

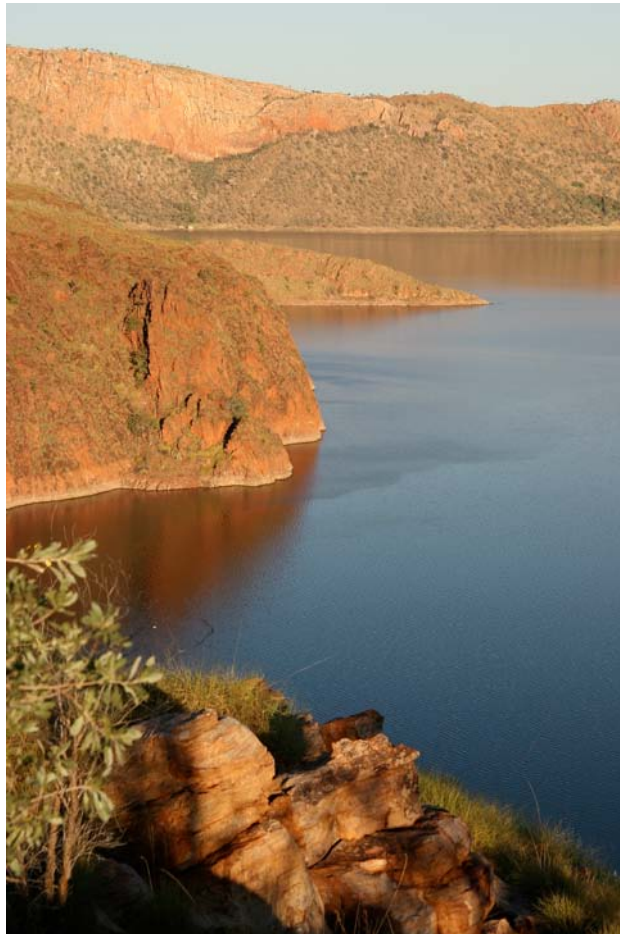
Analysis of institutional arrangements and constraints affecting the establishment of water markets across northern Australia

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Executive Summary

This report is the first of three reports and part of a two year project entitled *Establishing water markets in northern Australia: a study to assess feasibility and consequences of market-based mechanisms of water delivery* undertaken through the Australian National University's Crawford School of Economics and Government. The Tropical Rivers and Coastal Knowledge (TRaCK) hub funded this project under Theme 6.1 "Sustainable Enterprises". This research is being undertaken in collaboration with the North Australian Indigenous Land and Sea Management Alliance (NAILSMA). This first report provides analysis of current institutional arrangements and constraints affecting the establishment of water markets across tropical Queensland, Northern Territory and Western Australia, (with focus on the Gulf, Timor and North East drainage divisions).

Research needs were identified by TRaCK and NAILSMA (and the Indigenous Water Policy Group), and from this structured interview questions were developed. Data collection involved a review of literature from a number of different sources (government, media and scholarly articles) and utilised qualitative interviews with 42 State, Territory, Commonwealth government officials, land council representatives and experts. Data was collected through structured personal interviews using an open ended format; telephone interviews were undertaken when face-to-face interviews were not possible. Most interviews were audio recorded, with transcripts sent back to all interviewees for confirmation. Findings were developed comparing multiple data sources, and sent out to interviewees for their feedback. Changes were made where appropriate and from this the final report was then produced.

The research findings highlight that the jurisdictions analysed have the framework in place to support water markets, but some States have more robust frameworks in place (such as Queensland)— however, it is emphasised that the development and importance of water markets is influenced by the demand for water in each of the jurisdictions. This study found that all jurisdictions have focused on planning in the north and have taken a precautionary approach to implementing water reform. This approach has been implemented using *best* available knowledge, but it is informed by a recognition that generally there is a limited understanding of the characteristics of water resources across the north, as well as related ecological and cultural values. Several features are shared across jurisdictions including a desire to support Indigenous access to water that may be accommodated through an Indigenous reserve (which may include water for drinking,

customary and consumptive purposes) or through an entitlement, or a blend of both. Including Indigenous people in water planning has been hampered by community capacity in the north and relevant governments are constrained in overcoming this challenge by limited resources. A key finding of the study is that inter-basin transfers are not, in general, supported by interviewees and, at present, cross border trading is highly circumscribed. Some concern was also raised about inclusion of mining activities in water markets.

Various constraints were identified to the establishment of water markets across northern Australia. The key constraints identified generally across the north include physical limits to trade, knowledge gaps and legislative and institutional frameworks. In the Northern Territory, interviewees identified community attitude and values as being a major limitation on the establishment of water markets. In Queensland, the *Wild Rivers Act 2005* which prescribes the intensity of water-based development in the north was viewed as a significant barrier to water trading. In Western Australia, land tenure issues, particularly native title processes were seen as being the most significant limitation (albeit indirect) to the establishment of water markets in the north. Despite these constraints, many respondents recognised that establishing a robust and cost effective water management framework has the potential to support sustainable development outcomes across the north.

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All errors and omissions are the responsibility of the authors.

Abbreviations

COAG	Council of Australian Governments
CTH	Commonwealth
DERM	Department of Environment and Resource Management (QLD)
DEWHA	Department of Environment, Water, Heritage and the Arts (CTH)
DRMAC	Daly River Management Advisory Committee
IWPG	Indigenous Water Policy Group
KLC	Kimberley Land Council
MDB	Murray Darling Basin
MG Corp.	Yawoorroong Miriuwung Gajerrong Yirrgeb Noong Dawang Aboriginal Corporation
NAILSMA	North Australian Indigenous Land and Sea Management Alliance
NICWER	National Irrigation Corporation Water Entitlement Register
NLC	Northern Land Council
NRETAS (NT)	Department of Natural Resources, Environment, The Arts and Sport (NT)
NWMS	National Water Marketing System
NT	Northern Territory
NWC	National Water Commission
NWI	National Water Initiative
OIC	Ord Irrigation Co-operative
QLD	Queensland
ROP	Resource Operations Plan (QLD)
TRaCK	Tropical Rivers and Coastal Knowledge network
WA	Western Australia
WRMU	Water Resource Management Unit (WA)
WRP	Water Resources Plan (QLD)

Glossary

Aboriginal freehold	Land designated under the <u>Aboriginal Land Rights Act</u> (1976) (Northern Territory) for Indigenous traditional owners in the Northern Territory
Aquifer	An underground geological formation which can yield quantities of groundwater for extraction.
Cap	The limit set on volumes of water available for extraction in a consumptive pool.
Consumptive pool	The actual volume of water made available for consumptive use, which generally set out in a water plan for the specific resource.
Consumptive Use	Water made available for private use, for both commercial and personal activities.
Native Title	Those rights and processes accorded under the <u>Native Title Act</u> (1993) (Commonwealth) to Indigenous Australians.
Regulated system	A water resource where use is regulated through water infrastructure (such as storage and distribution channels).
Supplemented scheme	In Queensland this term is used to describe water regulated through water infrastructure (such as storage and distribution channels).
Temporary trade	The trade of seasonal water allocations which involves the transfer of whole or part of an entitlement in the season (or future seasons). In Queensland this is known as a seasonal water assignment.
Unregulated system	A water resource where water is not distributed to users through infrastructure.
Unsupplemented water	In Queensland this term is used to describe a water resource where water is not distributed to users through infrastructure.
Water access entitlement	An ongoing entitlement to exclusive access to a share of water from a specific consumptive pool defined in a water plan.

Water allocation	The amount of water provided in a licence to use or for water access entitlements in a given period as identified in the rules of the specific water plan.
Water plan	A statutory plan or government endorsed water allocation plan for both surface and groundwater systems which is developed using scientific assessment and done in consultation with stakeholders to support sustainable water use.
Wild Rivers	Declarations to preserve a river system under <u>Wild Rivers Act (2005)</u> (Queensland) which limits development

1. Introduction

The Tropical Rivers and Coastal Knowledge network (TRaCK) research hub identified the need for research under Theme 6 “Enterprise Development” to examine the feasibility and viability of market-based instruments for water allocation in a north Australian context, with focus on the Timor Sea, Gulf of Carpentaria and North East Coast drainage divisions (see Appendix 1 for a map of the area which is from Broome to Cairns and north). This project identifies the conditions required for robust water markets, compares these to conditions present in north Australia, and if appropriate suggests alternative mechanisms more suitable to existing conditions in northern Australia. An assessment of the costs and benefits will be made at the end of the two year project, using efficiency, effectiveness and equity criteria. The aim of this report is to support policy and decision makers with a better understanding of perceptions and regulations in the north.

1.1 Project Overview

This study, entitled “Establishing water markets in northern Australia: a study to assess feasibility and consequences of market-based mechanisms of water delivery,” is a two year project, funded through, theme 6.1 of TRaCK. There are three tasks for this project:

1. Analyse current institutional arrangements and constraints for establishing water markets across Queensland, NT and Western Australia,
2. Analyse key stakeholder attitudes and values relating to water trading and consideration of the implications for the establishment of markets,
3. Assess the costs and benefits of introducing water trading to northern Australia ensuring consideration of efficiency, effectiveness and equity criteria.

In line with the terms of reference of this project, this report, task 1, provides an analysis of existing institutional arrangements and identifies the constraints in creating water markets across northern Australia. This report presents the views and opinions of decision makers and experts at a Commonwealth and State/Territory level on institutional arrangements and constraints for the establishment of water markets in northern Australia. This first phase commenced on December 10 2008, with field work commencing in late February 2009 and completed May 01 2009. Interviews were conducted with representatives from government, land councils and experts in the field, to augment literature review.

This first section of this report provides an overview of the project. The second section provides background to the institutional setting both at a national and state/territory level. The third section covers the methodology for this report. The fourth section provides findings from analysis and the fifth section provides conclusions and further research.

2. Water Reform

The impetus for institutional reform in the management of Australia's water resources was a result of factors such as increasing scarcity coupled with growing demand, climate change and enhanced awareness of environmental costs (Grafton and Peterson, 2007). The potential to trade water has existed in certain states in Australia for quite some time— for instance South Australia, Victoria and New South Wales took steps to unbundle land and water to encourage trading over two decades ago (Brooks and Harris, 2008). A national approach to water reform, in particular a common approach to developing the institutional underpinnings of market based water allocation, was proposed during the establishment of Council of Australian Governments (COAG) (1994) Water Reform Framework. While reforms by States up until then were recognised by COAG as improving water efficiency outcomes, the COAG (1994) framework aimed to facilitate change in the sustainable management and allocation of water through centralized coordination. Several targets were identified in COAG 1994, these included (among others): steps to create a clear property right to water, expanding market based mechanisms to water allocation (including interstate trade) and the creation of environmental flows (COAG, 1994).

In 1995 the National Competition Policy was established to further the commitments to water reform in areas such as institutional arrangements, cost recovery and pricing, ecological water, stakeholder consultation and engagement and the expansion of allocation and tradable entitlements (Pigram, 2006). In 2004, building on COAG 1994, an Inter-governmental Agreement, the National Water Initiative (NWI), was approved to enhance the national water reform agenda. Under the NWI, state and territory governments (with the exception of WA until 2006) signed on to commit to implement (among other things) the following:

- Develop statutory water plans that provide sufficient water for the environment and report on this
- Introduce nationally compatible and reliable registers to record water entitlements (and their trade)
- Create a risk sharing framework to allow for potential change in the level of water available to users
- Establish standards and policy for water accounting, metering and monitoring to accurately report use and improve efficiency
- Best practice pricing (actual cost of storage and delivery) and institutional arrangements to promote greater efficiency in use and expand the trade in water
- Remove barriers to markets

(National Water Initiative, 2004)

The overarching aim of the NWI was to further the national framework for the management of water, establishing common regulatory and planning systems for both surface and groundwater (and recognizing the connection between these systems). This change reflected a “paradigm shift in the underlying logic of water management from community development to one based on property rights (Connell, Robins and Dovers, 2007: 127). But this property regime was to occur with a clear recognition of

social, environmental and cultural outcomes and impacts. A sustainable level of water extraction is sought under the NWI and use is to be guided by a rigorous planning framework which develops plans (defining allocations) supported in legislation and regulation (Gentle and Olszak, 2007). Clauses 52-54 in the NWI also address “Indigenous Access to Water,” and seek to involve Indigenous peoples in water planning (wherever possible) to account for water used by those with native title for cultural purposes (NWI, 2004). Jackson and Morrison (2007) argue that to include Indigenous people in water planning and to account for Indigenous water requires improved understanding among decision makers around the diverse Indigenous perspectives on country, Indigenous values and uses of water and to the scope of these actual rights and interests to water. NAILSMA (2008) through the Indigenous Water Policy Group (IWPG) suggests that often native title rights and interests are narrowly construed and that Indigenous rights to water extend to “commercial and customary rights” (NAISLMA, 2008: 4). In the context of northern Australia the existence of native title rights, as well as the interaction of a land rights regime, will be critical issues in furthering the implementation of NWI reforms.

A new institutional framework envisaged by the NWI (with register, metering, statutory planning, accounting), and coordinated by the Commonwealth, encourages the use of market mechanisms to allocate water within a planning framework. This framework should take into consideration third party impacts, the environment and Indigenous access to water (as well as native title interests).

2.1 Institutional Setting

Each State and Territory committed to a process of institutional change in how water is governed, managed and allocated under the NWI. The focus on reform has been supported by the National Water Commission (NWC) assessing the pace of implementation across Australia in its *Biennial Assessment of Progress in Implementation of the National Water Initiative* (NWC, 2007; 2009); and, summarising trading in each State and Territory, with the development of an *Australian Water Markets Report, 2007-2008* (NWC, 2008). There has been a strong focus in NWI reform that has largely been concentrated on the pressing conditions in the Murray Darling Basin (MDB) (Bjornlund, 2003; NWC, 2008) and developing the Murray Darling Basin Water Agreement (Pigram, 2006). By contrast, water markets in northern Australia are limited in size and saw little trading or development of plans— for example in 2007-8 there was no trading in the Northern Territory although arrangements are currently in place to facilitate trade (NWC, 2008).

The role of the NWC is to drive the implementation of water reform and inform expenditure of the Australian Government Water Fund, which is made up of the Raising National Water Standards, Water Smart Australia, and Australian Water Funds Communities programmes. The Raising National Water Standards program aims to invest in and enhance the measuring and monitoring of water supply and use. In 2004, COAG sought to develop a national register system and States and Territories committed to this under paragraph 59 of the NWI (NWI, 2004). In the Biennial Assessment of progress by the NWC (2007), the pace of implementation was examined for key elements of the reform agenda, which included the water access entitlement and planning framework, water markets and trading, best practice pricing, integrated management of water for environmental and other public benefit, water

resource accounting, and urban water reform—the assessment determined that “...governments have made considerable progress in implementing the NWI over its first two years” (NWC, 2007: 7). The 2009 Biennial Assessment identified considerable progress in water reform across Australia (NWC, 2009) using four central themes: (1) understanding our water resources and use (includes water planning, accounting and surface and groundwater connectivity); (2) ensuring the health of river and groundwater systems (environmental flow and mechanisms to deal with over-allocation and overuse); (3) enhancing the productivity and efficiency of water use (looking at water entitlements, markets and pricing); and (4) dealing with challenges face by rural and urban communities (addressing structural adjustment and reform, risk assignment and urban water) (NWC 2009). In terms of water markets and trading the NWC found that “Outside the MDB, planning and entitlement reforms need to be pushed along to develop new and expanded markets for water (NWC, 2009: x).

2.1.1 Water markets and trading

The national water reform agenda seeks to drive the development of institutional, regulatory and policy change to support water trading so as to facilitate the reallocation of water to more productive uses, enhance efficiency and sustainable outcomes (PricewaterhouseCoopers, 2006). Included in this reform are the development of a specified property right, a register, metering, water accounting, and a planning framework which guides allocations and provides for the environment as well as third party impacts.

The NWC Australian Water Markets Report 2007-2008 summarises trading activity in each State and Territory. The report estimated that the total value of trade in the 2007-2008 water year was \$1.68 billion, and almost 1600 GL of allocated water was traded Australia wide, though the MDB states (including Queensland’s non-Basin markets) dominate with 99% of Australia’s total water allocation trade and comprises 99.9 % of total market volume (NWC, 2008).

Institutional Arrangements for Water Markets

Clauses 58-63 in the NWI sets out the ‘blueprint’ for water markets and trading, with an action plan guiding the implementation of a trading regime (NWI, 2004). Water trading is viewed by the NWC as being the “centrepiece” of reform driven by the NWI (NWC, 2008: iii). Kemper (2001: 1) identifies a water market as “... an arrangement in which holders of water rights trade them with each other or to outside parties.” Water markets have been proposed as mechanisms to enhance the efficient use and reallocation to most productive use for water resources (Bjornlund, 2003). The NWC defines a permanent water trade as “transfer of water access entitlement from one legal entity to another, with or without a change in location” (NWC, 2008: xii), while a temporary trade is an “assignment of water allocation from one authorised user to another, or between water accounts held by the same water user, with or without a change in location” (NWC, 2008: xiii).

Key issues in terms of the design of water markets include: types of water resource (groundwater or surface water) traded, connectivity, the nature of use and needs of entitlement holders, and if there exists non market use and informal trading. Effective

water markets require suitable institutional arrangements that include: well specified and tradable water rights, an administrative system which competently processes and registers trades between individuals, infrastructure that delivers water reliably and a common water accounting system (Kemper, 2001). The NWC (2009) offer four elements that are required for water markets: that water be tradable without constraints (except rules that seek to efficiently manage ecological or hydrological limitations), the market be a level playing field with insignificant transaction costs, a diverse range of water products are offered to participants, and there are no externalities on third parties (such as the environment and other users). A report by PricewaterhouseCoopers (2006) proposes that for successful markets the following conditions are required: a clear right to the commodity, transparent and logical rules, credible and accessible information for traders, a familiar method of exchange, efficient administrative processes, low transaction cost vis-à-vis commodity value, an ability for users to enter markets, and the market itself must be accepted by the community. However, to make a market work there is required: “competition between different parties, for the rights to some commodity or other form of property of which there is a finite supply” (PricewaterhouseCoopers, 2006: 37). Howe, Schurmeier and Shaw Jr. (1986) identify six criteria for effective water markets that allow for reallocation to most productive use— these are flexibility in reallocation, security of entitlement tenure, a real opportunity cost, and certainty in process outcome, a perception of equity and fairness, and reflecting public values. In assessing the MDB, Turrall et al. (2005) argue that significant progress is still required to meet the criteria set out in Howe, Schurmeier and Shaw Jr. (1986), which focus on institutional arrangements as important to achieve outcomes, and suggest that “where effective arrangements for water entitlements, water accounting and water allocation do not exist, it is very unlikely that sustainable water trading can be meaningfully established” (Turrall et al., 2005: 8). Stoeckl et al. (2008) argue that for effective markets there is required perfect knowledge available for players, competition in the market, no externalities, minimal cost enforcement and cost efficient water infrastructure. Literature emphasises that institutional arrangements are crucial to the function of successful water markets, but the literature also underscores that an equally important condition is competition among a sufficient number of users for the resource.

Kemper and Simpson (1998) identify the following key elements for water markets in the Colorado: a property or user right to water (definition, allocation, measurement and return flows), a contracting mechanism, availability and access to information, and an administering and enforcing agency. Kemper and Simpson (1998) articulate that in establishing water markets these elements were often adapted to localised settings in what is usually a politically driven process— outcomes from this include limits on trade out of the irrigation district and constraints on ownership rights to non land owners. Limits imposed on trade that are not based on bio-physical limitations have also been identified by Bjornlund (2004) and the NWC (2009) in the MDB. Drawing on work by Putnam (1993), Kemper and Simpson (1998) identify that features such as history, and social capital (networks, norms, values) play an important role in how reforms are accepted and driven. In north Australia, Straton et al. (2006) found that norms and information flow are important influences on the function of water markets.

