability to document and articulate their concerns amongst groups competing for water resources. Indigenous organisational development, frameworks that structure the terms of engagement with governments and other stakeholders, and policies that reflect Indigenous aspirations are all necessary conditions for effective participation.

In the following section we turn to a number of approaches and tools gaining popularity in supporting decision-making and revealing the trade-offs associated with complex natural resource management problems.

4.3 Tools for Trade-Offs

4.3.1 Introduction

In this chapter, a variety of processes or 'tools' are reviewed that assist in identifying and addressing trade-offs related to complex and often difficult decisions. A trade-off refers to a situation that involves making decisions when each choice has both advantages and disadvantages. The complexities involved with decisions about natural resource management and, in particular, choices involved in water planning, mean that there may be many advantages and disadvantages related to different planning options and therefore many trade-offs. There may also be many different decision makers involved in such water planning exercises and often these decision makers will have conflicting priorities and preferences. Balancing such priorities to ensure optimal outcomes from the planning decision is a key requirement of any tool dealing with trade-offs. The first step however is for decision makers to acquire a good understanding of the trade-offs that may be involved with the array of different options that are under review. Tools for effectively dealing with trade-offs must therefore take into account all of these requirements. The outcome of using these tools is not always necessarily going to be a win-win situation (although this may often occur) but rather to identify what the difficult choices and preferences are and to at least attempt to reach some sort of compromise that is agreeable to all stakeholders.

The tools reviewed in this chapter are based on those commonly used within the decision analysis, public participation and stakeholder engagement literature. As such it is not an exhaustive list but reflects an overview of various methods that have had frequent use and revisions. Decision support and participatory tools are common means of dealing with trade-offs and in particular Multi-criteria Evaluation and variations of this approach have been used effectively in natural resource management and planning and are explicitly directed at identifying trade-offs. Other methods have varying objectives, one of which may be trade-off identification and analysis. In this chapter, Multi-criteria Evaluation, Citizens' Juries, Deliberative Multi-

criteria Evaluation, Consensus Conferences, Deliberative Polls and Focus Groups are explained and reviewed in detail as suitable tools for identifying, analysing and dealing with trade-offs, particularly in the water planning context..

4.3.2 Multi-Criteria Evaluation

Multi-criteria Evaluation (MCE, also known as Multi-criteria Analysis) is a means of simplifying complex decision-making tasks which may involve many stakeholders, a diversity of possible outcomes and many and sometimes intangible criteria by which to assess the outcomes. In many public decision problems, such as those involved with environmental policy, the objectives of the decision may conflict and the criteria used to assess the effectiveness of different policy options may vary widely in importance. MCE is an effective technique in which to identify trade-offs in the decision-making process with the ultimate goal of achieving compromise. It is also an important means by which structure and transparency can be imposed upon the decision-making process.

For example, decisions concerning water catchment planning often involve many trade-offs such as competing uses of the water for irrigation, tourism benefits or environmental flows. Different stakeholders will have different priorities for the use of the water and each of these different uses could result in widely different economic, social and environmental impacts. The purpose of MCE is to try and find the best water plan in terms of the benefits enjoyed and the stakeholders satisfied.

The origins of MCE lie in the fields of mathematics and Operations Research and it has had a great deal of practical usage by public planners in such areas as the siting of health facilities, motorways and nuclear reactors as well as natural resource management (Massam 1988, Nijkamp et al. 1990, Munda et al. 1994, Herath and Prato 2006).

As discussed subsequently, a Multi-criteria Evaluation seeks to provide a means by which a logical process that is often implicitly carried out by an individual when coming to a decision can be expressed and explored. In complex decision-making tasks, which sometimes involve many objectives and many decision-makers, a structured process may be lost in the complexity of the issues. Multi-criteria Evaluation refers to the class of decision aiding techniques which:

- decide between a finite number of options,
- use a set of criteria to judge the options, and
- use a method by which the options are ranked, based on how well they satisfy each of the criteria.

In the MCE process, a variety of different options or scenarios are identified which represent the different possible decision alternatives that have to be compared with one being chosen as the outcome of the decision process. A set of decision criteria are developed by which each of these options are assessed. The criteria are also weighted by stakeholders to reflect their importance in the decision-making process to each of the stakeholders. Information on the criteria impacts and weightings are then aggregated in a mathematical software program and the optimal scenario is

chosen. Finally, a sensitivity analysis is carried out on the results. In many types of MCEs, the ultimate outcome is a preferred option or set of options that is based upon a rigorous definition of priorities and preferences decided upon by the decision-maker[13]. MCE should be regarded as an aid in the process of decision-making and not necessarily as a means of coming to a singular optimal solution[14] as followed by many mathematical optimisation programs. As such, the MCE process is valued for the enlightenment and unravelling of issues that it can provide in the decision-making problem. The process adds to the knowledge of the decision-maker and is greatly aided by including the decision-maker in each step of the analysis. This is one reason why some forms of MCE are regarded as superior to other decision aiding techniques (for example, mathematical programming methods and Cost Benefit Analysis) which more closely resemble a 'black box' approach.

Steps in the Analysis

In general, a series of common steps are followed by the decision-maker and the analyst in all MCE techniques. In terms of analysing trade-offs, the whole process may be repeated with 'fine tuning' by the decision-maker to aspects related to his or her input. This part also allows for any trade-offs to be identified in the overall decision process. The following sections provide a detailed description of, and guidelines for, these major steps in the Multi-criteria Evaluation.

Choosing the options and the objectives

The choice of options and of the overall objective or objectives is important and closely related steps in any decision-making process. The objective can be as broad as necessary, but in the case of multiple decision-makers, overall agreement should be reached. The options could reflect each of the preferred scenarios of the decision-makers or could be based on an amalgamation of plans of the decision-makers. Massam (1988: 36) suggests a benchmarking approach as a framework for the options which should include:

- the status quo,
- an ideal best plan,
- an hypothetical worst plan, and
- a plan of minimum satisfaction.

The options should be sufficient in number, however, to represent a realistic selection for the decision-maker but should not be too numerous to make the analysis unwieldy or unnecessarily complex.

Selecting the criteria

The decision-maker usually selects the criteria. The criteria are designed to compare and assess each of the options and therefore must relate to the overall objective of the decision-making task. Initially, criteria can be very broad and then broken down

[13] The singular term is used here in this section, but many decision makers may be involved.

[14] 'Optimal solution' in MCE literature refers to the option under investigation that is ranked highest by the MCE aggregation software

into components or sub-criteria and even lower level sub-criteria. Ideally, the lowest levels of the criteria structure are those which are measurable (quantitatively or qualitatively) and are known as indicators.

The criteria should…	Explanation
be complete and exhaustive	The criteria cover all possible aspects of the decision-making problem and make the analysis complete.
contain mutually exclusive (non-redundant) items	This is to prevent double counting of aspects of the decision-making problem and to better allow trade-offs to take place. This essentially means that the preferences associated with the impacts of options can be assigned independently from one criterion to the next. For example, this means that you can assign preference scores for the options on one criterion without knowing what the options' preference scores are for any other criteria. This condition must be met for any MCA if a weighted average summation approach to combine preferences across criteria is to be used.
be clearly defined	The criteria must be directly relevant to the defined problem.
be decomposable if necessary so that the final set has minimal properties	The criteria should be decomposable into smaller measurable units as appropriate. For example, a criterion such as 'quality of life' may be measured as an index based on the sub-criteria of level of income, access to health care and level of education. Eventually no other smaller set of criteria can be measured, however.
be restricted in number	This is so that weighting the criteria does not become unmanageable or difficult. Advice on the number of criteria or sub-criteria in any group varies but most practitioners regard 7 to 12 criteria as the maximum (Yoon and Hwang 1995: 8; RAC 1992d: 17). However, the Analytic Hierarchy Process manages large numbers of criteria by the hierarchical framework that it employs. Under this technique, when the number of objectives or criteria become large, then a hierarchical structure of objectives and/or criteria is imposed.

Figure 11: Table identifying suitable criteria

Adapted from DLTR 2001: 5-7

Weighting the criteria

In Multi-criteria Evaluations, the preferences of the decision-maker are accounted for by the weighting or scoring placed on each of the criteria and sub-criteria[15]. These weightings may range from equal importance of all criteria, to a ranking of most to least important or to a relative weighting of all criteria. The weights may be qualitatively expressed, quantitatively expressed or a mixture of both. In analyses which involve many different decision-makers, this can be the most important and informative part of conducting the whole process. It allows stakeholders to express differing views explicitly and it helps identify those areas which are of most importance to them and which warrant careful investigation. The weightings make explicit those areas which may ultimately require possible trade-off solutions and thus they provide a greater focus for a complex decision problem.

