

*Environmental Flows in the
Murray-Darling Basin*

Market Based Governance
Public Institutional and Legal Reform

By

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Submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy
of the Australian National University
November 2014



THE AUSTRALIAN NATIONAL UNIVERSITY

Environmental Policy in the Advisory Executive Branch

Market Based Governance Public Institutions and Legal Reform

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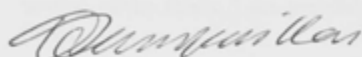
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Candidate's Declaration

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



Vinoli Thampapillai

Date:

March 2014

Acknowledgements

I am most grateful to my supervisor Prof. Neil Gunningham for his expert supervision and support for throughout the research and writing of the thesis.

I wish to thank Prof. Stephen Dovers for his guidance and support during the research and writing of the thesis. I am grateful to Prof. Quentin Grafton for his thoughtful advice on the thesis.

I wish to thank the staff of the Fenner School of the Environment and Society, ANU for their generous support and encouragement. I owe a special thanks to Ms Amy Chen for her administrative support. I am grateful to the Fenner School of Environment and Society for funding the qualitative interview research.

I wish to thank the former Murray Darling Commission and Murray Darling Basin Authority for their kind assistance in providing networks to conduct interviews in the Murray Darling Basin. I wish to express deep gratitude to the National Farmer's Federation and the Farmer's Federation of Victoria, NSW and Queensland for their valuable assistance. I am most grateful to the individual irrigators and government officials who kindly provided their valuable time and shared their important thoughts on the research.

I most grateful for the supervisory expertise and generosity of Prof. Ben Boer, Prof. Mary Crock and Prof. Terry Carney at the University of Sydney Law School, where this research first commenced. I am most grateful to the University of Sydney for the provision of scholarship funding to facilitate the initial comparative legal analysis. I am most grateful to Professor Bo Ohlmer, Swedish University of Agricultural Sciences, Uppsala, Sweden, Dr Lars Drake, Kemi, Stockholm, Sweden for facilitating comparative law research. I am most grateful to the late Prof. Staffan Westerlund, Faculty of Law, Uppsala University for his thoughtful comments on the research work. I am most grateful to Mr Anders Bernzell, former Executive Director of the Stockholm Water Institute for valuable comments made upon the research.

I am indebted and most grateful to Professor Michael Trebilcock, Faculty of Law, University of Toronto, Canada for introducing me to school of New Institutional Economic theory, which is the main analytical method applied in this dissertation.

I am deeply indebted and most grateful to my family for their love and support through the doctoral research.

Abstract

The Murray Darling Basin (MDB) is a major irrigated agricultural region known as the food bowl of Australia. Over-allocation of water rights to irrigation in the MDB has mimicked a tragedy of the commons and has led to the degradation of the ecosystem of rivers in the basin. Competition between environment and agriculture is at the heart of the problem. As water in the river systems is semicommon, where private and common rights coexist and interact due to the fluid nature of the resource, employing an exclusion strategy is difficult. Hence governance is central to the management of the river system to ensure ecosystem resilience. The key governance solutions to this problem employed by the Commonwealth government are the use of the water market to reconfigure water from irrigation to the environment, and use of the Federal *Water Act 2007* to harmonize water planning across the transboundary river system which extends over four states and one territory.

There exists ongoing disappointment in current market based, legal and institutional policy in the Murray Darling Basin articulated by irrigators and State governments. Significant resistance to the government water buyback program has been expressed by irrigators and the upstream state governments. The governments of Queensland and New South Wales waited until February 2014 to sign the agreement for implementation of the MDB Plan which entered into effect in November 2012. Agreement was secured after the Federal government agreed to legislate to cap buybacks at 1500GL. As of February 2014, 1200 GL (long term average) of the 2750 GL required for the environment has been acquired by government due to resistance by upstream states and irrigators.

There is an absence of comprehensive treatment of the water governance problem. Therefore this research examines the limitations of the water market, water law and public institutions to address the identified problem in the MDB. A combination international comparative water law, a qualitative survey of 41 irrigators, conducted across four jurisdictions of the MDB, documentary analysis is employed in the research, viewed through the lens of New Institutional Economics. This dissertation is concerned with two central research questions pertaining to water governance structures for addressing over-allocation and the delivery of environmental flows to build ecosystem resilience in the Murray Darling river system. The research questions are articulated as follows:

- (i) What are the limits of market based water governance expressed as water buybacks, as a means of reconfiguring private water rights toward environmental flows in the Murray Darling river system for building ecosystem resilience?
- (ii) Which public institutional and legal reforms are necessary to resolve the conflict between environmental and socio-economic uses of the Murray Darling river system in order to maintain ecosystem resilience?

The analysis of the research highlights three central limits to the use of water markets for the reconfiguration and efficient management of environmental flows by the Commonwealth Environmental Holder. Through examination of bounded rationality articulated in New Institutional Economics Theory, three interrelated limits were identified namely, the endowment

effect, free rider effect, and lack of a transition economy to overcome the contraction of the rural economy caused by reduction of irrigation activity. This dissertation is one of the few to demonstrate the presence of an endowment effect in the real world setting, outside an experimental setting. The endowment effect refers to the initial assignment of property, the effect of which has been shown to place a limitation on trading activity in numerous contexts. This occurs because the willingness to accept (WTA) payment to relinquish property owned, far exceeds the willingness to pay (WTP) to acquire the same property. The endowment effect tied to the free rider effect can be addressed by a sustainable rural economic transition strategy. Lack of viable, alternate economic development has proven to be a problem in rural and regional Australia. This dissertation highlights the importance of investment in training, research and innovation in Information Communication Technology (ICT) in the MDB as a transition strategy attached to water policy. New Institutional Economics theory informs of the importance of institutional linkages for the achievement of transition economy goals between the MDBA and relevant government departments, including Treasury, Finance, Communications, Education, Employment and Training, and AUSTRADE. These institutional linkages have the potential to convert the economy dependent on agriculture to a knowledge economy over a period of two decades. This transition has the potential to reduce the level of youth migration from the rural sector to the urban sector, increasing the possibility of service sector expansion. At every major stage of water reform in the MDB to reduce over-extraction, from the 1994 cap and trade system, to the 2004 National Water Initiative to the *Water Act 2007*, a sustainable rural economic transition strategy has been repeatedly missed by successive governments. However State governments post-2011 have very belatedly commenced raising the matter of structural adjustment repeatedly in negotiations with the Federal government following vocal protests by irrigators.

This dissertation also highlights limitations of water law and public institutions which include the absence of effective conflict resolution rules, mistrust in government management of water, mistrust in government institutional capacity, inadequate information flow and lack of clarity over property rights and compensation rules. Reform proposals therefore concern inclusion of conflict resolution provisions at the daily operational level and the Federal and State level. Daily operation rules adapted for the MDB focus on ongoing cooperation between heterogeneous users at the regional level to minimize conflict. At the Federal and State level the reform model proposes modification of the “no significant harm rule” articulated in international law, to include cost-benefit analysis rules and compensation rules. This dissertation proposes inclusion of the substantially modified “no-significant harm” rule as an amendment to the *Water Act 2007*. The aim of the no significant harm rule is to ensure all parties consider the impact of their actions upon other stakeholders and to promote respectful dialogue between parties. The model proposed sought to address key concerns pertaining to institutional bias, valuation methods and mechanisms to address harm to the rural economy. Inclusion of the modified “no significant harm rule” holds the potential to improve cooperative negotiations between State and

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CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

The Murray-Darling Basin (MDB) spanning four states (Queensland, New South Wales, Victoria, South Australia) and one territory (Australian Capital Territory), is known as the food bowl of Australia, and is dominated by irrigated agriculture. The transboundary Murray-Darling River system which supplies this Basin is comprised of the Darling River system in the north and the Murray River system in the south. The river system is characterized by droughts and floods, which climate scientists fear will be heightened by climate change. The most recent prolonged drought was termed the millennium drought and lasted between 2001 and 2010. Drought conditions have re-emerged in 2014 in Queensland, northern New South Wales and South Australia.¹

Over-allocation of water entitlements for economic use, mostly for irrigated agriculture, has led to serious environmental degradation of the water resources of the MDB. Evidence of environmental degradation was unambiguous during the millennium drought, creating alarm regarding the long term viability of the river system. The *Water Act 2007* (Cth) was enacted to address environmental concerns in the MDB as previous water governance measures between 1994 and 2007 failed to deliver reasonable outcomes. The Murray-Darling Basin Authority (MDBA) was established by the *Water Act 2007*. The MDBA estimated that the baseline diversion limit (BDL) representing the current level of extraction with reference to the base year 2009, is 13 623 GL per year. The MDBA set the environmentally sustainable diversion limit (SDL), at 10 873 GL per annum, to be achieved by 2019. This requires a reduction in water consumption of 2750GL per annum across the basin to deliver environmental flows. Environmental flows are artificial flood events mimicking natural flood events designed to improve the quantity and quality of water flows in the river. The contraction of water available for

¹ Bureau of Meteorology, Rainfall Deficiencies increase in Queensland and New South Wales and South Australian, Press Release, 4 February 2014.

economic uses leads to conflict between users, representative State governments and the Federal government.

Two measures are employed to recover water for environmental flows under the *Water Act 2007*, namely water buy backs from willing sellers and from water savings through on-farm infrastructure improvements. Approximately \$9 billion has been assigned by the Commonwealth government to recover water for environmental flows through these two measures. Water buybacks, are a quarter of the cost of on-farm infrastructure and deliver long term benefits for the river system by reducing over-allocation. On-farm infrastructure improvements involve no reduction in water consumption, however minimize water leakages. An agreement exists to provide fifty percent of the water saved through minimization of leakages to government environmental managers. Therefore, irrigators prefer on-farm infrastructure improvements over water buybacks. There is substantial resistance from irrigators and some MDB States to the water buyback program.

1.2 THE THESIS RESEARCH QUESTIONS

This thesis is concerned with two central research questions pertaining to water governance structures for addressing over-allocation through delivery of environmental flows to build ecosystem resilience in the Murray-Darling Basin. The research questions are articulated in the following manner:

- (i) What are the limits of market based water governance expressed as water buybacks, as a means of reconfiguring private water rights toward environmental flows in the Murray-Darling river system for building ecosystem resilience?
- (ii) Which public institutional and legal reforms are necessary to resolve the conflict between environmental and socio-economic uses of the Murray-Darling river system in order to achieve and maintain ecosystem resilience?

This research seeks to comprehend the interaction between legal, economic and cultural factors impacting the water crisis in the MDB. To achieve this goal the thesis combines new institutional economics, international comparative law and a qualitative survey of 41 irrigators. The qualitative survey method is articulated in Chapter Three.

New Institutional Economics (NIE) highlights the importance of institutions and individual mental models of key stakeholders to delivering sustainable development. The qualitative survey method using a sample of 41 irrigators across four jurisdictions is combined with new institutional economics theory to facilitate in-depth exploration of the bounded rationality of stakeholders, relevant to the function of institutions. In this manner NIE, as articulated below, builds on neo-classical economics to better reflect reality. The Murray-Darling Basin is a transboundary river system involving transboundary conflicts. The international comparative law method permits exploration of conflict resolution reform options applicable to a transboundary river basin with reference to the *Convention on Non Navigational Uses of International Watercourses, 1997* (herein *UN Watercourses Convention 1997*). In this thesis the no-significant harm rule contained within the *UN Watercourses Convention 1997* is substantially expanded to address transboundary conflict in the MDB. The theoretical and mixed methodology treatment of the MDB employing New Institutional Economics and International Comparative law is required to comprehend and address the complexities of the MDB. These are combined with the qualitative survey method to develop comprehensive policy proposals.

Water governance in the MDB has been extensively researched nationally and internationally.² However, a comprehensive approach to institutional reform, addressing the limits of the market and the inadequacies of the law in the MDB is absent.

1.2.1 THESIS ARGUMENT, RESEARCH SURVEY AND NEW INSTITUTIONAL ECONOMICS THEORY

This research first argues that there exist inherent limitations to water buybacks, as a means of reconfiguring private water rights toward state owned environmental water, and second, that these limits imply the need for institutional reforms to increase the

² Daniel Connell and Quentin Grafton (Eds), *Basin Futures: Water Reform in the Murray-Darling Basin*, ANU EPress, 2011; John Quiggin, Thilak Mallawaarachchi and Sarah Chambers, *Water Policy Reform in the Murray-Darling Basin*, Edward Elgar, 2012; Lin Crase, *Water Policy in Australia: The Impact of Change and Uncertainty*, Resources for the Future, 2011; John Langford, John Briscoe, Nathan Taylor (Eds), *"Crisis and Opportunity: Lesson of Australia Water Reform – Volume 1*, CEDA, Harvard, Uniwat, Victorian Department of Sustainability and Environment, 2011.

willingness to sell water to government to facilitate its management of environmental flows.

To address the first research question as articulated in section 1.2 an in-person qualitative survey was undertaken in 2008-09 at the height of the millennium drought, to examine the factors inhibiting irrigator willingness to sell water to government buyers in the Murray-Darling Basin. The qualitative data is analyzed with reference to New Institutional Economic theory, discussed in detail in the section below. The detail of survey method is discussed in Chapter Three. This thesis argues that the endowment effect, tied to the free rider effect and central concern for the rural economy adversely limit the success of the environmental water buyback program. These concepts are articulated in detail in chapter two. An economic transition strategy to be embedded in water policy and law using institutional linkages is proposed as a solution. The potential of ICT as a possible economic transition strategy is briefly discussed.

As the subsequent legal and government institutional mechanisms introduced in 2007 and 2008 have not provided adequate measures to resolve conflict between competing environmental and socio-economic uses of water in the Murray-Darling Basin, the qualitative survey also sought responses to determine viable institutional reforms for reshaping the law for conflict resolution between competing heterogeneous water users. In doing so it sought to address the second research question articulated in section 1.2. A particular focus was on elements of a proposed substantially amended “no-significant harm” conflict resolution rule, which is examined in some detail in Chapters Two and Six of the thesis. The proposed no-significant harm rule emanates from framework international water law provisions, adapted for the specific conditions of the MDB.

1.2.2 NEW INSTITUTIONAL ECONOMICS (NIE)

The theoretical framework adopted to analyze the data emanating from the two research questions is New Institutional Economics (NIE). NIE was founded by Ronald Coase, and subsequently developed by Douglass North and Oliver Williamson. Ronald Coase (1991) in his Nobel Prize lecture observed that neoclassical economics has focused

on prices and output articulated in price theory.³ Coase states that neo-classical economics has ignored “the working of the economic system” which is termed the institutional structure of production. Coase also observed, that from the time Adam Smith published the *Wealth of Nations*, economists have been focused on refining this work, in which prices coordinate the economy through the forces of demand and supply. In this model regulation and centralized planning are rejected.⁴

In neo-classical economics “competition through a system of prices coordinates the economy”.⁵ However Coase observed that within firms, management, which is also a factor of production, is required to coordinate economic activity. Coase asked why is management needed “if the pricing system provided all the coordination necessary?” Coase observed the presence of costs associated with the use of the pricing mechanisms espoused by neo-classical economics. These costs include information costs (an example includes obtaining information on prices), “negotiations to be undertaken, contracts to be drawn up, inspections to be made, arrangements to be made to settle disputes and so on”.⁶ These costs were not addressed in standard neoclassical economic theory, which assumed that such costs were zero. Coase was the first to introduce these costs to the centre stage as transaction costs in 1932, and his analysis of such costs subsequently earned him a Nobel prize in 1991.⁷

Coase (1991) highlighted the example of events in Eastern Europe, after the collapse of communism and the transition toward a market economy. Coase observed that this transition was impeded by a lack of appropriate attention to the institutions required to support a market economy. Coase states that lowering transaction costs to achieve economic efficiency requires planning and management, and cannot be left to the market

³ Ronald Coase, *The Institutional Structure of Production*, Nobel Prize Lecture, 1991.

⁴ *Ibid.*

⁵ *Id.*

⁶ *Id.*

⁷ First presented by Ronald Coase in a lecture at the University of Dundee, published subsequently, in Ronald Coase, *The Nature of the Firm*, (1937) 4(16), *Economica*, 386-405.

alone. For example the introduction of contract law which provides standard contractual forms that can reduce transaction costs attached to legal drafting. Coase's insights into transaction costs lead to advancements in organizational economics (the study of internal transactions within the firm as an organization) and new institutional economic analysis.⁸ NIE recognizes that institutions exist to reduce the transaction costs which impede economically efficient market outcomes and that they incorporate a theory of institutions - laws, rules, customs and norms - into economics", extending neo-classical economic theory.⁹ While NIE retains the assumption of scarcity and perfect competition, the assumptions of rationality, perfect information and zero transaction costs central to neo-classical economics, are abandoned to better reflect reality.¹⁰

Menard and Shirley (2011) document the presence of two central branches of NIE (Figure 1.1).¹¹ The first branch, led by Nobel prize winners Ronald Coase (1991) and Oliver Williamson (2009) concerns transaction cost economics (TCE) and involves the study of firms and micro-economic decisions to make or buy goods and services. The second branch developed by Nobel prize winner Douglass North (1993) pertains to the impact of institutions on the larger question of economic development. North and others, questioned the neoclassical economics assumption that economic development was determined by endowments, human capital and technological growth alone, and argued that institutions and the role of state also matter. The second branch of NIE intersects with the first branch of NIE in the study of how institutions reduce transaction costs to improve overall economic development.¹² As Coase (1991) explains "*if the costs of*

⁸ Claude Menard and Mary Shirley, *New Institutional Economics: From Early Intuitions to a New Paradigm?*, Working Paper 8, Ronald Coase Institute, 2012 at 8.

⁹ <http://www.coase.org/newinstitutionaleconomics.htm> (viewed 26 November 2013); See also Douglas North, *New Institutional Economics and Development*, JR Commons Lecture American Economics Association Meeting, January 1992 at 1; Douglass C. North, *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, 1990.

¹⁰ <http://www.coase.org/newinstitutionaleconomics.htm>

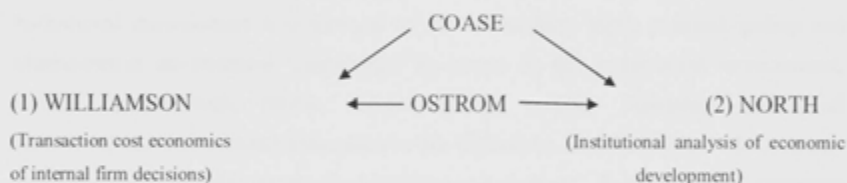
¹¹ Claude Menard and Mary M. Shirley, *The Contribution of Douglass North to New Institutional Economics*, Claude Menard and Mary M. Shirley (Eds) in *Economic Institutions, Rights Growth and Sustainability: the Legacy of Douglass North*, Cambridge University Press, 2011 at 3-4; *Supra* note 8.

¹² *Ibid* at 3-4.

making an exchange are greater than the gains that exchange would bring, that exchange would not take place and the greater production that would flow from specialization would not be realized".¹³ That is transaction costs can determine the structure of the whole economy, by guiding which goods and services are produced. The second branch of NIE extends beyond consideration of transaction costs. A central focus of the second branch of NIE also concerns how property rights and enforcement of contracts affect economic development.

Nobel prize winner Elinor Ostrom (2009) further extended Coase's work by demonstrating that costs of negotiation can be overcome through collective action by small close knit groups to manage common pool resources.¹⁴

FIGURE 1.1 BRANCHES OF NIE



Source: adapted from Menard and Shirley (2011 and 2012)

Definition of Institutions

It is important to provide a more precise definition of the term “institution” within the framework of New Institutional Economics, as distinct from the common usage of the word, meaning organizational body. The most widely accepted definition of institutions

¹³ *Supra* note 3.

¹⁴ Elinor Ostrom, A Polycentric Approach for Coping with Climate Change, *World Bank Policy Research Working Paper*, 2009.

in the literature encompassing market, legal and other public sectors, is articulated by North (1990, 1992).¹⁵

North (1990, 1992) defined institutions as “the rules of the game of society or more formally, the humanly devised constraints that structure human interaction”. It is further argued by North that the rule of law as an institution, involving respect for civil and political rights, is required for long run economic growth. There are three components of institutions identified by North (1990, 1992).¹⁶

- (i) “formal rules (constitutions, statute law, common law, regulations)
- (ii) Informal constraints (conventions, norms of behaviour and self imposed code of conduct)”,
- (iii) Enforcement mechanisms applied to both formal and informal constraints.

In the field of NIE it is also important to understand that the institutional environment (IE) is distinguished from institutional arrangements (IA). Shah (2005) observes that the institutional environment is comprised of the overarching legal, political, policy and administrative environment, constructed by actors in the institutional environment, namely “governments, NGOs, donors, policy makers, legislators and local administrators”. Institutional arrangements are defined by Shah (2005) as “*the humanly imposed rules in use that govern the behaviour and dealings*”. Institutional arrangements can only succeed if nurtured by the institutional environment.¹⁷ This distinction is important from a reform perspective in order to analyze how institutional arrangements and the institutional environment affect each other.

¹⁵ *Supra* note 9.

¹⁶ *Ibid.*

¹⁷ Tushar Shah, The New Institutional Economics of India's Water Policy, *African Water Laws: Plural Legislative Framework for Rural Water Management in Africa*, 26-28 January 2005, Johannesburg, South Africa.

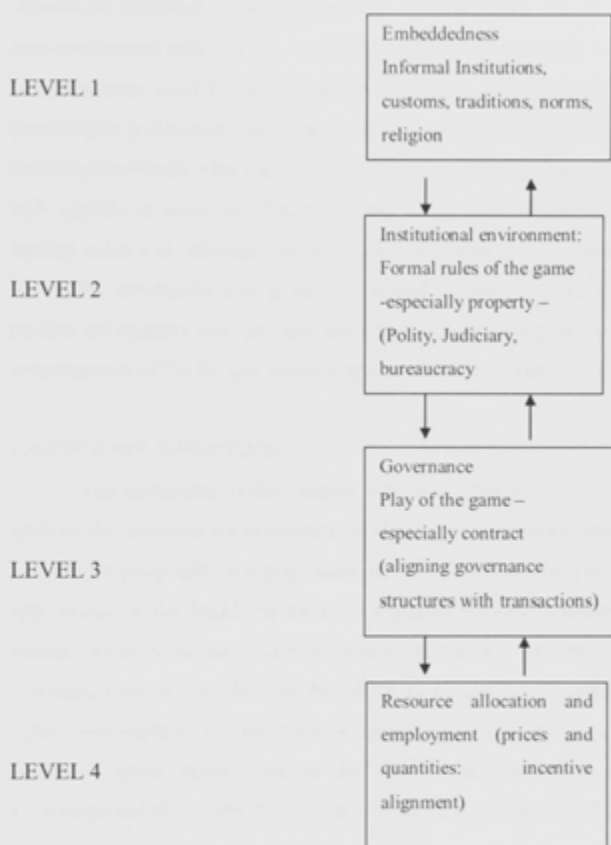
Williamson (2000) articulated four levels of new institutional economic analysis (Figure 1.2).¹⁸ The first level houses norms, customs, mores and traditions, referred to as social “embeddedness”. These informal institutions are most often slow to change. At the second level sits the institutional environment. The institutional environment is comprised of the executive, legislature, judiciary and bureaucracy, responsible for constructing formal rules. The third level concerns transaction cost economics and governance through contract law. The fourth level is concerned with resource allocation, prices and output, the domain of neo-classical economics.

The informal cultural, social, economic and political norms embedded in level one determine the decision making patterns of individuals and the likelihood of adherence to formal rules established by the institutional environment at level two. Hence in recognizing that individual rationality is varied or limited, the study of the individual mental model on the achievement of economic development is very important in new institutional economics.¹⁹

¹⁸ O. Williamson, The New Institutional Economics: Taking Stock, Looking Ahead, (2000) 38 *Journal of Economic Literature*, 595-613 at 596-600.

¹⁹ *Supra* note 18; *Supra* note 9; see also Douglass North, Institutions and the Performance of Economies over Time, in C. Menard and. M Shirley (Eds), *Handbook of New Institutional Economics*, Springer, 2005.

FIGURE 1.2 LEVELS OF INSTITUTIONS



Source: Oliver Williamson (2000)

This dissertation is concerned with institutional reforms for the achievement of sustainable development of water resources in the MDB. Sustainable development in the MDB involves reconfiguration of property rights in water primarily from irrigated agriculture toward the environment through the water market and water law. This research argues that there are inherent limits to the reconfiguration of property rights in water toward the environment via the market. This dissertation further argues that the

existing water law is incomplete with respect to conflict resolution and absence of substantial inclusion of socio-economic considerations. An in person qualitative survey was constructed based on the concepts of NIE with reference to levels one, two and three of institutional analysis as set out above (Figure 1.2). The qualitative research questions constructed in this study and analysis of data are focused on the second branch of NIE led by Douglass North which examines the impact of institutions on economic development. NIE applied to water involves the study of the role of formal law, formal and informal market rules and informal norms on the achievement of sustainable development. The scope for investigation is greatly enhanced by relaxing the assumptions of rationality, perfect information and zero transaction costs. Hence it provides opportunity for rigorous investigation of the factors which impact the success water policy reform.

1.3 CHAPTER OVERVIEW

The remainder of this chapter will be divided into seven sections. Section 1.4 will address the concepts of ecosystem resilience and environmental flows. Section 1.5 will present the geography and population of the MDB. Section 1.6 will discuss the economic importance of the MDB. Section 1.7 explains the environmental concerns in the MDB arising from economic activity, which is mainly irrigated agriculture. Section 1.8 conceptualizes the conflict in the MDB as one of environmental rights versus human rights, and explains the need for governance and defines water governance. Section 1.9 discusses water governance in the MDB and difficulties in recovering water for environmental flows. The final section presents the structure of the thesis.

1.4 ECOSYSTEM RESILIENCE AND ENVIRONMENTAL FLOWS

The hydrological cycle delivers water to rivers from rainfall runoff, seepage and snowfield or glacial melt. Water in rivers is lost through evaporation or via percolation to groundwater systems. The quantity and quality of natural river flow is determined by the relationship between this system of gains and losses. The rate of river flow is in turn dependent on the gradient of the land, which also impacts water quality, by determining the rate at which toxins are flushed from the river system.

As water is essential for human life, and also for social and economics uses, the extraction of water by humans is inevitable, causing disruption to the natural flow of river systems. The construction of dams and weirs to support economic development has adverse ecological consequences associated with the creation of barriers to the flow of rivers. This includes the inability of fish species and aquatic invertebrates to migrate, leading to a reduced level of genetic mixing.²⁰ The reduced gene pool affects the long term viability of the species. Releases of water from dams can reduce the temperature at the lower strata of the river water, adversely impacting native fish breeding.²¹ Water bird breeding in wetland habitats is also adversely impacted by structural impediments to river flow. The construction of dams upstream for irrigation, disrupts seasonal flow. Variations between high flows and low flows, part of natural river system, permit sunlight to reach certain levels of the river during low flow periods supporting biodiversity. Structural barriers impede these natural variations and furthermore, rules permitting water extraction only during high flow periods do not account for ecosystem needs attached to high flows.²² For example aquatic plant life depends on a natural pattern of wetting and drying. The absence of flood events or the presence of inappropriate flood events associated with man-made barriers and releases can also lead to tree death. This will destabilize riverbanks and may lead to erosion.

Extensive extraction of water from rivers for human use depletes water that would otherwise nurture wetland systems, which are an integral component of a sustainable river system. Wetlands deliver important ecological services, which include water purification, flood protection, shoreline stabilization, groundwater recharge and stream flow maintenance.²³ Water travels to wetlands via run off. Wetlands trap and bury excess

²⁰ Terry Hillman, *Ecological Requirements: Creating a Working River in the Murray-Darling Basin*, in Lin Crase (Ed), "Water Policy in Australia: The Impact of Change and Uncertainty", Resources for the Future, 2011 at 128.

²¹ *Ibid.*

²² *Id.*

²³ Department of Ecology, Washington State, *Function and Values of Wetland*, http://www.ecy.wa.gov/programs_sea/wetlands/functions.html (viewed 16 June 2012); Rafik Hirji and

sediments, nutrients and other pollutants, acting like a sink. Large aquatic plants present in certain riparian wetland areas purify water by removing micro-organisms and pollutants, operating as a filtration system.²⁴ The removal of excess nutrient from the river system prevents algal blooms which cause oxygen depletion in the water, harming fish stocks and other aquatic life. Once toxins are buried, wetland soils must be managed to ensure that the toxins do not re-enter the aquatic system. Wetlands offer flood protection of a supplementary nature by holding storm water. Plants within a wetland also bind root systems to the soils, acting as a buffer against water flows, protecting the shoreline of rivers.²⁵ Ground water recharge can also occur through wetland systems. The movement of water between groundwater and surface water systems via wetlands contributes to water quality and ecosystem structure.²⁶ Groundwater may be released into the stream flow during periods of low flow via wetlands depending on the nature of the hydrological interconnections.²⁷ Wetlands also provide a habitat for water birds, fish and numerous other species of plant and animal life, important to the maintenance of the food chain. Dams, weirs and other water infrastructure disrupt river flows and interfere with the natural ecosystem equilibrium.

Delivery of environmental flows seeks to remedy these man-made disruptions to river flow. Environmental flows concern management of the quantity, quality and timing of water flows in river systems to maintain the health of the river and interconnected

Richard Davis, *Environmental flows in Water resources Policies, Plans and Projects: Case Studies*, Environment Department Papers, The World Bank Environment Department, April 2009 at 2 and 3.

²⁴ Department of Ecology, Washington State (viewed at 16 June 2012), *Supra* note 23; R.B.E Shutes, Artificial wetland and water quality improvement, (2001) 26 *Environmental International*, 441-447 at 441; Robert Evans, J. Gilliam and J. Lilly, *Wetlands and Water Quality*, North Carolina Cooperative Extension Service, June 1996.

²⁵ Department of Ecology, Washington State (viewed at 16 June 2012), *Supra* note 23.

²⁶ Marios Sophocleous, The Science and Practices of Environmental Flows and the Role of Hydrogeologists, (2007) 45(4), *Groundwater*, 393-401 at 394.

²⁷ Department of Ecology, Washington State (viewed at 16 June 2012), *Supra* note 23.

ground water systems for sustainable use.²⁸ The International Union for the Conservation of Nature (IUCN) defines environmental flow as “the water regime provided within a river, wetland, or coastal zone to maintain ecosystems and their benefits where there are competing water uses and where flows are regulated”.²⁹ Neglecting environmental flows can threaten the very existence of the river system. Delaying implementation of environmental flows can impose significant social costs, such as increased salinity, dangerous algal blooms, extinction of certain species of fish and water birds, and result in insufficient water for food and drinking. That is, a loss of ecosystem resilience.

Environmental flows seek to mimic natural flooding events to deliver ecosystem resilience.³⁰ Ecosystem resilience is the capacity of the ecological system to “withstand shocks and disturbances, and rebuild itself” after the shock has ended.³¹ An ecosystem is regarded as resilient when many species are present to perform the same ecosystem service function to guard against shocks, as opposed to vulnerable state of reduced biodiversity.³² In the absence of ecosystem resilience the harm to the ecosystem is irreversible, as the reduced biodiversity no longer provides a buffer to deliver the necessary ecosystem services, when one or more species is lost. A simple example of an ecosystem service is the consumption of algae by several species. When biodiversity is lost the harmful algae will flourish. It has been observed that ecosystems with low resilience generate ongoing ecosystem services until subsequent shocks create irreversible damage once a critical threshold is reached.³³

²⁸ Megan Dyson, Ger Bergkamp and John Scanlon, *Flow – The Essentials of Environmental Flows*, Water and Nature Initiative of the IUCN, 2003; Rafik Hirji and Richard Davis, World Bank (2009), *Supra* note 23.

²⁹ Dyson, Bergkamp, Scanlon (2003) *Ibid* at 2.

³⁰ IC Overton, Colloff, MJ Doody, TM Henderson, and SM Cuddy, *Ecological Outcomes of Flow Regimes in the Murray-Darling Basin*, National Research Flagship water for a Healthy Country, CSIRO, 2009

³¹ Swedish Ministry of the Environment, *Resilience and Sustainable Development*, A report for the Swedish Environmental Advisory Council (www.ima.kth.se/utb/mj2694/pdf/Resilience.pdf viewed 25-3-2013); Carl Folke et al., Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations, (2002) 31(5) *Ambio*, 437-440.

³² *Ibid.*

³³ *Id.*

Management of environmental flows by definition seeks to optimize ecological, economic, and social outcomes. This is a complex task. When seeking to deliver environmental flows, measurable targets must be set. Determining such targets relies in part, upon good science but scientific uncertainty is prevalent in this regard and can often delay decision making on river rehabilitation. Several scientific methods and approaches exist for determining environmental flows, which are beyond the scope of this thesis.

Environmental Flows and Sustainable Development

Environmental flows by definition must balance ecosystem and socio-economic needs and are to be distinguished from the natural flows of untapped water systems.³⁴ The IUCN states that *“The environmental flow allocated to a river is...primarily a matter of social choice, with science providing technical support in terms of what the river ecosystem will be like under various flow regimes”*.³⁵ Therefore an environmental flow requirement for rehabilitation of any particular river will differ according to values of each society attached to the level of socio-economic development and state of each river system.

In the context of sustainable development, the concept of environmental flow has also been expanded to incorporate individual and social welfare, with a focus on poverty alleviation, equity, and culturally appropriate practices.³⁶ The 1987 Brundtland Commission Report defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their

³⁴ Dyson, Bergkamp, Scanlon (2003) *Supra* note 28 at 17.

³⁵ Dyson, Bergkamp, Scanlon (2003) *Supra* note 28. On the role of science, see also Kathleen Bowmer, *Scientific Advice on Natural Resource Management: A Report to the Natural Resource Management Ministerial Council*, Kathleen Bowmer and Associates, 2004.

³⁶ Rafik Hirji and Richard Davis, World Bank (2009) *Supra* note 23 at 3, 2009 at 3.

own needs".³⁷ Sustainable development is therefore a matter of intergenerational ethics, involving complex scientific and socio-economic assessments.³⁸

Sustainable development involving environmental flows is also defined with reference to integrated water resources management.³⁹ The Agenda 21 blueprint for the environment which arose from the 1992 United Nations Conference on Environment and Development (UNCED), sets out the policy framework for the sustainable development of water. Chapter 18 articulates the plan for Integrated Water Resources Management (IWRM). Section 18.8 defines IWRM to be founded upon: "*the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilization. To this end, water resources have to be protected, taking into account the functioning of aquatic ecosystems and the perennality of the resource, in order to satisfy and reconcile needs for water in human activities.*"⁴⁰ The concept of IWRM articulated in 1992, emanates from the United Nations activity in the 1950s and United Nations Water Conference, held in Mara Del Plata, Argentina, in March 1977.

The Global Water Partnership reads the text of section 18.1 of IWRM to refer to "*a process which promotes coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustaining of vital ecosystems.*"⁴¹ Biswas

³⁷ Gro Harlem Brundtland, *Our Common Future*, Report of the World Commission on Environment and Development, World Commission on Environment and Development, 1987. Published as Annex to General Assembly document A/42/427.

³⁸ Shorge Sato, *Sustainable Development and the Selfish Gene: A Rational Paradigm for Achieving Intergenerational Equity*, (2003) 11, *New York University Environmental Law Journal*, 503-530.

³⁹ Dyson, Bergkamp, Scanlon (2003) *Supra* note 28 at 9 and 15.

⁴⁰ Chapter 18, *Protection of the Quality and Supply of Freshwater Resources: Application of Integrated Approaches to the Development, Management and Use of Water Resources*, Agenda 21, UN Department of Economic and Social Affairs, Division for Sustainable Development (1992), UN Doc.A/CONF.151/26/Rev.1.

⁴¹ Cited in W.B. Snellen and A. Schrevel, *IWRM: For Sustainable Use of Water, 50 Years of International Experience with the Concept of Integrated Water Resource Management*. Background document to the FAO/Netherlands Conference on Water and Food Ecosystems, Ministry of Agriculture, Nature and Food Quality, The Netherlands, October 2004.

(2008) has criticized the definition of IWRM as vague and therefore limited in effectiveness, despite its prominence.⁴² It is argued that the definition provides no practical guidance as to how water issues are to be integrated. As an indicator of the lack of precision of the IWRM definition Biswas identifies 41 interrelated water management issues to be integrated. Hence, while environmental flow protection is addressed by IWRM broadly, the definition of IWRM in international law provides very limited practical assistance for enforcement and implementation. This dissertation seeks to remedy this situation.

The securing of environmental flows within the framework of sustainable development is also recognized under the *United Nations Convention on the Law of Non-Navigational Uses of International Watercourses*, 1997 with reference to Article 7 (No Significant Harm Rule) and Article 5 (Equitable and Reasonable Utilization). These rules provide greater practical guidance than the IWRM rules, but continue to only serve as a framework model. This research explores this rule model in greater depth in latter chapters. This dissertation seeks to expand and adapt this rule model for national management of transboundary water to achieve sustainable development.

Environmental flow is a central and well established concept in domestic and international water law and water science for the management of river systems. It is of central importance for the achievement of ecosystem resilience and sustainable economic production. Decision making on environmental flows involves complex and rigorous water science and socio-economic assessments. Reconciling the competing socio-economic and ecosystem rights to water which characterize the Murray-Darling Basin, are at the heart of environmental flow management. Without carefully managed environmental flows to address repeated shocks, ecosystems can lose their resilience. The consequence is irreversible harm to the environment and therefore to social and economic systems dependent upon resilient ecosystems.

⁴² Asit Biswas, *Integrated Water Resources Management: Is it Working?* (2008) 24(1), *Water Resources Development*, 5-22.

1.5 MURRAY-DARLING BASIN, AUSTRALIA – GEOGRAPHY AND POPULATION

The Murray-Darling Basin (MDB) is comprised of the river Darling system in the northern basin and river Murray system in the southern basin (Figure 1.3). The Basin spans five jurisdictions Queensland, New South Wales, Australian Capital Territory, Victoria and South Australia, covering an estimated fourteen percent of Australia’s land area. The population of the Murray-Darling Basin is approximately 2.1 million.⁴³ Table 1.1 articulates the percentage of the MDB population in the MDB distributed according to State and Territory.⁴⁴

TABLE 1.1 PERCENTAGE OF POPULATION ACCORDING TO MDB JURISDICTION

State	% of population
Australian Capital Territory	16.1
New South Wales	38.7
Queensland	10.8
Victoria	28.7
South Australia	5.6

⁴³ Murray-Darling Basin Authority, *Guide to the Proposed Basin Plan: Overview*, Commonwealth of Australia, 2010 at 15.

⁴⁴ House of Representatives Standing Committee on Regional Australia, *Of Droughts and Flooding Rains: Inquiry into the impact of the Guide to the Murray-Darling*, Commonwealth, May 2011.

FIGURE 1.3 MURRAY-DARLING BASIN



Source: <http://www.irrnsw.org.au/murray.htm>

1.5.1 THE DARLING RIVER SYSTEM

The Darling River is Australia's longest river at 2700 km⁴⁵. It originates in the Condamine catchment in south-eastern Queensland in the Great Dividing Range, meeting the River Murray at Wentworth, New South Wales. The Darling River has a lower gradient than the Murray River. The climate records of the Darling River system present a pattern of extended low rainfall, flooding and drought leading to a climate variation which is greater in the Darling River Basin than the Murray River Basin⁴⁶ To mitigate against flooding and drought a system of dams and weirs regulates the Darling River. Large private dams are located on the Darling River system.⁴⁷ Regulation of rivers in the

⁴⁵ Roland Breckwoldt, Robert Boden and Jenny Andrew, *The Darling*, Murray-Darling Basin Commission 2004 at 3.

⁴⁶ Webb McKeown & Associates Pty Ltd, State of the Darling: Interim Hydrology Report, Murray-Darling Basin Commission, 2007 at 2; *The Darling*, Murray-Darling Basin Commission 2004 at 14; *Supra* note 45.

⁴⁷ *Supra* note 46 at 15.

Darling Basin has prevented extremely low flows in specific regions. However the combined construction of dams and weirs across the whole river system for extractive purposes has left the entire Basin system vulnerable to drought 61 years in every 100 years, compared to 5 years in 100 years under a natural flow regime.⁴⁸

1.5.2 THE MURRAY RIVER SYSTEM

The Murray River commences in the Snowy Mountains of New South Wales, spanning 2500 km.⁴⁹ The Murray River forms the border of New South Wales and Victoria. The Murrumbidgee River on the Murray River system is extensively regulated, holding 26 storages and joins the Murray River via the Lachlan River.⁵⁰ Water is diverted from the Snowy River system to the Murray and Murrumbidgee rivers for hydroelectricity and irrigation.⁵¹ The Murray River enters the sea on the coast of South Australia, through Lake Alexandrina and Lake Albert, known as the Lower Lakes.

1.5.3 GROUND WATER IN THE MURRAY-DARLING BASIN

The Great Artesian Basin (GAB) and the Murray Basin are the two major groundwater systems in the Murray-Darling Basin, amongst eleven further minor groundwater systems.⁵² The GAB spans Queensland, New South Wales, South Australia and the Northern Territory. This groundwater supplies water to inland Australia and is used as a reserve source of water for irrigators to mitigate against the risks attached to

⁴⁸MDBC, The Impacts of Water Regulation and Storage on the Basin's Rivers, http://www2.mdbc.gov.au/nrm/water_issues/impact_of_water_regulation, (viewed 21/6/2012).

⁴⁹ J. Scanlon, From Taking, to Capping to Returning: The Story of Restoring Environment Flows in the Murray-Darling Basin in Australia, Stockholm International Water Institute Seminar, 2002.

⁵⁰ R.T. Kingsford, Ecological Impacts and Institutional and Economic Drivers for Water Resource Development – a case Study of the Murrumbidgee River, Australia, (2003) 6(1) *Aquatic Ecosystem Health and Management*, 69-79.

⁵¹ Office of Water, Returning environmental flows to the Snowy River: An overview of water recovery, management and delivery of increased flows, NSW Government, February 2010.

⁵² Sinclair Knight and Merz, Projection of Extraction Rates and Implications for Future Demand and Competition for Surface Water, Murray-Darling Basin Commission and CSIRO, 2003.

variable rainfall. The Surat Basin in the GAB also houses large reserves of coal-seam gas (CSG), subject to mining activity. The CSG mining activity is of concern with regard to its impact on the quality of groundwater. The Murray Groundwater Basin is positioned in the Southern Basin. It is comparatively thinner and its storage capacity is less than the GAB. Its water quality is variable, with highly saline groundwater found in the Murrumbidgee region.⁵³

Riverine ground-surface water interconnections involve seepage from surface water sources to groundwater sources, known as tributary groundwater.⁵⁴ The second form of surface-groundwater interconnectivity involves surface rainfall recharge.⁵⁵ The most significant groundwater recharge area in the Great Artesian Basin is found in the Great Diving Range, Queensland. The third ground-surface water interconnection is artesian mound springs such as those found at Peery Lake in the Paroo catchment, NSW.⁵⁶ Adequate environmental flows are required to ensure surface-ground water interconnectivity for recharge of ground water.⁵⁷

1.6 ECONOMIC IMPORTANCE OF THE MURRAY-DARLING BASIN

The Murray-Darling Basin is one of the most significant food producing regions of Australia, consuming substantial quantities of water. Approximately 84 percent of MDB land is devoted to agriculture. Of this, only 2.3 percent is irrigated agricultural land. However, an estimated 65 percent of Australian irrigated land is located in the

⁵³ *Ibid.*

⁵⁴ Charles W. Howe, Policy issues and institutional impediments in the management of groundwater: lesson from case studies, (2002) 7 *Environmental and Development Economics*, 625-641.

⁵⁵ *Ibid.*

⁵⁶ Department Environment, Climate Change and Water, *Paroo River Wetland Ramsar Site: Ecological Character Description*, NSW Government, 2007.

⁵⁷ S.Parson, R. Evans and M. Hoban, Surface-groundwater connectivity assessment: A report to the Australia Government from the CSIRO Murray-Darling Basin Sustainable Yields Project, CSIRO, 2008.

Murray-Darling Basin region.⁵⁸ The Murray-Darling river system supplied half of all water for irrigated agricultural use nationally in 2007-08 during the height of the millennium drought.⁵⁹ The amount of water used during this period was one third of the level consumed in 2000-01. As a consequence the gross value of water doubled.⁶⁰ The emergence of the global food crisis and the increase in demand for agricultural output, balanced the negative impact of the drought.

The total agricultural water consumption for Australia in 2011-12 was 9007GL, with in excess of 69 percent of this total consumed in the MDB at 6174GL.⁶¹ Upstream MDB states were the largest consumers, with NSW consuming 3751GL and Queensland consuming 2108GL. The MDB with reference to the nation, supplies 90 percent of all cotton, 56 percent of all grapes, 42 percent of all nuts and 32 percent of all dairy products. The total gross value of agricultural production (GVAP) for Australia in 2010-11 was 46 billion.⁶² The GVAP in the MDB was \$19.2 billion, amounting to 42 percent of the GVAP for Australia. The gross value of irrigated agricultural production (GVIAP) in the Murray-Darling Basin was \$5.9 billion, 46 percent of the GVIAP of Australia.⁶³ Domestic agriculture has experienced a declining terms of trade. However productivity growth in domestic farming has protected the competitiveness of agriculture.⁶⁴

While agriculture's share of GDP is 2.7 percent, the agriculture sector is highly export orientated. An example is the surge in Victorian food exports to China, valued at

⁵⁸ Murray-Darling Basin Authority, *Guide to the Basin Plan*, Commonwealth of Australia, October 2010 at 20; see also Productivity Commission, *Water Rights Arrangements in Australia and Overseas*, Commission Research Paper, (2003), Productivity Commission, Melbourne.

⁵⁹ Murray-Darling Basin Authority, *Guide to the Basin Plan*, Commonwealth of Australia, October 2010 at 20; see also K.J. Walker, *The Political Economy of Environmental Policy – An Australian Introduction* (1994), UNSW Press.

⁶⁰ Mae Kirby et al., *The Economic Impact of Water Reductions During the Millennium Drought in the Murray-Darling Basin*, Australian Agricultural and Resource Economic Society, 7-10 February, 2012.

⁶¹ Australian Bureau of Statistics, *Water Use on Australian Farms, 2011-12*.

⁶² Australian Bureau of Statistics, *Year Book Australia 2012*, 24/05/2012

⁶³ Australian Bureau of Statistics, *Gross Value of Irrigated Agricultural Production, 2011-12*

⁶⁴ ABARE, *Agriculture in Australia*, Commonwealth of Australia, 2006

\$9.4 billion in 2011-12.⁶⁵ Approximately 60 percent of total production is exported.⁶⁶ Australian agriculture has therefore retained its importance, particularly in light of the recent world food crisis of 2008. It is predicted that the world population will reach 9.3 billion at 2050, requiring food production to increase by 70 percent.⁶⁷ Furthermore there is a domestic demand for securing fresh locally produced food.⁶⁸ The international and domestic demand for food drives agricultural land prices up, creating optimism among MDB farmers. The projected future financial gains from irrigated agriculture is a key reason why MDB irrigators find reductions in water entitlements under current government water buyback policy difficult to accept.

Irrigated agriculture creates an economy for goods and services in regional areas, generating further employment.⁶⁹ The number of people employed in agriculture halved from 4.8 percent to 2.5 percent between 1992 and 2012.⁷⁰ However agriculture contributes to expanding employment in the food services sector and ancillary services (processing, transport and other). The domestic and export income and employment generated from agriculture in the MDB is in substantial conflict with environmental interests.

1.7 ENVIRONMENTAL FLOW CONCERNS IN THE MURRAY-DARLING BASIN

The Federal constitution (1901) expressly restricted the ability of the Federal government to manage water resources for irrigation and conservation under section 100, granting power to the States. To enhance economic growth, each State allocated water

⁶⁵ Darren Gray, *China's appetite propels surge in Victorian farm exports*, *The Age*, October 16, 2013.

⁶⁶ *Supra* note 64

⁶⁷ *Supra* note 62

⁶⁸ *Supra* note 62

⁶⁹ *Supra* note 63

⁷⁰ *Supra* note 63

entitlements independent of decision making in other MDB states. Water extraction in Australia grew by sixty-five percent between 1983-84 and 1996-97, the majority of which is attributed to agriculture.⁷¹ Over allocation of private water entitlements led to a serious deterioration in river health over time due to over-use, mimicking the tragedy of the commons.⁷²

Extensive irrigated agriculture has caused serious environmental degradation including reduction in biodiversity, rising algal blooms, compounding of salinisation in irrigated and dry land areas and water logging. Saline water reduces crop yields and productive land area, renders water unfit for human consumption, and causes damage to water pipes.⁷³ In the case of algal blooms, recent research suggests that the ingestion of blue-green algae may lead to the development of motor neurone disease.⁷⁴

The hydrological characteristics of the Murray-Darling River system include sections of shallow depressions not defined by river banks receiving intermittent flows.⁷⁵ This water termed floodplain water or overland flow is an important component of the river system. Floodplain diversions comprise a sizeable proportion of total diversions in the rivers of Queensland and Northern NSW.⁷⁶ The practice of floodplain harvesting reduces the amount of water returning to the river system, which adversely impacts the quality and quantity of the downstream river flows and wetlands. It also impacts groundwater recharge. In light of these concerns the State governments have regulated floodplain extractions to protect ecosystem health.⁷⁷

⁷¹ *Supra* note 49.

⁷² The tragedy of the commons, as described by Garrett Hardin (1968) is a situation of over-use of an open access natural resource; Garret Hardin, *The Tragedy of the Commons*, (1968) 162 *Science*, 1243-1248.

⁷³ J. Quiggin, *Environmental Economics of the Murray-Darling River System*, (2001) 45(1) *The Australian Journal of Agricultural and Resource Economics*, at 70.

⁷⁴ Dani Cooper, *Motor neurone clue in blue-green algae*, ABC Science, 26 September 2013.

⁷⁵ Poh-Ling Tan, *Dividing the Waters: A Critical Analysis of Law Reform in Water Allocation and Management in Australia from 1989-1999*, PhD Thesis, Australian National University, 2001.

⁷⁶ *Supra* note 73 at 70.

⁷⁷ Richard T Kingsford and A. Roff, *A Case Study: Floodplain development on the Paroo River, the last free flowing river in the Murray-Darling Basin*, UNSW, August 2008.

Acid sulphate soils have been observed in South Australia, Northern Victoria and South West NSW along the Murray River. Toxicity at the level of car battery sulfuric acid pH 1.8 was found at Bottle Bend in NSW in 2008 during the millennium drought of 2001-2010.⁷⁸ Climate change exacerbates natural cycles of droughts and flooding, increasing environmental degradation.

1.8 CONFLICT IN THE MURRAY-DARLING BASIN CONCEPTUALIZED AS ENVIRONMENTAL RIGHTS VERSUS HUMAN RIGHTS

Achieving sustainable development through building ecosystem resilience in the Murray-Darling Basin concerns the balancing of two sets of conflicting rights, environmental and human rights embedded in the provision of water. The first set of rights may be classified as largely environmental rights concerned with the provision of environmental flows for preservation of biodiversity and conservation of natural resources to achieve ecosystem resilience through assignment of property rights to environmental flows. Assigning property rights to the environment confers recognition of the equal and concurrent importance of environmental and socio-economic rights to water. As ecosystem resilience and socio-economic welfare of humans are interdependent the assignment of property rights to the environment to protect human welfare is crucial.⁷⁹

Breckenridge (2005) states modern scientific knowledge informs decision makers that ecosystems are in possession of “dynamic biophysical systems” containing complex interactions between organisms and the physical and chemical environment.⁸⁰ As the ecosystem is self governing the equilibrium is always dynamic. Breckenridge cites Holling and Gunderson (2002) who argue that “the complexities and non-linear phenomena in ecosystems mean that firm predictions cannot be made and that

⁷⁸ Richard T Kingsford et.al, A Ramsar Wetland in Crisis – In Coorong, Lower Lakes and Murray Mouth, Marine & Freshwater Research, 18 March 2009.

⁷⁹ Lee P. Breckenridge, Can Fish own water?: Envisioning non-human property in ecosystem, (2005), 20(2), *Journal of Land Use*, 295-335.

⁸⁰ *Ibid.*

ecosystems cannot be successfully managed or closely controlled in an engineering sense”.⁸¹ Irrigators in the MDB demand concrete scientific evidence that the set environmental flow targets will deliver ecosystem resilience. However the complexity of ecosystems make provision of accurate responses difficult. Breckenridge (2005) argues that static models are unsuitable for ecosystem management. Hence adaptive management systems are recommended, which permit decision makers to “perceive patterns of activity and changes in ecosystems” and provide flexible responses. Breckenridge (2005) observes that the central question then concerns how much allowance non-human organisms should be granted to deliver ecosystem services. Pittock et al (2012) notes that the balance of the interests between human and non-human organisms with reference to ecosystems, has not been achieved in Australia.⁸²

The second set of rights concerns sustainable provision of river flows as socio-economic and civil and political human rights for the delivery of drinking water, food, industrial production and hydroelectricity for rural and urban populations. As water is an essential requirement for all human life, the right to clean water forms a basis for the right to life as articulated in Article 6 of the International Convention on Civil and Political Rights (ICCPR).⁸³ The right to food and clean drinking water is also implied in the right to health provided in Article 12 of the Convention on Economic, Social and Cultural Rights (ICESCR) and Article 24 of the Convention on the Rights of the Child.⁸⁴ The right to sustainable economic development of water resources is embedded in the Convention of Economic, Social and Cultural Rights, 1966.

⁸¹ *Id*: L. Gunderson and C. S. Holling (Eds), *Panarchy: understanding transformations in human and natural systems*. Island Press, Washington, D.C., USA, 2002.

⁸² J. Pittock, S Cork and S. Maynard, The State of the Application of Ecosystem Services in Australia, (2012) 1, *Ecosystems* 111-120.

⁸³ Antoinette Hilderling. International Law, Sustainable Development and Water Management, Eburon Publishers 2004 at 75.

⁸⁴ Stephen C. McCaffrey, The Human Right to Water Revisited, in Edith Brown et.al. (Eds) “Water and International Economic Law”, *Oxford University Press*, (2004); Henri Smets, *The Right to Water as an Enforceable right*, *Environmental Policy and Law*, 34/2, 2004. Peter H. Gleik, *The Human Right to Water*, (1998) 1 *Water Policy* 487-503; John Scanlon et.al., *Water as a Human Right? IUCN Environmental Policy and Law Paper No. 51*, (2004).

Competition for water exists between the two sets of rights, even though nonhuman organisms and humans are interdependent. Declining ecosystem health adversely impacts economic growth over the medium to long term. Therefore it is important to balance the two sets of rights to water such that the protection of environmental rights reinforces socio-economic, civil and political rights in water. Achievement of this goal is the very essence of sustainable development. Individual economic users of water systems cannot be expected to voluntarily manage the resource to deliver ecosystems resilience, due to the tendency to act in a self interested manner. Therefore state governance is necessary to preserve the public interest in water resources. In the *ICM Agriculture Pty Ltd v Commonwealth* case the High Court recognized that governance strategies exercised by the state to manage environmental and socio-economic uses of water are necessary because, "water is, like light and air, common property".⁸⁵ In explaining common property, the High Court referred to resources which were for the "common benefit of man". That is citizens share a common interest in water resources, which may also be expressed as civil and political rights, and socio-economic rights, reinforced by environmental rights when sustainable development is achieved, as described above. Climate change increases the degree of competition between environmental and socio-economic rights, creating greater complexity within the water governance problem.

Environmental, Social and Economic Justice

This conflict between two sets of rights can also be explained with reference to concepts of justice which incorporate the values of sustainable development, Kaldor-Hicks efficiency, fairness, and equality. These four values are described below. Justice is an important consideration in resolving conflict in the MDB. This is because irrigators perceive government environmental decision making, which involves transferring water away from irrigation to the environment, as causing unjust harm to individuals and rural

⁸⁵ Douglas Fisher, Water Law, the High Court and techniques of judicial reasoning, (2010) 27, *Environmental Planning and Law Journal*, 85-97 at 90; *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [109] per Hayne, Kiefel and Bell JJ.

communities.⁸⁶ These perceptions are articulated in detail with reference to qualitative interview data presented in chapter four and analyzed in chapter five. Justice mechanisms which prevent and mitigate harm are central to conflict resolution. Gross (2011) observes that from a reform perspective, decision making processes which are regarded by the community as just are more readily accepted.⁸⁷ Gross (2011) further argues that the absence of justice mechanisms to resolve conflict, can create a “build up of perceived layers of injustice” leading to withdrawal from government negotiation processes.⁸⁸ Justice is required to secure cooperation. In this thesis justice in environmental decision making is defined as incorporating the competing environmental, social and economic justice outcomes.

Sustainable development is at the heart of water governance reforms in the Murray-Darling Basin. Environmental justice as sustainable development, as stated earlier, requires at minimum that “future generations are left no worse off than current generations”.⁸⁹ This definition of sustainable development as environmental justice is the most accepted in the literature. Environmental justice requires intergenerational equity embedded in the definition of sustainable development, which in turn embraces social and economic justice addressed below. That is the ecosystem resilience must be maintained in a manner which supports constant or improved socio-economic outcomes across time.

Stavins, Wagner and Wagner (2003) argue that dynamic efficiency, that is the achievement of economy efficiency over time, completes the concept of sustainable development expressed as intergenerational equity.⁹⁰ Stavins, Wagner and Wagner (2003) argue that improvements in economic outcomes over time, embedded in the

⁸⁶ Catherine Gross, “Why Justice is Important”, in Daniel Connell and Quentin Grafton (Ed), *Basin Futures: Water Reform in the Murray-Darling Basin*, ANU Epress, 2011.

⁸⁷ *Supra* note 86 at 150.

⁸⁸ *Supra* note 86 at 159.

⁸⁹ *Supra* note 37.

⁹⁰ Robert Stavins, Alexander Wagner and Gernot Wagner, Interpreting Sustainability in Economic Terms: Dynamic Efficiency plus Intergenerational Equity, (2003), *Economic Letters*, 339-343.

concept of economy efficiency must be incorporated into the definition of sustainable development. This is because constant consumption at subsistence level or a similarly low level is not acceptable public policy.⁹¹ Economic justice in this research is defined as Kaldor-Hicks efficiency with compensation as opposed to Pareto efficiency.⁹² Pareto efficiency requires that no one person is made worse off by an individual institutional decision involving reallocation of resources.⁹³ Achievement of Pareto efficiency for large societal groups is almost always impossible.⁹⁴ Hence the concept of Kaldor Hicks efficiency evolved, also termed a “potential Pareto improvement”. This concept involves a social choice imposed by an institution where the parties gaining a benefit have the capacity to compensate those parties suffering economic losses. However in order to establish Kaldor Hicks efficiency, it is not necessary that actual compensation flows to those parties suffering the loss.⁹⁵ The Federal constitutional provision s51 (xxxii) demonstrates that compensation for property acquired by government is an accepted norm within the society. As the primary method of acquiring water for the environment is through a government purchasing strategy involving willing sellers, conflict over compensation is minimized. Kaldor Hicks efficiency also recognizes that some losses are too remote to receive compensation. For example every unit of indirect unemployment caused by contraction of an irrigation economy after water is reallocated to the environment.

Sen’s (2009) summary of Rawls on social justice is accepted in this research as a measure of social outcomes, where social justice requires fairness and equality. Fairness is defined as the “avoidance of bias in evaluations, taking note of interests and concerns of others..., and in particular, ...avoidance of being influenced by our respective vested

⁹¹ *Supra* note 90 at 340.

⁹² AK Dasgupta and DW Pearce, *Cost-Benefit Analysis: Theory and Practice*, MacMillan, 1972.

⁹³ Robert Cooter and Thomas Ulen, *Law and Economics*, 4th Edn, (Pearson Addison: 2003) at 17.

⁹⁴ See also Louis Kaplow and Steven Shavell, Any Non-welfarist method of policy assessment violates the Pareto principle, (2001) 109 (2) *Journal of Political Economy*, 281-286.

⁹⁵ *Supra* note 93 at 48.

interests, or by our personal priorities or eccentricities or prejudices”.⁹⁶ That is, impartiality. This definition is chosen as it directly corresponds to the concerns articulated by irrigators presented in chapters four and five of this thesis. Equality is defined as articulated by Rawls, with reference to the first principle of justice which states: “Each person is to have an equal right to the most extensive scheme of equal basic liberties compatible with a similar scheme of liberties for others”.⁹⁷ Equality in the MDB context then means equal rights to hold property in water for humans and the environment, equal access to compensation and equal rights to participate in collaborative decision making, after critical human water needs are met. Rawls’ equality principle is chosen in this thesis as it seeks to improve upon the utilitarian model, which requires that some be left worse off to maximize welfare. Equality is granted regardless of the size of initial endowment, under the equality principle. It is a principle which accords with the fundamental moral values of a liberal democratic society, which is therefore acceptable to the community and stable. Justice as fairness and equality can serve to complement rather than contest the value of economic efficiency described above.

Defining Water Governance

The UNDP (2002) defines water governance as the “range of political, social, economic and administrative systems that are in place to regulate the development and management of water resources and provision of water services at different levels of society”.⁹⁸ Essentially, there exist two modes of water governance, through the market and through public sector institutions. Both market-based water governance, through an environmental water purchasing strategy, and public sector water governance, through water planning, have been employed in the Murray-Darling Basin.

⁹⁶ Amartya Sen, *The Idea of Justice*, Allen Lane 2009; John Rawls, *A Theory of Justice*, Oxford University Press, 1999.

⁹⁷ John Rawls (1999) *Supra* note 95.

⁹⁸ UNDP, Global Water Partnership and ICLEI, Dialogue on Effective Water Governance, *Global Water Partnership* 2002 at 1.

The market as an institution

Governance through the water market occurs in theory through the “invisible-hand” of the competitive market.⁹⁹ It is argued that the market can be termed an institution where regular and frequent exchanges (trades) take place, supported by legal infrastructure to ensure the exchange is effected and enforced.¹⁰⁰ Hodgson (1988) has argued that market clearing and the determination of prices follow rules and therefore the market is an institution.¹⁰¹

The conceptualization of markets as institutions can be traced back to Commons (1934) and Hayek (1945).¹⁰² Selected supporting literature includes Sen (1999:142), Stiglitz (2002), Dinar (2002), Hodgson (1988), Williamson (1998), Barma and Vogel (2007), Schlicht (2003), Bardsley et.al. (2002), and Rosenbaum (2000).¹⁰³ In the context of the water sector, when a water market is created, allocation decisions are determined in part or in whole by market forces of supply and demand. That is water management

⁹⁹ Stephen Bell, *Economic Governance and Institutional Dynamics*, Oxford University Press, 2002 at 7.

¹⁰⁰ Rosenbaum Eckehard, What is a Market? On the Methodology of a contested Concept, *Review of Social Economy*, 58, Issue 4: 455-482, 2000.

¹⁰¹ Geoffrey M Hodgson, *Economics and Modern Institutional Economics*, Polity Press: Cambridge, 1988.

¹⁰² John Commons, *Institutional Economics: Its Place in Political Economy*, Madison: University of Wisconsin Press, 1934; Fredrich Hayek, The Use of Knowledge in Society, (1945) 35 *American Economic Review*, 519-530.

¹⁰³ Bardsley et al, New Directions in Environmental Policy, *Agenda*, Vol. 9, No. 3, 2002; Ariel Dinar, Review: Institutions, Transactions Costs and Environmental Policy: Institutional Reform for Water Resources by RayChallen, *American Journal of Agricultural Economics*, Vol. 48: 250-251, 2002; Hodgson Geoffrey, *Economics and Institutions: A Manifesto for Modern Institutional Economics*, Polity Press, Cambridge, 1988; Menard Claude, Markets as Institutions versus Organizations as Markets? Disentangling Some Fundamental Concepts, *Journal of Economic Behaviour and Organization*, Vol. 28: 161-182, 1995; Rosenbaum Eckehard, What is a Market? On the Methodology of a contested Concept, *Review of Social Economy*, 58, Issue 4: 455-482, 2000; Schliet Ekkehart, Review: Individuals, Institutions and Markets by Chrysostomos Mantzavinos, *Journal of Economic Literature*, Vol. 41 No.1: 225-226, 2003; Amartya Sen ., *Development as Freedom*, Anchor Books, 1999; Stiglitz, Joseph E., "Information", in David R. Henderson, ed., *The Concise Encyclopedia of Economics*, Indianapolis: Liberty Fund, Inc. [Online], 2002; Oliver E. Williamson, The Institutions of Governance, *The American Economic Review*, Vol. 88, No. 2, 1998.

decisions pertaining to the allocation of water between alternative uses are made by the market. Thus management of water allocations is no longer the sole territory of public organizations. The water market in taking on this management role through a system of informal rules can be said to be acting as an institution.

Public sector water governance

Public sector water governance refers to the management of the water sector by public sector organizations. Organizational structures vary from highly centralized to highly de-centralized systems. Within the Murray-Darling Basin, the Federal government, States and territory governments, and local governments possess different public sector water governance structures, which operate concurrently.

Currently Federal and MDB state governments are seeking to balance the two sets of rights, environmental and human rights, through the conferral of environmental property rights to the ecosystem, to deliver ecosystem needs through the two governance mechanisms articulated above. This action seeks to give the environment equal rights alongside irrigators. The conferral of property rights to the environment has been met with resistance in the MDB, because the government is purchasing water entitlements from irrigators to create the environmental property. Hence the volume of water available for irrigation is reduced. A detailed examination of the central reasons for the causes of the conflict is articulated in chapters four and five of the thesis with reference to qualitative data, followed by reform proposals presented in chapter six. An articulation of state of the conflict under current water governance arrangements is presented later in this chapter.