Table 1: Conditions for an effective market

Conditions for an effective market	Australia (MDB)	International
	<ul style="list-style-type: none"> • Tradable with limited constraints; level playing field and minimal transaction costs; diverse range of water products offered to all participants; no third party impacts (NWC, 2009). • Specified right to water, clear rules, accurate publicly available information, competent administration, relatively low transaction costs and a publicly accepted market. Competition among users (PricewaterhouseCoopers, 2006). • Turrall et al. (2005) underscore the importance of effective institutional arrangements such as specified water entitlements, and rigorous water allocation and water accounting procedures. • Perfect knowledge available for all players, competitive market, no externalities, minimal cost enforcement and cost efficient water infrastructure (Stoeckl et al., 2008). 	<ul style="list-style-type: none"> • Specified and tradable water rights, an effective register and administrative system reliable infrastructure, a common water accounting system (Kemper, 2001) • Property right, trading exchange, available information, administration and enforcement agency, reliable infrastructure, accurate accounting and reporting of use (Kemper and Simpson, 1998). • Flexibility, security, an opportunity cost, certainty, equity and fairness, reflects public values (Howe, Schurmeier and Shaw Jr., 1986).

Using Kemper and Simpson’s (1998) framework and applying it to Australia’s water reforms in the north Australian context, two key questions arise: (1) What institutional arrangements need to be in place to make water markets work; and (2) How and whether institutional arrangements to support water markets can be adapted to local conditions, as well as the existing policy and institutional setting? In addition to these considerations, attention must be given to the scarcity of water. Unless a commodity is scarce then the capacity for trading is limited— in considering the development of markets in northern Australia the present situation highlights that currently trade in water is limited in size (NWC, 2008) and the resource is generally unallocated or under-allocated (Pigram, 2006). Understanding how markets could work or develop in this context has yet to be explored in the literature.

Barriers to establishing and operating water markets

Despite a focus on water reform across Australia since COAG 1994, markets, planning and policy generally remain at a formative stage (Stoeckl and Abrahams, 2007). The NWC highlighted that the level of science informing water planning across Australia “remains a concern” (NWC, 2007: 7). Grafton and Peterson (2007) identify that there is a common need to understand flow regime required to achieve desired ecological outcomes— as well there is a lack of knowledge around water pricing, transaction costs and the social impacts of trading— these are knowledge gaps which may impact the efficacy of markets. Stoeckl and Abrahams (2007: 3) argue that “gaps in knowledge remain, particularly regarding groundwater, environmental and ecological needs, and deficiencies in measurement, accounting, metering and reporting” These knowledge deficiencies all have the effect of enhancing risk (particularly to the environment) and reducing the accuracy of monitoring regimes. The NWC (2007) underscores that a shortage of skilled water resource practitioners in Australia acts to hinder the progress of the NWI’s water reform agenda (which markets is an important component). Stoeckl et al. (2006) argue that a constraint on water trading is restrictions on inter-basin transfers, which is where the most benefit can be obtained when water can be distributed to where supply conditions are constrained. In the MDB the NWC (2009) identifies trades out of district as a limitation. While across Australia they argue that the following barriers be removed and includes: that the unbundling of land and water be progressed to enhance reform, that consistent reporting be adopted across jurisdictions to encourage trading, and more information on third party impacts be employed.

Barriers	General (MDB)	Northern Australia
	<ul style="list-style-type: none"> • Poor understanding of environmental flow regime, pricing, transaction costs and social impacts (Grafton and Peterson, 2007). • Human resource issues (NWC, 2007). • Trades out of district, unbundled land and water, inconsistent reporting standards, limited information on third party impacts (NWC, 2009). • Knowledge gaps, poor metering, accounting and reporting standards (Stoeckl and Abrahams, 2007). • Challenges for inter-basin transfers (Stoeckl et al. 2006). • Uncertainty with supply, limited infrastructure, culture, limited flexibility in institutional arrangements, interaction with financial institutions, administrative issues and structural adjustment for communities (Bjornlund, 2004). 	<ul style="list-style-type: none"> • Limited understanding of resource, uncertainty on effect of extraction on social and ecological values (Stoeckl et al., 2006; Straton et al., 2006).

Table 2: Barriers to establishment or effective operation of markets

In examining constraints in the MDB, Bjornlund (2004) identified impediments to water markets through workshops and focus groups with stakeholders. These impediments included doubts about future water supply, physical infrastructure

constraints, and restrictions on trades out of irrigation districts—stakeholders also described tradition and culture among irrigators as being a limitation to markets, as well as the limited flexibility and security in property rights across jurisdictions and financial institutions requiring individuals to hold entitlements—other constraints included administrative issues and adjustment pressures in communities (Bjornlund, 2004). In a north Australian context, systems are generally not well understood and there is little consumptive use—while markets may exist in specific regions there is little trading (in contrast to the MDB). Water availability in northern Australia is episodic unlike the perennial rivers in south Eastern Australia, there is often a reliance on aquifers, and the impacts of extraction are little understood. The lack of knowledge on the characteristics of water resources in northern Australia could potentially have significant social and ecological impacts if water is allocated to consumptive uses without in depth analysis of its effect (Stoeckl et al., 2006; Straton et al., 2006). Straton et al. (2006) also view labour constraints as a limitation on the business models for water dependent industries in the north.

2.2 Drivers for Change in North Australia

Pigram makes the observation that the: “Development of the water resources of the tropical north has always held a strong fascination for many Australians” (Pigram, 2006: 50). Pigram goes on to describe that Queensland has approximately 45% of surface water run-off in Australia, but that this is largely confined to drainage divisions in the tropical north, which is largely undeveloped (Pigram, 2006). In other jurisdictions in the north, there is a similar situation in the tropical belt of the NT which has highly seasonal surface run-off, and northern Western Australia which also has a significant component (albeit seasonal) of water resources in the state which are largely undeveloped outside the Ord River irrigation project (which is expanding). The relative abundance of water in the north has sustained an idea that there is potential for irrigation development in parts of northern Australia.¹

There are various research initiatives to create frameworks to explore the development potential of northern Australia—these are funded through the Commonwealth Government which has established an Office of Northern Australia, and includes the Northern Australian Land and Water Taskforce, Northern Australian Irrigation Futures (which identified the potential for an irrigation mosaic model) and Northern Australia Water Futures Assessment (the first part is the Northern Australia Sustainable Yields Project). There is also the environmental research hub Tropical Rivers and Coastal Knowledge (TRaCK) which is exploring the biological, ecological and physical attributes of northern Australia’s freshwater resources.

2.3 Institutional Arrangements in Northern Australia

The study region for this project encompasses a vast and diverse geographic area, from Cairns in the east to the Kimberley in the west. Stoeckl et al. (2006) and Hegarty, Kellett and Bristow (2005) identify the complex array of institutions, regulation and legislation that interact around water in a north Australian context—not only does this include

¹ An Australian Broadcasting Commission news report title underscores this, “Farmers told to move north ‘where water is’” underscores a sentiment that opportunities exist in irrigation across northern Australia given water supply constraints in south eastern Australia (Barker, 2006).

legislation within jurisdictions but Commonwealth legislation. Each State and Territory has assigned ownership of water to the Crown, and the jurisdictions have developed their own unique institutional, legal and policy settings to meet local conditions. As a result of this institutional diversity there is different terminology between the jurisdictions. For example, Queensland uses *supplemented* to describe whether there exists water infrastructure to store and/or distribute water to users and *un-supplemented* where users self supply (while NWI terminology and that used in NT and WA is *regulated/unregulated*). A summary of the different institutional frameworks for water, and for water trading in jurisdictions is provided in Table 3. Table 4 provides a review of water plans (that allow for trading) and identifies how robust these institutional arrangements are.

Commonwealth

Each State and Territory is vested with control over water sharing, although the Commonwealth has utilised its various constitutional powers to effect change within States over time, and in the NT the Commonwealth has significant power under section 122 of the Commonwealth Constitution to legislate. The Commonwealth plays an important role in driving water reform and is a crucial part of the institutional framework of northern Australia.

The key institutions in relation to water at a Commonwealth level are the Department of Environment, Water Heritage and the Arts (DEWHA) and the NWC. The National Water Commission Act (2004) enables the NWC to carry out its functions furthering the NWI. The Water Act (2007) (CTH) provides for Commonwealth control over the MDB, it also augments the NWI in areas such as best practice pricing and record keeping. Amendments to the Water Act in 2008 provided the Bureau of Meteorology with expanded powers under the Meteorology Act (1955) to set a national standard for water information, collect and publish information on water, and develop a National Water Account that shall detail water supply and use across the nation (DEWHA, 2007). Other important Acts and Regulation that have an impact on the management of water resources in States and Territories include:

- Environmental Protection and Biodiversity Conservation Act (1999) which provides for protection of areas of national ecological significance, and areas designated under World Heritage or RAMSAR listing.
- Native Title Act (1993) which sets out the process for Indigenous Australians to get recognition of various rights (e.g. customary rights) they may possess to unencumbered land. Importantly, section 211 of the Act provides for the protection of native title rights, such as those to hunt and fish, and may be relevant to decision making for water resources in each jurisdiction.

Table 3: Institutional, legislative and policy framework for water Trading in QLD, NT and WA

	NT	QLD	WA
Water Legislation	<u>Water Act</u> (1992) (amended 2004)	<u>Water Act</u> (2000)	<u>Rights in Water and Irrigation Act</u> (1914)
Legislation to support water trading	✓	✓	✓
- Intra-state/territory	✓	✓	✓
- Interstate	✓	✓	✓
Regulatory Planning Processes prior to trade	Water Allocation Plan in a Water Control District- where trade is allowed	Water Resources Plan which is applied in the Resources Operation Plan, where trade is allowed	Regional Plan which is applied locally in Water Allocation Management Plan – trade only within Water Resource Management Unit (WRMU)
Trading permitted in regulated/supplemented and unregulated/unsupplemented schemes	Regulated	Supplemented and Unsupplemented	Regulated (generally within Co-operatives)
Entitlement to water separate to land	X	✓ Where there is a Resources Operation Plan	x
Surface Water Access Entitlement/Allocation Specification	<u>Water license</u> : required for any water extracted other than for rural stock and domestic <u>Water allocation</u> : volumetric limit for licenses expressed annually or monthly	<u>Water license</u> : allows one to extract water but comes attached with land <u>Water allocation</u> : an annual share of the resource not bundled with land <u>Interim water allocation</u> : enables user to extract water before ROP completed	<u>Water license</u> : necessary to extract water unless for rural stock and domestic use
License required for consumptive (commercial) use	✓	✓	✓

(Adapted from PricewaterhouseCoopers Report 2006)

Table 3: Institutional, Legislative and Policy Framework for Water Trading in QLD, NT and WA (cont)

	NT	QLD	WA
Delivery right separate from resource share component in legislation	X	X	x
Allocations metered	✓	✓	✓
Types of Entitlements/Licenses that cannot be traded	Groundwater trade is confined to Water Control District and there can be no upstream trade unless no harm can be proven	Stock and Domestic	Stock and Domestic; entitlements that are purely speculative; entitlements without clearly specified volumes; and water for In situ vales (Ecological Water Requirements and Return Flow)
Requirement of interest in land to access entitlement/allocation	✓ Application for license requires assessment of land use activity proposed and projected water needs (compared to industry standard in area)	x	✓ Require an ability to access land to apply water to, either through freehold title or lease agreement,
Types of permanent trades	May trade whole or part of entitlement provided in license (but whole can only be temporary)	May trade water allocation or under certain circumstances transfer interim water allocations to another landholding and in certain areas specified in Water Regulation (2 areas in the State)	May trade whole or part of entitlement provided in license (but whole is only through land sale)
Types of temporary trades	May trade whole or part of entitlement provided in license	Seasonal Water Assignments are a one-off assignment of a specified volume of water for the remainder of the water year. Leases are similar to leases of land i.e. they transfer all the benefits and responsibilities of the entitlement for the period.	May trade whole or part of entitlement but cannot on trade to a third party
Minimum period for temporary transfer	N/A as no trades	No minimum requirement	A 1 year assignment

(Adapted from PricewaterhouseCoopers Report 2006)

Table 3: Institutional, Legislative and Policy Framework for Water Trading in QLD, NT and WA (cont)

	NT	QLD	WA
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Government approval of trade required	✓	✓ For unsupplemented yes. In supplemented only for permanent trade. Sunwater has online exchange for temporary trade.	✓ Must apply for transfer of license and allocation
Intrastate trading - permitted - occurred	✓ x Trade only within Water Control Districts	✓ ✓ ✓ Seasonal water assignment trade and permanent only within ROP areas.	✓ ✓ Trade only with Water Resource Management Unit. Though water transfer is common.
Interstate trading - permitted - occurred	✓ X	✓ ✓ (Yes seasonal cross border trade has occurred in south)	✓ x (Although possible no process to do this in place)
Fees, Charges and Taxes	N/A	✓	x
Statutory Authority to storage and distribution water	✓ Power and Water has right to storage and distribution in urban areas.	✓ Sunwater has storage license and distributes water in supplemented schemes- it has a contract with licensees to provide water.	✓ Water Corporation, a government owned corporation has right to storage and releases water to Co-operatives.
Co-operatives in Irrigation Areas/Districts	X	X	✓
National Compatible Register	X But part of NWMS	✓	x But NICWER and NWMS participation.
Water Accounting	✓	✓	✓
Indigenous Reserve	In Katherine, 2% of the resource available to successful native title holder group.	In Cape York Heritage Area Wild Rivers and Cultural or Commercial Licenses available for 10 ML per year in Gulf and Mitchell	Currently assessing policy options in La Grange aquifer draft plan.
Legislation proscribing water trading	X	X <u>Wild Rivers Act</u> 2005 prescribes low impact development in high preservation zones.	x

(Adapted from PricewaterhouseCoopers Report 2006)

2.3.1 Robust design applied to water plans

Water planning sets the platform for trade in jurisdictions across northern Australia. The NWI states that surface water and groundwater plans should be adaptive to address environmental and other public benefit outcomes (clause 25). Schedule E4 of the NWI provides that plans should be capable of adapting and integrating change. Clause 40 of the NWI underscores the importance of a monitoring and review program to support plans. It has been identified that the direction and outcomes of plans should be supported in legislation and state-wide policy, to increase consistency there should be strategies to meet these objectives. Table 4 provides an overview of plans in the tropical belt of northern Australia, how robust they are, and any adaptive measures employed around water sharing and allocation.

Water Allocation Plans in North	NT (WAP)	QLD (WRP and ROP)	WA (Regional Plans and Water Management Plan's (WMP))
Completed	Tindall (2009)	Gulf WRP (2007) Mitchell WRP (2007)	Ord River WMP (2006)
Draft	Oollo Mataranka	Gulf ROP Mitchell ROP	La Grange
Duration of Plan	10 years	10 years	3 years
Plan Review	≤ 5 years	≤ 10 years (WRP's)	7 years
Statutory Plan	Yes, the water allocation plan is statutory.	Yes, the WRP is statutory.	No. But the proposed Water Resources Management Bill provides for statutory plans.
Adaptive measures	Yes, the plan may be amended any time without compensation. Also the risk assignment framework with statutory power to reduce allocation to zero (and impose restrictions on stock and domestic) provides flexibility each year.	Yes, there is a risk assignment framework in supplemented schemes to reduce entitlements. The ROP may be amended at any time or replaced by the Minister. The WRP, if replaced within first 10 years allows for entitlement holders to be paid reasonable compensation if the change reduces the value of the entitlement. Annual reports assess performance in meeting specific outcomes in plans (ss. 54-56).	There is a statutory process to reduce allocation if there is impact on the environment or to respond to changing conditions. The Ord plan can be amended, revoked, replaced according to statute.

Table 4: Plans in the tropical belt of northern Australia

2.3.2 Northern Territory

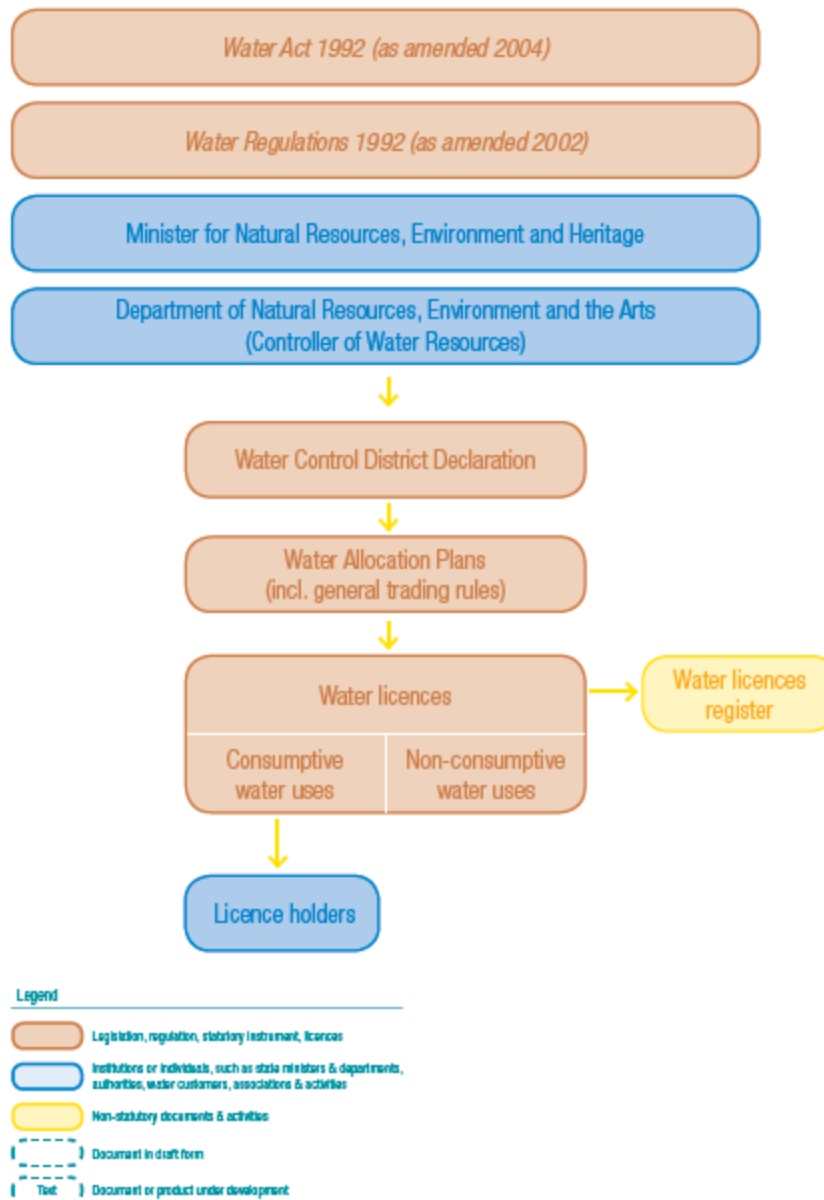
Institutional Arrangements

The protection of natural and cultural values is an important aim in managing the NT's water resources (Northern Territory Government, 2009). The Water Act (1992) (amended 2004) provides the legislative underpinning for water trading, as well as the power to manage and allocate water in the NT (see Diagram 1 for the institutional and regulatory framework for water allocation in the Northern Territory). The Water Act sets the rules for licensing of groundwater and surface water extraction, as well as provides for the maintenance of a register of entitlements. The Department of Natural Resources, Environment, the Arts and Sport (NRETAS) is responsible for administering the Water Act, and a Controller of Water Resources advises and reports to the responsible Minister, and issues, transfers and amends licenses. Trading can only occur within a Water Control District which is declared by a Minister when there is sufficient need to do so (i.e. reaching full allocation). Currently, in the NT there are six Water Control Districts and there are three finalised Water Allocation Plans, which sets the general trading rules in Water Control Districts. There is one plan in place in the study region, for the Tindall aquifer in Katherine, and there are also draft water plans to be prepared for the Ooloo aquifer and Mataranka region.