Evaluating the options

The options are assessed in two stages: first, by how important each of the criteria and sub-criteria are to the decision-maker (the weight vector ***w***) and second, by how well each option rates in terms of each of the criteria and sub-criteria of assessment.

The second stage is displayed by means of an Impact Matrix *M* where each of the components, the m_{ij}, represent the evaluation or impact of the *j*th alternative according to the *i*th criterion. In other words, the Impact Matrix shows the performance of each option according to the individual criteria (see Table 2 for an example).

Solving the typical discrete multi-criteria decision problem involves:
A: a finite set of *i* = 1 … *I* feasible options;
G_j: the evaluation criteria used to assess the options, where G_j maps the set of options onto the real number line i.e. $G_j : A \rightarrow R$ for all *i* = 1… *I*;

If *A* has two elements, *a* and *b* and *a* is regarded as being a better solution than *b* according to the *j*th criterion, then $G_j(a) > G_j(b)$ (Munda et al. 1994).

The final ranking of each of the options is then calculated by a mathematical operation using the Impact Matrix and the criteria/sub-criteria weights. The form of this mathematical operation (often referred to as the 'aggregation procedure', Munda et al. 1994) often describes the particular type of Multi-criteria Evaluation employed.

Criteria	**Options***

[15] In some decision processes, decision makers may prefer not to explicitly weight the criteria but rather to analyse the impact matrix and base their judgement only on how well each of the decision options perform according to the criteria. In this case however, implicit weights for the criteria do exist, but are not revealed.

		1 Business as usual	**2** Agriculture water use emphasis	**3** Environmental flows emphasis	**4** Combination of agriculture, tourism and environmental uses
Economic costs	$m	5	6	8	5.5
Economic benefits	$m	6	10	9	11
Water Quality	SO2/ml	20	20	10	15
Environmental flows	ML	50	40	100	80
Employment level	‘000	25	28	22	25

Figure 12: Table showing example of an Impact Matrix for a Water Planning Problem

Option titles only are provided. Each option would contain a detailed plan to reflect the strategy identified by the title.

Sensitivity analysis

Although not always undertaken, particularly in MCEs that pursue a single optimal outcome, sensitivity analysis of the results is regarded as an extremely important part of the MCE process. It is particularly useful in identifying various trade-offs and the associated consequences of these trade-offs involved in the decision problem. There are several reasons for this, mainly related to exploring the complexities of the decision-making problem more fully, and some related to overcoming or at least recognising criticisms of the technique.

It is very important that the sensitivity of outcomes can be tested for different values of the most crucial and contentious criteria and impacts. For example, in a group decision-making situation, if it were found that there was a great disparity in preferences for a certain criterion then it may be enlightening to find out how the overall results change with the changes in preference levels for this criterion. If the results are not greatly affected, then the criterion can take less importance in the overall process and the decision-makers can concentrate on other criteria and trade-offs. If the results are extremely sensitive to this criterion, then closer scrutiny should be given to it by confirming values and measurements.

Interacting and iterating

The analyst can achieve greater understanding of the decision-making problem by interacting with the decision-maker to allow further iterations in the analysis if necessary and also to identify where trade-offs can be made. In group decision-making situations, this step can be crucial if the ultimate aim of the analysis is to reach some compromise or agreement on the outcome. Often, interaction and further iterations can be facilitated by the use of computer software models that allow for faster manipulation of the data.

Spatial MCE

For spatial data, one promising but little used technique for interacting with the decision-maker is the incorporation of geographical information systems into the Multi-criteria Evaluation (Janssen and Rietveld 1990). For example, for a decision concerning different areas of land being put to different purposes, it could be possible to link the outcomes of a Multi-criteria Evaluation to a graphical interface depicting these different land-use options. In Australia, the Bureau of Rural Sciences has developed a spatial MCE software tool called MCAS-S[16] (Multi-Criteria Analysis Shell for Spatial Decision Support, http://adl.brs.gov.au/mcass/index.html). MCAS-S has been used on rangelands assessments, land cover change and impacts on ecosystem services as well as sustainability assessments in regional areas. In the United States, spatial MCE has been effective in assessing priority areas for land conservation and other natural resource management issues (Strager 2004; Strager and Rosenberger 2006).

4.3.3 The Citizens' Jury

Another method of incorporating public participation into a decision making process that may involve the investigation of trade-offs is the Citizens' Jury (Coote and Lenaghan 1997). This approach has had widespread use in particular in deciding health issues in Europe (Lenaghan 1999) and in environmental issues in both Europe (O'Connor 2000) and the United States (Crosby 1999). It has had growing use in Australia (James and Blamey 1999, Robinson et al. 2002, Niemeyer and Blamey 2003, Western Australian Department of Infrastructure and Planning 2005).

The Citizens' Jury is based on the model that is used in the judicial system for assessing the guilt of people charged with a criminal offence. For those juries concerned with a public decision-making process (such as the allocation of health funds or the identification of protected areas), the typical jury has ranged from 10 to around 20 participants. The jury can be selected either randomly or by use of a stratified random sample. The jury is given a specific charge which is well worded, clear and direct. Ideally the process uses a facilitator and the jury is given sufficient time to deliberate, ask questions and call witnesses. This may take several days. A process which involves significant complexity or one that requires many witnesses may take much longer. Witnesses are chosen based on their expert knowledge and can and should be selected to represent differing viewpoints. The jury should be comfortable that adequate time has been given to all viewpoints. The final outcome is usually a consensus position reached by the jury usually documented in a report to the relevant agency that has established the jury.

The steps in the Citizens' Jury process are as follow:

1. Jury Selection: this is done after a random selection of potential participants usually via a telephone survey to ascertain their willingness to participate. The jury is then selected based on demographic and attitudinal characteristics to best reflect a sub sample of the relevant stakeholders.

[16] Multi-Criteria Analysis Shell for Spatial Decision Support, http://adl.brs.gov.au/mcass/index.html

2. Witness Selection: Experts are selected to represent all issues and perspectives of the argument. Experts are to give information to the jurors so that they can make fully informed decisions.
3. Charge: The charge usually takes the form or a question or series of questions or issues to be addressed and answered by the jury and provides the essential focus for the jury. The charge should neither be too broad or too narrow and must be established at the beginning of the process. Unlike a criminal jury, is it not usually reflected in a 'yes' or 'no' answer (e.g. 'guilty, or 'not guilty'). A charge that could be related to a water planning process could be: 'to choose an optimal water plan that best reflects the principles of sustainability and equity for the next ten years'.
4. Hearings: The hearings represent the meetings attended by the jurors and are presided over by an independent facilitator (judge) with the expert witnesses providing information and answering questions as necessary. The rules of procedure are clearly established at the start and time is given to allow the jurors to get to know each other and take part in discussions and deliberations. This process may take several days.
5. Recommendations: At the end of the process the jury must provide the agreed recommendations and reasons for these recommendations (Adapted from Jefferson Center 2004).

Although not specifically targeted as a method for identifying trade-offs, the process of allowing individuals to express their concerns and discuss and deliberate over differences is a way to achieve this.

4.3.4 Deliberative Multi-Criteria Evaluation (DMCE)

A method that has been developed specifically for use as a tool to identify and assess trade-offs between multiple decision-makers preferences and the outcomes that many different decision options may have is Deliberative Multi-criteria Evaluation (DMCE, Proctor and Drechsler 2006). It has been developed as a combination of Multi-criteria Evaluation and the Citizens Jury techniques to enhance the advantages and overcome the disadvantages of each.

Multi-criteria Evaluation has the great advantage of being able to simplify very difficult decision problems. MCE provides a framework or approach to complex decision-making problems that allows the problem to be broken down into transparent and identifiable parts. This structuring process then enables the complexities of the problem to be unravelled. This is done essentially through the process of identifying objectives, criteria and indicators. Applying MCE in an heuristic way enables the MCE to aid in the learning process of complex issues.