The following sections discuss how water governance has been applied to balance the two sets of rights in conflict, environmental and human rights, in the MDB and the difficulties which have arisen to 2013.

1.9 WATER GOVERNANCE IN THE MURRAY-DARLING BASIN

Following the drought of 1895-1902, negotiations over the rights to the waters of the Murray River ensued, coinciding with the timing of Federation in 1901, being directly impacted by disputes between the States over the waters of the Murray-Darling Basin.

The Federal constitution expressly restricted the ability of the Federal government to manage water resources for irrigation and conservation under section 100, granting power to the States.

Environmental problems surfaced during the 1970s and by the 1980s addressing these problems required a coordinated effort (since the Federal government was constitutionally constrained from imposing solutions on the states) and this effort culminated in the 1987 Murray-Darling Basin Agreement. In 1992 a new Murray-Darling Agreement was signed by New South Wales, Victoria and South Australia establishing the former Murray-Darling Basin Commission (MDBC).¹⁰⁴ The MDBC has been replaced by the Murray-Darling Basin Authority (MDBA) since 2007. The recent history demonstrates that the conflict between environmental and human rights in the MDB is difficult to resolve.

The Cap and Water Trading Arrangements

To address the environmental degradation caused by over-extraction, a permanent limit to diversion of water from the Basin was set at 1993-94 levels of extraction, known as “the cap” and was imposed from 1 July 1997. Water trade was permitted within the constraints established by the cap. Water trading, as defined by the former Murray-Darling Basin Commission, is the temporary or permanent buying and selling of water.¹⁰⁵ Water trade was employed to balance security of water supply for economic users with the concurrent provision of water for environmental flows, achieved by capping water extraction. Commencing in 1998, the former Murray-Darling Basin Commission established inter-state water trading between South Australia, Victoria and New South Wales.¹⁰⁶ Water trade required the separation of water property rights from

¹⁰⁴ *Supra* note 49.

¹⁰⁵ <http://www.mdbc.gov.au> (30/5/2005)

¹⁰⁶ <http://www.thelivingmurray.mdbc.gov.au> (30/5/2005)

land title. New water legislation was implemented in Basin states creating the current water access entitlements and trading arrangements.¹⁰⁷

Water access entitlements are structured in the following manner:¹⁰⁸

- (i) a perpetual share of a water resource specified in a water plan, subject to a revision at the end of the life of a water plan;
- (ii) separate from land;
- (iii) the tenure of water access rights can be cancelled only where the conditions associated with the entitlement are violated.
- (iv) Categorized according to security of supply: high security delivering 80 percent to 95 percent of water entitlement in drought years, general security delivering often 0 percent and up to 50 percent of water entitlement in drought years;
- (v) Tradable, usufructory rights, which provide the right of access to extract water for use.

However the cap and trade system did not successfully address the environmental degradation crisis caused by over-allocation. This is because the introduction of water trading actually increased the level of water use and irrigation activity. Young (2011) observed that water use increased by 29 percent, in the first five years of water trading, while the irrigated area increased by 22 percent for the same period. This increased water use occurred through the activation of sleeper entitlements (previously unused entitlements) and dozer entitlements (partially used entitlements).¹⁰⁹ Upon introducing the cap and trade system, governments had failed to regulate to prevent the activation of sleeper and dozer licenses.

¹⁰⁷ *Supra* note 105.

¹⁰⁸ Robyn Glindermann and Grant Anderson, *The National Water Initiative*, Allens Arthur Robinson; Intergovernmental Agreement on a National Water Initiative, Commonwealth of Australia, 2004 www.findlaw.com.au/article/default.asp (5/1/2005).

¹⁰⁹ Mike Young, Water Markets: A Downstream perspective, in John Langford and John Briscoe, *The Australian Water Project: Crisis and Opportunity – Lesson of Australian Water Reform*, CEDA, 2011.

The National Water Initiative (NWI) and Governmental Environmental Buybacks

The inadequacy of the 1994 cap and trade system led to further governance reforms. In June 2004, the Council of Australian Governments (COAG – Commonwealth, State and Territory governments) reached the National Water Initiative (NWI) agreement for the development of the national water management scheme which would supersede State and Territorial legislative arrangements, to be in full operation by 2014.¹¹⁰ Government water buybacks for environmental flows were introduced by COAG in 2004 under the “Intergovernmental Agreement on the National Water Initiative (NWI)” and “Addressing Water Over-allocation and Achieving Environmental Objectives in the Murray-Darling Basin Agreement”.¹¹¹ The 2004 National Water Initiative (NWI) portrayed water markets as central to the recovery of water in the Murray-Darling Basin to address over-allocation.¹¹² Water markets as an institution involve the use of the forces of demand and supply for tradable usufructory water rights, to allocate water between economic use and the environment. Under the government buyback program, State and Federal governments agreed to enter the water market to purchase tradable usufructory water rights from private water users in order to deliver environmental flows to the river system.

The COAG agreement included the Living Murray Program which allocated \$A500 million for returning water to and improving the health of the Basin. Stated as the top priority, was water recovery for six ecological systems. The target return was for 500 GL per year between June 2004 and June 2009. However, the key study driving water reform since 2004 stated that the best available science indicates that between 2000 and

¹¹⁰ Daniel Connell, *Water Politics in the Murray-Darling Basin*, The Federation Press, 2007.

¹¹¹ Council of Australian Governments, *Intergovernmental Agreement on National Water Initiative*, (2004a), Council of Australian Governments, *Intergovernmental Agreement on Addressing Over-allocation and Achieving Environmental Objectives in the Murray-Darling Basin* (2004b).

¹¹² Price Waterhouse Coopers, *National Water Initiative Water Trading*, 2006, Department of Prime Minister and Cabinet.

4000 GL per annum return was needed to have a “moderate to high chance” of achieving improvements in river health.¹¹³

Between June 2004 and June 2009, at the height of the decade long drought, very limited progress was made in recovering water for environmental flows. In 2008-09 there existed a large gap between the quantity of water held by Australian governments on paper and actual water recovery, as the majority of purchases were general security water entitlements. These general security water entitlements are termed “paper water” entitlements, when little or no water is allocated to the entitlement during dry periods.¹¹⁴ General security entitlements tend to be “paper water” entitlements during in most dry period circumstances. This is because receive lower priority than high security water entitlements for water allocation. High security water entitlements can receive up to 90 percent of a water entitlement during drought periods. As a consequence of large numbers of general security purchases the ecological crisis worsened.

The deteriorating state of the Lower Lakes and the Coorong in South Australia raised alarm. In the three years to July 2008, water levels in Lake Alexandrina fell from 1600GL to 940GL. Lake Albert and Lake Alexandrina were then below sea level at -0.3m and -0.4m respectively, while the Coorong had salt loads which were four times that of the ocean.¹¹⁵ The Federal government considered flooding Lake Albert and Lake Alexandrina with sea water to prevent the exposure of acid sulphate soils.¹¹⁶ In March 2008, fresh water was pumped from Lake Alexandrina to Lake Albert after the situation was declared an emergency.

The majority of purchases on the government register to 2013 under various government buyback programs are general security entitlements, rather than high security

¹¹³ Wentworth Group, *Blueprint for a National Water Plan*, (2003) at 9, WWF, J. Quiggin, *Repurchase of Renewal Rights: a policy option for the National Water Initiative*, (2006), 50, *The Australian Journal of Agricultural Economics*, 425-435.

¹¹⁴ R.Q Grafton, J. Bennett and K. Hussey, *Dry Water*, Policy Briefs 3, Crawford School of Economics and Government, Australian National University, 2007.

¹¹⁵ MDBC (2008), “Lower Lakes Quick Figures – as at 31 July 2008, <http://www.mdbc.gov.au>.

¹¹⁶ J. Walker, Rains not reaching the Murray System, Lakes Crisis Deepens, *The Weekend Australian*, 9-10 August 2008.

(see Appendix 1). This creates the possibility of future paper water crises, of concern to ecosystem resilience, especially as drought periods recur in the era of climate change.

Commonwealth Government take over of MDB Governance, the *Water Act 2007* and the *Water Amendment Act 2008*

As a consequence of limited progress and prolonged drought, in January 2007, the Federal Government announced a broader \$10 billion water fund under the National Water Security Plan. \$3.1 billion of the total was to be devoted to a buy-back program over ten years.¹¹⁷ A\$5.8 billion was allocated to water saving infrastructure projects. This was followed by major legislative changes in August 2007 under the Coalition government which sought to centralize water governance of the Murray-Darling Basin. The new arrangements provided an equal focus on water planning at the Federal level and market-based water governance.

The shift in power over water management to the Federal Government away from the States was a significant constitutional issue. The introduction of the Federal *Water Act 2007* attempted to transfer power to the Federal government largely through the external affairs power in the Constitution. The legislation relied heavily on the *UN Convention on Biological Diversity, 1992* and the *Ramsar Convention on Wetlands of International Importance, 1971*.¹¹⁸ Victoria provided initial resistance to the Federal Government legal takeover. After a change in Federal government, Victorian cooperation was secured via provision of Federal financial incentives amounting to A\$1.2 billion.

The *Water Amendment Act 2008* directly referred power under the Constitution from all States to the Federal government. Hence the propensity for constitutional challenges has been limited. However the States retain the power to withdraw referral of

¹¹⁷ Commonwealth Government of Australia, *A National Plan for Water Security*, 25 January 2007.

¹¹⁸ Pittock, Finlayson, Gardner and McKay (2010) argue that reliance on the Ramsar Convention is undermined by the absence of adherence to the convention by government; Jamie Pittock et al., *Changing Character: The Ramsar Convention on Wetlands and Climate Change in the Murray-Darling Basin, Australia*, (2010) 27, *EPLJ* 401.

powers, as no constitutional amendment was proposed or achieved. As the *Water Act 2007* had been negotiated at the last hour ahead of a Federal election, critical human needs, including water for drinking and food, had been omitted in error. The *Water Amendment Act 2008* created special provisions for the management of water for critical human needs under the new Federal government.

A new Federal government institution, the Murray-Darling Basin Authority (MDBA) was created under the *Water Act 2007*. The MDBA was empowered to design a Murray-Darling Basin Plan setting sustainable diversion limits (SDL) for the whole of the Murray-Darling Basin. The Basin Plan is issued in a series of stages in draft form for public review ahead of final approval by the Federal Water Minister. Once approved by Parliament it becomes a law. In November 2012 the MDB Plan became law. After this time State governments must draft consistent State water plans to be submitted to the Federal Water Minister for approval. The *Water Act 2007* also established the Commonwealth Environmental Water Holder (CEWH), to secure central control over the environmental water buyback program and management of environmental flows.

Events leading up to the MDB Plan Law, 2012

In October 2010 the MDBA released the Guide to the Basin Plan for public review as required by the *Water Act 2007*. The Guide recommended a sustainable diversion limit of between 3000 GL to 7600 GL per year, to be achieved through water buybacks from willing sellers and infrastructure improvements. The guide document was met by serious and violent public criticism for failure to balance environmental flow outcomes and socio-economic outcomes, which include employment, rural economic and infrastructure development. The public response included heated discussions and burning of the guide plan document by irrigators most affected by the proposed legislative changes (see Figures 1.4 and 1.5).

The Chairman of the MDBA stated in 2010 that the focus of the MDBA as mandated by the *Water Act 2007*, was on the environment, rather than socio-economic considerations. This interpretation of the law was refuted by the Federal Attorney General's Department. In December 2010 the Chairman and several members of the board of the MDBA resigned.

The Draft Basin Plan was released in November 2011, followed by further public criticisms on the same grounds. Permissible ground water extraction under the Draft Plan increased by 2600GL, while surface water extractions were to be cut by 2750GL. This drew serious criticism from leading environmental science groups due the lack of recognition of the interconnectivity of ground and surface water.¹¹⁹ As a consequence the Wentworth Group of Concerned Scientists advising the MDBA, walked away from the negotiation process.

¹¹⁹ Wentworth Group of Concerned Scientists, Statement on the 2011 Draft Murray-Darling Basin Plan in response to the release of the Draft Plan, January 2012.

FIGURE 1.4: BURNING OF THE GUIDE TO THE BASIN PLAN IN GRIFFITH, NSW
2010



Source: ABC News, October 2010

FIGURE 1.5: PROTESTS AGAINST THE WATER ACT 2007, HELD IN OCTOBER
2010



Source: *The Australian*, October 2010

Environmental government water buy-backs from willing sellers remained a key environmental flow recovery strategy under government policy attached to the proposed plan.

Events following the MDB Plan Law, 2012

On 22 November 2012, the Federal Government approved the Basin Plan as law, requiring a 2750GL environmental flow return annually, comprised of surface and ground water. The Federal Government further committed \$1.77 billion for the recovery of an additional 450GL to bring the total annual target return to 3200GL. However the government of New South Wales announced significant funding cuts to the MDBA in 2013, in response to the failure of the Federal government to provide adequate funding to address structural adjustment problems caused by water reductions. The New South Wales government also imposed a 3 percent annual limit on water buybacks in 2013, to operate for a decade. South Australia, the most downstream state also announced significant funding cuts to the MDBA, stating that it did not want to subsidize gains acquired by the upstream states.

To give effect to the Basin Plan law, the States were required under the *Water Act 2007* to sign the Intergovernmental Agreement on Implementing Water Reform in the Murray-Darling Basin 2013. Implementation involves harmonizing State water plans with the overarching Federal Basin Plan law. While Victoria, South Australia and the Australian Capital Territory signed the agreement in 2013, New South Wales and Queensland refused. Following a change in Federal Government in October 2013, the incoming government provided a commitment to cap water buybacks at 1500 GL in law. Under these terms the New South Wales and Queensland governments signed the Implementation Agreement in late February 2014 following an assurance that the cap on buybacks would enter into law by the end of 2014.¹²⁰

¹²⁰ Murray-Darling Basin Authority, *Environmental Water Recovery Progress*, Commonwealth of Australia, 2014.

This is a major set back in negotiations for reconfiguring water rights to environmental flows. At December 2013 only 1138GL of the 2750GL have been recovered via the buyback.¹²¹ Hence only a further total of 400GL may be recovered via the government environmental buyback program under the new agreement. At December 2013 a total of 541GL has been recovered via infrastructure projects and another 49GL from other initiatives. This leaves 622GL to be recovered by infrastructure projects alone, of a total of 1022GL yet to be recovered. Grafton (2010) has questioned the cost effectiveness of infrastructure water saving measures.¹²² Quiggin (2012) cites cost estimates for water saved by infrastructure improvements to be between \$4000-\$6000 per ML, compared to \$1000-\$2000 per ML for water saved via buybacks from willing sellers.¹²³ Wittwer and Dixon (2013) have reiterated these sentiments.¹²⁴

1.10 STRUCTURE OF THE THESIS

This thesis comprises seven chapters. This first chapter has introduced the research problem, articulating the nature of the competition for water resources between agricultural and environmental uses in the MDB.

The second chapter reviews the relevant literature and is divided into two parts according to the two research questions pertaining to (i) the limits of the water market and (ii) the inadequacies of the water law and public institutions for delivering environmental flows in the MDB.

¹²¹ *Ibid.*

¹²² Quentin Grafton, How to increase the Cost-Effectiveness of Water Reform and Environmental Flows in the Murray-Darling Basin, (2010) 17 *Agenda*, 17-40.

¹²³ John Quiggin, Why the Guide to the proposed basin plan failed, and what can be done to fix it, in John Quiggin, Thilak Mallawaarachchi and Sarah Chambers (Eds), *Water Policy Reform: Lessons in Sustainability from the Murray-Darling Basin*, Edward Elgar, 2012 at 57.

¹²⁴ Glyn Wittwer and Jamie Dixon, Effective Use of Public Funding in the Murray-Darling Basin: A Comparison of buybacks and infrastructure upgrades, (2013) 57 *Agricultural and Resource Economics*, 399-421.

The third chapter presents the methodological approach to answering the research questions and developing the thesis argument. The methodology chapter builds upon the new institutional economics framework articulated in chapters one and two, and introduces the qualitative survey method, the international comparative law method and the documentary analysis method. A qualitative research survey was undertaken at the height of the drought period in 2008 to examine:

- (i) willingness to sell water to environmental government buyers and;
- (ii) investigate gaps in the law relevant to addressing conflict between environmental and socio-economic uses of water. Triangulation involving international comparative law and the documentary analysis method was used to confirm conclusions emanating from the qualitative study.

Chapter Four presents the data and key findings emanating from the qualitative interviews with irrigators in four significant irrigated agriculture regions of the Murray-Darling Basin where over-allocation of water was present. The selected regions are the upper Condamine in Queensland, Border Rivers in Queensland and NSW, Murrumbidgee in NSW, and Goulburn-Murray, in Victoria. The data and key findings from interviews with government officials at the Federal and State level undertaken in 2008-09 are also presented in Chapter Four.

Chapter Five presents the analysis of the data and key findings on the two research questions, divided into two parts, the limits of the water market and inadequacies of water law and public institutions. Part I concerning the limits of the water market for delivering environmental flows, presents three interconnected findings, namely:

- (1) the endowment effect;
- (2) the central concern for the rural economy and transition economy requirement;
- and (3) the free rider effect.

The initial findings were published in 2008 and 2009 as detailed in the next section with reference to Chapter Five.

Part 2 concerning the inadequacies of law and public institutions presents three interconnected findings:

- (1) lack of confidence in government institutional capacity to manage environmental flows;
- (2) mistrust in government's sense of fairness toward rural communities; and
- (3) absence of adequate conflict resolution mechanisms and rules.

Chapter Six presents a comprehensive reform model for water governance in the Murray-Darling Basin. The first part of the reform model concerns addressing limits of the water market with reference to transition economy institutional linkage rules. Information communication technology is proposed as a viable transition option. The second half of the reform model concerns the inadequacies of the law for resolving conflict between competing environmental and socio-economic uses of water. The conflict resolution model substantially extends the "no significant harm" rule found in customary international water law, with reference to cost-benefit analysis and compensation rules, for disputes between State and Federal government. A daily operational rule model is proposed for the mitigation and resolution of intra-regional conflict.

Chapter Seven presents the conclusions highlighting the major contributions of the thesis.

1.11 PUBLICATIONS FROM THE THESIS

The following paper was published from Chapter One, Introduction:

- (i) Thampapillai V., (2006) Sustainable Development and Water Trade along the Murray-Darling River Basin, *Environmental Policy and Law* 36 (1), 42-48.

The following papers were published from Chapter Two, Literature Review:

(ii) Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 1, *Environmental Policy and Law* 39 (4-5), 247-265.

(iii) Thampapillai V., (2007) Water Governance in Sweden, Working Paper Series, Department of Economics, Swedish University of Agricultural Sciences, Uppsala, Sweden.

The following papers and conference papers were published from Chapter Five and Two, Analysis and Literature Review:

(iv) Thampapillai V (2008), Limits to the Willingness to Sell to Government Water Buy-backs in the Murray-Darling Basin, *Canadian Law and Economics Conference, University of Toronto, Canada, 26-27 September 2008.*

(iv) Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 2, *Environmental Policy and Law* 39 (6), 317-322.

(v) Thampapillai Vinoli, Environmental and Human Rights to Water in the Murray-Darling Basin: The Federal Water Act 2007, The Water Amendment Act 2008 and Lessons from International Water and Trade Law, presented at the *Nordic Environmental Social Sciences Conference, Stockholm University, Stockholm Resilience Centre and Stockholm Environment Institute, Sweden, 14-16 June 2011* and *Canadian Law and Economics Conference, Faculty of Law, University of Toronto, Canada September 23-24, 2011.*

(vi) Thamapillai V., (2011), International Water Law for Transboundary Resource Management: Environmental and Human Rights, *Environmental Policy and Law*, 41 (3), 127-135.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will address the existing literature concerned with the two central research questions articulated earlier as follows:

(i) The first research question seeks to understand the limits of one form of market based water governance, water buybacks. This form of governance is designed to reconfigure private water rights toward environmental water rights in the Murray-Darling river system to build ecosystem resilience.

Part I of the literature review will address the literature relevant to the first research question. One of the impediments to reconfiguration is irrigators' misconception of their property rights to water as full private rights rather than tradable usufructory rights.¹²⁵ The first section will review conceptions of property relevant to the reconfiguration of water rights toward environmental property in the Murray-Darling Basin. The next sections will review the literature relevant to three key possible limitations to government environmental buybacks. These sections concern:

- (i) the endowment effect, which involves the psychology of holding onto property;
- (ii) the free rider effect, which is predicted to adversely affect water sales;
- (iii) studies on socio-economic impacts of government water buybacks and economic transitions.

The final section will review the general literature on government water buyback programs in the MDB and internationally, with reference to willingness to sell.

In light of the importance of ecosystem resilience, the second research question seeks to identify the necessary public institutional and legal reforms to resolve the conflict between environmental and socio-economic uses of the Murray-Darling river

¹²⁵ John Marsden, *Water Entitlements and Property Rights: An Economic Perspective*, 2002, *Property*, 43-54.

system. Part 2 will address the second research question. The first section of Part 2 reviews the literature on the new institutional economics of water management. The second section reviews the critical analyses of the *Water Act 2007*, *Water Amendment Act 2008*, the MDB Plan Law and preceding draft documents, with a focus on compensation rules. The final section reviews the literature on the no significant harm rule in the international water law and cost-benefit analysis rules.

PART 1 – THE LIMITS OF MARKET BASED WATER GOVERNANCE

2.2 PROPERTY AND WATER

Understanding different property regimes is important for comprehending the difficulties associated with reconfiguring private property in water to environmental flows in the MDB, where water resources as a whole are a common property resource. The standard property trilogy is private property, state property and commons property (open access)¹²⁶.

Private Property: Blackstone articulated private property to be “that sole and despotic dominion which one man claims and exercises over the external thing of the world, in total exclusion of the right of any other individual in the universe”.¹²⁷

State Property: is held by the government for the benefit of society, where rules are established for inclusion and exclusion.

Commons Property: in this context refers to open access property, which is used by all, where no individual may exclude entry and deny privilege of use. For example, open air, deep oceans, unregulated forests, streams and lakes. Hardin (1968) devised the phrase “tragedy of the commons” to explain the situation where open access leads to over-utilization of the resource causing degradation.¹²⁸

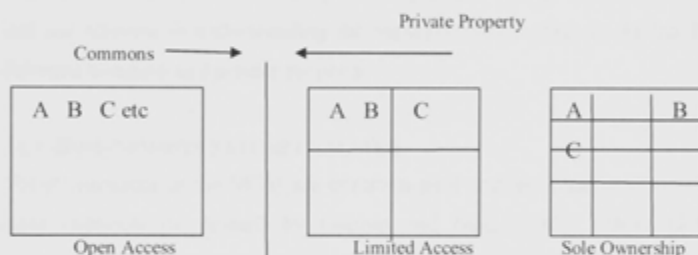
¹²⁶ Open access commons property involves unlimited access, use and no right of exclusion. Limited access common property is distinguishable, where “the members of a clearly demarked group have a legal right to exclude non-members of that group from using a resource”. See Elinor Ostrom and Charlotte Hess, *Private and Common Property Rights*, *Encyclopedia of Law and Economics*, Northampton, MA, Edward Elgar, 2008 at 6.

¹²⁷ William Blackstone, *Commentaries on the Laws of England*, University of Chicago Press, 1979.

¹²⁸ Garrett Hardin, *The Tragedy of the Commons*, (1968) 162, *Science*, 1243-1248.

Hardin was preceded by Aristotle in identifying the tragedy of the commons.¹²⁹ Heller (2001) states that when the tragedy of the commons arises, liberals and utilitarians seek privatization or state control solutions respectively. However, excessive privatization or fragmentation of the commons, as has occurred in the MDB, can have the same impact as the tragedy of the commons (see Figure 2.1, right arrow). Communitarians instead seek to identify the “limited circumstances in which close knit groups can avoid tragedy”.¹³⁰

Figure 2.1 The Boundaries of Property



Source: Michael Heller, 1998¹³¹

Michael Heller (2001) argues that the static standard trilogy is outdated.¹³² The author states that property theory should be dynamic to allow new forms of property to be recognized, and seeks recognition of existing and “emerging property relations” which have remained invisible, due to the entrenchment of the standard trilogy of property.

¹²⁹ S Everson (Ed), B Jowett (trans), *Aristotle. The Politics and the Constitution of Athens*, Cambridge University Press, 1996.

¹³⁰ Michael A Heller, The Dynamic Analytics of Property Law, (2001) 2(79) *Theoretical Inquiries in Law*, 79-94.

¹³¹ Michael A. Heller, The Tragedy of the Anticommons: Property in Transition from Marx to Markets, (1998) 2 *Harvard Law Review*, 621.

¹³² *Supra* note 124; Hanoch Dagan and Michael Heller, The Liberal Commons, (2001) *Yale Law Journal*, 110:549

Heller explains that the boundaries of the trilogy are in fact dynamic. When resources are limited, private property rights emerge from common property, in the form of limited access property rights as termed by Heller (2001), and termed collective properties by Rose (2000).¹³³ Figure 2.1 illustrates this movement of property between boundaries, from the commons to the limited access (left arrow).

Collective property as termed by Carol Rose (2000) includes, common pool resources (custom based common fields, fisheries, community irrigation works, forests), associations (clubs and churches), semi-commons, liberal commons, and limited commons properties. These conceptions of property will be explained later in the Chapter and are relevant to understanding the management of water in the MDB which moves between common and private property.

2.2.1 SEMI-COMMON NATURE OF WATER

Water resources in the MDB are common pool resources and semi-common. Common pool resources as defined by Ostrom and Hess (2007), “share two attributes of importance for economic activities: (a) it is costly to exclude all individuals from using the good either through physical barriers or legal instruments; (b) the benefits consumed by one individual subtract from the benefits available to others”.¹³⁴ The term “semi-commons” was first constructed by Henry Smith to describe certain common pool resources, such as water, which can be described as fugitive in nature and where the full exclusion as achieved in private landed property is difficult. Semi-commons refers to a state in which the commons and private property coexist and interact due to the physical nature of the resource.¹³⁵ Water in the MDB is a common pool resource when flowing in the river and held as private property, when stored in private farm dams by irrigators who hold usufructory rights to extract water from the river. As water is a fluid resource, water

¹³³ Carol Rose, *Left Brain, Right Brain and History in the New Law and Economics of Property*, *Yale Law School Scholarship Series*, (2000) 1801.

¹³⁴ Elinor Ostrom and Charlotte Hess (2008), *Supra* note 125.

¹³⁵ Henry Smith, *Governing water – semi-commons of fluid property*, (2008) 50 *Arizona Law Review*, 445-478.

from dams, seep into the soil and reach ground water aquifers, making exclusion difficult. Evaporation and leakages from irrigation channels, may return water to common pool surface ground water stores

Henry Smith (2008) observed that the fluid nature of water means exclusion strategies are difficult to apply, as water moves freely between common and private property. There are three central consequences of semi-commons property:

- (i) high information costs attached to measuring, monitoring, policing flows and enforcement.
- (ii) strategic behaviour in the semi-commons involves collection of all benefits by private users, who “however face a fraction of costs”, the consequence of which is over use and free riding.
- (iii) the need for extensive governance rules.

These three features of semi-commons property imply that cooperation is important.

Governance of the Semi-commons

As a consequence of the interaction between common and private property, governance rules are essential for the management of the semi-commons. Smith (2008) observes that where uses and endowments are homogenous it is “easier to devise governance rules” as incentives exist for reaching an agreement.¹³⁶ Agreement is difficult to secure when interests are heterogeneous. High costs are incurred in these circumstances when a need to change governance systems arises as conditions shift. Governance rules can then become obsolete, where users make strategic decisions to override rules.¹³⁷ Fennell (2009) observes that in the context of challenges arising in the semi-commons, over-use or under-use can occur.

Fennell (2009) argues that “governance mechanisms for reversibility are important in the semi-commons as one property right regime may offer superior benefits

¹³⁶ Henry Smith, *Semi-common Property Rights and Scattering in the Open Fields*, (2000) 29 *Journal of Legal Studies*, 131 at 140.

¹³⁷ Henry Smith, *Governing the Tele-semicommons*, *Yale Law School Legal Scholarship Repository*, 2005 at 296-97.

over the other, over time under changing circumstances".¹³⁸ Fennell (2009) notes that creating rules which permit flexible reversibility of the shares of common and private rights in a semi-commons, may not prevent all strategic behaviour. The author further notes, "the new mixes may reduce the tendency to behave strategically by improving returns to the majority".¹³⁹

Libecap (2008) and Libecap and Smith (2001) suggest that unitization in the management of oil or gas is a method of delivering socially optimal returns. Unitization involves "a single firm, often with the largest leased area, designated as the unit operator to develop the field as a whole. The other firms share in the net returns with the unit operator based on negotiated formulas".¹⁴⁰ Unitization overcomes the tragedy of fragmentation where over-privatization leads to overuse.¹⁴¹ Libecap (2008) observes that unitization has been difficult to achieve as a consequence of strategic behaviour and conflict over management rules and revenue sharing. Unitization may be compared to the Federal government take-over of the MDB where all State water plans must ultimately comply with the Federal Basin Plan. That is, the MDB is treated as one unit, where the Federal government is equivalent to the unit operator, negotiating of formulas for extraction, use and conservation. State governments are akin to the smaller firms which function under the direction of the unit operator.

Water Rights in the Semi-commons

Schlager and Ostrom (1992) state that for most common pool resources, the most pertinent operational rules for property rights are access and withdrawal. Access is

¹³⁸ Lee Anne Fennell, Commons, Anticommons, Semicommons, *John M. Olin, Law and Economics Working Paper, No. 457*, The Law School, University of Chicago, 2009 at 18-19.

¹³⁹ *Ibid* at 18-19.

¹⁴⁰ Gary Libecap, Unitization, *New Palgrave Dictionary of Law and Economics*, 2008; Gary Libecap and James Smith, Regulatory Remedies to the Common Pool: The Limits to oil field unitization, 2001, 22(1), *The Energy Journal*, 1-26.

¹⁴¹ Eric Freyfogle, Tragedy of Fragmentation, (2002), 36(2), *Valparaiso University Law Review*, 307-337.

defined as “the right to enter a defined physical property”. Withdrawal is defined as “the right to obtain the product of resources”. The authors note that individuals possessing access and withdrawal rights do not always have the right to participate in collective choice decisions.¹⁴²

Schlager and Ostrom (1992) observe that collective choice property rights for common pool resources, involve exclusion, management and alienability. Management is “the right to regulate internal use patterns and transform the resource by making improvements”. Exclusion is “the right to determine who may have access, and how that right may be transferred. Alienation is “the right to sell or lease” all or any of the bundle of rights. The Murray-Darling river system is a semicommons, where irrigators possess rights of access, withdrawal and alienability, and collective choice decisions are made by the Federal and State governments. However, irrigators can impact collective choice decisions through choosing to provide or withdraw cooperation and lobbying government.

2.2.2 EMERGENCE OF NEW FORMS OF PROPERTY RIGHTS

Demsetz (1967) states that property rights “convey the right to benefit or harm others”.¹⁴³ Externalities are harmful or beneficial by-products of productive activities, which affect external parties, the cost of which is not absorbed by the producer exercising property rights. Internalization involves bearing of the cost of the externality produced by the property right holder. The author observes that the externality occurs when “the cost of internalization exceeds the gains of internalization”. Demsetz (1967) argues that new property rights will emerge to internalize the costs of an externality, where the gains of internalization exceed the costs of internalization. New property rights emerge when perceptions of costs and benefits of irrigated agricultural production change.¹⁴⁴

¹⁴² Edella Schlager and Elinor Ostrom, Property Rights Regimes and Natural Resources: Conceptual Analysis, 1992, 68 (3) *Land Economics* 1992 at 250 to 251.

¹⁴³ Harold Demsetz, Toward a Theory of Property Rights, 1967, 57(2), *The American Economic Review*, 347-359 at 350.

¹⁴⁴ *Ibid* at 350.

The effects of unsustainable use of the Murray-Darling river system were realized in the 1990s, leading to a reassessment of the costs and benefits of irrigated agricultural production. A cap and trade system introduced in 1994-97 to address environmental concerns, involved the legal separation of land and water title, creating a new separate property in water. The new right property in water comprises access, withdrawal and alienability. This property right is a tradable usufructory right which provides equity for borrowing.

It was hoped that water use would be capped to protect the environment, and that traded water would move to the highest value uses through market forces. However overuse of the water resources of the MDB continued even though water trade was successful. The externalities caused by over-extraction were not internalized by users. The re-evaluation of costs of environmental degradation led to a Commonwealth takeover of the Murray-Darling Basin. This involved the creation of a new Commonwealth property in environmental water.

That is a new environmental property right emerged as the costs of internalization of the externality (environmental degradation) was less than the benefits of restoring the river system.

However, the State and Commonwealth governments hold multiple exclusion rights over the environment water in the MDB, in accordance with the section 100 of the constitution and the *Water Act 2007*.

2.2.3 ANTI-COMMONS

The anti-commons arises in a situation where there exist multiple exclusion rights over a given property. These exclusion rights are held by two or more legal entities or exercised informally.¹⁴⁵ The concept was first articulated by Michelman (1982, 1985), however the term “anti-commons” was first constructed and expanded by Heller (1998).

¹⁴⁶ The anti-common property in environmental water in the MDB is being constructed

¹⁴⁵ Michael Heller, *The Tragedy of the Anticommons: A concise Introduction and Lexicon*, 2013, 76(1), *Modern Law Review*, 6-25.

¹⁴⁶ Frank Michelman, *Ethics, Economics and the Law of Property*, in J. Roland Pennock and John W. Chapman (Eds), *Nomos XXIV: Ethics, Economics and the Law*, NYU Press, 1982 at 6 and 9; Frank

by reconfiguring irrigators' water entitlements to environmental property through the water buyback or on-farm water savings infrastructure improvements. The latter is painfully slow and is strategically favoured by irrigators even though they can cost up to four or five times more than government water buybacks.¹⁴⁷ Once reconfiguration occurs, water held as environmental property in the anti-commons is managed by Federal and State governments holding multiple exclusions rights.

Heller (1998) first explained the concept of the anti-commons with reference to Moscow's economic transition from socialism to privatization, where multiple exclusion rights were bestowed to local government councils, workers' collectives, privatization agencies, and regional and federal regulators over stores.¹⁴⁸ Under stocking of stores occurred as multiple exclusion rights were activated. Buchanan and Yoon (2000) explain the dilemma of the anti-common with reference to the example of a parking lot, where persons A and B hold rights of exclusion, leading to a situation where persons must obtain permits from both persons A and B in order to park.¹⁴⁹ The anti-common arises in the MDB, where two legal entities, the Commonwealth government and the MDB State governments exercise exclusion rights over the management of the entire MDB. The anti-common property in water in the MDB arises from reconfiguration of private property toward the environment. Figure 2.2 articulates the nature of this reconfiguration, involving movement from different states of ownership, that is the commons and private property, en route to the anti-commons.¹⁵⁰

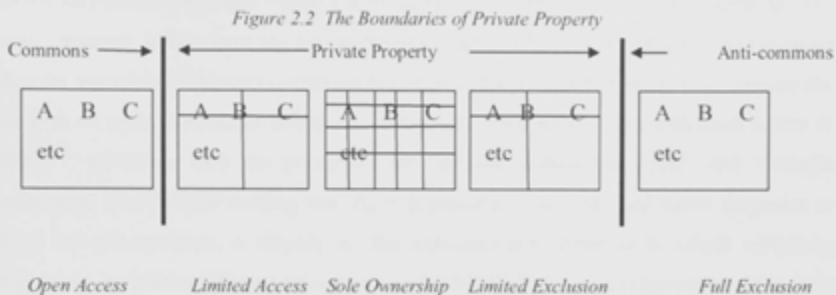
Michelman, *Is the Tragedy of the Common Inevitable?*, remarks at Property Panel, AALS, January 1985 (unpublished manuscript); *Supra* note 125.

¹⁴⁷ Quentin Grafton, *How to Increase the Cost-Effectiveness of Water Reform and Environmental Flows in the Murray-Darling Basin*, (2010) 17(2) *Agenda*, 17-40; John Quiggin, Tillak Mallawarachi, Sarah Chambers, *Water Policy Reform: Lesson in Sustainability from the Murray-Darling Basin*, Edward Elgar, 2012; Glyn Wittwer and Janine Dixon, *Effective Use of Public Funding in the Murray-Darling Basin: A comparison of buybacks and infrastructure upgrades*, (2013) 57(3), *Australian Journal of Agricultural and Resource Economics*, 399-421.

¹⁴⁸ *Supra* note 125.

¹⁴⁹ James Buchanan and Yong Yoon, *Symmetric Tragedies: Commons and Anti-commons*, (2000) 43(1), *Journal of Law and Economics*, 1-13.

¹⁵⁰ *Supra* note 125.



Source: Michael Heller (1999), Yale Law Journal

2.2.4 TRAGEDY OF THE ANTI-COMMONS

Heller (1998) explains that where there are multiple rights of exclusion, there is a tendency for the resource to be under-utilized. In the case of Moscow's transition economy, the storefronts remained empty due to the veto rights held by multiple parties constraining stocking of stores. In the case of the parking lot, the space will be under-utilized where persons A and B do not cooperate and coordinate decisions on assigning permits. The under-utilization was termed by Heller (1998) a tragedy of the anti-commons. This circumstance is the mirror image of the tragedy of the commons, where no rights of exclusion exist and overuse occurs. Fennell (2009) observes that while Heller (1998, 2008) made the concept of tragedy of the anti-commons prominent, numerous other scholars had previously identified inefficiencies arising from multiple rights of veto, with reference to Arrow (1979), Buchanan (1973), Demetz (1967) and Krier (1992).¹⁵¹

¹⁵¹ *Supra* note 132; Kenneth Arrow, The Property Rights Doctrine and Demand Revelation Under Incomplete Information, in Michael J. Boskin (Ed), *Economics and Human Welfare*, New York, Academic Press, 1979, 23-39; James Buchanan, The institutional structure of Externality, 1973, 14, *Public Choice*, 69-82; Harold Demetz, Toward a Theory of Property Rights, 1967, 57, *American Economic Review*, 347-

While Heller (1998, 2008) identifies the tragedy of the anti-commons as underuse through multiple exclusion rights in conflict, Fennell (2009) argues that the first tragedy of the anti-commons occurs where it is difficult to assemble privatized fragments into the anti-commons, only where the anti-commons is more efficient. Fennell (2009) observed that the assembly of the anti-commons becomes difficult where property rules require the consent of each entitlement holder and where the price set by the entitlement holder is high.¹⁵² Assembly may be prevented by “routine transaction costs” and strategic behaviour, for example holding out. As it is possible to secure a substitute fragment to form an anti-common, a tragedy of the anti-common occurs only where substitute fragments are absent. This situation exists in the MDB. Hence reconfiguration of property rights to the environment by the least cost method, government water buybacks from willing sellers, is resisted by irrigators and upstream States.

2.2.5 PROPERTY IN WATER AS A BUNDLE OF RIGHTS AND RESPONSIBILITIES

Heller (2001) argues that the conceptualization of property ownership as a bundle of rights “poorly describes emerging property innovations and problems”. The author further states that the old conception of “property-as-thing” and the bundle of rights concept are both inadequate in describing “legal structures for scarce resources”. In the late 1800s Hohfeld constructed the concept of property as a “complex aggregate of social and legal relationships made up of rights, privileges, duties and immunities”.¹⁵³ For water the conceptualization of rights and interdependent responsibilities is most important in the context of environmental degradation. In her article Property as a Keystone Right, Carol Rose proposed water as “a core organizing image for property” over land. Here the author states:¹⁵⁴

359; James Krier, The tragedy of the commons, Part Two, 1992, 15, *Harvard Journal of Public Policy*, 325-347.

¹⁵² *Supra* note 132.

¹⁵³ Michael A Heller, The Dynamic Analytics of Property Law, (2001) 2(79) *Theoretical Inquiries in Law*, 79-94; Hanoch Dagan and Michael Heller, The Liberal Commons, (2001) *Yale Law Journal*, 110:549

¹⁵⁴ Carol M. Rose, Property as the Keystone Right?, Yale Law School Legal Scholarship Repository, (1996) 1801.

“But why is land – immovable, enduring land – the central symbol for property? Why not say water? Water, after all, is in fact the subject of important and valuable property rights, and indeed, concerns about water can substantially modify the rule about land. If water were our chief symbol for property, we might think of property right – and perhaps other rights – in a quite different way. We might think of rights literally and figuratively as more fluid and less fenced-in; we might think of property as entailing less of the awesome Blackstonian power of exclusion and of the qualities of flexibility, reasonableness and moderation, attentiveness to others and cooperative solutions to common problems.”

This conceptualization is relevant in the MDB, as the river water is a semi-common. The presence of a semi-common resource, requires cooperation and implementation of shared responsibilities by the affected parties.

2.2.6 BOUNDED RATIONALITY AND KEY LIMITATIONS OF THE WATER BUYBACK

Water for environmental flows in the MDB requires the reconfiguration of water held as private property to the anti-commons as environmental property held by the state. The first manner in which reconfiguration occurs is through the voluntary participation in the water buyback program. This section concerns the impact of emotions attached to private property rights which may limit the success of reconfiguration of property rights through water markets. In New Institutional Economics (NIE) the relaxation of the assumption of rationality, requires the need for investigation of individual mental models on the operation of the market as an institution, as articulated in Chapter One. In the qualitative survey undertaken in this research the mental models of irrigators were investigated with reference to the concept of bounded rationality. The assumption of bounded rationality, first articulated by Herbert Simon (1957), explains how individual decision making is bounded by imperfect information, variations in mental computational capacities and varied emotional responses.¹⁵⁵ In the investigation of bounded rationality

¹⁵⁵ Herbert Simon, A Behavioural Model of Rational Choice, in *Models of Man, Social and Rational: Mathematical Essays on Rational Behaviour, in a social setting*, New York, Wiley, 1957; L. Venkatachalam, Behavioural Economics for Environmental Policy, (2008) 67, *Ecological Economics*, 640-645; Cars Hommes, Bounded Rationality and Learning in Complex Markets, in Barkley Rosser (Ed), *Handbook of Economic Complexity*, Cheltenham: Edward Elgar, 2008.

of irrigators in the MDB conducted in this research, three themes emerged, namely the endowment effect, the free rider effect and concern for the rural economy. Hence the literature in these areas is presented below.

2.3 THE ENDOWMENT EFFECT

The endowment effect refers to the initial assignment of property, the effect of which has been shown to place a limitation on trading activity in numerous contexts. This occurs because the willingness to accept (WTA) payment to relinquish property owned, far exceeds the willingness to pay (WTP) to acquire the same property. The presence of an endowment effect means that vendors will refuse to reduce selling prices to meet consumer demand. Thaler (1980) first named the increased valuation given to a property owned in full and the tendency to hold onto this property, the endowment effect.¹⁵⁶ However in creating the concept of the endowment effect, the author referred to hypothetical wine bottles appreciating in value. Surveys or experimental testing of willingness to sell appreciating tangible assets, including water attached to farm properties, to illustrate and develop the theoretical point were not undertaken.

Knetsch and Sinden (1984) ran early experiments which confirmed the presence of the endowment effect with reference to lottery tickets.¹⁵⁷ However, it was argued by Coursey, Hovis and Schultze (1987) that the gap between willingness to accept and willingness to pay would decrease with extended market experience. That is in a one-shot attempted selling experience, potential sellers may tend to over-value their asset in the market place decreasing the tendency to sell, while experienced sellers would avoid this error.¹⁵⁸ In response, Kahneman, Knetsch and Thaler (1990) undertook further experiments with reference to opportunity to learn from experience in the market place,

¹⁵⁶ R. Thaler, Toward a Positive Theory of Consumer Choice, (1980) 1 *Journal of Economic Behaviour and Organization*, 39-60.

¹⁵⁷ J. Knetsch and J.A. Sinden, Willingness to Pay and Compensation Demanded: Experimental Evidence of an Unexpected Disparity in Measures of Value, (1984) 99 *Quarterly Journal of Economics*, 507-521.

¹⁵⁸ D. Coursey, J. Hovis and W. Schulze, The Disparity between willingness to accept and willingness to pay measures of value, (1987) 102 *Quarterly Journal of Economic*, 679-690; D. Kahneman, J. Knetsch and R. Thaler, Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias, (1991) 5(1) *The Journal of Economic Perspectives*, 193-206 at 194.

underscoring the importance of the initial assignment of property rights. It was shown that once individuals were granted full possession of good, even with market experience, their willingness to part with that good in exchange for another good or dollars, may decline.¹⁵⁹ That is willingness to accept exceeded willingness to pay by a noticeable amount. However, only small consumer goods such as coffee cups, Swiss chocolate bars, and pens were used in classroom experiments.

The repeated experiments lead to the conclusion that the endowment effect can result in under-trading, disputing the Coase theorem which argues that in the presence of low transaction costs, parties will trade to the same point regardless of the initial assignment of property rights.¹⁶⁰ The experiments run by Kahneman, Knetsch and Thaler (1990), were controlled for both low transaction costs and income effects, which were observed to be trivial. That is, there is normally ease of trade in small inexpensive consumer goods given minimal transaction costs accompanied by stable and relatively uniform student incomes across classroom experiments. Transaction costs are expenses incurred during the process of buying and selling, such as lawyers fees, information costs and transportation costs. The positive income effect refers to the increase in demand for a good or service and increased consumption of superior goods when income rises. A negative income effect gives rise to the opposite outcome.

When can the endowment effect be observed?

The endowment effect is observed in times of scarcity, where less expensive consumptive good substitutes are not available.¹⁶¹ Kahneman, Knetsch and Thaler (1990) also observed that individual economic valuation of the initial endowment can also increase with reference to sentimental attachment.¹⁶² However the presence of

¹⁵⁹ D. Kahneman, J. Knetsch and R. Thaler, "Experimental Tests of the Endowment Effect and the Coase Theorem, (1990) 98(6) *The Journal of Political Economy*, 1325-1348.

¹⁶⁰ A. Richards and N. Singh, *No Easy Exit: Property Rights, Markets and Negotiations over Water*, USC Department of Economics Working Paper, No. 463, 2000.

¹⁶¹ *Supra* note 153.

¹⁶² See George Stigler and Gary Becker, *De Gustibus Non Est Disputandum*, (1977), 67(2) *The American Economic Review*, 76-90.

sentimental attachment was not covered in their experiments. Hoffman and Spitzer (2002) refer to Radin's general observation that "property may become bound up with an individual's personality", such as "favourite clothing, a wedding ring", family jewelry or the "traditional family home".¹⁶³ Thaler (1980) and Kelman (1979) observed that where an individual has financially invested in an endowment which appreciates in value, the individual is less likely to be willing to sell, contributing to a stronger endowment effect.¹⁶⁴ In his study Kelman (1979) made the reference to financial investments in a good or service, such as a house or tennis club membership.¹⁶⁵

Venkatachalam (2008) notes that endowment effect is found where "commitment costs arising from uncertainty, irreversibility and limited market learning experiences" exist.¹⁶⁶ Kahneman, Knetsch and Thaler (1991) and Knetsch and Sinden (1984:517) also documented two concepts related to uncertainty and irreversibility, explaining the endowment effect, namely "loss aversion" and "status quo bias". The latter two concepts emerge directly from Kahneman and Tversky's (1979) prospect theory.¹⁶⁷ In prospect theory, there exists a loss or regret aversion attached to the future prospect of giving up an endowment. It is stated that the size of the psychological pain attached to giving up a good, outweighs any potential gain in giving up a good where the endowment effect exists. Status quo bias emerging from prospect theory, is therefore the tendency to keep the same bundle of goods or "remain at the status quo", as consequence of the loss aversion embedded in the endowment effect. Hoffman and Spitzer (2002) observe that the law can contribute to status quo bias creating an endowment effect. By way of explanation, the authors refer to expectation of high level of education, where the law has

¹⁶³ Margaret Radin, Property and Personhood ,(1982) 34, *Stanford Law Review* 957 cited in Elizabeth Hoffman and Matthew Spitzer, Willingness to Pay vs Willingness to Accept: Legal and Economic Implications, (1993) 71, *Washington University Law Review*, 59-114 at 90.

¹⁶⁴ *Supra* note 150 at 46-47.

¹⁶⁵ Mark Kelman, Consumption Theory, Production Theory and Ideology in the Coase Theorem, (1979) 52 *California Law Review*, 669.

¹⁶⁶ L. Venkatachalam, (2008) *Supra* note 149 at 641.

¹⁶⁷ Daniel Kahneman and Amos Tversky, *Prospect Theory: An Analysis of Decisions Under Risk*, (1979) 2 *Econometrica*, 263-292.

protected educational levels in society, and clean streets where the law has provided citizens with the entitlement to clean streets.

Kahneman, Knetsch and Thaler (1990:1326), refer to studies on access to public goods, where the “perceived illegitimacy” of the sale of a public good inhibits trading activity and the demand for compensation is large.¹⁶⁸ Hovenkamp (1991) and Horowitz and McConnell (2002) observed that the gap between WTA and WTP for entitlements to public goods, which are not commonly traded, is much higher than for private goods.¹⁶⁹ Hovenkamp (1991) cites Hammack and Brown (1974) who found that “hunters would pay \$247 on average to preserve a wetland hunting area, but would require \$1044 to release an entitlement to it they already had.”¹⁷⁰

With respect to water, Gaffney (1997) observed hoarding behavior in American water markets attributed to a perception of perpetual increasing demand for water.¹⁷¹ In the Chilean context Bauer (1998) observed that “centuries of labor to [move] water to dry lands and the constant threat of drought” encouraged Chilean farmers to hold water entitlements regardless of the cost. That is, harsh circumstances giving rise to water scarcity led to a higher valuation by the individual holding property. However in both contexts the authors did not articulate and seek to apply the theory of the endowment effect. This anecdotal evidence tends to suggest that water is a good for which the endowment effect is present, worthy of deeper investigation.

¹⁶⁸ Robert Rowe, D. D’Arge, C. Ralph and David S. Brookshire, An Experiment on the Economic Value of Visibility, (1980) 7, *Journal of Environmental Economics and Management*, 1-19.

¹⁶⁹ Herbert Hovenkamp, Legal Policy and the Endowment Effect, (1991), 20(2) *The Journal of Legal Studies*, 225-247 at 228; John Horowitz and Kenneth McConnell, A Review of WTA/WTP Studies, (2002) 44, *Journal of Environmental Economics and Management*, 426-447; See also Elizabeth Hoffman and Matthew Spitzer (1993) *Supra* note 157.

¹⁷⁰ J. Hammack, and G.M. Brown, *Waterfowl and Wetlands: Toward a Bioeconomic Analysis*, Baltimore: John Hopkins Press (for resources for the future), 1974, cited in Herbert Hovenkamp, (1991) *Supra* note 163.

¹⁷¹ M. Gaffney, “What Price Water Marketing? California’s new frontier” (1997) 56 *The American Journal of Economics and Sociology*, 475-521.

When is the endowment effect absent?

Kahneman, Knetsch and Thaler (1990) note, that the endowment effect is not uniformly observed. For, example there is no endowment effect for goods deliberately purchased for re-sale. The authors also demonstrated in the experimental use of tokens to mimic securities trading, that the willingness to accept and willingness to pay converges, supported by other experimental studies mimicking the securities market.¹⁷² The authors further acknowledged that sellers may overstate willingness to accept to increase the sale price. Hoffman and Spitzer (2002) observe that the notable multi-period work by Coursey, Hovis and Schulze, Knez Smith and Williams, and McLelland and Schulze refute the presence of the endowment effect for items such as lottery tickets and items for which risk exists.¹⁷³ Hoffman and Spitzer (2002) further argue with reference to general evidence of consumer behaviour, that individuals regularly trade goods such as used cars, clothing and housewares, in contrast to coffee cups, chocolate and pens used in the Kahneman, Knetsch and Thaler (1990) experiments, which are consumer goods which individuals are unaccustomed to re-selling. The authors argue that experimental evidence on the endowment effect requires independent replication outside the experimental setting to be regarded as a "sound and convincing" theory.

Critique of the Experimental method

Horowitz and McConnell (2002) observed that the reason why Kahneman, Knetsch and Thaler's body of experimental work on the endowment effect has not had a major effect on economic models and policy, is due to two factors. First is the use of hypothetical payments, student classroom subjects and no incentive structure built into questions for participants to reveal their true WTP (known as incentive compatible elicitation). The second criticism pertains to the "absence of a rich set of behavioural

¹⁷² See Elizabeth Hoffman and Matthew Spitzer, (1993) *Supra* note 157 at 81.

¹⁷³ D. Coursey, J. Hovis and W. Schulze, The Disparity between Willingness to Accept and Willingness to Pay Measures of Value, (1987) 102, *Quarterly Journal of Economics*, 679-690; Peter Knez, Vernon Smith and Arlington Williams, Individual Rationality, Market Rationality and Value Estimation, (1985) 75, *American Economic Review*, 397-402; Gary H. McLelland and William D. Schulze, *The Disparity Between Willingness to Pay Versus Willingness to Accept as a Framing Effect*, in Donald Brown and J. Keith Smith Eds., *Frontiers of Mathematical Psychology: Essays in Honor of Clyde Coombs*, 1991;

patterns”, comparing ratios of WTA/WTP across goods. That is, the number of studies on real world goods outside the classroom or laboratory hypothetical analytical framework is low in number.¹⁷⁴ Furthermore it is also argued that a survey method would elicit a truer picture of seller preferences with regard to the presence of the endowment effect.

Implications of the endowment effect finding for law and economics of the environment

The “basic independence assumption” accepted in standard economic models states that “people will evaluate commodities independently” of ownership.¹⁷⁵ This assumption underpins the Coase Theorem and the credible possibility of achievement of Kaldor-Hicks compensatory efficiency by market negotiation. Hoffman and Spitzer (2002) observe that the Coase Theorem is the “starting point for much economic analysis of legal rules”.¹⁷⁶ The authors further observe most surveys pertaining to environmental goods request data on individual willingness to pay rather than willingness to accept for conservation of environmental goods within a cost-benefit analysis framework. This is due to an assumption that the gap between willingness to pay and willing to accept is minimal (less than five percent).¹⁷⁷ Thus mainstream economics largely ignores the endowment effect. This is problematic, at least in some circumstances.

Venkatachalam (2008) argues that application of the Coasian framework to an environmental problem, without accounting for the endowment effect may lead to sub-optimal outcomes.¹⁷⁸ Greater evidence of the circumstances which give rise to the endowment effect in a real world natural resources setting with reference to willingness to accept, will place the endowment effect as a substantial qualification to the Coase

¹⁷⁴ Prof Jack Knetsch, Simon Fraser University, Vancouver, Canada, personal communication.

¹⁷⁵ Elizabeth Hoffman and Matthew Spitzer (1993) *Supra* note 157 at 62.

¹⁷⁶ Elizabeth Hoffman and Matthew Spitzer (1993), *Supra* note 157 at 59.

¹⁷⁷ Hoffmann and Spitzer observe that this assumption arose from the application of Willig’s (1976) finding, later assumed to apply to environmental goods. See Robert D. Willig, Consumer Surplus without Apology, (1976) 66 *American Economic Review*, 589; and for a critique see Duncan Kennedy *Cost-Benefit Analysis of Entitlement Problems: A Critique*, (1981) 33 *Stanford Law Review*, 387.

¹⁷⁸ L. Venkatachalam (2008) *Supra* note 149 at 641.

Theorem, in all standard law and economic analyses of trade in environmental and other goods. Knetsch (1984) further observes that if it is shown that WTA significantly exceeds WTP where the community enjoys clean air or water, the discipline of cost-benefit analysis must use the WTA value over the WTP value irrespective of initial endowment.¹⁷⁹ Whether the discounting of the endowment effect in mainstream economics is a serious inadequacy depends upon the real-world importance of that effect, which, as indicated above, may vary considerably depending upon the context. The particular circumstances of environmental law and economic policy in general and water buy-backs in particular requires further investigation of the presence of the endowment effect for environmental goods in the real world setting, outside classroom and laboratory experiments, in order to re-orient policy making.

Gaps in the literature on the endowment effect

An important gap in the literature exists with reference to the endowment effect and its relationship to the presence of limited trading of privately owned, highly secure water assets to government environmental buyers in the Murray-Darling Basin. The results from this dissertation were the very first to demonstrate the presence of a strong endowment effect in the Murray-Darling Basin with reference to in-person qualitative interviews of forty-one irrigators who were potential sellers, rather than classroom or laboratory experiments.¹⁸⁰ The results on the endowment effect are analyzed in full in Chapter Five of this thesis comprising a major contribution addressing the gap in the literature.

¹⁷⁹ Jack Knetsch, Legal Rules and the Basis for Evaluating Economic Losses, (1984) 4 (1), *International Review of Law and Economics*, 5-13 at 9; Elizabeth Hoffman and Matthew Spitzer (1993) *Supra* note 157 at 107. .

¹⁸⁰ The results were presented in a conference paper in September 2008, at the Canadian Law and Economics Conference, University of Toronto. Preliminary analysis of the results was published in 2009 in the *Journal of Environmental Policy and Law*: Thampapillai V (2008), Limits to the Willingness to Sell to Government Water Buy-backs in the Murray-Darling Basin, *Canadian Law and Economics Conference, University of Toronto, Canada, 26-27 September 2008*; Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 2, *Environmental Policy and Law* 39 (6) , 317-322; Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 1, *Environmental Policy and Law* 39 (4-5), 247-265.

2.4 FREE RIDER PROBLEM

The free rider problem is the tendency for individuals to gain the benefit of consumption of a publicly provided good (in this case sustainable environmental flows), without contributing towards maintenance and payment for the benefit.¹⁸¹ This tendency is greater in larger groups. The tendency to free ride is minimized where benefits can be confined to the contributors.¹⁸²

Grafton (2000) observed that the institution costs of addressing the free rider problem may be high, particularly with reference to enforcement costs.¹⁸³ Arneson (1982) demonstrates why this is so, by contrasting the views of Rawls and Nozick on the matter of the free rider problem with reference to conceptions of justice as fairness. Under Rawls' principle of fairness all beneficiaries of a restriction on liberty by some, must also contribute a payment for the benefit. Nozick argues that imposition of an obligation on beneficiaries is unfair, and draws the analogy of forcing payment for a gift or a scheme which is opposed, noting further that the distribution of benefits may be uneven.¹⁸⁴ That is, where there is no "voluntary acceptance" of a benefit of the sustainable environment in the mind of the recipient, high enforcement costs arise due to a higher tendency to shirk payment.

The presence of the free rider problem in the Murray-Darling Basin is well recognized, given that there is no way to exclude participants who do not contribute to sustainability programs.¹⁸⁵ The unanswered question in the literature is then to what extent is the free-rider problem a limitation to the success of the government buyback program? That is, to what extent does voluntary acceptance of the gift of a sustainable

¹⁸¹ Mancur Olson, *The Logic of Collective Action: Public Goods and The Theory of Groups*, Harvard University Press, 1965.

¹⁸² *Ibid.*

¹⁸³ Quentin Grafton, Governance of the Commons: A Role for the State? (2000) 76(4), *Land Economics*, 504-517. See also Graham R. Marshall, From Words to Deeds: Enforcing Farmer's Conservation Cost-Sharing Commitments (2004), 20(2), *Journal of Rural Studies*, 157-167.

¹⁸⁴ Cited in Richard J Arneson, The principle of Fairness and Free Rider Problems, (1982) 92(4) *Ethics*, 616-633-at 616-617.

¹⁸⁵ See Graham R. Marshall, Farmers cooperating in the commons, A study of collective action in salinity management, (2004) 51 (3-4), *Ecological Economics*, 271-286.

ecosystem exist in the minds of irrigators, leading to the free rider problem. Arneson (1982) refers to Simmons definition of voluntary acceptance, meaning actively seeking and knowingly taking the benefit, which is in this instance a sustainable river system supporting ongoing agricultural production.

2.5 LITERATURE ON THE SOCIO ECONOMIC IMPACT OF THE BUYBACK

Concern for the rural economy was a central preoccupation of irrigators interviewed in this research on the acceptability of the water buyback program. Hence the following section examines the relevant literature regarding the socio-economic impact on water buybacks. A first set of four major studies on the expected social impacts of reduction in water entitlements to meet environmental flows were undertaken under the Living Murray program, predicting serious adverse impacts for regional economies.¹⁸⁶ However a second set of four econometric studies reviewed by the Productivity Commission (2010) contradicted these results.¹⁸⁷ The latter studies are supported by a MDBA (2012) report.¹⁸⁸

¹⁸⁶ Hassall and Associates et al., “*Scoping Study: Social Impacts Assessments of Possible Increased Flow Allocations to the River Murray System*”, MDBC, 2003; M. Fenton, “*Development of a Framework for Social Impact Assessment in the Living Murray: Water Recovery in the Murray Irrigation Area of NSW*”, EBC/MDBC, 2003; J. Edwards, B. Cheers and H. Bjornlund, “Social, Economic and Community Impacts of Water Markets in Australia’s Murray-Darling Basin Region”, (2007) 2(6), *Journal of Interdisciplinary Social Sciences*, 1-10;2006; and MDBC, “*The Living Murray: Scoping of Economic Issues in the Living Murray, with an emphasis on the irrigation sector*”, Commonwealth of Australia, 2004.

¹⁸⁷ P. B. Dixon, M.T Rimmer, and G. Wittwer, *Modelling the Australian Government’s Buyback Scheme with a dynamic multi-regional CGE model*, General Paper, Melbourne, 2009; D. Peterson, G. Dwyer, G. Appels and J. Fry, *Modelling water trade in the southern Murray-Darling Basin*, Productivity Commission Staff Working Paper, 2004; M. Qureshi, J. Connor, M. Kirby, and M. Mainuddin, “Economic Assessment of Acquiring Water for Environmental Flows in the Murray Basin”, (2007) 51, *The Australian Journal of Agricultural and Resource Economics*, 283-303; RMCg and Wakool Shire Council, *Socio-economic impacts: closure of Wakool Irrigation District (or parts thereof)* Wakool Shire Council; see also G. Wittwer, *Confusing Policy and Catastrophe: Buybacks and Drought in the Murray-Darling Basin*, (2011) 30(3) *Economic Papers*, 289-295.

¹⁸⁸ Murray-Darling Basin Authority, *The Socio-Economic Implications of the Proposed Basin Plan*, Commonwealth of Australia, May 2012; see also Glyn Wittwer and Peter Dixon, “*The Economic Impact of the Buy-back Programs*”, in Australian Water Project, “Crisis and Opportunity: Lessons of Australian Water Reform”, CEDA 2011.

The first set of studies observed that community members were particularly concerned that trade in permanent water entitlements would harm water exporting communities. The findings were general with no reference to the degree of impact on willingness to sell. Predicted adverse on-farm impacts of reduced water entitlements identified in the four studies include: increased debt, lower profitability, reduction in the number of farms, reduced farm employment, increases in the prices of water, increases in land values, changes in self-identity, changes in family lifestyle and fewer young people in farming. Predicted off-farm impacts included: reduced employment and expenditure in local towns, increased expenditure outside the area, reduction in the number of local businesses, reduced investor confidence, increased migration outside the area, reduced availability of skills and knowledge in the area. There have been indications that there is social pressure not to sell water out of areas.¹⁸⁹

The second set of studies reviewed by the Productivity Commission (2010) estimated that the impact of the environmental buybacks on the southern MDB system would in fact be small. Wittwer and Dixon (2011) found that the drought was the cause of recent unemployment in the MDB and not the government buyback process. It was argued that the buyback process has the potential to have a “positive marginal impact on regional employment”. Furthermore Dixon, Rimmer and Wittwer (2010) observed that “irrigation only accounts for 4 percent of GDP across the region and farming only 11.2 percent of GDP”. However the Productivity Commission (2010) added a qualification to the findings of the second set of studies, noting that some towns are more reliant on irrigated agriculture and the environmental buybacks would have “substantial adverse impacts in these areas, citing Colleambally as an example. Independent Economics (2012) also observes that Wittwer (2011) assumed that reduced water to agriculture would result in larger increases in selling prices for agricultural produce. Independent Economics moderated the selling prices to a smaller rise in their econometric modeling.¹⁹⁰ Independent Economics further observes that the optimistic picture for the

¹⁸⁹ M. Fenton, (2003) *Supra* note 185.

¹⁹⁰ Independent Economics, *Modelling the Economic Impact of the Draft Basin Plan*, 13 April 2012; Glynn Wittwer, *Basin Plan CGE Modelling Using Term-H2O*, Murray-Darling Basin Authority, 2011.

regional economy is impacted by assumptions pertaining to (i) the investment of buyback sale proceeds into the regional economy and (ii) farm owners who sell remaining in the region.