In 2007-8 there was 494,000 ML of licenses in the NT, with no trade (NWC, 2008). A license enables the holder to draw surface or groundwater subject to the terms of the license, and where an allocation plan exists the license holder must abide by this allocation plan. Only water allocated for "consumptive beneficial use" may be traded, there cannot be trades between non consumptive (cultural and ecological water) water and consumptive (commercial) water. In addition to the requirement that trade can only occur within Water Control Districts, two additional constraints on trading include: (1) no upstream trade unless it is proven to have no impact on the provisions of an allocation plan, and (2) only 'within-aquifer' trading is permitted.

Straton et al. (2006) identified in interviews with horticulturists in the Katherine region of the NT that there was a negative perception of water markets, particularly the function of systems in southern Australia and its application to the northern context. However, Straton et al. (2006) also found that horticulturists are in favour of security of entitlement tenure, more efficient administrative regimes and more scientific understanding to guide planning. Straton et al. (2006) also found that informal norms and values (i.e. social connections) have an impact on the formal institutional framework—it is also argued that the level of information available to users will impacts water trading. The authors call for increased participation of communities in water resource management and planning (Straton et al., 2006) — this approach reflects that highlighted in the NWI.

Figure 1: Institutional and regulatory framework for water trading in the Northern Territory



Sourced from National Water Commission, 2008, Australian Water Markets Report 2007/8

2.3.3 Queensland

Institutional Arrangements

Queensland has significant water resources in the north primarily in unsupplemented or unregulated systems, but has limited water resources in South East Queensland where a majority of the population resides (Pigram, 2006). The Water Act (2000) governs the management of Queensland's water resources and establishes a water planning, water sharing and water trading framework.

There are three types of trade available in Queensland:

- (1) a permanent trade of water allocation and a permanent transfer of an interim water allocation (which can only occur in specified areas and before a Resource Operations Plan commences, with the entitlement generally reattaching to land), and
- (2) a lease of a water allocation and,
- (3) a seasonal water assignment (a temporary trade).

The Water Regulations 2002 set in place the procedural requirements and fees for trade. The Department of Environment and Resource Management (DERM) functions to support and administer: water planning and water sharing, as well as water allocations and the water licensing and entitlement regime. DERM also administers resource operations licenses (for Sunwater to operate infrastructure such as storages and channels in supplemented schemes) and distribution operations licenses. DERM also administers permanent water trades as well as provides approvals to seasonal water assignments in unsupplemented systems.

Sunwater, a government owned corporation, approves seasonal assignments of water in supplemented systems (for which it has an operations license and manages water storage and distribution infrastructure) and it has in place an online trading mechanism to facilitate these arrangements. It must also follow a trading code of conduct. Trade in unsupplemented areas (like in much of northern Australia) requires DERM approval.

DERM, at the direction of its Minister and Chief Executive Officer, has in place a two-tiered planning framework to manage water. The first stage of planning is the Water Resources Plan (WRP), which sets the water planning and sharing parameters of a catchment, identifying the volume of water resources available in the catchment— during the WRP process DERM undertakes flow modelling and determines the water to be shared between consumptive and non consumptive uses. These WRP's are statutory plans and are reviewed after 10 years. If they are changed within the 10 years after the WRP is approved then a water allocation holder is entitled to be paid reasonable compensation by the State if a change reduces the value of the allocation. The ROP also facilitates trade in the catchment by converting existing water licenses and interim water allocations to tradeable water allocations, separating this water allocation from land title, granting a resource operations license, as well as establishing trading rules to support sustainable use and avoid impacts on third parties. Each year an allocation for entitlements in supplemented schemes is set according to a water sharing index which is the mean of the percentage of number of months in the simulation period (a historic period) for each priority group (high to low security) that allocations are fully supplied.

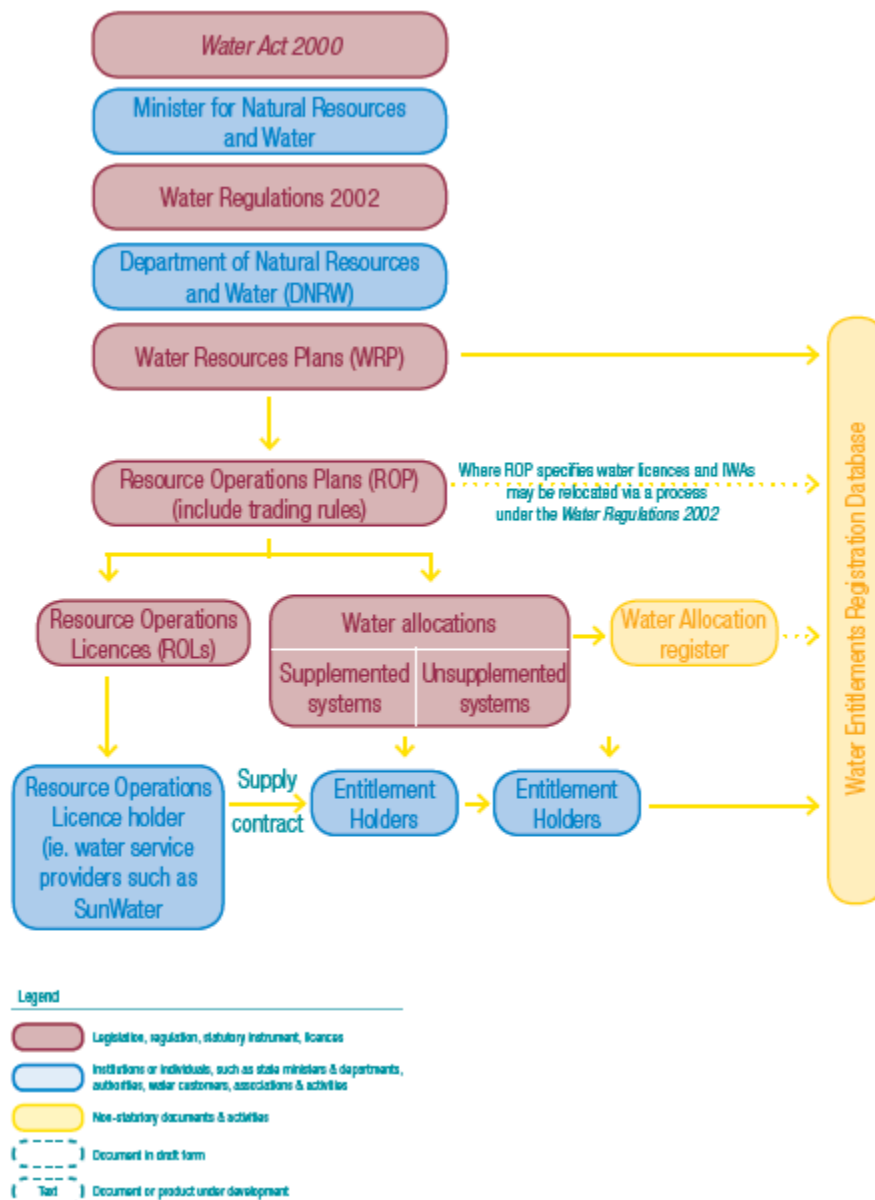
Water entitlements that are converted under the ROP are recorded on a functioning register, the Water Allocations Register (based on the Land Register). This register records details such as the holder/s of the water allocation, tenancy arrangements, location, purpose, conditions and nominal volume. For supplemented water allocations it will also record the relevant resource operations licence and the priority group. For unsupplemented allocations it also details the water management area, extraction rate, flow conditions, volumetric limit and water allocation group. It is also possible to register encumbrances and interests such as mortgages and administrative advices such as settlement notices (DERM, 2009). For a trade to take effect it must be registered. The Registrar of Water Allocations also functions as the Registrar of Land Titles, in the Registrar of Titles and Water Allocations in DERM (DERM, 2009). Only trade that modifies the attributes of an allocation require DERM approval.

In 2007-8 there were 3.567 GL of water entitlements issued in Queensland, with 75, 968 ML of trade (with a value of \$57.7 M) of which 44.5% was part of a property sale (NWC, 2008). Little of this occurred in the study region. Queensland has more water storages than its counterparts in northern Australia. There are two WRP's in the study region: that being the Gulf and Mitchell WRP's, both completed in 2007— the ROP's for these WRP's are still at a draft stage.

Constraints

Some constraints identified on water trade in Queensland include: the requirement of approvals for a change in location of water extraction, the restriction on trade between supplemented schemes (NWC, 2008) and lack of support among users for online trading within supplemented schemes (Queensland Farmers Federation, 2008).

Figure 2: Institutional and regulatory framework for water trading in Queensland



Sourced from National Water Commission, 2008, Australian Water Markets Report 2007/8

2.3.4 Western Australia

Institutional Arrangements

WA was the last State to sign on to the NWI in April 2006. The Rights in Water and Irrigation Act (1914) (RIWI Act) provides the framework for water governance in the State, regulating and managing its use, as well as supporting its protection (see Diagram 3 for a diagram of the institutional and regulatory framework for water trading in WA). The Rights in Water and Regulations 2000 (WA) supports this Act. A state-wide policy No. 6 provides for trade of water entitlements, there are also state-wide policies to support environmental objectives and water sharing. Before trade can occur the seller must hold a valid, tradable license. To be eligible for a license, persons must have access to land. There are two forms of trade available in the state:

- (1) Part or whole of the license in a permanent transfer (whole permanent transfer can only occur through a land sale); and
- (2) Temporary transfer

Only volumetric licenses can be traded in whole or in part to another eligible party (i.e. someone else who has access to land). The Department of Water is responsible for administering the RIWI Act, and provides approvals (or refusals) to trade, which must occur within water resource management units (WRMU) (which is basically within a specific basin or aquifer). There are 45 groundwater and 51 surface water management areas in the state (NWC, 2008). In 2007-8 there were 2.515 GL of water licenses issued in WA, with trade of 486 ML mostly concentrated in the south west of the state (with a value of about \$1 M), and 57 % of water trade was associated with a property sale (NWC, 2008). A Water Licensing database forms the license register and records all permanent and temporary trade. Irrigation Co-operatives that hold bulk water licenses and their members access their entitlements through the Co-operative. All trades are registered through the National Irrigation Co-operative Water Entitlement Register (NICWER).

Western Australia has embarked on a water reform program, a result of the NWI and state-driven review. The reform agenda involves a consolidation of 11 separate pieces of water related legislation, including the RIWI Act into two pieces of legislation— these are currently the Water Services Bill and the Water Resources Management Bill. The unbundling of land and water title is provided for in these new Bills. There is a three tier planning framework at a State, Regional and local area Management Plan (allocation plan) level. In the north, a Kimberley-wide Regional Plan is being developed that is a strategy document which sets the broad parameters of development and water use in the region. The Ord River Surface Water plan is the only operational plan in the study region. A draft La Grange aquifer management plan has been developed with a 50 GL cap set on extraction.

Water trading has occurred in the south west of WA. On the Ord River, a two-tiered trading structure exists within the local Co-operative that provides a volumetric allocation based on irrigated area (in hectares) in the scheme—at the time of data collection there had been no trading in the Ord. There is a 95% reliability provided to irrigators in the Ord (meaning irrigators can access their full allocation 95 years out of 100). For Ord Stage 1 (16,000 ha in total) there is an entitlement to 17 ML of water for 1 hectare of land.

Funding for Stage 2 has been approved that will provide for another 16,000 ha of land under irrigation in the scheme.

Constraints

The NWC (2008) found that markets are not deep or well developed in Western Australia, and identified institutional and legislative constraints to trade. Trades must occur within a WRMU, but there are examples of transfers. The Department of Water may refuse to allow a trade if it is inconsistent with policy, or to protect the environment, prevent inefficient use, or to encourage a fair market.

Figure 3: Institutional and regulatory framework for water trading in Western Australia



Sourced from National Water Commission, 2008, Australian Water Markets Report 2007/8

3. Project Methodology

Interview questions (see Appendix 2) for this study were developed to provide an open-ended discussion with interviewees. The aim of the interviews was to: (1) Discuss the development and progress of institutional arrangements for supporting water markets, with a focus on the tropical belt in northern Australia; and (2) Identify constraints to the establishment of water markets in the context of the north.

The respondents were key decision makers, policy makers and opinion leaders. The qualitative nature of the study was designed to provide rich understanding of context, as well as to articulate meanings, values, experiences and views of these diverse opinion leaders, policy makers and experts (Denzin and Lincoln, 2000). Contacts were provided by research partners and a 'snowball method' was employed with interviewees (where interviewees provide introductions to potential interviewees). Data collection ceased once no new names or data emerged (Strauss and Corbin, 1998).

3.1 Data Collection

Structured interview questions were developed in collaboration with NAILSMA and these questions were pre-tested with interviewees. The protocol used included:

- (1) Initial contact was made, either through introductory email or through telephone contact with interviewees (identified by research partners);
- (2) Consent forms information sheets and questions were sent by email prior to meeting with interviewees; and
- (3) For those interviewees who agreed to be interviewed, a time and location was arranged for the interview.

The ethical protocol set out for this project and approved by the Australian National University's Human Research Ethics Committee guided data collection. It was emphasised that participation was as voluntary and input could be withdrawn at any time. In total 28 representatives from relevant State/Territory and Commonwealth government departments were interviewed, and a further 14 people were interviewed from land councils, as well as experts in the field. Field work was conducted in Kununurra, Perth, Broome, Darwin, Canberra, Brisbane and Cairns (see Appendix 3 for a list of interviewees, dates and locations of interviews). Most of the interviews were audio recorded face-to-face interviews at the office of interviewees. Seven interviews were conducted by telephone because of incompatible schedules.

Transcripts were recorded from audio or handwritten notes as soon as interviews were completed. These transcripts were sent back to interviewees for their confirmation. In some cases transcripts were amended or points clarified. The confirmed interview data was then compiled into a database and results were compared among interviewees to identify any patterns or differences in responses. Tentative findings were discerned from data then sent out to interviewees, to be proven or disproven. Conclusive findings were developed after this stage and the final version of the report prepared.

3.2 Analysis

Transcripts of each interview were entered into a database and the data was organised according to each question. The answers to questions were compared within and across the various jurisdictions. Patterns were identified and themes generated for each question. These findings were compared to existing literature, media and other documents, ‘triangulating’ data sources to provide greater reliability in findings (Jick, 1979). Tentative findings were sent out to interviewees to clarify emerging issues, and then finally compared to the literature, increasing validity, reliability and credibility of findings (Auberbach and Silverstein, 2003; Miles and Huberman, 1994). More conclusive findings were generated after careful consideration of feedback from interviewees. Thus, data analysis involved data reduction, data display, and conclusion drawing and verification (Auberbach and Silverstein, 2003; Miles and Huberman, 1994).

4. Analysis of Institutional Arrangements, Important Features and Constraints to Establishing Water Markets

Based on the responses of 42 interviewees, this section provides an analysis of the institutional arrangements for supporting water markets in each jurisdiction in northern Australia.

4.1 Institutional Arrangements

This section presents findings from interviewees in each State/Territory, as well as the perspectives of interviewees from the Commonwealth Government. A review is undertaken of the property right to water, the institutional arrangements in each jurisdiction to support water trading, as well as the approaches and strategies, if any, to meet commitments under the NWI (with focus on northern Australia).

4.1.1 Commonwealth

How useful water markets would be to the conditions present in a north Australian context was contested by interviewees. However, it was emphasised by a number of interviewees in the Commonwealth that it is not the market by itself that will produce positive outcomes but the entire water management system outlined in the NWI.

"...Don't get hooked up on [the] special features of [the] Top End. I know there is the land and the water. But you have to approach it as 'what do you need for a market'? And that is clear water planning rules, an efficient register, and then you stand back... Doing the water management rules is good for sustainability even aside from your market. The water register system working well is a pre-requisite to an efficient market but its not the market, and by establishing a register you wont have a market overnight, [but] you will have the means for a better market... Metering is critical... Chris Guest, DEWHA

The prevailing perspective among interviewees in the Commonwealth is that the needs of a water market are the same anywhere, regardless of features. The conditions present in northern Australia such as lack of competition for the resource, episodic flow regimes,

and high variability do not preclude the tropical belt from adopting market based mechanisms for water allocation. It was emphasised by interviewees that for an effective water market in the north, alongside sufficient demand, the following elements are required:

- (1) The creation of an exclusive property right (unbundling land and water title);
- (2) A rigorous planning framework;
- (3) A functioning water register;
- (4) A common water accounting system; and
- (5) Adequate water metering.

These conditions tend to reflect the focus of the NWI and the conditions for an effective market in literature in a domestic and international context. The general view among interviewees was that the transition towards implementing trading arrangements may be complex, and require a significant investment of time and resources (which may not necessarily be cost effective across the region). There also may be a variety of constraints to the establishment of water markets and there may be no incentive or need for water markets in many catchments where water is not scarce and other approaches for allocating water may be preferred—these approaches included some of the non market methods currently used in the jurisdictions.

Several interviewees from the Commonwealth argued that there is a sequence to the development of institutional arrangements suitable for effective water markets. In jurisdictions, such as the NT, where the cost-benefit ratio to implement all aspects of the institutional arrangements for water trading may not be favourable—but it was argued that certain elements, such as statutory water planning, metering and accounting may be introduced to support improved outcomes in water management. It was discussed in interviews that COAG has supported and driven the development of a National Water Marketing System (NWMS), for which all States and Territories are involved (Queensland and Victoria already have suitable water registers that do not need redesign – however, these states are involved in the NWMS for initiatives such as the development of a National Portal and interoperability). The NWMS will aim to develop a common register system across jurisdictions. It will record entitlements, the ownership details of the entitlement, as well as particulars of any trade in the entitlement designed to improve information available to buyers and sellers—to create a confidence in trading regimes.

A water policy specialist raised an important issue in an interview, arguing that before moving towards water markets there needs to be some process of dealing with the legal rights of stakeholders. This point is particularly important in a north Australian context with the prominence of Indigenous interests. These interests have grounding in both statutory and common law and should be addressed if they are to be infringed in any way. Given that there are subsistence and customary rights provided for and protected under the Native Title Act 1993, any trading regime may need to be adapted to the conditions present in each region and seek to accommodate these rights. Several interviewees emphasised that there are sets of issues in the north which will inevitably be resolved in the courts before being considered by policy (the example provided was Indigenous issues like the Blue Mud Bay case, or the rights of commercial fisherman/prawn trawlers).

A number of interviewees reflected that decision makers may need to think innovatively in the north to determine how and when a market may be appropriate to introduce into a catchment. An interviewee describes the north Australian context and a potential way forward given the conditions present:

"For the development of markets one of the theories is that you need a cap. Why would you buy a right when you can apply for one and get it cheaper? There is still a frontier mentality to water in northern Australia. Before trading you have to deal with the broad allocation of rights first, then look at fishing rights, then impose a limit on how much can be used in irrigation. You need some creative thinking about the framework and lay out options. There would need to be some trigger points in the framework for when trading occurs." Water Policy Specialist, Canberra

It was identified in interviews that as governments recognise the importance of markets and they become more relevant to the north, decision makers will need to weigh up the costs and benefits (including social impacts) to a trading framework on a case by case basis. Creating flexibility (such as through a risk sharing framework) in markets to adapt to changing climatic and supply scenarios was also viewed as important, informed by experience in the MDB.