MCE is typically a process that is carried out by a single decision maker. When multiple decision makers are involved with different priorities and therefore different weightings for the decision criteria, the MCE process usually addresses this by taking an average over these weights which does not reflect the variation in opinions that these weights may represent. A lot of valuable information in critical trade-offs and outliers may be lost by this simple averaging procedure. When the analysis concerns

only one decision-maker, the mathematical incorporation of the preference weights into the decision-making problem is relatively straightforward. When it concerns more than one decision-maker, the process becomes more complex and controversial because a matrix of different preference weights for different decision-makers has to be reduced to a single vector in order for a single optimal solution to be found. Such a reduction may be performed by taking a simple average, a modal or even a median figure over the range of the weights, but such reductions may lose important trade-off information related to the outcomes of the analysis under extreme weightings. There is no clear consensus in the literature on how to reduce many different preference weightings for the criteria.

Citizens Juries, on the other hand, do allow for an effective approach of interaction between decision-makers and analyst and for conducting an iterative process. In general however, citizens' juries have not addressed the problem of structuring the decision-making problem that faces decision-makers. A logical progression to overcome both these problems and to enhance the advantages of both is to combine the two approaches. Deliberative Multi-criteria Evaluation (DMCE) combines the facilitation qualities of the Citizens Jury process with the analytical and integrating qualities of the Multi-criteria Evaluation technique by giving the jury the charge of coming to agreement on the weightings for the decision criteria (Figure 13).

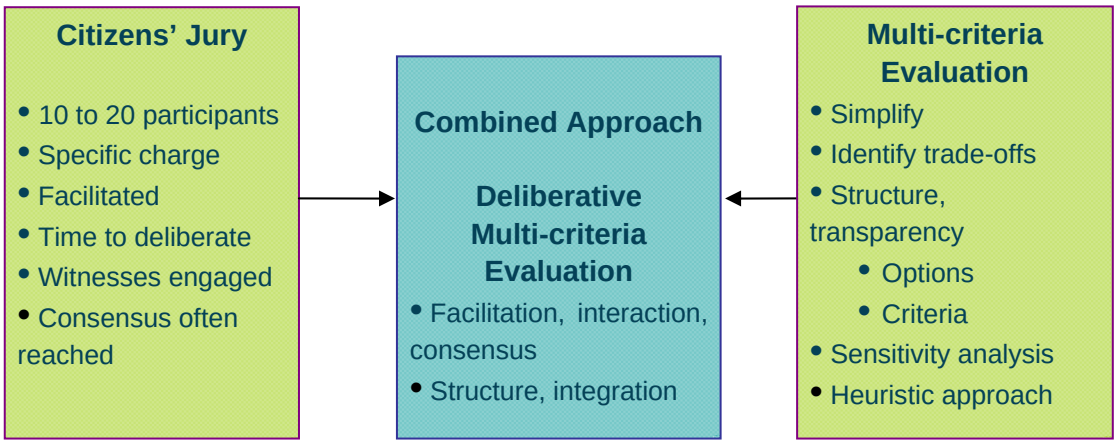

Figure 13: Deliberative Multi-criteria Evaluation

As the weightings typically vary for different jurors, the deliberative process and discussions are prompted by those with wide disparities in their weights to argue their case. Expert witnesses can be called in for each weighting issue where big disagreements exist to give more information. The MCE software can then be displayed iteratively as the jurors agree to change their weightings and a sensitivity analysis can also be conducted iteratively to determine if the variation in the weightings makes any difference to the overall ranking of the different options under investigation.

Steps in a Deliberative Multi-criteria Evaluation

The processes in the DMCE are similar to those outlined in the MCE steps

previously. Figure 3 gives a summary of each of the steps in the DMCE framework. In the first step the set of feasible options or potential outcomes are identified by the analyst to clarify the decision problem. The stakeholders decision makers are then chosen. Next, the decision-makers seek to identify the overall objective that is to be achieved in the process, agrees on the suggested options to be analysed and then identifies the criteria by which to judge the selected options. An important part of the process is then to apply appropriate weights to each of the criteria. These reflect the particular preferences of the decision-makers in how important each criterion is in relation to the overall objective.

The jury is then brought together to deliberate over their weightings and to come to agreement on them. First they are shown the initial set of weights given by each person so that every stakeholder can see the position of each other on the weighting scale. Where large disparities exist, expert witnesses are brought in with specific knowledge on these criteria to give more information and answer questions from the stakeholder jury. The jury is then given time to deliberate on each criterion and then to give their weightings again. Appropriate software is chosen by the analyst to assist the jurors to show them the results of each iteration of weightings.

This interactive process can be repeated several times to see if greater consensus can be reached on the weightings and most importantly to identify the crucial trade-offs in the decision process that may warrant greater investigation. The sensitivity of the ranking of options can also be estimated with respect to the chosen weights and displayed to the jurors. The whole process is facilitated by an unbiased judge, who enables all jurors to have their say and to maintain structure and continuity in the process.

4.3.5 Consensus Conferences/Deliberative Polls

A consensus conference is a deliberative forum of representatives from the public that are given a decision problem that they have to form consensus on. It originated in Denmark during the 1980s and both members of the public and experts are brought together as separate panels to discuss and debate various issues that the public representatives are meant to form consensus on. It is similar to a citizens jury although usually much larger. The structure may also be quite different and the key issues for discussion, the experts chosen and the ultimate decision are all determined by the public panel. Several consensus conferences have been held in Australia to date with the first being one on Gene Technology in the Food Chain that was held in Sydney at the Sydney Museum in March 1999.

Deliberative Polling is a similar technique to the consensus conference where members of the public and experts are brought together to discuss a particular issue. It was developed by James Fishkin in the US in 1988. In the deliberative poll, a survey is given to the public respondents prior to their being brought together for two or three days of discussion, questioning of experts and deliberation (Fishkin 1991). During this process another survey is taken and then again at the end. The idea is that peoples' attitudes and beliefs will change and more informed decisions will be made by the process of deliberation and receiving information. In Australia, several national deliberative polls have been undertaken with the most famous being one on

a republic referendum in 1998 and another on national reconciliation with Aboriginal people in 2001 (Ryan 2002, Hendriks 2006).

Although not specifically developed to act as tools to identify trade-offs the consensus conferences and deliberative polls often deliver the key trade-offs in the outcomes.

4.3.6 Focus Groups

The process involving a focus group is a structured one that is often carried out in marketing and social research to elicit ideas and opinions from a specifically targeted group of people about a topic of interest usually by carefully constructed interview questions. A focus group has been defined as a "carefully planned discussion designed to obtain perceptions in a defined area of interest in a permissive, non-threatening environment" (Krueger 1988: 18). Focus groups have had extensive use in Australia and overseas since around the Second World War (McLachlan 2005) and are often seen as a quick and inexpensive way to investigate peoples attitudes to different issues and questions. This technique has also had success in being applied via virtual mediums such as the internet. Although not usually specifically cited as a tool to determine trade-offs the interview questions can be directed to ignite discussions and debate by the groups that will reveal such important trade-offs.

4.3.7 Conclusions

In this chapter, several different methods have been shown that deal effectively with complex trade-off situations related to decision making problems. Each of these methods provide for the involvement of stakeholders and inclusion of their views, opinions and preferences in the decision making process. Deciding on which method to use will depend on the contextual situation of the decision problem as well as the analysts and stakeholders involved. Some problems may require more technical and involved processes such as the DMCE, whereas for other problems, it may be appropriate to use a more simplified approach such as the focus group method. The key message from all of these methods that deal with trade-off identification and assessment, particularly in natural resource management, is the involvement of stakeholders and the ability for them to have their views heard. In the next section, methods for assessing and monitoring the success of the participatory process used, whether it be for identifying trade-offs or other reasons, are provided. The assessment techniques discussed can be effectively incorporated into all of the trade-off tools described in this chapter.