An independent banking consultant report to the MDBA (Rizza, 2010) observes that the banking sector holds concerns pertaining to the impact of water availability after the buyback on asset values of borrowers.¹⁹¹ It was noted that SDL announcements and the Basin Plan create financial uncertainty, particularly after the most recent Global Financial Crisis 2007-08. Furthermore it was argued that funds received from the proceeds of buyback were more likely to be transferred directly to banks for immediate debt reduction rather than spending in rural communities, given the presence of high indebtedness in the agricultural sector of the MDB. The permanent sale of water entitlements reduces the assets base of farmers, constraining the capacity of farmers to undertake further borrowing required to restructure farming activity to adjust to less water availability. These sentiments were echoed in the House of Representatives Standing Committee on Regional Australia (2011) inquiry into the adverse consequence of the Guide to the Basin Plan released in 2010.¹⁹²

2.5.1 ECONOMIC TRANSITION AND GOVERNMENT ENVIRONMENT WATER BUYBACK PROGRAMS

Reference to transition economies commonly pertains to communist or socialist economies in transition toward a market economy. In the case of the MDB, a rural agrarian market economy in transition towards a “sustainable economy” or “green economy” is occurring. There is a broader development economics literature focusing on agrarian transitions and transition to a sustainable economy. However this body of research is not specifically focused on environmental flow recovery through water buybacks and sustainable economic transitions. Much of the literature is focused on the

¹⁹¹ Adrian Rizza, The Potential Effects of Changes to Water Allocation Policy on Financing the Agriculture Sector and Businesses in the Murray-Darling Basin, Report to the Murray-Darling Basin Authority, 2010.

¹⁹² House of Representatives Standing Committee on Regional Australia, *Of Drought and Flooding Rains: Inquiry into the impact of the Guide to the Murray-Darling Basin Plan*, Commonwealth of Australia, 2011.

carbon economy aspect of climate change, rather than what is referred to in this dissertation as “environmental water transition economies”.

In the context of water management McColl and Young (2005) observe that transition policies are most often justified on equity grounds when changes in government policy cause sudden or unexpected hardship. It is argued that welfare reasoning for transition policies is distinguishable, with a focus on expected or current hardships induced by a change in government policy.¹⁹³ McColl and Young (2005) present a series of arguments against “well intentioned adjustment programs” based on the erosion of the competitive position of non-recipients. However, McColl and Young (2005) recommend the consideration of re-establishment grants, re-training grants, and regional adjustment grants as effective transition strategies. However their study did not specifically concern government water buybacks for environmental flows and transition economies. Nor did it consider strategic economic investment transition strategies.

Studies on institutional reforms for transitioning economies to a sustainable state during and after environmental water buybacks are scarce, with reference to the Murray-Darling Basin and internationally. There are no studies demonstrating that an economic transition must be made a central element of the Murray-Darling Basin Plan law to stimulate willingness to sell and improve the effectiveness of the Plan. Results from this dissertation pertaining to the need for a rural economic transition strategy to be embedded in the water law to stimulate willingness to sell water to environmental buyers were published in 2008 and 2009, and are analyzed in Chapters Five and Six.¹⁹⁴

¹⁹³ J. McColl and M. Young, *Managing Change: Australian Structural Adjustment Lessons for Water*, CSIRO, 2005 at viii and ix.

¹⁹⁴ *Supra* note 179.

2.5.2 MURRAY-DARLING BASIN SURVEY STUDIES: GENERAL COMMENTARY ON THE GOVERNMENT BUYBACK

As this research demonstrated that resistance to the government water buyback was strong, it was necessary to further examine a set of survey studies in the literature presenting general opinions on the water buyback. An additional set of studies investigating willingness to sell is also relevant to comprehending the resistance to government water buybacks and identifying gaps in the literature.

The general commentary gathered in survey analyses by ACIL Tasman (2008) and the Productivity Commission (2010) included concern for the level of “paper water” purchases delivering little or no water during dry years, and the lack of strategic planning attached to purchases.¹⁹⁵ The National Water Commission (2007) survey revealed that irrigators were concerned that the government would push water prices upward. They held concerns the buyback program would lead to compulsory reductions, and observed the need for proper dissemination of market rules and requested more sound scientific analysis of over-allocation.¹⁹⁶ Waterfind (2008) identified a lack of transparency with regard to actual water recovered; the level of security attached to water purchased; and the exact location of water purchased.¹⁹⁷ Sinclair Knight and Merz (2008) reported that information on whether areas targeted for purchase were fully metered to enable enforcement was limited. It was revealed that 93 000 extraction points on the Murray-Darling Basin required upgrading new meters at a cost of \$650 million, limiting the quality of data on actual recovery through the purchase program.¹⁹⁸

¹⁹⁵ ACIL Tasman, *Australia's working rivers: the role of infrastructure and water buybacks in recovering environmental flows*, 2008; Productivity Commission Report, *Market Mechanism for Recovering Water in the Murray-Darling Basin*, Australian Government, March 2010.

¹⁹⁶ National Water Commission (NWC), *Report of the National Water Commission's 2007 Stakeholder Forum*, Commonwealth of Australia, 2007.

¹⁹⁷ Waterfind, “Analysis of the Federal Government Buyback”, 2008.

¹⁹⁸ Sinclair Knight and Merz, “Managing the Water Cycle for Rural Subdivisions”, 2008; S Parnell, Usage Meters need \$650 million upgrade, *The Australian*, 7 July 2008.

MDB SURVEY STUDIES ON WILLINGNESS TO SELL TOWARD THE GOVERNMENT BUYBACK

The majority of survey literature on the MDB focuses on general attitudes toward the government environmental flow buyback program. Literature on willingness to sell water to government environmental buyers in the MDB is scarce. Two quantitative phone survey studies by Marsden Jacob Associates (2012) of 589 irrigators and Wheeler, Lane Miller, Zuo and Bjornlund (2011) of 624 irrigators found that debt was the main reason for selling. Wheeler et. al (2011) found that most irrigators surveyed in Victoria and South Australia were unwilling to sell, distinguishing between commercially orientated willing sellers and succession orientated holders of water as property. However these studies did not undertake analysis with reference to the theory of the endowment effect.¹⁹⁹

INTERNATIONAL SURVEY STUDIES ON WILLINGNESS TO SELL TO GOVERNMENT BUYBACK

Studies examining the specific factors inducing or inhibiting irrigators' decisions to sell water to government buyers for environmental flows are scarce internationally and constitute a gap in the literature on the Murray-Darling Basin. This research is essential for understanding why such large quantities of "paper water" delivering little or no water during drier years have been purchased, while the majority of high security entitlements have been retained by irrigators in the MDB.

A notable qualitative American study, by Ise and Sunding (1998) directly examined irrigator willingness to sell to government water buybacks in Lohantan Valley, Nevada, United States. The water purchased by government was to be released from upstream storages to dilute a sewage treatment facility's outflow. This was

¹⁹⁹ S. Wheeler, C. Lane –Miller, A. Zuo and H. Bjornlund, Who wants to sell Water to the Government and How much do they want to sell?, Unpublished, 2011; H. Bjornlund, S. Wheeler and Jeremy Cheeseman, Irrigators, Water Trading and Debt: Buying water entitlements for the environment, in D. Connell and Q. Grafton, Basin Futures: Water Reform in the Murray-Darling Basin, ANU EPress, 2011; see also Jeremy Cheeseman and Sarah Wheeler, *Survey of Water Entitlement sellers under the restoring the balance in the Murray-Darling Basin program*, Final report prepared for the Department of Environment, Water, Population and Communities, Marsden Jacob Associates, 2012.

intended to bring the river's water quality into compliance with oxygen levels stipulated by the Federal *Clean Water Act* and an intergovernmental agreement reached with the First Nation Paiute Tribe.

Data on factors impacting seller decisions was collected from a sample of 30 sellers and 35 non sellers, using a combination of telephone interviews and mail surveys.

The results of the study indicated that the following factors were likely to impede the sale of water to government:²⁰⁰

- (i) High annual profits per unit of water applied;
- (ii) Long planning time-frame due to presence of an heir willing to take over the farm business and/or irrigator far from retirement age, and/or excellent health;
- (iii) Lack of or low value of off-farm employment / Lack of skills to acquire off-farm employment;
- (i) Close proximity to the nearest town;
- (ii) On-farm residence / Appreciation of lifestyle benefits

Additionally the following factors impeding sales arose from specific events occurring in the Lahontan Valley, Nevada:²⁰¹

- (vi) Mistrust of government expressed by some respondents who were concerned that water purchased for environmental purposes would be re-sold to urban water users due to uncontrolled expansion of cities.
- (v) Simultaneous/earlier government program of reduction in water allocations;
- (vii) Uncertainty on the future of agriculture created by pending law suits between the Federal Government and First Nations Paiute tribe;
- (viii) Opposition to water trading restrictions which some irrigators believed created a situation where the government was effectively the sole purchaser.

The qualitative analysis by Ise and Sunding (1998) demonstrated that personal characteristics and catchment characteristics can drive selling patterns. This indicates that

²⁰⁰ S. Ise and D. Sunding, *Reallocating Water from Agriculture to the Environment under a Voluntary Purchase Program*, (1998), 20(1) *Review of Agricultural Economics*, 221-224; cited in and research extended and adapted for the MDB in *Supra* note 179.

²⁰¹ S. Ise and D. Sunding, (1998) *Ibid.*

success of a voluntary buy-back program is highly dependent on the chance that personal characteristics and/or catchment characteristics favouring the sale of water to government are present in the target region. However Ise and Sunding (1998) did not apply the theory of the endowment effect in their analysis, nor did the authors examine comparative preferential selling toward private and government buyers.

Monitoring and Enforcement costs

Smith's (2008) information cost theory of water as property highlights the importance of examining monitoring and enforcement costs.²⁰² Marchiori, Sayre and Simon (2012) found even where willingness to sell to a buyback programs exists, the absence of a monitoring and enforcement regime would undermine the government program with reference to ground water in Spain.²⁰³ Where monitoring and enforcement are weak, illegal extraction by the purchaser or others after the sale is possible. This finding was reiterated by Scarborough (2010) who examined water buyback programs in California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.²⁰⁴

2.6 CONCLUSIONS: GAPS IN THE LITERATURE

The first research question seeks to identify the limits of market-based water governance for ensuring environmental flows in the Murray-Darling Basin. The gaps identified in the literature in this respect with reference to reconfiguring water to the environment are three-fold:

- (i) The existing literature does not examine of the extent and structure of the endowment effect in the MDB adversely impacting the success of government buybacks for environmental flows;

²⁰² *Supra* note 134.

²⁰³ Carmen Marchiori, Susan Stratton Sayre, Leo K. Simon, On the Implementation and Performance of Water Rights Buy-Back Schemes (2012) 26 *Water Resources Management*, 2799-2816.

²⁰⁴ Brandon Scarborough, *Environmental Water Markets: Restoring Streams through Trade*, PERC Policy Series, 46, 2010.

(ii) The existing literature does not seek to examine the degree of importance of transition economy strategies for overriding the endowments effect and other constraints impacting the buyback program. This was achieved through examination of preferential selling patterns by sellers toward either government or private buyers.²⁰⁵

(iii) The existing literature on the Murray-Darling Basin does not significantly engage with the literature on the tragedy of the anti-commons. That is under-utilization of water resources for the environmental, social and economic purposes due the presence of multiple exclusion right holders (State and Federal governments). Identifying potential tragedies of the anti-commons is central to developing key institutional reforms.

²⁰⁵ *Supra* note 179.

PART 2- THE ADEQUACY OF PUBLIC INSTITUTIONAL AND LEGAL REFORM FOR RESOLVING CONFLICT BETWEEN ENVIRONMENTAL AND SOCIO-ECONOMIC USES IN THE MDB

2.7 NEW INSTITUTIONAL ECONOMICS ANALYSES OF WATER RESOURCE MANAGEMENT

The introductory chapter articulated the theory of new institutional economics (NIE) as the main analytical framework pursued in this thesis. The focus of applied NIE continues with respect to the second research question pertaining to public institutional and legal reform in the MDB for resolution of conflict between environmental and socio-economic water uses. This section of the literature review will therefore review the relevant new institutional economic literature applied to resolving water resource problems and legal reform.

A comprehensive definition of water institutions offered by Saleth and Dinar (2005), building on the work of Ostrom (1986, 1990) and North (1992), is as follows: *"rules that together describe actions situations, delineate actions sets, provide incentives and determine outcomes both in individual and collective decisions related to water development, allocation, use and management."*²⁰⁶ In this context an action situation is simply a situation requiring collective action for the management of a water resource, where a set of social choices pertaining to water allocation constitute the action set.

This research seeks to examine the adequacy of the existing water law with reference to institutional frameworks. Institutional frameworks build the necessary trust and cooperation to achieve a sustainable balance between environmental and socio-economic interests in water in the MDB. Moving from this broader framework of institutions for trust and cooperation, the following section then proceeds to consider

²⁰⁶ R. Maria Saleth and A. Dinar, *Water Institutional Reform: Theory and Practice*, (2005) 7, *Water Policy* at 2; Douglas North, *New Institutional Economics and Development*, JR Commons Lecture American Economics Association Meeting, January 1992 at 1; Elinor Ostrom, *The Agenda for Study of Institutions*, (1986) 48, *Public Choice*, 3-25; Elinor Ostrom, *Governing the Commons: The Evolution of Institution for Collective Action*, Cambridge University Press, 1990.

specific writing on cost-benefit rules and compensation rules relevant to resolving the tension between environmental and socio-economic water uses.

BUILDING SOCIAL CAPITAL AND TRUST: INSTITUTIONAL ARRANGEMENTS FOR COLLECTIVE WATER RESOURCE MANAGEMENT:

The importance of trust

Heller (1998) observed that tragedy of the anti-commons is avoided in close knit communities through the development of informal norms and institutions which build trust for management of the resource.²⁰⁷ This mirrors Ostrom's (1990) findings for the commons. In this context Olson (1965) made a simple yet important observation that the presence of a small number of individuals leads to a high degree of cooperation, because the situation creates conditions for the building of high social capital. This leaves the open question of how best to achieve trust and cooperation where the number of parties is large, such as the case of the MDB, where communication networks are more complicated and the range of interests are more diverse.

Donahue (2004) establishes a three part test for initiatives in a negotiation where trust is built. First, a significant proportion of the accepted initiative must represent the public interest. Second, a well-functioning democratic government should have the power to make a final decision on an initiative. Third, parties should respond to one another in a strategic rational manner, having regard for the interests and intentions of each party. Where the possibility of a government that is "weak", "absent" or wholly "undemocratic" arises, regulatory safeguards which establish decision making processes and demand institutional capacity may in part mitigate the impact of very serious institutional failures.²⁰⁸ The third condition requires that purpose and intent of the negotiation be

²⁰⁷ *Supra* note 130.

²⁰⁸ John Donahue, On Collaborative Governance, *John F Kennedy School of Government, Harvard University*, 2004 at 4.

understood. This is to occur in the presence of trust built through an extended social capital network necessary to reduce hostilities and create a willingness to engage within a framework of a deeper understanding of each party's perspective.

Four key mechanisms for building trust are highlighted in the NIE literature, applicable where the numbers of parties are large. These are, institutional linkages, institutions for the protection of minority interests, institutions for user participation and institutional capacity.

Institutional linkages

The bargaining power of groups within the political process shapes institutional development. Saleth and Dinar (2004) undertook a survey of 127 leading water professionals across 43 countries, and found that institutional linkages were capable of overcoming technical and political-economy power imbalance barriers to the delivery of desired institutional reforms.²⁰⁹ Institutional linkages include market and non-market long and short term agreements which may be both formal and informal between institutions, and rules within and outside institutions.

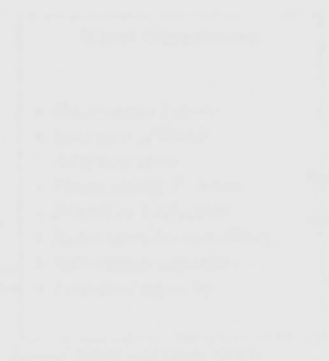
In explaining institutional linkages Saleth and Dinar (2004) cite a classification by Kiser and Ostrom (1982) of sequential and nested rules within a hierarchical system of collective choice, constitutional and operational rules. Here collective choice rules are derived from constitutional choice rules, while operational choice rules are developed in accordance with collective choice rules.²¹⁰ Ostrom (1990) explains that (i) constitutional choice rules pertain to formulation of governance, adjudication, and modification, (ii) collective choice rules pertain to policy making, management and adjudication and (iii) operational choice rules are day to day decisions pertaining to appropriation of resources, provisions of resources, monitoring and enforcement.

²⁰⁹ Maria Saleth and Ariel Dinar, *The Institutional Economics of Water: A Cross-Country Analysis of Institutions and Performance*, Edward Elgar / World Bank, 2004 at 310.

²¹⁰ Cited in *Ibid* at 28; L. Kiser and E Ostrom, *Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches*, in E. Ostrom, *Strategies of Political Inquiry*, Beverly Hills CA: Sage, 1982: 179-222.

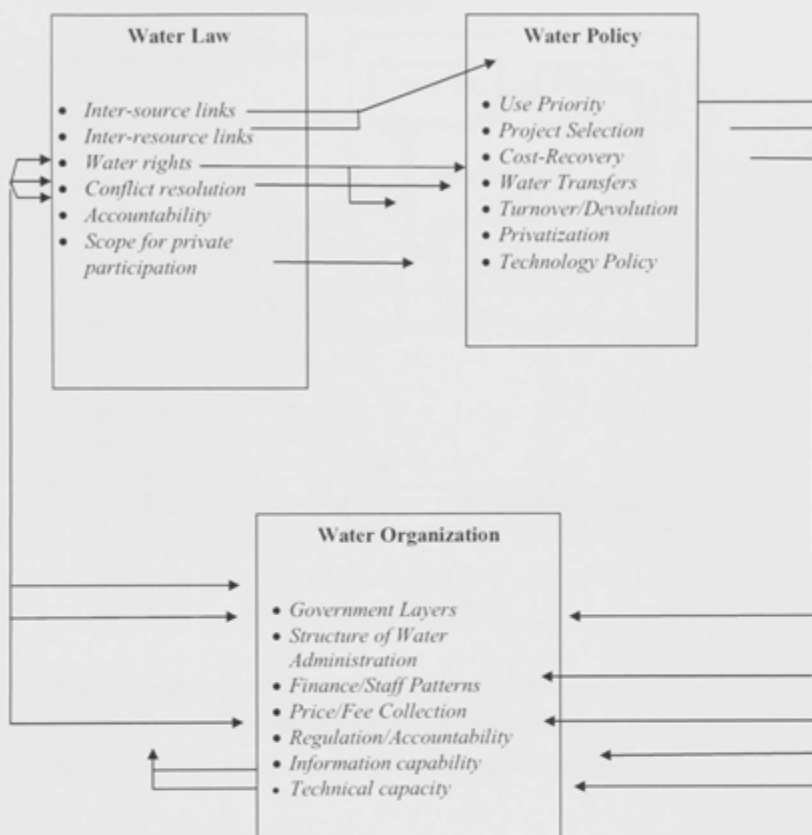
Institutional failure in this context occurs where institutional linkage rules in the three aforementioned categories of rules are not strategically employed to overcome established barriers to reform, and powerful individual actors within institutions hold subjective biases that impede progress. Hence correction of government failure within this framework is a matter of devising strategic legal rules as the central corrective force to facilitate institutional linkages.

The arrows in figure 2.3 represent the potential direct and indirect linkages between the three components of water institutions, water law, water policy and water organizations as articulated by Saleth and Dinar (2005). The authors argue that these institutional linkages are affected by “exogenous and contextual influences” present in the institutional environment. Figure 2.3 illustrates this interaction.²¹¹



²¹¹ *Supra* note 205.

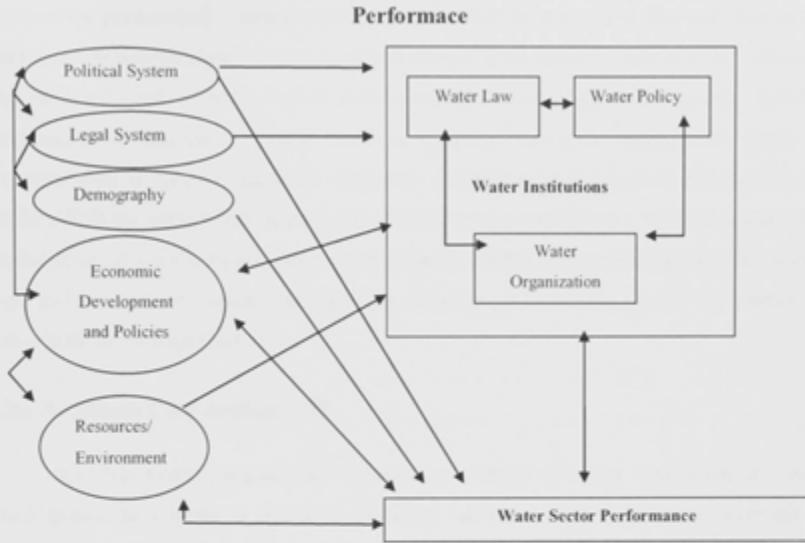
Figure 2.3: Simplified Water Institutional Structure



Source: Saleth and Dinar (2005)

The linkages represented by arrows in Figure 2.4 seek to articulate the impact of water institutions and the institutional environment on water sector performance. The diagram further articulates the relationship between the institutional environment and water institutions. Saleth and Dinar (2005) describe this illustration as partial, acknowledging the presence of greater complexity.

Figure 2.4: Water institutional environment, Institutions and Water Sector



Source: Saleth and Dinar, (2005)

The major components of the water institutional environment impacting water institutions driving water sector performance are: the political system, the legal system, demography, economic development and policies and resources/environment.

Institutions for the protection of minority interests

The second major institution for cooperation seeks to afford special protection for minority interests. Kenneth Arrow (1951) articulated in mathematical form, the likelihood of failure within the institution of majority rule democratic governance in the impossibility theorem, by demonstrating that strict ordering of preferences of three or more democratic candidates will not meet social justice criteria which include (i) independence of alternative choices when the third candidate enters the race and (ii) the

exclusion of non-dictatorial rule.²¹² That is deficiencies within or manipulation of the rules of the preferential voting system as an institution for a social choice may lead to the least best dictatorial style of environmental choice. This occurs where cultural values of the majority result in either severe environmental or socio-economic damage. Specific institutional arrangements which build in minority views for example by grant of constitutional or special legislative right may sometime overcome these deficiencies.²¹³ In the MDB the assignment of property of rights to the environment seeks to address the deficiencies of a majority economic interests in the MDB. Other minority interests, which can include socio-economic interests can also be protected by special legislative or constitutional arrangement.

User participation and building trust

Grafton (2000) argued that government control of water which restricts user participation is a negative outcome, fostering mistrust. Grafton advocates institutions which support user participation citing the example of public-private cooperation in ecosystem tourism services attached to the management and conservation of natural resources.²¹⁴ These solutions would avoid environmental degradation by allowing users to derive a profit from an environmental protection regime and work cooperatively building trust in mutually beneficial resource management. Grafton et al (2009) and Foerster (2011) also espouse adaptive institutions for water management described as “robust” which are responsive to “changing social values and hydrological, environmental and economic conditions”.²¹⁵ This requires institutional mechanisms

²¹² Kenneth Arrow, *Social Choice and Individual Values*, New York Wiley and Sons, 1951; William Baumol, *Economic Theory and Operations Analysis*, 4th Edn, Prentice Hall, 1977 at 531-535.

²¹³ See discussion of constitutional electoral protection of ethnic minorities to avoid deficiencies of majority rule in Vinoli Thampapillai, *Legal and Economic Institutions for Private Sector Growth in Post-Conflict Economies*, LLM Thesis, University of Toronto, 2003 at 140-142.

²¹⁴ Quentin Grafton, Governance of the Common: A role for the State, (2000), 76(4), *Land Economics*, 504-517.

²¹⁵ Quentin Grafton, A primer for water institutions and governance: concepts, definitions and measures, *Northern Australia Land and Water Science Review*, Draft, October 2009 at 6; Anita Foerster, Developing

which permit communication between competing user participants, flexibility to allow changes in direction, perhaps through periodic review structures or emergency derogation clauses.

In this context Dagan and Heller's (2001) liberal commons joint cooperative model in which management is shared between heterogeneous users, who maintain private rights and share a common area. Management of condominiums and marital property are examples of a liberal commons. The authors advocate the "liberal commons" management model which permits the right of exit as a fundamental value of liberalism, distinguishing this model from a common pool resource model. The authors further argue that the right of exit promotes cooperative action directed at preventing exit occurring. A joint cooperative organization such as a liberal commons is required for daily operational management and to address ongoing conflicts and build trust in a region.

Institutional Capacity

Managing institutional linkages and implementing conflict resolution institutions requires institutional capacity. Regulatory safeguards are required to ensure that persons without the necessary institutional capacity are prevented from holding leadership roles. Without such safeguards institutional failure is guaranteed. Ostrom and Ostrom (1972) highlight the well established importance of "decision making capabilities" in water resource development institutions. In this context, collaboration is sought between various professional groups such as scientists, engineers, lawyers, economists, financial analysts, and political scientists. Such collaboration enables decision making on the feasibility of water choices to be guided by criteria drawn from technical, financial, economic, legal, and political fields.²¹⁶

Purposeful and adaptive institutions for effective water governance, (2011), 25 *Water Resource Management*, 4005-4018.

²¹⁶ Vincent Ostrom and Elinor Ostrom, Legal and Political Conditions of Water Resource Development, *Land Economics*, Vol XLVIII, No. 1, 1972.

This section has reviewed the NIE concepts relevant to water law and policy reform in the MDB. The following section examines the literature identifying inadequacies in the water law governing conflicting uses of water in the MDB relevant to the second research question.

2.8 LITERATURE ON THE CRITICAL ANALYSES OF THE *WATER ACT 2007* AND THE *WATER AMENDMENT ACT 2008*

Background to the Water Law

In August 2007 the Federal *Water Act* was passed with a focus on central government water planning for the Murray-Darling Basin, that is Federal control of the Basin. This required an effective override of State constitutional powers to manage water resources under section 100 of the Constitution. Section 100 states: “*The Commonwealth shall not, by any law or regulation of trade or commerce, abridge the right of a State or of the residents therein to the reasonable use of the water of rivers for conservation or irrigation*”. The Federal *Water Act 2007* was initially achieved primarily by the use of the external affairs power to provide environmental flows. The key feature of the *Water Act 2007* is the creation of the Murray-Darling Basin Authority (MDBA) responsible for developing the Murray-Darling Basin Plan which involves setting sustainable diversion limits (SDL), administration and enforcement. The *Water Act 2007* established a mandatory public consultation process for the development of the Murray-Darling Basin Plan which becomes law. The Act further articulates the mandatory content of the Basin Plan. The *Water Act 2007* also established the office of the Commonwealth Environment Water Holder (CEWH) responsible for the management of water acquired for environmental flows. Compensation provisions and dispute resolution courts are articulated in the Act. The Federal Magistrates Court, the court of a State or Territory are primary judicial organizations for enforcement.

To avoid the possibility of future constitutional disputes, it was necessary for the States to refer power under the *Water Amendment Act 2008* to the Commonwealth under section 122 and section 51(38) of the Australian Constitution. This guaranteed the

validity of key provisions of the *Water Act 2007*.²¹⁷ All Basin States, excluding the Australian Capital Territory, referred power to the Commonwealth with respect to all matters covered in the *Murray-Darling Basin Agreement 1992*, attached in Schedule 1 of the *Federal Water Act 2007*.²¹⁸ The 2008 *Water Amendment Act* also transfers power from the Murray-Darling Basin Commission to the Murray-Darling Basin Authority (MDBA). Importantly the *Water Amendment 2008* included provisions for prioritizing critical human needs, which include water for drinking and domestic use, correcting a serious omission in the *Water Act 2007*.

Critical Analyses of the *Water Act 2007* and the *Water Amendment Act 2008*

This section considers two key criticisms of the water law in the Murray-Darling Basin. The first is the perceived absence of focus on socio-economic rights and the second is the failure to protect groundwater rights through provision of sufficient proprietary rights capable of attracting compensation on just terms under the constitution where acquisition occurs. Limited protection exists for surface water under restricted circumstances.

1. Inadequate focus on economic rights

The emphasis of the *Water Act 2007* is predominantly environmental in nature and has been criticized for precisely this reason. The environmental focus is due to

²¹⁷ Angus Martyn et al., *Water Amendment Bill 2008, Bills Digest, Department of Parliamentary Services, Commonwealth of Australia*, no. 45, 2008-2009, 14 October 2008, ISSN 1328-8091; Selina Mitchell, PM could face legal stoush over Murray-Darling Basin, *The Australian*, 26 January 2007. See also A. Gardner, A. Bartlett, and J. Gray, *Water Resources Law*, Lexis Nexis, 2009 for a detailed examination of the development of Australian water law; see Alex Gardner, *Lee Gropler v Commonwealth and Murray-Darling Basin Authority – reflection on conception of Australian water access rights*, 2013, 28 (3) *Australian Environment Review*, 517-502, for discussion of an unsuccessful constitutional legal challenge to *Water Act 2007* on economic grounds attached to the principle of reasonable use, referred to the Federal Court.

²¹⁸ *Water (Commonwealth Powers) Act*, 2008 Victoria; *Water (Commonwealth Powers) Act 2008* Queensland; *Water (Commonwealth Powers) Act*, 2008 South Australia; *Water (Commonwealth Powers) Act*, 2008 New South Wales.

constitutional limitations imposed by s100 and the consequential heavy reliance on the external affairs power to give effect to international environmental treaties.²¹⁹ Economic rights to water for sustainable development received only very brief treatment in s3(c) with an indirect or broad supporting references made in sections 21 and 22 (Items 3 and 5) of the *Water Act 2007*. Hence the legislation was criticized for failing to implement the “triple bottom line” which is articulated in section 3(c) of the *Water Act 2007* as the optimization of “economic, social and environmental” outcomes. Gardner (2012) argues that the dominance of environmental focus in the *Water Act 2007* is justified by the need to correct previous imbalance in favour of economic interests in the Murray-Darling Basin. However, the author acknowledges that political difficulties will persist where reductions in water entitlements are uncompensated. Similarly political difficulties will undermine the operation of the *Water Act 2007* if indirect economic losses are not addressed alongside direct economic losses, when sustainable diversion limits are implemented.

It was initially argued that no clear legislative mandate existed within the Federal *Water Act 2007* for the MDBA to include transition economy management strategies in the Guide to the Basin Plan, 2010. In response to criticisms the then Minister for Regional Development, Mr Simon Crean, stated that the terms of reference articulated in the *Water Act 2007* were too narrow, limiting the scope of the MDBA’s analysis. In December 2010 the Chairman of the MDBA, Mr Michael Taylor resigned over a difference of opinion over the law, arguing that under the Federal *Water Act 2007*, environmental considerations were paramount.²²⁰ The then Water Minister, Mr Tony Burke subsequently obtained a legal opinion from the Australian government solicitor stating that the *Water Act 2007* “provides for the use of Basin water resources in a way that optimizes economic, social and environmental outcomes”, citing section 3(c) of the Act. The legal opinion noted further that the international law upon which the *Water Act*

²¹⁹ Paul Kildea and George Williams, ‘The Constitution and Management of Water in Australia’s Rivers’, (2010), Vol 32(4), *Sydney Law Review*, 595-616 at 603.

²²⁰ Editorial, *Government losing its way on water reform*, The Age, December 13, 2010.

2007 relies, requires optimization of all three factors, economic, social and environmental.²²¹

Kildea and Williams (2011) observed that while section 21 of the Act, which articulates the general basis on which the basin plan is to be developed, gives primacy to environment, s 21(4) clearly states that social and economic factors are relevant to the plan.²²² Section 21 (4) requires that subject to the environmental objectives of the basin plan, the MDBA and the Minister must

- “(a) take into account the principles of ecologically sustainable development; and
- (b) act on the basis of the best available scientific knowledge and socio-economic analysis; and
- (c) have regard to the following:...
- (ii) the consumptive and other economic uses of the Basin water resources...
- (iii) Social, cultural, Indigenous and other public benefit issues”.

While government lawyers and academics contributed to literature on explaining the water law with reference to socio-economic interests, the literature is scarce on how to refine the existing water law to better accommodate socio-economic interests. This dissertation builds upon the existing literature by testing the acceptability of elements of a no-significant harm rule which would better incorporate socio-economic interests alongside environmental interests.

2. Compulsory acquisition of ground water without compensation: A Question of Fairness

Compensation emerged as a key concern for irrigators in the MDB in the research undertaken in this thesis. The absence of a fair compensation framework is recognized in the literature presented below. Section 51(xxxi) of the constitution states that the

²²¹ *Supra* note 191 at 21-22; see also The Senate Legal and Constitutional Affairs References Committee: A Balancing Act: Provisions of the Water Act 2007, Commonwealth of Australia, June 2011; Australian Government Response to the Senate Legal and Constitutional Affairs References Committee Report: A Balancing Act: Provisions of the Water Act 2007.

²²² Paul Kildea and George Williams, Submission to the Senate Legal and Constitutional Committee, Inquiry into the Provisions of the Water Act 2007, 16 March 2011.

Commonwealth may make laws for “the acquisition of property on just terms from any State or person for any purpose in respect of which Parliament has power to make laws”. State governments are not bound by similar Constitutional provisions and may therefore acquire property without payment of just compensation. The *Water Act 2007* bars compulsory acquisition of water access rights under section 255.

Thus far the major cases concerning compulsory acquisition of water in the Murray-Darling Basin have concerned ground water licences. Under the common law a land owner was not granted a cause of action for compensation for ground water appropriated by the State, irrespective of the duration for which the landholder had extracted water from the same ground water source.²²³ The Federal *Water Act 2007* and State water laws have not sought to remedy this situation and have received criticism on grounds of unfairness for this reason. A ground water licence is not a water access entitlement for the purposes of s 255 of the *Water Act 2007*.

In *ICM Agriculture Pty Ltd v The Commonwealth* [2009] HCA 51, French CJ, Gummow J, Crennan J of the High Court affirmed that no common law right to compensation for acquisition of ground water exists, on the basis that the plaintiffs and the Crown failed to hold a proprietary interest in the ground water.²²⁴ This is because the renewable bore licences are mere licences and therefore do not amount to a property capable of being acquired. In this case the NSW government replaced the *Water Act 1912* with *Water Management 2000*, converting bore licences to aquifer access licences, concurrently reducing the amount of water available to the licence holders under the new scheme by two-thirds. The plaintiffs sought compensation under s51 (xxx) of the Constitution for acquisition of property. A majority of 6/1 held no acquisition had occurred because neither government obtained a benefit as a consequence of the reduction in entitlement.²²⁵ Heydon J dissenting argued that there had been an acquisition of property on less than just

²²³ *Kennedy v Minister for Works* (1970) WAR 102

²²⁴ See commentary in Andrew McIntosh and Janis Cunliffe, The Significance of ICM in the Evolution of s51(xxx). (2012) 29, *Environmental Planning Law Journal*, 297-315 at 313.

²²⁵ *ICM Agriculture Pty Ltd v The Commonwealth* [2009] HCA 51; http://www.austlii.edu.au/cases/cth/high_ct/2009/51.html

terms, and that the government of New South Wales had regained control of the lost entitlements by extinguishing rights and gaining “the capacity to take more water for itself...”²²⁶ Heydon J further held that it was unconstitutional for the government of New South Wales to act together with the Commonwealth to acquire ground water rights on less than just terms.

Following the *ICM* decision, Arnold appealed the New South Wales Court of Appeal decision to the High Court in *Arnold & Ors v Minister Administering the Water Management Act 2000* [2010] HCA 3. Special leave to appeal was granted on three grounds:

- (i) Questions arising as to whether the replacement of bore licences with water aquifer access licences holding less water, amounted to an acquisition of property;
- (ii) Questions as to whether, if classed an acquisition, whether the terms were unjust.
- (iii) Questions as to whether the National Water Initiative funding agreement “were laws or regulations of trade or commerce contravening s 100 of the Constitution, which prohibits the Commonwealth from limiting the right of State and its residents to the reasonable use of the waters of rivers for conservation or irrigation”.²²⁷

In answering these questions the High Court followed the *ICM Agriculture Pty Ltd*, finding as precedent that there had been no acquisition of property. On the third ground, the High Court found that rights and liberties to ground water did not amount to rights to “water of rivers” under section 100 of the Constitution.

In response to the *Arnold* and *ICM* cases, George Williams (2010) questioned the fairness of a Federal system which permits State governments pass constitutionally valid laws to

²²⁶ Cited in Andrew McIntosh and Janis Cunliffe, The Significance of *ICM* in the Evolution of s51(xxxi). (2012) 29, *Environmental Planning Law Journal*, 297-315 at 314; Patricia Lane, *An Unholy Alliance – Combined Federal/State Impacts on Property Rights in Australia*, Legal Studies Research Paper, No.10/130, Sydney Law School, November 2010 at 11.

²²⁷ *Arnold & Ors v Minister Administering the Water Management Act 2000* [2010] HCA 3: High Court of Australia, Judgment summary, 10 February 2010

compulsorily acquire ground water without paying adequate or any compensation.²²⁸ That is, the *Water Act* 2007 did not regulate to achieve “fairness”. The legislation therefore failed to address the concerns raised by the dissenting judgment of Heydon J in the ICM Agriculture case”.

In *Murrumbidgee Groundwater Preservation Association Inc v Minister for Natural Resources*, [2005] NSWCA 10 irrigators challenged across the board cuts in groundwater entitlements and other reductions under the *Water Sharing Plan for the Lower Murrumbidgee Groundwater Sources 2003*. The challenge was rejected on the basis of the overarching sustainability policy justified the government’s decision making.²²⁹ Millar (2005) observes that the NSW State government responded to McClelland’s CJ judgment by first deferring the commencement of five groundwater plans to study equity considerations. Secondly, unlike ICM where the plaintiffs received inadequate compensation, the NSW government responded by provision of financial assistance to ground water irrigators facing reductions in highly stressed regions. However, Millar notes that the policy decision to compensate is entirely discretionary and ad-hoc, and did not establish a legal precedent which can be relied upon to secure compensation by other ground water users.²³⁰ That is the procedural justice was not uniform across the Basin.

The literature on groundwater acquisition and related cuts to water consumption in the MDB raised the general concept of justice as fairness. Gross (2011) discusses justice and injustice in the MDB with reference to administrative cuts to carry-over water and rural – urban competition for water. Gross (2011) observes the presence of three types of justice:

- (i) “interactional justice concerned with respectful treatment
- (ii) procedural justice concerned with elements of the decision making process; and

²²⁸ George Williams, Stuck in an unfair Federal System. *Sydney Morning Herald*, February 16, 2010.

²²⁹ Ilona Millar, Testing the Waters: Legal Challenge to Water Sharing Plans in NSW, *Environmental Defenders Office* (NSW), 2005.

²³⁰ *Ibid.*

(iii) distributive justice concerned with the fairness of outcomes”.²³¹

Injustice occurring in the MDB was identified by Gross (2011) to be (i) harm suffered amounting to distributive injustice, (ii) disrespectful treatment as interactional injustice, and (iii) flawed procedures as procedural injustice. Syme and Nancarrow (2008) reiterate these elements of justice and injustice with reference to discussion of the application of Water Benefits Account Assessment methodology.²³² The literature articulated above highlights concern over the unfairness of the current compensation regime in the context of groundwater and carry-over water.

However, the literature on the MDB did not examine the viability of specific interactional and procedural institutional reforms to existing compensation and other procedural rules to achieve distributive justice as fairness expressed as environmental and socio-economic outcomes. This dissertation sought to test the viability of interactional justice and procedural justice institutional reforms to deliver distributive justice. This was undertaken with reference to developing specific elements of a proposed no-significant harm rule.

Deficiencies in the Risk sharing and compensation provisions

The risk sharing provisions in the *Water Act* 2007 mirror the risk sharing provisions of the National Water Initiative (NWI) 2004. Risks are divided into two sub-categories: '(i) risks arising from reductions in diversion limits; and (ii) risks arising from other changes to the Basin Plan. Compensation claims discussed below are divided into two separate categories accordingly.

The National Water Initiative 2004 provides that risks from climate change (droughts and flooding) and other natural factors (bushfires) are to be borne by water entitlement holders in perpetuity.²³³ However, compensation is available to water

²³¹ Catherine Gross, Why Justice is Important, in Daniel Connell and Quentin Grafton, *Basin Futures: Water Reform in the MDB*, ANU Epress, 2011 at 149-152.

²³² Geoffrey J. Syme and Blair E. Nancarrow, Justice and the Allocation of Benefits from Water, (2008) 27(3), *Social Alternatives*, 21-25.

²³³ Clause 48, Council of Australian Government, *Intergovernmental Agreement on a National Water Initiative*, 2004 cited in Poh Ling Tan, (2010) *Adaptation Measures for Water Security in a Changing*

entitlement holders after 2014, if the risks of reduction of water supply or less reliable water supply can be attributed to “bona-fide improvements in the knowledge of water systems”.²³⁴ Until 2014 water entitlement holders bear 100 percent of the risk under this heading, given that reductions are negotiated under existing water plans and reviews of accepted water plans.²³⁵ After 2014 the Commonwealth and State governments also share the risks arising under “comprehensive water plans commencing or renewed” with water entitlement holders, such that:²³⁶

- (i) The first three percent of the cost of reductions to water allocations to water access entitlements caused by “bona-fide improvements in the knowledge of water systems” is to be borne by water entitlement holders.
- (ii) The next 3 to 6 percent of the cost of reductions in allocations to water access entitlements is to be shared between the State and Commonwealth governments, in a ratio of 1:2.
- (iii) State and Commonwealth governments are to share the costs of reductions to water allocations to water access entitlements equally for reductions in excess of 6 percent.

Compensatory payments for water access entitlement holders are permitted for: (i) reductions in water allocations; or (ii) changes in reliability of water allocations caused by a reduction in the long term average sustainable diversion limit (SDL).

In order to claim compensation, the reduction borne by water access entitlement holders must “*be reasonably attributable to the Commonwealth’s share of the reduction.*” The four categories of water access entitlement allocation for which a claim is permitted in the event of a reduction in allocation are articulated in s 77(b), or the

Climate: Policy, Planning and Law, in Tim Bonyhady et al. (Eds), *Adaptation to Climate Change: Law and Policy*, The Federation Press, at 144.

²³⁴ Clause 49, Council of Australian Governments, *Intergovernmental Agreement on a National Water Initiative*, 2004 cited in Poh Ling Tan (2010) *Ibid* at 144.

²³⁵ Poh Ling Tan (2010), *Supra* note 232 at 144.

²³⁶ Clause 49, Council of Australian Governments *Supra* note 233.

Basin Plan must state that a section 83 compensation claim is available for category two changes in reliability of water allocations caused by the SDL. The Federal Minister is to decide compensation claims which are subject to Administrative Appeals Tribunal review.

Tan (2010) argues that the risk sharing provisions articulated in the National Water Initiative and the Federal *Water Act* 2007, are difficult to implement for three key reasons. The first being an assumption that environmentally sustainable levels of extraction will be achieved in a timely manner, with substantial management outcomes to be achieved by 2014, leaving a relatively small compensatory burden upon the State. Second, it is argued that reductions in volumetric allocations and/or reliability cannot be caused by a single factor, such as “improvements in knowledge of water systems”. Finally, Tan (2010) highlights the different characteristics of each catchment areas, creating impediments to the successful application of a Basin or nation-wide risk assignment management framework.²³⁷ In conclusion the critique observes that the wording of the compensation and risk sharing provisions is vague and lacks coherence, creating legal uncertainty for irrigators. Hence there is scope for legal reform in this area with reference to compensation.

2.9 CRITICAL ANALYSIS OF THE MDB PLAN LAW AND THE PRECEDING DRAFT DOCUMENTS

On 22 November 2012 the Federal Water Minister adopted the Basin Plan as law. The sustainable diversion limits (SDLs) set under the plan are for a return of 2750GL per annum. On 7 February 2013 an additional recovery target of 450GL over a decade accompanied by \$1.77 billion funding became law, bringing the total return target to 3200GL. The water is to be recovered through water-buybacks and infrastructure projects. The final Basin Plan increases ground water extraction by 1700GL, which is a reduced figure from the 2600GL proposed in the 2011 draft Basin Plan.

In the lead to the final Basin Plan between 2010 and 2012 a number of criticisms were directed toward the plan. The House of Representatives Standing Committee on Regional

²³⁷ Poh Ling Tan, (2010) *Supra* note 232 at 144.

Australia (2011) initially criticized the October 2010 Guide to the Basin Plan document as one which “provoked despair”, in failing to clearly articulate the method of achieving the SDL targets. The Committee also observed in its review of 643 public submissions, 142 exhibit documents and basin wide hearings, that the consultation process in the lead to the final Basin Plan, had actually led to a reduction of community trust in the MDBA.²³⁸ Langford, Briscoe and Porter (2010) observed that to achieve cooperation the final Basin Plan had to deliver improvements to the environment and farmers lives.²³⁹

The CSIRO held concerns that climate change impact predictions had not been tied to the recommended SDL.²⁴⁰ The Wentworth Group of Concerned Scientists (2012) had called for the 2011 Draft Basin Plan to be withdrawn on the basis that “it does not provide the information required to make an informed decision on the future of the river system”. The group delivered five key criticisms of the draft Basin Plan document:

1. “The Plan specifies a volume of water but it does not identify the volume of water required to deliver a healthy working river, as required by the Commonwealth Water Act;
2. “The Plan cites river management infrastructure as the limiting factor, however there is no assessment of the feasibility or cost of redesigning river management infrastructure...so that a healthy working river can be delivered”;
3. “There is no incorporation in modeling provided of the impact of “increasing groundwater extractions by 2600GL” on surface water flows, which are to be cut by 2750GL”, ignoring the connectivity of surface and ground water”;
4. “The plan sets long term diversion limits on the assumption that there is no risk to river health from climate change”; and

²³⁸ *Supra* note 191.

²³⁹ John Langford, John Briscoe and Michael Porter, *Creating Wealth from Our Water*, *The Australian*, 1 November 2010.

²⁴⁰ *Supra* note 191.

5. "There is no information presented on the effectiveness of the Plan to cope with long dry periods such as that experienced throughout the Basin during most of the last decade..."²⁴¹

The Wentworth group further accused the MDBA of ignoring the best available science to the point of "manipulating science" to meet the needs of a political outcome and resigned from their advisory role to the MDBA as a consequence. The Wentworth Group's criticism of the final 2012 Basin Plan was similar to criticisms made earlier, with regard to the increased groundwater extraction target of 1700GL, citing the interconnection between ground and surface waters. In this context the Wentworth Group argued that the actual final SDL was therefore 2800GL rather than 3200GL. Again it was argued that the scientific analysis did not prove that a 3200GL or 2800GL return would "deliver a healthy working river".²⁴² The Wentworth Group argued that an SDL of 3200GL would achieve 66 percent of the 112 environmental water targets across the Basin set by the MDBA and only 15 percent of the environmental water targets in South Australia, without accounting for increases in groundwater extraction.

The South Australian Government had earlier observed with reference to the draft Basin Plan 2011, that all the states ecological needs would not be met. Ahead of the adoption of the final Basin Plan the Victorian Government and the New South Wales Government criticized the 2750GL environmental flow target with reference to the high cost exerted upon regional communities and industries. The New South Wales government further questioned the scientific evidence attached to environmental needs and outcomes and highlighted a need to articulate and delegate implementation costs. The National Irrigators Council representing the broader irrigation community observed that a 2750GL return would lead to "socio-economic dislocation" and that the Plan was heavily biased toward the environment.

²⁴¹ Wentworth Group of Concerned Scientists, Statement on the 2011 Draft Murray-Darling Basin Plan in response to the release of the Draft Plan, January 2012.

²⁴² Wentworth Group of Concerned Scientists, Evaluation of 3200GL Modeling with Relaxed Constraints, 26 October 2012.

In March 2013 the Senate and Regional Affairs and Transport References Committee issued its report entitled: *The Management of the Murray-Darling Basin Plan*. Four of the six of the key findings are articulated below and are relevant to the rule reform model proposed in this thesis:²⁴³

(i) "On the matter of surface water, the Committee expressed concern regarding the method in which the MDBA arrived at the figure of 2750GL/y. The committee believed that further research on climate change impacts and run-off interceptions in modeling was required. It noted further that information presented to stakeholders required improvement.

(ii) On the matter of groundwater the committee raised concerns regarding the increase in extraction limits for groundwater, noting that changes had not been explained with respect to interconnectivity between ground and surface water. The absence of a precautionary approach is of concern.

(iii) On the matter of flow outcomes attached to different mixes of security type (general, high), the Committee was concerned that the MDBA had not sought data on flow outcomes.

(iv) On the matter of socio-economic impacts and stakeholder engagement the committee was concerned about the limitations of socio-economic modeling. Evidence exists with regard to gaps in the consultation processes, despite the large number of consultation meetings attached to the Basin Plan. The committee was concerned that "while the MDBA had embraced localism for future work, it had not explained the concept to stakeholders." Politicians and the MDBA were accused of deliberately withholding information and failing to give "definitive answers" to questions. The National Irrigators Council stated they were "crying out for information" despite the consultation process. The MDBA stated that they were considering creating a community committee to advise on SDL proposals with a hierarchy involving local communities at the base. However on a separate occasion the Chair of the MDBA stated that localism would create greater problem by interfering with Federal government decisions. While the importance of local

²⁴³ The Senate and Regional Affairs and Transport References Committee, *Management of the Murray-Darling Basin Plan*, Commonwealth of Australia, March 2013.

knowledge is comprehended, the concept of localism is not well understood. The Committee found that the MDBA needs to clarify the meaning of localism.

While the critique in the literature focused on the deficiencies of the Basin Plan and drafts leading to the final Basin Plan, a significant gap in the literature was the absence of analysis of:

- (i) the role played by inadequate conflict resolution rules in the *Water Act 2007*, in increasing hostile responses to MDBA actions, given the presence of competition between agriculture and environment for water resources and;
- (ii) how conflict resolution provisions in the *Water Act 2007* could be reformed to address the problems raised.

2.10 CRITICAL ANALYSES OF GOVERNMENT WATER ORGANIZATIONS

Three key government water organizations are reviewed here, the Commonwealth Environmental Water Holder (CEWH), the Federal Department of Environment, (formerly the Department of Sustainability, Environment, Water, Population and Communities - SEWPAC), and the Murray-Darling Basin Authority (MDBA). The central criticisms of these organizations emerged from the House of Representatives Standing Committee on Regional Australia (2011) highlighting inadequacies in the implementation of the law by these organizations.²⁴⁴ As noted above, the Standing Committee's report was based on 643 public submissions, 142 exhibit documents and basin wide consultations.

Commonwealth Environmental Water Holder

The Commonwealth Water Holder (CEWH) is the Federal government's agency for the holding of all water purchased or acquired for environmental management purposes, housed in the Federal Department of the Environment. The CEWH administers

²⁴⁴ *Supra* note 192.

the Restoring the Balance buyback program and the Sustainable Rural Water Use and Infrastructure Program. The management of water held must occur in accordance with a final Basin Plan. The CEWH is required to report annually on its performance and the Commonwealth Auditor General is to evaluate performance.²⁴⁵

The House of Representative Standing Committee on Regional Australia (2011) observed that the CEWH buyback lacked a strategic focus, such that it “causes significant harm to community viability, that strands assets and results in less efficient and more expensive irrigation systems”. It was further argued that the organization was “not transparent and unresponsive to innovation”.²⁴⁶ It was recommended that the CEWH be detached from the Department of the Environment (then SEWPAC) to improve function.

Department of the Environment (formerly SEWPAC)

The Department of the Environment assumed all responsibility for water in 2010-11 from the Department of Climate Change and Energy Efficiency. The Murray-Darling Basin is described as a “significant focus” of the Department in the context of the development of the draft Basin Plan.²⁴⁷ The Department administers the Water for the Future Program.

The House of Representative Standing Committee on Regional Australia (2011) reported “grave mistrust of this department across Basin communities resulting from the failure of the department to identify and respond to community concerns...”. It was argued that the department failed to deliver water programs and strategic buybacks.²⁴⁸

²⁴⁵ CEWH, Environmental Water Recovery Strategy for the Murray-Darling Basin, Commonwealth of Australia, November 2012; The Auditor General, Commonwealth Environmental Watering Activities, ANAO, Audit Report No. 36, 2012-13.

²⁴⁶ *Supra* note 192 at 2-3.

²⁴⁷ Department of Sustainability, Environmental, Water, Population and Communities, Annual Report 2010-11, <http://www.environment.gov.au/about/publications/annual-report/10-11>.

²⁴⁸ *Supra* note 191 at 3 at 3.

Murray-Darling Basin Authority (MDBA)

The Murray-Darling Basin Authority (MDBA) was established under the *Water Act 2007* to produce and govern the Federal Basin Plan. The central feature of the *Federal Water Act 2007* is the Basin Plan to be reviewed every ten years by the MDBA, preceded by publication of the Guide the Basin Plan document for consultation. The Act requires a mandatory consultation process involving Basin State governments, the Basin officials committee, the Basin community committee and consultation must include the general public. The *Federal Water Act 2007* requires public consultation to occur within a 16 week time frame. The MDBA is then required to prepare a draft Basin Plan document incorporating the findings of the consultations. Once finalized, the Water Minister to must make a decision on adoption of the plan within 60 days. If the Minister returns the plan to the MDBA with corrections, the MDBA is required to respond with reference to a public document summarizing submissions received. The Minister is permitted a further 30 days in which to decide to adopt the plan.²⁴⁹ This legislative time frame is intended to ensure rapid protection of environmental flows. Once adopted and approved by the Federal Water Minister, the Basin Plan is tabled in parliament becomes a legislative instrument. The MDB Plan became law in 2012.

The House of Representatives Standing Committee on Regional Australia was critical of the consultation process undertaken by the MDBA in the lead to the adoption of the final Basin Plan. The Committee observed that community respect for the MDBA had been built on the reputation of its predecessor the Murray-Darling Basin Commission and the success of environmental programs it administered. The Committee noted that the development of the Guide to the Basin Plan in October 2010 and the manner in which consultations were undertaken damaged the reputation of the MDBA, before the community, State Governments and the scientific community.

As observed in the introduction, the release of the Guide to the Basin Plan 2010 led to community violence, where irrigators engaged in public burnings of the Guide. It was proposed that the MDBA develop a community engagement strategy for the

²⁴⁹ Angus Martyn and Paula Pyburne, *Water Bill 2007, Bills Digest, Department of Parliamentary Services, Commonwealth of Australia*, No. 30: 2007-08, 14 August 2007; *Water Act 2007*.

development of the Basin Plan in the future, involving clear communication with communities and State Governments, to reduce and address anxiety over socio-economic implications.²⁵⁰ The MDBA is partially funded by State governments. In response to the Draft Basin Plan 2011, the NSW State government withdrew A\$16 million in funding for 2012, and a further A\$8.9 million for 2013. South Australia also followed suit. This reduced the MDBA's capacity in environmental management, including the end of native fish strategy program.

A gap in the literature exists with respect to how to reform the institutional framework articulated in the *Water Act 2007* responsible for guiding the negotiations between the Federal government represented by the MDBA and the State government. There is no rule framework to guide consultations between Federal and State parties to the conflict in the *Water Act 2007*. The conflict in the MDB centres on environmental, social and economic harms. Hence the following section provides a detailed examination of the "no significant harm" rule articulated in international water law.

The National Water Commission

The National Water Commission (NWC) has not received critical attention in the literature. The role of the NWC is to assess progress on water reform and provide independent advice under the National Water Commission Act 2004. The NWC, which as of 2014 is to be abolished, was intended to play a leading role in assessing implementation of the Basin Plan law. In March 2013 the NWC published its first report on progress entitled *Murray Darling Basin Plan: Implementation Initial Report*. In March 2013 the NWC published its first report on progress entitled *Murray-Darling Basin Plan: Implementation Initial Report*, noting the need for strong cooperation between rural communities and government and observed further that implementation planning should have occurred at an earlier stage of the negotiation process.

²⁵⁰ *Supra* note 191 at 71-89.

2.11 CRITICAL ANALYSES OF THE “NO SIGNIFICANT HARM” RULE: CONFLICT RESOLUTION PROVISIONS IN CUSTOMARY INTERNATIONAL WATER LAW

It is important to consider which international water law principles could be expressly included in future amendments to domestic water legislation to improve the management of water resources in the Murray-Darling Basin. The following section will therefore briefly discuss the environmental protection of water resources under the *United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses*, 1997, with reference to Article 7, the “no significant harm rule”. The convention remains customary law due to tensions between upstream and downstream transboundary states. This tension primarily exists over two rules, the no significant harm rule (Article 7) recognized as a downstream remedy and the equitable and reasonable utilization rule (Article 5), recognized as an upstream remedy.²⁵¹ Abseno (2009) observes, that in the context of the Nile Basin, downstream state Egypt, favours the no-significant harm rule for protections against economic harms.²⁵² The convention is known as a “framework convention”, allowing states to adapt and develop the law according to their own national and regional circumstances.²⁵³ Thus far there is scarce literature on adapting Article 7 or Article 5 for the Murray-Darling Basin.

The literature articulates the presence of an ongoing debate stemming from the time of drafting as to whether Article 7 on the matter of no significant harm or Article 5 pertaining to the requirement of reasonable and equitable use of water, takes precedence. It is often argued that Article 5 is dominant.²⁵⁴ However, it is clear from a plain English

²⁵¹ Salman, M. A. Salman, The United Nations Convention Ten Years Later: Why Has its Entry into Force Proven Difficult”, (2007) 32 (1) *Water International*, 1-15.

²⁵² Musa Mohammed Abseno, The Concepts of Equitable Utilization, No Significant Harm and Benefit Sharing under the Nile River Basin Cooperative Framework Agreement: Some Highlights on Theory and Practice, (2009) 20 *Journal of Water Law*, 86.

²⁵³ *Supra* note 250 at 4.

²⁵⁴ Patricia Wouters and Sarah Hendry, Promoting Water for All, (2009) 20, *Journal of Water Law*, 45 at 47.

reading of the text, as Spiegel (2005) argues, that the provisions must be read together to make a proper legal determination.²⁵⁵

The no significant harm rule is chosen as a primary focus in this dissertation for its potential to deliver accountability, transparency and justice as a conflict resolution mechanism, which incorporates considerations in Article 5. The text of the *Water Act 2007* is primarily focused on addressing environmental harms. Hence the author considers that the inclusion of the no significant harm rule would permit a greater balance in considering socio-economic and environmental harm.

The text of the relevant articles in the *UN Watercourses Convention* is presented below.

²⁵⁵ Carolin Spiegel, *International Water Law: The Contribution of Western United States Water Law to the United Nations Convention on the Law of the Non-Navigable Uses of International Watercourses*, *Duke J. of Comp & Int'l L.* 15, (2005) 333-361; Stephen McCaffrey, *The Law of International Watercourses Non-Navigational Uses*, Oxford University Press, 2001; *Supra* note 250.

The No Significant Harm Rule

Article 7 of the Watercourse convention entitled "Obligation not to cause significant harm" requires:

1. *"Watercourse States shall, in utilizing an [international] watercourse in their territories take all appropriate measures to prevent the causing of significant harm to other watercourse States."*
2. *Where significant harm nevertheless is caused to another watercourse State, the States whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of Articles 5 and 6, in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate to discuss the question of compensation."*

Embedded in Article 7 is the requirement of States to take reasonable care to avoid or mitigate significant harm. It is also evident that article 7 must be read together with articles 5 and 6 to determine whether a harm is significant, as opposed to accepted within the boundaries of "equitable and reasonable use". That is, Article 7(2) first requires a court to consider whether the principle of equitable and reasonable utilization and participation articulated in Article 5 has been breached by transboundary watercourse states.

Article 5 requires the following:

Article 5

Equitable and reasonable utilization and participation

1. *Watercourse states shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular an international watercourse shall be used and developed therefrom, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse.*
2. *Watercourse states shall participate in the use, development and protection of an international watercourse in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof, as provided in the present Convention.*

Article 6 articulates the factors relevant to determining what constitutes equitable and reasonable utilization. The general factors contained in Article 6 to be adapted for the Murray-Darling Basin, distinguishing significant harm from reasonable and equitable utilization are re-stated below.

Article 6

Factors Relevant to Equitable and Reasonable Utilization

- (1) *“Utilization of an international watercourse in an equitable and reasonable manner within the meaning of Article 5 requires taking into account all relevant factors and circumstances, including:*
 - (a) *Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;*
 - (b) *The social and economic needs of the watercourse States concerned;*
 - (c) *The population dependent on the watercourse in each watercourse state;*
 - (d) *The effects of uses of the watercourses in one watercourse state on other watercourse states;*
 - (e) *Existing and potential uses of the watercourse;*
 - (f) *Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect;*
 - (g) *The availability of alternatives, of comparable value, to a particular planned or existing use.*
- (2) *In the application of Article 5 or paragraph 1 of this article, watercourse states concerned shall, when the need arises, enter into consultations in a spirit of cooperation.*
- (3) *The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is a reasonable and equitable use, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.”*

Critique of the no significant harm rule as an effective institutional arrangement for cooperation

McCaffrey (2001) observed that the “no significant harm rule” established in customary international water law was one of the most difficult rules negotiated.²⁵⁶ This is a consequence of the problems involved in establishing consensus on a definition of “significant harm”, distinct from an “accepted level of harm” associated with reasonable and equitable use. Furthermore, as noted above, the “no significant harm” rule is traditionally viewed as a downstream protective principle.²⁵⁷

The absence of concrete minimum standards in the existing “no significant harm rule”, meant that the international court of justice (ICJ) did not seek to apply the rule in the *Gabcikovo-Nagymaros*²⁵⁸ case although Hungary sought to build a legal argument based on this rule.²⁵⁹ The court rejected Hungary’s argument, finding that the situation was not one of grave and imminent peril, threatening the essential interests of Hungary.²⁶⁰ The court instead looked to Articles 5 and 6 to assess whether the activity concerned was reasonable and equitable against the factors articulated. This dispute was protracted, indicating that the court’s application of the rules were ineffective. The court recommended continued negotiation with a focus on environmental risks and prevention of irreversible environmental harm.²⁶¹ The inability of the court to deliver a directed set of outcomes is directly attributable to the open wording of the interrelated Articles 5, 6 and 7.

²⁵⁶ McCaffrey (2001) *Supra* note 254 at 348.

²⁵⁷ Salman M.A. Salman, Downstream riparians can also harm upstream riparians: the concept of foreclosure of future interests, (2010), 35(4) *Water International*, 350-364.

²⁵⁸ *Case Concerning the Gabcikovo-Nagymaros project (Hungary/Slovakia)*, Judgment of 25 September 1997, ICJ, No.92.

²⁵⁹ *Supra* note 254 at 356.

²⁶⁰ Patricia Wouters, The Legal Response to International Water Scarcity and Water Conflicts: The UN Watercourses Convention and Beyond, *The African Water Page*, (2000): http://www.thewaterpage.com/pat-wouters_html.

²⁶¹ Philippe Sands, *Principles of International Environmental Law*, Cambridge University Press, 2nd Edn, 2003 at 476.

Rieu-Clarke (2009) noted that the terms of Article 7 were imprecise to determine the level of harm required to trigger legal intervention.²⁶² Hildering (2004) and Wolf (1999) have argued that concrete minimum standards need to be developed by states to replace the general list of factors for consideration stated in Article 6, required to distinguish reasonable and equitable utilization from significant harm.²⁶³ While the factors articulated in Article 6 provide an indication of what should be accounted for in assessing significant harm with reference to what is equitable and reasonable, the wording of the provision provides a considerably wide discretion to the court. The discretion is particularly broad in permitting the court to assign a weight to each of the factors. Article 6 may be criticized as being too vague in this context. Rieu-Clarke and Loures (2009) also observe that at the time of drafting the convention, members of the General Assembly were concerned that the convention did not “appropriately balance” the interests of upstream and downstream parties with reference to Articles 7 and 5.

It is often stated, that from the time of drafting of the convention, Article 5 pertaining to reasonable and equitable utilization is favoured over Article 7 on the matter of significant harm. However by process of logical deduction, it is clear that a use which is neither equitable nor reasonable can be classified as such, if significant harm exists as a consequence of use. As Spiegel (2005) observes in determining what is equitable and reasonable, the US Supreme Court regards harm as a determinative factor. The doctrine of equitable and reasonable use elaborated in the convention has its origins in decisions of the United States Supreme Court with respect to disputes between states over water resources.²⁶⁴ Spiegel (2005) notes more specifically that the *Watercourses Convention* on

²⁶² Alistair Rieu-Clarke and Flavia Rocha Loures, Still Not in Force: Should States Support the 1997 UN Watercourses Convention, (2009) 18(2), *Review of European Community and International Environmental Law*, 185-197.

²⁶³ Antoinette Hildering, *International Law, Sustainable Development and Water Management*, Eburon Publishers, 2004; Aaron T. Wolf, Criteria for Equitable Allocations: The Heart of International Water Conflict, (1999) 23, *Natural Resources Forum*, 3-30.

²⁶⁴ Stephen C. McCaffrey, The Contribution of the UN Convention on the Law of Non-navigational uses of International Watercourses, *Int. J. Global Environmental Issues*, Vol 1., Nos 3/4, (2001) 250-263.

the whole borrows heavily from principles of water law developed in the western United States.²⁶⁵

Spiegel (2005) notes that the construction of the American equitable utilization doctrine is primarily a downstream remedy and observes that the approach of the *Watercourses Convention* has specifically looked to the jurisprudence of the US Supreme Court which requires that:

- States are obliged to share water resources;
- A state must show real or substantial harm or injury;
- The injured state may petition the court to allocate the resource equitably;
- Where the injured state has shown substantial injury, the burden of proof falls on the injuring state to demonstrate equitable utilization.

Article 7, 5 and 6 read together are effectively a cost-benefit analysis problem with regard to assessing harms and benefits, where additionally preventative and after the fact compensatory measures are required to give effect to the provisions.