4.1.2 Northern Territory

"The real emphasis of the NWI has been on transparency and information-- it's a prerequisite of markets. The NT has developed legislation which creates registers and licenses. The NT Water Act says you can have markets but doesn't establish the rules...Spatial constraints on trade would result in small markets and that probably wouldn't work, as there wouldn't be enough sellers and buyers. The key concern is not to stuff up tropical rivers. There is a fear of getting it wrong. To sum up attitudes to water markets, I would say that the government is willing but worried." Peter Whitehead, Senior Policy Officer, NRETAS

Several respondents stated that the general approach to introducing a water trading framework in the NT was, and should be, precautionary. There are no internal metrics for water reform in the NT apart from those indicators assessed by the NWC in its national water market reports. The focus in the NT has been on planning and the NT is part of the National Water Marketing System (NWMS) to develop a register that is compatible with other jurisdictions across Australia. This section provides further detail on the approach to achieving commitments under the NWI.

a description of existing property rights in water

A water licensing regime exists in the NT, where landholders apply to NRETAS for an allocation of water for a projected use (which is compared against industry standards). The potential to trade exists in the NT under the Water Act. The ability to trade occurs within Water Control Districts and trading rules are contained in Water Allocation Plans. However, there have been no trades as yet.

The general approach to implementing a water reform agenda in the NT can be described by Ian Lancaster, Controller of Water Resources NRETAS (NT):

"The rules are restrictive for trading, the community wants this. The community doesn't want water to be treated like the stock-market. They want water to be used for agriculture and horticulture, for regional development. These rules have been developed in a completely transparent manner. Given the immaturity of the market and industry, we are taking a precautionary approach...Unless you can show me a land use, a plan and realistic volume then you cannot get a licence to access water."

Therefore, the pace of reform and the approach to trading in the NT is shaped by community opinion. Interviewees emphasised that they did not want to see a repeat of the MDB in the NT and a precautionary approach to implementing reform has been adopted. Interviewees reflected that communities want to see water supporting regional economic development outcomes and not being purchased for speculative use.

existing and proposed means/strategies for complying with the NWI provisions

Reform in the NT has been focused on developing water plans and on setting conservative limits for consumptive pools. Interviewees emphasised that the concept of a water market is only at its infancy in the NT and that there is still much more work to be undertaken to enhance understanding the characteristics of water resources. A precautionary approach is adopted in identifying limits to consumptive pools because of knowledge gaps, and to also reflect community values which interviewees described as sceptical views towards water trading. An 80/20 guideline is employed which provides a cap of 20% on water resources for consumptive use and 80% set aside for ecological and cultural flows. Ian Lancaster, Controller of Water Resources, NT discussed the 80/20 guideline, as well as the interaction of Indigenous interests which are prominent in land tenure:

"For the 80/20 guidelines, 80% is set aside for environmental and cultural purposes. Indigenous people don't want to be just lumped in with the environment. They want to be included in the consumptive pool. It's a non issue. We can provide an Indigenous reserve out of the 20%. We could keep Indigenous x% set aside, if an when Indigenous people want to get involved in enterprise. They could develop a plan and could apply for X megalitres. We want to ensure that Indigenous people aren't locked out of the water allocation process. Can Indigenous people trade it? I would be concerned if they could permanently trade, however I see no reason why temporary trading couldn't be undertaken. I would take advice from the Indigenous Water Policy Group. Any funds gained could be poured into Indigenous economic development. If you can get \$100 per megalitre for 500 megalitres then do it for 5 years [and] that would allow the development of indigenous enterprise."

Interviewees identified that the 80/20 guidelines may offer challenges for groundwater where uncertainty about the size of aquifers requires almost a case-by-case assessment in developing caps. Some interviewees offered that without understanding recharge, interaction with surface water and the impact of extraction during the dry, there is increased potential for negative outcomes. However, interviewees from the NT argued that the 80/20 rule is strictly a guideline and because most catchments are under-allocated

there is room to adjust extraction limits as required. Also, understanding the scope of cultural and ecological rights, which are gradually being viewed as distinct, requires appropriate investigation to minimise third party impacts. The development of community advisory groups such as the Daly River Management Advisory Committee, which has a traditional owner reference group advising it, may improve understanding of the diverse community values attached to water sources in the region.

Generally, the NT respondents argued that the NWC is satisfied with the NT's performance in meeting NWI commitments, particularly given the complex conditions present in the NT for implementing reform (such as lack of demand for water). Currently a register is required under legislation, the NT is part of the NWMS development process, and interviewees highlighted that there are 220 licenses across the NT (at the time of data collection). The current register identifies owners, postal address, location and size of entitlement, and the source. It was argued in the NT that prices were unlikely to be revealed in the NT register for some time. Commonwealth interviewees asserted that prices are crucial to the functioning of an efficient register. The NWMS process was envisaged to create a standard for registers, and improvements were identified for the NT register.

4.1.3 Queensland

Interviewees highlighted the robust trading framework involving Sunwater and its clients in supplemented (regulated) systems across Queensland. However, the study area in the north is almost all unsupplemented (unregulated), with only two WRP's in the Gulf and the Mitchell, and the rights and ability to trade have a different set of management needs (compared to supplemented systems). Interviewees reflected that Queensland has met all its NWI commitments, particularly the register, accounting and metering arrangements. There are internal metrics, such as for the pace of planning rollout across Queensland. However, planning has taken more time than anticipated due to the intensive level of public consultation and scientific assessment. Planning has largely been focused on surface water resources and several catchments in the study area have been subject to Wild Rivers declarations, which may restrict the level of development in high preservation zones.

a description of existing property rights in water

“The water allocation which is the entitlement is created under the Water Act and the Water Act specifies the mandatory attributes of both supplemented and unsupplemented water allocations and effectively the WRP and ROP... They effectively flesh out the right, in terms of the conditions under which you can take water. The entitlement... [is] not something which is renewed every 10 years [unlike previous arrangements]. What is refreshed every 10 years is essentially the conditions under which people can take water which is what the ROP's do and its reviewed through a public process a bit like town plans which attenuate your freehold rights to land. The ROP's really are attenuating your rights under which you take water. It's very similar in that way, where there's a statutory renewal process and timeframe for these things.” Water Expert, Queensland.

Title to land and water has been unbundled in areas where there are ROP's in Queensland. A water entitlement is similar to land title in that they are mortgageable and local government rates are calculated according to the entitlements value. Entitlements are no longer subject to renewal and the water entitlement register in Queensland follows the Torrens land register system (and is operated through the same agency). However, amendments to the WRP and ROP may alter the conditions of the entitlement, and reasonable compensation is only payable if the WRP is amended within its 10 year life and where the value of the entitlement has been affected. In supplemented systems water users have a contractual relationship with the water service provider, in most cases this is Sunwater, and the rules for trading are contained in ROP's. There are varying degrees of reliability provided to entitlements in supplemented schemes with high priority generally for uses such as drinking supplies and medium to irrigation (sometimes mines may be granted high priority water and irrigators can purchase high priority water on the market). Interviewees identified the processes in moving towards creating an exclusive right to water, which involved changing relationships with local government and financial services companies in how they assess land values and obtain security. Often the value of water entitlements form a considerable part of farm worth. Interviewees identified the flexibility the system provides to users, with the ability to transfer across sectors and to highest and best use.

existing and proposed means/strategies for complying with the NWI provisions

Interviewees underscored the focus on planning in Queensland in meeting NWI commitments. Planning has been concentrated on surface water resources and generally located outside the study region (with only two WRP's in the region). In north Queensland there have been catchments set aside under Wild Rivers declarations which prescribe the level of development. Developing a robust water planning framework according to interviewees supports sustainable water use in ways specific to each catchment. Tom Crothers, GM Water Allocation and Planning, DERM (QLD) offers that:

“We adapt policies to each of the specific issues in the plan, because it's very hard to have a one size fits all approach. We have some general policy principles that fit right across the State, we have a team here in our water planning unit that overview those policy principles. In each plan you have some idiosyncrasies and you need to pick up on local issues.”

A rule based approach is used to conserve environmental flows and protect third party users. Markets can then operate efficiently to reallocate water among users. The entitlement registry system in Queensland, along with Victoria, is viewed as a benchmark. There has also been significant progress in water accounting and metering. A number of interviewees reflected that Queensland was further advanced in implementing water trading frameworks than other jurisdictions in the north. However, interviewees offered that the conditions present in each jurisdiction influence the pace of reform. A water policy expert articulates:

“I reckon, if you look at where we are in Queensland versus where others are in each state I would say there are differences and I think the reasons for those differences are legitimate. If you look at WA they are a different place...there are different sets of issues. They have a big groundwater component which the NWI and COAG never really nailed and to be quite blunt the tools which you

need to support specification of property rights and the creation of good plans are not as good for groundwater at this point as it is for surface water. It's harder. So you could get high and mighty and say WA are a long way behind Queensland, but it's because they have a different problem than Queensland. Queensland really set out from a position where we had three things. We had the will to get on with it, we said that right that's COAG lets do it. We had the glorious position of not having a majorly over-allocated system in the first place, we had the ability to say alright lets stop there and we had a little room to move to get to that limit. So it wasn't a hard position compared to most of the southern States. And, thirdly we picked the easy bits, like we've done very little creation of tradable rights in groundwater in any parts of Queensland. We've picked the ones which are much easier to define and model and simulate, which is all the surface water stuff."

Queensland has been able to progress institutional arrangements for water markets because of political will, having catchments that were not over allocated (where reform may often require negotiation and compensation) and by focusing on surface water which was simpler to characterise for water sharing arrangements. However, it was emphasised that in the north there are more complex issues and interviewees identified the challenges in planning and developing trading rules in groundwater, as well as understanding the extent of customary and ecological values.

4.1.4 Western Australia

Western Australia (WA) signed up to the NWI last in 2006 and interviewees identified the difficulties faced by Western Australia in passing NWI consistent legislation (where land and water are unbundled), as well as the challenges for reform in WA where groundwater predominates. The state currently employs those criteria used for assessment by the NWC to evaluate its performance in meeting NWI commitments, and WA also has an NWI implementation plan guiding reform. WA has pursued reform in accounting and has a pilot project for metering, and is also a part of the NWMS to progress its register. In the study region there has been a surface water plan developed for the Ord River scheme and a draft plan for the La Grange aquifer (south of Broome). However, during interviews it was emphasised by interviewees that changing climatic condition in the south West may impose pressure in the future on the north's water resources (either for intra-state transfer or encouraging a migration of farmers north). Supporting Indigenous access and involvement in water markets was viewed as an important feature of institutional arrangements and is discussed in section 4.2.

a description of existing property rights in water

A licensing regime exists in WA for water where applicants require access to land to be eligible for a water license. Licensees must not be speculative, there must be actual use which is consistent with the license otherwise licenses are revoked without compensation (interviewees reflected that this may change under proposed legislation expected to take effect in 2010 or 2011). There are limits on extraction in water resource management units (WRMU), licensees are subject to conditions and volumetric limits set out in water allocation plans. The level of allocation in each WRMU commences at C1 (25% of consumptive pool allocated), C2 (50%) and trading is not likely to occur until allocation reaches C3 (75%) to C4 (100%) which is full allocation of the consumptive pool or allocation limit. Where the level of allocation increases there is requirement for more

investigation and consultation to determine the sustainability of extraction— and allocation limits may be adjusted accordingly. There are various mechanisms for government in WA to develop water markets under current legislation. Water may be auctioned once there is some level of scarcity in a system, or a floor price may be set for users buying into a system. However, outside irrigation schemes administrative mechanisms are used to allocate water to landholders for projected use that is assessed as reasonable.

Interviewees from WA emphasised that the use of market based mechanisms for water is increasingly being considered in the near future— and despite the fact that land and water remain bundled alternatives are being canvassed to facilitate trading. There are still issues with trying to establish trading in groundwater, Ed Hauck, Manager Strategic Projects, Department of Water WA articulates the thinking in WA:

In a sense markets hold an economic value by virtue of an entitlement to water. Such an entitlement infers the legal separation of land and water titles. You should be able to take your water entitlement to the bank, as you would a land title, and the bank would lend you funds using your water entitlement as security. However, there is still some critical thinking required around groundwater, particularly the aspect of separation of land and water access. In a fully used system if you want a market that is effective in terms of being responsive to demand for water and if you accept the cost of transitioning to markets may generate 'windfall gains' for some water users, then yes the separation of land and water title is a necessary thing. In cases where the public interest controls the majority of a particular water resource then perhaps a different form of trading from that envisioned by the NWI can occur based on the agreed use of water over a given period of time.

Interviewees identified that the demand for water across the State may not necessitate markets, that different approaches may be more appropriate in WA. Co-operatives have been under scrutiny as providing a restraint on market entry, particularly constraints on selling outside the co-operative (and scheme). However, some interviewees emphasised the role that co-operatives play an important role in managing trades between members, promoting water efficiency, providing new infrastructure and services to members. Ian Loh, Senior Planner, Department of Water (WA) indicated the following, that customers of irrigation co-operatives obtain their rights to water through a two tiered water entitlement system in WA. Co-operatives hold a water licence, issued under the Rights in Water and Irrigation Act (1914), to take water from a watercourse (or other water resource). Customers hold shares in the co-operative that define their individual rights to water. The co-operative can trade their (bulk) entitlement, in accord with the licensing provisions of the Rights in Water and Irrigation Act (1914). Co-operative members can trade their shares between members in accord with the Articles of Association of their co-operative. Members may trade their rights to the co-operative and the co-operative to other parties outside the co-operative. That is, any individual wishing to trade entitlements outside the co-operative, must do so with the approval and support of the co-operative. As elsewhere in Australia, co-operatives in WA are concerned about protecting their customer base and have resisted such trades. However, one co-operative has traded some of their licensed entitlements, originally provided for distribution losses, to the public water supply authority. The financial income from the trade enabled the co-operative to pipe their irrigation supply scheme, thereby enabling the co-operative to trade their surplus (distribution loss) entitlements to the public water supply authority over a

five year period. (Note that the on-farm component of their entitlement was not changed by the trade). Ian Loh, described that:

"While the Irrigation Co-ops will continue to protect their own customer base, I see this downside as being insufficient to override the benefits of having the Irrigation Co-ops manage the water trades between their members locally, promote water efficiency within their district and improve the service to their members ."

Some interviewees reflected that the co-operative system may reduce the flexibility of members to sell entitlement to non members, and may reduce the area under irrigation (having impacts on the scheme generally such as economies of scale and development of infrastructure). However, in the Ord, there is protection offered through the Mutual, which is assigned with assets and is particularly important for insurance of assets in the Ord (this is especially so where natural disasters could destroy assets of members that are non-insurable). Interviewees noted that financial services companies seeking to obtain security over a water entitlement found that co-operatives present challenges, as the entitlement is not provided to the individual. Interviewees suggested that some form of innovation may be important to provide greater flexibility to co-operative members and financial services companies.

existing and proposed means/strategies for complying with the NWI provisions (esp. rules relating to establishing and operating water markets)

The focus on reform in WA has been in preparing new legislation as well as developing the planning framework. Interviewees identified a state-wide policy number 6 which promotes tradeable water entitlements. The measures used to assess water reform in WA are those produced by the NWC and that set out in the State's NWI implementation plan. There has been work in WA on water accounting and initiatives for metering. Developing markets, interviewees emphasised would be through the co-operative structures in surface water. For groundwater the development of trading rules required further work and interviewees reflected that this was a complex issue (this is discussed later in the constraints section). Several interviewees emphasised that in the north of WA there may be little applicability of market based mechanisms for water as problems of scarcity do not exist (with reliability being 95% for irrigators in the Ord scheme). Among interviewees there is recognition that there may be a migration of irrigators to the north as supply becomes constrained in the south. The situation in the north through the co-operatives is described by Geoff Strickland, CEO Ord Irrigation Co-operative, who elaborates:

"I think we all know where the NWI is coming from in terms of water savings in the Murray Darling. But we also acknowledge that some initiatives are quite irrelevant to a place that has an increasing supply of water and a very small irrigation usage from the storage supply. There's not a great incentive for us to strive for incredibly high efficiencies, it costs us a fortune in infrastructure and maintenance to do it and the members don't benefit at all. Until agriculture expands, there's no market for saved water."

Interviewees identified that the need for markets in the north is different to contexts where water scarcity exists. However, in WA some interviewees believe that the certainty perpetual entitlements could provide would encourage investment in the north, especially given that irrigators in the Ord only have 5 year licenses. But, according to interviewees

development shall continue to occur through the two tiered co-operative system because of the benefits the structure applies to licensees. Interviewees also emphasised that the benefits of localising management of water delivery outweigh the challenges of restricting trading to members of the co-operative.

4.2 Features of Northern Australia

In analysing the institutional arrangements for establishing water markets in northern Australia, there were some common features across the region important to the implementation of the NWI reform agenda. These features included: a relative lack of scarcity and how this influences the development of institutional arrangements; as well as the prominence of Indigenous interests, Indigenous access to water and Indigenous cultural and economic aspirations around water. This part also looks at policies on inter-basin trading and cross border issues; mining related water access; and, non market methods of allocation.

Developing institutional arrangements for markets before scarcity and competition

Across northern Australia, in WA, QLD and the NT, non market methods of water allocation are generally used, with market based mechanisms only relevant in a few cases. To obtain a water license, for instance in the NT, a proponent, who must have access to land, lodges a land use plan with a reasonable assessment of water required to NRETAS. If this projection and use is deemed appropriate a license is granted. The Controller of Water Resources in the NT, Ian Lancaster offers that "*the present practice is traditional, but still allows for a water trading market, albeit restricted.*" Most interviewees agreed that without competition and scarcity there is no pressing need for market based instruments in north Australia (with a few exceptions), and that the transitions in an under-allocated setting is complex, and the cost benefit for broadly implementing institutional and regulatory reform is unfavourable.

While the function of markets themselves may be constrained, establishing institutional arrangements such as planning, accounting and metering are viewed as important. Staying with the NT example, the recognition that markets are an important tool for managing water resources is widely accepted among policy makers and regulators, John Childs, who is Chair of the Daly River Management Advisory Committee (DRMAC) and the TRaCK Program Management Committee argues that "*From a policy point of view, why wouldn't you want it [water] to be traded, it's a rational use of a resource, a limited resource. It leads to highest and best value use of that resource. But this is only marginally relevant in the NT. There are limited cases where this applies...In other cases it is cheaper to get a license than buy water.*" This point was echoed in unregulated and unsupplemented systems in WA and QLD that the potential for creating market frameworks is subject to a different (if not complex) set of management requirements. But the case for introducing the institutional underpinnings for a market before reaching scarcity is articulated by Will Fargher, acting General Manager, Water Markets and Efficiency Group, NWC:

"There is a case for not waiting until you reach full allocation before considering the institutional arrangements required for trade... as it is possible to pre-empt those... There is much to be learned from the southern States in this regard, where the water allocation and management framework

has had to be retrofitted with necessary institutional and administrative arrangements required for trade...at a higher cost and with more legacy issues than had the system been established with trading in mind...In ten or twenty years time when it is likely there will be significantly less water available than at present for irrigated agriculture in the MDB, and further development and perhaps full allocation in the north... then trade will be an important part of ensuring efficient allocation and use of water... Given the time required to introduce the water planning, entitlement, allocation, registry, accounting and metering arrangements to enable trade, plus given that these measures are important to best practice water resource management regardless, there is a strong case for work to begin now."

In light of projected climatic trends (which seem to indicate stable rainfall in the north), setting the pre-conditions for trade may enable regulators and policy makers to create a strategic path forward in managing water sustainably through a robust and adaptive market framework. Interviewees suggested that there is a benefit in having ground rules for establishing water markets in place even though markets are unlikely to be introduced in many areas for years to come. However, areas experiencing increased competition for water would benefit from a clear pathway for establishment of water markets (such as the Tindall aquifer in Katherine NT for example). Ed Hauck, Manager Strategic Projects, Department of Water WA offers that:

"There is a need to consider market based mechanisms where competition for available water exists. Markets tend to develop in places that experience a significant growth in water use, especially in areas with a concentration in demand for water. If there is an agreed market mechanism that government and water users can work to then everybody is informed of the rules up front. This can defuse conflict and the possible politicisation of water sharing decisions. Currently market activity is minimal or non-existent in most areas in WA and where water is available for allocation it can generally be accessed for the cost of establishing water infrastructure."