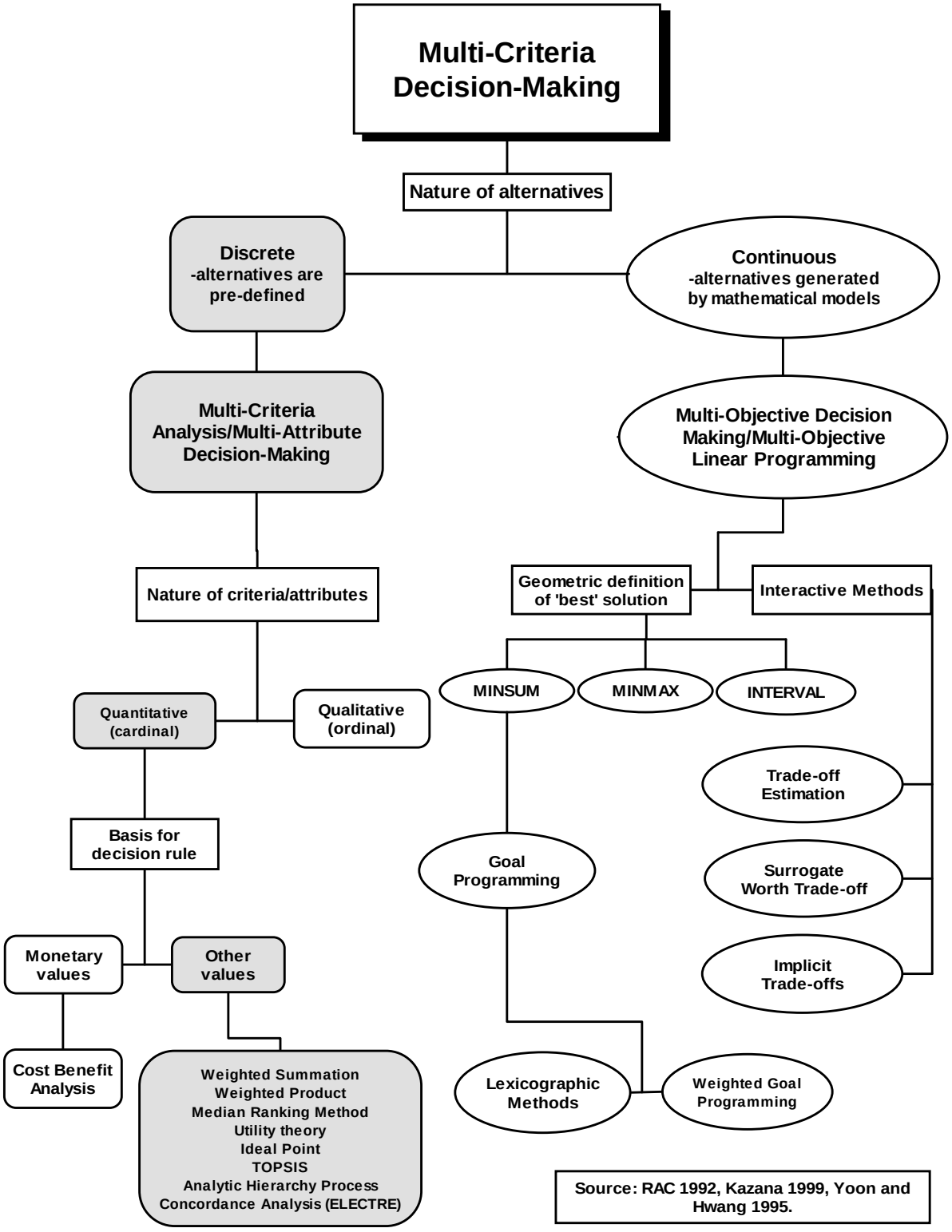

Figure 14: A taxonomy of Multi-criteria Decision-making methods

Source: RAC 1992b; Kazana 1999; Yoon and Hwang 1995

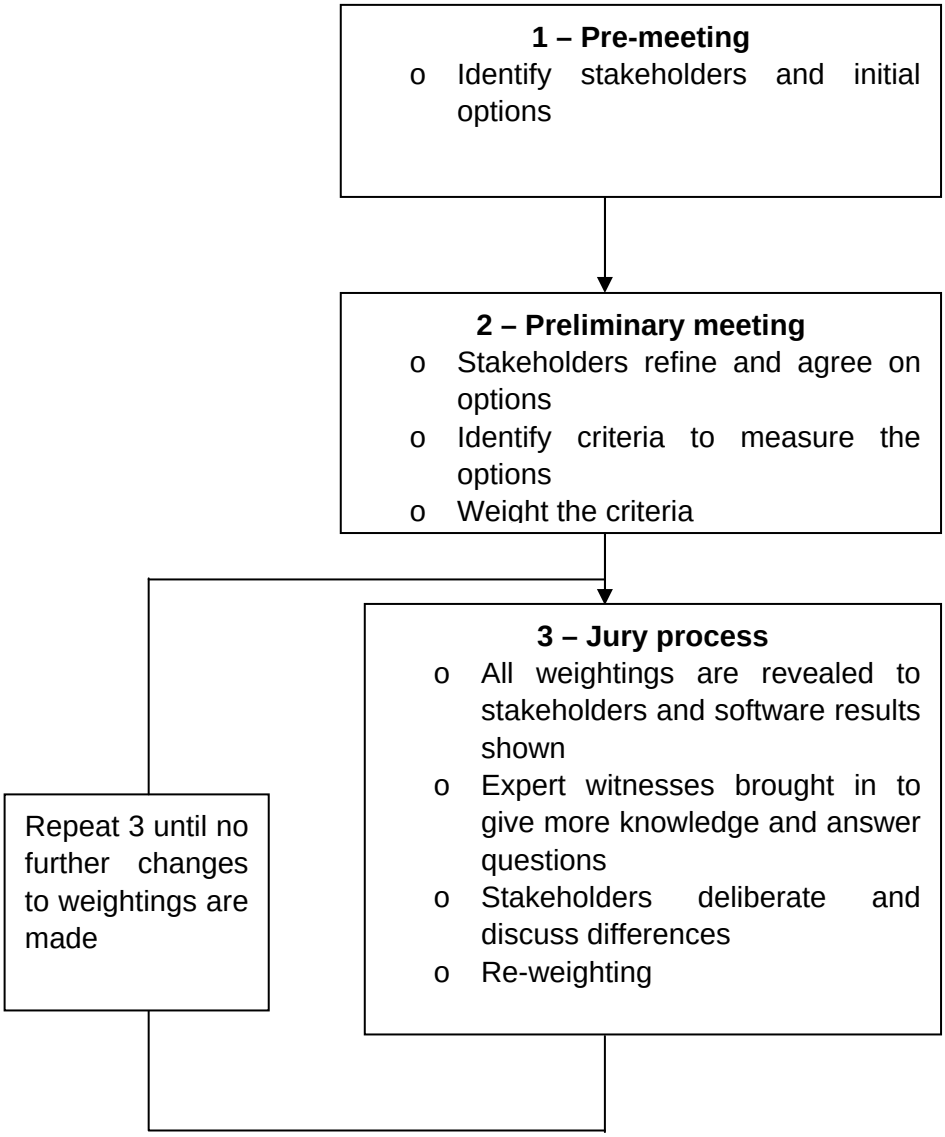

Figure 15: Steps in a DMCE

5.1 Assessing Collaboration: The Case for Improved Monitoring and Evaluating

The preceding sections have explored public participation and collaboration as both a discourse and a practice in the field of water resource planning and management. One of the limitations to our understanding of current approaches to water resource planning is that methods of determining the success or effectiveness of collaborative processes remain theoretically under-developed and methodologically under-explored. As Cleaver (2001) argues, despite the “heroic claims” made in support of increased collaboration and participation in decision-making, there is limited evidence of the long-term effectiveness of participation. The value of participation for improving decision-making often relies on an “act of faith” (2001: 36), rather than substantial evidence. The lack of evidence is partially explained by the absence of an established framework against which the impacts and effects of collaboration can be rigorously assessed and evaluated.

To address this gap, an appropriate monitoring and evaluation (M&E) framework to assess collaborative approaches to water resource planning is necessary. This is essential, not only in improving current practice, but also to orient the retrospective evaluation of water resource planning in Northern Australia. For the purposes here, the definition of M&E is adopted from Patton as ‘‘the systematic collection of information about the activities, characteristics, and outcomes of programs for use by specific people to reduce uncertainties, improve effectiveness, and make decisions with regard to what those programs are doing and affecting’’ (Patton 1987: 14).The authors believe that explicit and transparent processes for the monitoring and evaluation of collaborative processes are vital to their effectiveness and continual improvement, and have drawn on the abundant research on monitoring and evaluation of community participation and collaboration.

This section primarily relies upon the literature relating to the practice of M&E in the fields of natural resource management and international development by non-governmental agencies (NGOs). Much of the innovation in M&E practice occurs in these fields, as a result of what Roche (1999) describes as a “vicious circle”. According to Roche, increased competition between NGOs, the growing need for establishing profile and fundraising, poor institutional learning and accountability, and the absence of professional norms and standards combine to increase the pressure on NGOs to demonstrate outcomes and impacts of development and advocacy programs. As a result, frameworks to assess changes which occur as a result of specific collaborative interventions, including the inclusion of collaborative process, have been subject to the most sophisticated progress within these fields.