A substantial gap in the literature continues to be the absence of an analysis of the application of the no-significant harm rule to the Murray-Darling River Basin in the context of conflict resolution. Therefore the viability of cost-benefit analysis rules and compensation rules for a more precise application of the no-significant harm rule tailored to the requirements of the Murray-Darling River Basin is considered in this dissertation. Analyzing the acceptability of rules is essential for demonstrating potential for effective implementation and enforcement.²⁶⁶

²⁶⁵ Spiegel (2005) *Supra* note 254.

²⁶⁶ Daniel Berkowitz, Katharina Pistor, and Jean Francois Richard, The Transplant Effect, (2003) 51, *The American Journal of Comparative Law*, 163-204.

2.12 BUILDING INSTITUTIONS FOR CONFLICT RESOLUTION INTO A NO SIGNIFICANT HARM RULE

Within the eight principles identified by Ostrom (1990), conflict resolution was highlighted for “long-enduring common pool resource institutions”. In this context Ostrom (1990) identified a need for “rapid access and low cost conflict resolution mechanisms between appropriators, and between appropriators and government officials”.²⁶⁷ Ostrom and Kiser (1982) conclude that in conflict resolution provisions, centralization of water law and “legal integration” are required for high water institutional performance. This analyzes the acceptability and viability of two forms of conflict resolution rules in the Murray-Darling Basin, namely cost-benefit analysis rules and compensation rules to be built into a law reform model expanding the framework no-significant harm rule. These two sets of rules were chosen for their potential to build institutions for sustainability which address the “uncertainty and complexity” as Dovers (2003) recommends, and to deliver the “sophistication in mechanisms for feedback and communication” identified as a requirement by Foerster (2011).²⁶⁸ This section first examines the relevant literature on the cost-benefit analysis rules. Compensation rules in *Water Act 2007* were discussed earlier in section 2.8 and are discussed here further with reference to work of Frank Michelman on just compensation.²⁶⁹

2.12.1. COST-BENEFIT ANALYSIS RULES

Cost-benefit analysis refers to the calculation and ranking of various policy alternatives with reference to net benefits and costs (harms). Benefits are defined as increases in human wellbeing/utility and costs as reductions in human

²⁶⁷ Elinor Ostrom (1990) *Supra* note 205 at 182.

²⁶⁸ S. Dovers, Processes and Institutions for resource and environmental management: why and how to analyse? in S Dovers and S Rivers (Eds) “Managing Australia’s Environment, Federation, Sydney 2003; Anita Foerster (2011) *Supra* note 214 at 4007.

²⁶⁹ Frank I. Michelman, Property, Utility and Fairness: Comments on the Ethical Foundations of “Just Compensation” Law, (1967) 80(6), *Harvard Law Review*, 1165-1258.

wellbeing/utility.²⁷⁰ Social benefits, being the aggregation of individual benefits within society, must outweigh the social costs. The literature on the MDB does not test for the acceptability of the use of CBA in a consistent assessment framework. In constructing qualitative research questions in this dissertation, the Federal *Water Act 2007* was compared the American and Swedish rule models in environmental and water decision making.

Ackerman and Heinzerling are recognized as leading critics of the implementation of cost-benefit analysis in environmental regulation.²⁷¹ The major criticisms include:

- (i) Current valuation methods favour easily quantifiable items such as costs and benefits to the private sector, however are inadequate for “hard to quantify ethical values of biodiversity, environmental health, social equity, empowerment of politically disadvantaged groups and public well-being”.²⁷²
- (ii) Discounting “systematically and improperly downgrades the importance of environmental regulation”²⁷³

For these reasons Ackerman and Heinzerling (2002) argue that cost-benefit analysis fails to deliver the objectivity and transparency promised by its advocates. In response to these criticisms of the cost-benefit approach to decision making, Alan Carlin of the US Environmental Protection Agency suggests that cost-benefit analyses be carried out in all proposed major regulations for advisory rather than determinative purposes. In

²⁷⁰ D. Pearce, G. Atkinson and S. Mourato, *Cost-Benefit Analysis and the Environment: Recent Developments*, OECD 2006 at 16; See also Quentin Grafton, *Economic Costs and Benefits of the Proposed Basin Plan*, in D. Connell and Q. Grafton: *Basin Futures: Water Reform in the Murray-Darling Basin*, ANU EPress, 2011.

²⁷¹ Alan Carlin, US EPA, *The New Challenge to Cost-Benefit Analysis*, *Regulation*, Fall 2005; see Lisa Heinzerling and Frank Ackerman, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, *Georgetown Environmental Law and Policy Institute*, *Georgetown Law Centre*, 2002; Frank Ackerman, Lisa Heinzerling and Rachel Massey, *Applying Cost-Benefit Analysis to Past Decisions: Was Protecting the Environment Ever a Good Idea?*, *Tufts University*, July 2004; Gary Bryner, *Beyond Cost-Benefit Analysis: Promoting Ecological Sustainability in Natural Resource and Environmental Agencies in the United States*, *Berlin Conference on Human Dimensions of Global Environmental Change*, November 2006; Tyler Cowen, *Using Cost-Benefit Analysis to Review Regulation*, *George Mason University*, 1998.

²⁷² Gary Bryner (2006) *Ibid* at 18.

²⁷³ Lisa Heinzerling and Frank Ackerman, (2002), *Supra* note 270 at 1.

this context the former Clinton administration recognized that not all benefits and costs can be monetized and required non-monetary consequences be regarded as influential in a regulatory analysis.²⁷⁴

Hsu (2005) observed that cost-benefit analysis rules have the potential to remove institutional bias through the institution of the correct procedural rules.²⁷⁵ Hsu and Loomis (2002) and Arrow et al.(1996) advocate American practice in which review boards have been appointed to assess the accuracy of cost-benefit analyses in water decisions, since the time of Jimmy Carter's presidency (1977-1981).²⁷⁶ In this manner Hsu (2005) argues that it is almost always possible to identify institutional bias and problematic valuations. In the United States the Office of Information and Regulatory Affairs (OIRA) has executive authority to review regulations with reference to CBA where the predicted annual impact is \$100 million and above.²⁷⁷ However, OIRA has been criticized for a lack of transparency and for harming regulation though prolonging periods of review.

While the principles of cost-benefit analysis have long history in the water decisions in the United States where they were first applied to the American public water sector in 1808, the European Union Water Framework Water Directive (WFD) 2000 has more recently embraced cost-benefit analysis rules. Article 5 (1) of the EU WFD 2000 requires "an economic analysis of water use". In implementing the EU WFD 2000, the

²⁷⁴ Robert Hahn, Sheila Olmstead, and Robert Stavins, *Environmental Regulation in the 1990s: A Retrospective Analysis*, (2003) 27 *Harvard Environmental Law Review* at 382.

²⁷⁵ Shi Ling Hsu, *On the Role of Cost-Benefit Analysis in Environmental Law*, (2005), 35(1) *Environmental Law*, 135-174.

²⁷⁶ Shi Ling Hsu and John Loomis, *A Defense of Cost-Benefit Analysis for Natural Resource Policy*, (2002) 32, *Environmental Law Reporter*, 10239-10244, at 10240 and 10241; Arrow et al., *Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?*, (1996) 272 *Science* 221-222.

²⁷⁷ Stuart Shapiro, *The Evolution of Cost-Benefit Analysis in U.S Regulatory Decision making*, *Jerusalem Papers in Regulation and Governance*, Working Paper No.5, May 2010; Gabriel Daly, *A New Cost of Cost-Benefit Analysis*, *Harvard Environmental Law Review*, *Environmental Law Blog*, 7 November 2013.

Swedish Environmental Code requires cost-benefit analysis of all “water undertakings”, which involves stakeholder participation by parties affected.²⁷⁸

Chapter 6, Section 6 the Swedish *Ordinance on Water Quality Management*, 2004 states that “an analysis of [measures to protect the environment] under the *Environmental Code* shall include an assessment of both the economic and the environmental consequences of actions, the costs and benefits should be quantified”. Chapter 2, Section 4 of the Swedish *Ordinance on Water Quality Management*, 2004 states that “water authorities should plan their work according to this regulation so that it allows and encourages the participation of all those involved in the management of the quality of the aquatic environment”. Kinell et al (2012) observe that the integration of public participation in cost-benefit analysis in practice is substantial.²⁷⁹

Kinell et.al (2012) predicted strategic behaviour of stakeholders. While consensus building occurred through stakeholder participation in the Swedish case study analyzed by the authors, it was noted that the region studied was characterized by a long history of consultation and lack of historical conflict. It was also noted that the historical culture of Swedish decision making has involved “consensus building”.²⁸⁰ Where consensus building does not form part of the culture of decision making, greater care in cooperative management is required.

Valuation is recognized as controversial in Swedish literature, however unlike the American model the Swedish rule structure does not address this concern with reference to review boards.²⁸¹

²⁷⁸ Ordinance on Water Quality Management (SFS2004:660); Gerda Kinell, Tore Soderqvist, Ragnar Elmgren, Jakob Walve and Frida Franzen, *Cost-Benefit Analysis in a Framework of Stakeholder Involvement and Integrated Coastal Zone Modeling*. CERE Working Paper, 2012:1; Vinoli Thampapillai, *Water Governance in Sweden*, Swedish University of Agricultural Sciences Working Paper Series, 2007:2.

²⁷⁹ Gerda Kinell et al (2012) *Supra* note 277 at 23.

²⁸⁰ Gerda Kinell et.al. (2012) *Supra* note 277 at 23.

²⁸¹ Bengt Kristom, Plus-Minus Economic Assessment for the Environment, Swedish University of Agricultural Sciences, http://plusminus.slu.se/RapporterPDF/Faktablad_om_+-pubENG.pdf (viewed 4-4-2013); Beatrice Hedelin and Magnus Lindh, Implementing the EU Water Framework Directive – Prospects for Sustainable Water Planning in Sweden, (2008) 18, *European Environment*, 327-344 at 340.

Selected Valuation Methods

How benefits and costs are to be valued is a question central to benefit-cost analysis. Three methods of valuation are articulated below.

Contingent Valuation and Willingness to pay

Contingent valuation is concerned with valuing the existence of an object, such as a species of bird or a wetland. The value is not obtained via utilization of the object, but rather merely from its presence. Thus contingent valuation is obtained by asking people their willingness to pay for an object which is not normally bought and sold in the market place.²⁸²

Sen (2000) observes that limitations of the market centric 'willingness to pay' approach include the neglect of distributional issues. Sen also critiques the "lone ranger" model of the 'willingness to pay' method in the context of environmental problems, arguing that the idea of treating the prevention of an environmental damage as a private good an individual may buy is illogical. Perhaps a more credible approach would involve questioning individuals as to what percentage of their tax dollars they would be willing to contribute in a collective fashion to water conservation over other alternatives, such as health, education, defence, or general infrastructure. Knetsch (1994) observed that the construction of questions to ascertain willingness to pay can lead to institutional bias and inconsistent results.²⁸³

Direct Estimation of opportunity costs

The opportunity cost of an activity is the highest net benefit forgone as a result of undertaking that activity. It is possible to estimate the opportunity costs of environmental protection by calculating the net income forgone. For example, take the case of a policy decision to trade water toward a wetland and away from farm production. The farm

²⁸² A. K. Sen, *Environmental Evaluation and Social Choice: Contingent Valuation and the Market Analogy*, 46 *The Japanese Economic Review* 1, (1995), 23-37. See also Jeff Bennett, *Non market Valuation Scoping Study: A report prepared for the Murray-Darling Basin Committee*, September 2002.

²⁸³ Jack Knetsch, *Environmental Valuation: Some Problems of Wrong Questions and Misleading Answers*, (1994) 3 *Environmental Values*, 351-68.

income forgone can be estimated by (i) determining the volume of water required to restore the wetland; and (ii) estimating the amount and present value of the farm production which would have been produced with that volume of water.

Threshold Analysis

The concept of threshold values was established by Krutilla and Cicchetti (1972) and Krutilla and Fisher (1975) with respect to a hydro-electric scheme in Hell's Canyon, a wilderness area in the United States.²⁸⁴ This method is applicable in cases where two mutually exclusive options exist: (i) economic development of a natural resource or (ii) environmental protection of the natural resource.

The threshold value is the minimum value of the environmental benefit arising from the conservation of a natural environment which would make the conservation option at least equal to the value of the alternative. This method involves estimating the net present value (NPV) of each option and finally comparing each NPV to determine the capital required to make the environmental conservation option match the economic value of the alternative. The choice of discount rate within this calculation is important, as different discount rates generate substantially different results. This method also relies on knowledge of the environmental benefit.

While the accuracy of valuation is a central preoccupation of cost-benefit analysis, the American and Swedish cost-benefit analysis rule models do not specify acceptable valuation methods, nor provide a guide to the limitation of each method to assist decision makers. There is no literature in the Murray-Darling Basin on development of valuation rules within a cost-benefit analysis framework.

2.12.2 COMPENSATION RULES: MICHELMAN ON JUST COMPENSATION

The extent of the anguish caused by the introduction of the guide to the MDB plan in 2010, expressed as public burning of the guide document and community hostility during MDB plan consultation meetings, represents the nature of the conflict between

²⁸⁴ David James, *The Application of Economic Techniques in Environmental Impact Assessment*, *Kluwer Academic Publishers*, 1994 at 93.

environmental and socio-economic uses in the MDB. This degree of social unrest may be explained by Michelman's analysis of just compensation law in his 1967 article entitled "Property, Utility and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law".²⁸⁵ In discussing the terms of compensatory justice for capricious redistribution of resources by the state, Michelman makes reference to Hobhouse's belief that: "*a rational social order does not rest 'the essential dispensable condition of the happiness of one man on the unavoidable misery of another, the happiness of forty million of men on the misery of one.... it is eternally unjust that one man should die for the people*". Michelman further turns to Holmes who argues that "*a government ought not to be called civilized if it sacrifices the citizen more than it can help it*".²⁸⁶

Under the constitution, courts are empowered to determine what constitutes a taking or compulsory acquisition through government action. Michelman states that the courts are constrained in their ability to accurately assess what is a taking, by observing that indirect socio-economic harms are not always classified a taking in the judicial system. That is, courts are unable to address all forms of compensation. The author refers to this as the compensation problem. In this context Michelman has advocated a "de-emphasis" on the exclusive reliance on courts to address the problem of compensation. The question is then whether governments can escape payment of compensation to communities suffering indirect collective losses as a consequence of government programs where no direct compulsory acquisition has occurred. The author offers two key examples. The first example refers to low flying government military aircraft causing a loss of enjoyment and reduced value of land. Compensation is due only where the flight path is directly over the land. However the same harm caused to an adjacent piece of land, does not attract the right to compensation. The second example is one of a government expropriation of an easement to build a highway attracting compensation to land owners under the constitution, while business interests suffering devaluation due to increased traffic do not attract compensation.

²⁸⁵ Frank I. Michelman (1967) *Supra* note 268.

²⁸⁶ Frank I. Michelman (1967) *Supra* note 268. .

Michelman observes that in government policy decision making the balancing test is popular. In the balancing test government action is deemed legitimate if the social gains outweighs the individual losses. However the deficiency of the balancing test is the assumption that there exist some interests which may be excluded from and "counterpoised against society's interest". Michelman states that the individual is at the heart of liberal philosophy and asks how liberal democratic institutions can justify weighing social gains against individual losses.

Michelman argues, that while people may adjust to "random uncertainty" through insurance schemes, risk of losses due to changes in government strategy will cause people to be "on edge". In this context people face the "risk of being strategically imposed upon", and devote substantial resources devising "counter strategies" and avoiding the risk." This is referred to as the demoralization cost.

In addressing compensation problems, Michelman focuses on John Rawls' Theory of Justice, and suggests that the correct test for compensability is not based solely on efficiency gains, but on the test of fairness.

Michelman defines three concepts in a compensation rule constructed to deliver fairness, namely (i) efficiency gains, (ii) demoralization costs and (iii) settlement costs.

(i) Efficiency gains: are the excess of benefits over losses incurred as a consequence of a particular measure. "Benefits are measured by the amount in dollars which prospective gainers are willing to pay to secure adoption of the measure. Losses are measured as the amount in dollars the losers would insist upon to agree to adoption of the measure."

(ii) Demoralization costs are "the total of (1) the dollar value necessary to offset disutilities which accrue to losers and their sympathizers specifically from the realization that no compensation is offered, and (2) the present capitalized value of the lost future production (reflecting either impaired incentives or social unrest) caused by demoralization of uncompensated losers, their sympathizers and other observers disturbed by the thought that they themselves may be subjected to similar treatment on some other occasion".

(iii) Settlement costs "are measured by the dollar value of the time, effort and resources which would be required in order to reach settlements adequate to avoid demoralization costs."

To determine compensation with reference to these three concepts, Michelman articulates five compensation rule statements. First, a government measure is to be rejected if both the settlement costs and the demoralization costs exceed efficiency gains. Second, if the government measure proceeds under the first circumstance, the lower of the settlement or demoralization costs must be paid in compensation. Third, compensation is to be paid whenever settlement costs are less than demoralization costs and efficiency gains. Fourth, if the settlement costs while lower than demoralization cost, exceed the efficiency gains, the government measure is regarded "improper regardless of whether compensation is paid. Fifth, compensation is only to be paid "where the demoralization costs exceed settlement costs".

The author observes that human psychology and behaviour must be studied to assess demoralization costs. In this context Michelman argues that the losses caused by government action have tendency to be more "counterproductive" than other kinds of losses, such as accidents and natural disasters.

Finally Michelman argues that fairness is far too difficult a concept for courts to manage, and that these decisions are better handled at the political level. The author observes that greater flexibility exists in the political sphere to assess fairness with reference to settlement costs to administer compensation. Michelman states that courts may be unduly rigid and constrained in assessing fairness with regard to settlement costs for the administration of compensation. It is argued that where "political officials are capable of a finesse beyond the grasp of courts, then they are obliged to make use of it".

As the phenomenon of demoralization is key to understanding the reactions of irrigator responses water policy in the MDB, it is considered that a focus on Michelman's writing in this respect is important. The literature on the adequacy of law in the MDB does not examine the construction of compensation rules with reference to the demoralization cost and settlement cost concept. The thesis analyzes the acceptability of new compensation rules and seeks to address indirect collective losses within the framework of the demoralization concept.

2.13 CONCLUSIONS: GAPS IN THE LEGAL LITERATURE

The second research question seeks to identify and address the inadequacies in the current public institutional and legal reforms for resolving conflict between environmental and socio-economic uses of water. The following gaps in the literature on the adequacy of existing water law in the Murray-Darling Basin to address conflict between environmental and socio-economic uses were identified:

- (i) There is scarce literature on the necessary institutional linkages and institutional capacity reforms between socio-economic agencies and the MDBA for building trust in decision making with reference to cost-benefit analysis rules and compensation provisions;
- (ii) A gap in the literature exists with reference to application of the no-significant harm rule to the Murray-Darling River Basin in the context of conflict resolution.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This dissertation analyzes the competitive environmental, social and economic forces impacting ecosystem resilience in the Murray-Darling river system. The purpose of this study is to construct an institutional reform model to address the limits of the water buyback program and deficiencies in the *Water Act 2007*.

Triangulation is used as the process of inquiry in this study. There are three types of triangulation, methods triangulation (use of more than one method); investigator triangulation (use of multiple investigators) and theory triangulation (use of multiple theories). Triangulation of methods was chosen for this research. Triangulation involves gathering information from different sources to identify a point of convergence. That is, triangulation allows cross verification of inferences from different methods, through observance of a point of convergence of conclusions.²⁸⁷ In this manner triangulation increases the validity of the conclusions of the research.

Three methods were used in the triangulation applied to new institutional economic analysis of the water problem:

- (i) international comparative law method;
- (ii) qualitative interview data from 41 irrigators across four Murray-Darling Basin regions at the height of the millennium drought in 2008-09;
- (iii) documentary analysis of the water reform progress to February 2014.

²⁸⁷ Wendy Olsen, *Triangulation in Social Research: Qualitative Research and Quantitative Methods can really be mixed in*. M. Holborn Omskirk, *Developments in Sociology*, Causeway Press, 2004; Julia Brannen, *Mixed Methods: A Discussion*, Economic and Social Research Council, National Centre for Research Method, 2005.

Triangulation of methods sought to address the limitations of data generated from single set of qualitative interviews (see Figure 3.1).²⁸⁸ The New Institutional Economics theoretical approach requires analysis of a set of factors impacting water sector performance (see Figure 2.4). Hence triangulation of methods is well suited to investigation of these factors to arrive at a conclusion.

Figure 3.1: Triangulation - Mixed method approach



In the context of triangulation of methods, the analysis is presented in two stages. First the summary of the key findings emanating from the qualitative interview data is presented in Chapter Four. Second, the key findings of the qualitative interview data are combined with documentary analysis of the progress of the water reform in the MDB to February 2014 and the international comparative law method, viewed through the lens of new institutional economics, and are presented in Chapter Five.

²⁸⁸. Derek Layder, *Sociological Practice*, SAGE, 1998; Derek Layder, *Sociological Practice: Linking Theory and Social Research*, SAGE Publications, 2005; Layder argues that "a multi-strategy framework is preferable in order to tease out the multi-layered nature of social life."

The framework of new institutional economics theory was discussed in Chapter One (1.2.2) and Chapter Two (section 2.7). International Comparative Law employed in this dissertation is discussed in section 3.9 of this chapter. The literature relevant to comparative law analysis was articulated in Chapter Two (sections 2.5, 2.11, and 2.12.1). The documentary analysis method is discussed in section 3.11 of this chapter. The following section, 3.2, discusses the methodology for collection and analysis of the qualitative empirical data used in this thesis.

3.2 STRATEGIES OF INQUIRY FOR EMPIRICAL RESEARCH

Two strategies of inquiry are utilized in this research. The first is Adaptive Theory (Layder 1998, 2005) applied to New Institutional Economic Theory (NIE) as articulated in Chapter One and Chapter Two.²⁸⁹ The second is the collective case study approach applied to the international comparative law study and qualitative research method. The reasons for selection of Adaptive theory and the collective case study approach are discussed below.

3.2.1 ADAPTIVE THEORY APPROACH

Adaptive theory seeks to link pre-existing theory and theory constructed from data analysis of actual empirical research, thereby bridging the gap between middle range theory and grounded theory.²⁹⁰ Middle-range theory relies on the formulation of an initial theory and requires the testing of theory in the research. It involves a small number of controlled variables, and is therefore best suited to the use of quantitative methods.²⁹¹ On the other hand, grounded theory requires the development of theoretical concepts and hypothesis as the data is uncovered (building theory from the ground up). Grounded

²⁸⁹Derek Layder (2005) *Supra* note 287.

²⁹⁰*Ibid* at 1.

²⁹¹*Id* at 16.

theory seeks to import a deeper level of understanding of subjects of the research and therefore places a greater emphasis on qualitative data.²⁹²

Instead of limiting the development of theory to a fixed time period within the research framework, Layder proposes that adaptive theory allows for theorizing to occur throughout the research process, combining an examination of pre-existing theories and allowing for the adaptation of theories as data analysis progresses. That is, deductive and inductive reasoning are embraced in the one approach.²⁹³ The primary aim of this research is not to develop a new theory, but rather to integrate and adapt existing theoretical insights into data analysis and develop a reform model for achieving a balance between environmental and socio-economic uses in the Murray-Darling Basin.

3.2.2 COLLECTIVE CASE STUDY APPROACH

A second strategy, the collective case study approach, is used in both the qualitative interview method and the international comparative law method. Stake (2005) draws distinctions between three categories of case study approaches.²⁹⁴ The first class is termed “intrinsic”, where the researcher seeks to understand the workings of a singular case of interest. The second is termed “instrumental”, meaning that a researcher will seek to draw generalizations from a single case which may share features of several other cases of interest. That is, the instrumental case demonstrates typicality. The third category, “collective” case study approach, refers to the exploration of several cases simultaneously to investigate a phenomenon, population or general condition. In this thesis the general condition investigated is poor environmental flows in the Murray-Darling river system giving rise to a need for re-allocation of water rights toward the environment and engagement in institutional and legal reform.

²⁹² *Id* at 18.

²⁹³ *Id* at 51.

²⁹⁴ Robert Stake, *Qualitative Case Studies*, in Norman Denzin and Yvonna Lincoln, *The Sage Handbook of Qualitative Research*, SAGE, 2005 at 445-447.

The need for a multi-focus approach across the transboundary water resources of the MDB makes the collective case study approach to undertaking qualitative interviews most suitable. It is unlikely that a single case study will meet the requirement of typicality. As different institutional and legal frameworks exist for water, in each state the collective case study approach more appropriate for analyzing this complexity.

As different institutional and legal frameworks exist for water, in each state the collective case study approach more appropriate for analyzing this complexity.

In this context, the collective case study approach seeks to ensure greater representation within the sample across the three upstream states of the MDB, namely Queensland, New South Wales and Victoria. As ACT diversions from the MDB are negligible and South Australia's capacity to recover environmental flows is constrained by the extraction levels of the upstream states, irrigators in both regions are excluded in irrigator interviews.

Similarly in seeking to develop a legal and public institutional reform model for the MDB by using an international comparative law method, a collective case study approach is adopted. This is done in order to draw from a wider range of experiences and to demonstrate that differentiation in some variables may impact the success of a particular type of reform applicable to the unique circumstances of the MDB.

3.3 INTRODUCTION TO THE QUALITATIVE INTERVIEW RESEARCH METHOD

A qualitative interview method is ideally suited to answering the research questions articulated Chapter One. This method requires collection of information on the experiences and perceptions of individual water users within catchments areas and representatives of public organizations responsible for the management of environmental flows. Qualitative methodologies are essentially focused on understanding social relations and reality as experience.²⁹⁵ Denzin and Lincoln (1998) explain that qualitative research is concerned with "the major public and private issues and personal troubles that

²⁹⁵ Terry Hutchinson, *Research and Writing in Law*, (Lawbook Co., 2002) at 85.

define a particular historical moment”.²⁹⁶ This research is concerned with the relationships between irrigators, public organizational actors and the law during a period of time in which water scarcity (in terms quantity and quality) was acutely felt in the Murray-Darling Basin. The most recent drought period occurred between 2001 and early 2010. Qualitative data was collected during 2008 and 2009 at the height of this millennium drought.

Qualitative sampling permits the researcher to select subjects most relevant to the research problem. That is, the targeting of “information rich” sources. In contrast, quantitative methods often involve random sampling.²⁹⁷ Furthermore obtaining a representative sample using a quantitative method would require the use of a postal or phone survey method, given that farmers present in the Murray-Darling Basin are approximately 15 500 in number. A qualitative interview method was considered preferable to a quantitative survey method as the latter would be unlikely to clearly establish causal links between variables.²⁹⁸ Quantitative postal and phone surveys also have limited scope for obtaining a deeper understanding of the motivations of farmers and organizational actors.²⁹⁹

In-person qualitative interviews make it possible to elicit detailed and complex information which has not been reported in other publications. In-person qualitative interviews permit open-ended questions to allow interviewees to present evidence of unique and/or interconnected responses.³⁰⁰ It has been observed that qualitative interviews permit the articulation of a broad range of human factors, which include “contradictory

²⁹⁶ N. Denzin and Yvonna Lincoln (Eds), *Strategies of Qualitative Research*, (Sage Publications, 1998) at xi.

²⁹⁷ Martin N. Marshall, ‘Sampling for Qualitative Research’, (1996) Vol.13(6), *Family Practice, Oxford University Press*, 522-525.

²⁹⁸ David de Vaus, *Surveys in Social Research*, Routledge, 2001 at 7.

²⁹⁹ *Ibid* at 7.

³⁰⁰ N. Denzin and Yvonna Lincoln (Eds) (1998) *Supra* note 287..

behaviour, beliefs, opinions, emotion, and relationships between individuals."³⁰¹ That is qualitative interviews facilitate the exploration of bounded rationality, central to new institutional economics. Qualitative in-person interviews permitted gathering of non-verbal information pertaining to emotional responses to questions. This can lead to gathering greater in depth information pertaining to the emotional response.

Responses may tend to be more accurate in a qualitative, in person setting. Qualitative in person interviews also permit the connection of responses to the surrounding field environment in which the interviewee is positioned. The qualitative method also allows follow-up questions after an initial interview, should new facts come to light. The in-person qualitative method allows for the building of trust which may permit the volunteering of additional relevant information outside the scope of interview questions.

3.4 IN-DEPTH QUALITATIVE INTERVIEW METHOD AND ADDRESSING LIMITATIONS

In-depth interviews permit the extraction of detailed information on stakeholder perceptions of the current state of water governance in the Murray-Darling Basin with respect to the delivery of environmental flows. The perceptions of stakeholders obtained via interviews can inform reform efforts by highlighting the depth and nature of problems experienced in the current system of water governance.

Limitations of the interview method include misunderstanding and interviewer bias. To overcome these constraints, all interviews were taped, some interviewees were either asked to verify accuracy of the transcribed interviews where possible or answers were reviewed during the interview. Taped interviews provide a relatively accurate record of interviewee responses and permit the content of the interview to be revisited during research analysis. Taped interviews may however lead to guarded responses. Overcoming this limitation depends on the ability of the interviewer to develop a rapport with the interviewee. An accurate recording was an overriding consideration.

³⁰¹ Family Health International, *Qualitative Research methods: A data field Collectors Guide*, USAID, 2002.

Interviewer bias, in the context of this research may be detected in questions demonstrating a preference for one form of governance or method of assessment (cost-benefit analysis) over another. To this end the design of particular questions avoided the propensity for interviewer bias, by allowing stakeholders to present perceptions on possible alternatives and engage in critical analysis. In the event that interviewees had difficulty answering the questions, both positive and negative aspects of alternatives were presented to determine the interviewee's preference.

Clearly a qualitative study is not statistically significant, but may provide important insights which inform our understanding of market failure in the water sector, SDL enforcement constraints and provide a basis for legal and institutional reform. This is particularly so if repeated patterns of responses are observed across the case study areas selected. Substantial variations in responses may point to unexpected and previously undocumented governance issues for the Murray-Darling Basin. Triangulation using interview data across four Murray-Darling Basin regions, documentary analysis of the water reform progress to 2014, new institutional economic theory and international comparative case studies sought to address the limitation of data generated from single set of qualitative interviews³⁰²

3.4.1 QUALITATIVE INTERVIEW PROCESS

All interviews were conducted as in-depth qualitative interviews using semi-structured questions.³⁰³ The use of semi-structured questions allows for unanticipated responses and permits interviewees freedom to articulate their own perceptions. Initial questions may be relatively open ended, allowing for the possibility of detailed questioning if required.³⁰⁴ A review of the relevant literature, which included relevant case law, has been used to design the questions.

³⁰² Derek Layder (2005) *Supra* note 287. Layder argues that "a multi-strategy framework is preferable in order to tease out the multi-layered nature of social life."

³⁰³ Paul Nichols, *Social Survey Methods*, Oxford:Oxfam, 1991.

³⁰⁴ *Ibid.*

A selected number of interview questions for irrigators tested the limits in the willingness to sell water toward the environment in the Murray-Darling Basin. Some of the questions are an adaptation of questions designed by Ise and Sunding (1998) in their examination of the US Government water buy-back scheme in the Lohantan Valley, Nevada.³⁰⁵ The questions were then extended to elicit views on a range of additional factors, some specific to the Murray-Darling Basin, which may affect willingness to sell to government environmental buyers. Personal financial questions were avoided, as the questions were posed during the drought period which was a sensitive time. The survey questions are contained in Appendix 2. The interview questions abide by the ethics requirements of the Australian National University.³⁰⁶

The former Murray-Darling Commission assisted in recruiting irrigators in the relevant regional areas via their Community Advisory Committee comprised of a number of farmers. Catchment Management Authorities of the selected catchments were also of assistance. The National Farmer's Federation and the Farmer's Federation of Victoria, NSW and Queensland were approached for assistance. Individual irrigators also provided lists of possible interviewees within their own professional sub-organizational groupings.

It was possible to interview irrigators in the Goulburn-Broken, Murrumbidgee, Border Rivers and Condamine catchments within two hours driving distance from each major town. One week was devoted to each region, involving three to four days of interviewing and the remainder devoted to initial transcribing and reflection on the implications of data for the next round of regional interviews.

Government stakeholders were approached directly in capital cities (Canberra, Sydney, Melbourne, Brisbane). The government interviews were completed over a two day period spent in each capital city. The required Australian National University ethics clearance was granted in April 2008. All irrigator interviews were completed between May and July 2008. Government interviews were completed between 2008 and 2009.

Each interview was conducted in accordance with the requirements of the Australian National University Human Research Ethics Committee (HREC). Interviews

³⁰⁵ Sabrina Ise and David Sunding (1998), *Supra* note 199 at 219.

³⁰⁶ http://www.anu.edu.au/ro/ORI/Human/human_index.php

were held with informed and written voluntary consent. Interviewees were informed that they were free to withdraw from the study at any time and, refrain from answering particular questions, or may terminate an interview if they wished. Irrigators were approached through public sources, government or farmer's federations and were contacted only after consent to participate through these organizations was obtained.

When interviewees were initially contacted they were informed of the full details of the research and permission was requested to tape record the interview. Consent forms for signature and information sheets were attached to written communication with interviewees and were presented at the interview. These documents provided the contact details of the researcher and the Australian National University Human Research Ethics Committee office.

3.5 QUALITATIVE INTERVIEW RESEARCH PROCESS

3.5.1 SELECTION OF FOUR REGIONS ON THE BASIS OF OVERALLOCATION

Four regional case studies across the upstream states, Queensland, New South Wales and Victoria were selected on the basis of overallocation of water entitlements. The four regions selected are upper Condamine, Queensland; Border Rivers, NSW and Queensland; Murumbidgee, New South Wales; and Goulburn-Broken, Victoria. While the survey undertaken in this thesis was conducted in 2008 the four selected regions remain over-allocated in 2012-13. Table 3.1 provides details of over-allocation at 2010. Selected regions are in bold text.

TABLE 3.1 ENVIRONMENTAL WATER AVAILABLE FOR OFFSET

REGION	HELD ENVIRONMENT WATER TO OFFSET REDUCTIONS AT 30 JUNE 2010 (GL/Y)	RANGE OF GAP AFTER WATER RECOVERY AT 30 JUNE 2010 (GL/Y)
Murray	309	784-1155
Murrumbidgee	64	615-864
Goulburn-Broken	107	341-492
Condamine- Balonne	1	204-274
Border Rivers	4	82-108
Namoi	6	66-88
Macquarie-Castlereagh	57	47-78
Campase	5	35-47
Loddon	3	35-40
Gwydir	64	26-57
Lower Darling	0	16-20
Barwon – Darling	32	12-25
Moonie	1	11-14
Warrego	8	10-12
Ovens	0	10-11
Eastern Mount Lofty Ranges	0	3-4
Lachlan	45	-1-24
Paroo	0	0-0

Source: adapted from MDBA (2010) Table 11.1 at 153

All regions selected were characterized by poor environmental flows and a concentration of irrigation activity. To identify regions possessing these characteristics, a review of recent literature on the condition of the Murray-Darling Basin was conducted, with a focus on the work of the CSIRO. The former Murray-Darling Basin Commission was also contacted and the Commission provided information on the location of relevant irrigators within the Murray-Darling Basin. Figure 3.2 illustrates the position of the regions selected.

FIGURE 3.2 MDB REPORTING REGIONS



Source: <http://www.csiro.au/partnerships/MDBSYReports.htm> (2007)

The four regional case studies were selected, as they are heterogeneous with respect to geography, hydrology, farming practices and water resource management. This facilitated the testing of variations in responses to questions. It was necessary to gather data across the four regions in order to develop flexible legal and institutional arrangements which would meet the needs of stakeholders in the three upstream states of the Murray-Darling Basin. A detailed background to the four regions selected is provided in section 3.12 of this Chapter. Table 3.2 summarizes the characteristics of the selected regional areas according to river, environmental flow issues, use of market based measures to recover water, water plan status, cap status, and stakeholders.

TABLE 3.2: SELECTED REGIONS

Region	Regional Characteristics
Murrumbidgee NSW	<p>Selected River: Murrumbidgee River, tributary of the Murray River</p> <p>Environmental Flow issues: Lowbidgee floodplains threatened, biodiversity loss, irrigation and dryland salinity, other water quality issues, reduced water flows, downstream competition.</p> <p>Market-based measures: Riverbank, NSW Government targeting Lowbidgee floodplain of the Murrumbidgee River</p> <p>Water Plan Status: Murrumbidgee Water Sharing Plan commenced July 2004, valid for 10 years. Plan amended in 2006 to stop across the board reductions in groundwater entitlements for Low Murrumbidgee; "history of use" criterion applied. Federal Basin Plan to enter into force in 2019</p> <p>Past Cap Status and sustainable diversion limit status: In compliance 2005/06; In breach 2004/05, by 115GL, but cumulative cap credit still exists calculated from 1997/98. Final SDL to be negotiated in late 2012-13</p> <p>Stakeholders: Irrigators, NSW Government, Federal Government, Murrumbidgee Catchment Management Authority, Environmental NGOs, Indigenous communities, Industry, UNESCO Hydrology Environment Life Policy program.</p>
Goulburn-Broken VIC	<p>Selected River: Goulburn River, is a declared heritage river and tributary of the Murray River</p> <p>Environmental Flow issues: salinity, other water quality issues (algal blooms), biodiversity concerns</p> <p>Market-based measures: Living-Murray Intergovernmental buy-back scheme,</p> <p>Water Plan Status: "Bulk Entitlements", dictate minimum environmental flows. Current plan will be replaced by the Federal Basin Plan in 2019.</p> <p>Past Cap Status and sustainable diversion limit status: In breach 2005/06 by 10GL, but in cumulative cap credit since July 1997. Final SDL to be negotiated in late 2012-13.</p> <p>Stakeholders: Irrigators, VIC Government, Federal Government, Goulburn-Broken Catchment Management Authority, Environmental NGOs, Indigenous communities, Industry.</p>

<p>Condamine Queensland</p>	<p>Selected River: Condamine river</p> <p>Environmental Flow issues: ground water depletion, over extraction of surface water, biodiversity loss, soil erosion, salinity, water quality</p> <p>Market-based measures: No Queensland government environmental market measures. Commonwealth Environmental Water holder has jurisdiction</p> <p>Water Plan Status: Current Water Plan to be replaced by Federal Basin Plan in 2019.</p> <p>Cap Status and sustainable diversion limit: cap was not set</p> <p>Stakeholders: Irrigators, QLD/NSW Government, Federal Government, Border Rivers Catchment Management Authority, Environmental NGOs, Indigenous communities, Industry.</p>
<p>Queensland Border Rivers NSW/QLD</p>	<p>Selected River: Barwon River</p> <p>Environmental Flow issues: water quality (algal blooms), water extraction has reduced end of system flows, projected future groundwater use deemed unsustainable.</p> <p>Market-based measures: No Queensland government environmental market measures. Commonwealth Environmental Water holder has jurisdiction.</p> <p>Water Plan Status: Water Resources Plan set in 2003. Resource operation plan set by QLD government at 2008, amended 2011. Federal Basin Plan to enter into effect in 2019.</p> <p>Past Cap Status and sustainable diversion limit: Cap was not set. Final SDL to be negotiated in late 2012-13</p> <p>Stakeholders: : Irrigators, QLD/NSW Government, Federal Government, Border Rivers Catchment Management Authority, Environmental NGOs, Indigenous communities, Industry.</p>

3.5.2 SELECTION OF THE SAMPLE: INTERVIEWEES

Three main approaches to sample selection in qualitative studies exist, namely, purposive sampling, convenience sampling and theoretical sampling.³⁰⁷

Purposive Sampling

Purposive sampling requires the selection of a sample which will best answer the research question. This requires the development a framework of variables or criteria relevant to answering the research questions.³⁰⁸ Interviewees selected through the purposive method may also be able to suggest other subjects. This is referred to as snowball sampling.

Convenience Sampling

Convenience sampling refers to choice of subject with regard to ease of accessibility.

Theoretical Sampling

Theoretical sampling involves the selection of a sample driven by theory. It involves choice of sample to “test, elaborate and refine” a theory.³⁰⁹ This form of sampling involves building theory from interpretation of data, attached to the grounded theory approach.

Purposive sampling was chosen for this research. In the context of this research, the framework of variables for irrigator interviewee selection is derived from the characteristics of the regions. The main criterion is that irrigators selected should be located in a region characterized by an environmental flow problem related to the concentration of irrigation activity (see section 3.5.1). A range of government stakeholders involved in managing the environmental flow problem were selected to obtain public sector perspectives on the research question. Snowball sampling occurred during the interview process. Snowball sampling in this circumstance did not lead to

³⁰⁷ *Supra* note 294.

³⁰⁸ *Supra* note 294.

³⁰⁹ Imelda T Coyne, Sampling in qualitative research: Purposeful and theoretical sampling: merging or clear boundaries, (1997) 26 *Journal of Advanced Nursing*, 623-630.

representational problems, as the key criterion was irrigator presence in a region affected by environmental flow problems.

Convenience sampling has been used to a limited extent, in that remote interior regions located a great distance from major cities and towns were excluded. The use of purposive sampling serves to mitigate the deficiencies attached to convenience sampling, which includes a lack of representation.

The design of questions was directed toward gathering interview data from irrigators and government officials which would allow the integration and adaptation of pre-existing theoretical insights from new institutional economics, into the data analysis and the legal reform model for the Murray-Darling Basin. Purposive and theoretical sampling were melded with regard to the exploration of bounded rationality, central to new institutional economics theory, to explain the limits and inadequacies of water governance in the MDB. As NIE theory applied to water governance argues that institutions are central to achievement sustainable development, the target sample was comprised of key stakeholders responsible for shaping the function of institutions in the MDB, namely, irrigators and government officials across four upstream regions.

3.5.3 SELECTION OF SAMPLE SIZE

Irrigation comprises the largest share of extractive use in the Murray-Darling Basin (83 percent at 2004/5)³¹⁰. Hence irrigators were the focus of 41 in person interviews to test the limitations to the willingness to sell and the adequacy of legal and public institutional reforms.

A smaller number of senior government water officials, twelve in total, were also interviewed for the purpose of obtaining their perspectives on property rights to water, over-allocation and allocation processes, environmental buybacks, and the *Federal Water Act 2007*. The limitations of legal institutions and law are further examined by direct reference to case law and legislation. Hence it was not considered necessary to interview court officials.

³¹⁰ Murray-Darling Basin Authority, *Guide to the Basin Plan*, Commonwealth of Australia 2010.

In quantitative, as opposed to qualitative research it is common to choose a large sample size from a random sample to reach an unbiased conclusion, involving extrapolation to explain the general population. Qualitative research is chosen where there is a need to investigate the psycho-social reasons for outcomes. Hence qualitative samples are targeted and smaller in size, based on the nature of the problem being investigated. In the context of this research the psycho-social causes for the limits of market based water governance in the MDB and the inadequacies of the *Water Act 2007* are investigated in context of over-allocation and environmental degradation. The appropriate sample size for a qualitative study is one that adequately answers the research question. As this research deploys mixed methods, including documentary analysis and international comparative law, a sample of approximately 10 irrigators per region across four regions was chosen, bringing the total to 41 irrigators surveyed. Two to three senior government officials were interviewed in each jurisdiction. Documentary analysis was used to confirm the observed psychology of each group of irrigators and government officials according to region/ jurisdiction. International comparative law with reference to (i) the Ise and Sunding study (1998) articulated in Chapter One (ii) cost benefit rules and compensation rules attached to the no significant rule, was also employed to confirm patterns of responses. Table 3.3 summarizes the interview sample.

TABLE 3.3: NUMBER AND TYPES OF IN-PERSON STRUCTURED INTERVIEWS

Interviewee Type	Total Number	Number
Irrigators Murrumbidgee, NSW Condamine, QLD Goulburn-Broken, VIC Border Rivers, NSW/QLD	41 individual interviews 5 in a single group interview	15 (individual) 9 (individual) 12 (individual) 10 (5 individual, 5 group)
State Government officials NSW Victorian Queensland South Australia	9	3 2 3 1
Federal Government Departments	3	3
TOTAL	59	

3.6 QUALITATIVE SURVEY QUESTIONS

There are two research questions examined in the thesis, discussed in the introductory chapter. The first research question asked the following:

What are the limits of market based water governance expressed as water buybacks, as a means of reconfiguring private water rights toward environmental flows in the Murray-Darling river system for building ecosystem resilience?

The first set of interview questions emanating from research question one are organized into three themes:

Questions asked from Irrigators

- (i) Factors impacting the unwillingness to sell to government environmental buyers;
- (ii) Preferential selling patterns among irrigators; and
- (iii) General attitudes to the government environmental buyback.

The second research question asked the following: Which public institutional and legal reforms are necessary to resolve the conflict between environmental and socio-economic uses of the Murray-Darling river system in order to achieve and maintain ecosystem resilience?

The second set of interview questions emanating from research question two are organized into five themes:

Questions asked from Irrigators:

- (i) Irrigators' views on government policy on:
 - sustainability,
 - SDLs,
 - climate change and
 - water allocations;
- (ii) Irrigators' views on information flows with regard to water trade;
- (iii) Irrigators' views on property rights to water;
- (iv) Irrigators' views on acceptability of proposed institutions for alternate conflict resolution: cost benefit analysis and compensation rules.

Questions asked from Government Officials:

(v) Government's institutional capacity assessed against comprehension of:

- Irrigators' rights to property
- Environmental water buybacks
- Water Act 2007
- Overallocation

The interview questions are attached in appendix two.

3.7 OVERVIEW OF METHODS OF DATA ANALYSIS

This section outlines the system for managing and analyzing the data collected. Analysis was to be undertaken after each round of regional interviews, to allow for further exploration of ideas and information to further refine subsequent rounds of catchment interviews.

Interviews were transcribed in full, to the extent that this was possible within the time constraints. Conversation that was clearly unrelated to the research questions was excluded from transcripts. All individual interviewees were assigned a number to prevent identification. For the research to deliver meaningful information on willingness to sell and material for an institutional and legal reform framework, it was necessary to identify the regional areas selected and the government departments interviewed.

3.7.1 QUALITATIVE INTERVIEW DATA ANALYSIS USING CODING

A system of provisional coding has been developed.³¹¹ Provisional coding allows sections of text of interviews to be linked to specified concepts and categories. This enables management of large volumes of transcribed data. The provisional codes were developed from themes identified in the literature, the researchers own ideas for a public institutional and legal framework, and existing theory. Codes reflect the research questions and are thus divided into two categories, namely market codes and public

³¹¹ Derek Layder, *Sociological Practice: Linking Theory and Social Research*, (SAGE Publications, 2005).

institutional and legal codes (Tables 3.4, 3.5 and 3.6). Core/Satellite codes, that is, those referring to main subject areas, are also included.

Code	Description	Code	Description
01	General	10	Law
02	Business	11	Political Science
03	Education	12	Social Work
04	Health	13	Psychology
05	Humanities	14	Religion
06	Life Sciences	15	Science
07	Mathematics	16	Statistics
08	Medicine	17	Technology
09	Physical Sciences	18	Other

TABLE 3.4: MARKET INSTITUTIONAL CODES

MARKET CODES	Explanation of responses sought	Illustration of responses
Willing to sell	Responses detailing socio-economic factors inducing sale of water to environment and type of sale preferred (temp/permanent).	Concern for impact of long term environmental health on irrigation activity induced sale. Low security water sold failed to deliver returns during the drought.
Unwilling to sell	Responses detailing socio-economic factors inhibiting sale of water to environment.	Concern for the rural and regional economy
Status of property rights and likelihood of sale	Responses detailing degree of certainty of title to water for irrigators and ability/willingness to sell.	Demonstration of a need for irrigators to examine title documents to establish grant of perpetual rights as articulated in law
Pricing of water licences	Response from government on the procedures for setting prices of any new water licences issued.	Market determines the price, often at auction. Over-allocation has meant the focus is on reduction of water entitlements.
Government Buybacks	Government and irrigator perceptions of progress of water buybacks	Concern was expressed by irrigators over the impact on the regional economy. State government buyers were pleased with progress.
Impact of competition	Responses from government and irrigators on the impact of competition	Government buyers gave no indication that they were being out-competed by private buyers. Irrigators often stated that they preferred to sell to private irrigators over government to protect the rural economy.

TABLE 3.5: PUBLIC INSTITUTIONAL CODES

INSTITUTIONAL CODES	Explanation	Illustration
Irrigator dialogue with government	Responses on level and type of engagement with government.	Lack of information sharing and transparency reported.
Irrigator perceptions of the SDL and environmental flows	Responses on willingness to comply and appreciation of environmental needs.	While environmental flow measures are viewed as necessary, irrigators were unhappy with the SDL.
Compulsory Acquisition	Responses of government and irrigators on acceptability of compulsory acquisition.	Irrigators expressed concern regarding acquisition at the end of planning periods without compensation and government officials indicated that minor reductions had occurred.
Compensation	Responses to compulsory acquisition after alternative compensation packages are presented.	Preference was to accept monetary compensation over combined relocation and monetary compensation
Cost-benefit analysis	Responses from irrigators/government on receptiveness to application of CBA.	Irrigators indicated concern over lack of consistent decision making. Government official indicated that CBA was undertaken, however that requirements for consistent procedures were not set in regulation.
Incentive compatibility/sanctions Use of selective incentives	Responses from Federal government on success of mechanisms to induce cooperation and views of States and irrigators	The market is viewed as a central to the purchasing strategy for environmental flow, alongside infrastructure improvements.

TABLE 3.6 RULE OF LAW INSTITUTIONAL CODES

RULE OF LAW		
Transparency / Accountability	Responses on whether there is a need to publish data on transactions involving environmental flows (prices, location)	Transparency on purchase processes and location of purchases were recorded as concerns
Equality	Do irrigators have equal access to compensation provisions?	NSW irrigators complained that compensation for acquisition of ground water licences was not uniform.
Conflict resolution - institutional capacity	Responses from all parties on barriers to resolution through negotiation or courts	Expenses drive a preference for class actions
Enforcement – institutional capacity	Responses on factors impeding enforcement. Monitoring/measurement.	Metering was an impediment, lack of institutional capacity to manage water and cost-benefit analysis was an irrigator concern
Government capture	Responses on the presence of government capture by vested interests	Mistrust in government articulated. Irrigators expressed concern over the presence of vested interests in government decision making. Irrigators noted their own involvement in government decision making, while some believed that their numbers were too low to have an impact on government decision making.
Federal Water Act 2007	Responses to the adequacy of the legislation and federal take over	Favourable responses, however with limited knowledge of the detail of the law
Case Law	Responses from irrigators and government on impact on decision making of recent case law : notably Murrumbidgee Groundwater and Ashworth v State of Victoria.	Irrigators in the region were familiar with recent decision, and commented on inconsistent decision making with respect to compensation.

3.8 INTRODUCTION TO THE INTERNATIONAL COMPARATIVE LAW METHOD

To deepen the exploration of possible institutional and legal reforms required to address the market-based water governance problem in the MDB, a second method, international comparative law, is employed in the thesis. Applied International Comparative Law requires analysis of variations in law across jurisdictions which accounts for exogenous factors shaping the law. These factors may include geography, climate, race, national history, culture, religion, technological innovation, societal needs and political interests.³¹² The purpose of comparing alternative legal systems is primarily for legal and public institutional reform.³¹³ For international comparative research to be meaningful it is necessary that problems of a similar nature exist in each of the jurisdictions considered.³¹⁴ In all countries considered a combination of water quantity and/or quality problems exist, involving the need to re-allocate water resources. While the problem faced by each country in the comparative study must be similar in nature, the legal and institutional approach employed to solve the problem in each country need not be the same.³¹⁵ Cappelletti observes that the legal/ juridical/ institutional solutions investigated “can be very different without diminishing at all the worth of comparative analysis”. In fact analysis of variation in approaches to a problem may provide deeper insights.

³¹² Mauro Cappelletti, *Comparative Law Teaching and Scholarship: method and objectives*, (1994) No.1, *Asia Pacific Law Review*, 1-8.

³¹³ *Ibid*; T. Koopmans, *Understanding Political Systems: A Comment on Methods of Comparative Research*, (1987) 17 *Georgia Journal of International and Comparative Law*, 261.

D. Roebuck, ‘The Past is Another Country: Legal History as Comparative Law’, paper presented at International Conference on Comparative Law, Peking : Institute of Comparative Law and Sociology of Law, April 7-10, 1992) at 5; Xavier Blanc-Jouvan, ‘The Teaching of Comparative Law: Goals and Methods’, paper presented at International Conference on Comparative Law, Peking : Institute of Comparative Law and Sociology of Law, April 7-10, 1992 at 2; Ralf Michaels, *The Functional Method of Comparative Law*, in Matthias Reinmann and Richard Zimmermann (Eds), *The Oxford Handbook of Comparative Law*, (Oxford University Press, 2006) at 368 and 373.

³¹⁴ *Supra* note 311.

³¹⁵ *Supra* note 311.

3.9 INTERNATIONAL COMPARATIVE LAW METHOD: RESEARCH DESIGN AND PROCESS

3.9.1 SELECTION OF COUNTRIES FOR COMPARISON WITH MURRAY-DARLING BASIN, AUSTRALIA

As the Murray-Darling Basin is a transboundary river basin, a comparison with the international water governance systems is also undertaken to examine legal principles and institutional structures which may be imported. Where common obstacles are identified, insights from theoretical frameworks will be integrated into a public institutional and legal reform model for the Murray-Darling Basin (see Table 3.7). International water law, derived from American law was the main area of comparative law in this study, articulated in Chapters Two, Five and Six.

The common feature in all jurisdictions selected is the presence of environmental flow problems in each country. Countries for comparison have been selected on the basis of the *degree* of market-based and state-based water governance approaches for managing environmental flows. A wide variation in approaches was sought to generate a broader range of ideas for reform in the Murray-Darling Basin. Countries are listed according to the degree of market-based governance in descending order in Table 3.8 below.

TABLE 3.7: MDB AND INTERNATIONAL ENVIRONMENTAL GOVERNANCE COMPARISON

Jurisdiction	Shared problem	Approach
International Environmental Law/Institutions for Water	Transboundary conflict over environmental flows Enforcement	Binding and Non-binding principles, including the No-Significant Harm Rule.
Governance of MDB	Institutional capacity	Binding federal and state laws.

TABLE 3.8: INTERNATIONAL COMPARATIVE LAW CASES

Country	Degree of Market-based Water Governance	Environmental Flow/ Water Scarcity Problem
Australia	High: MDB, Australia followed the US experience (see Ise and Sunding, 1998). Water markets were promoted by COAG in 1994. The government buy-back program in water markets to restore environmental flows was introduced in 2004 under NWI. A general policy of no compulsory acquisition has been adopted, although some acquisition has occurred. Hence water purchases are from willing sellers only.	Serious water scarcity and quality problems in the MDB. Problems are transboundary.
United States	High: Water purchase program in water markets articulated in law for environmental flows exists in Western United States which preceded	Serious water scarcity and quality problems in Western United States. Problems are transboundary.

	<p>Australian programs. The American findings on willingness to sell to government environmental buyers articulated by Ise and Sunding 1998, are compared to MDB, Australia, to examine inherent limits of the market.</p> <p>Cost-benefit analysis governance systems for environmental decisions is compared.</p>	
Sweden	<p>None: No water markets exist, however government water sharing plans operate. To manage water in times of scarcity the government administers a policy of compulsory acquisition through court system with limited or no compensation. Environmental flows are the responsibility of government and legal institutions, as in MDB, Australia.</p> <p>The main point of comparison is the use of cost-benefit analysis for water undertakings applicable to the development of a reform model.</p>	<p>Localized water scarcity in Southern Sweden. Serious water quality problems across the country. Problems are transboundary, including deterioration of water quality in the Baltic sea.</p>

3.9.2 METHODS OF DATA COLLECTION

To undertake the comparative analysis, a visiting research position was organized for a brief period at the Swedish University of Agricultural Sciences (June-July 2006), supplemented by documentary analysis with respect to comparisons involving American and international water law.

Documentary analysis was the main method employed in the international comparative law studies. Data was obtained from secondary documentary sources,

legislation, and case law. Informal interviews were held with government officials and academics for the purpose of clarification of the law, public institutional frameworks and for gathering documentary material.

3.9.3 METHODS OF DATA ANALYSIS

The country studies and the international environmental law study involved documentary analysis. The comparative analysis was written to incorporate the analysis of the qualitative interview data for the Murray-Darling Basin after collection. To build a public institutional and legal reform model the following codes articulated in Table 3.9 have been adopted:

TABLE 3.9: INTERNATIONAL COMPARATIVE LAW CODES

Government Institutions
Institutional linkages
Institutional capacity
Transparency and accountability procedures
Legal Institutions and Law
No Significant Harm rule: Compensation rule extensions
No Significant Harm rule: Cost Benefit Analysis rule extensions

3.10 DOCUMENTARY ANALYSIS METHOD

Documentary analysis in this research involved the systematic collection and analysis of government water policy documents, government reports, individual submissions of government inquiries, newspaper articles, press releases, case law and legislation relevant to the research questions (Table 3.10). Policy reform cannot be undertaken without study of existing documented policy and developments. Hence documentary analysis is a very important method of inquiry and a strong basis for making recommendations.³¹⁶

The documents analyzed are produced by organizations which are devoid of any influence by the researcher. The independence of the documentary material analysis eliminates researcher bias and makes the conclusions derived through the triangulation process of research analysis more robust and valid.³¹⁷ In this context documentary analysis was undertaken with reference to the progress of water reform in the MDB between 2008 and 2014.

A limitation of the documentary analysis method applied to water governance in the MDB is the length of time required to monitor progress and confirm the validity of qualitative results. For example, the Water Act 2007 which directed the MDB Plan, was followed by the Guide to the Basin Plan in 2010. The final Basin Plan was only enacted as law in November 2012 after intense negotiations following substantial resistance to the 2010 Guide to the Basin Plan. The Inter-governmental implementation Agreement was only signed by all MDB States at February 2014 on the basis that water buybacks would be capped under the law. The resistance documented at each stage of reform creating substantial delays, and the documented conditions for agreement, were used to confirm the published findings of the qualitative study (2008-09).³¹⁸

³¹⁶ IDS, Learning About Qualitative Document Analysis, ILT Brief, August 2013.

³¹⁷ *Id.*

³¹⁸ *Supra* note 204.

TABLE 3.10 DOCUMENTARY ANALYSIS MATERIALS

Document Type	Examples
Government Reports and policy documents	House of Representatives Standing Committee on Regional Australia, <i>Of Drought and Flooding Rains: Inquiry into the impact of the Guide to the Murray-Darling Basin Plan</i> , Commonwealth of Australia, 2011 Individual submissions made to government inquiries Productivity Commission reports MDBA reports and MDB Plan CEWH reports NWC reports ABARE reports CSIRO reports ANAO reports
Statistical data	ABS, ABARE, DAFF
Media reports	Newspaper articles Government Press releases
Legal documents	Legislation Draft Bills and parliamentary first and second reading materials International Law materials Case Law
Private and Academic reports	Marsden Jacobs Associates University reports

3.11 DATA ANALYSIS PRESENTATION

The analysis is presented in two stages. First the summary of qualitative interview data is presented in Chapter Four. Second, the qualitative interview data is combined with documentary analysis of the progress of the water reform of the MDB to March 2014 and international comparative law, viewed through the lens of new institutional economics. The latter is presented in Chapter Five.

3.12 DETAILED PRESENTATION OF SELECTED REGIONS

The following sections are a detailed articulation of the background to each of the four selected regions.

3.12.1 THE CONDAMINE-BALONNE REPORTING REGION

The Condamine-Balonne reporting region which is identified by the CSIRO Sustainable Yields Project, comprises the Condamine and Maronora-Balonne catchment areas as defined by the Murray-Darling Basin Commission. The Condamine and Maronora-Balonne catchments are located in southern Queensland, while the Condamine-Balonne reporting region in its entirety extends into Northern New South Wales (Figure 3.4).

The Balonne catchment was excluded from this study due the presence of extensive reporting and research analysis undertaken on the region, particularly with respect to cotton production in the catchment and Queensland and New South Wales irrigator views on competing claims for water.³¹⁹ The Condamine region, in particular the Upper Condamine region, was selected for interviews (Figure 3.5).

FIGURE 3.4 THE CONDAMINE-BALONNE CATCHMENT

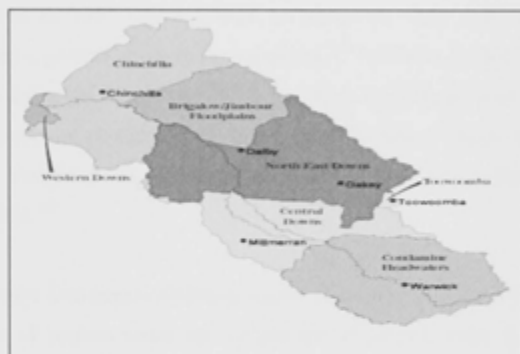


³¹⁹ See Claudia Baldwin, *Integrating Values and Interests in Water Planning using a Consensus-Building Approach*, PhD Thesis, University of Queensland, June 2008; and

Poh-Ling Tan, *Dividing the Waters: A Critical Analysis of Law Reform in Water Allocation and Management in Australia*, PhD Thesis, Australian National University, May 2001.

Source: <http://www.nrw.qld.gov.au>

FIGURE 3.5 THE CONDAMINE CATCHMENT



Source: <http://www.condaminecatchment.com.au/images/LandcareMap.jpg>

The Condamine region considered in this research, forms part of the historically famous farming region named the Darling Downs. The region is located at the headwaters of the Darling River system, west of the Great Dividing Range.³²⁰ The Condamine River forms part of the MDB, sourced from a number of tributaries passing through narrow valleys, widening as the river falls into the lower Balonne floodplain wetlands between St George and Walgett.³²¹ The Condamine catchment is divided into the upper and mid Condamine sub-catchments. The average rainfall for the period 1997-2006 is consistent with rainfall

³²⁰ Andrew Biggs and Bruce Carey, *The Condamine Catchment*, Catchment Series, Queensland Department of Natural Resources and Water, 2006 at 1.

³²¹ Department of Environment and Resource Management, 'State of the Rivers – Upper Condamine – Technical Report, State of Queensland', 2012 at i; CSIRO, *Water Availability in the Condamine-Balonne: A Report to the Australian Government from the CSIRO Murray-Darling Sustainable Yields Project*, CSIRO Australia, 2008 at 14.

patterns for the period 1895-2006.³²² Intense flooding in Northern Queensland in February 2009 resulted in relatively minor flooding in the Upper Condamine catchment. Highly fertile soils have made this catchment one of the most productive in the nation.³²³ Agricultural activity in the area commenced during the 1840s.³²⁴ At the height of agricultural expansion in 1937, there existed in excess of 6500 dairy farms in the catchment, as well as a growth in cropping industries.³²⁵ However by 2003, the number of dairy farms had fallen to 250.³²⁶ At 2001, irrigated agricultural production in the Condamine catchment was dominated by beef cattle, broadacre crops and cotton.³²⁷ Cotton production comprised 63.5 percent of irrigated land use in the Condamine catchment during 2000.³²⁸

Water use in the entire Condamine-Balonne region as reported by the CSIRO in June 2008 was 3 percent of surface water and 10 percent of ground water in the Murray-Darling Basin.³²⁹ Total surface water extraction for the region was reported to be high, at 53 percent of available surface water.³³⁰ Large volumes of ground water enter surface water flows, which then return to ground water systems through seepage from stream beds.³³¹ Ground water depletion is one of the most important environmental concerns in this region, particularly for the Condamine catchment. Ground water in the mid-Condamine is sourced largely from the Great Artesian Basin. The Great Artesian Basin

³²² CSIRO (2008), *Ibid* at 14.

³²³ CSIRO (2008), *Supra* note 320 at 17.

³²⁴ *Supra* note 119 at 1.

³²⁵ *Ibid* at 1.

³²⁶ *Id* at 1.

³²⁷ Murray-Darling Basin Commission, Annual Report 2004-2005, *MDBC Publication No. 23/05*, at 88.

³²⁸ CSIRO (2008) *Supra* note 320 at 3.

³²⁹ *Ibid* at 3.

³³⁰ *Id* at 4.

³³¹ *Id*.

lies beneath 20 percent of Australia's mainland, making it the largest artesian basin in the world, covering Queensland, New South Wales, Northern Territory, and South Australia. Salinity levels of the ground water are suitable for stock and domestic use, but not for irrigation.³³² Aquifers in the Upper Condamine are alluvial systems linked to rivers and creeks, used predominantly for irrigation.³³³

Ninety-seven percent of ground water extraction across the Condamine and Balonne catchments occurs in the upper Condamine, which was a key reason for selecting this region for irrigator interviews.³³⁴ It is known that ground water extraction needs to be cut substantially to achieve sustainability and was expected that this would occur through government intervention during the drought period (2001-2010).³³⁵ However under the draft Basin Plan produced by the MDBA gives permission to increase ground water extraction overall.

Another significant and well studied environmental problem concerns over-extraction of surface and floodplain water in the Condamine-Balonne region resulting in very low flows to the Narran Lakes in northern NSW. The Narran Lakes is listed for conservation in the *Ramsar Convention on Wetlands of International Significance*. Over-extraction particularly in the case of floodplain waters of the Culgoa River in the Lower Balonne management area, is recognized as the main cause of environmental damage to the Narran Lakes. However, water from the upper Condamine is also capable of reaching NSW. The Condamine Management Association argued that the Upper Condamine does not have a large impact on the Narran Lakes, while salinity and riparian vegetation are greater environmental concerns in the Condamine.³³⁶

³³² *Id* at 23.