So creating a market mechanism that can be applied in the north over time will facilitate access to water that reflects its true value. This would provide alternatives to more traditional arrangements for sharing water that may not result in efficient water use and could hinder development by not recognising higher value uses of water. Interviewees also discussed that a market based approach could potentially offer a revenue stream for Indigenous groups where their interests were recognised, and this is discussed later in this section.

Without a pressing need for markets to allocate water, jurisdictions in northern Australia have been undertaking planning in surface and some groundwater resources (especially in the NT). In establishing the parameters for markets (such as what is the sustainable take in consumptive pools), jurisdictions have generally taken a precautionary approach.

General approach to NWI led reform

When setting the parameters for markets through planning processes (such as WRP's or WAP's), a precautionary approach is being adopted in the north across all the jurisdictions. This planning has entailed rigorous assessments driven by scientific and technical assessment (often with the use of independent panels or contractors) with public

consultation (the use of Community Reference Groups in Queensland and Water Advisory Committees in the NT), which has been a priority for relevant water departments. Tom Crothers, GM Water Allocation and Planning, DERM (QLD) highlights that the:

“...view of the NWC is that we are meeting them [NWI objectives] too slowly. They would like us to get our planning frameworks in place quicker. Our view is we are better off doing a thorough job, putting a robust framework in place, and coming back with no regrets later, rather than doing a rushed job that will require follow up changes.”

This precautionary or ‘quality’ approach is emulated in all the jurisdictions, with for example only 50 GL/y assigned to the consumptive pool in the La Grange draft plan in WA, only one quarter of what was requested by the initial proponent put forward for an irrigation development proposal a decade ago. The increased time taken in developing plans in the north can be attributed to the relative lack of knowledge on many of these catchments and aquifers on the characteristics of the resource, the vast geographic distances involved in undertaking field work, a prioritisation of departmental resources on more pressing issues in urban areas and the south (in WA and Queensland), and for stakeholder consultation which often involves a large Indigenous population many of whom speak English as a second language.

Other characteristic features of the north

Overall, the features of the north demonstrate that the implementation of a water reform agenda is occurring in each jurisdiction but this is prioritised by relevant departments according to need (which is often where demand and population are). As Wilf Finn, Manager Water Markets and Efficiency Group, at the NWC identifies in the north, the key features are:

“... It’s at an early stage of development overall, however there a few differences from the outset. First of all, the southern states have a longer administrative history of doing this work, not to say they are better resourced, but they have more institutional experience. Secondly, there are different seasonal and climatic considerations. The third is a stronger Indigenous involvement in the north.”

There are some features that are generally shared across the north, while each jurisdiction is unique (and each shall be discussed later in this section), the table below summarises the important features around the establishment of water markets shared across each State and Territory in northern Australia.

Table 5: Shared features relevant to the establishment of water markets in northern Australia

Features
<ul style="list-style-type: none">• Unregulated and unconnected systems (importance of groundwater)• Lack of infrastructure• Seasonality and evaporation• Stable climatic and rainfall trends• Socio-economic issues for Indigenous peoples• Land tenure issues (native title, pastoral, Aboriginal freehold)• Importance of cultural and environmental flows• Under-allocated systems• Resource driven economies

Table 2 highlights that there is seasonality in many of the water resources in northern Australia, with water becoming scarce during the dry season (this is also when many irrigators require water) and that infrastructure for irrigation is undeveloped and severely constrained by evaporation. In the context of northern Queensland, Tom Crothers, GM Water Allocation and Planning, DERM (QLD) describes that:

"... Our water systems up here, they're different to southern Australia where they rely on storage and snow fed rivers. There are only four major storages in the Queensland part of north Australia, the rest of the water users rely on run of river flows, which are boom and bust situations. In the dry you are flat out finding a base flow in some of these rivers. So irrigation is boom and bust in this situation. In Mt Isa there is 2.5 meters of evaporation, so if you have storage it's going to have high evaporation rates which questions the economic viability of irrigation."

Generally, most catchments across northern Australia are unallocated or under-allocated, with land tenure issues being very different from the predominant freehold title in southern Australia. Most of the land base across northern Australia is Aboriginal freehold (mainly in the NT under the *Aboriginal Land Rights Act* (NT) 1976), vacant crown land or pastoral lease which generally requires native title processes before non-pastoral development can occur. Indigenous Australians make up a considerable part of the population across northern Australia and there are initiatives to improve the socio-economic situation of Indigenous Australians in the region. Also, many catchments and aquifers are unregulated or unsupplemented and a plan may not be finalised (or statutory). Water may be required for maintaining biodiversity or for cultural purposes, and the actual quantity required must be considered in developing water plans. Interviewees reflected that identifying the volumes of water for maintaining social, cultural and ecological values, as well as evaluating the potential for third party impacts makes the planning process more complex, as well as time and resource intensive. Interviewees underscored the extent and detail of water allocation plans and how these ecological and social parameters in plans are pre-tested. Once water plans are developed, for example in supplemented and regulated systems in the south, users then operate within the guidelines of relevant plans (and where appropriate markets may then be used to reallocate water among the range of users). The north presents more complex issues according to interviewees, particularly given the importance of cultural and biodiversity values, and the interaction of groundwater with these values (interviewees emphasised that groundwater resources are less understood and more prevalent in the north). Randall Cox, Director, Strategic Water Policy (DERM), elaborates on the differences between supplemented and unsupplemented systems in Queensland:

“For supplemented water entitlements we go to a lot of trouble during the water resource planning process to pre-test the kind of trades that that water users are most likely to want to arrange. By doing this we set bounds within which trades can be approved without affecting our ability to meet environmental flow objectives and the water supplies of other water users. These bounds become rules in the water plans and trades have to be completed in accordance with the rules. For example, a rule might say that the no more than 1000 ML can be transferred into a particular reach of a river from other reaches. These arrangements means that most market activity can happen quickly with confidence that the environment and other water users will not be unreasonably affected by market activity. Trading of unsupplemented water entitlements, such as water harvesting entitlements and groundwater entitlements is much more difficult. When the place of extraction of unsupplemented entitlements are changed environmental flows and the water supplies of others users can easily be affected. These trades need to be considered more on a case by case basis. Most of the flow in northern Australia is unsupplemented.”

Because of this level of uncertainty in the north, in allocating water in unregulated or unsupplemented systems, decision makers have applied the precautionary principle in defining the consumptive pool. Interviewees noted the initiatives occurring to improve understanding of water resources in northern Australia.

Interviewees emphasised that most of these river systems in the north have little connectivity and they are unlike the MDB where a functioning market can work within the same system across States. The unconnected nature of systems in the north restricts the ability for a market by reducing competition among users, as well as constraining the potential for transfer from catchment to catchment. This may in any case have important environmental impacts and thus be limited by legislation. However, in terms of uncertainty around supply because of climate change some interviewees identified that the north, according to the best available science, is likely to maintain a stable climate and rainfall regime into the near future, which is in contrast to most of the growing regions in southern Australia. Ed Hauck, Manager Strategic Projects, Department of Water (WA) said that:

"The trends in northern Australia as I understand them are for a relatively stable rainfall regime. If you look out to 2030 and beyond to 2050, credible scientific analysis shows there will likely be no significant change from historical rainfall. Of course this needs to be considered in the context of uncertainty that comes with climate science. This contrasts with the projected decrease in rainfall in many parts of southern Australia where there is a higher level of water use, more fully used systems and a growing scarcity in freshwater resources. So as competition for available water becomes more intense people will look north. But there are some very big steps along the way."

With trends identifying the potential for greater demand for northern Australia's water over the medium-to-long-term, importance is being placed in generating greater understanding on the characteristics of these water resources. However, there are urgent priorities on departmental resources in the south of these jurisdictions where supply is

projected to be constrained over time. Nonetheless, an issue which is growing in importance is Indigenous involvement in water management and planning, particularly in discussion on northern Australia, as well as the potential for an Indigenous reserve in a consumptive pool. Indigenous interests are seeking a role as the institutional arrangements for water markets are being developed.

Indigenous access to water

"My view is that the role and engagement of Aboriginal people should be integral to any water planning and development, and management of water in northern Australia... [Also] given that people want to live on country and they live on the lands then there is a human asset for people like the NWC, the State and Territory water management departments..." Joe Ross, Chair Indigenous Water Policy Group

"The conversation has moved away from involvement to a rights based approach in the consumptive pool." Robbie Dalton, Policy Advisor, Northern Land Council

Discussion in interviews tended to focus on the importance of Indigenous peoples across northern Australia in developing water markets— in particular the role of Indigenous people and their level of involvement in water planning and trading frameworks. The NWI (2004) provides in clauses 52-54 for Indigenous access to water and involvement in water planning where reasonable. While cultural values are generally grouped and protected under environmental flows in the water planning process, there were questions raised in interviews about whether this is appropriate. Also, Indigenous groups are asking for a portion of the consumptive pool for economic development (at present or in the future). The form of Indigenous involvement in water markets is being assessed by various governments, the IWPG and NAILSMA at present. Obviously the importance of participating in water markets and the realisable economic benefits will differ among Indigenous communities. However, ensuring that there is some involvement, whether as an Indigenous reserve (which may include community drinking water, cultural water and water in the consumptive pool) or an entitlement (which could be for cultural or consumptive water and be either traded temporarily or permanently) is important. But in the NT for example, the Indigenous Reserve is for consumptive purposes only (for commercial development) because there can be no trade between consumptive and non consumptive uses. Further work in the area in WA will determine the policy options available for Indigenous access to water, but cultural values have been recognised in the La Grange aquifer draft plan. In Queensland a cultural license has been made available for 10 ML, and there is discussion on the availability of commercial licenses for Indigenous people. While an Indigenous reserve and/or entitlement are theoretically possible in a consumptive pool, some Indigenous groups are asserting that there are Indigenous rights to water that are yet to be fully recognised. This is a broader issue and interviewees in government emphasised that this debate around Indigenous rights to water is probably best determined in the courts. Some interviewees offered that greater political and legal leverage in the Northern Territory may precipitate swifter movement to a right or rights to water than in WA or Queensland.

Explored next in greater detail are the implications for water markets for Indigenous people in northern Australia, the level of consultation and engagement in water planning, as well as the concept of Indigenous involvement in a water market framework.

Implications of water markets

The interaction of NWI driven water reform raises complex issues for Indigenous people across northern Australia. On one hand questions emerge about the implications for Indigenous cultural obligations, for example, Dave Munday, Regional Manager for the Kimberley Department of Water raises the issue that *"A part of the NWI is removing water from land. [We have developed] the La Grange draft allocation plan [in the west Kimberley] it's a groundwater resource. We don't really understand the resource that well so we've been conservative. The Fitzroy gravels and La Grange are connected, there are shared wetlands, songs and stories, [and] if you allocate to a grower that might affect the marshes. Culturally it's not possible to split water and land, you can't separate them."* Several participants identified that joining the world of water trading could impose a form of double jeopardy on Indigenous people– while Indigenous groups may gain monetarily from trading this may at the same time have detrimental impacts for meeting cultural obligations, and vice versa. On the other hand, Robbie Dalton Policy Advisor, Northern Land Council voices that participation and involvement in the water reform process is necessary and should be encouraged, *"There are concerns about being locked out [of water markets] when there are few economic opportunities or resources available to Indigenous people. Northern Australia has disadvantaged people, and here is an opportunity to do something... pulling people out of poverty is a good outcome."* Motivating Indigenous interests is that this is an opportunity to be a direct beneficiary in the allocation of a resource. It was noted that there would be no compulsion for Indigenous groups to trade their entitlement or reserve.

While active involvement in water markets is an objective for land councils, NAILSMA and the Indigenous Water Policy Group (IWPG), this growing recognition that participation in the water economy may offer opportunity should be tempered by economic realities, as Ed Hauck, Manager Strategic Projects, Department of Water (WA) argues:

"The anticipation of value of markets maybe overrated where there is low level of use. Remember that water for traditional cultural uses and environmental needs is quarantined outside water that is potentially available in a water market – so its water for commercial uses I'm referring to. It's not the water market itself that holds value, it's what you do with the water that reflects value in the market, and water scarcity drives the market. Water markets mature as the availability of water decreases. Limits to water use are defined in water allocation plans and the level of use is regulated through instruments such as water licences. Defining potential uses of water for commercial purposes therefore becomes important to Aboriginal communities who seek to benefit from developing water markets. However, in cases where water systems are fully used, without a clearly thought out use for water, buying into a water market might not be the best investment across the range of needs in the Aboriginal community."

Interviewees emphasised that the potential for water to facilitate business development opportunities for Indigenous groups, or to enable the lease of water entitlements they may hold, will be dependent on the conditions present to support water based economic activities in each community. While it is identified that the potential to generate value from water trading and markets is in many cases limited across the study region (and

constraints are discussed later in this section), it was viewed as being important to participate at the outset in the development of a water trading framework, to further the cultural, social and economic objectives of Indigenous groups in the study region. Joe Ross, Chair of the IWPG describes the movement towards Indigenous involvement in the consumptive pool:

"[An] issue on people's radar screens is the...development of a consumptive pool and water trading which is in my mind is a long way off. It would be detrimental for Aboriginal people to not participate in the debate now because regardless if its 20 years off the rules are being made as we speak. Now, I think we've only got a window of opportunity in northern Australia of about three years and then the system and the legislation...has been developed—either including Aboriginal people or not including (but subject to prior informed consent)."

Therefore, Indigenous groups are lobbying to play a role in shaping and developing the institutional arrangements for water trading across northern Australia. The alternative according to a number of interviewees is to have Indigenous interests effectively excluded from this process, which may reduce the level of control Indigenous interests can exercise in water management and planning (which some interviewees argued may reduce the ability of Indigenous people to meet customary responsibilities), and if markets develop this could limit the economic benefits they derive from a trading framework.

Consultation and Engagement

The NWI sought to enhance statutory water planning in the States and Territories, and in doing this improve Indigenous involvement in planning through formal stakeholder consultation and engagement processes. Indigenous involvement in water planning supports the identification of cultural and ecological values (some may be native title rights and thus protected under s 211 of the Native Title Act), and often these rights are grouped under environmental water. While most interviewees identified an increasing intent by government to consult and engage Indigenous people, there were concerns among some interviewees that current methods of consultation are unsuitable for many Indigenous communities, and fail to engage Indigenous people adequately in ways that build understanding or awareness of water planning, or water reform in general. In saying this, a number of participants underscored the constraints that hamper government consultation efforts such as time and resources (particularly in undertaking consultations over the vast distances in the north), human capital (particularly the level of understanding of Western systems and English in Indigenous communities) and level of community interest. Interviewees underscored that often water planning issues are complex and communicating these to all stakeholders can be challenging. However, consultation and engagement with Indigenous stakeholders is an important area that requires further focus and there a number of processes occurring to overcome some of these constraints. Interviewees identified community education programs, (while themselves resource and time intensive) as having some scope to improve outcomes, and the NWC has funded the IWPG and Indigenous Community Water Facilitators across the north to work in communities to encourage greater awareness of water management issues generally.

Northern Territory

In the NT the Tindall aquifer water allocation plan is complete and there are several other draft plans in different stages of completion in the tropical belt. The creation of the Daly River Management Advisory Committee (DRMAC) and the Daly River Aboriginal Reference Group, which is representative of Indigenous clans in the Daly River catchment, were viewed as important mechanisms for stakeholder input, informing government and setting the parameters for development in the region. As Robbie Dalton, Land and Sea Manager, Northern Land Council offers:

“Thus far a combination of policy and NLC people are supporting consultation. There is the Daly River Aboriginal Reference Group, which provides expert advice and feeds into DRMAC, who are experts. They are recognising that Indigenous people are experts on their country and they are advising outcomes.”

The Aboriginal Reference Group model is seen as important through having direct traditional owner involvement in planning processes. Some interviewees thought that the time taken for consultation (providing ample time for stakeholders to develop advice), and the status accorded to Indigenous knowledge was a significant step forward. However, there is a realisation that no matter how much consultation is undertaken some views cannot be accepted or integrated into the planning process, and over time there may be changes to these views. Thus, the ability to have flexibility built into institutional arrangements is important, as John Childs, Chair of TRaCK Program Management Committee and DRMAC describes:

“A lot of effort has been made to consult everyone– the whole process has been extended to accommodate everyone and then more re-consultation. At the end of it all, issues will arise with some people, but if we have an adaptive management framework things can be adjusted in time. You don’t need everything right; we have the precautionary latitude to adjust.”

It was acknowledged that in the NT there is awareness that despite the amount of consultation and engagement that has occurred through DRMAC and similar initiatives, that there is required flexibility to adjust plans over time to reflect changes in beliefs and values of stakeholders. As well this allows for changing environmental conditions to be accommodated in water sharing arrangements.

Queensland

In north QLD, several interviewees argued that there is an extensive consultation framework that informs water planning, these include in regions such as Cape York a Community Reference Group, there is also a Regional Advisory Council, and an Indigenous Reference Group. As well, in implementing legislation to conserve specific free flowing rivers under the Wild Rivers Act (2005) there were various meetings and consultations around water management and planning. The QLD water planning framework to establish a WRP is time and resource intensive, and seeks to attempt to involve the public in meaningful ways. As one interviewee who wished to remain anonymous argues:

“I don’t know of any other process that goes to this extent... [and] the detail of the prescriptive consultation in WRP’s. There is a lot of fine tuning of plans

that comes from this. It's the reason why it takes years, its something you can't knock over in 12 o 18 months. There are several rounds of consultation and we try to get maximum consensus before we finalise a plan. We give groups an opportunity to put people up on these panels."

Consultation may not often meet the needs of Indigenous people who often don't have the capacity to effectively engage in processes or within the timeframes set for water planning. In other ways, water is but one issue of many for Indigenous groups, and often this may not be as pressing an issue as health for example. Terry Piper, Chief Operating Officer of Balkanu Development Corporation argues:

"One of the things government doesn't realise, is that when you're engaging in remote areas with Indigenous people that are widely dispersed on concepts that are often new or not well supported, the consultation takes quite a while, [and] while they may allocate 5 months for consultation, this often means just one visit to remote people. When you've got so many people to see, that one visit just skims the surface...People do not formulate an informed view of complex matters in one discussion. The problem with government is they don't have the money to do a proper assessment and consultation... no matter what traditional owners say about certain things the government is not going to take it on board because Government is unwilling to fund the necessary studies. Government expects the public and traditional owners...to come forward and make informed submissions without any funding or support, it reverses the onus of proof..."

The processes in place to allow for public input in establishing WRP's may not necessarily accommodate the needs of Indigenous people, and allowing for Indigenous interests to engage in ways appropriate to their needs may be constrained by time and departmental budgets. Indigenous people in northern QLD generally may not always have the capacity or resources to engage effectively in the science or provide enough input into the planning process.

Western Australia

In northern WA, there have been various planning processes such as the La Grange aquifer draft plan, and the final plan for the Ord River scheme. There are no statutory planning processes in WA, but the Department of Water has funded a position in its Kununurra Office to support consultation and engagement efforts with the Kimberley Indigenous population. The Kimberley region has a significant Indigenous population, and there is generally poor infrastructure (outside the Ord) and there are human capital issues among the Indigenous population (in relation to understanding the Western system). There have been negotiations for a gas hub in the Kimberley which has focused people's time and energy in the region, as well in 2005 the Miriwung Gajerrong people (MG Corp) native title holders for the lower Ord (including the Irrigation project) were involved in the negotiation of an Ord Final Agreement, which precluded the Department of Water from directly involving the group in planning for the lower Ord. The extent and method of consultation and engagement with Indigenous people is constrained by the level of human capital in communities in the Kimberley and resources have been focused on a variety of other issues. As well the planning process is evolving, as Dave Munday, Regional Manager Kimberley, Department of Water (WA) offers:

"There is very little money for consultation and... we didn't have a template [for a water plan]. There is such low capacity in the Kimberley that we piggybacked with other meetings...I don't think we had a clear vision of a plan and we really didn't have the money to consult— it was frustrating...It has to be meaningful, consultation must be done appropriately but you can't do fly in fly out meetings, you can't build trust that way. But we don't have the resources, they talk language up here and there's no emails."