5.1.1 Principles of monitoring and evaluation in Australian water policy

At present, the monitoring and evaluation of the water reform process is limited to state level assessment against nationally identified indicators for “water access

entitlements, environmental water, water use efficiency, water pricing and water trading" (CoAG 2004: 22). Despite the requirement for public participation in the reform process, there is no formal requirement for the monitoring or evaluation of the impact, effect or effectiveness of that participation. The authors consider that assessing the effects and impacts of collaboration on water planning is necessary in order to:

- Facilitate an adaptive process for water planning and management;
- Enable the testing of collaborative mechanisms;
- Build reflection into the participatory approaches to water planning and management of water resources; and to
- Engender a culture of continual improvement for Indigenous engagement and participation.

Throughout its literature and practice, there is widespread recognition that natural resource planning and management is to be regarded not only in terms of outcomes, but also as a **process** (Barr and Cary 2000). Sustainability in resource management, which is regarded by some as the aspirational objective of the National Water Initiative (Connell and Dovers 2003), is represented as an ongoing process whereby behaviours and practices are critically adopted and adapted based on experiences of social learning. The social learning experiences in this process are a result of cycles of planning, implementation, monitoring, reviewing, and reassessing towards a new phase of implementation based on experiential learning (see Gray and Lawrence 2001: 154-155, Pretty 2002). It is the cyclic nature of this process that is captured by the term 'adaptive management'. Adaptive management begins

> with the central tenet that management involves a continual learning process that cannot conveniently be separated into functions like research and ongoing regulatory activities and probably never converges to a blissful equilibrium involving full knowledge and optimum productivity (Walters 1986: 8).

The adaptive management approach to monitoring and evaluation has been embodied in the guideline documents and national frameworks for natural resource management multi-laterally endorsed by the State and Australian Governments (DEH 2003a, 2003b), and have long been proposed to address environmental problems in Australia, including coastal management and climate change. An adaptive approach is also evident in the approach to Australian water reform. Section 25 of the National Water Initiative provides that the State and Australian governments will develop planning frameworks which "provide for adaptive management of surface and groundwater systems in order to meet productive, environmental and other public benefit outcomes" (NWI 2004). An effective adaptive management system would not only identify targets towards the achievement of sustainability and effective public participation, but also include a monitoring system to measure progress and achievements against the targets, and a response system that enables modifying interventions in response to the findings (Gunderson et al. 1995). This systematic approach to M&E is notably absent from the Australian water reform process at present, which only requires a monitoring and review process geared towards allocation and compliance.

The second rationale for monitoring and evaluating collaboration is to contribute to

experimentation or testing of participatory mechanisms. As Parnell et al. identify, the 'trialability' of innovative and alternative practices is a major factor in their uptake:

> Trials contribute substantially to both the decision-making and skill development aspects of the learning process. If small scale trials are not possible or not enlightening for some reason, the chances of widespread adoption are greatly diminished… Untrialable technologies may still be adopted… but generally only after substantial information-seeking, discussion, analysis and reflection (2005: 3).

A trialling process, however, has limited value in the absence of a monitoring and evaluation framework able to assess its outcomes or success. The outcomes from a trial, particularly if measured in terms of its impacts on natural resource condition, may take a long time to accrue. The long time scales required of trials, and for collaborative processes generally, for demonstrable quantitative outcomes underlie the need for improvements in methods to determine whether or not a particular collaborative mechanism has been successful. As Rowe and Frewer (2004: 515) posit, although the mechanisms for participation have multiplied, it is not apparent which of the mechanisms are more or less effective and in what context. To enable experimentation and comparison of participative mechanisms, an M&E framework needs to be flexible enough to accommodate a range of applications from specific collaborative tools as well as whole-of-planning engagement strategies.

The third rationale for monitoring and evaluation for collaborative water planning is that it is essential to the validity of any attempt to identify the **affected stakeholders** of a water planning process (Frost 1995) due to the constantly evolving dynamics of the relationships between stakeholders. Jennings and Lockie suggest that a given stakeholder analysis is always a "draft representation of dynamic networks of social relationships" and as such:

> [r]egular updating acts recursively to both help capture and reflect the changing ways stakeholders perceive their own interests, values and aspirations over time, and to promote learning and interactions among stakeholders that lead to such change (2005: 293).

The emphasis here is on the need for monitoring to be **collaborative**, rather than imposed externally through the interventions of experts or independently of the affected groups. Collaborative and participatory evolution of a participatory process through monitoring and evaluation enhances mutual understandings among stakeholders, can assist in the development of strategies for engagement and in alternative dispute resolution between conflicting stakeholder groups (Jennings and Lockie 2005). Hoverman (2005) also emphasises the process value of participatory evaluation, which provides an array of benefits in engendering a continuous improvement process. Inclusive and participatory approaches to evaluation and monitoring are suggested: to increase participants' engagement, sense of ownership and self-determination; to create and refine shared understandings about the intent and implementation of a program; and to establish a culture of social learning that supports and reinforces the program. Above all, Hoverman (2005) suggests that participatory evaluation and monitoring creates a learning culture which is critical to the success of an adaptive management approach.

The knowledge generation component of monitoring and evaluation has a series of

flow-on effects, including the generation of insights into problems and to increase the public and decision-maker's awareness of the impacts of those problems. Collaborative M&E can also strengthen the legitimacy and effectiveness of programs, increase community responsiveness and strengthen community-government partnerships which are vital for the success of environmental governance reforms. It similarly demonstrates a commitment to transparency and accountability by government agencies. Amongst its proponents, collaborative M&E "goes beyond measuring changes and is also concerned with building people's capacities to improve learning and self-reliance regarding their own development" (Estrella et al. 2000: 14). Bellamy et al. (2001) provide a comprehensive list of potential benefits and outcomes of collaborative M&E, which includes improvements in program management, transparency and accountability, reducing risk and uncertainty, fostering learning, and improving the consultation process generally.

Collaborative monitoring and evaluation has also been identified by Taylor (2003) as the "preferred model of practice" for the evaluation of indigenous participation. As such, the development of appropriate mechanisms for the monitoring and evaluation of indigenous participation provides an avenue for improving indigenous engagement on water issues more generally. Taylor develops a series of guidelines for the proper consideration of the inter-cultural issues in evaluation with Indigenous communities in Australia, through the development of ethical, cultural standards, which he argues:

> must be based on respect for Indigenous people's inherent right to self-determination, and our right to control and maintain our culture and heritage. Mutually respectful, inclusive, consultative evaluation practices in the before, during and after stages are seen as the preferred model of practice. Evaluations with and about Indigenous peoples must be founded on a process of meaningful engagement and reciprocity between the evaluators and the Indigenous peoples concerned and be underpinned by Indigenous decision-making based on free and fully informed consent (Taylor 2003: 51).

Appropriate evaluative mechanisms can be used to ensure that cultural and intellectual property rights of participants are recognised and protected through the process. Collaborative M&E can also to take into consideration the specificity of protocols at a local level, which has a determining relationship over the cultural and institutional legitimacy of participation by individuals in a given area:

> Any broad inter-cultural understandings, however well defined and understood, will nevertheless require testing, clarification, refining and checking as to their legitimacy and relevance at the local level.…. Indigenous ways of learning, knowing, deciding and interacting in relation to the world at large vary greatly from community to community (and this means any practice manual or code of ethics must be flexible and not prescriptive in terms of local representative structures or protocols for the handling of knowledge and confidentiality – it must be organic by definition) (Taylor 2003: 49).

5.1.2 Components of a Monitoring and Evaluation Framework

Despite the advantages which accrue from effective monitoring and evaluation of collaboration, questions of what to evaluate, and how, remain vexed. Rosener (1978, 1981) has identified four key issues inherent in the evaluation of participation:

- the concepts of ‘participation’, ‘engagement’ and ‘collaboration’ are complex and value laden;
- there are no widely endorsed criteria for judging success or effectiveness;
- there are no agreed upon evaluation methods; and
- there are few reliable measurement tools.

Chess (2000) argues that the scientific and social complexity and the contested meaning of participation for environmental decision-making create difficulties in assessing environmental public participation. Difficulties in assessing participation in water planning stem from its policy characteristics:

> where problems are highly complex, interests and objectives are numerous and in conflict, information and knowledge are quite incomplete, ends and means are ambiguous, control is fragmented and the external environment is in flux (Lang 1990: 3).