³³³ *Id* at 24 and 29.

³³⁴ *Id* at 4.

³³⁵ *Id* at 4 and 5.

³³⁶ Condamine Catchment Management Association, Response to the Draft Water Allocation and Management Plan Condamine Balonne Basin, 23 October 2000.

The total regional population in both the Condamine and Balonne catchments combined is approximately 182 000, concentrated in Toowoomba, Warwick, Dalby, and Chinchilla. In 2004, total water consumption across agriculture, industry and community consumption was 315 GL, of which ninety percent was consumed in the rural sector for irrigation, stock and domestic use.³³⁷

Coal and coal seam gas mining in the Condamine catchment corresponds to a high degree of water extraction alongside irrigated agriculture. Coal seam gas production, which is natural gas marketed as Liquefied Natural Gas (LNG), releases water as a by-product. This water is contaminated by salts and other impurities.³³⁸ Planned investment in coal seam mining is predicted to involve the extraction of billions of litres of water, which requires reverse osmosis treatment to deliver water suitable for drinking and irrigation. However, concerns exist with respect to the depletion of ground water reserves held in the Great Artesian Basin.

Water Entitlements in the Condamine Catchment

The type of water products/entitlements available in the Condamine catchment at the time of the interviews (May-July 2008) included:

- (i) Surface hectare licenses with no storage permitted. This is an entitlement to extract in-stream water when the river reaches a specified level over a specified weir. Extraction of water under this entitlement is regulated by the size of the pump and the quantity of flow passing the property.
- (ii) Surface water harvesting license, which is a regulated supply entitlement from a specified dam, namely the Leslie dam.

³³⁷ J. Wolfenden and M. Evans, *Water Futures for the Condamine Catchment - A study commissioned by the Condamine Management Association, Toowoomba, Queensland, Centre for Ecological Economics and Water Policy Research, University of New England, Armidale, 2004.*

³³⁸ *Water Futures, Toowoomba:* <http://www.toowoombawater.com.au>

(iii) Volumetric ground water license: A volumetric limit license is subject to set allocations. However, some irrigators were unaware of how much they were actually pumping as no proper metering devices were in place (personal communication, 2008). Hence pumping restrictions set according to time were often imposed by government. However, actual compliance was admittedly difficult to monitor.³³⁹

(iv) Overland flow / Floodplain water harvesting licences are only required in some sections of the catchment for this type of extraction.

No security is attached to water in un-supplemented water systems, that is, water systems with no storage infrastructure. High and medium security water is available on supplemented systems.

Water Trading

Interstate water trading was not possible during the period in which the interviews were conducted, that is, May-July 2008. However some degree of temporary trade operated within the State. An overarching Water Resources Plan (WRP) was adopted earlier in 2004. The Condamine Resource Operations Plan under the WRP finally entered into force in December 2008 after prolonged delays, applying water trading rules. The Resource Operations Plan (ROP) for the Lower Balonne region had been the subject of a legal challenge in the Queensland Supreme Court during 2008 and 2009, in which judicial review of the ROP was sought.³⁴⁰ The ROP was to permit the separation of legal title to land and water. The status of the Resource Operations Plan for the Lower Balonne catchment area was classified as deferred at January 2010. This effectively barred interstate water trade from the Lower Balonne area. On 8 December 2011 amendments to the 2008 Resource Operations Plan were effected, very belatedly separating land and

³³⁹ Interview 1.

³⁴⁰ Arlie Douglas, Legal challenge may further delay the Condamine-Balonne ROP, ABC Rural, 1 May 2008, <http://www.abc.net.au/rural/qlld/content/2007/s2232987.htm>

water entitlements to facilitating permanent water trade.³⁴¹ However, Tan et.al. (2012) observes that separation of land and water title is qualified and limited to areas where “hydrological data is considered adequate to specify water security and environmental flow objectives and where community support coincides with drivers for trade”.³⁴²

3.12.2 THE BORDER RIVERS REGION

Further south of the Condamine-Balonne region lies the transboundary Border Rivers region crossing northern New South Wales and southern Queensland, positioned west of the Great Dividing Range (Figure 3.6).³⁴³ Agricultural activity in the catchment centres on the Macintyre Brook, the Macintyre River, the Dumaresq River and the Barwon River.³⁴⁴ Other major water resources in the area include the Great Artesian Basin, alluvial aquifers and wetlands. The major water storages include Pindari, Glenyon and Coolmunda dams.³⁴⁵ Average rainfall in the region has remained consistent over the past 111 years.³⁴⁶

³⁴¹ Department of Environment and Resource Management, Condamine and Balonne Catchment: Current Status of Planning Activities, Queensland Government, 2012.

³⁴² P-L Tan, C. Baldwin, I. White and K. Burry, “Water Planning in the Condamine Alluvium, Queensland: Sharing Information and eliciting views in a context of overallocation,” (2012) *Journal of Hydrology*, doi:10.1016/j.jhydrol.2012.01.004

³⁴³ Meredith Hope and Robert Bennett, Border Rivers (NSW) Catchment Irrigation Profile, NSW Agriculture and the NSW Department of Sustainable Natural Resources.

³⁴⁴ CSIRO, Water Availability in the Border Rivers: Summary of a Report to the Australian Government from the CSIRO Murray-Darling Sustainable Yields Project, *CSIRO Australia*, 2007 at 3.

³⁴⁵ *Ibid* at 14.

³⁴⁶ *Id.*

FIGURE 3.6: BORDER RIVERS REGION



Source: www.environment.gov.au

Irrigated cropping in the catchment covering 75 300 hectares is dominated by cotton production, followed by cereals, pasture and hay, and orchards.³⁴⁷ Approximately 75 percent of irrigated land area is devoted to cotton production.³⁴⁸ The population stands at approximately 50 000, concentrated in the towns of Glenn Innes, Inverell, Tenterfield, Stanthorpe, Inglewood, Mungindi and Goondiwindi. It has been observed that approximately sixty-three percent of businesses in the catchment are dependent on agriculture.³⁴⁹ Agriculture is the largest employer in the region, employing 3030 people, that is 24.4 percent of the workforce.³⁵⁰

Environmental flow problems in the catchment include deteriorating soil and surface water quality, notably salinity, in the Brigalow plains area and to the north of the region.³⁵¹ The key findings of a 2007 CSIRO investigation into water availability in the

³⁴⁷ *Id* at 15.

³⁴⁸ *Id* at 3.

³⁴⁹ *Supra* note 342 at 15.

³⁵⁰ NSW Irrigators Council Fact Sheet, Border Rivers, undated.

³⁵¹ *Supra* note 343.

Border Rivers catchment are: (i) surface water diversion has adversely impacted end of system flows and surface water availability may fall by ten percent by 2030 as a consequence of climate change; (ii) extensive ground water development in the Dumaresq River region is likely to cause a decline in ground water levels and stream flows levels in the future; (iii) predicted increases of ground water use will be unsustainable causing further reductions to streamflow.³⁵² The CSIRO reported that the ground water extraction in the Barwon region exceeds recharge.³⁵³ In total ground water extraction in the Border Rivers catchment accounts of two percent of all ground water extraction in the Murray-Darling Basin.³⁵⁴

As a transboundary region, the two sections of the Border Rivers region (Border Rivers Queensland catchment and Border Rivers New South Wales catchment) are governed separately by the Queensland and NSW state governments. The joint management of the Border Rivers region is undertaken by the Border Rivers Management Committee, comprising state government officials sourced from the relevant departments. The Committee is responsible for the coordination of the consultative arrangements between Queensland and New South Wales for management of water resources in the region.³⁵⁵

Separation of land and water title in the NSW Border Rivers region came into effect in 2005, while Queensland was continuing the finalization of separation of land and water title during 2009 and into 2010. Hence interstate water trade was possible in NSW, however this was not the case in Queensland during the time period June 2004 – June 2009. Furthermore, it should be noted that the Queensland government did not participate in

³⁵² *Ibid.*

³⁵³ *Id.*

³⁵⁴ *Id.*

³⁵⁵ Natural Resources and Water, Queensland, *Border Rivers Resource Operations Plan*, March 2008.

the Cap and Trade system instituted in 1997, unlike NSW. At 2012 Border Rivers interstate water trading had been facilitated by law and policy.³⁵⁶

In July 2009 the premiers of NSW and Queensland signed the NSW-Queensland Border Rivers intergovernmental agreement between the states, replacing the 1946 NSW-Queensland Border Rivers Agreement. The agreement addresses water sharing arrangements between the states of the Border Rivers region and is implemented via a water sharing plan.³⁵⁷

Water security products in the Border Rivers catchment were termed A and B, corresponding to high and general security entitlements respectively. Surface water irrigators interviewed in the catchment received on average a water allocation of thirty to forty percent of their entitlement in the five years to 2008. Ground water irrigators had faced substantial cuts to water use imposed by the catchment water sharing plan.

The water sharing plan requires:³⁵⁸

- (i) environmental flow rules for both states within the Border Rivers, including holding of water in Pindari Dam (NSW) to protect and maintain environmental assets;
- (ii) allocation of water for town supply, landholders, industry and agriculture; and
- (iii) separation of land and water title to facilitate and allow for the commencement of water trade between NSW and Queensland.

Separate water plans exist for both the NSW and Queensland sections of the Border Rivers region. Water Management in the Queensland section is governed by the Border

³⁵⁶ Department of Environment and Resource Management, 'Border Rivers Interstate Water Market', Queensland Government, 2012: www.derm.qld.gov.au/water/trading/interstate-trade.html

³⁵⁷ Minister Phillip Costa, Water Sharing Plan for the NSW Border Rivers Regulated River Water Source, Media Release, 1 July 2009.

³⁵⁸ Minister Phillip Costa, Water Sharing Plan for the NSW Border Rivers Regulated River Water Source, Media Release, 1 July 2009.

Rivers Resource Operations Plan, 2008, which has a life span of ten years. Elements of the plan include:³⁵⁹

- (i) Conversion of entitlements to tradable water allocations on supplemented and unsupplemented supply schemes;
- (ii) Creation of a water allocations register;
- (iii) Metering of all surface water entitlements;
- (iv) Provisions for interstate water trade;
- (v) Continuous share arrangements for water allocation;
- (vi) Water licences issued for authorized overland flow works, require that the average volume taken under the licence not exceed the amount that could be taken prior to date on which the plan entered into force;
- (vii) Conversion of medium priority water to high priority for the Goondiwindi Shire Council.

The NSW section of the region is governed by the NSW Border River regulated river water source, Water Sharing Plan Guide, June 2009. The plan outlines three key rules:

- (i) Continuous low flow rule: This required a minimum release of 10 megalitres per day from Pindari dams to maintain environmental flows;
- (ii) Translucency rule: requires the immediate release of specified inflows into the dam per day for environmental flows;
- (iii) Stimulus flow rule: refers to a pulse of water released to stimulate natural ecological processes.

The NSW Border Rivers Water Sharing Plan provides for the following:³⁶⁰

- (i) Adaptive environmental water: water committed for environmental purposes during specified times or in specified circumstances.

³⁵⁹ Natural Resources and Water, Queensland, *Border Rivers Resource Operations Plan*, March 2008.

³⁶⁰ NSW Department of Water and Energy, *Water Sharing Plan, NSW Border Rivers Regulated River Water Source, Guide*, June 2009.

- (ii) Basic landholder rights: stock and domestic water rights.
- (iii) Requirements for water under access license: water extraction outside the sphere of stock and domestic water, must be authorized under a water access license.
- (iv) Granting access license: water access licenses may be traded on the market. However the granting of new access licenses is restricted to local water utility or town water supply, domestic or Aboriginal cultural purposes.
- (v) Long-term average annual extraction limit: This limit is set at the average volume of extraction given the available infrastructure and development at 2001/02.
- (vi) Available water determinations: The determinations define the share component available to each category of license.
- (vii) Water allocation accounts: Accounts have been established for each access license.
- (viii) Extraction condition for supplementary water: the form of extraction may only occur under Departmental announced decision.
- (ix) Access license dealing rules: These rules govern sales, rentals, conversion to another category of license and change of location of extraction.
- (x) Mandatory conditions: Specified conditions apply to all water access licences.
- (xi) System operation rules: These rules govern operational matters impacting the quantity and supply of water.
- (xii) Monitoring and reporting of plan performance. (However the NSW Border Rivers Irrigator council has observed that inadequate metering has constrained the ability of government institutions to manage water in the region).³⁶¹

Floodplain Harvesting and Overland Flows

Floodplain harvesting is defined by the NSW Government as “the collection, extraction and impoundment of water flowing across floodplains”.³⁶² The regulation of floodplain

³⁶¹ NSW Irrigators Council, Fact Sheet: Border Rivers (NSW) Catchment Irrigation Profile, undated at 3.

waters of NSW or overland flows as they are known in Queensland has been an issue of concern. At the time the irrigator interviews in April-July 2008 were undertaken the NSW government had issued a 'Draft Floodplain Harvesting Policy' for public consultations. At the time of the interviews overland flow waters were not consistently regulated. The New South Wales – Queensland Border Rivers Intergovernmental Agreement 2008, sought to place some limits overland flow extraction and floodplain harvesting in each State. The *Water Resource (Border Rivers) Plan*, Queensland, 2003 was subsequently amended to link regulation of overland flows to the *Sustainable Planning Act 2009*, Queensland. Section 33 requires that decisions on grant of overland flow licences or permits take into account "natural aquatic, ecosystems, including natural wetlands; and users of overland flow water downstream of the area to which the application relates."

Transportation of water from the Border Rivers Region to the Menindee Lakes

Water flows from the Border Rivers to the Menindee Lakes in western New South Wales. Storages were constructed in the 1960s by the NSW government around a series of natural lakes to provide water for the town of Broken Hill and surrounding irrigators. Seepage losses and evaporation losses continue to be a concern, even after the breaking of the drought.³⁶³ Infrastructure development is seeking to reduce these losses.

3.12.3 THE MURRUMBIDGEE CATCHMENT

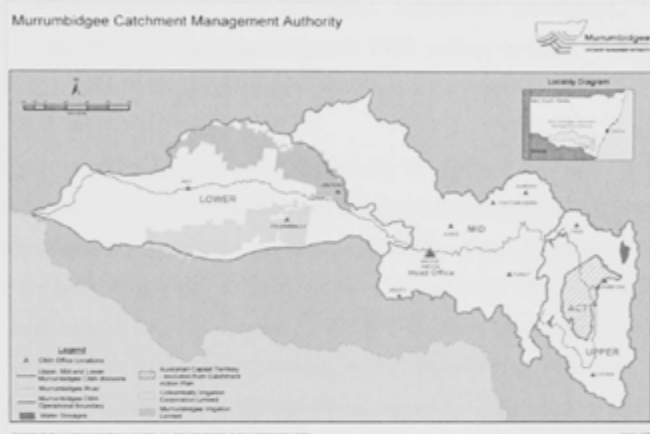
The Murrumbidgee catchment is located in southern New South Wales, east of the Great Dividing Range (Figure 3.7). The population of the Murrumbidgee catchment is 500 000, located mostly in Canberra, Wagga Wagga, Griffith, Hay and Leeton.³⁶⁴

³⁶² www.water.nsw.gov.au/.../policy_advice_3-floodplainharvesting.pdf

³⁶³ NSW Government Office of Water, 'Management of Releases to Menindee Lakes to South Australia, Department of Environment, Climate Change and Water, State of New South Wales, 2010.

³⁶⁴ CSIRO, *Water Availability in the Murrumbidgee: A Report to the Australian Government from the CSIRO Murray-Darling Sustainable Yields Project*, CSIRO Australia, 2008 at 14.

FIGURE 3.7 MURRUMBIDGEE CATCHMENT



Source: Murrumbidgee Catchment Authority

The major water sources for the catchment are the Murrumbidgee River and its tributaries sourced in the Snowy Mountains, Snowy Mountains Hydro-electric Scheme, alluvial aquifers, wetlands.³⁶⁵ The Snowy River is a snowmelt river, sourced from the Snowy Mountains in NSW, reaching the Victoria's coastline at Marlo. The Snowy Mountain Hydro electric scheme is Australia's largest, constructed in the 1880s, diverting irrigation water for the Murrumbidgee and Murray regions as a byproduct of electricity generation for NSW and Victoria.³⁶⁶ The Scheme was jointly funded by New South Wales, Victoria and the Federal government. The average annual rainfall for the period 1997-2006 was approximately eleven percent lower than the longer term average for the period 1895-2006.³⁶⁷

³⁶⁵ *Supra* note 363.

³⁶⁶ NSW Office of Water, *The Snowy River and the Snowy Mountains Scheme*, 24 Dec 2009.

³⁶⁷ *Supra* note 363 at 14.

In June 2003 the CSIRO reported that total agricultural production for the Murrumbidgee catchment, including both dryland and irrigated, exceeded \$1 billion per annum, comprising sixteen percent of total Australian agricultural production.³⁶⁸ Irrigated agriculture on its own was worth an estimated \$408 million in 2002.³⁶⁹ Cereals, rice, pasture and hay, citrus fruits and grapes are produced in the region.

Murrumbidgee Irrigation Limited and Coleambally Irrigation Cooperative Limited are the main water users in the catchment, consuming approximately eight-five percent of all water.³⁷⁰ Murrumbidgee Irrigation Limited, a privately owned irrigation company, is responsible for delivering water to farms in the southern NSW Murray Irrigation area, covering a land area of 748 000 hectares.³⁷¹ In 1995 the NSW government privatized the Murray Irrigation Area and districts, leading to the establishment of Murray Irrigation Limited which also services the Murrumbidgee region.³⁷² The three companies hold water licenses granted by the NSW Department of Water and Energy. Irrigator shareholding in the companies corresponds to the proportion of water entitlements held by individual irrigators.³⁷³

Water products are divided into high and general security in the Murrumbidgee catchment. High security entitlements consistently delivered between eighty to ninety-five percent of water entitlements in the five years to 2008. General security entitlements

³⁶⁸ CSIRO, *Lower Murrumbidgee Catchment – First Global HELP Reference Basin: A Pilot Project for Hydrology for the Environment, Life and Policy (HELP)*, UNESCO and WMO, 2003.

³⁶⁹ Shahbaz Khan, *Nomination of the Lower Murrumbidgee Catchment for UNESCO's HELP Pilot Demonstration Status*, Quebec, Canada, 2002.

³⁷⁰ *Supra* note 367.

³⁷¹ Murray Irrigation Limited, *Taking up the challenge – Responsible Irrigation Management*, December 2005 <http://www.murrayirrigation.com.au/> (viewed 12/8/2009).

³⁷² *Ibid.*

³⁷³ *Ibid.*

performed weakly over the same period, gradually declined from fifty-five percent of water entitlements to fourteen percent in 2007/08. In some areas catchment allocations had not exceeded 10 percent in the four years to 2009/10.

Past and present concerns exist as to the adverse impact of diversion of water away from the Snowy River. Following the inquiry held in 1998 a legal agreement was signed by the Federal, NSW and Victorian governments on environmental flows and associated environmental entitlements. The Water for Rivers program for environmental flow recovery, was established as an outcome of these negotiations. Khan (2004) identified the following environmental issues in the catchment: (i) altered flows adversely impacting river and wetland ecosystems; (ii) reduced water quality; dryland and irrigation salinity; (iii) ground water depletion (iv) erosion in regulated reaches caused by bank slumping; and (v) erosion in tributaries caused by perennial tree removal and poor cropping/grazing practices.³⁷⁴

With respect to total water consumption in the MDB, the Murrumbidgee catchment consumes in excess of twenty-two percent of all surface water and twenty-four percent of all ground water.³⁷⁵ Groundwater entitlements in the Lower Murrumbidgee are being reduced from 324 GL at 2004/05 levels to 280 GL.³⁷⁶ It is expected that the revised level of extraction will still lead to an 8m decline in ground water levels at extraction points and will also contribute to a 53GL decline in Murrumbidgee River surface flows.³⁷⁷ NSW State Government cuts to ground water entitlements made under the *Water Sharing Plan for the Lower Murrumbidgee Source, 2003*, often without compensation, have led to bitter disputes within the region. Ground water irrigators challenged State Government

³⁷⁴ Shahbaz Kahn, Integrating Hydrology with Environment, Livelihood and Policy Issues: The Murrumbidgee Model, *Water Resources Development*, Vol. 20, No. 3, (2004): 415-429.

³⁷⁵ *Supra* note 363 at 14

³⁷⁶ *Id* at 4.

³⁷⁷ *Id* at 4.

ground water cuts in the Land and Environment court in 2005.³⁷⁸ In addition to cuts undertaken by government, irrigators face competition for ground water resources from mining industry interests.

The Murrumbidgee water sharing plan entered into force in 2004, valid for 10 years. The format of Murrumbidgee water sharing plan, is similar to the NSW Border Rivers Water Sharing Plan in structure and content. This water sharing plan seeks to ensure water is allocated to environmental flows and therefore achieve sustainable water use. The document covers: environmental water, basic landholder rights, requirements for water under access licenses, long term extraction limits, available water determinations, water allocation accounting, extraction conditions for supplementary water, water access licenses, access license dealings. In 2006 NSW water sharing plans were suspended due to the severity of the drought.³⁷⁹ The Murrumbidgee water sharing plan remained suspended at January 2010.

3.12.4 THE GOULBURN-BROKEN REGION

The Goulburn-Broken catchment is located in northern and central Victoria, with irrigation activity centered around the Goulburn and Broken Rivers (Figure 3.8). The Goulburn River, the largest inland river in Victoria, commences in the Victorian Alps, meeting the Murray River at Echuca. The Broken Rivers is one of the tributaries of the Goulburn River. Other related water resources include fractured rock and alluvial aquifers, and public and private water infrastructure, including Eildon dam.³⁸⁰ The CSIRO reports that average annual rainfall in the ten years to 2008 has been

³⁷⁸ *Murrumbidgee Groundwater Preservation Association Inc v Minister for Natural Resources* [2005] NSWCA 10.

³⁷⁹ <http://www.weeklytimesnow.com.au/article/2009/09/30>

³⁸⁰ CSIRO, *Water Availability in the Goulburn-Broken: A Report to the Australian Government from the CSIRO Murray-Darling Sustainable Yields Project*, CSIRO Australia, 2008 at 14.

approximately fifteen percent lower than average annual rainfall for the period 1895 to 2006.³⁸¹

FIGURE 3.8 GOULBURN-BROKEN CATCHMENT



<http://www.nrm.gov.au/nrm/vic-gbro.html>

The major town centres are Shepparton, Nagambie, Benalla, Kyabram and Tatura, with a total catchment population exceeding 200 000. Dryland farming, namely cropping and grazing contributes to the majority of agricultural production. Dairying and horticulture comprise irrigated agriculture in the region, which is divided into the Shepparton Irrigation Area and Central Goulburn Irrigation Area.³⁸² Crops specific to the Shepparton Irrigation area are firstly pasture for dairy production, followed by horticulture, grain crops, seed crops, forage crop and vegetables. The Shepparton Irrigation Area makes a sizable contribution to the Victorian economy. Food processing contributes to 25 percent

³⁸¹ *Ibid* at 14.

³⁸² *Id* at 16.

of rural Victoria's economic output and generates \$1.7 billion in the Shepparton Irrigation Area alone.³⁸³

Environmental concerns in the catchment identified by the Federal government include, dryland salinity involving the export of 180 000 tonnes of salt to the River Murray and irrigation areas, soil acidification and broader soil degradation. Water-quality problems include frequent blue-green algal blooms, and the decline of biodiversity and ecosystem processes.³⁸⁴ The Cooperative Research Centre for Catchment Hydrology states that approximately 45 percent of the regions waterways are in very poor, poor or moderate environmental condition.³⁸⁵ Ground water systems in the region have been described as "heavily committed", while quantity of surface water flows are impacted by large scale afforestation and irrigation development.³⁸⁶ The Barmah-Millewa Forest has been deemed an "Icon site", targeted for environmental watering, and is subject to a monitoring program administered by the Goulburn Broken Catchment Management Authority.

Water products in the catchment are termed high, medium and low reliability shares, referring to the share of available water for consumption. In 2006 the Victorian government pursued what is known as the "80:20 deal", involving the creation of greater legal certainty for irrigators over eighty percent of what was previously known as "sales water", in return for a transfer of twenty percent of water holdings to government for the environment.³⁸⁷ Lower-reliability water shares were created for the acquired twenty

³⁸³ http://www.catchmentcrc.org.au/focus_catchments/goulburnriver.html; Goulburn-Murray Water, *Shepparton Irrigation Region Water Supply Protection Area Management Plan (Groundwater)*, Annual Report for the Year Ending June 2009.

³⁸⁴ Australian Government, *Caring for Our Country: Goulburn-Broken – Natural Resource Management Region*, <http://www.nrm.gov.au/nrm/vic-gbro.html> (viewed 7 March, 2009); http://www.catchmentcrc.org.au/focus_catchments/goulburnriver.html

³⁸⁵ http://www.catchmentcrc.org.au/focus_catchments/goulburnriver.html

³⁸⁶ *Ibid.*

³⁸⁷ Victorian Department of Primary Industries, *Securing Our - Water Future Together 22 : Lower Reliability Water Shares and the 80:20 sales water deal*, <http://www.dpi.vic.gov.au>

percent, in what was termed by the Victorian government as a “separate legally secure asset”.³⁸⁸

Legal separation of a land and water title was formalized under the *Water (Resource Management) Act* (Vic) 2005 and *Water (Governance) Act* 2006, and was in progress during 2009.³⁸⁹ Water rights are divided into the following three components and are separated from land title:³⁹⁰

- (i) Water share: “a legally recognized, secure share of water available to the farmer to irrigate his or her crops”;
- (ii) Delivery share: “an entitlement to have water delivered via infrastructure to the farmer’s property”;
- (iii) Water use license: “an authority to use water for irrigation on a particular property”.

The Northern Victoria Irrigation Renewal Project (NVIRP) is responsible for the modernization of irrigation infrastructure in Northern Victoria. The Federal and Victorian governments have negotiated \$2 billion in funding to be allocated under the NVIRP for improving infrastructure in Northern Victoria in order to deliver water savings. Water is to be recovered by preventing excessive “leakage, seepage, evaporation and other system inefficiencies”.³⁹¹ The water savings are to be released to meet environmental flows, irrigation needs and water for Melbourne.

The North-South pipeline (also termed the Sugarloaf pipeline) was under construction to carry water from the Goulburn River to metropolitan Melbourne and is the cause of serious concern for irrigators in the Goulburn-Broken catchment. It has involved some degree of compulsory acquisition and will clearly limit the availability of water for

³⁸⁸ *Ibid.*

³⁸⁹ Danny Barlow and Hayley Coates, *Unbundling, Unbundling*, Water Rights, LJJ, June 2008.

³⁹⁰ *Ibid.*

³⁹¹ http://www.nvirp.com.au/about/our_background.aspx

irrigation.³⁹² The North-South pipeline project was due for completion in 2012 at an estimated cost of \$750 million. Melbourne's water supply under the NVIRP is to be held in Eildon Dam. Environmental impacts of the pipeline were considered with reference to the *Environmental Protection and Biodiversity Conservation Act* by the Victorian government in May 2008.³⁹³ In August 2009 due to concern over the plight of irrigators affected by drought in Northern Victoria, the Victorian opposition blocked regulation related to the development of the North-South pipeline in the upper house preventing the transfer of water to Melbourne.³⁹⁴ In November 2011 the Victorian Minister for Agriculture, Food Security and Water announced that the pipeline would only be used in times of critical human need.³⁹⁵

The South Australian Premier, Mike Rann, lodged legal action in the High Court against the state of Victoria in 2009, on the basis that existing barriers to trading water, notably the 4 percent limit on trade out of irrigation areas, violate constitutional provisions. As discussed in Chapter Three, the case was subsequently settled out of court.

3.13 CONCLUSION

The chapter has presented the methodological approaches employed in the thesis, which aim to facilitate the provision of answers to the research questions identified. The first broad question seeks to identify limits to market based water governance in the MDB, while the second question seeks to identify limits in the existing public institutional and legal framework for transboundary governance of the MDB. The qualitative interview method and international comparative law method seek to confirm the expected location

³⁹² Mike Edmonds and Nick Higginbottom, *Farmers Oppose North-South Pipeline*, Herald Sun, October 3, 2008 <http://www.heraldsun.com.au/news/pipeline-land-grab-fury>

³⁹³ Government of Victoria, *Our Water, Our Future*, <http://www.ourwater.vic.gov.au/programs/water-grid/sugarloaf>

³⁹⁴ Simon Lauder, Govt high and dry after Victorian pipeline, <http://www.abc.net.au/news/stories/2009/08/13/26554291.htm?section=justin>

³⁹⁵ The Hon Peter Walsh MP, Minister for Agriculture and Food Security, Minister for Water, 'Coalition shuts down north-south pipeline' Media Release, 15 November 2011.

of limits in existing governance systems and inspire ideas for reform based on the experience of institutional successes and failures. Adaptive Theory guides the integration and adaptation of pre-existing theory into a reform model, with a focus on New Institutional Economics.

CHAPTER FOUR

QUALITATIVE INTERVIEW DATA AND KEY FINDINGS

4.1 INTRODUCTION

This chapter presents the key findings from the data collected at the height of the millennium drought in 2008-09 on the two main research questions discussed in this thesis. The first research question concerned identifying the limits of market based water governance in the MDB for reconfiguring water rights to the environment. The findings for the first research question are addressed across three themes:

Questions asked from Irrigators

- (i) Factors impacting the unwillingness to sell to government environmental buyers;
- (ii) Preferential selling patterns among irrigators; and
- (iii) General attitudes to the government environmental buyback.

The second research question concerned the inadequacies of public institutions and water law and the key findings are addressed with reference to five themes:

Questions asked from Irrigators:

- (i) Irrigators' views on government policy on:
 - sustainability,
 - SDLs,
 - climate change and
 - water allocations;
- (ii) Irrigators' views on information flows with regard to water trade;
- (iii) Irrigators' views on property rights to water;
- (iv) Irrigators' views on acceptability of proposed institutions for alternate conflict resolution: cost benefit analysis and compensation rules.

Questions asked from Government Officials:

(v) Government's institutional capacity assessed against comprehension of:

- Irrigators' rights to property
- Environmental water buybacks
- Water Act 2007
- Over-allocation

The data is presented with discussion, quotes representative of the majority across all regions, quotes representative of distinct views within regions, and a summary of key findings at the end of each section.

4.2 LIMITS OF THE GOVERNMENT WATER BUYBACK PROGRAMS FOR ENVIRONMENTAL FLOWS IN THE MURRAY-DARLING BASIN

4.2.1 FACTORS IMPACTING UNWILLINGNESS TO SELL TO GOVERNMENT

Approximately 80 percent of all farms in the MDB are family owned. All irrigators surveyed owned family farm businesses. Corporate farmers were not interviewed, due to absence of availability, being in the minority. The majority, 22 of 41, held high security water entitlements and additional general security entitlements, with a mix of surface and ground water. The majority of MDB irrigators surveyed, 32 of the 41, planned to remain in farming and were unwilling to sell permanent water entitlements to government environmental buyers permanently due to the factors articulated below. Selected quotes are provided as an illustration of the range of general responses.

(i) **Lifestyle choices**

Appreciation of lifestyle benefits and emotional attachment to farming, land and water led to an unwillingness to sell to government. Irrigator 38 in the Border Rivers region, New South Wales/Queensland stated: *"No, ...I love the farm and the lifestyle. If I sell, it will take away my earning capacity. I am good at farming and someone has to produce food and fibre...There is an emotional attachment to the land."*

(ii) **Presence of a willing heir**

The presence of a successor and desire to continue a family tradition, noting that some farmers were second, third or fourth generation farmers, led to an unwillingness to sell water to government. Irrigator 6 in the Condamine region, Queensland stated *"Because I have a son involved in the business and we will expand, it is unlikely that we would sell... Our two sons are very keen on farming and plan to take over one day. Both sons studied agriculture related fields at university. One son is currently farming in England"*.

(iii) **Profitable farm business**

The presence of a profitable farm business led to an unwillingness to sell water to government. Irrigator 13 in the Goulburn Broken region, Victoria stated *"The business is*

doing reasonably well considering the drought". Irrigator 23 observed, that while costs were rising, the business was *"profitable at present"*, and would not sell to government as *"all the water [was] needed for production."*

(iv) University level training in agriculture

The presence of university level training and expertise to manage a farm created a psychological reluctance to engage in retraining. This led to an unwillingness to consider selling water to government. Irrigator 40 in the Border Rivers region, New South Wales/Queensland stated: *"I completed an agricultural economics degree at the University of New England, Armidale, worked for a bank, then a multi-national cotton merchant. I completed a graduate diploma in applied finance with the Securities Institute"*.

(v) Low off-farm income

Low off-farm income also represented an absence of a skill base required to obtain a higher alternative income leading to an unwillingness to sell water to government. Where farmers were aged close to retirement, retraining options were rejected. Irrigator 5 in the Condamine region, Queensland stated: *"Farming is the principal source of income, with other investments present. I don't know what else I would do, which is the reason I am still farming. I am close to retirement and there is no need for a government retraining program."*

(vi) Farm as a retirement asset

The intention to hold the farm as a retirement asset, led to an unwillingness to sell water to government. Irrigator 24 in the Murrumbidgee region, New South Wales stated: *"The farm forms part of my retirement assets"*, hence the permanent sale of water was not an option.

(vi) Valuation of water as an integral farm asset attached to land

Valuation of water as an integral farm asset despite separation of land and water title led to an unwillingness to sell. Irrigator 11 in the Goulburn Broken region, Victoria stated he

would “never” sell: “*Unbundling may occur under the law, but as far as I am concerned this water is attached to this land. I would not sell it out of this area if I had to sell, because you put the whole community at risk of folding*”

(vii) Permanent plantings

The need to protect permanent plantings led to unwillingness to sell. Irrigator 25 in the Murrumbidgee stated “*No, we couldn't [even] sell temporarily because the vines would not fully recover after a two year period*”.

A majority of 32 of the 41 across the four reporting regions wished to remain in farming and reasoning was consistent across the four regions. Irrigators with high off-farm incomes were not always willing to sell. Despite enduring low water allocations and reduced profitability during the drought period, the majority of farmers were determined to remain in farming.

Potential sellers, nine out of forty-one in total, were more likely to be those facing financial hardship having little or close to zero water allocation, close to retirement, in possession of a reasonably high off-farm income and/or having no other family member to take over the family business, and holding entitlements which were of little or no value. Additional region specific factors which may prompt a sale identified in the Murrumbidgee region included greater regulatory intervention to meet occupational health and safety requirements which drove up farm costs. There were no other major differences in reasoning across the four reporting regions.

- **Key Finding: Endowment effect**

The first theme emerging from the data is the enduring presence of an unwillingness to sell. This decision making pattern is related to attachment to water as an integral farm asset, family cultural practice of farming, agricultural educational training, water held as a retirement asset and low off farm income. These factors combine to give rise to an endowment effect analyzed in Chapter Five.

4.2.2 PREFERENTIAL SELLING PATTERNS AMONG IRRIGATORS

A hypothetical question was posed to irrigators where they were asked to consider a situation in which they had decided to sell water, and were offered exactly the same purchase price by another irrigator and a government environmental buyer. They were asked which buyer they prefer to sell the water to, government or an irrigator. The majority of irrigators surveyed, twenty-three of forty-one in total, preferred to sell to an irrigator over a government environmental buyer when offered the same market price. The key reason provided on each occasion was to transfer the water to other irrigators to preserve the viability of the rural economy. The second preference was to sell to an irrigator outside the region over the government environmental buyer, again to preserve the rural economy. One further irrigator refused to consider even a hypothetical sale to government and further seven were uncertain, indicating concern for the rural economy. This brought the total to thirty-one irrigators indicating concern for the rural economy as an important factor determining selling preferences. The desire to preserve the rural economy was stronger in the Murrumbidgee and Goulburn-Broken region along the Murray river system, compared to the Upper Condamine and Border Rivers regions combined along the Darling river system.

Concern regarding the ability of government to manage water for the environment was expressed when directing selling preferences to irrigator buyers. Irrigator 18 in the Goulburn Broken region, Victoria provided a response which represented the majority: "I

would always sell to the irrigator. I prefer to sell to irrigators in my area and my next preference is an irrigator in Victoria, then to an interstate irrigator. This is necessary to protect the whole community. I would like to see trade restricted to districts. Why should water be sent to the sea?" Irrigator 23 in the Murrumbidgee region, New South Wales stated "I would sell to the irrigator to improve the regional economy. I am unsure about how the government would manage the water".

Irrigators not expressing a strong bias to either party, sought to assess whether the level of water sold to government was too high. If it was determined to be too high, they indicated a willingness to sell to irrigators for the purpose of preserving the rural economy. The lack of information on the level of water sold to government was a concern. In the presence of the lack of transparency about the composition of sales, the responses indicated that irrigators would continue to prefer to sell to other irrigators.

Irrigators who were unwilling to make permanent sales to government at 2008 made reference to the higher cost of maintaining irrigation infrastructure to be borne by a smaller number of remaining irrigators. This is related to the contraction of the irrigation sector within the rural economy, rather than the contraction of the rural economy itself. Irrigators tied to the culture of irrigated agriculture within the rural economy preferred to sell to another irrigator.

Only three irrigators stated that they clearly preferred to sell to government environmental buyers on a permanent basis, while six stated that they had no preference. Temporary trade was favoured over permanent trade.

• **Key Finding: Central importance of a transition economy strategy.**

The second key theme pertains to the high value placed on the rural economy in determining selling preferences between government and private irrigator buyers. Irrigators' lack of confidence in government's ability to manage environmental water, was a further consideration in determining irrigators' selling preferences away from government toward private irrigators.

4.2.3 IRRIGATORS' ATTITUDES TO GOVERNMENT ENVIRONMENTAL WATER BUYBACKS

To comprehend how irrigator values pertaining to environmental policy impact irrigator market choices on participation in the government environmental buyback program, irrigators were asked to present their views on the buyback program. A total of 25 irrigators of 41 approved in the majority, while 16 disapproved.

In the Condamine (Qld), Border Rivers (NSW/Qld) and Murrumbidgee (NSW) reporting regions there was no correlation between approval of the government environmental buyback program and willingness to sell. The majority of irrigators interviewed in these catchments approved of the idea of the government buyback, despite the fact that the majority of these respondents were clearly unwilling to sell water to government. The voluntary nature of the buyback was supported as a measure respecting individual rights to water as property.

There was an expectation that other irrigators would sell to government to ensure the river system was sustainable to continue irrigated farming. For example irrigator 39 in the Border Rivers region supported voluntary buyback as a measure to stem the possible tide of compulsory acquisition. He was eager to see the government buy more water, holding the belief that many willing sellers existed particularly amongst those wishing to retire. His statements reflected the presence of a free rider problem: *"[Buybacks are] good if [they] help the environment – then it is a better world for everyone. People will get off our backs. Those who want to stay on the land – we can merrily go on about it"*. In the Condamine irrigator 9 believed buybacks were *"essential"* and irrigator 3 believed they were *"equitable"*, but neither wished to sell to government.

A second environmental policy question posed to irrigators concerned reactions to hypothetical substantial administrative reductions in water entitlements to deliver environmental flows. A majority of 21 of 41 believed that substantial cuts were unwarranted, while a further four were uncertain. Most irrigators suggested that

extractions in their region were sustainable and the problem of over-extraction existed elsewhere in the MDB. On the Darling system irrigators blamed downstream farmers for over-extraction and poor water management, with reference to evaporation in the Menindee Lakes Storage. In Queensland and NSW, irrigators also blamed South Australia for over extraction. The latter responses meant many farmers were not preparing for a major adjustment in farming practices to make the entire MDB system sustainable for farming over the longer term, expecting other parties to bear the adverse impacts. That is, a free-rider problem.

Irrigators who rejected the government environmental buyback also expressed a deep mistrust in government management of environmental water. For example irrigator 17 in the Goulburn Broken region, Victoria stated: *"I have seen instances where water has been very badly managed. In fact it has been detrimental to the environment on a couple of occasions. The flooding of Barmah Forests is an example, four years ago it was watered in the wrong season. They got black water with a lot of organic material in it. It flowed back into the river and caused a massive oxygen deficiency in the river. A lot of aquatic life died"*.

Irrigator 10 in the Goulburn Broken stated: *"The government is looking at no extra storages for water. Therefore they have to get their water for their rising populations from areas where the least amount of votes are. [We are] generally the country communities. So sustainability is not looking good. Actions are driven by the urban vote who have little understanding of the Murray system"*.

Irrigator 29 in the Murrumbidgee stated *"there is poor government management of environmental flows... The river has not stopped running. We don't audit or benchmark environmental flows"*.

Key finding: Free Rider Effect and Mistrust in government

The free rider effect was evident, as irrigators were aware of the importance of restoring the environmental health of the Murray-Darling river system, but were unwilling to give up their highly valued water entitlements. Irrigators expected that other irrigators would contribute to environmental restoration. The endowment effect and their stated preference to preserve the rural economy were the main reasons for the unwillingness to give up water entitlements, contributing to the free rider effect. Where environmental buybacks were rejected mistrust in government was expressed.

4.3 INADEQUACIES OF PUBLIC INSTITUTIONS AND WATER LAW

To address the second research question on the inadequacies of public institutions and water law, questions were asked in the following areas from irrigators:

- (i) Environmental and sustainability policy, SDLs, climate change and water allocations;
- (ii) Information flows on water buybacks;
- (iii) Understanding of property rights to water;
- (iv) Cost-benefit analysis rules and compensation rules (for the purpose of building these two rules into a no significant harm conflict resolution rule model. The no significant harm rule could not be discussed directly due to lack of familiarity with the rule).

Government officials from Queensland, New South Wales, Victoria and South Australia were interviewed on the matter of institutional capacity across water buybacks, property rights, the *Water Act 2007* and water allocations. The government interviews are presented in section 4.3.4.

4.3.1 IRRIGATORS' VIEWS ON GOVERNMENT POLICY ON ENVIRONMENTAL FLOWS AND SUSTAINABILITY, SDLs, CLIMATE CHANGE AND WATER ALLOCATIONS

4.3.1.1 IRRIGATORS' VIEWS ON ENVIRONMENTAL FLOW AND SUSTAINABILITY POLICY

Irrigators were asked to provide a considered view on overall environmental flow and sustainability policy in the MDB, without reference to the buyback program. In response to this question a majority of 25 irrigators disapproved of general environmental flow and sustainability policy, while 16 irrigators approved.

Irrigators recognized that the health of the river was important for their economic survival. However the strongest concern articulated by 16 irrigators in total, of which 8 were located in the Goulburn-Broken region, Victoria, was an inability to trust government decision making, raising the matter of institutional capacity and observing the presence of institutional bias. The matter of government institutional bias was

expressed with reference to central focus of the *Water Act 2007* on the environment over the rural economy. It was argued that in achieving sustainability there needed to be a balancing of priorities in meeting environmental requirements and food production, particularly in light of the world food crisis. Those irrigators who approved of the direction of environmental flow and sustainability policy in the MDB, also held concerns for institutional capacity and institutional coordination across the Basin. Many irrigators were concerned that the government was confusing drought impacts with over-allocation.

Key Finding: Mistrust and lack of confidence in government institutional capacity

On the matter of general environmental sustainability policy, mistrust in government decision making was articulated. Specifically concerns regarding institutional bias and inadequate institutional capacity existed.

4.3.1.2 IRRIGATORS' VIEWS ON THE PAST CAP AND THE FUTURE SDLs

The following question sought information on individual irrigators' assessments of the past cap on extraction policy instituted in 1997, and comparative assessments on the future sustainable diversion limits (SDLs) under the *Water Act 2007*.

A majority of respondents across the regions, 24 of 41 in total approved of the past cap policy, while 6 were uncertain. It was noted that the state of Queensland had not participated in the cap, hence Queensland irrigators had not been adversely impacted. However, a majority of 25 irrigators across all regions disapproved of the prospective SDLs under the *Water Act 2007*. A further three irrigators were uncertain. Concerns were raised for the economic future of communities with regard to the impact of SDLs. None of the irrigators interviewed in the Murrumbidgee region supported the prospective SDLs.

Irrigators raised concerns that the State water law permitted administrative reductions without compensation at the conclusion of a water plan period, which were in effect a disguised form of compulsory acquisition. In this context irrigators stated that

there should be a guarantee of compensation. Some irrigators indicated that they would try to adapt their farming patterns to manage with less water. It was observed that smaller farms would fold, while large farms would survive via adaptation strategies. Irrigator 39 in the Border Rivers region, NSW/Queensland, stated that the establishment of a SDL volume could be used as an “election stunt” or “political smoke screen” devised to impress urban voters. He argued that therefore the method of calculation and delivery of SDLs needed to be presented in a credible, coherent and transparent manner. Irrigators in the Condamine region were concerned that government decision making on coal seam gas mining was biased against irrigators and rendered environmental policy hypocritical. This because the irrigators believed that coal seam gas exploration would contaminate the ground water system.

Irrigator 14’s response in the Goulburn-Broken region, Victoria summarized the collective views of those who supported a revised SDL: “[A revision] has to be scientifically based, not an emotional decision based on individual perceptions. Full compensation is required. There should be a reasonable lead time to allow us to adapt. The longer we have to adapt the less pain there [will be]. Three to five years is needed. A rapid change would lead to a mass exit.”

The responses show that ahead of the release of the Guide to the Basin Plan 2010 and the draft Basin Plan 2011, irrigators at 2008 already held strong concerns on the matter of the new SDLs. Irrigators further articulated their concern that the pressure of the urban voter bias toward the environment, would lead politicians to ignore their minority rural irrigator concerns.

In summary, trust in government was absent on the matter of the design of the prospective SDLs. Irrigators were anxious about possible administrative reductions attached to SDLs and uncertain about the nature of compensation rules contained in “risk sharing provisions” in the *Water Act 2007*.

- **Key finding: Disapproval of SDLs and mistrust in government**

On the matter of the past cap versus the current SDL policy, the cap received greater support, while SDL policy was subject to a higher degree of disapproval. Irrigators were concerned that SDLs would harm regional communities and lead to compulsory acquisition without compensation. Mistrust in government decision making and institutional capacity was articulated.

4.3.1.3 IRRIGATOR'S VIEWS ON CLIMATE CHANGE

The next environmental policy question tested irrigator's beliefs on climate change as an indicator of acceptance of government policy. A total of 13 irrigators rejected climate change as a reality and a further 9 irrigators were uncertain, bringing the total to 22 of 41 across all regional responses. Only 19 of the 41 irrigators interviewed across the four reporting regions accepted climate change as a factual reality.

The irrigators who rejected the occurrence of climate change firmly believed current weather patterns and the resultant hydrological flows were part of a natural cycle, making references to discussions with previous generations of farmers and their own early experiences on the land. Irrigator 39 in the Border Rivers region, NSW/Queensland was uncertain, observing that his family had been in the region for 170 years. He stated: *"If you go back through our records, there is one period of 22 years (1928-1950) when the river did not break its banks. It has not broken its banks for 8 years now. It rained a lot in the 1950s. I believe Australia has large cycles and we are in a dry period. We have had a cool summer and a warm winter. It is unclear. We have changed our farming habits, cropping and stock levels"*.

A number of irrigators stated that they had experienced hotter periods in the past and irrigator 36 in the Murrumbidgee region, NSW firmly believed that climate change

was “good politics”. Irrigator 29 in the Murrumbidgee region, NSW was adamant that climate change was false based on his own experiences and international dialogue.

Irrigator 14 in the Goulburn Broken region Victoria, believed climate change was a reality. However he raised concerns as to the accuracy of scientific predictions pertaining to outcomes and believed that climate impacts were entirely manageable. He stated: *“When you look back at the historical data it shows that we have a constant change. We are finally starting to see better modeling on changes out of CSIRO, [which predicts we will be] 15-20 percent worse-off. Modeling suggests that by 2020 we should be better off in terms of rainfall. If that is correct, climate change is not as scary as the soothsayers predict.*

Irrigator 17 in the Goulburn-Broken region, Victoria believed in climate change. The irrigator had obtained a masters degree in a separate discipline. He countered the argument that the current phase was part of natural cycle, observing the following:

“There are plants flowering that should not do so until September. These people who think it is a natural cycle must believe they live in a static system. There are small fluctuations and large simultaneous fluctuations. When I [undertook] my masters in 1976 which was in the area of energy use in irrigated agriculture in Victoria, the question was how much fuel [are] we using to make food. We used to ask where all the energy was going.Of course [climate change] is happening.”

- **Key finding : Mistrust in the science of climate change**

On the matter of climate change, many respondents articulated a mistrust in the science of climate change and government decision making in this respect.

4.3.1.4 IRRIGATORS’ SATISFACTION WITH GOVERNMENT WATER ALLOCATIONS

Irrigators were asked questions pertaining to their relationships with government water organizations with respect to water allocations. The questions were posed at the height of

the drought in mid 2008. Despite drought conditions, a majority of 28 irrigators across all regions were satisfied with government allocation processes, while a further 13 articulated dissatisfaction.

Irrigators in all regions diversified their source of water across surface, ground and floodplain water. High security and high reliability entitlement holders were more likely to express satisfaction with the government allocation process. However even general security and general security equivalent water entitlement holders expressed satisfaction with allocation processes. Carry over provisions from year to year received praise across regions. However the articulation of the irrigators' relationship with government on allocations varied across the regions.

The data demonstrated that in the upper Condamine region half of all irrigators interviewed had strong relationships with government and were satisfied with allocation processes during the drought period. Irrigator 3 in the upper Condamine region, Queensland explained that the Leslie dam allocations were "*a straightforward accounting decision based on the presence of water*". Condamine irrigators described the existing allocation system as "reasonable and fair". However, water pumping restrictions in the Condamine region were criticized, in terms of management of timing of announcements, lack of metering and division of water between towns and farms.

In the Border Rivers region irrigators' raised several concerns. These pertained to (i) inconsistent compensation policies, (ii) unfair transfer of water to Broken Hill through the Menindee Lakes scheme away from irrigation, (iii) inadequate metering and monitoring, (iv) institutional capacity concerns and (v) lack of scientific rigour within government in deciding upon reductions to entitlements.

Irrigator 40 in the Border Rivers region, NSW/Queensland expressed concerns about the lack of proper government consultation, arguing for the granting of compensation for ground water share cuts which had occurred previously. Inconsistent distribution of compensation soured relationships with government in NSW. The irrigator stated: "*We should not be asked to buy the available ground water to make up for the shortfall. Gwydir and Namoi have been compensated for reduced ground water shares. It has been termed a structural adjustment payment. In our area, 5000 ML of the initial 32*

000ML ground water has been granted to the environment under the Water Sharing Planbut the Border Rivers Food and Fibre [organization] has been given the impression that there will be no structural adjustment payment for this area as the State till is empty. We made a 60 slide presentation on the situation in the area and it was dismissed by government in 15 minutes. Government consultation is a farce”.

In the Murrumbidgee region a five percent transfer to the environment gave rise to concerns of further government acquisitions. In the Murrumbidgee region, NSW high security water holders were unhappy with a recent 5 percent cut without compensation, for environmental flows under a water sharing plan. Irrigator 35 in the Murrumbidgee region stated: *“Water is allocated to the environment before farmers, and there is a world food shortage. People can’t eat the environment to survive. [The permanent surrender of] five percent [of our entitlement] to the environment was not a deal. It was taken without compensation or negotiation with growers. Murrumbidgee irrigation may have negotiated it. Every grower I know was totally opposed to it. It was basically a legal method of stealing from us.”*

Discretionary powers of the Minister and lack of transparency were further concerns in the Murrumbidgee region. Tension between high and general security entitlement holders was expressed in the Murrumbidgee region. High security entitlement holders argued that this was due to a lack of knowledge of the water accounting system on the part of general security entitlement holders.

Satisfaction with government allocation processes was highest in the Goulburn-Broken region, although transparency concerns and equity concerns with reference to allocation of water to urban centres were raised. Irrigator 21, who worked closely with government, observed that the catchment had a *“good history of allocation and [that the Victorian Government] used sound methodology, which has given us high reliability”*. However, Irrigator 15 in the Goulburn-Broken region stated that he would *“like to see increased openness and transparency in processes...In terms of environmental flows, in some seasons there is borrowing from other systems. It becomes complicated as to who*

owns what. The formula for deciding allocations and environmental flows has not been made readily available to the public”.

Key finding: Mixed approval of water allocation

On the matter of irrigator satisfaction with government water allocations, the data presented differing approval ratings according to region, with satisfaction highest in the Condamine region. Where dissatisfaction was expressed, there was an articulation of transparency concerns, institutional capacity concerns, concern over the prospect of administrative reductions without compensation at the end of a life of a plan, lack of use of credible science, inadequate metering and monitoring, too greater discretionary ministerial power, concerns for equitable sharing of water between rural and urban centres, and inter-irrigator tension between high and general security water holders.

4.3.2 IRRIGATORS' VIEWS ON WATER BUYBACK INFORMATION FLOWS FROM GOVERNMENT

It is understood that the performance of water institutions relies on structural and functional linkages.³⁹⁶ Rules requiring sharing of information between water organizations, government and irrigators normally improve water sector performance where information exchange has previously been inadequate. In this context irrigators were asked to articulate how much information they had received from government on the water buyback for environmental flows and general water trading.

³⁹⁶ M. Saleth and A. Dinar, *Water Institutional Reforms: Theory and Practice*, (2005), 7 *Water Policy*, 1-9 at 3.

The majority of irrigators across all regions, 34 of 41, stated that they received no information, despite being highly networked into nested irrigator water organizations. A further two irrigators stated they had received incomplete information. Only one irrigator in the Condamine region, Queensland stated he had received complete information as a consequence of working directly with government on the Resource Operations Plan for ten years. Four irrigators across the Murrumbidgee region, NSW and Goulburn-Broken region, Victoria stated that due to holding concurrent government positions or a position on a government advisory committee, the question was not applicable.

Irrigator 27 in the Murrumbidgee region, NSW observed *"we have received no information via the mail, only what we hear on the radio and see on the news, including information on River Reach"*. Irrigator 30 in the Murrumbidgee region, NSW stated that the government provided minimal information, observing *"the government has played its cards close to its chest"*. Irrigator 32 in the Murrumbidgee region, NSW stated he received most of his information from the newspapers. Irrigator 15 in the Goulburn-Broken region, Victoria also stated that he was *"very disappointed with the way in which government had provided information on buybacks...and I personally would not get involved in the Federal government buyback. They call it a tender process, but they end up bargaining with individual sellers so in fact it becomes a private treaty. There is no market feedback"*.

Five irrigators in a group interview held in the Border Rivers region discussed information sharing on policy related to water trade. They stated that they were unclear about the new role of the ACCC and its expanded powers under the *Water Act 2007* to levy charges, and the adverse impact the role would have on existing networks. The Queensland Border Rivers irrigators were also concerned that they had not been informed of a formal process for responding to the NSW draft floodplain policy and sought to organize a response through their irrigator organizations.

Irrigator 17 in the Goulburn-Broken region, Victoria argued that government had been “quite bad”. He stated: “I never know when they are in the market, except through the tender process.” Similarly irrigator 20 in the Goulburn-Broken region, Victoria called for greater transparency and expressed concern at the lack of licensing regulations for water brokers.

The sentiments articulated by irrigator 17 were echoed in other regions, where irrigators had received no direct communication from organizations such as the former MDBC, now the MDBA. There was a general perception that the failure to share information on the part of the government was deliberate with regard to the buyback policy and related policies pertaining to the ACCC and floodplain water use. The absence of adequate information sharing has adverse implications for willingness to sell and broader SDL negotiations.

Key Finding: Mistrust as a consequence of absent government information flows

On the matter of provision of information on water trading by government, the data demonstrated poor communication of information by government to irrigators across all regions. This was perceived as deliberate and engendered mistrust in government.

4.3.3 IRRIGATORS’ VIEWS ON PROPERTY RIGHTS TO WATER

Compulsory acquisition is technically barred by the *Water Act 2007*. However the administrative reductions permitted under climate change risk sharing provisions of the *Water Act 2007*, may be perceived as a form of compulsory acquisition with some right of compensation only under specified circumstances.

State governments are not constitutionally required to pay compensation for property in water acquired under State law. There are many instances in the MDB in which State governments have reduced ground water entitlements without compensation.³⁹⁷ The fairness of a Federal system which permits State governments to pass constitutionally valid laws to compulsorily acquire water without paying adequate or any compensation, has been questioned.³⁹⁸ The absence of a concrete right to compensation creates considerable uncertainty for irrigators.³⁹⁹ Against this background of uncertainty, the terms of property rights to surface, ground and floodplain waters are a key issue for negotiation in the MDB between irrigators and Federal and State government.

In order to understand the capacity of irrigators to negotiate the terms of their water rights, irrigators were asked their understanding of the duration of their existing property rights to water, either as perpetual or fixed. Irrigators were further asked whether they had received written confirmation from government of the status of their entitlements. This included questions as to whether government had provided irrigators instructions as to how to alter to title documents.

Only 25 of the 41 irrigators were certain that they held perpetual water entitlements, while 12 irrigators stated they were uncertain of the terms of their water entitlement. The level of uncertainty was greatest in the upper Condamine region, Queensland, because at 2008 the conversion of fixed term licenses to perpetual water entitlement was promised under the draft Condamine-Balonne Resource Operations Plan, however was yet to be implemented. A minority of 4 irrigators stated they were conscious that they held fixed

³⁹⁷ See for example, *Arnold v Minister Administering the Water Management Act 2000; Murrumbidgee Groundwater Preservation Association Inc v Minister for Natural Resources*, [2005] NSWCA 10; *ICM Agriculture Pty Ltd v The Commonwealth* [2009] HCA 51.

³⁹⁸ George Williams, *Stuck in an unfair Federal System*, *Sydney Morning Herald*, February 16, 2010.

³⁹⁹ A. Macintosh and R. Denniss, *Property Rights and the Environment: Should farmers have a right to compensation?*, *Discussion Paper Number 74*, The Australia Institute, November 2004.

term licenses which required application for renewal, and no right of compensation was attached.

The responses across the other three regions, revealed that after the water plans became law conferring perpetual water entitlement status on certain categories of water entitlements, many irrigators had not proceeded to have title documents altered to reflect this change in status. Taking these steps would have given irrigators greater confidence in negotiating Basin Plan outcomes.

A key and repeated concern across all catchments was the mistrust in the government's use of its right to reduce entitlements at the end of a life of a state water plan without compensation. Irrigator 9 in the Condamine region, Queensland stated:

"The government would like us to believe that our licenses will become perpetual after the Resource Operation Plan goes through, but in fact they will be subject to a ten year review. Hence [as the] entitlement has a 10 year term, [this] is the life of the Water Resources Plan...At the end of the review period all bets are off, they can make reductions without compensation".

Irrigator 5 in the Condamine region, Queensland, discussing end of water plan reductions also stated:

"After the review period, I am anticipating that we will see a cut in entitlement. It will depend on the world food shortage. If food production becomes a priority then farmers will keep their entitlements over the environment, and vice versa....we will have to fight hard to keep what we have got.[It is] unclear whether the reduction will involve allocation or entitlement, but I believe entitlements will be affected... [I am] sure that government will avoid paying compensation regardless of the type of reduction that occurs. I would support a perpetual water right with a guarantee to compensation for any reduction in entitlement".

Irrigator 33 in the Murrumbidgee region, NSW observed that his entitlement could be considered perpetual up to a point given that the "government can change laws and rules,

and there is only a ten year term for Water Sharing Plan. Who knows what will happen after then”.

Irrigator 38 in the Border Rivers region, NSW/Queensland noted that *“under the Water Sharing Plan they remain 10 year reviewable entitlements”*, observing that no compensation would be available after the ten year period. The irrigator was concerned that following the Federal takeover of water management in the Murray-Darling Basin, even the allowance of a ten year term would not be recognized.

Irrigator 18 in the Goulburn-Broken catchment explained the situation as follows:

“If you had asked me three years ago whether my surface water license was perpetual I would have said yes. But now I am not so sure because land and water have been separated. Water is not property now. Under the enabling legislation it is merely an ‘entitlement’. Why all irrigators did not protest I’ll never know....Government decisions are the most dangerous things for farmers there are, and [[farmers] do not watch government decisions, of any party. No Victorian government will look after farmers. More people live in Melbourne, our vote does not count. The Victorian government resisted the Federal Government takeover because we fought long and hard until we got the right incentives. But neither government guaranteed perpetual water rights. Compensation is not guaranteed if water entitlements are reduced in 2012 due to climate change....I assure you it is not a full property right. ... It’s called a water share ownership. I own a water share and a delivery share, and I must have a water use license as well.”

This degree of uncertainty at the end of water plan review, with a possibility of no compensation is of great concern to irrigators.

- **Key finding: Mistrust in government handling of irrigator property rights**
- On the matter of irrigator understanding of property rights to water, a recurring concern was the possibility of administrative reductions without compensation at the end of the life of a water plan. Uncertainty over the long term status of property rights to water appears to be driving mistrust in government and conflict in the Basin, requiring intervention through the development of the appropriate institutional linkages. Of particular concern was the failure of many irrigators to alter title documents after statutory changes were made to confer perpetual rights.

4.3.4 IRRIGATORS' VIEWS ON AMENDMENTS TO THE *WATER ACT* 2007: ACCEPTABILITY OF PROPOSED COMPONENTS OF THE NO SIGNIFICANT HARM RULE

In Chapter Two the *United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses*, 1997 (*UN Watercourses Convention* 1997) was discussed with reference to absence of adequate conflict resolution rules in the *Water Act* 2007. It was observed that the *Water Act* 2007 contained no equivalent provision to Article 7 of the *UN Watercourses Convention* 1997, concerned with preventing and mitigating significant, social, economic and environmental harm arising from water decisions to achieve justice⁴⁰⁰. Over the longer term (20-30 years) administrative reductions may occur, as has occurred in the past to secure water for the environment, given the presence of large quantities of general security water on government environmental water registers. General security entitlements may yield zero returns during extended drought, which has re-emerged in 2014 following the millennium drought (2001-2010). Drought periods are exacerbated by climate change. To address environmental and economic harms in a just manner at the time these decisions are to be made, this dissertation proposes that the framework “No significant harm” Article 7 contained in the *UN Watercourses Convention* 1997 be adapted and expanded for the special circumstances of the Murray-Darling Basin, by the inclusion of two rule extensions, compensation rules and cost-benefit analysis rules. These rules were discussed in Chapter Two and are analyzed further in Chapters Five and Six.

As irrigators were unlikely to be familiar with the *UN Watercourses Convention* 1997, direct questions on the no significant harm rule were avoided. However the two key proposed rule extensions, cost-benefit analysis and compensation rules were discussed to test their acceptability.

⁴⁰⁰ See generally Geoffrey Syme and Blair Nancarrow, *Justice, Sustainability and Integrated Management: Concluding Thoughts*, (2001), 14(4) *Social Justice Research*, 453-456; Leading constitutional lawyer, Prof. George Williams (2010) observed in general public commentary that the Basin Plan could be subject to legal challenge for failing to meet the international legal obligations underpinning the *Water Act* 2007, requiring optimization of economic, social and environmental outcomes, see G. Williams, “When Water Pours into Legal Minefields”, *The Age*, 26 October 2010.

The questions on the two institutional reforms pertained to:

- (i) The consistent application of cost-benefit analysis rules to water purchases and water acquisition decisions in the MDB. This is recommended to optimize environmental and socio-economic benefits and minimize environmental and socio-economic harms or costs. The rules insist on representation of stakeholders in valuation of environmental and economic assets, with the inclusion of an independent review panel to correct institutional bias.
- (ii) A clear articulation of compensation rules to mitigate socio-economic harms caused by government decisions to divert water to the environment to address environmental harms. The rules take into account efficiency gains of a measure alongside demoralization costs and settlement costs, as articulated by Frank Michelman (1967), discussed in Chapter Two.

4.3.4.1 FIRST EXTENSION TO THE NO SIGNIFICANT HARM RULE : COST-BENEFIT ANALYSIS RULES

Irrigators were asked whether they would support institutional reform for the compulsory use of cost-benefit analysis (CBA) by government in the assessment of:

- (i) water purchases ; and
- (ii) reductions in water entitlements.

In constructing this question the Federal *Water Act 2007* was compared to article 5 of the EU Water Framework Directive (WFD) 2000 and Swedish legal implementation of the WFD requiring CBA for all water decisions, and American discourse on CBA rules. As stated above the literature in this area was reviewed in Chapter Two. At present there is no legal requirement for MDB government institutions to undertake CBA on a consistent basis prior to government purchases of land and water or water entitlements.

A majority of irrigators, 22 of 41, gave strong support for the consistent application of cost-benefit analysis mandated by law. A further 5 irrigators provided qualified support for compulsory cost-benefit analysis, bringing the total to 27. These irrigators expressed concern regarding the absence of institutional capacity to undertake a competent analysis.

The consistent use of CBA by government received support on the basis that *"it is wise to invest in a form of accountability, [and] transparency must be considered. It is tax payer's money"*. Irrigator 9 in the Condamine region, Queensland believed the use of CBA was *"absolutely critical"*. He stated: *"I have seen no evidence of such processes being used in Queensland or NSW. I think this question is perhaps the most important one of all."*

All five Border Rivers region, NSW/Queensland irrigators interviewed supported the consistent and compulsory use of CBA by government. It was observed that Australian governments had not used CBA consistently to date in the context of assessing the viability of government purchases and reductions in entitlements or allocations. Irrigator 41 in the Border Rivers Region, NSW/Queensland regarded the use of CBA as a process establishing greater openness and transparency in government decision making. Irrigator 39 expressed the belief that use of CBA is fundamental for over-allocated areas and for the identification of environmental target areas. Irrigator 38 in the Border Rivers region, NSW/Queensland observed that the practice of CBA would help to identify where the highest return per megalitre could be achieved.