While there is recognition that funding constrains the extent of formal consultation and engagement, there is the intent to consult and engage the Indigenous population. However, there are significant constraints to facilitating greater awareness and engagement in the region in water planning that requires further resourcing. As Nolan Hunter, Deputy CEO of the Kimberley Land Council articulates:

"We understand that the government has limitations, they've talked about their limited funds, whether its timeframes or resources. The intent is there though, we are talking more. If you're determining the level of engagement in water management and planning, they understand that Indigenous people haven't been engaged at the level needed. I believe that they [the Department of Water] are mindful that there needs to be further processes for engagement with Indigenous people outside the normal planning phase."

While resources may support better outcomes, human capital issues often mean that more resources are not necessarily the solution to enhancing Indigenous engagement. The challenges interviewees argued revolve around the barriers in generating understanding on the planning process for Indigenous people in the region. While some interviewees identified that planning processes are more suited to planners and those with expertise in water, integrating Indigenous knowledge and ensuring Indigenous involvement is an issue which is growing in importance.

The approach to planning in the Kimberley may not necessarily involve Indigenous people in a formal way, but interviewees reflected that it has aimed to promote capacity building and generate outcomes 'on the ground.' This adaptive approach to planning and processes for consultation and engagement in the Kimberley emerged because of the pressing need to enhance capacity. Interviewees acknowledged that it is important to engage closely with Indigenous people when issues directly affect their livelihoods. Also, there are cultural issues that need to be considered in planning, such as whom are relevant Indigenous stakeholders to a plan, what 'country' can Indigenous people talk for, and where is Indigenous peoples' input relevant. A common approach or standard to consultation and engagement to ensure accountability and transparency is required to maintain positive outcomes— there are various research and policy processes being undertaken to achieve this, Paul Lane, Executive Officer, the Kimberley Institute outlines the work his organisation is involved with relating to the La Grange draft allocation plan (and its consultation process). This work he states will develop a "...a comprehensive position for those three native title holding groups [involved in La Grange] and will certainly form a basis for understanding across the wider Kimberley native title groupings. And any of the research work or the legal work that we do in the La Grange should have application across the broader Kimberley to some extent..." Furthermore, this process in the La Grange will progress discussions on the scope of Indigenous rights to water, which has grown from the extent of customary and subsistence rights to the potential for commercial rights for Indigenous people in the region.

Summary

Interviewees emphasised that in each State and Territory the intent exists from government to support Indigenous involvement in water planning processes. However, there are various constraints to effectively consulting and engaging Indigenous people. This requires some innovative thinking to support planning processes, as resources alone may not necessarily overcome some of the capacity issues among Indigenous people in the region that limits engagement.

Indigenous involvement in water markets

There are processes occurring in each jurisdiction to explore options to facilitate Indigenous access into water markets. There is the potential for an Indigenous reserve in all jurisdictions (under the Cape York Heritage Act there has been 1% of mean annual flow reserve set aside for Indigenous people), or for an Indigenous entitlement that could be tradeable (in the jurisdictions this would not include non commercial values). A reserve would be a set aside which would include non commercial values such as community access to drinking water and water for customary use, as well as water for economic development (which may be leased or traded, or applied to land for irrigation). There may be a mix of both a reserve and entitlement, but whichever the form a clear distinction is required between non consumptive and consumptive uses to prevent trading between them. Interviewees representing Indigenous interests suggested that arrangements made between Indigenous groups and the State in the La Grange aquifer draft plan may establish a benchmark for further water planning (particularly in discussions around the consumptive pool. It was offered that the Indigenous interests would need to define a use and the volumes of water required to further aspirations in the consumptive pool. Whether native title rights extend to commercial rights to water was seen as a broader issue that would require a whole of government approach, or hearing in the courts.

The form of Indigenous involvement within institutional arrangements is being assessed in each jurisdiction, Will Fargher, acting General Manager, Water Markets and Efficiency Group, NWC suggests: *"...this is obviously an evolving area of policy and there will be a range of options worth considering... one of these could be for Indigenous people to secure stand alone entitlements to water equivalent to other consumptive entitlements... providing access to water for both cultural and economic use in a way which leaves decisions around the use of those entitlements to Indigenous people"* While a reserve could preserve non consumptive uses and entrench an Indigenous position in the consumptive pool, the use of entitlements rather than rule based approaches is optimal in a market based system (to create flexibility). However, there are concerns about whether an entitlement could be traded by relevant Indigenous interests permanently. A number of interviewees believed that it would not serve Indigenous interests if they could trade their entitlements permanently and then return to government at a later date asking for more water. Other interviewees felt that it would be paternalistic to not allow Indigenous people the ability to permanently trade water entitlements. Brendan Edgar, contends that, *"I think right now there is a first mover advantage in the north to get a hold of water before there is a price on it...There is a huge opportunity to provide for the economic interests of Indigenous people. If communities then choose to sell their development entitlement then that's their business"*. Whatever the approach, involving Indigenous interests for purposes of equity, and offering potential economic development

opportunities is an important objective (particularly as the Federal Government aims to 'Close the Gap' between Indigenous and non Indigenous socio-economic interests).

Northern Territory

"Indigenous equity is very important, 50% of land in the NT is Indigenous land. Are we going to sell water from under them? In Cape York Heritage Area, 1% of flow goes to Indigenous people. The question is whether that is enough. An ideological commitment to markets may drive bad social outcomes." Ian Lancaster, Controller of Water Resources, NRETAS (NT)

The NT has the largest percentage of Indigenous owned land in Australia, and there were concerns among interviewees that a shift to markets could exclude Indigenous people in the region from water resources on their own country. Therefore, providing security of access and a level of control is an important objective for Indigenous representative groups. In the NT, it was discussed by interviewees that 2% of groundwater resources in the Tindall aquifer plan area (around Katherine) was made available to native title holders (on condition that the claim is successful), reflecting the amount of land made available to claimants in native title processes (the formula for allocating water on Aboriginal freehold was not described in interviews). While the structure of this reserve has not been finalised (i.e. the amount of water made available to Indigenous interests for consumptive and non consumptive uses and the types of activity allowed), there were concerns about the equity of the arrangement. Indigenous people represent 50% of demographic in the Katherine region, and as Robbie Dalton, Policy Advisor Northern Land Council asserts, *"Two percent is clearly not equitable, but we do congratulate the governments' decision to come to the party and negotiate with us about an allocation"* The difficulties lie, according to interviewees across jurisdictions, with identifying the types of water based development Indigenous people seek to undertake, and the volumes of water associated with customary and potential economic uses for Indigenous people.

Queensland

"The Indigenous Reserve...When it's granted it's likely to be granted as a water licence (the same as a water access entitlement, however it's tied to land). Indigenous water, because Indigenous communities usually don't have the capacity to buy that water, they usually don't have funds to get into the market, it's likely to be granted as a license, a non tradable license. It's very early days in this policy approach. The thinking behind the policy approach is that it's probably going to be counter-productive to grant the water as a water allocation to an Indigenous entity and should they sell it off the Indigenous community are likely to come back in 5 years knocking on the door of government saying we want more water...The provisions under the Cape York Peninsula Heritage Act are that water is provided to meet the social and economic aspirations of the Indigenous community... So far we haven't had any applications for that water yet, it's provided for in the Mitchell and the Gulf Water Resource Plans... [and] ...we used a process to determine how you assess whether... an application is meeting the social and economic aspirations of an Indigenous community." Tom Crothers, GM Water Allocation and Planning, DERM (QLD)

An Indigenous reserve was established for Indigenous communities in the Cape York Heritage Protection Area and there is the potential to establish Indigenous reserves for water under the Wild Rivers Act (2005). In total approximately 1% of mean annual flow is reserved for social and economic purposes in Cape York. An equitable process was used according to representatives in DERM in calculating the reserve, informed by science and the Cape York Land Use Study, the amount of irrigable land held by Indigenous communities was multiplied by 10 megalitres (the same method used in the Barron WRP). There is debate whether this 1% is adequate, however, without understanding the operation of this reserve and the actual volumes of water required to meet the social and economic aspirations of communities, this is difficult to assess. The aspirations of communities need further development to understand whether the reserve is adequate and during interviews the potential for enterprise development was viewed as being severely constrained, thereby limiting the scope of water needed for economic purposes (particularly in high preservation zones in declared Wild Rivers areas). Outside the Cape, Indigenous interests are accommodated in environmental flows and this is a point of contention, as increasingly Indigenous groups see water associated with customary use as separate from water for the environment, and are seeking consumptive rights.

Some interviewees in Queensland reflected that reserves are not optimal and that using market systems to transfer water to special groups (where government can purchase water for Indigenous groups) is far more appropriate. Several interviewees offered that allocating water from the environment to Indigenous groups for consumptive use was a matter for public approval and not for DERM alone to consider. However, underlying these issues is whether involvement in water markets is going to be relevant or viable. According to Terry Piper, Chief Operating Officer, Balkanu Development Corporation:

"The implications are going to be confined to particular areas, so water markets may have big implications for Indigenous people in particular areas, like possibly the Mitchell River catchment if there's more development and irrigation [and] in the Gulf. Ultimately there may be some localised areas on Cape York where trading of allocations could be possible for irrigation...If mining is going to be extracting water there may be some opportunities for trading with the Indigenous water allocation, so people might get some commercial rights from that..."

In northern Queensland, where irrigation is feasible, Indigenous groups may have commercial opportunities, or where there is the potential to sell allocation to mining companies this may generate revenue. However, not all communities across the north will be presented with such opportunities and the potential to trade is unlikely in the foreseeable future in many catchments (in protected areas this again is not relevant). An issue of importance is that a number of mining projects have special agreements to access significant volumes of water, these often occur in regions like north Queensland where there are no competing users and third party impacts from the allocation. Therefore, the potential to trade Indigenous allocations with mines to supplement their use is proscribed in these circumstances. Terry Piper from Balkanu Development Corporation argued that mining companies should be required to pay royalties for water, in the same way they do for minerals– but, in saying this he states that any trade or activity must occur in a way that is consistent with the cultural values relating of the specific Indigenous community.

So, in Queensland the framework for an Indigenous Reserve exists, but it is difficult to assess whether it is adequate because they have not yet been operational.

Western Australia

"There are two parts to our native title rights and interests to water, firstly there is the involvement in the planning and management of water, and then there is the rights to water in the consumptive pool...I understand that the WA Government is influenced by the State Solicitors opinion on rights to water arising out of native title which view these as only sustenance rights which extend only to cultural, ceremonial and hunting purposes... That's their position. We think we can influence them... They [the WA Government] don't have a legal reason to compel them to provide water allocation to traditional owners as there is currently no Indigenous legal ownership to water apart from rights and interests arising out of native title. We are aiming to build a relationship with government, engaging with them, giving them the opportunity to consider the reasons for Indigenous rights to the consumptive pool." Nolan Hunter, Deputy CEO, Kimberley Land Council

During interviews in WA, the discussion generally became focused on Indigenous involvement in a water market framework in the north. This occurred because of a number of reasons. There was the creation of a Kimberley wide regional water plan which stimulated thinking about how Indigenous people's rights and interests fit within WA's water management and planning framework. Also, Indigenous representative groups have been pressing for involvement in the consumptive pool in the La Grange draft allocation plan. In the Ord Stage 2 expansion, 5% of irrigation land (about 800 ha) was provided to native title claimants, with an implied 5% right to access water (approx 20 GL). While native title rights are not viewed as extending to commercial rights to water, the thinking that is driving debate is that Indigenous people should not be marginalised from access to water. Also, there is the potential that a permanent water entitlement could facilitate economic development opportunities (through trade or through water based economic development).

Interviewees identified that the form of Indigenous involvement in water markets is shaped by legislative and institutional requirements. Across the jurisdictions there is variation in how issue are defined, but commonly there is required distinction between consumptive and non consumptive uses and no trade between the two. Ed Hauck, Manager Strategic Projects, Department of Water (WA), describes the various options available for Indigenous involvement in WA:

"Some of the options can be characterised in broad terms through concepts such as a reserve, a licence that involves traditional uses, or a licence which would require some Indigenous business model to be developed and some aspirations linked to future water use. It may be a combination linking a few concepts together, including consideration of water aspects in Native Title determinations. But for options to be understood there is a need to define terminology so when people talk about, for example - cultural flows, everyone understands what is meant. In some jurisdictions and in some circles the term 'cultural flows' include both commercial use and non-commercial aspects of water. We would prefer to distinguish clearly around in-situ values and basic rights which include environmental and non-commercial (traditional) uses as

separate from commercial use of water. It's only the commercial use of water that is subject to trading and water markets”.

From interviews the concept of an Indigenous reserve is possible and interviewees agreed that it could potentially encompass rights in a consumptive pool that may be traded. Whether these rights could be permanently traded, or traded without having used them for a specific activity, was debated, with no clear answers. Several interviewees emphasised that in WA the aspiration of rights to water should be made separate to the objective for an establishing an Indigenous reserve in water sharing arrangements. An Indigenous reserve could include secure access to drinking water for communities as well as water for cultural and commercial purposes (but again a clear delineation between the two to prevent trading between consumptive and non consumptive uses). Some interviewees believed that rights to water may currently be unpalatable and could jeopardise the potential to secure an Indigenous reserve. A reserve is capable of being formed under the RIWI Act, but the decision to grant an Indigenous reserve would require government approval. The issue of possibly creating a reserve in systems that are fully allocated is a difficult one as access to water would likely require water to be procured through market mechanisms. Aside from this, equity considerations would need to be taken into account to ensure claims by all stakeholder groups were heard.

There was recognition in interviews in WA that cultural and environmental water are becoming confused— the terminology of cultural water is not preferred by the Department of Water. Indigenous interests view cultural water as being distinct, being linked to ceremony and identity, as well as subsistence. However, a process is being sought to create an arrangement that fits within the institutional and legislative framework in WA, which is broader than water set aside for cultural purposes, and includes obligation to support Indigenous involvement as a separate element in the consumptive pool. While there is no legal obligation to support Indigenous involvement in the consumptive pool, Indigenous interests assert that broadly this is necessary to involve Indigenous people in water planning and to develop economic opportunities around water.

Who is a beneficiary to Indigenous involvement?

Identifying who exactly shall hold entitlements or are beneficiaries to any Indigenous reserve was raised in interviews as a crucial issue that will require further deliberation. For example, some catchments may start in semi arid zones and end in tidal estuary. Irrigation based activity may occur only where soil and water quality is highest. But water is equally important to all groups along the catchment and extraction may potentially have impacts downstream on fishery productivity. Also, the lack of knowledge around connection with groundwater also raises implications where extraction from surface water impacts soaks or springs for people in other areas. Paul Lane, CEO of the Kimberley Institute argues:

"How do you say that those people's interests are more relevant at the top of the Fitzroy than those in the Nyinkina tidal area? It is equally essential to the life of the river... If you said to each of the tribal groups on the Fitzroy River that 5% of the consumptive pool is yours, what's 5% in the tidal area? Not that it isn't important to them it's their country and it has a particular use. But the water isn't worth 2 bob, it can never be used for potable or irrigation or anything like that. Trying to have this discussion with people is going to be very difficult."

There are many questions that will need to be answered, such as who shall derive the benefits of water trading? Is it all groups and people with a connection to a catchment? Are there varying degrees of salience that influence the level of income one receives? Other questions about an Indigenous Reserve and who should be eligible to be a beneficiary included: do Indigenous people have to live on country to be a beneficiary or do they have to be accepted by relevant native title representative bodies or land councils as a traditional owner? And, will urban Indigenous people who are not registered as native title holders or traditional owners miss out on involvement or benefits in water markets? A representative of NRETAS elaborates:

“With the set aside, how do you apportion that? ... We are left with options of acknowledging those under the ALRA [Aboriginal Land Rights Act] or Native Title... It should be broader than that. The tension is where do you draw the line? ... How do you stop it from being a handout? ... Attaching it to land is imperfect because there will be those who miss out because of policies of the past. We’re at infancy, Indigenous interests ideas are better formed than ours.”

So, defining who are beneficiaries and the structures to administer and distribute benefits may follow existing statutory arrangements for Indigenous land tenure. However, there may be an opportunity to provide for Indigenous people without connection to land. Also, notions of individuals owning parts of entitlements to establish businesses and access finance may be considered to promote entrepreneurship. Joe Ross, Chair IWPG elaborates:

“...The identification of who actually owns it [water] is difficult even for Aboriginal people ...The Indigenous Reserve should be held in a common good trust and that all social and economic benefits derived from that water should go to all Aboriginal people in that specific area. In the NT you would probably say...anyone living in those tropical freshwater systems... should be able to access that trust. That’s one model. The other model is specific traditional owners wanting to acquire that water and then there are individuals. But I think they contravene their real values of what Aboriginal people thought of water. Water was always for the common good.”

The interviews highlighted that there are different concepts of customary ownership across the north, and each region should determine the most effective way to administer an Indigenous reserve or entitlement, and in determining beneficiaries. Building on existing structures may offer an efficient means to manage these arrangements. However, there is the potential to create innovative models that may provide greater flexibility to relevant Indigenous groups in pursuing water based economic development. Each model should be carefully considered in light of the conditions in each region, as well as the institutional and legislative framework in each jurisdiction.

Summary

The potential exists for Indigenous reserves across northern Australia, which could encompass water for drinking, cultural and consumptive uses. The amount of water required for cultural and consumptive use is important to define and further research may provide more information on this. Also, there is a need to clarify potential commercial

uses for water and the projected volumes of water required for these activities. Some interviewees would prefer to see the use of entitlements to support efficient markets (whether now or in the future), but there would need to be a clear separation of consumptive and non consumptive uses to prevent trade between the two in jurisdictions across the north. Whether native title provides a right to water for commercial purposes is uncertain, but native title is generally viewed narrowly to include only hunting and customary rights.

Inter-basin trading and cross-border issues

"It's hard to imagine water trading beyond catchments and schemes— it will rarely be any more than that because water is really expensive to pump long distances, and there will always be environmental constraints... some mining companies might pay, but they aren't growing mangoes..." Seamus Parker, Manager, Legislation and Regulation, Water Reform Project, Council of Mayors (SEQ)

Interviewees argued that because systems are generally disconnected across northern Australia there would be required significant infrastructure to allow for inter basin transfers (and trading). The potential for inter-basin transfer is highly constrained by the economics of such activity, with it only likely to occur for high priority and value uses such as urban or mining purposes— not for irrigation. Most interviewees found that trading is likely to be intra-catchment in the north and occur mostly during the dry. Interviewees found that across northern Australia the potential for inter-state trading is limited. In the jurisdictions trading can generally only occur within water allocation plan areas. Stoeckl et al. (2006) argue that restrictions on inter-basin transfer limit water trading as that the most significant gains are to be obtained from transfers to where supply conditions are constrained. While there are no policies or legislation that explicitly prevent inter-jurisdiction transfers of water, it would require significant planning which would be time and resource intensive. The only scope for cross border trading is potentially between the NT and WA from the Ord Irrigation District into the Keep District on the NT side. However, the likelihood that this will occur in the foreseeable future is low. The NT has yet to commence native title and environmental approval processes, and there would be required the enactment of complementary legislation in both WA and NT to allow for an expansion of the scheme into the Keep. Interviewees identified that it would take approximately 10 years before approval and planning processes were completed by the NT. Another issue is that the NT does not support the use of Genetically Modified cotton, which may be an important crop in Ord Stage 2 and may reduce the potential for developing the Keep.

Interviewees identified that across the region Indigenous people would generally be opposed to the transfer of water from catchment to catchment because of the negative impacts this could have for their country. There were issues raised by interviewees in WA and NT around trading from aquifer to aquifer and river to river, on environmental grounds. The potential for moving aquatic species around the landscape is of concern, particularly in biodiversity rich regions in northern WA and the NT. In Queensland the spread of pests (such as Tilapia) is also a concern.