In order to review the variety of approaches to the evaluation of collaboration, following Guba and Lincoln (1989; also Marsden et al. 1994; Rudqvist 1994), we can identify four successive ‘generations’ of evaluation of collaboration which are differentiated by their respective assumptions about the purpose of evaluation, the role of participation and the role of the evaluator. These categories also provide a framework for the consideration of what to monitor and evaluate in terms of identifying criteria to determine the ‘successes’ of participation and collaboration.

First generation evaluation is generated for compliance purposes, particularly in justifying agency expenditure or activity. To the extent that monitoring and evaluation of collaborative processes are currently undertaken for water resource management in practice, they are invariably located in this category. Such evaluation typically comprises the production of a report which documents the methods of engagement, provides a summation of stakeholder contributions and a concluding discussion which may include key lessons or recommendations. Findings from first generation evaluations are typically evidenced by crude quantitative indicators of inputs – such as numbers of public meetings, attendance at workshops or number of public submissions. Such approaches provide little opportunity for reflexive practice, and provide no basis on which to assess the relationship between the participation and the substantive outcomes, or indeed to determine whether similar outcomes could have been achieved without public participation.

Second generation evaluation assesses the substantive outcomes of collaboration against a set of stated objectives. With regards to water planning, the NWI provides five requirements for all catchment-based water resource plans (NWI 2004):

- consultation with stakeholders including those within or downstream of the plan area;
- the application of the best available scientific knowledge and, consistent with the level of knowledge and resource use, socio-economic analyses;
- adequate opportunity for consumptive use, environmental, cultural, and other public benefit issues to be identified and considered in an open and transparent way;

- reference to broader regional natural resource management planning processes; and
- consideration of, and synchronisation with, cross-jurisdictional water planning cycles.

Hence a second generation evaluation would assess the extent to which the collaboration contributed to the achievement of these objectives. More sophisticated approaches follow Beirele (1999, Beierle and Cayford 2002) in recognising that there are implicit 'social goals' that are desired by public participation which should be thereby included in an evaluation against the objectives of a public participation process. Those "social goals" are defined as

> those goals which are valued outcomes of a participatory process, but which transcend the immediate interests of any party in that process. The goals are: educating the public, incorporating public values and knowledge into decision-making, building trust, reducing conflict, and assuring cost-effective decision-making (Beirle 1999: ii).

Whilst second generation evaluation goes further in the assessment of the substantive outcomes of participation, it retains a largely technical and descriptive function, and tends to provide limited scope for collaborative participation in the evaluation process. As such, it tends towards expert-driven managerialism in its application and function (Guba and Lincoln 1989).

In third-generation evaluation, the evaluator assumes 'the role of a judge' (Rudqvist 1996: 23), and provides scope for the inclusion of consideration of specific criteria that would relate to an assumed ideal of participation. This type of evaluation is typified by the work of Rowe, Frewer and colleagues (Rowe and Frewer 2000, 2004; Rowe et al. 2005). In their evaluation framework, the assessment against objectives characterised by first and second generation evaluations is appended by additional criteria which aim to address issues such as procedural fairness, equity and distributional justice. The new criteria comprise two types: acceptance criteria, which concern features of a method that make it acceptable to the wider public, and process criteria, which concern features of the process that are liable to ensure that it takes place in an effective manner. This criteria is summarised in the table below (Figure 16).

Acceptance Criteria	
Representativeness	The participants in the exercise should comprise a broadly representative sample of the affected population
Independence	The participation process should be conducted in an independent (unbiased) way
Early Involvement	The participants should be involved as early as possible in the process, as soon as value judgments become salient/relevant
Influence	The output of the procedure should have a genuine impact on policy

Transparency	The process should be transparent so that the relevant population can see what is going on and how decisions are being made
Process Criteria	
Resource Accessibility	Participants should have access to the appropriate resources to enable them to successfully fulfil their brief
Task Definition	The nature and scope of the participation task should be clearly defined
Structured Decision-making	The participation exercise should use/provide appropriate mechanisms for structuring and displaying the decision making process.
Cost Effectiveness	The procedure should in some sense be cost effective from the point of view of the sponsors.

Figure 16: Table of criteria

A similar framework is advanced in the work of Syme, Saddler and Nancarrow (Syme and Nancarrow 2002; Syme and Sadler 1994) specifically with regards to water planning in Australia. From the perspective of these authors, evaluation should be conducted against a framework of justice considerations. One example of the justice criteria used by these authors (Syme and Nancarrow 2002) is provided below.

Justice Criteria	Description
Interactive justice	Participants found the process sympathetic to their preferred mode of involvement and they found the interactions with planners dignified and pleasant
Procedural justice	Participants found the program to be unbiased and an adequate range of participants had an opportunity to be heard by decision-makers
Distributive justice	Participants were satisfied with the decision itself
Overall Assessment	With regards to the adequacy of performance against the other criteria, participants would participate again on this or related issues and with the agency

Figure 17: Table of justice criteria

A number of authors have expressed concerns with the robustness of the findings from the evaluation of collaborative methods in third generation evaluation approaches. For instance, Abelson et al. (2003: 244) suggest that this approach relies on an assumption that “a process that ensures equality of access, procedural fairness and mutual respect will produce legitimate outcomes”. This is regarded as an unrealistically narrow theoretical frame that occludes from analysis the role of power within institutions and individuals, and their capacities to structure participation towards pre-determined purposes, ends and outcomes. Third generation evaluation similarly fails to capture the multiplicity of changes derived from a participatory process. Indeed, the range of outcomes derived from collaboration would include multi-dimensional behavioural changes which may not be reflected in the substantive outcomes or the process itself. These changes could encompass individual and organisational learning effects such as new collaborations, social networks and strategic alliances, new avenues for dialogue and knowledge exchange, impacts on

cultural norms and behavioural standards, transformations of discourse and language, and new processes of community engagement, planning, and capacity (Bellamy et al. 2001). To address this, the assessment criteria used for an M&E framework should be sufficiently information rich and sensitive to demonstrate the connections between participatory processes and substantive outcomes, but also identify additional indicators capable of capturing the multiple dimensions of beneficial outcomes from participation, including social learning and changes in social norms.

A further critique of third generation evaluation is provided by Guba and Lincoln (1989) themselves, who advocate a fourth generation evaluation based on the recognition that the process of evaluation is co-constitutive of the outcomes from the collaboration. Their constructivist epistemology is particularly salient in instances of cross-cultural collaboration, such as water planning in Northern Australia, where what is at stake in deliberation is not only the negotiation between identified policy alternatives, but indeed, as Chambers puts it, 'whose reality counts' (1997). Two recent approaches have attempted to develop comprehensive frameworks for the evaluation of public participation and collaboration which are sensitive to the role of embedded power relations, the multiplicity of emergent benefits and the constitutive nature of the evaluation process, and can be considered fourth generation evaluation approaches.

Abelson et al. (2003) draw on the work of Webler (1995), Renn (1992) and Beirle (1999) to articulate an evaluative framework for public participation which identifies not only procedural fairness and equity, but also attempts to grapple with the enduring role of power both embodied in the operation and objectives of political institutions, but also in the legitimisation of certain forms of knowledge. In regards to the latter, they refer to the competence of the process, which goes beyond evaluating the content of a process to the evaluation of whether

> appropriate knowledge and understanding of the issue is achieved through access to information and the interpretation of the information. Competence also requires that appropriate procedures be used to select the knowledge that will be considered in the process (Abelson et al. 2003: 244).

Their evaluative framework is presented below in Figure 18.

Representation	Procedural Rules	Information	Outcomes/decisions
Legitimacy and fairness in selection process	Degree of citizen control/input into agenda setting, establishing rules, selecting experts, information	Accessibility	Legitimacy and accountability of decision-making
Geographically representative	Deliberation: Amount of time	Readability	Communication of decisions
Demographically representative	Deliberation: Emphasis on challenging experts, information	Digestibility	Responses to decision or input
Politically representative	Credibility and legitimacy of process	Selection and presentation	More informed citizenry
Community representative	What point in decision-making process is input sought?	Who chooses the information? Who chooses the experts?	Achievement of consensus over the decision (ie. broad-based understanding and acceptance
Participant selection or self-selection	Who is listening? (e.g. influential decision-makers or junior staff)	Interpretation	Better (or different decisions)
Inclusiveness of process or exclusiveness of process		Adequacy of time provided to consider, discuss and challenge the information	

Figure 18: Principles for the Design and Evaluation of Public Participation Processes

Oliver et al. (2006, 2007) have developed a similar monitoring and evaluation framework as a result of the Engaged Government Project. This project investigated the value of collaboration between different government agencies, tiers of government and the community as a means of delivering regional outcomes, and assessed factors that may enable and inhibit such collaboration. The project developed a series of tools for improved collaboration, one of which is an M&E framework to assess the outcomes of collaborations. Although this framework was particularly directed towards collaboration, the developed framework is clearly relevant to assessing participation in water planning. A schematic diagram of the M&E framework is provided below.