Irrigator 31 in the Murrumbidgee region, NSW articulated *"very strong support"* for the use of CBA. He put forward the following argument: *"The analysis enables us to work out our priorities. There would be communities which exist partially because of irrigation [such as Narrendra] while others are totally dependent on irrigation (Leeton and Griffith). Lack of transparency [is a problem]. At least government and stakeholders will have a clearer picture of why they are taking certain action...."*

Irrigator 29, in the Murrumbidgee region, NSW argued that CBA should be used as a first step, expressing concern that the government was currently obtaining water wherever possible without a coordinated approach. He argued that the government would “take too much water out of one system and leave it in others, causing damage to the rural economy”. Irrigator 26 in the Murrumbidgee region, NSW agreed that CBA had to be completed on a consistent basis, however doubted that the institutional capacity existed in Australia to undertake the necessary assessments.

Irrigator 15 in the Goulburn-Broken Region, Victoria argued that use of CBA was important in order to measure socio-economic impacts and environmental impacts. In the context of undertaking CBA irrigator 17 believed the CBA would be important in assessing food security risks: *“I think the underlying issue that government should examine is, how much food [should] we ... produce? Do we have a food policy? Do we import or is there a food security issue. I hesitantly agree with the conclusion that Australia does not have a food security issue – that we will always be able to produce more than we need.”*

Irrigators in the Condamine region, Queensland provided qualified support, and observed that the presence of competent institutional capacity, the achievement of consistency and the development of a broader set of decision making processes were essential for CBA to succeed. Irrigators 10, 11, 16 and 17 in the Goulburn-Broken region, Victoria observed the time frame for the CBA poses problems given that the value of crops can fluctuate greatly in either direction. Irrigator 11 in the Goulburn-Broken region, Victoria also noted that transparency in the CBA process would be essential.

Irrigators providing no support for CBA predicted a procedure leading to a breakdown in relationships of trust. Institutional bias was the primary cause of concern for the 10 irrigators stating a lack of support for CBA. Irrigator 27 in the Murrumbidgee region, NSW stated: *“The distrust comes into play the moment you mention government department processes. Draft plans put up by the government always become law even when they ask for our submissions. So I don’t think there would be a lot of trust on the*

part of many different groups that the government would do the right thing by them – except for looking after themselves.” Irrigator 36 in the Murrumbidgee region, NSW argued that an independent assessment panel would be acceptable, but also feared that government would “stack a panel with people from a certain area who will act in their own interests”. Irrigator 18 in the Goulburn-Broken region, Victoria was unsure, observing that results can be skewed. She stated: “If I thought it was done honestly, then yes. Even if you put a process in place to control bias, I am not sure that it would be done that way. The older I get, the more cynical I get. I have never seen a committee formed yet, without knowing ahead of time what they will say. If you pay for a report, you make sure it says what you want – and the government is very good at doing that.”

Other reasons for opposing CBA were as follows:

(i) *“the idea of CBA is too simplistic while environmental values and social values are too difficult to estimate: “there is no direct measure for environmental values. How do you put a value on a bird breeding event and general biodiversity. You can only put a dollar value on the water.”;*

(ii) *“the stream of net benefits are difficult to calculate given the unpredictability of water flows, unless the government were to purchase high security water”;*

(iii) unfamiliarity with CBA;

(iv) perception that rural economies would suffer in any event and that it would be better to focus as an individual irrigator on transition strategies, such as exporting agricultural expertise as a service, rather than participate in CBA;

(v) *“decisions should be made on the basis of sound science”*, whereas CBA would allow for bias and emotion to determine government action;

(vi) *“economics is a very inexact science”*, and noting that societal values can change dramatically in the future, which may render the analysis highly inaccurate. That is, the application of net present value calculations for alternative options may not yield a true assessment.

- **Key Findings: Acceptability of Cost-benefit analysis rules attached to the no-significant harm rule**
- A majority of 22 supported the inclusion of cost-benefit rules and a further 5 provided qualified support.
- It was believed that the application of cost-benefit rules would bring greater transparency, accountability and trust between government and irrigators.
- Supporters viewed the rule as “absolutely critical” and “fundamental”, and viewed the question as “the most important” for establishing priorities.
- Those who opposed CBA raised valid concerns to be addressed in the construction of rules. These concerns pertained to the presence of institutional bias, validity of valuations of the environment, government institutional capacity and the presence of serious mistrust in government.

4.3.4.2 THE SECOND EXTENTION TO THE NO SIGNIFICANT HARM RULE: COMPENSATION RULES

In light of the repeated articulation of irrigator concern regarding the possibility of administrative reductions without compensation, based on past practices under end of State water plan review procedures. Irrigators were asked to consider a hypothetical situation in which they face major cuts to their water entitlements to achieve SDLs in future Basin Plan. In this context they were asked to choose which compensation package under proposed institutional reforms they would prefer. Three hypothetical compensation choices were offered, as compensation for every economic loss incurred, eliminating the complications of the risk sharing provisions of the *Water Act 2007*:

- (i) Monetary compensation at market prices.
- (ii) Provision of land and irrigation water entitlements in a location outside the MDB, such as the Northern Territory and some monetary compensation.
- (iii) Provision of land and irrigation water entitlements in a location outside the MDB without monetary compensation.

Land and water entitlement relocation as part of an integrated compensation package was considered in light of irrigator expertise and emotional attachment to the farming profession, and Federal and State government investigations into possible expansion of irrigated agriculture in the Northern Territory.⁴⁰¹ At the time of interviews in April-July 2008, only the Northern Territory relocation option was considered. In late 2010 Tasmania's Premier toured the Murray-Darling Basin to encourage relocation of agriculture to Tasmania.⁴⁰² Relocation to Tasmania was not discussed in the 2008 irrigator interviews.

Monetary compensation was preferred in the majority by 25 irrigators of 41, while 12 stated they would consider a combination of land and water relocation and monetary compensation and only one irrigator stated he was willing to consider land and water relocation, without monetary compensation. Three further irrigators refused to consider any kind of compensation and would engage in legal action to retain their existing water rights. The majority, a total of 38 irrigators were willing to participate in some form of compensation program. However, irrigators indicated that their initial strategic position in the hypothetical situation would be to resist SDL cuts and then negotiate compensation.

Preference for Monetary Compensation only

Those preferring monetary compensation over a combined relocation and monetary option, reflected upon their age and inability to commence a new business. Many stated that if they were younger they would be more likely to consider investing in relocation. These irrigators also considered their strong family ties and social links to the existing location, proximity to cities, a desire to make investment decisions without government interference and infrastructure problems in locations where government is currently exploring, notably the Northern Territory. Irrigator 15 in the Goulburn-Broken region,

⁴⁰¹ Tony Webster et.al, *Irrigated Agriculture: Development Opportunities and Implications for Northern Australia*, Northern Australia Land and Science Review, CSIRO, October 2009; Legislative Assembly of the Northern Territory, *Northern Territory Capacity to Progress Environmentally Sustainable Agricultural Production*, Sessional Committee on Environment and Sustainable Development, March 2011.

⁴⁰² Matthew Denholm, "Island State in bid to lure irrigators south", *The Australian*, 12 November 2010.

Victoria argued that monetary compensation would need to address the issue of stranded assets and loss of income. Irrigator 13 in the Goulburn-Broken region, Victoria suggested that the government should use the formula applied by Vic Roads in paying 125 to 130 percent of the market value of the property.

Preference for Relocation Compensation

Irrigator 41 in the Border Rivers region, NSW/Queensland raised concerns that native title served as an impediment to the expansion of agriculture in targeted areas such as the Northern Territory. Irrigator 8 in the upper Condamine region, Queensland, stated that he had engaged in recent talks exploring investment opportunities in the Northern Territory and Northern Queensland, noting that the cost of transport was high. He and many irrigators stated that if the government were to invest in infrastructure, schools, and hospitals in the Northern Territory he would seriously consider investing in irrigated agriculture in the region.

Irrigator 23 in the Murrumbidgee region, NSW stated that he would be willing to consider relocation, but would need to examine options in Northern Australia very closely. He indicated that he would be influenced by government investment in infrastructure and schools in the region, however also observed that he had established a life in the Murrumbidgee catchment and would not want to accept a reduction in the quality of life. Similarly while irrigator 28 in the Murrumbidgee region, NSW indicated that while he would like a combination or choice of both compensation options, he stated that Northern Australian options would be considered too geographically distant from family and town centres. Irrigator 29 in the Murrumbidgee, NSW region stated that he would be responsive to infrastructure development in Northern Australia. This response pattern was repeated across all regions. These responses indicated that the possibility of relocation to Tasmania, a small island state, with climate similar to Victoria and NSW, greater social infrastructure and smaller travel times to town centres, may have elicited greater interest.

Irrigators in the Murrumbidgee region, NSW raised concerns regarding the viability of government plans to expand agriculture in Northern Australia. Irrigator 27 In

the Murrumbidgee region, NSW argued that the varieties of rice which could be grown in Northern Australia were Asian varieties, which would make operations uncompetitive. Irrigator 32 in the Murrumbidgee region, NSW expressed concern about isolation and the prevalence of pests and diseases in the region. Irrigator 36 in the Murrumbidgee region, NSW had developed expertise in wine grape production and observed that the costs associated with relocating a vineyard were too great.

Irrigator 1 in the upper Condamine region, Queensland, stated in the context of accepting a package which incorporated both monetary compensation and relocation, that he would prefer to be relocated to an area close to his current location. He also observed that he would only object to substantial reductions in his water entitlement and if he believed the government's water science was incorrect. Irrigator 4 in the upper Condamine region, Queensland, believed that farmers should have access to all compensation options.

- **Key Findings: Acceptability of new compensation rules attached to the no significant harm rule**
- End of water plan administrative reductions without compensation were a major concern for irrigators;
- Irrigators preferred the flexibility and freedoms attached to the monetary compensation option;
- Irrigators were willing to consider relocation compensation options conditional upon their age and the presence government investment in social and economic infrastructure;
- Irrigators indicated a preference for a choice from a range of compensation options;

- Irrigators in the majority were willing and receptive to discussion of the legal security of compensation options should the worst circumstance of administrative reductions arise;
- Only three of forty-one interviewees refused to consider any compensation option and preferred to pursue legal action against the government to retain their property in water.

GOVERNMENT INSTITUTIONAL CAPACITY

4.3.5 DATA FROM GOVERNMENT OFFICIALS – INSTITUTIONAL CAPACITY

Twelve key government officials were interviewed across the Basin in the areas of (i) irrigators property rights in water, (ii) government water buybacks, (iii) the *Water Act* 2007 and (iv) water allocations, to assess government institutional capacity with reference to irrigator concerns.

4.3.5.1 GOVERNMENT OFFICIAL'S UNDERSTANDING OF IRRIGATOR'S RIGHTS TO PROPERTY IN WATER

The data on the responses provided by government officials on the nature of irrigators' property rights in water was collected with the intention of studying information flows and institutional capacity. The twelve key government officials were asked to discuss irrigator's rights to water as property, without prompting particular responses, in order to assess which matters were of leading concern in the minds of the government officials.

In Queensland, of the three persons interviewed, only one government official (3) located in the Queensland Department of Natural Resources and Mines, Brisbane held concerns for regarding end-of plan compulsory acquisitions and related negotiations with irrigators. He observed that "*amendments in the form of across the board reductions in entitlements can occur in accordance with a water resource plan, or after a plan period has been completed if the system is over-allocated*". He stated minor reductions across entitlements had occurred. In this context it was observed that government and community were in a series of what was described as "*intense negotiations*". He stated the ability to negotiate compulsory/forced reductions was limited by the buyback policy.

In New South Wales the three government officials did not raise the key matter of end-of plan reduction and compensation. They articulated their support for perpetual property rights in water. Government official 6 (NSW Riverbank program) incorrectly assumed that ground water rights were perpetual under the law.

In Victoria, of the two government officials interviewed, Government official 8 (Victorian Department of Sustainability and Environment) was concerned about what he described as “*silence on compensation for reductions in entitlements at the end of 15 year water plans*”. He also observed that no compensation had been awarded under the Victorian 80:20 deal where irrigators’ entitlements were cut by 20 percent in return for increased security over the remaining 80 percent. Government official 8 (Department of Sustainability and Environment) also stated: “*no compensation can be awarded for reductions in allocations during drought years, which is generally equitable. However the NWI risk allocation strategy is vague in this context.*”

In South Australia government official 9 (Department of Water, Land and Biodiversity Conservation) noted that all entitlements in South Australia are high security. However he believed even though perpetual rights were granted, that right is usufructory in nature, rather than one of full ownership. That is water rights are restricted to rights of access and extraction for use.

At the Federal level, of the three government officials interviewed, government official 11 (National Water Commission) noted that: “*entitlements can be reduced under the State law at the end of water plans.*” However government official 11 did not raise the matter of compensation on his own accord. Government official 12 (Living Murray Program, former Murray-Darling Basin Commission) expressed concern for the well-being of irrigators who sell property rights under financial pressure relinquishing assets held by their families for several generations.

The data demonstrated only a few government officials were aware of the key issue of pressing concern to irrigators, that is the prospect of end of State water plan administrative reductions in the absence of compensation. The data indicates the presence of a disconnection between government and irrigators on key concerns pertaining to property rights. This finding further explains the level of conflict between the irrigation community and government officials during the 2010 MDBA Basin Plan consultation

process. Hence there is a need for the development of institutional linkages in this regard to facilitate understanding and reduce conflict over irrigator property rights to water.

Key finding: Institutional capacity measured as institutional insensitivity to irrigator property rights concerns

On the matter of government understanding of irrigator property rights to water, the data presented only intermittent concern for irrigator's rights at the end of the life of a water plan, indicating a level of institutional insensitivity.

4.3.5.2 GOVERNMENT ENVIRONMENTAL WATER BUYBACKS

Government officials were asked general questions on the issue of environmental water buybacks in order to ensure responses were not prompted by interviewer bias.

In 2008-09 when the interviews were conducted the Queensland government officials were yet to commence co-management of a Federal-State water buyback program, and therefore had no strategic focus of factors stimulating or impeding willingness to sell. Government official 3 (Department of Natural Resources and Mines, Brisbane, Queensland) stated that: *"Queensland has no separate buyback program at 2008. State government environmental managers are not prevented from holding and managing water for the environment, however this has not been undertaken. We expect the Commonwealth government to purchase water. ...Queensland is not over-allocated compared to other States."*

Expertise on the water buyback program was present in NSW, particularly with respect to the Riverbank program. However in NSW there was no strategic focus on stimulating willingness to sell through the creation of alternative rural economic futures. This would require institutional linkages to other government departments, which was not raised as a matter of concern. A further area of concern was that the absence of large quantities of high security water on the purchase register was not viewed as a problem. High security water guarantees environmental flows and addresses the adverse impacts of recurrent prolonged drought through prioritization of delivery of water. The benefits of high security entitlements stands in contrast to the "paper-water" crisis delivered by general security entitlements, given recurrent drought cycles.

Government official 6 (Riverbank program, NSW) stated: *We are pleased with progress of the Riverbank purchase program. We do not perceive great difficulty in purchasing larger amounts of general security water. The purchases are feasible from a hydrological perspective. Different contracts of sale of water to government result in different times of completion. At 2008 the NSW government has not commenced buying outside NSW. The buyback progress is transparent and data is available on riverbank website".* Government official 6 further stated that *"very little high security water exists*

on the register, however we are engaged in buying back floodplain water". It was explained that the general security water would deliver returns in high rainfall periods.

In Victoria government officials again had no strategic focus on stimulating willingness to sell, nor did they reveal a plan to address the identified "paper water" crisis emerging during prolonged drier periods which may lead to irreversible biodiversity loss. Government official 8 (Department of Sustainability and the Environment), demonstrated a stronger preference for water savings via infrastructure development. However he observed that water recovered through this method was "paper water" for low security entitlements, with zero allocation for 2008 during the drought.

In South Australia, the relevant government official presented the purchase data on 35GL without reference to strategic focus on stimulating willingness to sell, in the same manner as other State government officials. The official noted that all entitlements in South Australia are high security.

At the Federal level there was no strategic focus on stimulating willingness to sell through the creation of alternative rural economic futures. There was recognition by the MDBA that the government would need to be strategic as a purchaser. However the MDBA official interviewed did not have an accurate knowledge of recent purchase data. The Commonwealth Environmental Water Holder, responsible for government environmental water purchases was not available for comment. This accords with findings on absence of transparency by this institution reported by the House of Representatives Standing Committee on Regional Australia, 2011. The National Water official was aware of the "paper-water" issues and was concerned to secure actual returns against all types of entitlements. However the official was not willing to comment on the impact of large volumes of general security entitlements on the register. The government official attached to the Living Murray Program was concerned about the nature of the security of entitlements being purchased. He also expressed concern for community economic welfare and preferred purchases to be dispersed to avoid a concentration of adverse economic impacts in one region.

Key Finding: Absence of strategic focus on water buybacks

Across the basin there was a consistent absence of strategic focus on the need to take action to stimulate willingness to sell high security water to government environmental buyers through creation of alternative rural economic futures. Concern over the purchase of “paper water” during dry periods and implications for ecosystem resilience was absent.

4.3.5.3 THE WATER ACT 2007

Data was collected on government official comprehension of the *Water Act 2007*. Government officials were asked general questions in order to ensure responses were not prompted by interviewer bias.

In Queensland, government officials interviewed did not engage in discussion of the *Water Act 2007* in any depth. One official admitted he was unfamiliar with the Act. Government official 3 (Department of Natural Resources and Mine, Brisbane, Queensland) stated “*I fully support a Basin wide plan, noting that this would be preferable to the past cap on extractions. I expect that the existing State water plans would run their course before a Basin wide plan took effect.*”

In NSW government officials were engaged in greater depth with regard to the tensions between the States, compensation issues, the life of state water plans, enforceability, and the nature of interaction of the MDBA. Government official 6 (NSW Riverbank) noted ahead of the *Water Amendment Act, 2008* that failing to include matters pertaining to critical human needs was a significant omission. This allowed

environmental needs to override critical human needs. The legislation was subsequently amended. Concerns regarding institutional capacity, institutional linkages and the strength of the law were raised. Government official 6 (NSW Riverbank) stated further: *"I am not sure about the future of the new MDBA. The MDBA is currently acting independently with respect to the Commonwealth government. Perhaps this may change, however I do not see any change beyond information sharing"*.

Government official 4 (Natural Resources Commission, NSW) *"The integrity of the Water Act 2007 is compromised by the negotiation controlled by premiers. Only two states (at July 2008) have put in place supporting legislation. Victoria has presented strong opposition. ... I am unsure how the MDBA Basin plan would work. I am uncertain if the Water Act 2007 was consistent with NWI. The law lacks strength to ensure enforceability."*

Victorian government officials interviewed were engaged in issues pertaining to tensions between States and the extent to which the *Water Act 2007* may be inadequate to address conflict in this respect. Government official 8 (Department of Sustainability and the Environment, Victoria) stated: *"the intent of the Act is worthwhile, however I still have misgivings regarding transfer of full control over the Basin to the Federal government...Victoria feels threatened by the Water Act 2007 and individual personalities in government are involved in influencing the State government's response. The State feels sidelined in light of MDBA's powers. The Act still provides the basis for the Federal government and Victoria to work together constructively. It would appear that under the Federal Water Act the Commonwealth government will have the final say on amendment of existing water plans.... there is no trust between the Victorian and Commonwealth government. There has never been a frank discussion between the Commonwealth and Victorian government on the original intent of the Act. In contrast NSW is keen to hand over power to the Commonwealth"*.

Government official 7 (Goulburn Murray Water) stated that although he had not studied the Act in detail he knew that: *"the Victorian irrigators are concerned that the*

reliability of their entitlements would be eroded by the new Federal legislation. They fear water would be taken away from Victoria if Adelaide were made a priority and are concerned that allocation could become arbitrary."

In South Australia, the relevant government official articulated strong support for the *Water Act 2007*, without engaging in critical analysis of the legislation. Government official 9 (Department of Water, Land and Biodiversity Conservation, Australia) stated: *"South Australia has passed enabling legislation and is clearly an advocate of the changes which have occurred under the Federal Water Act 2007, including the establishment of the MDBA, taking over and expanding role of MDBC. We expect to revise state water plans in accordance with Federal plan in 2012-2013"*.

At the Federal level, government officials were engaged on the matter of the need to build trust to effectively activate enforcement mechanisms in the Act. Government official 10 (MDBA) stated: *"With respect to the MDBA there is a time factor involved, and States need to build trust for effectiveness. Strong enforcement mechanisms are scattered through the Act. This is where building trust is required."*

The National Water Commission was focused on how best to secure a negotiation between States under the *Water Act 2007*. The National Water Commission (NWC) noted that their institutional capacity was focused on water science, and not in the areas of water economics or law. Government official 11 (National Water Commission) stated: *"the NWC works to maintain a cooperative relationship with all States. Joint work has been undertaken with Victoria funded by NWC. The NWC participates in water planning as an observer and for harmonization. However there is uncertainty as to extent of role of NWC with respect to harmonization. There is no legal rule requiring early harmonization and that political obstacles exist.*

With respect to use of cost-benefit analysis in the Basin Plan stated that it is hard to say whether the Commission would do it. The focus is on use of best available science. The role of the National Water Commission is to oversee water dependent ecosystems. In this

context the NWC was mainly staffed by water scientists monitoring quantity and quality of water, specifying environmental assets.”

Key Finding: Inconsistent engagement with the Water Act 2007

Queensland and South Australian officials had not researched the Act in depth. Victorian, New South Wales and Federal officials were critically engaged in identifying key weakness in and challenges for the Water Act 2007. However no party sought to propose solutions to problems identified, particularly with reference to conflict resolution.

4.3.5.4 GOVERNMENT OFFICIALS' VIEWS ON OVER-ALLOCATION OF WATER ENTITLEMENTS

Data was collected on government officials' views on over-allocation. Government officials were asked general questions in order to ensure responses were not prompted by interviewer bias.

Government officials' sensitivity was measured with reference to concerns raised by irrigators on water allocations. In summary the key concerns raised by irrigators regarding water allocations included, the need for transparency, development of institutional capacity, prospect of administrative reductions without compensation the end of the life of a water plan, metering and monitoring, too greater discretionary power conferred upon the minister, concerns for equitable sharing of water between urban and rural users, lack of use of credible science in administering reductions, and inter-irrigator tensions between high and general security entitlement holders.

In Queensland, government officials were highly knowledgeable about the state of ground water over allocation, metering and monitoring and were concerned to develop accurate ecological values to determine sustainable allocation of water. The question of how to develop capacity to ensure greater scientific rigour in this respect was not raised, but the focus implied an internal concern to develop greater capacity. Many of the other concerns raised by irrigators were not addressed.

In New South Wales, government officials identified gaps in data collection, metering and monitoring, and noted breaches in adherence to the past cap policy. Government official 4 (Natural Resources Commission, NSW) stated *that it will be the role of the NRC to examine whether the Basin Plan actually functions. Data on extraction is in a poor condition causing significant analytical problems. Water data collection was not properly resourced and attention is required to improving metering.* However, the need for uniform compensation rules and equity, increasing scientific rigour in decision making, improving transparency and controlling ministerial discretion were not addressed.

In Victoria, government officials made broad statements, and noted upstream floodplain allocation issues, without addressing the concerns raised by irrigators. However it is noted that irrigators in the Goulburn-Broken region of Victoria expressed the greatest level of satisfaction with government decision making on water allocations.

In South Australia the government official interviewed observed that: *“South Australia has achieved a high degree of metering and monitoring at a high cost”*. The wider issues raised by upstream irrigators were not raised.

At the Federal level, government officials referred the matter of over-allocation as an issue for the State government consideration, indicating an absence of critical engagement with irrigators necessary to demonstrate institutional capacity and sensitivity.

Key Finding: Institutional insensitivity with regard to water allocations and over-allocation

With the exception of New South Wales, government officials across the Basin did not raise the key issues highlighted by irrigators on the matter of water allocations of their own volition. This demonstrates a need to build institutional capacity with a focus institutional sensitivity.

CHAPTER FIVE

ANALYSIS

5.1 INTRODUCTION

Privatization of MDB water entitlements as a mechanism to avoid the tragedy of the commons has not guaranteed proper management of the river system.⁴⁰³ When water was initially privatized in the MDB no provision for proper management of environmental flows existed. Each State issued water entitlements without consideration for the river system as a single unit. Therefore the tragedy of over fragmentation arose when MDB State governments issued excessive private water rights, with adverse consequences for ecosystem resilience. Over fragmentation is another term for over-allocation. Over fragmentation causes a crisis of governance where ownership is divided amongst a large number of entities, as the opportunities for cooperative management fall as the number of owners rises.⁴⁰⁴ Private ownership and the operation of the market is no guarantee that individuals will collectively cooperate to conserve what they own.⁴⁰⁵

Furthermore, while the potential for a tragedy of the commons (over-use) was evident and therefore privatization of river water was advocated, the adverse impacts of the semi-common nature of water were not recognized at the time water was privatized in the MDB. The semi-commons involves the coexistence and interaction of private and common (open access) rights due to the nature of the resource, and was articulated in detail in Chapter Two (section 2.2.1). Oil, gas, water and internet information are examples of the semi commons. In the semi-commons there is a tendency for private users to behave strategically, extracting the maximum benefits from their private

⁴⁰³ Garrett Hardin, Tragedy of the Commons, (1968) 162 (3859), *Science*, 1243-1248.

⁴⁰⁴ Eric Freyfogle, The tragedy of over-fragmentation, (2002) 36 (2), *Valparaiso University Law Review*, 307-337.

⁴⁰⁵ *Ibid.*

entitlements and minimizing maintenance costs by passing the costs to the commons.⁴⁰⁶ That is, free riding arises in the water semi-commons, leading to environmental degradation of water resources. The fluid nature of water in the semi-common makes complete exclusion difficult. Hence governance strategies are necessary. To address problems arising in a semi-commons, the Federal and State governments agreed to construct an anti-common management regime to jointly govern water resources in the MDB. An anti-common management regime involves management by multiple exclusion right holders.

THE ANTI-COMMON MANAGEMENT REGIME FOR MDB RIVER SYSTEM

The millennium drought (2001-2010) emphasized the degradation of the river system which occurred as a consequence of over-allocation of water entitlements by State governments. To address this problem the Commonwealth government took over management of the whole of the MDB in 2007-08. The reform aimed to create property rights in environmental water to be managed by the Federal government with the cooperation of MDB State governments' to enhance environmental flows. This was to serve the primary aim of effecting sustainable diversion limits on water extraction.

At the Federal level, the Commonwealth government assigned responsibility to the MDBA to establish sustainable diversion limits (SDLs) within a MDB plan, and the Commonwealth Environmental Water Holder (CEWH) to acquire and manage the newly created environmental water entitlements to improve ecosystem resilience. State governments are required to produce State water plans consistent with the Federal MDB water plan. However under the constitution States retain the power to manage water within their boundaries by removing the referral of powers. This is an anti-common management regime. The anti-common arises where there are multiple exclusion rights over a given property.⁴⁰⁷ Such a situation exists in the MDB, where two legal entities, the

⁴⁰⁶ Henry Smith, *Governing water – semi-commons of fluid property*, (2008) 50 *Arizona Law Review*, 445-478; Henry Smith, *Semi-common Property Rights and Scattering in the Open Fields*, (2000) 29 *Journal of Legal Studies*, 131.

⁴⁰⁷ Michael A. Heller, *The Tragedy of the Anticommons: Property in Transition from Marx to Markets*, (1998) 2 *Harvard Law Review*, 621.

Commonwealth government and the MDB State governments exercise exclusion rights over the river water. Buchanan and Yoon (2000) explain the dilemma of the anti-common with reference to the example of a parking lot, where persons A and B hold rights of exclusion, leading to a situation where persons must obtain permits from both persons A and B in order to park.⁴⁰⁸ The parking lot will be under-utilized where persons A and B do not cooperate and coordinate decisions on assigning permits. Heller (1998) explains that where there are multiple rights of exclusion, there is a tendency for the resource to be under-utilized.⁴⁰⁹ This, the author termed a tragedy of the anti-commons. This circumstance is the mirror image of the tragedy of the commons, where no rights of exclusion exist and overuse occurs.

The analysis of the data seeks to highlight difficulties and limitations to:

- (i) reconfiguring existing water rights from irrigators to the environment; and
- (ii) managing property in environmental water in the MDB effectively to achieve ecosystem resilience.

Water management for the environment in the MDB is an anti-common, involving formal exclusion rights held by Federal and State governments, and informal exclusion rights held by strong agricultural competitive uses, with power to influence government decisions. Hence there is a potential for underutilization of the water resource for environmental purposes. That is a tragedy of the anti-commons. The concept was articulated in Chapter Two (section 2.2.3). The analysis is organized in two parts in accordance with the two research questions.

5.1.1 OVERVIEW OF THE CHAPTER

This chapter will analyze the key findings emanating from the data on the two research questions. The data analyzed here emerges from the in-person qualitative survey responses presented in Chapter Four, undertaken at the height of the millennium drought

⁴⁰⁸ James Buchanan and Yong Yoon, *Symmetric Tragedies: Commons and Anti-commons*, (2000) 43(1), *Journal of Law and Economics*, 1-13.

⁴⁰⁹ *Supra* note 406.

in 2008-09, considered with documentary analysis and implementation of the international comparative law method. The analysis presented in this chapter will include general proposals for reform, which will then be further developed in Chapter Six.

PART 1 - THE LIMITS TO MARKET BASED WATER GOVERNANCE FOR ENVIRONMENTAL FLOWS IN THE MURRAY-DARLING BASIN

The first research question concerned the limits of market based water governance to reconfigure water entitlements for environmental flows in the Murray-Darling Basin, in light of over extraction by irrigators. The main findings emanating from research question one, demonstrate the reasons for irrigators' resistance to the water buyback and the limits of market based water governance in the MDB. They are organized into three categories:

- (i) the presence of a strong endowment effect (section 5.2.1);
- (ii) the central importance of a transition economy strategy to stimulate willingness to sell (section 5.2.2);
- (iii) the presence of a free rider problem (section 5.2.3). This research demonstrates that the free rider problem in the MDB is tied to both the endowment effect and the need for a transition economy strategy.

PART 2 - THE EFFECTIVENESS OF PUBLIC INSTITUTIONS AND LAW FOR MANAGING ENVIRONMENTAL FLOWS IN THE MURRAY-DARLING BASIN

The second research question seeks to identify which public institutional and legal reforms are necessary to resolve the conflict between environmental and socio-economic uses of the Murray-Darling river system in order to arrive at a mutually acceptable SDL target set by the MDBA, to maintain ecosystem resilience.

The findings emerging from the data analysis pertaining to the second research question are organized into three categories:

- (i) Lack of confidence in government institutional capacity and absence of effective institutional linkages (section 5.3.2);
- (ii) Mistrust in government's fairness toward rural communities (section 5.3.3); and
- (iii) Lack of functional conflict resolution provisions with reference to the proposed no-significant harm rule incorporating compensation rules and cost-benefit analysis rules, and its acceptability (section 5.3.4).

PART I

5.2 THE LIMITS TO MARKET BASED WATER GOVERNANCE FOR ENVIRONMENTAL FLOWS IN THE MURRAY-DARLING BASIN

Successful irrigated agriculture in the MDB depends upon ecosystem resilience in the river system. Investigation of the first research question involved exploration of irrigator mental models under the bounded rationality assumption articulated in new institutional economics (NIE). This investigation is undertaken with respect to the role of institutions on achievement of sustainable development in the MDB, given the understanding that irrigators' rationality shapes institutions and their function. Bounded rationality, recognizes that the rational decision making power of individuals is bounded by imperfect information, differing mental capacities and emotional responses. As noted in section 5.1 three themes emerged from investigation of irrigator mental models under the first research question. These are the endowment effect, concern for the rural economy and the free rider effect, as limits to irrigator willingness to sell to the government environmental water buyback program.

5.2.1 THE ENDOWMENT EFFECT

As articulated in Chapter Two of this dissertation, the endowment effect is as Thaler (1980) described, a state where an owner's willingness to accept (WTA), payment as compensation for property already owned exceeds willingness to pay (WTP) to acquire that same property by a substantial amount.⁴¹⁰ As a consequence of the increased value given to property owned there is a tendency for the owner to hold onto this property.⁴¹¹ The majority of irrigators surveyed across the four regions of the MDB intended to hold onto their water entitlements, rather than participate in the environmental buyback. This decision making pattern can be in part attributed to the endowment effect.

⁴¹⁰R. Thaler, Toward a Positive Theory of Consumer Choice, (1980) 1 *Journal of Economic Behaviour and Organization*, 39-60; D. Kahneman, J. Knetsch and R. Thaler, "Experimental Tests of the Endowment Effect and the Coase Theorem, (1990) 98(6) *The Journal of Political Economy*, 1325-1348.

⁴¹¹ R. Thaler (1980) *Ibid.*

The reasons for the emergence of the endowment effect stated in the literature are four-fold. First, Kahneman, Knetsch and Thaler (1990) observed that the endowment effect can be caused by the absence of substitute goods. The second and third are articulated in Kahneman and Tversky's (1979) paper on prospect theory with regard to loss aversion and status quo bias. Loss aversion occurs where the psychological pain of losing something is so great that a preference for avoiding losses over acquiring gains exists. Status quo bias is the tendency to maintain the same position, arising as a consequence of loss aversion. Fourthly Hoffman and Spitzer (2002) identify sentimental attachment as a cause of the endowment effect, where property becomes bound to personality.

The endowment effect is a substantial qualification to the Coase Theorem. In the absence of transaction costs, the Coase Theorem argues that in the presence of an externality, parties will negotiate a reconfiguration of property rights through trade to the new efficient equilibrium level regardless of initial endowments. Where the endowment effect is present it is clear that initial endowments are a significant limitation to trading activity. It was noted by Venkatachalam (2008) that the use of a Coasian framework, in the absence of recognition of the endowment effect, can lead to sub-optimal outcomes.

The Endowment Effect in the Murray-Darling Basin

The presence of strong resistance by irrigators in the MDB to the water buyback, and the reasons they gave for this resistance, as described in the previous chapter, provides evidence of the endowment effect. Water is a key farm input for which there is no substitute, its value heightened during drought periods. The gross value of irrigated agricultural production in the Murray-Darling Basin for 2010-11 was \$5.9 billion.⁴¹² High profitability of irrigated farm business, valuation of water as an integral farm asset, tertiary training in irrigated agriculture, low off-farm income and the intention to use water entitlements as a retirement asset, led to loss aversion and status quo bias. An appreciation of lifestyle benefits and emotional attachment to irrigated agriculture, and

⁴¹² Australian Bureau of Statistics, Gross Value of Irrigated Agricultural Production, 2010-11, 13 December 2012.

family tradition of irrigated agriculture demonstrated the presence of sentimentality. That is, all four theoretical causes of the endowment effect articulated above were embedded in the irrigators' responses as described in Chapter Four. The endowment effect for water as property in the Murray-Darling Basin demonstrates the presence of a substantial qualification to operation of the Coase Theorem in the water market and in particular that initial endowments matter in trading decisions, limiting permanent sales of water entitlements.

The findings in this study on the MDB confirmed Ise and Sunding's (1998) findings emanating from an American study of irrigators' willingness to sell toward government environmental water purchase programs in the Lohantan Valley, Nevada.⁴¹³ While Ise and Sunding (1998) did not study or discuss the endowment effect, their research is nevertheless relevant to it. Specifically, in a comparative context the following factors observed by Ise and Sunding (1998) were also found to be present in the MDB, impeding willingness to sell:

- (i) A long term planning time-frame due to presence of an heir willing to take over the farm business and/or irrigator far from retirement age, and/or excellent health;
- (ii) Lack of or low value of off-farm employment / Lack of skills to acquire off-farm employment;
- (iii) On-farm residence / Appreciation of lifestyle benefits;
- (iv) Mistrust of government expressed by some respondents.

Indebtedness as a factor stimulating willingness to sell was also established in the Ise and Sunding (1998) study, and this too has been well established in the MDB literature.⁴¹⁴ In a circumstance of indebtedness the gap between WTA and WTP narrows, reducing the impact of the endowment effect.

⁴¹³ Sabrina Ise and David Sunding, (1998), 20, Reallocating Water to Agriculture under a Voluntary Purchase Program, *Review of Agricultural Economics*, 221-224.

⁴¹⁴ Henning Bjornlund et al., Irrigators, Water Trading, the Environment and Debt" Buying Water Entitlements for the Environment, in Daniel Connell and R. Quentin Grafton, (Eds), Basin Futures: Water Reform in the Murray-Darling Basin, ANU EPress 2011.

Research on the endowment effect in environmental water purchase programs is scarce both internationally and in the Murray-Darling Basin.⁴¹⁵ Previous endowment effect experiments undertaken by Kahneman, Thaler, Knetsch and others articulated in the seminal literature on the theory of the endowment effect concerned trade of chocolate bars, coffee cups, wine, lottery tickets and pens. Literature on real world examples of the endowment effect outside the experimental and classroom setting are rare.⁴¹⁶

This study demonstrates the endowment effect for water assets held by irrigators as a major limit with reference to a government environmental purchase program in the Murray-Darling Basin. The results from the qualitative survey in this dissertation were the very first to demonstrate the presence of a strong endowment effect in the Murray-Darling Basin.⁴¹⁷

Irrigators have actively lobbied State governments, to resist the Basin Plan and the water buyback program. Hence the impact of the endowment effect is evident at two levels in the Murray-Darling Basin – not just within the irrigation sector but also at the State government level. The Victorian government provided strong resistance to the transfer of power to the Commonwealth under the *Water Act 2007*, until the Commonwealth government offered a \$1.2 billion dollar sweetener for infrastructure upgrades. Victoria placed a 4 percent annual limit on trade of water out the state, leading to a South Australian challenge in the High Court which was later resolved by negotiation.⁴¹⁸

⁴¹⁵ Personal communication Prof. Jack Knetsch, Simon Fraser University, 4 April 2013 and 12 April 2013.

⁴¹⁶ *Ibid.*

⁴¹⁷ Thampapillai V (2008), Limits to the Willingness to Sell to Government Water Buy-backs in the Murray-Darling Basin, *Canadian Law and Economics Conference, University of Toronto, Canada*, 26-27 September 2008. Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 2, *Environmental Policy and Law* 39 (6) , 317-322; Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 1, *Environmental Policy and Law* 39 (4-5), 247-265.

⁴¹⁸ Peter Ker, Court fight looms over river, *The Age*, 6 March 2009; Premier Mike Rann, Hon Karlene Maywald (Minister for Water Security), Hon Jay Weatherill (Minister for the Environment), High Court challenge against vics on water launched, New Release, Government of South Australia, 1 December 2009.

At the time the final basin plan entered into law in November 2012, the NSW government, representing State irrigators' interests, issued a media release articulating its "disappointment" with the final basin plan. In late 2012 the New South Wales government also announced an annual three percent limit on buybacks of NSW water entitlements for environmental purposes in the MDB, effective from 15 January 2013.⁴¹⁹ The stated aim is to allow rural economies to adjust. The New South Wales government called for greater focus on infrastructure and referred to the buyback program as "lazy and destructive".⁴²⁰ In 2013 the NSW government cut funding to the MDBA by 70 percent, while South Australia has stated that it will reduce its funding by half from July 2014.⁴²¹ During 2013 both New South Wales and Queensland resisted Basin Plan Implementation agreement with express reference to rural economies. Following a change in Federal government in October 2013, and intense negotiations, New South Wales and Queensland signed the intergovernmental Basin Plan implementation agreement on the condition that water buybacks would be capped under the law at 1500GL.⁴²²

5.2.2 CENTRAL IMPORTANCE OF A TRANSITION ECONOMY STRATEGY

In the qualitative survey conducted in this research irrigators were asked to consider a hypothetical decision to sell where offer prices made by government and other

⁴¹⁹ NSW Department of Primary Industry, Office of Water, *The Basin Plan for the Murray-Darling*, <http://www.nsw.gov.au/Water-management/Law-and-policy/> (viewed 14-8-2013).

⁴²⁰ Andrew Stoner, Deputy Premier of NSW, Minister for Regional Infrastructure and Services and Katrina Hodgkinson, Minister for Primary Industries, *NSW Disappointed by Final Basin Plan*, Media Release, 22 November 2012.

⁴²¹ Tom Arup, State funding cuts to slash Murray-Darling work, *Sydney Morning Herald*, 27 February 2013.

⁴²² Murray-Darling Basin Authority, *Environmental Water Recovery Progress*, Commonwealth of Australia, 2014; The Hon Tony Abbott, States Agree to Implement Murray-Darling Water Reform, Media Release, 27 February 2014; NSW Department of Primary Industries, Office of Water, *The Basin Plan for Murray-Darling*: <http://www.water.nsw.gov.au/Water-management/Law-and-Policy/National-reforms/Basin> (viewed 10-3-2014); Anna Vidot, NSW Queensland agree on Basin Implementation, *ABC Rural*, 27 February 2014.

irrigators were equal. In articulating a preference to sell toward irrigators over government environmental buyers, irrigators in a strong majority stated that their desire was to preserve the rural economy as an overriding concern. In regional Australia the scope for industrial growth is limited due to the high cost of labour, compared to nations such as India and China. The high Australian dollar and cost of transport are further impediments for industrial growth. Rural economies are therefore heavily dependent on agriculture and service industries for the generation of employment. In rural areas the service sector is not as strong as urban service sectors where population is high. When the agricultural sector contracts, the population within the rural sector also falls and the rural service sector contracts. Hence any contraction in agriculture is unwelcome, even though terms of trade may be low.

Water taken out of the irrigation sector drives irrigation water prices upward. The increase in water price can push some irrigators out of irrigated agriculture causing a contraction in the rural economy. The finding that irrigators prefer to sell to other irrigators over government environmental buyers due to a concern for the rural economy implies that a strategic economic transition strategy for regional Australia must be developed alongside the Murray-Darling Basin Plan. This must be a legal requirement to diversify options for rural economic growth in the MDB, in order to stimulate willingness to sell toward government buyers. That is market based water governance through water buybacks will remain limited in the absence of certain conditions, not least a strong economic transition strategy. The House of Representatives Standing Committee on Regional Australia (2011) report confirmed the 2008-09 published findings of this study, that the prospect of rural economic contraction attached to SDL and water buyback policy has a demoralizing effect.⁴²³

The literature on government practice has not investigated the impact of these preferential selling patterns of irrigators on the success of the water buyback, and the need for transition policy to stimulate willingness to sell.⁴²⁴ As observed in Chapter Two the environmental economic transition literature is largely focused on the carbon

⁴²³ *Supra* note 416.

⁴²⁴ V. Thampapillai V (2008, 2009), *Ibid.*

economy. The MDB literature focuses on the socio-economic impact of the water buyback policy on MDB, without identifying and analyzing the need for economic transition strategies in the MDB. At every major stage of water reform in the MDB to reduce over-extraction, from the 1994 cap and trade system, to the 2004 National Water Initiative to the *Water Act 2007*, a rural economic transition strategy has been repeatedly missed by successive governments. However State governments post-2011 have very belatedly commenced raising the matter of structural adjustment repeatedly in negotiations with the Federal government following vocal protests by irrigators.⁴²⁵ In November 2012 the Federal Minister for Regional Australia and the Federal Minister for the Environment established a \$100 million Murray-Darling Basin regional economic diversification program. This action confirms the 2008-09 published findings of this research pertaining to the need for transition economy strategies. The provision of additional funding to NSW and Queensland from the MDB economic diversification fund to secure signature to the MDB Plan Implementation Agreement in February 2014 is further confirmation of the 2008-09 published findings of this strategy.⁴²⁶ A successful transition strategy needs to be well planned to achieve sustainability.

The concern and despair for the rural economy was most evident in interviews held in the town of Griffith in the Murrumbidgee region, which is almost entirely dependent on irrigated agriculture due to investment in permanent plantings. For example, vineyards, olives and citrus. It was here that the burning of the Guide to the Basin Plan occurred in October 2010. The qualitative observations in this research were entirely consistent with such dramatic incidents, and indicate that fear of rural economic decline is at the heart of the conflict in the Murray-Darling Basin. In the absence of mechanisms to mitigate that decline, market based mechanisms cannot operate effectively.

However, thus far the water law in the MDB has made no coherent effort to address this conflict. The *Water Act 2007* established the MDBA to construct a Basin wide environmental plan and the Commonwealth Environmental Water Holder (CEWH)

⁴²⁵ V. Thampapillai (2008, 2009) *Id.*; <http://www.anao.gov.au> (viewed 12-3-2014)

⁴²⁶ V Thampapillai (2008, 2009), *Id.*; *Supra* note 418.

to manage environmental water. However the legal language of the Water Act 2007 does not offer a direct, clear or coherent directive for the development of transition economy strategies. This is despite the fact that section 3 (c) of *Water Act 2007* states that optimization of environmental, economic and social outcomes is the goal of the legislation.⁴²⁷

The end result is that no economic investment strategy for rural economic transition was embedded in the Murray-Darling Basin Plan law, although an economic diversification fund has been belatedly established in November 2012. While the MDBA is charged with the responsibility of developing a Basin Plan to deliver ecosystem resilience, it does not have a legal mandate or capacity to develop a rural economic transition strategy. Nor did the *Water Act 2007* legislate for the relevant institutional linkages to other government departments such as Treasury, as would be necessary to manage a transition economy strategy.⁴²⁸ The absence of institutional linkages is considered later in Part 2 of this chapter.

The lack of a clear legal focus on a transition economy strategy is in substantial part, a consequence of politics. The *Water Act 2007* was drafted at the eleventh hour of an election campaign by the Howard government and a transition economy strategy was one of a number of elements missing from this legislation. In the manner that critical human needs was a significant omission from the *Water Act 2007*, the qualitative data indicates that the failure to include an economic transition strategy was another significant and equivalent omission from the Act.

COMPENSATION FOR COLLECTIVE LOSSES

A key issue associated with environmental economic transitions is the need for compensation, left unaddressed by the *Water Act 2007*. Although governments have promised that there will be no compulsory acquisition and purchases will occur only from

⁴²⁷ V. Thampapillai, Submission to the Inquiry into the impact of the Murray-Darling Basin Plan on Regional Australia, House Standing Committee on Regional Australia, Submission No.0145, Received 1 - 12-2010.

⁴²⁸ See Dr Ken Henry's comments in Mark Metherall and Kirsty Needham, Water Management a Disgrace, says Henry, *The Age*, 29 March 2010.

willing sellers, rural economies experience a “collective loss” where water is taken out of the irrigation system and diverted to the environment. In each region studied irrigators raised the issue of compensation rights and rural economic decline as a consequence of the buyback program and the Basin Plan. The irrigators’ dissatisfaction with the Basin Plan was illustrated by application to the High Court by 500 irrigators from Victoria, NSW and South Australia to challenge the constitutionality of the Basin Plan in November 2012. The case was referred to the Federal Court.⁴²⁹

A legal requirement for a rural economic transition strategy would be a form of “collective” compensation to address collective losses which irrigators raised as a central concern. However, as Michelman (1967) has argued “legislatures and administrative agencies [often] shirk their role in the compensation process”.⁴³⁰ The boundaries of constitutional and federal law provide for just compensation only where compulsory acquisition of water occurs. The law does not provide for compensation for indirect collective harms suffered when the rural economy declines as water is reconfigured toward environmental flows. Compensation in the form of a rural transition economy strategy embedded in the law, will address what Michelman identifies as the demoralization cost. As noted in chapter Two, demoralization costs are “the total of (1) the dollar value necessary to offset disutilities which accrue to losers and their sympathizers specifically from the realization that no compensation is offered, and (2) the present capitalized value of the lost future production (reflecting either impaired incentives or social unrest) caused by demoralization of uncompensated losers, their sympathizers and other observers disturbed by the thought that they themselves may be subjected to similar treatment on some other occasion”. The demoralization cost was most evident in irrigators’ responses on the decline of the rural economy attached to movement of water toward environmental flows. The demoralization effect is also clearly linked to the endowment effect and the free rider effect discussed in the next section. Addressing the demoralization cost is considered further in Part 2 of this chapter.

⁴²⁹ Elizabeth Byrne and Deb O’Callaghan. High Court knocks back irrigator challenge to Basin Plan, *ABC Rural*, 29 November 2012.

⁴³⁰ Frank I. Michelman, Property, Utility and Fairness: Comments on the Ethical Foundations of “Just Compensation” Law, (1967) 80(6), *Harvard Law Review*, 1165-1258

Relocation as transition compensation

Irrigators interviewed in this study were eager to discuss compensation issues, with reference to questions on relocation and monetary packages as compensation. Responses on relocation were mixed with reference to the Northern Territory. Irrigators in this study were open to relocation compensation depending on age and time from retirement. Government investment in infrastructure development in the new location increased the attractiveness of this option. Even where irrigators stated a preference for monetary compensation when water was acquired, the option to choose from both monetary and relocation options was warmly received. The qualitative research undertaken clearly demonstrated that relocation transition compensation strategies are acceptable to many irrigators. Literature in this respect is scarce in the MDB.

While the Federal government has investigated the possibility of irrigation development in the Northern Territory, and irrigation development in Tasmania and Western Australia was ongoing, relocation of MDB irrigators as a transition compensation strategy has not been included in the water law and the MDB Plan. This is an example of neglect of transition economy strategies. Tasmania possesses a number of expanding irrigation schemes which provide opportunities for relocation.⁴³¹ The Tasmanian premier invited MDB irrigators to consider relocation to irrigation districts in Tasmania in 2010.⁴³² However, Tasmanian irrigator requests for special loan concessions to mirror Higher Education Contribution Scheme (HECS) payments to purchase land and water entitlements in the newly developed irrigation schemes were refused by the Tasmanian government. Under the HECS system debt is paid off in full through delayed tax payments only when an income is secured. The absence of concern for societal welfare and a focus on market-based strategies, has given rise to irrigation community anger.

⁴³¹ The Hon Mark Butler, Minister for the Environment, Heritage and Water, Tasmania's Largest Irrigation Scheme Ready to Start, 14 May 2012.

⁴³² Matthew Denholm, Island State in bid to lure irrigators south, *The Australian*, 12 November 2010.

5.2.3 THE FREE RIDER EFFECT

As noted in Chapter Two, the free rider problem is the tendency for individuals to gain the benefit of consumption of a publicly provided good, in this case sustainable environmental flows, without contributing towards maintenance and payment for the benefit.⁴³³ The patterns of responses in this study are representative of how the free rider problem manifests with regard to semi-common property. Smith (2005) explains, in a semi-common private users seek to obtain all benefits, and behave strategically to bear only a fraction or none of the costs.⁴³⁴ Costs are pushed to the commons. Strategic behaviour will be greater for a fluid resource such as water, which cannot be contained as in the case of land.

A free rider problem in the MDB was evident. The majority of interviewees recognized and articulated the importance of environmental buybacks for recovering water for environmental flows. However the majority of irrigators interviewed were unwilling to sell *their* water to reconfigure property rights to the environment. The unwillingness to sell was bound to the endowment effect and the concern for the rural economy in the MDB, both of which served to escalate the free rider phenomenon. The psychological attachment to irrigated agriculture, and the concurrent understanding that the system must be made sustainable via the delivery of environmental flows, has given rise to the stated expectation that *other* irrigators will participate in the water buyback program to build the needed long term ecosystem resilience. Furthermore the recognition of environmental flow needs, but rejection of the need for substantial cuts in their own water use, underscored the presence of a free rider problem in the MDB. The nature of protests to the October 2010 guide to the Basin Plan, the pattern of majority general security purchases by government, irrigators' preference for on-farm infrastructure savings measures over buy backs, observed together with the qualitative data presented in this research, are indicators that the free rider problem in the MDB may be quite widespread.

⁴³³ Mancur Olson, *The Logic of Collective Action*, Harvard University Press, 1965.

⁴³⁴ Henry E. Smith, *Governing the Tele-Semicommons*, (2005) 22 *Yale Journal on Regulation*, 289.

With regard to security of entitlements, two main types exist in the MDB for annual allocation, high security (NSW) / high reliability (Vic, SA) water entitlements and general security (NSW) / low reliability (Vic) entitlements. High security entitlements are very reliable delivering 80 – 100 percent of the entitlement each year, including high quantities of water during drought periods. General security water delivers little (30-50 percent) and often zero water during drought periods. Hence, general security entitlements are sold more readily. It is more profitable for irrigators to accept a dollar amount from government than to hold a general security entitlement. The majority of purchases by government are therefore general security entitlements which deliver little or no water at times of water scarcity.

This pattern of sale indicates that genuine concern for the environment on the part of irrigators is limited, despite their awareness of the importance of ecosystem resilience on their long term economic activity. Irrigators place a very high value on high security water in the context of the economic returns which may be secured from these entitlements, particularly for perennial crops, and the agricultural lifestyle guaranteed by these entitlements. That is, the retention of high security entitlements by irrigators in this context is connected to the interrelated endowment effect and free rider problem in the MDB, with adverse implications for long term ecosystem resilience. The free rider phenomenon has not often been articulated as linked to or embedded within the endowment effect in the existing literature.

A degree of voluntary acceptance of the benefits of environmental flow policy by the respondents is contained within the free rider problem. That is, irrigator respondents articulated clear awareness of the importance of creating the conditions for ecosystem resilience through securing environmental flows for sustainable farming. Irrigators were clear that the problems of high salinity, algal blooms, and soil degradation would adversely impact their farm income. Within the framework of voluntary acceptance of the benefits, Rawls conception of fairness supports contribution toward the benefit by all beneficiaries.⁴³⁵ In articulating the principle of fairness Rawls stated “where a number of persons engage in a just, mutually advantageous cooperative venture according to rules

⁴³⁵ John Rawls, *A Theory of Justice*, Cambridge Mass: Harvard University Press, 1971.

and thus restrain their liberty in ways necessary to yield advantages for all, those who have submitted to these restrictions have a right to similar acquiescence on the part of those who have benefited from their submission."⁴³⁶ Nozick's objections to this principle articulated in Chapter Two are based on the conception of benefits being forced involuntarily on disinterested parties in the community.⁴³⁷ The widespread acknowledgement of the benefits of environmental flows policy by irrigators interviewed renders Nozick's forced gift free rider model articulated in Chapter Two, redundant. That is environmental policy is justifiable, even in the minds of the free riding irrigators.

The free rider effect explains the popularity amongst irrigators of water infrastructure savings over water buybacks, despite the fact the latter is less costly to society. The negotiation to secure Queensland and New South Wales signature to the MDB Plan Implementation Agreement in February 2014 involved capping water buybacks in the law at 1500GL. In this manner irrigators push the cost of securing ecosystem resilience to the commons, that is the tax payer.

5.2.4 CONCLUSIONS –PART 1

Reconfiguration of water away from over-allocated private rights to environmental flows through the buyback program creates an anti-commons property in water. This is because Federal, state and local communities (informally) hold multiple rights of exclusion, over the management of the MDB water resources. Where interests of the exclusion right holders are in conflict, cooperation to achieve sustainable development of water resources, breaks down. It was noted in Chapter Two that while Heller (2001) identifies the tragedy of the anti-commons as underuse through multiple exclusion rights in conflict, Fennell (2009) argues that the initial tragedy of the anti-commons occurs where it is difficult to assemble privatized fragments into the anti-commons leading to under use of water resources for environmental protection.⁴³⁸

⁴³⁶ *Ibid.*

⁴³⁷ Robert Nozick, *Anarchy, State and Utopia*, New York: Basic Books, 1974.

⁴³⁸ Lee Anne Fennell, Commons, Anticommons, Semicommons, *John M. Olin, Law and Economics Working Paper, No. 457*, The Law School, University of Chicago, 2009.

The qualitative data in this research provides evidence that in the MDB reconfiguring entitlements to water for the environment is a difficult venture. This tragedy of the anti-commons identified by Fennell (2009) is being driven by the endowment effect linked to irrigator concern for the future of the rural economy and the free rider effect. These aspects of irrigator mental models are driving State government action through the lobbying process. The past and current NSW and Queensland State – Federal government conflict over the the Basin Plan Implementation Agreement during 2013 and the institution of limits on water purchases by NSW and Victoria, are a potential tragedy of the anti-commons through delay. This is because reconfiguration of water to environmental flows is delayed, leading to under-utilization of water resources for environmental protection purposes. The cap on water buybacks at 1500Gl further entrenches the delay in reconfiguring water rights to the environment.

The presence of a strong endowment effect despite the multi-billion dollar buyback policy coupled with a strong preference for preserving the rural economy implies that a transition economy strategy embedded in the environmental planning framework is central to stimulating willingness to sell to the environment. The analysis indicates that it is possible for the gap between willingness to accept (WTA) and willingness to pay (WTP) to narrow when a transition economy strategy is in place. However, without a strong transition economy strategy the government will continue to acquire general security purchases in the majority, resulting in leading to inadequate water for the environment and ongoing environmental degradation in the MDB. This is of significant concern in the context of climate science predictions of repeated drought shocks. The government must therefore increase purchases of high security water. However the absence of sustainable transition economy strategies are a key impediment to this goal. Institutional reforms with respect to the transition economy strategy are discussed in Chapter Six.

PART 2

5.3 THE EFFECTIVENESS OF PUBLIC INSTITUTIONS AND LAW FOR MANAGING ENVIRONMENTAL FLOWS IN THE MURRAY-DARLING BASIN

5.3.1 INTRODUCTION

The second part of the analysis examines the role of public institutions and water law for:

- (i) securing environmental property rights in water from existing private water rights held by irrigators; and
- (ii) managing the new environmental water property regime to achieve ecosystem resilience. Achievement of these two goals is important for delivering sustainable development.

Examination of the role of public institutions and water law, identifies scope for institutional reform. The qualitative survey analysis considered alongside documentary and comparative legal analysis suggests that there are three principal obstacles to the achievement of the aforementioned goals:

- (i) Lack of confidence in government institutional capacity to manage and balance water for environmental flows and irrigated agriculture;
- (ii) Mistrust in government's sense of fairness toward rural communities;
- (iii) Absence of adequate conflict resolution mechanisms and rules.

5.3.2 LACK OF CONFIDENCE IN GOVERNMENT INSTITUTIONAL CAPACITY

Ostrom and Ostrom (1972) observed that in water management, institutional capacity has to be sourced from at least water science, financial, economic, legal and political fields.⁴³⁹ A perceived lack of institutional capacity across all required fields was a key driver of mistrust in government. The present research found that perceived lack of institutional capacity was most acutely experienced in terms of the:

⁴³⁹ Vincent Ostrom and Elinor Ostrom, *Legal and Political Conditions of Water Resource Development*, *Land Economics*, Vol XLVIII, No. 1, 1972.

- (i) absence of actual institutional linkages,
- (ii) actual lack of institutional sensitivity; and
- (iii) actual lack of information sharing.

Absence of institutional linkages – a major policy failure

Saleth and Dinar (2004) and Kiser and Ostrom (1982) advocate institutional linkages which may operate at the constitutional, policy making or operational daily management level.⁴⁴⁰

The absence of strategic deployment of institutional linkage rules in MDB water reform was evidenced by the irrigators' responses pertaining to the:

- (i) absence of government information sharing;
- (ii) the absence of use of participatory cost-benefit analysis for conflict resolution;
- (iii) the absence of a coherent dialogue on compensation for conflict resolution; and
- (iv) the absence of a government dialogue on the state of the rural economy.

That is, the irrigator responses demonstrated that the necessary institutional linkages for conflict resolution and economic transition strategies required to build trust and cooperation, were absent with reference to the development of SDL policy.

As noted in Part 1, the legal language of the *Water Act 2007* does not clearly and coherently require rural economic transition strategies to operate within the framework of the MDB environmental policy, where water is taken from a region for environmental flow purposes. Nor does the *Water Act 2007* offer a coherent conflict resolution framework. This research demonstrates that the level of mistrust in government expressed by irrigators in the Murray-Darling Basin is related to the lack of institutional linkages at the policy making level. These linkages are required to direct the MDBA to coordinate its work with other departments for this purpose. Necessary institutional linkages include Treasury and the Department of Finance.

⁴⁴⁰ Cited in M. Saleth and A. Dinar, *The Institutional Economics of Water, A cross-country analysis of institutions and performance*, Edward Elgar, World Bank, 2004; L. Kiser and E Ostrom, *Three Worlds of Action: A Meta-theoretical Synthesis of Institutional Approaches*, in E. Ostrom, *Strategies of Political Inquiry*, Beverly Hills CA: Sage, 1982: 179-222.

The MDBA should be able to inform the relevant government departments which communities are vulnerable to economic harm as a consequence of water policy. This information should be employed by the Department of Regional Australia, Treasury, Finance and other government departments to develop and coordinate sustainable transition economy strategies. These actions build trust which fosters cooperation.

Irrigators in the MDB overwhelmingly felt that their welfare and interests were subordinated to those of urban populations in the basin states, with respect to the dominance of environmental interests articulated in the Water Act 2007. Embedded in institutional linkages in the Murray-Darling Basin can be mechanisms for the protection of minority interests to address the problems identified in majority rule democracy by Arrow (1951).

Grafton (2000, 2009) and Foerster (2011) highlighted the importance of user participation and adaptive institutions for the building of trust in water management. This research builds on their findings by demonstrating that operational and policy institutional linkages involving user participation across water allocation, compensation issues, climate change dialogue, information sharing systems for water buybacks and trade would build trust through participation, and therefore improve irrigator-government negotiations in the Murray-Darling Basin. In the lead to development of the Guide to the Basin Plan 2010, information flows to stakeholders was limited, creating a hostile response from the irrigation community. Following the documentation of irrigators concerns by the House of Representatives Standing Committee on Regional Australia (2011) report, which mirrored the published qualitative findings of this research (2008-09), information flows have improved.

Lack of institutional sensitivity

Responses provided by government officials in this research were assessed with reference to the major concerns raised by irrigators. Government officials' responses were considered as a measure of institutional sensitivity and active knowledge of the environment in which they were operating. With regard to irrigators' concerns pertaining to property rights and end of plan reductions without compensation, and concerns raised by irrigators on the matter of allocations, government institutional insensitivity was

observed. While these were key issues of concern to irrigators, government officials did not appear to recognize the importance of these matters. That is they certainly did not raise the identified concerns as key issues.

At 2008, while some State government respondents had not researched the *Water Act 2007* in depth, the Victorian, New South Wales and Federal governments were critically engaged. The government officials recognized that tensions between states on the life of water plans, enforceability and the nature of interaction with the MDBA posed problems for the effectiveness of the *Water Act 2007*. The need to build trust to secure cooperation was raised by Federal government respondents. However the respondents proposed no possible solutions to problems identified. No government respondents raised the matter of a transition economy strategy and the issue of rural economic decline, linked to the implementation of environmental policy in the MDB. Government officials did not indicate a need for greater information sharing and dialogue. Furthermore, government officials did not articulate a need for introducing new conflict resolution rules, which would control institutional bias in decision making.

The results of this research revealed that the Murray-Darling Basin government negotiation framework does not meet the three part test set by Donahue (2004) articulated in Chapter Two to demonstrate institutional sensitivity.⁴⁴¹ The three part test required that (i) measures be in the public interest, (ii) the parties communicate in a strategic rational manner; and (iii) that the purpose and the intent of the negotiations be understood. First, concerns of irrigators regarding government appropriation of water at the end of a life of a plan without compensation, indicates that the current negotiations on SDLs do not always meet the public interest. This is particularly so in the absence of a compensation dialogue. Second the absence of a coherent information sharing framework does not allow for parties to communicate in a "strategic rational manner, having regard for the interests and intentions of each party". Third, the information sharing problem prevents irrigators and government from comprehending and developing a mutually agreed purpose and intent of the negotiations. The final Basin plan is the consequence of

⁴⁴¹ See John Donahue, On Collaborative Governance, John F Kennedy School of Government, Harvard University, 2004 at 4.

State and Federal government decision making, with no indication that concerns of irrigators articulated in this study and subsequent documented Basin wide consultations have been properly addressed.

Lack of Information Sharing and transparency

The absence of information sharing was a major institutional capacity deficiency in the MDB consultation process until 2010. Hostile relationships between the MDBA and irrigators during consultation processes following the release of the Guide to the Basin Plan in 2010 were clearly related to 2008-09 findings in this study on the lack of advance information sharing. Irrigators in this study were often unclear as to the exact tenancy of their property rights in water, which exacerbated concerns over their own economic welfare. Irrigators also stated that they received little or no information on the water buyback and compensation matters from government.

Resistance to the water buyback is in part related to the absence of this information sharing, and to the lack of any coherent dialogue with the irrigation community on impacts of climate change on irrigation businesses. The presence of such a dialogue may have further potential to improve outcomes for the environmental flow buyback program. The lack of understanding of climate change impacts within certain sections of the irrigation community may be overcome by operational linkages where government officials communicate with irrigators regularly on current climate change science relevant to the Murray-Darling Basin. Successive Federal governments in power between 2008 and 2013 recognized climate change. However, the current Abbott government refuses to acknowledge climate change.