The role of mining-related water access and use within the NWI framework

"Water management in mining operations needs to be looked at from an overall package of outcomes, including those that reflect sustainability and community objectives. High levels of water use in the short-term with a view to longer-term recovery can be considered viable if conditions imposed under mining, environment and water legislation are met." Ed Hauck, Manager Strategic Initiatives, Department of Water (WA)

Mining water use is recognised under the National Water Initiative and considers aspects such as regulated/supplemented systems, dewatering, water quality in mines, lack of competition and the special nature of some mining operations. A description of mining related water use in each jurisdiction is provided next:

- In the NT, water use by mines is not covered by the Water Act, but by the Mine Management Act, however, the Bureau of Meteorology may obtain estimates on actual water use by mines.
- In QLD, mines are treated as any other user. Where supplemented systems exist, mines are required to purchase entitlements and this has been important with cases such as the Entscham mine (where a mine had to dilute polluted water before discharging it into a river system). In unsupplemented systems mines can apply for volumes of water from the general reserve. Some older mines (such as Weipa) may be covered by the Special Agreements Act, which provide significant rights to extract water (up to 80% of mean annual flow). Water use for the petroleum industry is viewed as an emerging issue, though accounting for its use is acknowledged as complex.
- Interviewees in WA identified that mines have finite lives and use water that there is little competition for, such as deep aquifers. So interviewees argued that while mines should be treated as any other user in the RIWI Act, they shouldn't be brought under the NWI reporting framework. A number of major mines operate under Special Agreements, which are statutory contracts with the State. Mines may collect and discharge water (creating new products under an NWI framework), which they may recycle and process through their operations. Interviewees identified that mines may have trouble identifying the source of water which would make reporting guess work and difficult to manage.

Therefore, mining offers special circumstances recognised in paragraphs 33-34 of the NWI which may create challenges in reporting use. Also, mining may create new products under an NWI framework which will require changes in entitlements, Will Fargher, acting General Manager, Water Markets and Efficiency Group, NWC, suggests that in such circumstances:

"...in the case of mine de-watering or recycling... in areas where there is the opportunity for and value in returning water to say the environment... to enable this, and facilitate the emergence of what are

then essentially new water products, work on the definition of these entitlements and conditions on their use may be required.”

Across northern Australia mining projects and their interaction with the NWI framework will be dependent on whether mines are operating in the context of an unregulated or regulated system. In regulated systems, mines are treated like any other user and markets can address allocation issues. In unregulated systems, mines may be the only user, and they may create new products, or access resources that are not connected — bringing mines under the NWI framework may be challenging in these circumstances.

Non market methods of water allocation

Across the study region non market methods of water allocation predominate outside water allocation plan areas— with the only potential for trade in the Tindall aquifer in the NT, some potential in the Gulf and Mitchell catchments and within the two tiered co-operative system in the Ord. In Queensland, non market methods of allocation (apart from the statutory right to stock and domestic) for obtaining a water license exist in some unsupplemented systems where no Water Resource Plan’s have been developed. In WA and the NT, non-market methods for water sharing are generally applied and this in part reflects lower levels of demand for water (especially when compared to south eastern Australia). Currently across the north, an application to access water requires a right to access land and the development of a reasonable water use proposal. The proposal is reviewed to ensure the water requested is available in the area and that the proposed use is in line with conditions of the water licence. It is this licence that enables a legal right to access and use water and this process generally prevents speculation.

Across jurisdictions as the amount of un-allocated water decreases within a specific management area, the potential for trade increases. This also identifies the management area as a priority for water allocation planning and to formally determine water sharing arrangements. Once a limit or a cap is imposed this allows a market to develop. Interviewees emphasised that before markets are developed, non-market based mechanisms are effective in facilitating allocation and water sharing. Ed Hauck, Manager Strategic Projects, Department of Water (WA) elaborates that:

"A water licensing regime that has conditions of use attached to it is an effective way of managing water. A first-in- first-served licensing system works reasonably well up to a certain level of commitment against available water. But when you get to 70-80% allocation levels markets start to develop and then steps can be taken to transition to a market based approach to water allocation. There is a need for improved management and monitoring during this transition so you don't get caught unprepared and then wake up one day and realise the resource that was under-allocated is now over-allocated overnight and be faced with an expensive water recovery issue. Use of transition to market strategies together with water allocation plans and licensing systems will help to create water markets when and where required.

None of the plans in northern Australia make explicit the availability of resources to purchase back entitlements where there is over-allocation. Only the NT and Queensland establish a risk assignment framework to reduce entitlements/licenses if measured water levels decrease. In WA there is a broad statutory power to reduce allocations, and the La

Grange aquifer draft plan provides for reductions in allocations if there is evidenced detriment to the resource. There are drought provisions for allocations in the Ord scheme and priority is given to supporting the reliability of irrigators. The use of non market measures reflects that outside discrete areas there is low demand for water resources and interviewees reflected that it is unlikely that a market regime would be required in the foreseeable future. A representative of NRETAS argues that:

"... What is the point of developing a system if there are only 15-20 licensees? In those circumstances would it be more effective to keep the old fashioned regulated system? It's a critical mass thing. Do you design things differently, or not at all?"

Interviewees emphasised that while markets may be useful mechanisms in managing a scarce resource in the north they may not be so relevant. Despite this, interviewees suggested that the benefits of having markets are becoming clearer. In comparing market to non market systems interviewees from the Commonwealth and NWC argued that in the MDB markets have provided optimal outcomes. Non market methods interviewees argued pre-empt the kinds of economic activity occurring on land by restricting movement towards highest and best use, and inhibit structural adjustment, reduce area under irrigation, create information asymmetry, and potentially have a negative impacts on the environment through entrenching inefficient water use. In addition, where water is not properly priced, capital values are over-inflated creating a barrier to entry. Interviewees also noted that water users have less flexibility where non market methods exist (especially in obtaining income or financing).

Non market based methods of water allocation are the most common mechanism for water allocation in northern Australia. Without adequate demand jurisdictions have not prioritised the establishment of market based allocation across northern Australia, and the cost benefit to implementing these arrangements is a disincentive at present. If water becomes scarce, jurisdictions emphasised that they shall move incrementally towards market-based systems.

4.3 Constraints to establishing water markets

Interviewees identified a variety of constraints to the establishment of water markets across the tropical belt of northern Australia. Many of these constraints are inter-dependent such as physical constraints (e.g. soil and unconnected systems) and economic constraints (e.g. capital and operational costs to developing enterprise and infrastructure). While there were commonalities among constraints to the establishment of water markets in each jurisdiction, there are slight differences in each. First, the perspective of Commonwealth interviewees on constraints is presented, and then the constraints as identified by those interviewees from a State/Territory level.

4.3.1 Commonwealth perspective

"The north is seen as a real greenfields site, because allocations are low. We have the capacity to do things reasonably well, as we are starting from a low base. Water is generally unmetered, and metering and licensing are needed to effectively manage water. Most systems are unregulated apart from the Ord. The geography, poor soils and limited potential for water storage mean that

there are limited opportunities for large scale economic development. Rivers can be roughly divided into perennial, which are aquifer fed in the dry season, and seasonally dry rivers. Direct take from rivers is likely to target perennial systems although aquifer water is likely to be the smartest thing to use. There is distance from market problems, limited surface water across the dry season and it is less likely that governments will subsidise infrastructure such as large dams. Floodplain harvesting may be an option but this also has difficulties. With limited development opportunities the future will more likely be mosaics rather than broad-acre agriculture.” Brendan Edgar, consultant

The constraints for establishing water markets are closely tied to those barriers for water-based economic development in northern Australia. Interviewees offered that the costs of doing business (particularly energy and transport costs) across northern Australia were generally seen as prohibitive, especially for irrigated agriculture, where risk was generally seen to outweigh returns. In discussing constraints to the establishment of water markets, some interviewees identified the north as having a future potential for irrigation development. This is in light of changing climatic conditions causing farmers in southern Australia to look elsewhere for water, or migrate to a reliable water supply. However, before there is sufficient demand to allow for water trading (except where this is already occurring), interviewees highlighted general constraints in the north which may prevent or hinder their development. These constraints were identified as: (1) physical, (2) economic, (3) knowledge gaps, (4) political, and (5) the institutional and legislative framework. However, it was acknowledged that while constraints may be generalised across the north, barriers to the establishment of water markets will be different from catchment to catchment, and are influenced by a variety of factors including nature of water use, soil and crop type, and location.

Economic

Interviewees identified that across the north there is a lack of water-based economic activity, such as irrigated agriculture. The potential for irrigation is restricted by the costs of doing business across the vast distances and fragmentation across northern Australia, where transport and energy costs are significant. Also, across northern Australia infrastructure is concentrated in centres and there is little water delivery infrastructure outside of schemes such as the Ord. On top of this, there are substantive risks to operating in the north such as cyclones, flood and fire. Given these factors identifying a business model that creates an attractive risk return ratio is complex.

Physical

Interviewees identified physical constraints to the establishment of water markets across northern Australia in terms of hydrography, soil type and the prevalence of groundwater resources. A lack of connectivity between systems was seen to necessitate pumping water across catchments, if not markets would be limited to intra-catchment trading. Soil quality is often poor across the north and may not be congruent with water quality. A mosaic style of agriculture was proposed across the north by the North Australian Irrigation Futures project. In the north, interviewees identified that groundwater resources predominate, and that individuals can often access this themselves through bores. Individuals may have access to more than one groundwater source. Regulating such groundwater extraction requires some form of monitoring and accounting of volumetric

entitlement to ensure sustainable yields, and the cost benefit must be carefully considered. Also, the characteristics of groundwater resources are not well understood in the north particularly recharge which is assessed through historical data which can be highly variable. Identifying exactly what a sustainable yield is can be complex. Interviewees underscored that seasonal variations in water availability can create challenges in planning, as irrigation demand in northern Australia may potentially be most pressing when environmental flows are at their highest risk during the late dry season.

Political

“...It seems that there is a strong public dislike for the commoditisation of water in the NT, rightly or wrongly. This is a sentiment that the NT Department has reflected in strict trading rules, such as non-landholders not being able to trade, etc. An additional community sentiment that is reflected by the department is the focus on promoting use of water for development, rather than trading it onto the market.” Wilf Finn, Manager Water Markets and Efficiency Group, NWC

Interviewees from the Commonwealth identified that sentiment existed in some communities across the north that was often against the development of water trading regimes—this too has been reflected in literature in the context of a case study in Katherine, NT, by Straton et al. (2006) and in the MDB by Bjornlund (2004). Interviewees offered that this negative attitude to trading was dependent on whether there is a pressing need to trade, and where communities have seen the benefits of markets this attitude is less prevalent. Also, legislative support in jurisdictions for water trading can be weak where markets do not exist or are at a formative stage. However, the NWI is driving the intent to pursue (at least in part) the institutional arrangements for market based mechanisms for water trading. Some interviewees argued that water reform can be cast as resource management to deliver outcomes such as planning, metering, accounting and a register— as opposed to associating these as elements of market led reform which may have negative connotations in the community and hence be constrained in their development.

Knowledge Gaps

Interviewees from the Commonwealth reflected that outside the Ord, surface and groundwater resources across northern Australia are not well understood (in particular their interaction), reflecting the findings of Stoeckl et al. (2006). In many of these catchments there are important ecological and cultural values that must be understood and protected. This knowledge gap is not viewed primarily as a constraint to the establishment of water markets, but for water sharing and allocation, particularly in defining what a sustainable extraction limit in these catchments is. More planning is required and because of the limited understanding the relevant departments have adopted a precautionary approach to setting extraction limits. Some interviewees reflected that funding to undertake research is often constrained as departmental resources have been focused on more pressing water issues in southern parts of their jurisdiction (in reference to Queensland and WA). However, there are a number of initiatives occurring such as the CSIRO Sustainable Yields Project, North Australian Land and Water Taskforce and TRaCK which aim to improve knowledge of these catchments and aquifers.

Institutional and Legislative Framework

"With regard to North Queensland, Indigenous people in the Cape tell me that Indigenous access to water for consumptive purposes will be constrained by the Wild Rivers proclamations. While the Cape York Heritage Act allows up to 1% of mean annual flow to be available for consumptive use, there is no real clear indication how this will be achieved. I understand that it is expected that most will be allocated to Indigenous people and communities but as far as I know, neither Indigenous communities know how they would use or store this water for use nor does the Queensland Government know how and when it will allocate it, nor what conditions will apply to the use of the water. Another issue of concern is that some Wild Rivers are within the Cape and covered by the Cape York Heritage Act [CYHA]. One percent of mean annual flow of these rivers will be made available for consumptive use. However, some Wild Rivers are outside the Cape and not covered by the CYHA. There will be no water available for consumptive use from these river systems."
Murray Radcliffe, Senior Manager, Water Planning and Management, NWC

Interviewees in the Commonwealth reflected that the institutional and legislative arrangements in northern Australia may constrain the development of water markets. In north Queensland, Wild Rivers legislation was seen to limit the creation of consumptive pools in high preservation zones in Cape York as well in the Gulf. While across northern Australia, native title was viewed as a process that impacted land based development and hence the potential for water trading. Interviewees also identified that the capacity of departments to adjust to market based allocation varies across jurisdictions. Often the movement to market based regimes is limited by political constraints and by a lack of resources, especially in jurisdictions where there is no pressing need for trading. While interviewees identified the establishment of an institutional framework for water markets as being important, the cost benefit to establishing a metering and monitoring program, as well as the administrative support regime, was identified as a major disincentive for being proactive.

Interviewees identified a variety of constraints across northern Australia to the establishment of water markets. Several Commonwealth interviewees asserted that these barriers can be overcome with robust arrangements, reflecting an institutional perspective to water markets. As Chris Guest from DEWHA argues:

"I don't see why [water trading can't occur]. It's exactly the same as anywhere else, you need the two elements, the water management framework which specifies what the constraints on extraction are, what allowable transfers are on hydrological connectivity; and then you need the register system to define the license, manage the transaction and provide information. They're the things you need and once you've got those things in place the extent of the trade depends on the incentives of buyers and sellers and you can't put that there, all you can do is minimise the transaction costs and provide as much certainty as possible. So you remove the role of government as a problem, as a source of uncertainty about a trade, and minimise its costs."

It was evident in interviews that a movement towards robust institutional arrangements is an important outcome of reform. However, across northern Australia reforms must be considered in light of important land tenure and environmental legislation that may constrain the function of markets. Also, the ability for departments to implement institutional arrangements for water markets is restricted by institutional capacity, political will, resources and need for reform.

Summary

Interviewees from the Commonwealth emphasised the economic, physical, political, knowledge, and institutional constraints to the establishment of water markets in northern Australia. These are often interdependent, (such as physical and economic constraints), and may vary from catchment to catchment, dependent on nature of use, soils and distance from market.

4.3.2 Northern Territory

Interviewees identified various constraints to the establishment of water markets in the NT context that include: (1) community attitude, (2) physical limitations, (3) knowledge gaps, and (4) institutional and regulatory capacity.

Community Attitude and Values

"The only constraint is community attitude. It's not a constraint as I agree with it in this relatively immature stage of development in the NT. It was strongly rejected in research done by Stratton and during the water allocation process in Katherine. People are against open trading." Ian Lancaster, Controller of Water Resources, NRETAS, NT

"Communities to don't want profiteering with water; they want to know how to add value with water to promote regional economic development." Representative NRETAS.

Community perception was viewed as a major constraint to the establishment of water markets in the NT, reflecting the perception identified by Straton et al. (2006). Interviewees articulated that in their dealings with the public, various concerns about water trading had been expressed such as that trading would create speculation and have ramifications for local economies and social cohesion. Some interviewees explained that this community perception is because markets are at a formative stage and that the benefits of trading are not yet tangible.

Physical

As discussed by Commonwealth interviewees, systems in northern Australia are unconnected, with a reliance on groundwater throughout the year. There are also poor soils which restricts the potential for broad acre irrigation. All these factors constrain the potential for water markets by reducing the demand for water, which is a key condition identified by PricewaterhouseCoopers (2006).

Knowledge Gaps

"Our big problem is not efficient allocation. It is a lack of understanding of supply and social issues. Markets...might exacerbate these issues." Peter Whitehead, project officer NRETAS

A major issue in the NT is that the cultural and ecological values are not well understood in many catchments. Also, the volumes of water available for trade have not been suitably quantified. There has been little socio-economic assessment to determine likely impacts of trading. In defining the limits of trade, the NT government is taking a precautionary approach. Until further research can provide more information, knowledge gaps will continue to constrain the development of water markets where understanding is limited.

Institutional and Regulatory Capacity

"The major challenge is how you go from a system of allocating for free. When do we start charging for water, what's the floor price? When do we allow market pricing to function?" Peter Whitehead, Project Officer, NRETAS

"There are big differences between Commonwealth level and our understanding, this is true of economic instruments per se. The complexity is appreciated but the understanding is not there. We're often responding to desires that we can't satisfy. There are very few people in the Territory government system, probably less than a handful that have half an understanding of water trading, maybe 2 or 3." Representative NRETAS.

According to interviewees in the NT, the implementation of NWI led water reform in the NT is constrained by the capacity and resources of the relevant department. However, interviewees explained that the relatively low intensity of water based economic development impacts the scale of departmental budgets (and hence institutional capacity). Interviewees emphasised that the NT is still at a formative stage in developing markets and experience is generally consistent with this. Interviewees viewed the rollout of markets and relevant institutional arrangements occurring sequentially with the pace of demand for water.

4.3.3 Queensland

Interviewees identified four general constraints to the establishment of water markets in northern Queensland (1) knowledge gaps (2) physical constraints (3) community attitudes and values, and (4) the institutional and legal framework. Some of these constraints are tied in to the challenges with developing water-based economies in the region.

Knowledge gaps

"Our biggest constraint is knowledge and data of the water systems up there for the development of our modelling. We're very reticent about introducing tradable water allocations into catchments where we don't have high level of confidence in our modelling. In a lot of situations we don't have a lot of gauging stations and we get the best rainfall and runoff data we can, unless we are confident and we have validated the model...we are reticent about

introducing tradable water allocations in some plans." Tom Crothers, GM Water Allocation and Planning DERM (QLD)

In Queensland, like all jurisdictions in this study, interviewees identified that the level of knowledge on surface and groundwater in the tropical north was not sufficient enough to safely support 'sustainable' extraction targets. In Queensland, significant work has been undertaken on surface water resources across the state, but groundwater resources require further planning to ensure sustainable outcomes. The level of resources and time required to improve understanding of water resources across northern Australia is significant and often more funding is directed to areas where there is pressure on supply. There are a number of initiatives occurring to generate more knowledge on northern Queensland's water resources, as well as the ecological and cultural values attached to them.

Physical

"In north Queensland a major constraint is a lack of connectivity, you have discrete areas where trade is occurring...They are small unconnected markets when contrasted with the large connected Southern Murray Darling Basin..."
Wilf Finn, Manager, Water Markets and Efficiency Group, at the NWC

Interviewees identified that in northern Queensland there is less congruence of good soils and water, river systems lack connectivity and there is more groundwater resources. Interviewees emphasised that to date most of the water planning work has been focused on surface water in Queensland and that more work was required in understanding groundwater, the values attached to groundwater, interaction of groundwater with surface water and groundwater dependent ecosystems. Some interviewees also emphasised that for groundwater there is required the development of appropriate trading rules and regulation for groundwater. The issue of regulating overland flow was not viewed as a big issue in the north because of the seasonal wet.

Community attitude and values

"Probably the biggest barriers to trading are cultural– people moving to a mindset that water entitlements are a tradable commodity." Seamus Parker, Manager, Legislation and Regulation, Water Reform Project, Council of Mayors (SEQ).