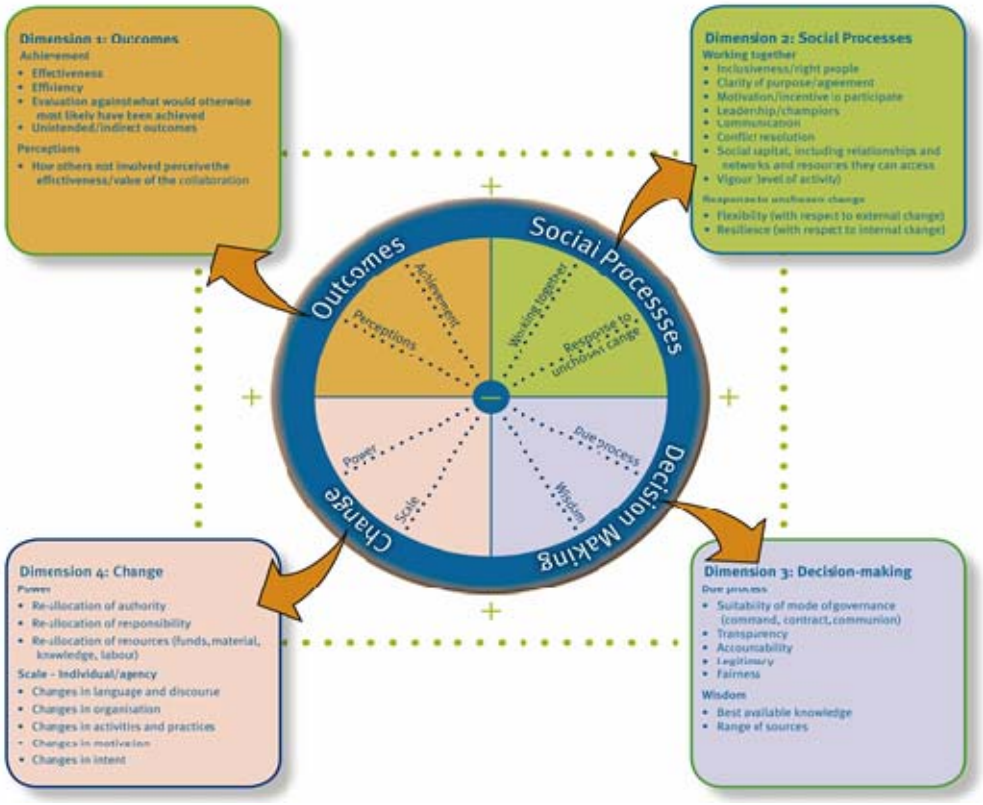

Figure 19: Monitoring and evaluation framework**.**
Source: Oliver et al (2007).

For the purposes of this research, these two frameworks will be employed to retrospectively assess the adequacy of public participation efforts in water resource planning in northern Australia.

5.1.3 Methods for monitoring and evaluating public participation

Identifying a framework for the assessment of collaboration does not determine in advance the most appropriate method or technique for monitoring and evaluation. There are a plethora of M&E techniques available, drawn from social science disciplines and participatory rural appraisal (Estrella and Gaventa 1998). This section will briefly summarise three approaches which will be of most use to the evaluation of

collaborative water planning.

By far the most widely recognised and established technique for M&E is the use of indicators (Estrella et al. 2000; Gujit and Woodhill 2002; Gujit 1999; Narayan 1993). Indicators are identified characteristics that can be seen, counted or measured and are used as incomplete representations of complex dynamics and systems to provide an understanding of conditions and trends (Lockie et al. 2002). Carefully selected indicators demonstrate changes to the aspects of a system that provide the most reliable 'clues' as to its condition and trend (Slobodkin 1994). Hence, monitoring these aspects provides feedback on the specific aspects of the process, whilst acknowledging the complex dynamics in operation as a whole (Lockie et al. 2005; Gahin and Peterson 2001). Roche (1999) provides two guidelines to the selection of appropriate indicators, which have gained significant currency particularly in the field of collaborative evaluation (for example, Mackenzie et al. 2006; Estrella et al. 2000; Taylor et al. 2000; Lockie et al. 2005). These are the SMART and SPICED filters, and they are detailed below.

SMART Indicator Filter for M&E	
Properties	Definition
Specific	Indicators should reflect those things that the project intends to change, avoiding measures that are largely subject to external influences
Measurable	Indicators must be precisely defined so that their measurement and interpretation is unambiguous Indicators should give objective data, independent of who is collecting the data Indicators should be comparable across groups, projects thus allowing changes to be compared and aggregated
Attainable	Indicators should be achievable by the project and therefore sensitive to the changes the project wishes to make
Relevant	It must be feasible to collect data on the chosen indicators within reasonable time and at reasonable cost Indicators should be relevant to the project in question
Timebound	Indicators should describe by when a certain change is expected

Figure 20: Table showing SMART Filter: Properties of Indicators
Source: Roche (1999**)**

SPICED Indicator Filter for M&E	
Properties	Definition
Subjective	Informants have a special position or experience that gives them unique insights which may yield a very high return on investigators time. In this sense, what may be seen by others as anecdotal becomes critical data because of the source's value.
Participatory	Indicators should be developed together with those best placed to assess them. This means involving a project's ultimate beneficiaries, but it can also mean involving local staff and other stakeholders.
Interpreted	Locally defined indicators may not mean much to other stakeholders, so they often need to be explained.
Cross-checked	The validity of assessment needs to be cross-checked by comparing different indicators and progress, and by using different informants, methods, and researchers.
Empowering	The process of setting and assessing indicators should be empowering in itself and allow groups and individuals to reflect critically on their changing situation
Diverse	There should be a deliberate effort to seek out different indicators from a range of groups, especially men and women. This information needs to be recorded in such a way that these differences can be assessed over time.

Figure 21: Table showing SPICED Filter: Properties of Indicator Development and Assessment
Source: Roche (1999)

Following selection, data is then assembled against these indicators using the techniques of conventional social science research using methodologies from qualitative, quantitative and ethnographic research, such as surveys, semi-structured interviews, oral histories, participant observation, document analysis and statistical inferences.

In a slight variation on the traditional indicator model, pictorial indicators and visual materials can be used to assess provide the data for evaluation. The example below is from the Nepal-UK Community Forestry Project, which worked with 1500 forest user groups in seven of the hill districts of Nepal. The project aimed to increase the effectiveness of forest user groups in managing their community forests on an equitable and sustainable basis (Hamilton et al. 2000). In the project, visual materials were found to encourage both literate and non-literate users to explore and clarify concepts. Participant's ability to express themselves was enhanced through the use of pictorial indicators, and has been subsequently adapted and adopted by the groups themselves in their own training. Pictorial indicators were found to be most effective if devised by the communities themselves, so that a common understanding of the conceptual issues represented is achieved.

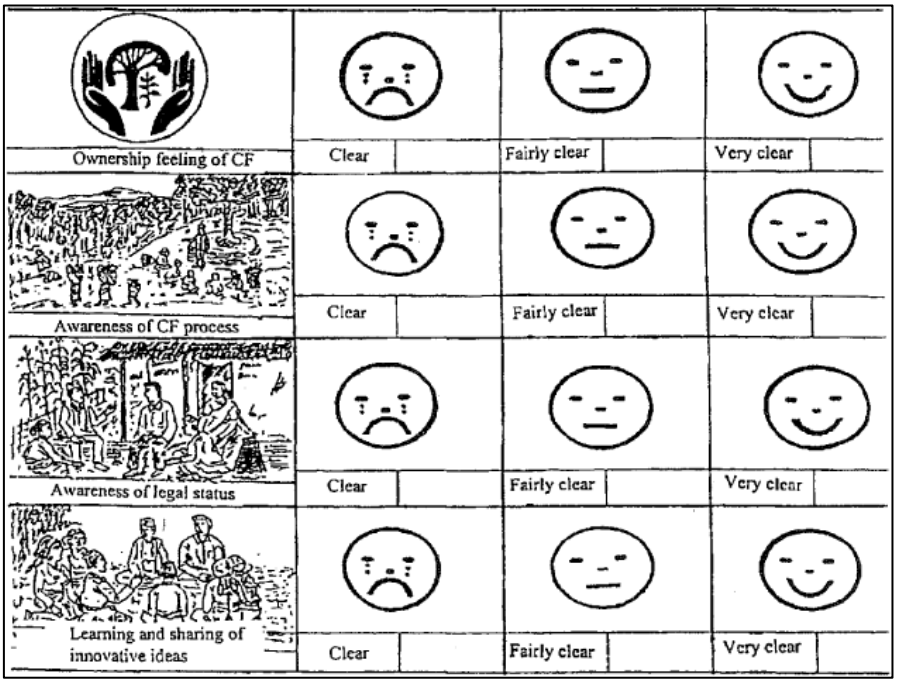

Figure 22: Pictorial indicators developed for Nepal-UK Community Forestry Project
Source: Hamilton et al. 2000