To build social capital between government water organizations and networks of irrigators and rural communities, it is clear from the data that the government must be more proactive in sharing information, not only on water buybacks, but also on property rights, climate change and compensation issues. In doing so, government would demonstrate the fulfillment of a duty of care and a strategic understanding of concerns of the irrigators. The findings in this study were confirmed by the House of Representatives

2011 study findings on the absence of transparency and communication emanating from SEWPAC, now the Federal Department of the Environment.⁴⁴²

5.3.3 MISTRUST IN GOVERNMENT

The New Institutional Economics literature places great importance on building trust for cooperation. Olson (1965), Ostrom (1990), Heller (1998), and Donahue (2004) all articulate the importance of trust for successful negotiations in the commons.⁴⁴³ In researching the inadequacies in the public institutional and legal framework for environmental management in the Murray-Darling Basin, mistrust in government was the dominant finding limiting irrigators' cooperation in environmental flow policy.

On the matter of the construction of general environmental sustainability policy, the government's perceived institutional bias toward the environment was a concern held by irrigators. On the matter of climate change, irrigators mistrusted the credibility of previous (2008 - September 2013) government scientific analysis and decision making. On the matter of government water allocations irrigators raised concerns with respect to too great a presence of discretionary ministerial power which they believed would be biased toward the environment.

A transition economy strategy attached to the Basin Plan would have proved to irrigators that the government is not biased toward the environment to the detriment of irrigators and the rural economy. As noted earlier, from the time of the institution of a cap and trade system in 1994 to reduce over-allocation, to the 2004 National Water Initiative, to the *Water Act* 2007, until November 2012, successive governments failed to include a sustainable transition economy strategy for rural economies dependent on irrigated agriculture, within environmental policy in the MDB.⁴⁴⁴ In November 2012 the Federal government very belatedly introduced a MDB economic diversification fund of

⁴⁴² House of Representatives Standing Committee on Regional Australia, Of drought and flooding rains: Inquiry into the impact of the Guide of the Murray-Darling Basin Plan, Commonwealth of Australia, 2011.

⁴⁴³ Elinor Ostrom, *Governing the Common: The Evolution of Institution for Collective Action*, Cambridge University Press, 1990; Michael Heller (1998) *Supra* note 406; John Donahue (2004) *Supra* note 440.

⁴⁴⁴ Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 1, *Environmental Policy and Law* 39 (4-5), 247-265.

\$100 million. The funds are to be distributed as follows: \$35.2 million to NSW, \$25 million to Victoria, \$25 million to South Australia and \$15 million to Queensland.⁴⁴⁵ However the Federal government has not developed a publicly documented comprehensive sustainable economic transition strategy for the MDB at February 2014. No institutional linkage structure for the management of the transition payments has been publicly documented at February 2014.

The sincere belief held by rural communities that the government is heavily biased toward the environment at the expense of their livelihoods drove mistrust. Coupling a transition economy strategy with environment policy for regions affected by reductions in water availability requires coordination of the work of the MDBA with other government departments such as Treasury, the Department of Finance and the Department of Infrastructure and Regional Development. These necessary institutional linkages are absent in environmental policy and law in the MDB. This omission has made the task of developing the MDB plan by the MDBA very difficult and constrained the ability to build bonds of trust with rural communities leading to repeated instances of irrigator and State government resistance to the MDB plan.

Another key issue adversely impacting trust between government and irrigators concerns compensation. Successive Commonwealth governments have assured irrigators in the MDB that there will be no compulsory acquisition of water entitlements. However despite this assurance, in response to questions on SDL targets, property rights and water allocations, irrigators repeatedly expressed concern about the prospect of compulsory acquisition without compensation at the end of State water plans under the implementation of the MDB Plan. This is because past state government practice has involved reductions to water entitlements without compensation at the end of the term of a State water plan. As the MDB Plan is now administered by the Federal government, a constitutional right to compensation for cuts to entitlements under State water plans may arise. Federal and State governments must clarify this issue with irrigators to build trust.

The presence of mistrust in government by irrigators in the Murray-Darling Basin has not been well studied or documented with the exception of the House of

⁴⁴⁵ Katie McRobert et al. Basin Plan Finally Signed, *Queensland Country Life*, 27 February 2014.

Representatives Standing Committee on Regional Australia 2011 report entitled “*Of drought and flooding rains: Inquiry into the impact of the Guide of the Murray-Darling Basin Plan*”. This inquiry was held in response to vigorous rural community opposition to the draft MDB Plan 2010. The findings of the House of Representatives study support the findings of this study on the matter of mistrust in government. In the House of Representatives study it was noted that the 2010 draft guide and consultation process “provoked despair” and reduced community trust.

5.3.4 ABSENCE OF ADEQUATE CONFLICT RESOLUTION RULES

Wolf (2007, 2012) observes that “water management by definition is conflict management”.⁴⁴⁶ In approaching this study it was evident that serious gaps in conflict resolution provisions of the *Water Act 2007* existed. Conflict resolution provisions were not placed at the heart of the *Water Act, 2007*. Instead the *Water Act 2007* only included time specific consultation process clauses attached to developing the Basin Plan and vague compensation clauses.⁴⁴⁷ As an alternative dispute resolution mechanism, the consultation processes are weak as they are time specific and without an integrated rule framework to guide negotiations on ongoing basis. References in the Act to judicial enforcement are primarily applicable to environmental flows. Minor attention is paid to the inadequate compensation clauses.⁴⁴⁸ No conflict resolution mechanisms exist to manage ongoing conflict. At the policy making level for MDB environmental management, rules are lacking to protect against the harms measured as rural economic decline due to the absence of a transition economic strategy, inadequate information sharing, and lack of institutional capacity. While section 3 (c) of the *Water Act 2007* required the optimization of environmental, social and economic outcomes, the remainder of the Act provides no coherent framework for balancing these competing interests. In this context the *Water Act 2007* would have been more robust if it had addressed economic and social outcomes, alongside environmental outcomes through conflict resolution rules.⁴⁴⁹

Conflicts can arise at two levels, and heighten in times of scarcity. The first level of conflict occurs at the daily operational level in a region where there are heterogeneous users, for example, irrigators, miners, indigenous users, and government environmental

⁴⁴⁶ Aaron T Wolf, *Shared Waters: Conflict and Cooperation*, (2007) 32, *Annual Review of Environmental Resources*, 3.1-3.29 at 3.5; Aaron T Wolf, *Spiritual understandings of conflict and transformation and their contribution to water dialogue*, (2012) 14 *Water Policy*, 73-88.

⁴⁴⁷ Ss 41-51 *Water Act 2007*: Consultation provisions.

⁴⁴⁸ S 77 and s 83 *Water Act 2007*: compensation provisions.

⁴⁴⁹ Article 7, United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, 1997.

managers. The second level of conflict occurs at the State to State or Federal to State level.

Conflict Resolution at the Daily operational management level

Ostrom (1990) has demonstrated that heterogeneous users can resolve “resource dilemmas” through correct institutional solutions.⁴⁵⁰ Ostrom (1990) argues that the operational rules should be set by the parties through mutual agreement, creating a forum where diverse users can voice concerns and negotiate without resorting to litigation. This will be particularly important in times of water scarcity. In this context Ostrom’s eight design principles are important, which can be equally applied to the interaction between private irrigators’ rights and the government officials managing the environmental water on a daily basis.⁴⁵¹

The eight principles for long enduring common-pool resources articulated by Ostrom (1990) are as follows: (i) clearly defined boundaries with regards to rights to withdraw the resource, (ii) appropriation rules should reflect local conditions; (iii) the ability of participants to modify operational rules; (iv) active monitoring of appropriation with accountability mechanisms; (v) sanctions which increase with the seriousness of the offense; (vi) low cost, rapid access conflict resolution mechanisms; (vii) appropriators rights to organize are not diminished by government intervention; and (viii) establishment of rules at multiple layers of governance.

Dagan and Heller (2001) criticized the absence of right of exit in Ostrom’s model, which prevents trading of property rights outside the group. The authors advocate the “liberal commons” management model which permits the right of exit as a fundamental value of liberalism. Dagan and Heller (2001) observe that exit can be used as a defensive mechanism where harm is caused to a party. The authors further argue that the right of exit promotes cooperative action directed at preventing exit occurring.

⁴⁵⁰ Elinor Ostrom (1990) *Supra* note 406 cited in Hanoch Dagan and Michael Heller, Liberal Commons, (2001) 110 The Yale Law Journal, 549-623.

⁴⁵¹ Elinor Ostrom, (1990) *Ibid* at 90.

A joint cooperative organization such as a liberal commons is required for daily operational management and to address ongoing conflicts and build trust in a region. The survey data in this dissertation demonstrated that on a daily basis irrigators were concerned about metering, monitoring and allocations. On broader issues such as climate change and general environmental policy irrigators' responses indicated a need for regular dialogue and information flows to secure participation. It is argued that common management creates "interpersonal capital" which emanates from a structure which builds "cooperation, support, trust and mutual responsibility".⁴⁵² Rose (2000) observes that customary practices emerge from interactions aimed at resolving the interpersonal conflicts which arise at the daily operational level.⁴⁵³ As a conflict resolution management framework, a joint cooperative organization, seeks to address the key concerns regarding mistrust in government identified earlier in this chapter. Absence of conflict resolution mechanisms of this nature is a substantial gap in the *Water Act 2007*. This form of flexible management is possible through regional water resource plan rules embedded in State water plans. The joint management structure suitable for the Murray-Darling Basin would be similar to the liberal commons model articulated by Dagan and Heller (2001) discussed in Chapter Five. With reference to Ostrom's eight design principles for long enduring common pool resources, irrigators identified the key ingredient missing in the MDB to be the absence of "low cost, rapid access conflict resolution mechanisms" which would function at the daily operational level and for disputes between States and the Federal government.

Conflict resolution at the State – Federal Management level

At the state to state and Federal to state level in the MDB, the competing environmental, economic and social interests require a different set of conflict resolution rules. The "no significant harm rule" bound to the "reasonable and equitable utilization

⁴⁵² Hanoch Dagan and Michael Heller (2001) *Supra* note 449 at 537.

⁴⁵³ Carol Rose, *Left Brain, Right Brain and History in the New Law and Economics of Property*, *Yale Law School Scholarship Series*, (2000) 1801.

rule”, read together form the foundation of customary international water law.⁴⁵⁴ The rules, reviewed in Chapter Two, are derived from Western United States water law, and remain customary international water law.⁴⁵⁵ Moreover, Spiegel (2005) and Kliot et al (2001) observed that the no significant harm rule and the equitable and reasonable utilization rule have been applied to the Nile Treaty of 1959, the 1944 Treaty between the US and Mexico relating to the waters of the Colorado and Tijuana Rivers and of the Rio Grande, the Treaty between Bangladesh and India on the sharing of the water at Farakka, 1996, the Treaty of Peace 1994 between Jordan and Israel, and the Danube Convention 1994.⁴⁵⁶ The list is not exhaustive. The two interrelated rules provide scope for addressing conflicts which require balancing of environmental, economic and social outcomes.⁴⁵⁷

The explanatory memorandum to the Water Amendment (Long Term Average Sustainable Diversion Limit Adjustment) Bill 2012 stated that “*it is envisaged that criteria to be specified in the Basin Plan will include that the mechanism must operate on a no-detriment basis.*” The adjustments would not then be able to weaken the social, economic and environmental outcomes inherent in the Basin Plan... Projects to enable

⁴⁵⁴ Article 7 and Article 5, United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, 1997.

⁴⁵⁵ “Customary international law is made up of rules that come from “a general practice accepted as law” and that exist independent of treaty law.”: Source ICRC.

⁴⁵⁶ Carolin Spiegel, International Water Law: The Contributions of Western United States Water law to the United Nations Convention on the Law of the Non-Navigable uses of International Water Courses, (2005) 15, *Duke Journal of Comparative and International Law*, 333-361 at 360; N. Kliot, D. Shmueli and U. Shamir, Institutions for management of transboundary water resources: their nature, characteristics and shortcomings, (2001) 3, *Water Policy*, 229-255.

⁴⁵⁷ Vinoli Thampapillai, Environmental and Human Rights to Water in the Murray-Darling Basin: The Federal Water Act 2007, The Water Amendment Act 2008 and Lessons from International Water and Trade Law, presented at the *Nordic Environmental Social Sciences Conference, Stockholm University, Stockholm Resilience Centre and Stockholm Environment Institute, Sweden, 14-16 June 2011* and *Canadian Law and Economics Conference, Faculty of Law, University of Toronto, Canada September 23-24, 2011*.

Vinoli Thampapillai., (2011), International Water Law for Transboundary Resource Management: Environmental and Human Rights, *Environmental Policy and Law*, 41 (3), 127-135.

improved environmental outcomes, must maintain or improve the socio-economic circumstances of Basin Communities compared with the Basin Plan.”⁴⁵⁸ However the Water Amendment (Long Term Average Sustainable Diversion Limit Adjustment) Act 2012, did not include a no-detriment rule when passed. There has been no development of the no-detriment rule in the MDB literature before or after the 2012 bill. Without development of the framework rule it is difficult to implement.

It is argued here that a set of coherent compensation rules and cost-benefit analysis rules could assist government decision makers to assess and distinguish what is “equitable and reasonable use” and what constitutes “significant harm” with regard to collective losses and gains. The international water law literature does not seek to extend the “no significant harm rule” to include specific compensation option rules or apply cost-benefit analysis rules. Hence, it was necessary to examine the Australian literature on compensation issues in the Murray-Darling Basin to build relevant rules which may be adapted. The American and Swedish literature on cost-benefit analysis in environmental and water law, in an advanced stage of legal development, were studied and compared to irrigators’ responses in this study.

5.3.4.1 COST-BENEFIT ANALYSIS RULES IN ENVIRONMENTAL DECISION MAKING

Refining and addressing deficiencies in the cost-benefit analysis rules

As observed in Chapter Two, cost-benefit analysis refers to the calculation and ranking of various policy alternatives with references to net benefits and costs (harms). In this dissertation it is recommended that cost-benefit analysis rules be built into a no-significant harm rule for water decisions in the Murray-Darling Basin as a guidance tool to manage disputes at the government to government level.

Ideally, cost-benefit analysis rules in water decision making seek to deliver distributive justice, in a manner which secures interactional and procedural justice. The leading critical American literature on cost-benefit analysis in environmental decision

⁴⁵⁸ Explanatory memorandum, *Water Amendment Act (Long Term Average Sustainable Diversion Limit Adjustment) Bill 2012*, House of Representatives, The Parliament of the Commonwealth of Australia.

making identifies concerns pertaining to inadequate valuation methods and adverse impacts of discounting on environmental regulation.⁴⁵⁹ Sen (2000) has critiqued the application of willingness to pay (WTP) assessments sought from individuals as flawed with regard to treating environmental goods as a private good. Knetsch (1994) noted that the manner in which WTP questions are constructed can reflect or create institutional bias and inconsistencies. This research confirms these concerns were consistent with concerns held by irrigators in the Murray-Darling Basin, who identified institutional bias and imprecise environmental valuations as key problems to be addressed. In addition to these central concerns identified in the literature, irrigators in the Murray-Darling Basin also highlighted concerns regarding government institutional capacity to undertake a valid cost-benefit analysis and expressed a general mistrust in government.

While a minority of irrigators interviewed in the Murray-Darling Basin were concerned that governments may import institutional biases into a cost benefit analysis, the majority supported cost-benefit analysis. MDB irrigators who supported cost-benefit analysis were focused on correcting cost-benefit analysis for institutional bias and valuation errors. As noted in Chapter Two Hsu (2005), Hsu and Loomis (2002) and Arrow et al.(1996) supported American practice in which review boards have been appointed to assess the accuracy of cost-benefit analyses in water decisions, since the time of Jimmy Carter's presidency (1977-1981).⁴⁶⁰ In correcting or minimizing institutional bias through procedural rules, a review mechanism would seek to achieve social justice, as defined by Sen (2009) and Rawls (1999) who emphasize the need to control vested interests and institutional bias, as articulated in Chapter One. In the MDB Federal government assessments may be biased toward the environment, while State

⁴⁵⁹ Lisa Heinzerling and Frank Ackerman, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, Georgetown Environmental Law and Policy Institute, Georgetown Law Centre, 2002; Sidney Shapiro and Christopher Schroeder, *Beyond Cost-Benefit Analysis: A Pragmatic Re-orientation*, (2008) 32(2), *Harvard Environmental Law Review, A Pragmatic Re-orientation*, 433-502.

⁴⁶⁰ Shi Ling Hsu, *On the Role of Cost-Benefit Analysis in Environmental Law*, (2005), 35(1) *Environmental Law*, 135-174; Shi Ling Hsu and John Loomis, *A Defense of Cost-Benefit Analysis for Natural Resource Policy*, (2002) 32, *Environmental Law Reporter*, 10239-10244, at 10240 and 10241; Arrow et al., *Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?*, (1996) 272 *Science* 221-222.

government assessments may be biased toward the rural economy as a general trend. In this context a requirement that the two government parties to a dispute present two separate cost-benefit analyses for independent review, would address concerns regarding the accuracy of valuations and institutional bias.

The European Union Water Framework Water Directive 2000 has recently embraced cost-benefit analysis rules. Chapter Two briefly reviewed the implementation of these cost-benefit analysis rules in Sweden, where water quality environmental flow issues are of concern. Article 5 (1) of the EU WFD 2000 requires “an economic analysis of water use”. In implementing the EU WFD 2000, the Swedish Environmental Code requires cost-benefit analysis of all “water undertakings”, which involves stakeholder participation by parties affected.⁴⁶¹ Kinell et al (2012) observe that stakeholder participation in cost-benefit analysis in Swedish law is a substantial requirement in practice. The majority of irrigators in the Murray-Darling Basin interviewed saw including the practice of cost-benefit analysis as the most important issue of all, and observed that the procedural rights embedded in cost-benefit analysis permitted greater participation and transparency. The expectation held by MDB irrigators that a cost-benefit analysis would be a participatory and transparent exercise, indicates the presence of a constituency for the advancement of a hybrid of the Swedish and American rule model in the Murray-Darling Basin. The concerns of the MDB irrigators in the area of valuation, can be used as a basis to further extend the Swedish and American legal rules and practice. Rules may specify the types of valuation methods to be included and construct the rule to acknowledge the difficulties in valuation, as a matter to be considered by decision makers and negotiators reviewing cost-benefit analyses.

⁴⁶¹ Ordinance on Water Quality Management (SFS2004:660); Gerda Kinell, Tore Soderqvist, Ragnar Elmgren, Jakob Walve and Frida Franzen, *Cost-Benefit Analysis in a Framework of Stakeholder Involvement and Integrated Coastal Zone Modeling*, CERE Working Paper, 2012:1; Vinoli Thampapillai, *Water Governance in Sweden*, Swedish University of Agricultural Sciences Working Paper Series, 2007:2.

Addressing Deficiencies in the No Significant Harm Rule through inclusion of cost-benefit analysis rules

The no-significant harm rule by definition requires a structure for decision makers to determine what amounts to “significant harm” and what can be considered to be “equitable and reasonable use”. It was observed in Chapter Two that Wolf (1999), Hilderling (2004), Rieu-Clarke (2009) criticized the no significant harm rule for its vagueness. The responses in this study provide evidence that irrigators in the Basin perceive that cost-benefit analysis rules are capable of delivering greater precision, thereby addressing this criticism. Cost-benefit analysis rules attempt to quantify in monetary terms the costs of the harm and the size of the benefits in this respect. Incorporating the cost-benefit analysis into the no significant harm rule would hold the potential to deeply bind the two predominant international water law rules expressed in Articles 5, 6 (Equitable and Reasonable Utilization) and 7 (No-Significant Harm) of the *UN Watercourses Convention 1997*, arguably lending a balance to upstream and downstream interests. The seven factors articulated in Article 6 (Reasonable and Equitable Utilization) of the *UN Watercourses Convention 1997* discussed in Chapter Two present a broad based starting point for cost-benefit analysis assessment. While agreement on clarification of the “no-significant harm” rule can be difficult at the international level, the qualitative responses obtained in this research indicate that irrigator cooperation on cost benefit analysis rules embedded a “no-significant harm” rule may be highly possible in the Murray-Darling Basin.

5.3.4.2 COMPENSATION RULES

The literature and judgments on compensation in the Murray-Darling Basin primarily concern disputes over government ground water acquisitions.⁴⁶² In contrast the research in this dissertation demonstrates the presence of an overriding concern held by irrigators about the prospect of acquisitions of surface and ground water entitlements at

⁴⁶² *Arnold & Ors v Minister Administering the Water Management Act 2000* [2010] HCA 3; *ICM Agriculture Pty Ltd v The Commonwealth* [2009] HCA 51; *Murrumbidgee Groundwater Preservation Association Inc v Minister for Natural Resources*, [2005] NSWCA 10.

the end of the term of current State water plans without compensation. The findings of this research imply that compensation rules in the *Water Act 2007* require clarification and revision to address this key concern of irrigators to build trust, cooperation and business confidence.

Irrigators' responses to questions on compensation

Under the constitution, States are not required to compensate for compulsory reductions, while Federal governments must pay compensation on just terms. As noted earlier after the Federal takeover of water law in the MDB, the Federal government may now be required to compensate for all end of term of State water plan compulsory reductions. However this ambiguous state creates uncertainty for farmers. The failure of the Federal and State governments to clarify this issue with irrigators built mistrust and uncertainty leading to demoralization. The demoralization effect translates to hesitance in further farm investments, social unrest and mental anguish. This was most evident in interviews through emotional reactions and responses. During qualitative interviews undertaken in this study, irrigators were very receptive to discussions of compensation options should they face compulsory reductions in the future.

As stated in Chapter Four, the proposed private compensation option rule model in this research included monetary compensation, relocation compensation, or a mix of both forms of compensation for every forced reduction in water entitlements. It is proposed that this rule would replace the vague risk sharing framework and language in the existing compensation provisions in the *Water Act 2007* as discussed in Chapter Two. The majority of irrigators interviewed, a total of 38 irrigators of 41, were willing and keen to discuss and participate in compensation options, with a preference for the flexibility of monetary compensation. Some irrigators were willing to consider relocation, observing the limitations of age and family ties to the region.

Irrigators also held concerns about government investment in social and economic infrastructure, particularly in the northern Australia. Irrigators indicated that their initial strategic position in the hypothetical situation of end of plan acquisitions, would be to resist SDL cuts and then negotiate compensation. Qualitative surveys, while not being amenable to rigorous statistical analysis have the advantage of being able to elicit

additional information through observance of expressions and tone of voice. This advantage was clearly present in the case of this question, with respect to hypothetical compulsory acquisition by State or Federal government. The emotional responses mirrored Michelman's findings on community responses to government measures which disadvantage society, leading to strong organized resistance to counter-act the government measure.

The resistance by irrigators to participation in the water buyback program was related to fear of rural economic contraction, as discussed in Part 1. This fear of collective loss gave rise to demoralization. The qualitative interview responses by irrigators in this study indicated compensation in the form of a transition economy strategy that provides off-farm income to address collective losses is necessary to address limits to the government water buyback program.⁴⁶³ The findings of this research support Michelman's (1967) assertion that compensation should not be limited to those who are directly impacted by a government acquisition which the courts can easily address.

Michelman's compensation rule framework is then highly relevant to the Murray-Darling Basin. Michelman advocated a de-emphasis on the reliance on courts in favour of political decision making to decide compensation arising from government action. The author argues that this is founded upon on a fairness test which he argues courts are unable to address. The author recommended an application of a three part fairness test, articulated in Chapter Two, to address the majority of losses, including indirect harms. In applying Michelman's compensation rules, the political sector is to account for (i) efficiency gains, (ii) demoralization costs and (iii) settlement costs, to make decisions which benefit the environment and preserve community welfare. The literature on the Murray-Darling Basin has not identified this compensation problem or addressed the importance of Michelman's concept of "demoralization costs".

⁴⁶³ Thampapillai V (2008), Limits to the Willingness to Sell to Government Water Buy-backs in the Murray-Darling Basin, *Canadian Law and Economics Conference, University of Toronto, Canada*, 26-27 September 2008; Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 2, *Environmental Policy and Law* 39 (6) , 317-322; Thampapillai V., (2009) Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 1, *Environmental Policy and Law* 39 (4-5), 247-265.

The reaction to the Guide to the Basin Plan 2010 demonstrated that a high degree of “demoralization” existed in response to the guide to MDB Plan. The House of Representatives Standing Committee on Regional Australia 2011 report entitled “*Of drought and flooding rains: Inquiry into the impact of the Guide of the Murray-Darling Basin Plan*”, subsequently documented demoralization in the irrigation community of the MDB. It is argued here that the construction of compensation rules with reference to Michelman’s demoralization concept will build trust between government and irrigators.

In response to this inquiry the MDBA and the government wound back the buyback program substantially. The resistance by New South Wales and Queensland governments during 2013 to the Federal MDB Basin implementation plan also reflects irrigators’ demoralization at the prospect of rural economic contraction without adequate attention to structural adjustment. As noted earlier in section 5.2.1 a cap on buybacks at 1500GL has been negotiated in February 2014.

In ground water acquisition cases without compensation, discussed in Chapter Two, the issue of justice as fairness was raised as a key concern. Gross’s (2011) research concerns and defines distributive, interactional and procedural justice as fairness for carry over water acquisitions and rural-urban water allocations in the Murray-Darling Basin.⁴⁶⁴ This dissertation extends the existing MDB literature beyond consideration on the fairness of these specific government decisions, to include a structure for potential future compensation rules, with reference to Michelman’s five part rule, articulated in Chapter Two (section 2.12.2).⁴⁶⁵

Collective losses in the MDB are being addressed, at least in one instance in February 2014. The Nimmie-Caira buyback and compensation for economic loss to three

⁴⁶⁴ Catherine Gross, Why Justice is Important, in Daniel Connell and Quentin Grafton, *Basin Futures: Water Reform in the MDB*, ANU Epress, 2011 at 149-152

⁴⁶⁵ As stated in Chapter Two: to determine compensation Michelman articulates five compensation rule statements. First, a government measure is to be rejected if both the settlement costs and the demoralization costs exceed efficiency gains. Second, if the government measure proceeds under the first circumstance, the lower of the settlement or demoralization costs must be paid in compensation. Third, compensation is to be paid whenever settlement costs are less than demoralization costs and efficiency gains. Fourth, if the settlement costs while lower than demoralization cost, exceed the efficiency gains, the government measure is regarded “improper regardless of whether compensation is paid. Fifth, compensation is only to be paid “where the demoralization costs exceed settlement costs”

councils, following an environmental buyback, sets a precedence for addressing collective losses through political decisions. In this scheme water bought from eleven farmers in the lower Murrumbidgee region for environmental purposes at a cost of \$180 million, will be accompanied by \$1.5 million each for three councils as compensation for lost revenues.⁴⁶⁶ The Federal and State governments have agreed that the Nimmie-Caira project will deliver substantial environmental benefits to “extensive wetlands and floodway ecosystems”.⁴⁶⁷

5.4 CONCLUSIONS

Market based water governance, expressed as water buybacks to reconfigure water rights to the environment from agriculture is limited by the endowment effect. The endowment effect is simultaneously linked to central concern for the rural economy and the free rider effect. These three concepts were articulated in detail in Chapter Two and analyzed with reference to the MDB in this chapter. The capping of environmental water buybacks at 1500GL of the 2750 to 3200GL target in February 2014 is evidence of the presence of limitations to the water buyback program, articulated through community pressure. Off farm income is often insignificant for irrigation farming families. In the absence of a sustainable transition economy strategy irrigators’ resistance to the water buyback program is significant in rural and regional areas. Rural communities have restricted avenues for mitigation of loss of income attached to the loss of irrigation water. Hence measures to counterbalance the erosion of economic welfare in the community are necessary to secure support for buybacks.

Securing water for the environment to address over-allocation is essential for building the ecosystem resilience necessary for sustainable long term economic growth and achievement of intergenerational equity. Hence reducing the current level of irrigated agriculture in the MDB is important. Chapter Six discusses the potential of information

⁴⁶⁶ Robb Harris, Irrigator Tick for NSW Stance on Murray-Darling Deal, Weekly Times Now, 3 March 2014; The Hon Mark Butler, Minister for the Environment, Heritage and Water and The Hon Katrina Hodgkinson, Minister for Primary Industries, Minister for Small Business, NSW Government *Nimmie-Caira Project Approved*, 4 July 2013.

⁴⁶⁷ Butler et. al (2013) *Ibid*.

communication technology (ICT) and creation of digital economies as a possible transition strategy for rural areas. The digital divide between the rural and urban sectors remains wide, and will need to be addressed with reference to (i) infrastructure, (ii) technology and (iii) technical skill enhancement, to facilitate ICT development. Such economic transitions require one to two decades to complete. A sustainable economic transition would enable expansion of a water buyback program in the future, as the impact of the endowment effect will be reduced by the presence of off-farm income sources. In light of recurring drought periods in the era of climate change, and the time taken to effect a sustainable economic transition, conflicts between environmental and agricultural water users can escalate.

The second half of this chapter considered the absence of necessary institutional linkages, and institutional capacity to build trust and cooperation to overcome conflict. This is central to facilitating a sustainable economic transition. Chapter Six considers the necessary institutional linkage rules and conflict resolution rules necessary for the creation of trust underpinning cooperation to secure environmental flows and balance water use for agriculture.

CHAPTER SIX

COMPREHENSIVE INSTITUTIONAL REFORM

6.1 INTRODUCTION

This dissertation proposes two major sets of reforms for water governance in the Murray-Darling Basin. The first concerns institutional linkage rules for rural transition economy strategies. These rules hold the potential to alleviate limitations of the government environmental buyback program attached to irrigators' concern for the rural economy. The second set of institutional reforms pertains to conflict resolution through negotiation intended to operate at two levels. The first level pertains to Federal-State and inter-state conflict. The second level pertains to intra-regional daily operational conflict. Institutional reforms addressing Federal – State and interstate conflict negotiations concern a body of 'no significant harm' rules derived from international customary law. In this dissertation the "no significant harm" rules are expanded and adapted for the circumstances of the Murray-Darling Basin with reference to compensation rules and cost-benefit analysis rules. The second set of institutional reforms regarding negotiation for conflict resolution is intended to be effected at the regional level to manage daily operations with respect to water allocations. The liberal commons model articulated in Chapter Two, incorporating Elinor Ostrom's eight rule framework is recommended to address concerns raised by irrigators and all water users.⁴⁶⁸ These rules should be given effect under State water resource operation rules constructed in accordance with the MDB Plan.

The aim of the whole reform model is to secure cooperative negotiation between irrigators and government, and Federal and State governments, to address over-allocation and restore the health of the river system. The reform model also suggests that insights provided by the New Institutional Economics should operate alongside neo-classical economics in developing public policy in water for sustainable development in the MDB.

⁴⁶⁸ Elinor Ostrom, *Governing the Commons. The Evolution of Institutions for Collective Action*, Cambridge University Press, 1990; Hanoeh Dagan and Michael Heller, *The Liberal Commons*, (2001) *Yale Law Journal*, 110:549.

This research argues that unless sustainable transition economic strategies are instituted in the MDB, recovering and managing water for environmental flows will remain a contentious issue. This is particularly so in light of repeated drought shocks in the era of climate change.

Reform Proposal One

Institutional linkage rules connecting the MDBA to relevant government departments are proposed as a reform solution, with a focus on the role of Information and Communications Technologies (ICT) in assisting transitioning rural economies to digital economies.

Reform Proposal Two

The second reform proposal presents a body of conflict resolution rules expanding the liberal commons model and the no significant harm rule.

Reform Proposal Three

The final reform proposal concerns the importance of including new institutional economic analysis alongside neo-classical economic approaches to water governance in the MDB.

6.2 CHAPTER OVERVIEW

This chapter is divided into three sections in accordance with the three major legislative and policy reform proposals. The next section discusses institutional linkage rule reform in the *Water Act 2007* for sustainable economic transitions, required to secure water for ecosystem resilience. The following section considers the advancement of the no-significant harm rule in the *Water Act 2007* and a daily operation liberal commons rule framework in regional resource operation plan laws to mitigate and resolve conflict. The final section considers the importance new institutional economics in the development of water policy.

ENVIRONMENTAL AND HUMAN RIGHTS TO WATER REVISITED

6.3 IRRIGATORS' ONGOING RESISTANCE TO THE WATER BUYBACK PROGRAM

The section briefly discusses the ongoing resistance to the water buyback program at 2013.⁴⁶⁹ The Murray-Darling Basin Plan annual environmental water target recovery is 2750 GL to 3200 GL for the achievement of sustainable development of the river system. At September 2013 a total of 1600 GL had been recovered. Of this total, 1116 GL had been secured through government water buybacks from willing sellers in the MDB. In September 2013, the Commonwealth Environmental Water Holder (CEWH) stated to a Senate Estimate Committee that 343 GL of the 1600 GL acquired has been sourced from water savings achieved through on-farm infrastructure improvements.⁴⁷⁰

On farm infrastructure improvements do not reduce water consumption by irrigators, but add to the volume of water available for the environment by reducing water leakages. It has been agreed between government and irrigators that half of all water saved through on-farm infrastructure improvements will be delivered to the environment. Several prominent economists, Grafton, Wittwer, Quiggin, and Crase observed that this method of water recovery was uneconomical, at approximately four times the cost of water buybacks.⁴⁷¹

As observed in Chapter Five, concern for the rural economy linked to the endowment effect and concurrently the free rider effect, has created strong resistance from the irrigated agricultural community to the water buyback program. In 2012, a group of 500 irrigators from Victoria, New South Wales and South Australia launched a constitutional challenge to the laws establishing the MDBA in the High Court. The High

⁴⁶⁹ National Farmers Federation, *Environmental Water Recovery Strategy for the Murray-Darling Basin*, Submission to the Water Recovery Team, Department of Sustainability, Environment, Water Population and Communities, 28 28 February 2013.

⁴⁷⁰ Anna Vidot, Commonwealth MDB Water entitlements worth \$2b, ABC Rural, 29 September 2013.

⁴⁷¹ Cited in Lauren Wilson, Libs to put a lid on water buybacks, the Australian, 10 October 2013; Clint Jasper, Water Buybacks better for taxpayers, ABC Rural, 26 June 2013; John Quiggin, Giving Up on the Murray-Darling Basin, <http://john.quiggin/2011/06/03/giving-up-on-the-murray-darling-basin/>; Lin Crase, Resisting the Murray-Darling Basin Plan – in whose interest?, The Conversation, 14 August 2013.

Court did not agree to hear the case, which was subsequently referred to the Federal Court.⁴⁷² Irrigators continued to lobby politicians against water buybacks. In July 2012 NSW farmers' representatives requested that the NSW Minister for Primary Industries formally withdraw from the MDB Ministerial council, if their changes to the draft Basin Plan were not accepted.⁴⁷³ The Minister agreed that she would "not accept a plan that is not in the best interests of our community", later citing concern over "massive buybacks by the Commonwealth in regional communities".⁴⁷⁴ The media reported that in Queensland the Premier, Campbell Newman, had communicated concern to the Prime Minister in June 2013, that rural communities would face serious adverse consequences arising from the Basin Plan.⁴⁷⁵

Yielding to the pressure from the rural communities, in November 2012 the former Federal Minister for Water, the Hon Tony Burke had announced the intention to reduce environmental buybacks.⁴⁷⁶ However Federal Water department officials stated that a further 280 GL was to be recovered via buybacks, to achieve the 2750 GL recovery target, involving 200 GL recovery from the southern basin and 80 GL from the northern basin. Following a change in government, the new Coalition government also announced in September 2013 that the water buyback program would be cut by \$650 million. During 2013 Queensland and New South Wales refused to sign the Intergovernmental agreement for the implementation of the MDB Plan. This agreement seeks full implementation of the MDB Plan by 2019. Inadequate funding for structural adjustment measures for adversely affected rural economies was the key reason stated for the objection. New South Wales also placed a 3 percent annual limit on water buybacks for a decade commencing January 2013.

⁴⁷² Elizabeth Byrne, High Court rejects irrigators' constitutional challenge, ABC News, 29 November 2012.

⁴⁷³ Julian Luke, Farmers vote Minister out of Basin Council, *The Land*, 27, July 2012.

⁴⁷⁴ *Ibid.*; Stephanie Smail, Standoff continues over the Murray-Darling Plan, ABC News, 24 June 2013.

⁴⁷⁵ *Ibid.*

⁴⁷⁶ Colin Bettles, Limit MDBA buybacks, says Burke, *The Land*, 7 November 2012.

As a consequence of irrigation community pressure and representative State government pressure against the water buyback program, movement of water from agricultural uses to the environment via buybacks is constrained. The inability of the Federal government to overcome State government restrictions on the use of the water market to reconfigure water to the environment is in effect a tragedy of the anticommons. That is, the exercise of multiple exclusion rights by State governments, leads to the under-use of water resources for environmental purposes. This phenomenon affecting general trade between economic users in water markets is not without precedent. A similar tragedy of the anticommons in western United States water markets is articulated by Bretsen and Hill (2009) and is implied in the work of Libecap (2006).⁴⁷⁷ Securing water for the environment requires cooperation from all stakeholders. In a presentation to the United Nations in May 2013, Chair of the MDBA, Mr Craig Knowles acknowledged that "science and evidence are critical, but without community support, they are not enough".⁴⁷⁸

The findings presented in the published qualitative analysis (2008-09) articulated in Chapters Four and Five,⁴⁷⁹ observing that the majority of irrigators wish to remain in irrigated agriculture, are consistent with the events to 2013 articulated above and are supported by several subsequent government reports. The Australian Consumer and Competition Commission (ACCC) data for 2011-2012 released in 2013, states that fewer farmers are leaving irrigation.⁴⁸⁰ Survey data collected by ABARE between 2006-07 and

⁴⁷⁷ Stephen Bretsen and Peter J. Hill, *Water Markets as a Tragedy of the Anticommons*, (2009) 33(3), *William and Mary Environmental Law and Policy Review*, 723; Gary Libecap, *Transaction costs, Property Rights and Tools of the New Institutional Economics: Water Rights and Water Markets*, Working Paper, University of Arizona, Tucson, 2006.

⁴⁷⁸ Mr Craig Knowles, Basin Plan put forward at United Nations, MDBA media release, 16 May 2013.

⁴⁷⁹ Thampapillai V (2008), *Limits to the Willingness to Sell to Government Water Buy-backs in the Murray-Darling Basin*, *Canadian Law and Economics Conference, University of Toronto, Canada*, 26-27 September 2008. Thampapillai V., (2009) *Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 2*, *Environmental Policy and Law* 39 (6) , 317-322; Thampapillai V., (2009) *Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 1*, *Environmental Policy and Law* 39 (4-5), 247-265.

⁴⁸⁰ ACCC, *Water Monitoring Report 2011-12*, 3 April 2013.

2010-11, revealed that the majority of farmers were not planning to exit irrigated agriculture.⁴⁸¹ Consistent with the findings of this study, in February 2013 the National Farmers Federation (NFF) issued the following statement to the Federal Department of the Environment:⁴⁸²

“The NFF has long called for the government to design and make public an exit strategy for the Australian Government exiting from the purchase of water. This is critically required to ensure that the broader water market is informed in a transparent way in relation to the activities of the largest permanent entitlement market player in recent times. To do otherwise invites significant detrimental impacts to the water market and lending arrangements using water as collateral”.

As noted in Chapter Five, after intensive negotiations in February 2014, Queensland and New South Wales agreed to sign the MDB Plan Implementation Agreement on the basis that a 1500 GL cap be placed on water buybacks in law.⁴⁸³

Australia is highly urbanized, with 69 percent of the population located in urban areas. Regional areas are sparsely populated (29 percent of the population) where the corresponding availability of services is less and opportunity for off-farm employment is limited. In this context irrigators in the MDB remain in irrigation agribusiness because the transaction costs of diversifying or moving entirely to off-farm employment are greater than the opportunity cost of remaining in irrigated agricultural production. The resistance to moving away from irrigated agriculture is a consequence of concern for the future of the rural economy tied to endowment effect and the free rider effect, reflecting high transaction costs. A key method of reducing these transaction costs is the implementation of sustainable rural economic transition strategies. The following section discusses institutional linkages for sustainable rural economic transition and prospects for

⁴⁸¹ Dale Ashton, Haydn Valle and Mark Oliver, *An Economic Survey of Irrigation farms in the Murray-Darling Basin: Industry Overview and Region Profile, 2010-11*, ABARE, 2012.

⁴⁸² National Farmers Federation, *Environmental Water Recovery Strategy for the Murray-Darling Basin*, Submission to the Federal Department of the Environment, 28 February 2013.

⁴⁸⁴ Parliament of Victoria, Rural and Regional Committee, *Final Report: Inquiry into the Opportunities for People to Use Telecommuting and E-Business to Work Remotely in Rural and Regional Victoria*, State of Victoria, February 2014.

transition to a knowledge based economy through information and communication technologies (ICT).

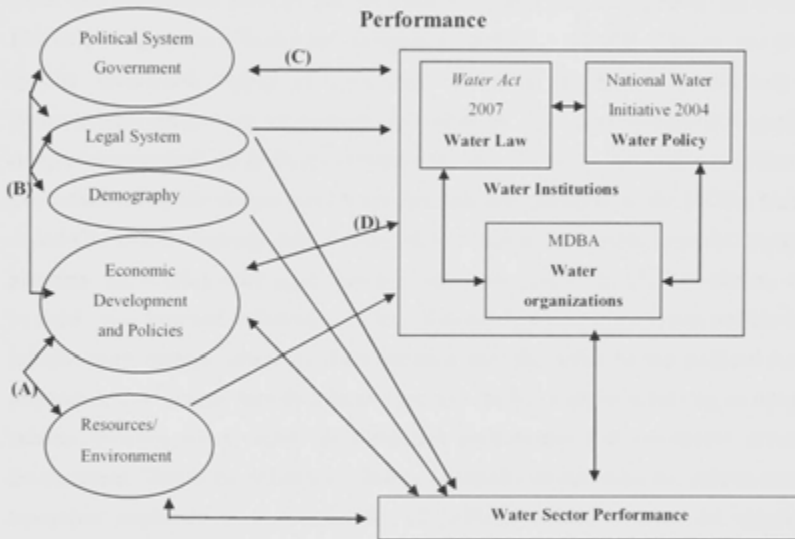
REFERENCES

- Figure 1: Model of the knowledge economy
-
- The diagram consists of three interconnected boxes. On the left, a box labeled 'ICT' has an arrow pointing to a central box labeled 'Knowledge Economy'. From the 'Knowledge Economy' box, an arrow points to a box on the right labeled 'Economic Growth'. There is also a feedback loop arrow from 'Economic Growth' back to 'ICT'.
- Figure 2: Model of the knowledge economy
-
- The diagram consists of three interconnected boxes. On the left, a box labeled 'ICT' has an arrow pointing to a central box labeled 'Knowledge Economy'. From the 'Knowledge Economy' box, an arrow points to a box on the right labeled 'Economic Growth'. There is also a feedback loop arrow from 'Economic Growth' back to 'ICT'.

**REFORM MODEL PART I:
INSTITUTIONAL LINKAGES FOR BALANCING ENVIRONMENTAL,
SOCIAL AND ECONOMIC RIGHTS IN THE MDB**

6.4 INSTITUTIONAL LINKAGES

Figure 6.1: MDB Water institutional environment, Institutions and Water Sector



Source: adapted from Saleth and Dinar, (2005)

Water law guiding the MDB is primarily the Water Act 2007 and subsequent amendment Acts. This law is based on water policy articulated in the National Water Initiative 2004 (NWI) agreed upon by Federal and State governments. The NWI requires over-allocation of water entitlements be reduced to restore ecosystem resilience in the MDB river system. The central water organization charged with the responsibility for setting sustainable diversion limits (SDLs) is the MDBA. This agency was severely criticized by rural

communities and State governments when it initially set the SDL target at 3000-7000GL per annum in 2010.

As observed in Chapter Five, from the time of the introduction 1994 Cap and Trade system, to the 2004 NWI, to the 2007 Water Act 2007, the government repeatedly missed the need for an inclusion of a coherent sustainable economic transition strategy. Yielding to rural community and political pressure the MDBA and the Federal Minister agreed to set the SDL surface water target at 2750 to 3200 GL per annum in November 2012. The permissible level of ground water extraction was concurrently increased by 1700GL, bringing the effective net reduction to 1050GL – 2800GL. This caused dissent by the Wentworth Group of Concerned Scientists in 2012 who believed that environmental needs were not properly accounted for. As a consequence of the political compromise reached, the leading environmental advisory group, the Wentworth Group of Concerned Scientists walked away from their advisory positions to the MDBA (Arrows A and C).. Due to ongoing lack of attention to coherent sustainable economic transition planning, the MDBA once again had to compromise when the 1500GL cap on water buybacks was imposed in February 2014, in favour of more costly and less reliable water infrastructure savings measures. This decision met the needs of the political system responding to concerns regarding rural economic decline without achieving an adequate balance between water sector environmental performance and sustainable economic development. That is the MDBA has had to repeatedly compromise the enhancement of ecosystem resilience as a consequence of political failure to focus on sustainable economic transitions. Figure 6.1 articulates the relationship between water institutions, the institutional environment and water sector performance in the MDB.

Section 3 (c) of the *Water Act 2007* requires the MDBA to “*promote the use and management of the Basin water resources in a way that optimizes economic, social and environmental outcomes.*” However the *Water Act 2007* does not guide the MDBA as to how the balance will be achieved. In establishing the SDLs, it should be recognized that if the socio-economic foundations of the rural community are concurrently harmed, the political system representing rural constituents will override ecosystem resilience measures. The *Water Act 2007* was mainly enacted to give voice to environmental concerns. However the *Water Act 2007* has failed to articulate the nature of the course of

action the MDBA needs to pursue in the event that ecosystem resilience is compromised by socio-economic concerns.

An ICT transition is a possible sustainable economic transition strategy for the MDB. In this context the MDBA will need to communicate through the Federal Minister for Water, the need to prioritize the current national digital economy strategy to operate alongside the MDB plan. This is will require institutional linkages to facilitate inter-connections between the two policies in the MDB, and holds the potential to enhance ecosystem resilience by providing off-farm income for the MDB community. At present the first city in the MDB to acquire broadband coverage is the university town of New England, Armidale. While ICT is being used to develop smart farming, the community has not developed a significant E-business sector, involving skills development. This requires education, training and scoping for E-business, involving public-private participation.⁴⁸⁴ E-business in the MDB should extend to non-agricultural businesses. Prioritization of digital economy strategy by government as a sustainable economic transition strategy, will depend on the level of prioritization afforded to ecosystem resilience. This requires the MDBA to be a stronger influential force on the political sector with regard to the links between sustainable economic transitions and ecosystem resilience (arrow D, Figure 6.1).

The availability of ICT education and training opportunities in regional centres, may attract the younger generation within irrigated farming families, wishing to diversify business interests. There will be a lag time between delivery of ICT infrastructure, education and training and business development. ICT business development internationally, in both developed and developing countries has usually occurred within the framework of Federal government investment and tertiary organizational involvement in the creation of technology parks. In the context of rural MDB, several regional universities exist to facilitate ICT economic development. Examining how developed and

⁴⁸⁴ Parliament of Victoria, Rural and Regional Committee, *Final Report: Inquiry into the Opportunities for People to Use Telecommuting and E-Business to Work Remotely in Rural and Regional Victoria*, State of Victoria, February 2014.

developing countries have delivered ICT business development to rural and equivalent areas, and implications for the MDB is a key area for future research.

6.5 INSTITUTIONAL LINKAGE REFORM FOR TRANSITION ECONOMY STRATEGIES

The documentary evidence presented in this thesis supports the qualitative analysis conclusion and NIE theory which requires that the MDBA needs to be more institutionally sensitive to the economic development of rural communities in order to improve water sector performance. Institutional linkages build institutional sensitivity. Institutional linkages are necessary to facilitate water sector performance in a manner which balances social, economic and environmental outcomes as required by section 3 of the *Water Act 2007*. As stated in Chapter Two, institutional linkages include long and short term agreements which may be both formal and informal between organizations, and rules within and outside organizations. Institutional linkages create networks of coordinated decision making, delivering institutional capacity and building trust between organizations. As discussed in Chapter Five new institutional linkage rules between the Murray-Darling Basin Authority, the Federal Water Minister and relevant government departments are essential for the creation and implementation of a transition economy strategy which would operate alongside the MDB plan. As argued in Chapter Five this is a significant omission in the *Water Act 2007*. The relevant government departments for rural economic transition strategies include the Department of Treasury, the Department of Finance, the Department of Prime Minister and Cabinet, the Department of Communication, the Department of Infrastructure and Regional Development, AUSTRADE, the Department of Employment and the Department of Education and Training.

The MDBA will not be charged with the responsibility of developing a transition economy strategy due to absence of institutional capacity. The duty of the MDBA acting through the Federal Water Minister, should therefore be to inform the relevant linked departments housing the necessary institutional capacity responsible for transition

economy strategies, which regions are susceptible to economic decline as a consequence of targeting by environmental water policy.

That is within this rule model the Federal Water Minister is required to put forward to the Department of Prime Minister and Cabinet the necessary linkages between environmental policy and economic transition strategies, where ICT is a key option, given lack of competitiveness in the manufacturing sector due to competition from India and China. The Department of Prime Minister and Cabinet and relevant economic government agencies have primary responsibility for developing sustainable economic transition strategies.

These institutional linkage rules inserted into the *Water Act 2007* could be constructed as follows:

(1) It is acknowledged that the movement of water from private uses in the MDB, primarily irrigated agriculture, to environmental flows causes harm to rural economies.

(2) In this context it is the duty of the MDBA and the Federal Water Minister to inform the relevant government departments listed in (2)(a) of vulnerable regions targeted for environmental flow delivery and formally request the preparation of a rural economic transition strategy:

(a) The relevant government departments for the preparation of a transition economic strategy are: the Prime Minister and Cabinet, Department of Treasury, the Department of Finance, the Department of Communication, the Department of Infrastructure and Regional Development, AUSTRADE, the Department of Employment and the Department of Education and Training.

(b) The Federal government is not precluded from including other Federal and State government departments in the preparation of transition economy strategies required under s 3 (a), (b) and (c).

(3) The government departments listed in 2(a) are responsible for the articulation and assessment of:

- (a) transition economic investment strategies for regional economies,
- (b) transition payments and compensation schemes,
- (c) transition education and training.

(4) Rural economic strategies are to be presented alongside the final Basin Plan and reviews of the Basin Plan

(5) The progress of rural economic strategies is to be reviewed every 5 years, and assessment of success with reference to rural economic growth is to be made every 10 years.

(6) Federal and State governments cannot be sued for the failure of a transition strategy, but remain liable for harm caused due to failure to develop and institute a transition strategy where environmental flow policy leads to economic contraction.

These institutional linkage rules articulated above and subsequent transition programs discussed in the next section may be a significant means of building trust between the government and the community. To prevent misuse and inefficient use of public funds, the institutional linkages would require Treasury to issue a public report on the transition strategies to operate alongside the Basin Plan. This would need to be achieved at the time of review of the Basin Plan.

The institutional linkages must also further require the Federal Water Minister to demonstrate that recommendations of the Treasury report are addressed alongside the Basin Plan and review of the Basin Plan. Where disagreements arise the institutional linkage rules should require the Federal Water Minister to prepare a statement of response justifying departures from the recommendations made by Treasury.

Reform Proposal 1

Institutional linkage rules for sustainable transition economic strategy to be linked to water policy, within the Water Act 2007

REFORM MODEL -PART 2: CONFLICT RESOLUTION RULES

6.6 NO SIGNIFICANT HARM RULE AND DAILY OPERATIONAL RULES

State–Federal conflict in the MDB was ongoing at 2013. The intergovernmental agreement on MDB implementation received final signature from New South Wales and Queensland in February 2014, following signature by South Australia and Victoria in the preceding year. New South Wales has cut annual funding to the MDBA from \$32 million to \$12 million in 2011-12, and undertook a further annual cut of \$8.9 million for 2012-13. This amounts to a 70 percent cut in funding. South Australia has also indicated that it will reduce funding to the MDB by half in 2014, by \$14.3 million.⁴⁸⁵ MDBA has stated that the reduced finance will lead to the deterioration of environmental assets, adversely impacting water quality monitoring and management. State governments have agreed to end the native fish strategy which monitors the levels of native fish as an indicator of ecological function, and also the river health audit program.⁴⁸⁶ The Victorian Water Minister, Mr Peter Walsh stated that he is “*disappointed that the Murray-Darling Basin Authority has not worked more closely with basin states....At this stage the authority is still thinking they’re going to it in their own right, they don’t have the resources, they don’t have the networks on the ground to be able to do that*”.⁴⁸⁷ These developments indicate the presence of foundations for ongoing conflict which exist in the irrigation community influencing State government action. Conflict over the economic and social harms caused by environmental policy to address environmental harms is at the heart of the discord in the MDB.

The absence of concrete conflict resolutions rules in the *Water Act* 2007 was discussed in Chapter Two and analyzed in Chapter Five. This section proposes two sets of conflict resolution rules to operate at two different levels of water governance. The first set of conflict resolution rules addresses Federal-State and interstate conflict within

⁴⁸⁵ Tom Arup, State funding cuts to slash Murray-Darling work, *The Canberra Times*, 27 February 2013.

⁴⁸⁶ MDBC, *Native Fish Strategy for the Murray-Darling Basin, 2003-2013*, May 2003.

⁴⁸⁷ Cited in ABC News, *Victoria urges better cooperation between Murray-Darling Basin states*, 22 November 2013.

the framework of a modified “no-significant harm rule”, were expanded to include cost-benefit analysis rules and compensation rules. The literature on the no-significant harm rule was discussed in detail in Chapter Two. To date the no significant harm rule has not been expanded to develop advanced mechanisms for cost-benefit analysis for determining significant harm or compensation rules for mitigating harm. Hence Chapter Two also explored the separate literature in this area. The rule model presented below is built against the background provided in Chapter Two and the analysis of the data presented in Chapter Five on the two proposed extensions to the no-significant harm rule.

The second set of conflict resolution mechanisms are intended to operate at the regional level as self governing institutions for users with limited government intervention. This model is based on the liberal commons model, incorporating Elinor Ostrom’s eight rule framework for long enduring common pool resource institutions articulated in Chapters Two and Five.

6.6.1 NO SIGNIFICANT HARM RULE FOR THE MURRAY-DARLING BASIN: ADDRESSING TWO KEY CONCERNS

Correcting environmental harms in the form of environmental degradation, through reallocating property in water to the environment to build ecosystem resilience is the primary focus of the *Water Act 2007*. As noted above the conflict in the Murray-Darling Basin has arisen primarily because addressing environmental harms leads to socio-economic harm to the irrigation community due to contraction of water for irrigation. As harm is the central focus of the conflict, the “no significant harm” rule derived from the *UN Convention on the Non-navigational uses of international watercourses, 1997* is a very appropriate starting point for instituting legal reform in the Murray-Darling Basin. The key rules in the *UN Convention on non-navigational uses of international watercourses, 1997*, Article 7 (no significant harm rule) and Article 5 and 6 (Reasonable and Equitable use rule) were articulated and discussed in detail in Chapter Two. A body of rules which determine which environmental, social and economic harms are significant and require prevention or mitigation of harm is crucial for resolving conflict in the MDB. Chapter Five argued that this was a substantial omission in the *Water Act 2007*. Berkowitz, Pistor and Richard (2003) demonstrated via empirical

research that acceptability of rules in the community and demand for a particular law leads to greater implementation and enforcement.⁴⁸⁸ Chapters Four and Five demonstrated that irrigators accepted in the majority the use cost-benefit analysis rules and compensation rules to address social and economic harms suffered when environmental flow policy is imposed on rural communities. Before proceeding to articulate the detail of these proposed extensions to the no-significant harm rule it is necessary to refine the existing definition of significant harm.

The no-significant harm rule as it is currently constructed in international water law, detailed in Chapter Two, holds two key problems which must be addressed in rule construction. Namely imprecision and resolving the debate over which of Article 5 or 7 is the dominant legal principle. These difficulties were articulated in Chapter Two and are reiterated below.

Imprecision of the rule

The original construction of the no-significant harm rule in the text of the *UN Convention on non-navigational uses of international watercourses*, 1997 asks decision makers to refer to the broad categories listed in Articles 5 and 6 to distinguish significant harm from reasonable and equitable utilization. These broad categories were listed in Chapter Two. In this context the rule has received criticism for its vagueness and lack of practical guidelines.⁴⁸⁹ Specifically Rieu-Clarke (2009) observed that the terms of Article 7 (the no significant harm rule) were too imprecise to determine the level of harm

⁴⁸⁸ Daniel Berkowitz, Katharina Pistor and Jean Francois Richard, The Transplant Effect, (2003) 51, *the American Journal of Comparative Law*, 163-206 at 188.

⁴⁸⁹ Antoinette Hildering, *International Law, Sustainable Development and Water Management*, Eburon Publishers, 2004; Aaron T. Wolf, Criteria for Equitable Allocations: The Heart of International Water Conflict, (1999) 23, *Natural Resources Forum*, 3-30; see also Aaron T. Wolf, Conflict and Cooperation Along International Waterways, (1998) 1(2) *Water Policy*, 251-265; Stephen C. McCaffrey, The Contribution of the UN Convention on the Law of Non-navigational uses of International Watercourses, *Int. J. Global Environmental Issues*, Vol 1., Nos 3/4, (2001) 250-263.

required to trigger legal intervention.⁴⁹⁰ As noted in Chapter Two, in practice the absence of concrete minimum standards in the existing “no significant harm” rule, meant that the ICJ ignored the rule in the *Gabcikovo-Nagymaros* case between Hungary and Slovakia, although Hungary sought to build an argument around this rule.⁴⁹¹ The court instead looked to Articles 5 and 6 to assess whether the activity was reasonable and equitable against the factors articulated. Due to the vague construction of the words in the rules, the ICJ was only able to recommend that the parties cooperate under the terms of the treaty, to account for environmental harms.⁴⁹² This case was submitted to the ICJ in 1993, decided in 1997 and negotiations were ongoing in 2006. A second example in practice, is the deletion of the no-detriment rule from the *Water Amendment (Long Term Sustainable Diversion Limit Adjustment) Act* 2012 which may also be attributed to vague legal language.

Identifying the dominant legal principle

As noted in Chapter Two, further complicating the application of the no-significant harm rule (Article 7), is the debate over whether the equitable and utilization rule (Articles 5 and 6) is dominant. The no significant harm rule is traditionally favored by upstream states, while the equitable and reasonable utilization rule is favored by downstream states. Utton (1996) observed that the “no significant harm” rule had its origins in environmental protection philosophy, while the “equitable and reasonable utilization” rule pertains to economic development.⁴⁹³ The “no significant harm rule”

⁴⁹⁰ Alistair Rieu-Clarke and Flavia Rocha Loures, Still Not in Force: Should States Support the 1997 UN Watercourses Convention, (2009) 18(2), *Review of European Community and International Environmental Law*, 185-197. See also Flavia Rocha Loures and Alistair Rieu-Clarke, Watercourses Convention in Force: Strengthening international for transboundary water management, Routledge, 2013.

⁴⁹¹ Stephen C. McCaffrey (2001), *Supra* note 488.

⁴⁹² Case concerning the Gabcikovo-Nagymaros project (Slovakia/Hungary), Judgment of 25 September 1997, ICJ No.92 para 140.

⁴⁹³ Albert Utton, Which Rule Should Prevail in International Water Disputes: That of Reasonableness of that of No Harm, (1996) 36, *Natural Resources Journal*, 635- 641 at 635.

proposed in this dissertation seeks to deeply integrate the two rules, with equal consideration provided for social and economic harms, alongside environmental harms. This will achieve the state goal of section 3(c) of the *Water Act 2007*. This model specifically rejects the legal construction proposed by McCaffrey (1996) which would allow a use to be deemed equitable and reasonable, even if it were to cause significant harm.⁴⁹⁴ As Spiegel (2005) has argued the two rules are to be read together to give full effect to the provisions.⁴⁹⁵ In accordance with Spiegel, it is argued here that the debate in the literature as to whether Article 5 (Reasonable and Equitable use and participation) prevails over Article 7 (No significant harm) should be avoided in the Murray-Darling Basin for ease in decision making. This should be achieved by constructing a legal rule which first requires assessment of whether a harm caused by an alternative use could be defined as significant. Where that harm can be demonstrated to be "significant", it can be logically argued that the level or manner of alternative use cannot be said to be "reasonable or equitable".

6.6.2 DEFINING SIGNIFICANT HARM

The construction of the no-significant harm rule adapted for the Murray-Darling Basin in this dissertation seeks to address these two central concerns articulated above. To achieve greater precision quantifiable measures of significant harm need to be developed with reference to the environment, the economy and society attached to a scientific and socio economic assessment of sustainability built into legal rules. That is, it is important to establish factual quantifiable tests where possible to avoid wide discretion in the interpretation of the legal rule. It is therefore proposed that Article 7 of the *Watercourses Convention* be expanded and adapted for the Murray-Darling Basin via amendment of the *Water Act 2007* with respect to articulating a definition of significant

⁴⁹⁴ Stephen McCaffrey, *An Assessment of the Work of the International Law Commission*, (1996) 36, *Natural Resource Journal*, 297 at 307.

⁴⁹⁵ Carolin Spiegel, *International Water Law: The Contribution of Western United States Water Law to the United Nations Convention on the Law of the Non-Navigable Uses of International Watercourses*, *Duke J. of Comp. & Int'l L.* 15, (2005) 333-361.

harm and articulating in law the requirement to prevent and eliminate significant harm as follows:

(1) Definition of Significant Harm: Environmental, Economic and Social

1 (A) SIGNIFICANT ENVIRONMENTAL HARM:

Significant environmental harm is to be quantified with reference to past, current and future environmental water concerns. The threshold values which give rise to significant harm must be documented in the legal rule with reference to the best available science. Environmental factors which trigger the no-significant harm rule include but are not limited to:

- (i) Salinity levels;
- (ii) Acidification of soils;
- (iii) Threshold environmental flow levels during drought periods assigned to locations;
- (iv) Fish stock levels;
- (v) other biodiversity levels
- (vii) emergence of invasive species
- (viii) water quality measures to address blue-green algae break outs and other forms of pollution
- (ix) flooding, where flood occurs in foreseeable patterns inviting flood mitigation infrastructure measures.

1 (B) SIGNIFICANT ECONOMIC HARM:

Significant economic harm or impending significant economic harm is to be measured by, but not limited to:

- (i) regional unemployment rate at a level set by Treasury
- (ii) individual unemployment directly or indirectly caused by a government environmental measure, where no transition economy programs are accessible;
- (iii) depletion or contamination of water to meet critical human needs
- (iv) serious reduction in land and water for agriculture, where imported food gives rise to bio-security risks and where agricultural production outside the MDB is insufficient in light of these bio-security risks.

1 (C) SIGNIFICANT SOCIAL HARM:

Significant social harm includes but is not limited to:

- (i) community violence
- (ii) evidence of declining services social infrastructure (including schools and hospitals)
- (iii) absence of cultural flows* for identified indigenous groups in the MDB listed in the MDB plan where the minimum level of flow negotiated in exact locations is not met, specified for drought and normal years.

*Cultural flows for indigenous peoples articulated in the proposed draft Article 1 (C) (iii) refers to 'customary lifestyles' attached to water.¹ This includes collection of bush foods, fishing in ancestral sites, and the practice of spiritual traditions attached to water, including sharing of knowledge.

The rules articulated above seek to deliver measureable targets to determine significant harm to trigger legal intervention. The rules proposed above are a starting point for negotiation. Developing quantifiable measures of significant environmental, economic and social harm is a key area for future research. Environmental harm triggers are relatively well researched and embedded in the *Water Act 2007* and the Basin Plan Law. Triggers for determining significant economic and social harm are less well researched. The cost-benefit analysis rules articulated later in this chapter will be central to measuring the extent of economic and social harms, and quantifying environmental harms. It is unlikely that the MDBA will possess the institutional capacity to assess significant harm independent of other government organizations. Institutional linkages to the MDBA necessary for the implementation of these rules involving determination of significant harm, will include the State and Federal Treasury and Finance departments, and the relevant State and Federal water departments.

6.6.3 PREVENTION AND MITIGATION RULES

The presence of mechanisms for the prevention and mitigation of significant economic, social and environmental harm, articulated in the definition rule above, is central for securing cooperation. A body of rules providing prevention and mitigation mechanisms provides a degree of security for the community, with respect to avenues to address risk of and actual harm. The prevention and mitigation of significant harm rules articulated below are derived from Article 7(2) of the *UN Convention on Non-navigational uses of International Watercourses 1997*, presented in Chapter Two. These rules articulated in the convention primarily seek to prevent and mitigate environmental harm. The model proposed in this thesis extends the existing rule to include prevention and mitigation of social and economic harm. The existing framework rule also does not articulate examples of reasonable preventative and mitigation measures. A list of suggested measures which may be considered reasonable and appropriate have been provided below. Cost benefit rules and compensation rules are embedded in the suggested measures.

PREVENTION OF SIGNIFICANT HARM: REASONABLE AND APPROPRIATE MEASURES

(2) "The Federal Government and watercourse states of the Murray-Darling Basin shall in utilizing the waters of the Murray-Darling Basin, take all *reasonable and appropriate measures to prevent* the causing of significant harm to other watercourse States.