"Initially there was a lot of resistance because of concern about speculators– the notion that it's really only a local irrigation community who should own water. Most irrigators would agree that's its alright for those using the water to trade among themselves, but they don't want large companies from outside the community accumulating large holdings of their water entitlements...That has not happened and the fear has abated a fair bit, so it is not as big an issue as it used to be." Randall Cox, Director, Strategic Water Policy (DERM).

Interviewees in Queensland identified communities were often sceptical and had concerns about speculative purchasing of water entitlements (especially the concept of 'water barons' buying up water coined Kerry Packer syndrome). There have also been challenges with individuals accepting the concept that water can be traded. However, where communities have been able to trade water, interviewees identified a growing support for markets and the outcomes they provide, such as flexibility. In northern

Australia (in the study region which does not take in the Mareeba Dimbulah scheme), there has been little trading so benefits have generally not been observed. Informing communities of the benefits of market based instruments for water delivery will require further work.

Institutional and Legislative Framework

Some interviewees identified certain constraints to the development of water markets in the broader institutional and legislative framework. These included the Wild Rivers Act (2005), where declarations identified as high preservation zones for their biodiversity values only allow low scale development. Some interviewees argued that these Wild Rivers declarations restricted the potential for intensive water extraction, limiting the development opportunities for Indigenous people in the region.

Another constraint identified by interviewees is that users leasing water for more than one year must undertake a land use plan which may act as a disincentive to such arrangements. Also, there was observed by some interviewees a need to increase coordination across relevant departments for approvals at a landscape level to maintain water quality.

4.3.4 Western Australia

"..Markets mechanisms are best suited to areas where the water available is well quantified, unlikely to increase in the future (through new investment in water infrastructure or resource re-assessment) and there is competition for the water currently available. It's hard to expect market mechanisms to work when major investments in new water infrastructure are being made at the same time. Current planning to expand the Ord River Irrigation Area, emphasises that the region is still very much in a planning and development stage. Competition for irrigation water and its reallocation through market mechanisms is not a priority at this stage on the Ord." Ian Loh, Senior Planner, Department of Water (WA)

"Generally, across north Australia, there's not a lot of water control through irrigation schemes, it's mainly individuals with their own extraction licenses. Consequently, there would be very little mechanism for water trading, apart from where you have an irrigation entity, water entitlements and a policy on trading. Trading is already a possibility, although it's limited to the irrigation area and there is virtually no support for trading water outside the irrigation system district. So a lack of entities that are capable of trading is probably a significant hindrance in northern Australia in general." Geoff Strickland, CEO Ord Irrigation Co-operative.

"It's not the constraints it's the limitations...The more the droughts and the changing climate kicks in and the more the migration of agricultural interests

from south to north, especially cotton growers and horticultural people [and] the MIS [Managed Investment Schemes] schemes...The more they start to come up, the more political pressure that comes to bear on governments to trade water." Joe Ross, Chair of the IWPG

Interviewee's identified constraints both broadly to the establishment of water markets in WA, as well as those barriers unique to the tropical north of the state. Interviewees emphasised that constraints may vary from catchment to catchment, that there are differences between surface and groundwater, as well as between the water needs between different users (such as between hydro, mining, irrigation). Three general constraints to the establishment of water markets were identified in the north were: (1) economic, (2) land tenure issues, and (3) knowledge gaps.

Economic

"It's hard to identify the value of water when Governments are investing in the water infrastructure to support development. If you are serious about developing (northern Australian) regions you are talking about making major government investments. That's part of what's behind the recent WA and Commonwealth Government's investment commitments in the East Kimberley. Their aim is to put a whole lot more money into the region to make the East Kimberley a more viable region." Ian Loh, Senior Planner, Department of Water (WA)

The only region where the potential for water trading currently exists in northern WA is in the Ord Irrigation Scheme through the two-tiered Co-operative system, where according to interviewees no formal trading has occurred to date. The La Grange aquifer draft plan is being developed which will set the rules for trading. The Ord irrigation business model is predicated on growing fruit and vegetable in the off season as well as Managed Investment Schemes (incentive schemes to support forestry plantations) targeting domestic and export markets. However, there are significant costs of business, with transport and energy costs tightening margins. Some interviewees raised the point that there is significant competition from Asian producers which has downward pressure on prices, impacting the viability of certain crops and products in the Ord. Interviewees suggested that water charges and the price of delivering water reflect this situation. According to interviewees, the level of investment in the Ord in infrastructure (especially water storage and delivery infrastructure), as well as good soils mean that it is unlikely irrigation development is likely to occur outside the Ord without considerable government expenditure.

Despite the planned expansion of the Ord (and broadly the East Kimberley) through both Federal and State Government support, and the potential to be globally competitive, some interviewees identified additional constraints to water markets. For example the amount of irrigable land is relatively small in the Ord, with an interviewee, Geoff Strickland CEO Ord Irrigation, arguing that: *"The Ord irrigation area is 15,000 ha, you start comparing that to areas in the East and it's the size of one farm, the whole area is less than Cubbie Station, therefore you can't fit too many farmers in."* The size of the Ord Irrigation area imposes limitations on water markets with the number of users restricted. This creates a focus on the surrounding areas and also the NT to expand its part of the irrigation scheme. Another constraint is that there is competition in the water needs cycle with the hydroelectric scheme. Further, there

are risks in the regions such as natural disaster (which the Co-operative structure assists with self insurance through its sister asset co-operative) which may have a bearing on investment decisions.

Land Tenure

"...Trying to progress development in these areas [across northern Australia] is complex and difficult. Land tenure issues are particularly challenging given that the proposed development is usually on vacant crown land or pastoral lease. Native title and aboriginal heritage issues must be resolved and environmental approvals obtained. You have to work with government and aboriginal interests to get the investigations done, so that the necessary approvals can be sought and eventually gained. Underpinning much of the NWI was an assumption that irrigation land was available, water infrastructure was in place and further development would be limited. While water may be available, developing most new areas in WA, outside the south West, usually require resolution of these native title, land tenure, and environmental issues before development can proceed. There can be long lead times, if we don't know much about these issues when development planning commences." Ian Loh, Senior Planner, Department of Water (WA)

Interviewees emphasised that a significant part of land in WA is vacant crown land or pastoral, and dealing with that land requires significant process such as those prescribed under the Native Title Act. The development of Ord Stage 2, culminating in the Ord Final Agreement with native title holders represented by MG Corp took several years to come to fruition. The potential for establishing land based development outside towns where land is already scheduled, such as Kununurra, is highly constrained. Understanding how the Native Title Act interacts with water and the extent of native title rights are important issues and there are initiatives occurring in WA to help overcome this important knowledge gap.

Knowledge gaps

"There are perceptions that there is an abundance of water in the north. This may hamper whether markets become operational as there may be a perception that...trading shouldn't be required...An abundance of water doesn't [necessarily] translate to [more] water for consumptive use." Representative, Department of Water (WA)

Interviewees emphasised an awareness of the complex relationship between water and the broader environment. Creating a consumptive pool can have implications on biodiversity as well as socio-cultural impacts. Understanding surface and groundwater resources through scientific and technical assessment and minimising third party impacts through consultation and engagement with stakeholders requires significant expenditure. Interviewees underscored that once water plans are developed there is required an ongoing process of monitoring, particularly if the Department of Water seeks to achieve sustainable use of water resources. Across northern WA, there has been relatively little pressure on most water resources and the scientific understanding is generally not

sufficient. Departmental expenditure for planning and monitoring has been focused on the south West of the state where there are pressing supply issues. A draft allocation plan has been prepared in the La Grange aquifer south of Broome, a plan has been developed for the Ord and there is a Kimberley wide regional plan that sets the strategic parameters for water based development. However, several interviewees highlighted that existing knowledge of water resources in the north, in particularly groundwater, required more work to understand the extent of the resource and to define the ecological and cultural values present, before water markets can even be considered.

Groundwater is a significant component of water resources in Western Australia, including the north. Understanding groundwater, its draw points, flow and interaction with surface water, as well as the impact of extraction on ecological and cultural values requires significant investigation. Developing this knowledge is time and resource intensive, requiring fieldwork and modelling, and across the north there has insufficient resources devoted to this task and is not comprehensive. Further, there must also be a capacity to review modelling and update planning. For example, Ian Loh, Senior Planner, Department of Water (WA) talks of some of the challenges with groundwater water planning and management:

"Groundwaters were always assumed to have a large storage and they would respond fairly slowly to climate change, but some superficial aquifers have responded dramatically to low rainfall over the last 10 years [in the south West]. As our understanding of the ecosystems dependent on these superficial aquifers has improved, the need to provide for variable groundwater extraction rates has increased... Considerable knowledge of the groundwater system and the response of any dependent ecosystem during periods of drought are required to develop the appropriate restriction policies and drought management strategies. As you go down an NWI path of issuing perpetual licenses, the level of understanding of groundwater systems must be substantial. Our understanding of many groundwater systems, especially in the north, is very limited. This agency has been concerned about the push to issue long term licenses and effectively allow markets to reallocate rights, when the fundamental knowledge of the aquifer's behaviour is so limited. However, I don't think the pressure to trade groundwater entitlement has been very great to date, and has been very limited in the north of WA ..."

Managing groundwater presents many challenges for planners and developing trading in the context of groundwater is complex, particularly when the level of understanding of volumes of water available is incomplete. To trade in groundwater, proponents would have to undertake scientific assessments to reduce the potential for environmental impact. As land and water remain bundled, interviewees raised the difficulty of groundwater trading in such a system. The expense of developing infrastructure to trade would be prohibitive in most cases, unless there is the development of large scale projects such as to use a recent example a 'gas hub' which would increase demand for water significantly in a given location. Some interviewees described how individuals may be able to access a number of aquifers on their land, and there may be difficulty in identifying connected resources. Finally, some interviewees argued that while trading in groundwater may be a useful mechanism in allowing reallocation to highest and best use, the level of trading is likely to be restricted.

4.3.5 Summary

In each jurisdiction in northern Australia, interviewees identified a variety of constraints to the establishment of water markets which apply generally to the north. While each constraint may vary in importance from catchment to catchment, most of these barriers are interdependent and often rely on the potential for water based economic development in each region. The constraints raised by interviewees include economic barriers, knowledge gaps on the resource (which could impact sustainability), physical barriers (i.e. a lack of connectivity among rivers or reliance on groundwater), and community values and attitudes against water trading. In the NT, institutional and regulatory capacity at this formative stage in the development of markets was seen to be a barrier to the establishment of water markets. In WA, land tenure issues were seen to restrict the potential for water markets. In Queensland the broader institutional and regulatory framework in the north restricted the potential for water markets by prescribing low scale development in declared Wild Rivers high preservation zones (although it is acknowledged that there is currently little demand pressure on these systems). A summary of the constraints by jurisdiction is provided in Table 6.

Table 6: Summary of constraints to the establishment of water markets in jurisdictions in northern Australia and from a Commonwealth perspective

Commonwealth	NT	QLD	WA
Physical	Physical	Physical	Land tenure issues
Knowledge gaps	Knowledge gaps	Knowledge gaps	Knowledge gaps
Institutional and legislative framework	Institutional and regulatory capacity	Institutional and legislative framework	Economics
Political	Community attitude and values	Community attitude and values	
Economics			

Interviewees identified that physical limitations will create discrete markets that generally remain unconnected from other systems, but this is dependent on the economics and the value of the use (mining v irrigation). The costs of doing business are a major constraint in the progress of water based development in the tropical north and governments will need to play an important role to support economic development in the region (through investment in infrastructure and subsidies).

Knowledge gaps were viewed as being a constraint that research (some of which is occurring) can help overcome by bringing understanding on issues such as groundwater resources (i.e. actual reserves and interaction with surface water), ecological and cultural values. Such knowledge supports sustainable outcomes into the future but may be constrained by funding as more resources are focused on more urgent water issues in southern Australia.

Institutional and regulatory capacity in jurisdictions such as the NT offer constraints in implementing reform but the situation reflects the level of water based development in the jurisdiction. An institutional and legislative framework that constrains water based development in the north and hence the potential for water use (such as Wild Rivers) would require legislative change, but again there are a variety of other constraints that are more pressing according to interviewees, such as economic and physical barriers. Interviewees reflected that land tenure issues such as native title processes require a supportive framework between government, proponents and Indigenous groups, to facilitate agreements around water to improve outcomes for these stakeholders. Where communities have not engaged in water trading, community attitudes and values and political considerations were viewed as barriers to the establishment of institutional arrangements for water markets. But most interviewees argued that as communities see the benefits of trading this sentiment will diminish.

5. Conclusions

The institutional and regulatory framework that governs water allocations across the three jurisdictions have developed independently to meet the specific needs of each jurisdiction and are influenced by physical features, economic considerations, political climate, community attitudes, and the existing legal and institutional framework. While the potential for water markets is generally constrained, most interviewees identified that commitments made under the NWI have created a platform and an intent that is helping to drive the development of new institutions and regulation for managing water. Most interviewees argued that the development of these NWI-led institutional arrangements is likely to bring about improved water resource management in northern Australia, and that each State/Territory can decide what is important (in light of financial limitations) and implement reforms accordingly.

The argument that to successfully implement innovations such as water markets (in this case the NWI) there must be some consideration of features present in the particular institutional setting was contested by some interviewees. In this viewpoint, they argued that a common institutional approach as laid out in the NWI is optimal. However, several features in northern Australia were identified that would affect the institutional arrangements such as (1) seasonal climatic regime, (2) a low population (3) Indigenous representation and values, (4) unique land tenure regime and (5) for the foreseeable future, highly circumscribed economic development opportunities.

Interviewees stated that the need for water reform, especially in terms of water markets, is not a priority. However, interviewees also reflected that the NWI-led reform agenda is driving best practice (or at least improving awareness) in water planning, Indigenous access to water, water entitlement registers, accounting and metering. A common view was not to replicate a Murray-Darling Basin over-allocation of water, and instead adopt a precautionary approach to water planning and management – this reflects the findings in the north of Stoeckl et al. (2006) and Straton et al. (2006) who support a precautionary approach to planning and allocation to consumptive uses where systems are not well understood in light of the potential social and ecological risks. There was also a strongly held view by some respondents for Indigenous aspirations in both economic development and water management. The form of what this role should be and its implications for water markets is still being debated.

A variety of constraints to the establishment of water markets in northern Australia are primarily related to physical features (such as unconnected systems) which will create fragmented and discrete markets— this may create barriers to economic development. Some constraints, such as knowledge gaps can be overcome with sufficient time and resources. Other constraints such as community attitudes and values, that include concerns about the consequences of water trading, need to be answered and will require adequate community consultation.

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Appendices

Appendix 1: Map of study region



Appendix 2: Interview Questions

Interview Questions

The purpose of this phase of the research project is to analyse current institutional arrangements and constraints affecting the establishment of water markets across tropical Queensland, Northern Territory and Western Australia.

1. Is water trading possible in your State or Territory?
 - a. If so, have there been any trades in the northern region of your jurisdiction?
2. What has been your experience with the development of water markets and trading in the tropical north of your State or Territory? (i.e. North East Coast, Gulf of Carpentaria, Timor Sea Drainage Divisions)
3. Does your Government have formal policy/ies on water trading?
 - a. Is there policy for water markets and trading specifically for the tropical north of your State/Territory?
4. Do other stakeholders have policies or just advocacy positions?
5. In establishing water trading and markets in northern Australia are there particular factors and needs to be taken into account?
 - a. If so, how have institutional and regulatory arrangements been adapted to the needs of these regions?
 - i. Do you think these adaptations are adequate? Why?
 - ii. If no, in your opinion what other factors should be taken into account?
 - b. Have you drawn any lessons from the Murray Darling Basin water market?
6. Is your jurisdiction meeting NWI obligations for the introduction of water trading?
 - a. In your opinion, how does your jurisdiction compare to other jurisdictions in northern Australia in implementing the market-based reforms expected by the NWI?
 - b. Are there particular circumstances that have affected the pace of water market establishment in your jurisdiction?
 - c. Do you have performance indicators or any other metrics to evaluate your progress in meeting the water reform agenda?
7. From a government perspective, are there factors that presently constrain the establishment of water markets in the tropical north of your State/Territory? If so, what are these constraints/barriers?
 - a. What actions have been taken by State/Territory government and relevant authorities to overcome these barriers?

- b. Has the Commonwealth played a role in overcoming constraints?
- 8.** Are there any inter-basin trading and/or cross-border issues in relation to water trading in your jurisdiction?
 - a. Does your jurisdiction consider trading out of basins to be unacceptable, or is restricting this viewed as a constraint on trade?
- 9.** What do you regard to be the most effective method of regulating water trading in northern Australia?
 - a. Would you consider the implementation of exit fees on the sale of water entitlements as a legitimate or useful method of regulating water trading?
- 10.** In your State/Territory, what is the role of mining-related water access and use within the NWI framework?
- 11.** What non-market methods of water allocation exist in urban, rural and remote areas?
 - a. How do you think these compare with market-based mechanisms?
 - b. Would native title customary rights under s211 of the NTA fall into such a category?
- 12.** What are the implications of water markets for Indigenous people in tropical northern Australia?
 - a. How do you see the involvement of Indigenous interests in the water allocation process?
 - i. Are there formal consultative mechanisms to incorporate Indigenous stakeholders in planning and policy development?

Appendix 3: List of Interviewees

Interviewees	Department/Role	Date and Time of Meeting	Location
Peter Whitehead	NRETAS	16th Feb 10 am	Darwin
Ian Lancaster	NRETAS	16th Feb 3 pm	Palmerston
Anon.	NRETAS	27th Feb 10 am	Darwin
Robbie Dalton	Northern Land Council	4th March 10 am	Darwin
Tom Crother, Aaron Stasi, Paul Hausler	DERM QLD	9th March 9:30 am	Brisbane
Scott Buchanan	DERM QLD	9th March 11am	Brisbane
Randall Cox	DERM QLD	9th March 12:30 pm	Brisbane
Anna Stratton	CSIRO	10th March 11 am (EST)	Phone
Anon.	Sunwater	10th March 2 pm	Brisbane
Seamus Parker	Council of SEQ Mayors	12th March 10 am	Brisbane
Terry Piper	Balkanu Enterprise Development Corporation	17th March 10:30 am	Cairns
Anon	DERM QLD	18th March 9 am	Cairns
Carolyn Hills and Ian Loh	Department of Water (WA)	23rd March 11:00 am (WST)	Perth
Gary Kairn	Kimberley Land Council	31st March, 9 am	Broome
Dave Munday	Department of Water (WA)	31st March 2 pm	Broome
Paul Lane and Howard Pedersen	Kimberley Institute	31st March 3 pm	Broome
Gary Scott	Environs Kimberley	1st April 4 pm	Broome
Joe Ross	Chair IWPG and NALWT	2nd April 4 pm	Broome
Geoff Strickland	CEO Ord Irrigation Co-operative	6th April 9:30 am	Kununurra
Des Hill and Sonia Leonard	MG Corporation	6th April 10 am	Kununurra
Anon	Department of Water (WA)	7th April 3 pm	Kununurra
Anon	Department of Water (WA)	8th April 9 am	Phone

Murray Radcliffe, Will Fargher, Wilf Finn	National Water Commission	15th April 10 am	Canberra
Chris Guest	DEWHA	15th April 2 pm	Canberra
Brendan Edgar	Consultant LWA	15th April 3 pm	Phone
Richard McLoughlin	DEWHA	16th April 9 am	Canberra
Isabelle Arnaud	DEWHA	16th April 12 pm	Canberra
Anon	Water Policy Specialist	21st April 3pm	Phone
John Childs	DRMAC and TRaCK	21st April 3:40 pm	Phone
Jim Donaldson	LWA	22nd April 12 pm	Brisbane
Nolan Hunter	Kimberley Land Council	23rd April 3 pm (CST)	Phone
Gayle Milnes	DEWHA	29th April 2pm (CST)	Phone
Ed Hauck	Department of Water (WA)	30th April 10:30 am (CST)	Phone