An approach which is currently gaining traction in natural resource management in Australia is the Most Significant Change technique. This approach draws on critical narratology to develop an approach to evaluation based on the recognition that stories of change, rather than indicators, may be more revealing, particularly in demonstrating intermediate outcomes. Through the life of the process, according to an agreed timeline, each participant records the single most significant change that occurred to them. Participants report on the specific 'facts' (what, when, where, with whom) and provide an explanation of why they consider that change is the most significant one of all the changes that may have occurred. The changes are then compiled, and the group collaboratively selects the ‘most significant change’ through dialogue and deliberation. This element of the process provides space for critical reflection and social learning by participants. Most Significant Change monitoring aims to uncover unique and unanticipated developments that occur as a result of the process, rather than evaluating against pre-identified outcomes (Davies 1998; Sigsgaard 2002; Davies and Dart 2005).

5.1.4 Barriers to Establishing M&E for Collaborative Water Planning

As mentioned above, there is no specific requirement to evaluate the public participation or collaboration components of water plans or management. As its establishment is often both complicated and quite expensive, the lack of a legislative requirement may dissuade planners and policy-makers from developing an M&E framework. This represents a major impediment to the establishment of a nationally agreed framework, particularly in light of a recent review of effective M&E frameworks by the New South Wales Natural Resources Commission (Zadnik 2007).

That review identified five attributes of effective M&E systems through a review of effective institutional models:

- **Strong drivers** are important for establishing an M&E system, ensuring its viability, and providing incentives for stakeholders to invest in the system. The usual key driver is that investors and decision-makers require or demand the information generated to inform their decisions, but may also include demands for accountability and strong public and political support.
- The **usefulness of the information** for investors and decision-makers determine the level of support in the longer term, particularly if that information is reviewed and adapted in response to evolving information needs.
- A **standardised approach** to monitoring, evaluation and reporting provides greater clarity about how to use and interpret the information.
- A **good governance structure** promotes investors and users' confidence in the system by providing transparency and accountability.
- **Adequate funding** is essential to develop and maintain the system, including access to appropriate expertise, reporting and technology. (Zadnik 2007)

Gaventa and Blauert (2000) also identify that much of the development of participatory monitoring and evaluation has occurred at the local community and project level, and the "scaling up" of the approach and techniques for use by larger institutions, particularly governments. This may present a series of issues and challenges over time, particularly in the relation to the specific competences and capacities required of agencies in order to undertake collaborative approaches (Gaventa and Blauert 2000). The scope of the institutional changes required to undertake collaborative M&E, including the flexibility to adapt in response to social learning, will present particular challenges to existing governance arrangements.

The review by the Natural Resources Commission (Zadnik 2007) highlights the need for information from an M&E framework to be salient and applicable, both in terms of creating the requisite drivers for the system and ensuring its continued viability. Syme and Sadler have previously posed that evaluations of collaboration in water planning must be directed towards decision-makers to improve the "processes that lead to informational exchange and joint evaluation of alternatives'' (Syme and Sadler 1994: 525). They argue that the effectiveness of any evaluation process relies on the development of a partnership between agencies and the wider community that is committed to the outcomes of evaluation as a basis of providing direction to any public participation program. In the absence of established protocols or the presentation of findings in a salient form for decision-makers, the likelihood of the utilisation of evaluation as an adaptive learning component is limited (Patton 1987). This requires that any M&E framework be accompanied by a corresponding learning strategy for improving the uptake of evaluation findings.

6. Conclusion

On the basis of the preceding literature review and analysis, four key themes are evident. These themes relate to key areas of ongoing inquiry:

- How can we apply the knowledge, tools and techniques developed in other areas and disciplines to the specific practice of water planning;
- How can we our ensure these approaches are culturally appropriate for effective Indigenous representation and participation;
- How do the changing paradigms of water planning impact on the possibilities of collaboration over time; and
- How can we ensure that water planning is sufficiently flexible and adaptive to respond to changes and improved understanding.

Firstly, our literature review and analysis reveals that much is already known about the process of collaboration in natural resource planning and management. In addition, different disciplines such as planning, international development, cultural heritage management, economics and social science have developed tools and techniques to address issues such as Indigenous engagement, trade-off analysis and adaptive management. A key gap, which is in part addressed by this review, is the synthesis of these diverse and disparate tools and techniques into a consistent framework which can be applied to the specific area of water planning. Given this is the case, the question is as much one of determining where, when and which tools are 'fit-for-purpose' for water planning, as it is of building capacity amongst water planning practitioners in making decisions about tool selection and use. The pilots in Phase Two of the project will seek to improve our understanding of both the adequacy and resource requirements for the innovative application of collaborative tools and processes for water planning.

Secondly, whilst Indigenous legal rights to water have now been recognised by the common law, matters of Indigenous participation and native title rights to water may not always be fully understood by agencies. For Indigenous participation and rights, issues arise relating to cultural differences in ways of knowing, valuing, communicating and making decisions. Depending on the circumstances facing each planning initiative, the Crown ownership of water may be contested by Indigenous groups. The issues affecting Indigenous participation are explored more fully in this volume, and the legal and policy context are described fully in Volume Three. An emerging paradigm of Indigenous participation in Natural Resource Management (NRM) and its relationship to non-Indigenous NRM need to be further explored, understood and articulated if participants from both Indigenous and non-Indigenous cultures are to collaborate effectively in water planning. Given that northern Australian regions tend to have a relatively high proportion of Indigenous people, further attention will be given to these matters in the action research case studies being undertaken in Phase Two of the project.

Thirdly, water planning has undergone a series of phases over time during which different paradigms have been evident. Water planners have been, and continue to be, variously concerned with engineering efficiency, economic development,

environmental sustainability and community and industry collaboration. The agencies within which they work also exist within a political environment, with staff working both as agents of the government of the day, as well as servants of the public. Further complexity, confusion and contestation arise from the interplay of potentially competing paradigms within the water sector, including market-based decision-making, engineering solutions and the demand for political action to halt the decline of freshwater ecological systems. Developing a toolkit of good practices in water planning may involve making tools that allow water planners to reflect on and, where necessary, adapt the structure and culture of their agencies in response to the internal barriers and enablers to collaborative water planning that they identify, as much as it is about seeking tools to build better ways to work with others outside their agency. Analysis of the prospective case studies will further understanding of this theme, particularly in terms of implications for water planning in northern Australia.

Fourthly, there appears to be a lack of a systematic, widely applied monitoring and evaluation framework for collaboration in Australian water planning. The discourse of collaboration (including citizen participation) has become increasingly evident in water planning legislation, policy, and practice for over two decades. However, a systematic framework for the evaluation of the outcomes and impact of collaboration in water planning appears lacking – both in terms of monitoring and evaluating the quality of the collaborative process, and in terms how it may have influenced on-ground water management outcomes. The lack of rigour in applying the term often results in water planners, and their government agency supervisors operating in an environment where terms such as ‘involve’, ‘consult’, ‘collaborate’ and ‘partner’ retain a cultivated ambiguity. Some have claimed that the outcomes expected of deliberative forms of collaboration are naïve and unrealistic underscoring limitations to current political and social theories of collaboration, deliberation and social learning. The dilemmas of when to collaborate, with whom, for what purpose, how frequently and by what methods, and how to report back on the usefulness of these collaborative endeavours arise. Empirically tractable methods for assessing collaborative outcomes are currently under-developed, particularly those suited to deliberative processes. Reporting on such matters logically involves comparing collaborative outcomes to those achieved using other approaches, meaning that the processes and outcomes achieved using other non-collaborative water planning paradigms would also be best evaluated using a similar framework.

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