Reasonable and appropriate measures include but are not limited to:

- (a) cost-benefit analysis for assessment social, economic and environmental harms and benefits;
- (b) Environmental impact statements;
- (c) Environmental buybacks of water;
- (d) Infrastructure measures for water saving where a cost-benefit analysis has been undertaken for guidance purposes;
- (e) Infrastructure measures to prevent flooding where climate change or natural weather patterns cause repeated cycles of flooding;
- (f) Acknowledging that socio-economic harms arising from government led environmental measures in the Basin Plan are a form of climate change displacement, the Federal government must articulate transition economy measures to be prepared by Treasury attached to the Basin Plan,
 - (i) including eligibility for compensation, relocation subsidies, training measures;
 - (ii) funding available to individuals identified as displaced and/or suffering economic and social harm arising from an environmental measure contained in the Basin Plan.

ELIMINATION AND MITIGATION OF SIGNIFICANT HARM

(3) "Where significant harm nevertheless is caused by another MDB State or Territory, the State or Territory causing the harm, assisted by the Federal Government, in the absence of an agreement to such use, shall take all reasonable and appropriate measures, in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate discuss the question of compensation".

The six measures listed above articulate how a duty of care to prevent and mitigate significant harm would be fulfilled. Cost-benefit analysis and environmental impact statements are well accepted methods of assessing social, economic and environmental harms in global practice to determine whether prevention or mitigation strategies are necessary. Cost-benefit analysis as a measure was approved by the majority of irrigators surveyed in this research. Refinement of cost-benefit analysis rules to address criticisms raised by MDB irrigators articulated in Chapters Four and Five is presented below. Water buybacks from willing sellers and infrastructure measures are further reasonable options for consideration as preventative and mitigation measures accepted in current practice.

This research has demonstrated that government environmental water buybacks are limited by the interaction of the endowment effect with the free rider effect and concern for the rural economy. Hence the compensation and transition payments articulated in the proposed final measure, Article 2(f) is important to mitigate harm to the rural economy. These transition strategies were discussed earlier in this chapter (section 6.4 and 6.5), as a form of collective compensation to address harms, which Michelman (1967) identified as being out of the reach of courts as they are indirect harms.

Compensation as a mitigation measure is a very important issue in the MDB. Given the historic pattern of administrative reductions at the end of the life of a water plan, irrigators interviewed in this study were concerned for the better articulation and

communication of compensation options for each unit of administrative reduction. Current risk sharing provisions have been repeatedly criticized as vague, as discussed in Chapter Two. Michelman's (1967) observation that courts experience difficulty in addressing compensation and delivering fairness, implies the need for negotiated compensation rules between irrigators and government, based on market values and, relocation of irrigated agriculture options. This can occur within the existing structure where the Federal Minister makes a decision on compensation subject to Administrative Appeals Tribunal review. In this way, the demoralization effect articulated by Michelman, is better addressed.

6.6.4 BURDEN OF PROOF RULES

The initial burden of proof falls on the party claiming significant harm or prospective significant harm. Where significant harm is shown, the burden of proof falls on the respondent to demonstrate that the best prevention and mitigation measures were undertaken.

6.6.5 COST-BENEFIT ANALYSIS GUIDANCE RULES FOR THE ASSESSMENT OF SIGNIFICANT HARM

This rule model recommends the articulation of cost-benefit analysis (CBA) guidance rules in the *Water Act 2007* for the assessment of potential and actual significant harm attached to suggested rule 2 (a) (see page 257). The suggested rule is presented below.

Cost-benefit analysis (CBA) as a guidance measure was strongly supported by the irrigators as an assessment tool for the measurement of harms. The failure to attach cost-benefit analysis rules as a measurement device to the no significant harm rule, has been a key omission in international water law rules and in the MDB. While a CBA assesses harm in dollar values, the triggers for proving significant environmental, economic and social harms will need to be first established under the definition of significant harm. Government departments such as the Federal Treasury will need to establish triggers for social and economic harm with reference to the definition provided above. Environmental

government departments such as the MDBA, will need to establish triggers for environmental harms.

To control for institutional bias and valuation errors raised as concerns by MDB irrigators interviewed in this study, it is proposed, that in the event of a conflict, both parties to the conflict should produce two separate cost-benefit analyses. Parties may consult each other and include valuations from the other party's submission if accepted. The creation of a new water tribunal is recommended in the next section, which would hold the task of assessing the merits of both CBAs. Opportunities for review of the decision made at first instance, to control institutional bias, mirroring the American model are described also described in the next section with reference to an independent review panel. It is recommended that stakeholder participation in constructing values be undertaken to deliver interactional justice as fairness and control institutional bias, in accordance with the Swedish model. Obtaining valid economic, social and environmental values will require extensive public consultation. Correcting for institutional bias will involve consulting a wide cross section of society. It is further recommended that it be made mandatory to document the inherent limitations of the valuation methods in the CBA, in order to prevent bias. The CBA rule framework is articulated on the following page.

4. COST BENEFIT ANALYSIS RULES FOR THE ASSESSMENT OF SIGNIFICANT HARM

(a) The cost-benefit analysis (CBA) referred to in this section is compulsory but not binding, serving as a guidance measure attached to the Basin Plan.

(b) The CBA must be completed in a 3 to 6 month time frame with reference to the commencement of the development of Federal and State Basin Plans and reviews.

(c) Measures listed in section 2 (c)-(f) and any other measure undertaken to prevent or address significant harms must be undertaken with reference to a cost-benefit analysis.

(d) A CBA which is to be undertaken as a guidance measure must demonstrate the proposed changes under the Basin Plan cause no significant harm.

The CBA must demonstrate that the costs of an environmental measure do not give rise to a significant socio-economic harm or that the socio-economic harm has been mitigated.

The CBA must demonstrate that the costs of a socio-economic measure do not give rise to a significant environmental harm or that the environmental harm has been mitigated.

(e) The drafts and final Basin Plan must refer to the CBA guidance reports produced by Federal and State governments.

(f) Valuation methods rule:

The following methods are recommended observing inherent limitations:

(i) Threshold valuation noting and controlling for the impact of the use of varied discount rates upon the final result;

(ii) Direct estimation of opportunity costs;

(iii) Contingent Valuation, observing the limitations present in obtaining individual valuations, given cultural impacts and changes in values across time, and controlling for bias in the construction of questions.

Parties are not limited to the use of the recommended valuation methods.

(g) At the Federal level the cost-benefit analysis is to be undertaken by the National Audit Office and Treasury as lead organizations in consultation with the CSIRO, ABARE and the MDBA.

(h) Completed water sales made under government environmental buyback programs cannot be reversed by a CBA or challenges to a CBA guidance document

(i) Controlling for institutional bias:

Each party to the conflict must present a CBA for assessment by the water tribunal. Appeals against the ruling of the water tribunal may be taken to an independent CBA review panel.

Valuations must involve consultation of all stakeholders: environmental, economic and indigenous. Valuations must involve a representative cross section of each stakeholder group.

Economists assigned to undertake the CBA must demonstrate substantial independence from the economic, environmental and indigenous interests in the Basin, and demonstrate a high degree of institutional capacity.

6.6.6 PROCEDURAL JUSTICE REQUIREMENTS: ESTABLISHMENT OF A WATER TRIBUNAL AND INDEPENDENT CBA REVIEW PANEL

It is recommended that alternative dispute resolution be undertaken by a newly established independent quasi-judicial water tribunal staffed by expert water lawyers, water scientists, economists, and engineers. Each would serve on a negotiation panel to deliver institutional capacity. Alternative dispute resolution is less costly compared to

resolution through the court system, and can foster cooperation in a non-adversarial setting. All panel members must demonstrate independence from economic, environmental and indigenous interests in the MDB. A new independent CBA review panel should be established to review the decisions of the water tribunal. The review panel should be primarily staffed by economists and lawyers, with access to the expertise of water scientists and water engineers.

It is unlikely that the detailed proposed rules will be implemented in the court system, until they have become entrenched in a custom of alternative dispute resolution. If the rules were to proceed to the court system, where the water tribunal decides that evidence of significant harm or potential significant harm exists and no cooperative negotiation is possible, the case must proceed to the Federal Court. Where the water tribunal rejects a claim of no significant harm, an appeal may be made to the Federal court. Assessing significant harm is an interdisciplinary exercise, requiring water science assessments, assessments of rural economic and social health, comprehension of the law and the extent to which engineering solutions may prevent or mitigate harm. Hence, the Federal court bench will require special expertise in water law, economics, engineering and science to make appropriate water decisions.

6.6.7 LEGAL STANDING

It is recommended that legal standing be granted to State governments and Federal governments. Governments are to act on behalf of individual and groups of farmers, mining companies, individual and groups of indigenous persons, individuals and communities with environmental interests, other industrial interests (individual and group), and other individuals or groups, capable of demonstrating significant harm. This will prevent large numbers of frivolous legal actions. In the current environment where State governments are responsive to community concerns, this arrangement may operate well. However where State governments are not responsive to community concerns, avenues for greater access to legal standing may be required.

6.6.8 TIMING OF CLAIMS

It is recommended that claims be heard at any time before or during the life of the basin plan. This may involve requiring the government to amend the plan to prevent or mitigate significant harm where necessary in accordance with decisions of the water tribunal as guidance. This is because significant harm or the threat of significant harm can emerge at any time during the life of a basin plan.

6.6.9 CONCLUSION

The aim of the “no significant harm” rule model is to drive cooperation over conflict, by ensuring all parties consider the impact of their actions upon other stakeholders and promote respectful dialogue guided by a rule framework. The rules provide a basis for inter-state negotiations and Federal-State negotiation where the interests of the two central stakeholders the environment and irrigators are represented. This model sought to address concerns raised by irrigators with reference to institutional bias, valuation methods, and mechanisms to address harm to the rural economy.

A key question in this model is how to differentiate a tolerable harm from a significant environmental, economic or social harm. To some extent this determination is affected by social and cultural values, which provides opportunity for government to negotiate thresholds of unacceptable harm with stakeholders. Other values are more easily determined by science, such as the level of pollutant in water which renders the water unsafe for plant, animal and human life. For this model to function effectively, the thresholds for environmental, social and economic harm must be negotiated between the government and stakeholders. They must then be established in law before the rule model has effect. Hence, what constitutes significant environmental, social and economic harm is a very important area for future research.

These deliberations will not produce a consensus overnight. Reaching an agreement on what constitutes significant environmental, social and economic harm, may involve a year of community consultations to establish rules acceptable to stakeholders and government. These rules must be supported by subsequent research and must be

flexible to adjust to new findings on the matter of what constitutes significant harm as water science and socio-economic research advances. Once this is achieved, the proposed no-significant harm rule model integrating rules to address environmental and socio-economic concerns, substantially addresses Biswas' (2008) critique of absence of substantive guidelines in the concept of integrated water resource management and the critique of the no significant harm rule with regard to absence of precision.⁴⁹⁶

6.7 REGIONAL DAILY OPERATIONAL RULE REFORM: SENSITIVITY TO UNCERTAINTY AND THE IMPORTANCE OF ASSESSING NORMS

Understanding norms and customs established by irrigators in the management of their property rights to water is important in securing cooperation between irrigators and government. Property rights to water in the Murray-Darling Basin held by irrigators are usufructory rights involving the right to extract water for use, with no ownership in water flowing in-stream. This is a weaker form of property right creating uncertainty for irrigators. Doremus (2011) observes that the nature of these property rights, is further weakened by uncertainty in water availability as a consequence of climate change.⁴⁹⁷ The emergence of new property rights in water for the environment through reconfiguration of irrigators' water rights, has created a new dimension of uncertainty for irrigators. Where property rights are weak, informal norms and customs develop to create certainty. Trebilcock and Veel (2008) observed that where property rights are weak informal mechanisms for protecting property rights develop through cooperation established through repeated interaction and informal norms for delivering social order and control.⁴⁹⁸ Identifying these norms can progress negotiations over securing property rights for environmental flows. One key norm observed in the MDB was the preference for and

⁴⁹⁶ Asit K. Biswas, *Integrated Water Resource Management: Is it Working?*, (2008) 24(1), *Water Resources Development*, 5-22.

⁴⁹⁷ Holly Doremus, *Climate Change and the Evolution of Property Rights*, (2011), *UC Irvine Law Review*, 1091-1123.

⁴⁹⁸ Michael Trebilcock and Paul Erik Veel, *Property Rights and Development: The Contingent Case for Formalization*, (2008) 30, *University of Pennsylvania Journal of International Law*, 397-481.

practice of inter-irrigator trade to strengthen the rural economy through keeping property rights in water in agriculture.

Kostritsky (2013) observed that until the 1990s law and economics ignored norms. In NIE norms are part of culture.⁴⁹⁹ Norms are ways in which people devise solutions for cooperation, exchanges and general social welfare. Law depends on norms to motivate people to adhere to law. A focus on norms leads to the acknowledgement of an alternate approach to rationality, termed ecological rationality. The ecological rationality helps people to deal with complexities and incompleteness of information and evolve mechanisms for cooperation and exchange which incorporate norms, trust, beliefs, organizations and networks. Norms together with private arrangements and legal rules promote welfare maximization including mitigating conflict for mutual gains. When an individual adheres to a norm and repeats it, others follow it. Then this becomes established in the society. It is the presence of norms and beliefs that make individuals cooperate without law and cooperate within law.

The embedded norms in a society need to be considered before enacting laws, property rights, contracts, and constitutions. As such, norms and laws share the function of maintaining social order through cooperation and coordination to solve issues. With respect to governance a government can use a norm as an input and devise a government rule if it is cost effective. Then there are norms that are products of government intervention. Norms take a long time to develop in a community and when they are established they are sticky. That is, norms remain embedded for a long time. In a community that is experiencing a new environment relating to a new way of dealing with matters, there is limited time for a norm to evolve spontaneously. The government can assist through its intervention to help develop norms that encourage cooperation and coordination for mutual gains.

Trebilcock and Veel (2008) cite Posner's signaling model where "social norms arise from the actions of individuals who are trying to signal to others that they are a

⁴⁹⁹ Juliet Kostritsky, *The Law and Economics of Norms*, (2013) 48(3) *Texas International Law Journal*, 465-505.

cooperative type in order to gain benefits from interaction with those individuals”.⁵⁰⁰ Signaling is very important for government environmental managers working with irrigators in the MDB to reduce propensity for conflict. This can be achieved through daily and regular operational dialogue with the irrigation community.

It is in the context of understanding the importance of the operation of informal norms in a community that a joint cooperative organization constructed as a liberal commons for MDB regional daily operational management was proposed in Chapter Five, in response to irrigators’ concerns regarding ongoing management requirements pertaining to metering, monitoring, allocations and absence of information flows. The responses obtained in this research also indicated that such operation rules would facilitate frequent government – irrigator dialogue and information flow on climate change, water buybacks, water trade and other related matters as required. Ostrom’s (1990) research demonstrating that heterogeneous users can devise cooperative institutions to address resource use problems is highly relevant to the interaction between private irrigators, government environmental water holders, miners, industrialists, indigenous groups and other stakeholders. The liberal commons model builds on Ostrom’s eight principle model, providing an additional right of exit. As noted in Chapter Five, Heller and Dagan (2001) define the liberal commons to be “*a legal regime that enables a limited group of owners to capture the economic and social benefit from cooperative use of a scarce resource, while also ensuring autonomy to individual members who each retain a secure right to exit.*”⁵⁰¹

In addition to Ostrom’s (1990) eight principles for long enduring resource institutions articulated in Chapter Five, the following proposed guidance rules for government are suggested to build trust and social capital in Basin for regional daily operational consultations within the framework of alternative dispute resolution. The proposed rules reflect Posner’s signaling model, where government would signal to irrigators its desire to cooperate for mutual benefit.

⁵⁰⁰ *Supra* note 497 at 414-415

⁵⁰¹ Hanoch Dagan and Michael Heller (2001) *Supra* note 467.

(i) Government officials should seek to demonstrate knowledge and awareness of the needs of various stakeholders in communication in order to avoid conflict, including violent conflict.

(ii) To achieve this aim Government officials should seek undertake efforts to understand and document in a respectful manner the perspectives and psychology of opponents facing harm as a consequence of environmental water policy, through regular strategic communication;

(iii) Communications should involve sensitive pre-planned statements and questions in communication which enable individuals adversely affected by environmental water policy to perceive their interests as being respected, valuable and accounted for.

(iv) Government officials should seek to construct daily operational policy and rules in a manner which demonstrates knowledge and awareness of the concerns of opposing stakeholders facing harm in the conflict. Construction of rules should include participation of all stakeholders.

(v) Government information flows and dialogue with irrigators on water buybacks, water trading, property rights to water, compensation matters, environmental policy and climate change science regarding the MDB should occur quarterly at minimum.

Heterogeneous users are grouped together in the liberal commons management model for common benefit. It is proposed that the daily operational liberal commons model be situated within resource operation plan laws. The aim of this measure is to mitigate the propensity for conflict.

REFORM PROPOSAL 2

Conflict resolution model comprised of:

- (i) A substantially expanded no significant harm rule to be included in the Water Act 2007;
- (ii) A daily operational liberal commons model to be included in regional resource operation plan law.

REFORM MODEL PART 3: INCLUSION OF NEW INSTITUTIONAL ECONOMICS IN PUBLIC POLICY

6.8 INCORPORATING NEW INSTITUTIONAL ECONOMICS (NIE) INTO MDB WATER POLICY

New Institutional Economic (NIE) applied to water resource problems can be structured in a manner readily accessible to water policy makers. Saleth and Dinar (2004) provide a clear articulation of NIE analysis of water institutions which involves examination of:⁵⁰²

- (i) "the decisions which have to be made;
- (ii) the players that have to make decisions;
- (iii) the institutional structures within which decision making will take place; and
- (iv) a set of performance criteria against which the process can be evaluated".

In the Murray-Darling Basin (MDB) the primary decision making pertains to allocation of water between environmental and economic uses. These decisions in the MDB are made by government interacting with stakeholders, of which the majority of those providing resistance to environmental water allocation mechanisms are irrigators. The institutional structures directing decision making in the MDB are the market rules for trading water and a body of water law. The performance criterion, is sustainable development, which incorporates the goal articulated in Article 3 of the *Water Act 2007*, which requires concurrent optimization of environmental, economic and social outcomes.

New institutional economics applied to the achievement of sustainable development of water resources examines the effectiveness of formal and informal rules, embedded in markets and in a body of water law. Water law and policy in the MDB must integrate understandings of social, cultural, economic and other norms, exercised informally and formally, to be successful. That is there exist particular social, cultural, economic and other norms present in the MDB rural agricultural community worthy of

⁵⁰² M Saleth and A. Dinar, *The Institutional Economics of Water: A Cross-Country Analysis of Institutional and Performance*, Edward Elgar Publishing, 2004 at 49.

study by government environmental buyers.⁵⁰³ New Institutional Economics requires consideration of these norms embedded in community views on the effective function of rules.

In contrast, neoclassical economic approaches to water policy assumes unbounded rationality and perfect information, which do not always reflect the reality of rural agricultural communities. In this way neoclassical economics ignores the impact of social, cultural, economic and other norms present in the institutional environment on the function of market and non-market institutional arrangements. Water policy should integrate neoclassical economic approaches with New Institutional Economics, which abandons the assumptions of rationality and perfect information to better reflect reality. Importantly, New Institutional Economics embraces the neo-classical economics assumptions of scarcity and competition for resources, central to the conflict between environmental and economic uses of water in the MDB. Competition for scarce water resources in the MDB has driven and continues to drive institutional change.

In the MDB sustainable development involves reconfiguring property in water toward the environment. Key to understanding the effectiveness of rules and government action for reconfiguration of water toward the environment is the mindset of irrigators and government stakeholders. Williamson (2000) and North (1990, 1992) observed that a key element of New Institutional Economics is the recognition of the importance of studying the "mental models" individuals possess "to interpret the world around them".⁵⁰⁴ NIE acknowledges that mental models vary between individuals and that information is processed differently from person to person. North (1990, 1992) argues that institutions are molded by "mental capacities and incomplete information".⁵⁰⁵ In this context North

⁵⁰³ See O. Williamson, *The New Institutional Economics: Taking Stock, Looking Ahead*, (2000) 38 *Journal of Economic Literature*, 595-613 at 596-597.

⁵⁰⁴ O. Williamson (2000) *Ibid* at 600; Douglass C. North, *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, 1990; Douglass North, *The New Institutional Economics and Development*, John R Commons Lecture, American Economic Association Meeting, January 1992, at 1-2; see also Douglass North, *Institutions and the Performance of Economies over Time*, in C. Menard and M Shirley (Eds), *Handbook of New Institutional Economics*, Springer, 2005.

⁵⁰⁵ Douglass C. North (1990) *Ibid*; Douglass North, (1992) *Ibid* at 7.

(1990, 1992) states where institutional change is essential to successful reform, it should be recognized that “the mental models of actors ... will shape choices”. This research explored the impact of irrigator and government “mental models” and information flows on the functioning of market institutions (the water buyback program) and public sector institutions (*Water Act 2007*) designed to reconfigure property rights toward the environment in the MDB. The purpose of this investigation was to develop a law reform model which would better balance environmental, social and economic outcomes in the MDB.

NIE also argues that incomplete information and variations in rationality across individuals create uncertainty giving rise to transaction costs. Transaction costs are defined by the Ronald Coase Institute as “*the costs of resources utilized for the creation, maintenance, use and change of institutions and organizations. They include the costs of defining and measuring resource claims, costs of utilizing and enforcing rights specified, the costs of information, negotiation and enforcement.*”⁵⁰⁶ In the NIE model formal and informal institutions are created to reduce these transaction costs.⁵⁰⁷ In the Murray-Darling Basin irrigators face a very high transaction costs in pursuing off-farm employment in light of the need to reduce irrigation to support ecosystem resilience. This is particularly so due to an absence of a coherent government economic transition strategy. That is the costs of acquiring information on alternative employment, the costs of re-training, social costs attached to leaving established business, family and friendship networks and the costs of relocation are high. As Coase (1991) explains “*if the costs of making an exchange are greater than the gains that exchange would bring, that exchange*

⁵⁰⁶Alexandra Benham, Glossary for New Institutional Economics, the Ronald Coase Institute, <http://www.coase.org/nieglossary.htm>, (viewed 24 November 2013); Ronald H. Coase, The Institutional Structure of Production, in C. Menard and. M Shirley (Eds), *Handbook of New Institutional Economics*, Springer, 2005 in at 34.

⁵⁰⁷ Claude Menard and Mary M Shirley, What is New Institutional Economics, in C. Menard and. M Shirley (Eds), *Handbook of New Institutional Economics*, Springer, 2005.

would not take place and the greater production that would flow from specialization would not be realized".⁵⁰⁸

The institutional change proposed in this thesis to facilitate transition economy opportunities would reduce the transaction costs irrigators face in making choices on new specializations. The no-significant harm rule model also seeks to reduce transaction costs by creating a series of legal norms to guide mandatory legislative negotiations and disputes. The presence of the rules can create a culture guiding behaviour, such that each party seeks to minimize harms caused to external parties in order to avoid costly disputes. A liberal commons daily operation rule framework to facilitate cooperation seeks to further reduce transaction costs attached to dispute resolution.

Cooperation to resolve conflict through building networks of trust between parties in conflict was highlighted by Heller (1998).⁵⁰⁹ In Chapter Two, four key mechanisms emanating from the NIE literature for building trust were highlighted. These were, institutional linkages⁵¹⁰, institutions for the protection of minority interests⁵¹¹, institutions for user participation⁵¹² and institutional capacity⁵¹³. The proposed reform models in this dissertation seek to incorporate all four elements.

⁵⁰⁸ Ronald H. Coase, *The Institutional Structure of Production*, Nobel Prize Lecture, 9 December 1991.

⁵⁰⁹ Michael Heller, *The Tragedy of the Anti-Commons: property in the transition from Marx to Markets*, (January 1998), 3(111) *Harvard Law Review*, 621.

⁵¹⁰ M. Saleth and A. Dinar, *The Institutional Economics of Water. A cross-country analysis of institutions and performance*, Edward Elgar, World Bank, 2004; R.M. Saleth and Ariel Dinar, *Water Institutional Reforms: Theory and Practice*, (2005) 7, *Water Policy*, 1-19; L. Kiser and Elinor Ostrom, *The three worlds of action: a methatheoretical synthesis of institutional analysis*, in Elinor Ostrom (Ed), *Strategies of Political Inquiry*, Beverly Hills CA, Sage, 1982, 179-222; Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, 1990 at 52.

⁵¹¹ Kenneth Arrow, *Social Choice and Individual Values*, New York Wiley and Sons, 1951; William Baumol, *Economic Theory and Operations Analysis*, 4th Edn, Prentice Hall, 1977 at 531-535.

⁵¹² Quentin Grafton, *Governance of the Common: A role for the State*, (2000), 76(4), *Land Economics*, 504-517.

⁵¹³ Vincent Ostrom and Elinor Ostrom, *Legal and Political Conditions of Water Resource Development*, *Land Economics*, Vol XLVIII, No. 1, 1972.

The irrigation community has provided the most resistance to the reconfiguration of water rights toward the environment, where mistrust between government and irrigators has been demonstrated. The reform model presented in this chapter incorporated the mental models of individual irrigators to discover the reasons for resistance and mistrust, and to propose institutional reforms for the achievement of sustainable water resource development which would be acceptable to the irrigation community. As North (2005) observed "*changing only the formal rules will produce the desired results only when the informal norms ... are complementary to that rule change...*".⁵¹⁴

This study has examined level one, two and three institutions, described in Williamson's (2000) model, involving the study of irrigators' beliefs and norms, water market institutions and the water law (see section 1.2.2, Figure 1.2, Chapter One). In employing a New Institutional Economics approach to examining the limits to market based rules in the MDB, the interconnected endowment effect, free rider effect and concern for the rural economy held by irrigators impacting market based water governance becomes visible. Through New Institutional Economics analysis of the effectiveness of the *Water Act* 2007, the need for and nature of new conflict resolution rules becomes evident. Therefore, the inclusion of New Institutional Economics in MDB water policy should be seriously considered.

REFORM PROPOSAL 3

New Institutional Economics theory to be included alongside neo-classical economic theory in water policy analysis.

⁵¹⁴ Douglass North (2005) *Supra* note 503 at 28.

CHAPTER SEVEN

CONCLUSIONS

7.1 INTRODUCTION

This study concludes with three reform proposals for consideration in water governance in the Murray-Darling Basin. The first two reform proposals directly address the two research questions articulated in Chapter One. The third reform proposal addresses overall policy development for water governance.

As observed in Chapter One, this thesis is concerned with two central research questions pertaining to water governance structures for addressing over-allocation of water entitlements through reconfiguration of water rights toward environmental flows to build ecosystem resilience in the Murray-Darling Basin. The research questions are articulated as follows:

- (i) What are the limits of market based water governance expressed as water buybacks, as a means of reconfiguring private water rights toward environmental flows in the Murray-Darling river system for building ecosystem resilience?
- (ii) Which public institutional and legal reforms are necessary to resolve the conflict between environmental and socio-economic uses of the Murray-Darling river system in order to achieve and maintain ecosystem resilience?

7.2 CHAPTER OVERVIEW

The following section 7.3 discusses the three reform proposals. This chapter then addresses the limitations of this study in section 7.4. The chapter then discusses the areas for future research emanating from this study in section 7.5.

7.3 REFORM PROPOSALS

7.3.1 REFORM PROPOSAL ONE: INSTITUTIONAL LINKAGES FOR A SUSTAINABLE TRANSITION ECONOMY POLICY

From the time of the 1994 Cap on extractions, to the 2004 NWI to the *Water Act* 2007, the matter of a sustainable transition economy policy attached to water reform policy was not addressed. This is particularly concerning, as water reform involves reducing water entitlements for agriculture. Under the *Water Act* 2007, the Federal government was conferred responsibility for the management of water for environment. At that time Treasury was not consulted despite the fact that \$10 billion of tax payer funds was allocated for water security reform. Treasury also received no consultation on the matter of any economic transition for rural MDB, as a measure attached to the management of water reductions.

In 2007 then Secretary of the Treasury Department, Dr Ken Henry in a bi-annual address to staff, stated:

*“ We have also worked hard to develop frameworks for the consideration of water reform and climate change policy. All of us would wish that we had been listened to more attentively over the past several years in both of these areas. There is no doubt that policy outcomes would have been far superior had our views been more influential. That is not just my view; I know that it is increasingly widely shared around this town. But we are not giving up. Water has got away from us a bit in recent time, but it will come back for some quality Treasury input at some stage – it will have to – and we are right at the centre of policy development in the climate change area ”.*⁵¹⁵

In this thesis reform model one requires that the MDBA be institutionally linked to Treasury, Finance and other economic government organizations to address the limitations of the water buyback program and prioritize linking water reform policy with a sustainable economic transition strategy, involving but not limited to a digital economy strategy for the MDB.

⁵¹⁵ Dr Ken Henry, Secretary to the Treasury, *Treasury's Effectiveness in the Current Environment*, Address to Staff at the Hyatt Canberra, 14 March 2007.

The *Water Act 2007* charged the MDBA with the responsibility of setting SDLs within the MDB plan. In doing so it provided the MDBA with the mandate to re-balance social, economic and environmental outcomes, stated briefly in section 3 (c) of the *Water Act 2007*. However it did not provide guidance as to how this would be achieved creating great confusion in the rural community in 2010 when the guide to the Basin Plan was presented.⁵¹⁶ The necessary policy institutional linkage rules and conflict resolution rules are completely absent in the *Water Act 2007*. Given these legal constraints, the MDBA's ability to balance the three goals (economic, social and environmental) is limited, without the necessary linkages to the Department of Prime Minister Cabinet, Treasury, Department of Finance, Department of Communications and Department of Regional Australia.

At present, a digital economy transition economy strategy to lift economic growth for the whole nation is advocated. In this context an independent broadband policy is delivering broad band network to the nation to facilitate a digital economy. However, there has been no effort to prioritize the digital economy policy within water reform policy in the MDB through institutional linkages to other government departments. This is despite standard public service practice which involves the establishment of "*cross agency strategic policy project teams for specified projects that would be evidenced based and practical and would deliver creative responses to complex policy problems*", as articulated by the Advisory Group on Reform of Australian Government Administration.⁵¹⁷

Due to the absence of the necessary institutional linkages, in November 2012 when the MDB plan was finalized, a compromise was made with regard to environmental flow recovery targets and total extractions. The surface water SDL was set at 2750GL per annum, while ground water extractions were increased to 1700GL. Following resistance by the upstream MDB states New South Wales and Queensland during 2013, the Federal

⁵¹⁶ The Senate Legal and Constitutional Affairs References Committee: *A Balancing Act: Provisions of the Water Act 2007*, Commonwealth of Australia, June 2011; Australian Government Response to the Senate Legal and Constitutional Affairs References Committee Report: *A Balancing Act: Provisions of the Water Act 2007*.

⁵¹⁷ *Ahead of the Game, Blueprint for the reform of Australian government administration*, Advisory Group on Reform of Australian Government Administration, March 2010

Government agreed to cap water buybacks at 1500GL in February 2014 and prioritize on farm infrastructure water improvements to reach the SDL goal of 2750GL.⁵¹⁸ The on-farm infrastructure savings do not reduce over-allocation of water entitlements, however they do reduce water leakages. Water saved through this method will be shared equally between the environment and agriculture, but at a much higher cost than water buybacks.

While these compromises are necessary to avoid upheaval to the rural community facing water reductions, it is unclear whether these current decisions are compatible with addressing the reduction of ecosystem resilience in the MDB. These compromises in the MDB water reform are also accompanied by State funding cuts to the MDBA leading to abandonment of the native fish strategy and the sustainable river audit. The controversial Guide to the MDB Plan published by the MDBA in 2010 originally recommended a water recovery target of 3000 to 7600GL to prevent irreversible damage to the ecosystem. Pittock and Finlayson (2011) argue that an environmental target below 4000 to 7600 GL is “insufficient to meet Ramsar Convention obligations.”⁵¹⁹

However it became clear to the author at 2008 that the buyback from willing sellers will be strongly resisted and that the irrigation community will place limits on the buyback. The qualitative interview analysis conducted in 2008-09, was combined with documentary analysis, identifying limits to the water buyback program and was published in 2008-09.⁵²⁰ This research articulated three key limitations to the water buyback,

⁵¹⁸ The Hon Tony Abbott, et al. States Agree to Implement Murray - Darling Water Reform, Joint Press Release, 27 February 2014.

⁵¹⁹ Jamie Pittock and Max Finlayson, *Freshwater Ecosystem Conservation: Principles versus policy*, in Daniel Connell and Quentin Grafton, *Basin Futures: Water Reform in the Murray-Darling Basin*, ANU EPress, 2011.

⁵²⁰ The results were presented in a conference paper in September 2008, at the Canadian Law and Economics Conference, University of Toronto: Thampapillai V (2008), *Limits to the Willingness to Sell to Government Water Buy-backs in the Murray-Darling Basin*, *Canadian Law and Economics Conference, University of Toronto*, Canada, 26-27 September 2008;

Preliminary analysis of the results was published in 2009 in the *Journal of Environmental Policy and Law*: Thampapillai V., (2009) *Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 2*, *Environmental Policy and Law* 39 (6) , 317-322; Thampapillai V., (2009)

program namely, the endowment effect tied to central for the rural economy and a free rider effect, and identified the need for sustainable economic transition strategy to stimulate willingness to sell to the environmental buyback program. As articulated in Chapter Two of this dissertation, the endowment effect is, as Thaler (1980) described, a state where an owner's willingness to accept (WTA) payment as compensation for property already owned exceeds willingness to pay (WTP) to acquire that same property by a substantial amount.⁵²¹ As a consequence of the increased value given to property owned there is a tendency for the owner to hold onto this property.⁵²² As observed in Chapter Five the research on the endowment effect within environmental water purchase programs is scarce both internationally and in the Murray-Darling Basin.⁵²³ Previous endowment effect experiments undertaken by Kahneman, Thaler, Knetsch and others articulated in the seminal literature on the theory of the endowment effect concerned trade of chocolate bars, coffee cups, wine, lottery tickets and pens. Literature on real world examples of the endowment effect outside the experimental and classroom setting are rare.⁵²⁴ The endowment effect is a key qualification to the Coase Theorem, because endowment effect theory and practice demonstrates that initial endowments determine trading activity.

The need for a sustainable transition economy strategy to stimulate willingness to sell to buybacks by reducing the endowment effect was articulated in the 2008-09 published work emanating from this thesis. This finding was validated by the House of Representatives Standing Committee on Regional Australia (2011) inquiry, which did not

Limits of Market-Based Water Governance for Environmental Flows in the Murray-Darling Basin – Part 1, *Environmental Policy and Law* 39 (4-5), 247-265.

⁵²¹R. Thaler, Toward a Positive Theory of Consumer Choice, (1980) 1 *Journal of Economic Behaviour and Organization*, 39-60; D. Kahneman, J. Knetsch and R. Thaler, "Experimental Tests of the Endowment Effect and the Coase Theorem, (1990) 98(6) *The Journal of Political Economy*, 1325-1348.

⁵²² R. Thaler (1980) *Ibid.*

⁵²³ Personal communication Prof. Jack Knetsch, Simon Fraser University, 4 April 2013 and 12 April 2013.

⁵²⁴ *Ibid.*

advocate a transition strategy, but articulated the socio-economic hardship in the MDB.⁵²⁵ In contrast to a sustainable economic transition strategy the Standing Committee recommended slowing down the buyback program and investment in water savings infrastructure.

As noted above, water reform in the MDB commenced in 1994. Very belatedly in November 2012 the Federal government established a small MDB economic diversification fund, of \$100 million to be distributed between the States. However no coherent sustainable transition economy strategy for the MDB has been publicly articulated at February 2014 by the Federal government. The cap on water buybacks at 1500GL in February 2014 as a condition for signing the MDB Plan implementation agreement by NSW and Queensland, is further confirmation of the validity of the 2008-09 published findings from this research on the limitations of the water buyback program. As noted above the endowment effect was identified as a key limitation in this research. Trebilcock's (2014) most recent work "The Political Economy of Policy Transitions", also acknowledges the role of the endowment effect on political behaviour with reference to policy transitions, lending further strength to the 2008-09 published findings of this research.⁵²⁶ In this work concerning challenges to policy transitions, Trebilcock explains the importance of considering the interim period between current policy and implementation of future policy. Trebilcock (2014) also argues that political compromises in this interim period to mute the resistance by "economic losers" are essential for achieving long term policy reform. These compromises may be temporarily

⁵²⁵ House of Representatives Standing Committee on Regional Australia, *Of Drought and Flooding Rains: Inquiry into the impact of the Guide to the Murray-Darling Basin Plan*, Commonwealth of Australia, 2011; V. Thampapillai, (2010) Submission to the Inquiry into the impact of the Murray-Darling Basin Plan on Regional Australia, House Standing Committee on Regional Australia, Submission No.0145, Received 1 - 12-2010.

⁵²⁶ Michael Trebilcock, *Dealing with Losers: Political Economy of Policy Transitions*, Stanford Law School, Law and Economics Seminar, February 20, 2014 at 36, with reference to Michael Trebilcock, *Dealing With Losers: The Political Economy of Policy Transitions*, Oxford University Press, (forthcoming November 2014).

necessary in the absence of a sustainable economic transition in light of the fact that Australian agriculture is one of the least subsidized globally.⁵²⁷

It is imperative that these limitations be overcome in order to avoid a tragedy of the anti-commons with respect to neglect of environmental concerns in the MDB. This tragedy, which is the mirror image of the tragedy of the commons, occurs when the water allocated for environmental flows is underutilized due to community pressure to retain water for agricultural consumptive purposes. This is particularly so when the domestic and international demand for Australian agricultural produce is increasing. Food imports into Australia are minor a source of food, compared to food produced domestically.⁵²⁸ The Department of Agriculture, Fisheries and Forestry further states that “Australia’s food net exports (trade surplus), as measured by the difference between the value of food exports and imports, increased by 14.6 percent to \$19.2 billion in 2011-12”. The Agricultural Competitiveness Issues Paper (2014) clearly articulates the importance of expanding Australian agricultural exports.⁵²⁹

However the Murray-Darling river system remains over-allocated, and there is a need for reduction in the number of small sized farms in the MDB. These two factors are interconnected. Small farms cannot realize adequate income through agriculture as terms of trade are declining. The strategy to counter balance the declining terms of trade is by increasing productivity. This is again difficult when farm sizes are small. Therefore farms rely on increased irrigation to increase productivity per hectare. Any contraction in the irrigation water will markedly affect net income of the farm.

Even if governments are supportive of irrigators’ concerns, as demonstrated by the imposition of a 1500GL cap on water buybacks, farmers cannot escape the realities of

⁵²⁷ Kym Anderson, Peter Lloyd, Donald MacLaren, Distortions to Agricultural Incentives in Australia since World War II, Policy Research Working Paper 4471, January 2008.

⁵²⁸ Department of Agriculture, Fisheries and Forestry, Australian Food Statistics 2011-12, Australian Government 2012.

⁵²⁹ Australian Government, Agricultural Competitiveness Issues Paper, Commonwealth of Australia, 2014.

climate change which causes extended drought periods.⁵³⁰ The effect of drought will be severe on small farms. Approximately forty percent of farming families in the MDB are small farms on very low incomes of an estimated \$30 000 per annum at 2006.⁵³¹ Therefore in the MDB there is a need for this section of the farming community to move away from agriculture to non-farming enterprises. Prioritizing development of the digital economy in the MDB region will bring e-commerce, e-governance and e-health professionals into the region, thereby increasing the population. This is a key area for future research.

The current trend of the decline in number of farmers and increase in farm size, points to the viability of large scale farming and difficulty of earning a reasonable income through small farms. Small scale farmers will benefit the most from a sustainable economic transition strategy. It is essential for the MDBA to form the necessary institutional linkages to government economic agencies to effect a coherent sustainable transition economy strategy.

**REFORM PROPOSAL 1: INSTITUTIONAL LINKAGES FOR ECONOMIC
TRANSITION**

Institutional linkages are proposed between government organizations connecting water policy and digital economy policy in the MDB as a priority to facilitate e-commerce, e-governance, e-health and e-education. The aim is assist irrigators transition from agriculture to a non-agricultural sector.

⁵³⁰ Barrie Pittock (Ed), *Climate Change: An Australian Guide to the Science and Potential Impacts*, Australian Greenhouse Office, 2003.

⁵³¹ Australian Bureau of Statistics, *Water and the Murray-Darling Basin – A Statistical Profile, 2001-01 to 2005-06*, Commonwealth of Australia, 2014.

7.3.2 CONFLICT RESOLUTION AND NEGOTIATION

Development of the regional economy through information communication technology (ICT: digital economy) will be a long term venture involving a decade or two. In the interim the competition for water between irrigation users and environmental users will persist and lead to conflict. Therefore to manage conflict in the interim period low cost, easily accessible conflict resolution mechanisms are required at the regional level, accompanied by increasingly formal structured conflict resolution mechanisms to manage inter-State and State-Federal conflicts.

The Commonwealth Environmental Water Holder has recognized that local information, support and experience are critical for successful delivery of environmental flows. This cooperation is required to reduce increased salinity, algal blooms, improve native fish and bird populations and recover wetland health.⁵³² Neglecting environmental flows can threaten the very existence of the river system. An ecosystem is regarded as resilient when many species (biodiversity) are present to perform the same ecosystem service function to guard against shocks. Reduced biodiversity removes the buffer necessary to deliver ecosystem services. It has been observed that ecosystems with low resilience generate ongoing ecosystem services until subsequent shocks create irreversible damage, once a critical threshold is reached.⁵³³ Management of environmental flows is a difficult task because of the uncertainty in scientific information. Hence local knowledge is important.

Competition for water between agriculture and the environment, reduces trust and cooperation, particularly when parties are not sensitive to each other's needs. Conflict can sometimes escalate beyond insensitivity. Machiori et. al. (2012) observed with reference to Spanish groundwater, that without proper monitoring and enforcement mechanisms, government water buyback programs could be undermined by unauthorized extractions

⁵³² Department of the Environment, Commonwealth Environmental Water Office, <http://www.environment.gov.au/topic/water/commonwealth-environmental-water-office> (viewed 17-3-2014)

⁵³³ *Supra* note 31.

after sale.⁵³⁴ At the time the MDB Plan law entered into force on 22 November 2012, river monitoring equipment (water level loggers, sensor recording instruments, batteries and solar panels) was stolen from a number of sites in the Menindee Lakes region, New South Wales.⁵³⁵ The New South Wales government articulated their inability to monitor river flows and provide vital information, and appealed for community cooperation to prevent theft. Monitoring continues to be a high priority in the context of ongoing conflict, although subject to budget constraints. The Australian National Audit Office (2013) stated: “*In the absence of a long-term monitoring and evaluation the CEWO has adopted a measured approach to short term ecological monitoring and evaluation that is based on delivery partner monitoring activities and detailed studies at key locations where environmental water has been delivered*”.⁵³⁶

The *Water Act 2007* is characterized by a lack of concrete conflict resolution rules. In this dissertation I have proposed two conflict resolution mechanisms. The first is a structured regional daily operational liberal commons model for management of daily concerns of heterogeneous users to be incorporated in regional resource operation plan laws, to reduce the propensity for conflict. The second conflict resolution mechanism involves a substantial expansion of the no-significant harm rule derived from international customary water law, incorporating cost-benefit analysis rules and compensation rules, to operate at the inter-governmental level.

⁵³⁴ Carmen Marchiori et al., On the Implementation and Performance of Water Rights Buyback Schemes, 2012, *Water Resource Management*, ISSN 0920-4741.

⁵³⁵ Department of Primary Industries, Office of Water, No data due to theft of river gauging equipment, New South Wales Government, Media Release, 22 November 2012.

⁵³⁶ Australian National Audit Office, Commonwealth Environmental Watering Activities 2012-13, Commonwealth of Australia, 2013.

REFORM PROPOSAL 2A:
DAILY OPERATIONAL RULES – LIBERAL COMMONS MODEL

At present the CEWH engages in watering activity with the assistance of “water management authorities, local advisory groups, landholders and scientists”.⁵³⁷ This dissertation proposes a more structured daily operational liberal commons model to secure cooperation and build trust. Heller and Dagan (2001) define the liberal commons to be “a legal regime that enables a limited group of owners to capture the economic and social benefit from cooperative use of a scarce resource, while also ensuring autonomy to individual members who each retain a secure right to exit.”⁵³⁸ Examples include management of condominiums and marital property. It was observed in Chapter Five that Ostrom’s (1990) research demonstrates that heterogeneous users can devise cooperative institutions to address resource use problems. This is highly relevant to the interaction between private irrigators, government environmental water holders, miners, industrialists, indigenous groups and other stakeholders in the MDB. The liberal commons model advocated in this study builds on Ostrom’s eight principle model articulated in Chapter Five, providing an additional right of exit and proposes additional guidance rules for government. The aim of the guidance rules, derived from the qualitative and documentary analysis, is to further build trust and social capital in Basin for regional daily operational consultations within the framework of alternative dispute resolution. As noted in Chapter Six the proposed rules reflect Posner’s signaling model, where government would signal to irrigators its desire to cooperate for mutual benefit. The regional daily operation rules are intended to be included in regional water resource operation plan laws, under State water plan laws.

⁵³⁷ CEWH, Annual Report 2012-13, Department of Sustainability, Environment, Water, Population and Communities, Commonwealth of Australia.

⁵³⁸ Hanoch Dagan and Michael Heller (2001) *Supra* note 467.

REFORM PROPOSAL 2B: MODIFIED THE NO-SIGNIFICANT HARM RULE MODEL

The no significant harm rule pertains to the balancing of social, economic and environmental harms, and was considered in detail in Chapter Two and extended in Chapters Five and Six of this dissertation. The no significant harm rule is one of two key principles contained in international customary water law and is considered for the formal resolution of inter-governmental conflict. Two proposed extensions to the no-significant harm rule were articulated in this research, cost-benefit analysis rules and compensation rules. The research employed qualitative survey analysis of the two proposed extension rules, documentary analysis and international comparative law analysis to devise a set of no-significant harm rules appropriate for the MDB. The literature on the MDB does not explore the importance of the no-significant harm rule, and the international law literature on the rule does not engage in expansion of the rules with reference to cost-benefit analysis and compensation rules, to deliver greater precision and functionality. As noted in Chapter Six the rules articulated provide a basis for inter-state negotiations and Federal-State negotiation where the interests of the two central stakeholders the environment and irrigators are represented. This model sought to address concerns raised by irrigators with reference to institutional bias, valuation methods, and mechanisms to address harm to the rural economy. The no significant harm rule proposed is intended to be included as an amendment to the *Water Act 2007*.

REFORM PROPOSAL 2A: REGIONAL DAILY OPERATION RULES – LIBERAL COMMONS

Regional daily operation rules in a liberal commons framework are proposed to bring the diverse interests of heterogeneous users together in a management organization to reduce the propensity for conflict and build cooperation and trust in the MDB.

REFORM PROPOSAL 2B: MODIFIED NO SIGNIFICANT HARM RULE

A substantial expansion of the no-significant harm rule is proposed, involving cost-benefit analysis rules and compensation rules, to deliver precision and functionality, to address inter-governmental conflict in the MDB.

7.3.3 INTEGRATING NEW INSTITUTIONAL ECONOMICS INTO MDB WATER POLICY

This research advocates inclusion of new institutional economic (NIE) theory in the analysis of water institutions, namely water markets, water law, water policy and water organizations, alongside neo-classical economic analysis.⁵³⁹ NIE applied to sustainable development recognizes that robust institutions are fundamental for sustainable economic growth, while neo-classical economic theory ignores the role of institutions. Three key assumptions of neo-classical economic theory are relaxed in NIE to better reflect reality. Importantly NIE recognizes bounded rationality, the presence of imperfect information and the presence of transaction costs. Analyzing water problems within this framework is essential for developing functional solutions.

It was noted in Chapter Six that in the MDB sustainable development involves reconfiguring property in water toward the environment. Key to understanding the effectiveness of rules and government action for reconfiguration of water toward the environment is the mindset of irrigators and government stakeholders. It was observed in Chapter Six that North (1990, 1992) argues that institutions are molded by “mental capacities and incomplete information”. In this context North (1990, 1992) states that where institutional change is essential to successful reform, it should be recognized that “the mental models of actors ... will shape choices”.⁵⁴⁰ Exploration of the impact of the bounded rationality and limited information flows, on water buybacks and the operation

⁵³⁹ R. Maria Saleth and A. Dinar, *Water Institutional Reform: Theory and Practice*, (2005) 7, *Water Policy*.

⁵⁴⁰ Douglass C. North (1990) *Ibid*; Douglass North, (1992) *Ibid* at 7.

of the *Water Act 2007*, was important for the development of the reform model, alongside documentary and international comparative law analysis.

Reduction of transaction costs are central for the achievement of sustainable development in NIE theory applied to water policy. Chapter Six discussed the articulation in NIE theory of the need for formal and informal institutions to reduce these transaction costs.⁵⁴¹ If water is to be reconfigured to the environment in larger quantities to reach an environmental sustainable recovery target of between 4000 - to 7600 GL per annum, irrigators are then forced to consider alternative livelihoods. This involves very high transaction costs for irrigators. As articulated in Chapter Six these costs include the costs of acquiring information on alternative employment, the costs of re-training, social costs attached to leaving established business, family and friendship networks and the costs of relocation. Hence there is great irrigator community resistance to water buybacks. The government institutional linkage rules proposed in Chapter Six for a sustainable transition economic strategy seek to reduce these transaction costs borne by irrigators who wish to exit irrigated agriculture. This reform facilitates movement of greater volumes of water to the environment to build ecosystem resilience. The two conflict resolution models articulated in detail in Chapter Six are intended to reduce transaction costs attached to conflict. The conflict resolution model proposed in this dissertation is a substantial advancement on the current provisions of the *Water Act 2007*.

⁵⁴¹ Claude Menard and Mary M Shirley, What is New Institutional Economics, in C. Menard and. M Shirley (Eds), *Handbook of New Institutional Economics*, Springer, 2005.

REFORM PROPOSAL 3: APPLICATION OF NEW INSTITUTIONAL ECONOMICS THEORY IN MDB WATER POLICY ALONGSIDE NEO-CLASSICAL ECONOMICS

New Institutional Economics applied to water policy concerns the role of institutions, bounded rationality, imperfect information and transaction costs on sustainable development and is therefore an essential analytical tool for water governance.

7.4 LIMITATIONS OF THE STUDY

It was beyond the scope of this thesis to undertake a detailed investigation of a digital economy transition strategy for various regions of the MDB. It was beyond the scope of this thesis to examine the impact of water buybacks and water law on Indigenous cultural water flows. As the water reform in the MDB is a pioneering work with regard to restoring ecosystem resilience of the entire Murray-Darling River system, it is not possible to compare the level of success of other environmental buyback programs with respect to enhancing ecosystem resilience. The international comparative analysis in this study was limited to comparison of conflict resolution rules and comparison of bounded rationality of Murray-Darling Basin irrigators with the Ise and Sunding's (1998) survey of American irrigators in Nevada, with reference to willingness and unwillingness to participate in water buybacks for the environment.⁵⁴²

⁵⁴² Sabrina Ise and David Sunding, *Reallocating Water from Agriculture to the Environment under a Voluntary Purchase Program*, (1998) 20, *Review of Agricultural Economics*, 221-224.

7.5 DIRECTIONS FOR FUTURE RESEARCH

This research highlighted the importance of a sustainable economic transition strategy for stimulating participation in the government environmental water buyback program. Future research on the prospects for and nature of a digital economy sustainable transition strategy for the MDB is very important.

The no significant harm rule was a further key component of this research. Further research is required to investigate how the trigger points for the determination for social and economic harm will be set, with reference to the economic and social measures identified in Chapter Six, necessary to guide the practice of CBA.

Long term ecosystem resilience requires bioprospecting for low water intensive commercial crops suitable for the MDB, such as medicinal plants to assist irrigators to switch to dryland farming.

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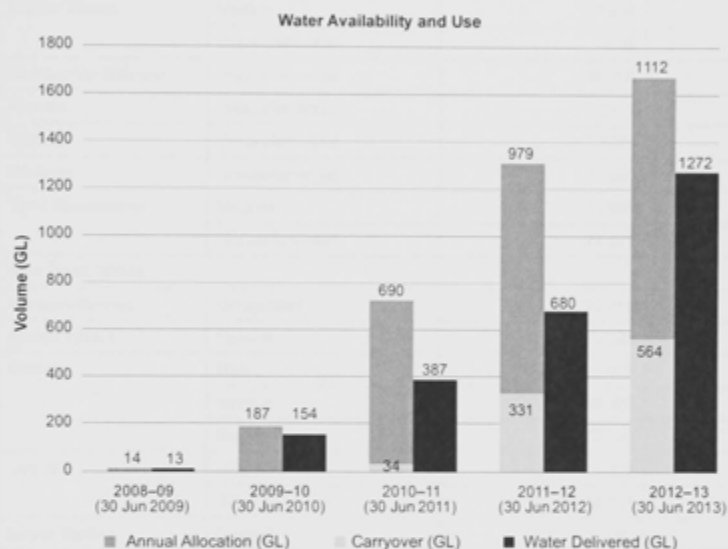
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APPENDIX 1 -PROGRESS OF THE GOVERNMENT WATER BUYBACK PROGRAM FOR ENVIRONMENTAL FLOWS IN THE MURRAY-DARLING BASIN TO JUNE 2013

Figure 1: Commonwealth environmental water availability and use since 2008–09



Note:

Data have been updated since previous annual reports in accordance with revised accounting treatment of some entitlements and water use. Evaporative losses have been deducted from carryover figures.

Catchment summaries

“Drier conditions returned to the Basin in 2012–13⁵⁴³. Commonwealth environmental watering in 2012–13 continued to build on the ecological recovery of riverine and wetland communities following the wetter conditions experienced in Basin catchments from 2010 to early 2012.

Watering actions throughout the Basin in 2012–13 were managed and delivered with the assistance of partners including water management authorities, local advisory groups, landholders and scientists. Commonwealth environmental water was usually delivered in conjunction with state government environmental water.”

Source: Commonwealth Environmental Holder, Annual Report, 2012-13, Commonwealth of Australia, 2013.

⁵⁴³ Bureau of Meteorology Murray–Darling Rainfall Deciles 1 July 2012 – 30 June 2013.

Commonwealth Environmental Water Office holdings in the Murray–Darling Basin

Table A1: Commonwealth Environmental Water Office holdings in the Murray–Darling Basin (at 30 June 2013) (continued)

RIVER SYSTEM	SECURITY/RELIABILITY	REGISTERED ENTITLEMENTS (ML ¹)	LONG-TERM AVERAGE ANNUAL YIELD (ML)
Queensland			
Border Rivers	Medium	11 684	3969
	Unsupplemented	4286	1814
Condamine Balonne	Unsupplemented	46 950	32 437
Moonie	Unsupplemented	1415	1100
Nebine	Unsupplemented	5920	1000
Warrego	Unsupplemented	16 050	8000
Total Queensland	Medium	11 684	3969
	Unsupplemented	74 621	44 351
New South Wales			
Barwon–Darling	Unregulated	22 275	22 275
Border Rivers	General	298	119
Gwydir	High	375	375
	General	89 525	32 229
	Supplementary	19 100	3629
Lachlan	High	933	933
	General	86 923	36 508
Lower Darling	General	492	399
Macquarie/Cudgegong	General	116 110	48 766
	Supplementary	1888	397
Murray	High	8553	8125
	General	318 186	257 731
	Supplementary	56	41
	Groundwater	1141	1141
	Conveyance	1230	964
	Unregulated	30	24
Murrumbidgee	High	4246	4034
	General	200 145	128 093
	Conveyance	8856	8413
	Supplementary	20 820	2915
Namoi (upper)	General	105	81
Namoi (lower)	General	6218	4788

Warrego	Unregulated	17 826	17 826
Total New South Wales	High	14 107	13 467
	General	818 002	508 713
	Conveyance	10 086	9378
	Supplementary	41 864	6981
	Unregulated	40 131	40 125
	Groundwater	1141	1141
Victoria			
Broken	High	117	111
	Low	4	3
Campaspe	High	6547	6219
	Low	395	194
Goulburn	High	205 090	194 792
	Low	11 389	4102
Loddon	High	2775	2636
	Low	527	142
Murray	High	243 534	231 393
	Low	11 765	3002
Ovens	High	70	67
Wimmera-Mallee	High	28 000	22 568
Total Victoria	High	486 133	457 785
	Low	24 081	7444
South Australia			
Murray	High	107 266	96 504
Total South Australia	High	107 266	96 504
Total Murray-Darling Basin			
	High	607 467	567 756
	General/Medium/Low	853 767	520 125
	Conveyance	10 086	9378
	Supplementary	41 864	6981
	Unsupplemented/Unregulated	114 752	84 476
	Groundwater	1141	1141

Notes:

1. One gigalitre equals 1000 megalitres. Some volumes may differ marginally from 30 June 2013 figures posted on the Commonwealth Environmental Water Office website due to accounting adjustments made after 30 June 2013.
2. The volume of water currently in the holdings is less than the volume secured under Water for the Future, which includes water entitlements secured under contract but not yet formally transferred to the Commonwealth.

Source: Commonwealth Environmental Holder, Annual Report, 2012-13, Commonwealth of Australia, 2013.

Additional notes:

3. In Victoria high reliability entitlements deliver only up to 50 percent of the entitlement during drought years and is not equivalent to NSW high security water, which delivered close to 95 percent during the drought years.⁵⁴⁴
4. The government has been unable to secure large quantities of NSW high security water. The majority of entitlements which are general security. During a drought close to zero allocation may be made to such entitlements, and on average 50 to 70 percent allocations have been estimated.⁵⁴⁵
5. Supplementary access entitlements are less reliable, and are waters available during specified high flow flood events, including dam spillages. Actual water recovery against these entitlements during a drought is zero. Unregulated water refers to water in a system yet to be regulated by a physical storage facility.

⁵⁴⁴ Allocation and Trading: Unbundled Water Entitlements, http://www.water.vic.gov.au/allocation/entitlements/irrigation_water_entitlements

⁵⁴⁵ www.waterforrivers.org.au/projects/completed (viewed 5 May 2012)

THE PROGRESS OF THE LIVING MURRAY (TLM) PURCHASE PROGRAM (JUNE 2004 – JUNE 2009)

The Living Murray Program was the first inter-governmental purchase program seeking to restore water to environmental flows in the MDB established in 2002. The program is a partnership between all Murray River State governments, the Australian Capital Territory and the Commonwealth government. Reporting responsibilities were transferred from the MDBC to the MDBA in 2007/08. The first step of the program sought to return 500GL in the five year period, June 2004 to June 2009 to six icon sites: the Barwah-Millewa Forest, Koondrook-Perricoota Forest, Hattah Lakes, Lindsay-Wallpolla, Chowilla Floodplain, and the Lower Lakes.

In June 2009 the Murray-Darling Basin Authority published data on the final total amount of water recovered to the Murray River system under the Living Murray Program. It could be determined from the data that 33 GL of high security water was recovered from South Australia, where all water held is high security. However the remaining water data, failed to transparently provide the water security classification of water entitlements acquired. As noted above the Victorian water (120GL) was entirely general security “paper” water entitlements delivering no water during the drought, recovered through infrastructure projects and not environmental buy-backs. The final total of 342.5 GL of unspecified water security remained well below the target of 500 GL at June 2009, adversely affecting the timing of environmental flows. Achieving the 500GL environmental flow on time at June 2009 was important for building ecosystem resilience.

APPENDIX-2: QUALITATIVE INTERVIEW QUESTIONS

QUESTIONS FOR IRRIGATORS

Irrigator Survey

1. Name _____
2. Address _____
3. Contact details _____

QUESTIONS

Section A: Background

4. What type of farming are you engaged in?
5. What is the size of the farm?
6. Is the business family owned? If not what is the ownership structure of the business?
7. How long have you been farming?
8. Are you happy to continue farming?
9. If you are happy to continue farming is it because:
 - profitable business
 - presence of heir willing to continue farming business
 - family tradition and preferred lifestyle – farm is our family home
 - no significant sources of external income
 - other

10. If you are not happy to continue farming, is it because:

- unprofitable business due to drought or other reason
- lack of heir willing to take up farming
- presence of other income sources and skills
- main residence off farm
- competition is driving prices up, and it will be more profitable to sell water
- other _____

11. Are you engaged in supplying export markets?

Section B: Water entitlements

1. Is your entitlement to surface, ground or floodplain water – all or some?

(a) Surface water; (b) ground water; (c) floodplain water; (d) all or some

2. Are you satisfied with the level of water provision for your farm?*

3. What type of water entitlement do you possess?

-name of licence

-level of security

-perpetual or fixed term? If fixed term what is the length of the term?

-if perpetual, has government confirmed the current legal status of your licence?

-do you support perpetual licences over fixed term?

- how would a fixed term licence affect your production decisions?

- given the drought conditions experienced in recent years, what has been the pattern of allocation to your entitlement for the period 2004-2007

4. Are you planning to increase or decrease water extractions? For what reason?

Section C: Water Sale

1. Are you planning to sell part or all of your entitlement (permanent) to government buyers seeking to improve environmental flows?
2. If the answer is no, are you able to discuss the reasons why?
3. If yes, will the sale be within the state or interstate?
4. Are you planning to sell part of your allocation (temporary) to government buyers seeking to improve environmental flows?
5. If the answer is no, are you able to discuss the reasons why?
6. If yes, will the sale be within the state or interstate?
7. Hypothetical question: If you were to sell either an entitlement or seasonal allocation, and the between the purchase prices offered by government and private buyers are almost the same, which type of buyer would you prefer?
Why?

8. Are you aware of regulation/red tape/other barriers which favour sale of water to either government or private buyers?
9. How much information has government provided on water markets to enable you to make any informed decision of whether to sell?
10. If you have sold water either to government or a private buyer, were you satisfied with the price received?
11. Have you ever purchased water on the market?
If yes, from whom and for what purpose?

Section D: Environmental flows and the Cap

Before asking the following questions, irrigators will be reminded that they do not have to answer all questions.

1. What are your views on government buybacks for environmental flows?
2. How do you perceive environmental flows and the concept of sustainability?
3. Some water experts have expressed the view that water entitlements in the Murray-Darling Basin must be substantially reduced.
Do you agree?
How would you predict substantial reductions would affect your operations?
4. What are your views on the Cap set by the former MDBC?
5. If the Cap is revised under the Water Act 2007 SDL to further reduce extractions, what would be your view of such a development?

Do you have an avenue to express your views to the government institutions responsible for making such decisions on the Cap/SDL?

6. If a reduction in entitlement occurs, what would you expect from government in the form of compensation?

- monetary compensation or
- a land and water relocation (farm/non-farm) package to another part of Australia or
- expect both of the above.

If you would object to any reduction, please provide reasons:

- established lifestyle and relationships (business and personal) in current geographic location
- children's schooling
- other

7. If you would have concerns about reductions in entitlement in any form and required legal representation, are you able to access affordable legal services?

8. What information on your legal rights has been provided to you by government and representative farm organizations?

Reductions in entitlements and receptiveness to use of cost-benefit analysis

9. Cost-Benefit analysis is often used in government decision making. This involves calculating the costs and benefits of each alternative action/policy to acquire the net-benefit of each possible alternative. The alternatives are then ranked according to size of net present value of the net benefit. The alternative deriving the highest net benefit will be the preferred solution.

In light of climate change, which may increase the frequency and severity of droughts, if governments decide to reduce entitlements for securing the long-term health of the basin, would you support the use of cost-benefit analysis in justifying the decisions made?

If no, why not?

If yes why?

Section E: Institutional Support

1. Where issues concerning water entitlements/allocations are confronting your farm business, where do you gain information and support?
2. How often do you talk to government officials about your water entitlements/allocations/use for your farm business?
Alternatively, do you rely on your own farming network organizations?

Section F: Sustainability Policy

1. What are your views on climate change and sustainable farming?

2. Would you support a water policy of non-binding recommendations on the best types of agriculture to undertake in specified geographic locations in the MDB and other parts of Australia for the purpose of achieving sustainability?

If yes, please elaborate

If no, please elaborate

3. Are there any other issues you wish to raise relating to water?

Thank you very much for your time. Your perceptions and views make a very valuable contribution to this research.

QUESTIONS FOR STATE AND FEDERAL GOVERNMENT ORGANIZATIONS

PART II. MARKET ORGANIZATIONS

1. Description of the organization and its relationship to the government

(a) Name of the organization (state or federal)

(b) Address

(c) Date of organization

(d) Type of organization

(e) Purpose

(f) Membership

(g) Capital

(h) Description of the organization's activities and its relationship to the government

Questions for State and Federal Government officials:

STATE:

Name:

Designation:

Department:

PART 1: MARKET BASED GOVERNANCE

Section A: Comprehension and Involvement in Environmental Water Buybacks

1. Is a State Government environmental buy-back program in place?

If no, why not?

2. If yes, how is it progressing against set targets?

3. If progress is slow, what is the cause?

-contractual delays

-drought conditions

-infrastructure delays

-lack of willing sellers

-geographic constraints

-property rights assignment is ambiguous and time is required for clarification

- too much competition bidding up prices above available budget
- other _____

4. Are details of water sales for the environment publicly available?

PART 2: LAW AND LEGAL INSTITUTIONS

Section B: Comprehension of Irrigators Right to Property

1. What proportion of water resources is vested in the State government according to law?
2. What proportion of privately held water access rights is perpetual?

Section C: Comprehension of and views on Water Act 2007

1. What are the State's views on the Federal *Water Act* 2007?

PART 3: GOVERNMENT INSTITUTIONS

Section D: Discussion and Knowledge of Over-allocation

1. Who is responsible for making decisions on allocations each season and how is this decision made?

2. Are there any issues pertaining allocation decision making which cause you concern?

